PREFACE.

WHILST we find books of reference in most departmen[illegible] Science and Literature [illegible] connection with European countries, daily becoming cheap[illegible]r and more abundant, those [illegible]stigate or seek for information regarding the resources of British India, or any of [illegible]tific and economic subjects connected with Eastern countries, still meet with much [illegible]y and hindrance, to the necessity of consulting numerous authors whose [illegible] are scarce or co[illegible]d as some inquirers are without the pecuniary means of [illegible]ring all the rec[illegible] and journ[illegible], or find it impossible to procure them at any [illegible]st, whilst other[illegible] or opportunity for such extensive research, it is evident [illegible]at progress in the[illegible] of knowledge would be greatly facilitated, by collecting nd condensing this widely dispersed information, thereby enabling future inquirers to gain ome acquaintance with the results of the investigations made by the many diligent and aborious individuals, who have devoted a great portion of their time to collecting in- [illegible]rmation over the vast area of Southern Asia.

My avocatio[illegible]mployed in India, more particularly in the past seven years, ave rendered nec[illegible]ne a collection of books of reference relating to India and the ast, somewhat m[illegible]ous and varied in character than private individuals generally ossess; whilst r[illegible]nent as Secretary to the Madras Central Committees for the reat Exhibition[illegible]he Madras Exhibition of 1855, the Universal Exhibition held Paris in 1855, and the Madras Exhibition of 1857, combined with my duties (since 851), as the Officer in charge of the Government Central Museum, have brought un- er my notice a rare variety of Eastern products and subjects of interest; and thinking [illegible]ore quitting the countries in which I have dwelt for nearly a quarter of [illegible]ury, I might with advantage leave to my successors in a portable form, the [illegible] on the p[illegible] of the East that have come under my notice, combined

with an abstract of the useful information respecting them contained in my books, I h been led to show the results in the present shape.

A work of this aim and character might doubtless fully occupy the life-tim of several men of varied attainments; and this *Cyclopædia of India and of Eastern and Southern Asia*, may therefore be regarded only as a first attempt towards the kind of boo the want of which has been long and generally felt. But although fully conscious o its incompleteness in many respects, yet, I trust it may still be received with all imper fections and omissions as a useful and opportune addition to Asiatic Literatur; at least by those who recognise the justness of the saying of Emmerson, that "the thing "done avails, and not what is said about it: and that an original sentence, or a step for "ward, is worth more than all the censures"* which may be made by such as are disposed to find fault, or who would demand in a work of this kind, a degree of perfection unattainable on a first trial.

The book is merely a novelty in form, the matter it contains being as old as our first possessions in India: it is simply a compilation of the facts and scientific knowledge, which authors and inquirers have been amassing and communicating since the to one another and the public. But, "in our time, the higher walks of literature have been so long and so often trodden, that whatever any individual may undertake, it is scarcely possible to keep out of the footsteps of some of his precursors"†; and this Cyclopædia, I may therefore avow to be but an endeavour to make generally available, in a condensed form the information acquired by those who have in any way investigated the natural or manufactured products of Southern Asia, or have at any time made its arts or natural history subjects of inquiry. Some of those whose writings I have made use of, have long since gone to their account, but many a labourer yet alive may find the result of his labour embodied here; and I have done this freely, because even those from whose writings I have most largely drawn, will acknowledge that the quaint old lines of Chaucer‡ still apply with full force; viz. that,

"Out of the old fields, as men sayeth,
Cometh all this new corn fro' yeare to yeare:
So out of old books, in good faith,
Cometh all this new Science that men lere."

Indeed, I have rather sought to collect and condense accurate and well ascertained facts, than to present novelties; for originality is but too often unconscious or undetected

* English Traits, p. 5. † Salad for the Social, page 317. ‡ Ibid. page 321.

years ago remarked, that all pretensions to it are ridiculous ; and a has told us, that 'there is nothing new under the sun.' But if there new in this work, I hope it may yet be found to contain much which unknown before ; and which want of books, leisure, or opportunity, may have arred them from learning.

The Cyclopædia is not intended to comprise the whole science of Botany, nor that of Medicine, or Zoology ; nor to instruct in all the matters useful in Commerce or the Arts ; but, whether examined for information or amusement, the botanist, the medical practitioner, the naturalist, and the merchant, may perhaps each find something in t, which, from his engagements, he did not know before, or though once knowing e may have again forgotten. In both cases, the work may prove useful, since old houghts are often like old clothes ; put away for a time, they become apparently ew by brushing up. It would have been better perhaps, had a work of this kind een undertaken years ago, or even now were it made the joint effort of several persons : ndeed, to render it in any way complete, would call for the resources at the command of Government rather than of individuals ; but we cannot have every thing at the time we ish, nor in the way we wish, and it is better to have some one undertake it and do it he best way he c *now*, than to postpone it to some further indefinite period.

With a view therefore of laying a foundation as a starting point for future inquirers now make the commencement of a work, towards which I hope to receive from ny quarters aid and support as I proceed : being thereby enabled either to produce future arged and improved editions of the work myself,—placing it, as I hope, within the each of all,—or seeing that task taken up hereafter, by younger men, with more time nd opportunity than are now before me. A dinner of fragments is often said to be he best dinner ; and in the same way, there are few minds but might furnish some nstruction and entertainment, from their scraps, or odds and ends of knowledge. Those ho cannot weave a uniform web, may at least produce a piece of patchwork* ; and ny items of information sent to me will be very acceptable.

There is another difficulty which inquirers in this country have had to meet and ruggle with ; I allude to the many languages and dialects in use in India and Eastern

* Guesses at Truth.

Asia, and consequently the variety of scientific, national, or even local names, by wh same thing is known. The only means of overcoming this difficulty was to frame a co ous Index of contents; for Pope has well said that

> "Index Learning turns no student pale,
> Yet holds the eel of Science by the tail."

This Indexing will add to the bulk of the book, but greatly also to its value a work of reference; and will be carefully completed.

CYCLOPÆDIA OF INDIA AND EASTERN ASIA,

Commercial, Industrial, and Scientific,

PRODUCTS OF THE

MINERAL, VEGETABLE AND ANIMAL KINGDOMS, USEFUL ARTS AND MANUFACTURES.

(1) ABACA BRAVA, the wild abaca, the name given by the natives of the Philippine Islands, to a variety of the Manilla Hemp, Musa textilis, called Agotai by the Bicoles.—*Royle, Fib. Plants. p.* 65.

(2) ABACA, MOUNTAIN, a variety of the Manilla Hemp Plant, Musa textilis, the fibres of which only serve for making ropes, called *Agotag* and *Amoquid* in the Bicol language.—*Royle, Fib. Plants., p.* 65.

(3) ABEER OR RANDA, a grateful perfumed powder, rubbed on the face or body, or sprinkled on clothes to scent them: one kind is composed of rice flour, or the powdered bark of the mango tree or deodar, camphor and aniseed. A superior kind is prepared from powdered sandalwood or wood aloes, Curcuma zerumbet (Kuchoor), or Curcuma zedoaria (ambi huldee), rose flowers, camphor, and civet cat perfume, pounded, sifted and mixed.—*Herklots.*

(4) ABELMOSCHUS ESCULENTUS.

Esculent Okra, ENG.	Benda, TEL.
Vendah, MAL.	Bhendie, DUK.
Vendee, TAM.	Ramturay or Dhenroos, BENG.

An annual herbaceous plant; generally cultivated in gardens in India. Abelmoschus esculentus, Wight and Arnott, (H. esculentus, L.) according to Roxburgh, is a distinct species from the *Abelmoschus longifolius*, Wall. (Hibiscus, Roxb.) and a native of tropical America. It is possible they may be one and the same plant, as they are considered by Wight and Arnott. Dr. Roxburgh says that he never found this plant wild, and that it is much cultivated throughout India. The other sort (A. esculentus) is a native of the West Indies. Dr. Roxburgh's admirable description of this plant is as follows:—"This is one of the best, if not the best, of the esculent herbs of India; the plant is easily raised from seed, and produces abundance of fruit, the only part which is eaten. The whole plant, particularly the capsules, is replete with much mild mucilage, which I consider as highly nourishing as well as mucilaginous, and might no doubt be employed to advantage in all diseases requiring emollients and demulcents. Some tender branches placed in water for examination soon rendered it gelatinous, almost as much so as if the branches of *Pedalium murex* had been standing in it. Dr. Cullen observes that coughing is often caused by acrid vapour rising from the lungs, irritating the glottis and its neighbourhood; that by besmearing these parts with demulcent matter, we often lessen the irritation and frequency of coughing. A mild, palatable, culinary preparation of the very young capsules of this plant, would, I think, stand as fair a chance to answer this intention as any thing I know, and at the same time prove a nourishing part of the diet." "The stigmas are replete with a very beautiful deep purple juice, which they communicate to paper, and which is tolerably durable. "*H. esculentus*, the West India *Okra*, possesses virtues nearly similar, though I believe inferior; this I have also cultivated for many years in the Botanic Garden, and it differs from this very conspicuously, both in the shape of the leaves and capsules."—*Roxb. Fl. Ind.* iii. p. 210. Without exactly admitting the correctness of Dr. Cullen's views as to the cause of the irritation of the glottis, experience amply shews the value of the practice recommended by that able physician; below will be found a formula for the preparation of a *demulcent lozenge*, which has been devised in the hope of meeting the object Roxburgh points out. O'Shaughnessy recommends this lozenge strongly as a very pleasant nutritive and soothing preparation.—*O'Shaughnessy page* 215-217. This plant though indigenous to the West Indies, has long been naturalized in India. It produces the well-known vegetable, the Bendikai, which is so much esteemed for imparting a mucilaginous thickening to soups. The young

pods are gathered green and pickled like capers. The seeds may be boiled like barley, and the mucilage which they contain is both emollient and demulcent. Its leaves are used for poultices. The plant yields a long silky fibre, strong and pliant, and well suited for the manufacture of ropes, string, gunny-bags and paper. The fibres are exported to a slight extent from this country, as hemp, to which they bear a considerable resemblance. A bundle of them tested by Dr. Roxburgh bore a weight of 79 lbs. when dry, and 95 lbs. when wet. In the Juries' Reports of the Madras Exhibition it is stated that there is a great consumption of them in the Madras Presidency, chiefly for rope and gunny-bags. In the year 1853-54 there was exported 6,112 cwt., valued at 27,113 Rs. Samples of these fibres were exhibited from a number of districts, but nearly all of them were discolored and their strength much impaired from steeping. They retain their gloss even when very brown and rotten.—*Roxb. Royle. Jury Rep. Mad. Exhib, &c. quoted in Useful Plants.* The lozenge above alluded to, is made of arrow root one ounce, white sugar one pound, abelmoschus mucilage concentrated to one-third, and strained, as much as required to form a mass, to be divided into lozenges and dried. These make a good demulcent in irritating coughs.—*Beng. Phar. p.* 434.

(5) ABELMOSCHUS FICULNEUS, Vendee Fibre, promises to yield a useful fibre for gunny bags and paper. The bark contains a large proportion of white reticulated fibre similar to that obtained from the Mulberry. It grows abundantly on the black cotton soils of India. At the Madras Exhibition of 1855, Mr. Jaffrey exhibited a very good clean sample of this fibre, of great length, but not very strong.—*Madras Exhibition Juries' Reports.*

(6) ABELMOSCHUS MOSCHATUS (*Moench.*) Nat. Ord. MALVACEÆ: MONADELPHIA POLYANDRA. *Sex. Syst.*

Musk-Mallow, ENG.	Kalee-kustoorie, DUK.
Caat-kustoorie, MAL.	Mooshk-dana, HIND.
Vettilei-kustoorie, TAM.	

An annual herbaceous plant, a native of the East Indies and of South America, and its seeds, the *Hubb-ool-mushk*, are to be found in all the bazaars, being in much esteem for their cordial, stomachic and antispasmodic virtues. Reduced to powder, the Arabs use them as an adjunct to coffee to which they impart an aroma. The seeds are brown, kidney shaped, the size of hemp seed, slightly compressed, striated with parallel streaks. In smell and taste, these seeds resemble a mixture of musk and amber, and on burning, a similar odour is evolved. This plant abounds in mucilage, and is said to be used in Upper India to clarify sugar. The seeds are also used as a substitute for animal musk in scenting powders and pomatums. The bruised seeds have been given with the best effe in counteracting bites of venomous reptiles, being applied both internally and externally. In the West Indies they are reduced to powder, steeped in rum, and in this state are considered most efficacious in snake bites. A strong fibre is also produced from this plant. Dr. Roxburgh cut the stems while in flower and immediately steeped them in water. According to his experiments, on the relative strength of Indian fibres, these broke at an average weight of 107 lbs. both when dry and wet.—*O'Shaughnessy; Madras Exhibition Juries' Reports: Useful Plants.*

(7) ABELMOSCHUS TETRAPHYLLA. At the Madras Exhibition of 1857, Mr. Jaffrey exhibited an excellent, white and strong fibre, obtained from this plant: flowers large, yellow, with a dark centre, abundant in Girgaum woods, Bombay. Wight in his Icones, 951, figures the A. angulosus.

(8) ABKARRY. Revenue derived in India from duties levied on the manufacture and sale of inebriating liquors, as toddy, pachwai, and arrack; also on intoxicating drugs, whether in substance, infusion or extract, as opium, bhang, churrus: also on certain licensed distilleries, and on shops licensed to sell by retail.—*Wilson.*

(9) ABROMA AUGUSTA, (*Linn.*) Nat. Ord. BYTTNERIACEÆ. MONADELPHIA DECANDRIA. *Sex: Syst:* Oolut-kumbul, BENG. Abroma Augusta, the Woollut Comal or Ullut Comal of Bengal, is a plant of the family of Byttneriaceæ and called by Dr. Roxburgh, Perennial Indian hemp or flax. It grows as a native of various parts of India, and as far east as the Philippines, and might be profitably cultivated as a cordage material, as the bark abounds in white fibre. It is a small tree or shrub with soft velvetty branches and drooping purple flowers, and grows so rapidly as to yield annually, two, three, or even four profitable cuttings, fit for peeling. On this account, and on account of the beauty, strength, and fineness of its fibres, it is deserving of more than common attention. The produce is said to be three times greater and one tenth stronger than that of Sunn. It is a perennial plant, but can be cultivated as an annual. If maceration be employed, its continuance must be guided by the heat of the weather. The plant succeeds well in all parts of India. Dr. Roxburgh called especial attention to it, inasmuch as it was more easy of cultivation than Sunn (Crotalaria juncea). To prepare the fibre, the bark is steeped in water for about a week, beyond which they require no further cleaning, and in this state, without any subsequent preparation they are not liable to become weakened through exposure to wet. A cord made from these fibres bore a weight of 74 lbs. while that of Sunn only 68 lbs.—*Royle. Riddell. Cyclopedia of Natural History. Useful Plants.*

(10) ABRUS PRECATORIUS (*Linn.*) Nat. Ord. LEGUMINOSÆ. MONADELPHIA ENNEANDRIA. *Sex. Syst.*

Wild Liquorice, ENG.	Ghoorieghenza, TEL.
Koonee, MAL.	Guncha, HIND.
Coondamunnie, TAM.	Sweta, Koonch, BENG.

A native of India, and thence spread into Africa and America. Of this creeper there are several varieties, with seeds, scarlet, black, and white. Those of a bright scarlet colour, with a jet black spot at the top, are used by the jewellers and druggists as weights, also for beads and rosaries, whence the specific name. From their extreme hardness and pretty appearance, people prize them for necklaces and other ornaments. They are said to be innocuous if swallowed whole, but dangerous in a powdered state. On the latter point, however, there must be some mistake, as they form an article of food in Egypt, though considered hard and indigestible. They are occasionally employed in external applications in ophthalmia. They are reduced to a fine powder by the goldsmiths, who use them in this state to increase adhesion in the more delicate parts of manufactured ornaments. In Hindoostan they are known as the Retti weights. The roots abound in sugar and are employed as a substitute for liquorice, for which they are a perfect substitute, in every respect. The leaves have a similar taste, and, mixed with honey, are applied externally in swellings of the body. Horsfield says that in Java the root is considered demulcent, and the mucilage is there combined with some bitter, while Lunan states that in Jamaica the leaves are used instead of tea. It is a popular belief that they almost "uniformly weigh exactly one grain, troy;" but they vary from one to two grains. The Burmese use them within a fraction for two grain weights. One hundred and twenty, by one mode of reckoning, and one hundred and twenty-eight by another, make one tickal, which weighs, according to Captain Low, 253·75 grains troy.—*Riddell. Useful Plants. Mason. O'Shaughnessy.* Wight in his Icones, 33, figures A. fruticulosus.

(11) ABUTILON. A genus of plants belonging to the natural order *Malvaceæ*. The genus contains about eighty species; three of which A. tomentosum: A. polyandrum and A. indicum, yield a fibrous material. That of the two last is known as *Toothee*, the fibre being long and silky, resembling hemp.

(12) ABUTILON INDICUM.

Country Mallow, ENG.	Nugoo-benda, TEL.
Payrin-toothee, MAL.	Petaree, BENG.
Perin-toottie, TAM.	

A small plant 2-3 feet, common in most parts of India, and cultivated in Burmah. It yields a rather strong fibre fit for the manufacture of ropes. The leaves contain a great deal of mucilage, and on that account are used in the same manner, in India and Burmah, as the marsh mallows in Europe. A decoction of them is used by European and Native practitioners as an emollient fomentation, and an infusion of the root is given as a cooling drink in fevers, Wight remarks that there is no character of any importance to separate this species from the A. asiaticum.—*Useful Plants. Mason.*

(13) ABUTILON POLYANDRUM.

Grows on the Neilgherries and Nundidroog; yields a long silky fibre, resembling hemp, fit for the manufacture of ropes, samples of which, as well as of that of the A. tomentosum, were submitted by Mr. Jaffrey to the Madras Exhibition, though those of the latter were not considered of a superior quality.—*Jur. Rep. Mad. Ex. Useful Plants.*

(14) ABUTILON TOMENTOSUM, or Toothee; some small indifferent specimens of fibre from this, were exhibited from two or three districts at the Madras Exhibition of 1855.—*Madras Exhibition Juries' Reports.* Wight also figures 68, A: crispum.

(15) ABWAB. Heads or subjects of taxation: miscellaneous cesses, imposts and charges.—*Wilson.*

(16) ACACIA. A very extensive genus of trees, inhabiting the tropical parts both of the Old and New Worlds, and over all Australia. There are nearly 300 species.—*Eng. Cyc.*

(17) ACACIA AMARA. Woonja marum. வேம்பு. *Mimoseæ*, Roxb. c. 122. A tolerably large tree, but of rather low stature, the wood dark coloured and hard. Dr. Wight had not an opportunity of properly examining it.—*Wight.*

(18) ACACIA ARABICA (*Willd.*) Nat. Ord. LEGUMINOSÆ. POLYGAMIA MONŒCIA. *Sex. Syst.*

Kurroo-vaylum, MAL.	Kalee-kekur, DUK.
Karoo-velum, TAM.	Babul, BENG: HIND:
Nulla-tooma, TEL.	

The tree is found in every district of India, and is worthy of cultivation on account of its gum, timber, and its seeds, a favourite food of sheep, &c. It is of rapid growth, and requires no water, flourishing in dry arid plains, and especially in black cotton soil, where other trees are rarely met with. Like several others of the same genus, it yields abundance of transparent gum, which is used in India as a substitute for the real gum Arabic, the latter being the produce of the A. vera. The gum is procured by making incisions in the bark, and the sap running out, hardens in lumps of different sizes and figures. The bark itself is used medicinally as a tonic and astringent; in decoction it is employed as a wash for ulcers; and finely powdered and mixed with gingely oil, externally, in cancerous affections. Mixed with the seeds of Sesamum orientale, after the oil has been expressed, it is an article of food with natives. A decoction of the bark makes a good substitute for soap, and is used in dyeing various shades of brown. According to Dr. Buchanan, moreover, it is employed in Mysore in the process of distilling rum. The leaves burnt and mixed with cocoanut-oil are applied externally in cases of itch. The

bark is extensively employed in tanning, and, under proper management, makes a good leather, imparting a reddish tinge. In native hands the leather is often porous, brittle and ill coloured. It is a very hard, tough wood and is extensively used, but can seldom be obtained of large size, and is generally very crooked. It is used for plough shares, naves of wheels, knees and ribs of country ships &c., and generally for all purposes, for which a bent hard wood is required. It makes excellent tent pegs. Although in great demand for ships, it does not last above 16 years, when so applied. It is common in the Dekhan and Pegu, thrives equally well in black or red soil, growing rapidly and requiring no water; the flowers are yellow and the tree on the whole ornamental. Another species of Acacia is mentioned by Dr. Riddell as found in the Dekhan, called *Ramkanta*, which grows tall and erect with a cypress like appearance, and differs in form and the colour of its legumes from the Arabica: it is extremely ornamental, but the natives have an objection to the tree from some superstitious motive, an ill omen being attached to it; the wood is hard, and used for cart-wheels, ploughs, &c.—*Riddell. Reports of Juries, M. E. Useful Plants. Mason. Rohde.*

(19) ACACIA CATECHU *(Willd.)* Nat. Ord. LEGUMINOSÆ. POLYGAMIA MONÆCIA, *Sex. Syst.*

Wodalay or Wothalay, TAM. | Kheir, HIND.
Podeelmaun, TEL. | Khaira, BENG.

This tree grows in Malabar and various parts of India, Burmah, Tenasserim &c., but more frequently in the Dekhan and the Carnatic. It is a small tree, and, though considered less hard and durable than other Acacias, it furnishes nevertheless, large and plentiful timber. It is found in great quantities in the forests of the Prome and Tharawaddy districts, as well as on the Shan side above Tounghoo, and is described by McClelland as affording a red wood, adapted to cabinet making. The substance, formerly known as Terra Japonica, was generally supposed to be yielded by this tree. It is now better understood as one of the kinds of catechu prepared in India—the word being derived from *cate* a tree, and *chu* juice. It is extracted from the unripe pods and old high-coloured wood, and the mode of preparation in some of the Northern parts of India is minutely described by Dr. Royle. The chips of the inner wood are put into an earthen pot over the fire; they are then boiled, and the clean liquor is strained off; when of sufficient consistence, they are poured into clay moulds. This is usually of a pale red colour, and in quadrangular pieces. Ainslie states that it is used in Berar in the process of dyeing chintz and other cloths. It is occasionally mixed with plaster to increase its adhesion, and is, also, in conjunction with certain oils, applied to beams to preserve them against the white ants. The most celebrated catechu is that obtained from Pegu, and this brings £4 or 5 a ton more than other astringent extracts. Catechu contains a greater proportion of tannin than other astringent substances, and it has been found that 1 lb. of this is equal to 7 or 8 lbs. of oak bark for tanning purposes. The manufactured article is brought down in considerable quantities from Berar and Nepaul, and thence to Calcutta, from whence it is exported to Europe. Other kinds of catechu are prepared in India, the commonest of which is that from the nut of the Areca palm. It is much used as a medicinal astringent substance, and forms a good leather of a red or orange colour.—*McClelland. Riddell. Useful Plants. Juries' Reports M. E.*

(20) ACACIA CONCINNA *(Willd.)* Nat. Ord. LEGUMINOSÆ. POLYGAMIA MONÆCIA, *Sex. Syst.*

Chikai, TEL. Reeta, BENG.

A climbing shrub growing in Bengal and Assam. A considerable trade is carried on in some parts of India in the pods of this shrub, which resemble the soap-nut in taste, and are used like it, for washing the head. They are also employed by the Hindoos for marking the forehead. The leaves are acid, and are used in cookery instead of tamarinds.—*Roxb. Nimmo, &c. quoted in Useful Plants.*

(21) ACACIA DEALBATA, a handsome tree, from fifteen to thirty feet high, most abundant in Port Philip and Twofold Bay, forming luxuriant groves on the banks of streams, between the parallels of latitude 34 and 30 degrees. Its bark contains a greater per centage of tannin than any other, and pays to ship to England.—*Simmonds.*

(22) ACACIA ELATA. Seet, BURMESE.

Plentiful in the Pegu, Tounghoo and Prome districts; timber straight, lengthy, and of large girth; wood red, adapted to cabinet making.—*McClelland.*

(23) ACACIA FARNESIANA *(Willd.)* Nat. Ord. LEGUMINOSÆ. POLYGAMIA MONÆCIA, *Sex. Syst.*

Gooya-babula, BENG. | Vaday-vullie-marum, TAM.
Kustoori, TEL. |

This is a large shrub or small tree armed with thorns, growing in Bengal, Assam, and the Peninsula of India. It exudes a considerable quantity of useful gum. Roxburgh says it is a native of every part of India. The wood is very hard and tough, and is much used for ship-knees, tent-pegs and similar work. The flowers, distilled, yield a delicious perfume.—*W. & A. Roxb. &c. quoted in Useful Plants.*

(24) ACACIA FERRUGINEA *(Willd.)* Nat. Ord. LEGUMINOSÆ. POLYGAMIA MONÆCIA, *Sex. Syst.*

Vulvaylum, TAM. Woanee, TEL.

A tree, 20-25 feet, armed with conical stipulary spines growing on the Coromandel coast, Courtallum and N. Circars. The bark steeped in jaggery water is distilled as an intoxicating liquor. It is very astringent. A decoction of the same, in conjunction with ginger and other ingredients, is frequently employed as an astringent wash for

the teeth *Ainslie. Lindl. &c. quoted in Useful Plants.*—Wight, also, figures, 1157, A, latronum.

(25) ACACIA LEUCOPHLÆA *(Willd.)* Nat. Ord. LEGUMINOSÆ. POLYGAMIA MONÆCIA, *Sex. Syst.*

Kekur, HIND. | Tella-tooma, TEL.
Velvaylum, TAM. |

Produces a good dark coloured wood, but generally small. The specific name is given from the pale yellowish colour of the bark, which is used in Madras as one of the ingredients in distilling arrack. This Acacia is easily distinguished by its panicled globular inflorescence and stipulary thorns. It grows in the Dekhan and in the woods and hills of the Coromandel Coast. A fibre is also prepared from the bark by maceration, after four or five days beating. It is used for large fishing nets and coarse kinds of cordage, being tough and strong. *Rep. M. E. Useful Plants. Wight. Rohde.*

(26) ACACIA MYRIOPHYLLA *(Grah.)*

A small tree, growing to the height of 12 feet, in Silhet. With the bark of this tree the mountaineers make an intoxicating liquor, which they drink, as we do beer.—*Useful Plants.*

(27) ACACIA ODORATISSIMA *(Willd.)*

Karinthakara, MAL. | Curroovaynghay, TAM.
Shinduga, TEL. |

A tree in height from 30-40 feet, growing in Malabar, Coromandel, and the Tenasserim Provinces. It furnishes a strong, hard, and heavy wood of rapid growth, attaining considerable size, about 1 foot square beams, and well suited for naves and felloes of wheels. The tree is abundant, and grows in almost any soil.. The grain is ornamental but rather open. Its timber is well suited for certain purposes of the house carpenter and for cartwrights and coach builders; it attains a considerable size and is of rapid growth, and its value for the general purposes of carpentery is not sufficiently known. The wood is said to turn nearly black in the course of time. *Mason. Juries' Reports. Jaffrey.*

(28) ACACIA ROBUSTA, the large Australian or Cape Acacia, is now growing freely on the Neilgherry Hills. At the Madras Exhibition of 1857, Mr. McIvor exhibited specimens of bast, from this tree, strong, very tough and durable, also pliable when wetted. In January 1856, Mr. McIvor first commenced employing this bast but it has since then been constantly made use of, for all the purposes to which Russian bast is put in gardens in Europe. This bast could be procured cheaply and in large quantities, as the trees when cut down throw up numerous young shoots, to the height of from six to twelve feet in one year. The bark of the tree is also a powerful tanning material.—*Madras Exhibition of* 1857.

(29). ACACIA RUGATA. SOAP ACACIA. The dry pods of this species of acacia are sold in the bazars of the Tenasserim Provinces, and are used as a substitute for soap in cleansing the hair. Turmeric and the leaves of the Soap Acacia afford a beautiful green dye.—*Mason.*

(30) ACACIA SASSA. *Syn.* A. gummifera. Mimosa gummif. οποχαλπασον: *Talleh* of the Arabs of the desert. A native of Africa near Mogadore, also of the Island of Bourbon; the trunk is very large and lofty, and affords the gum opocalpasum, the Abyssinian myrrh of Bruce. Dr. O'Shaughnessy states that it also produces the Bussorah gum of commerce, which may be substituted in medicine for Gum Tragacanth. —*O'Shaughnessy page* 301.

(31.) ACACIA SENEGAL. *Syn.* Mimosa Senegalensis. Trunk 15 to 20 feet in height; this affords the Senegal gum of commerce; it does not differ essentially from that of A: vera. —*O'Shaughnessy p.* 301.

(32) ACACIA SERISSA.

Dirisana, TEL. Seet, BURMESE.

Found throughout the Tenasserim provinces and India: timber large and plentiful, particularly in the Tounghoo district,—wood red, adapted to cabinet making and ship building. Mason describes it as a large tree, and its wood as "dark coloured, and very hard." It yields a large quantity of a clear gum, known in Southern India as the "dirasana" gum which closely resembles that from the Vachelia farnesiana.—*McClelland. Jaffrey. Madras Exh: Jur: Reports.*

(33) ACACIA SPECIOSA OR FLEXUOSA.

Velvaynghay, TAM. | Sirisha, BENG.
Dirisana, TEL. |

Grows in Travancore, and Coromandel. It is a tree of rapid growth and attaining a large size, with flowers white, very fragrant; supposed to be identical with the *A. sirissa,* which is extensively planted along the Ganges canal. Its large head affords a good shade. The timber is very durable, hard and close-grained, and is employed in making furniture, in ship building &c. It is of a light colour, and well adapted for frames for pictures and similar work. This tree yields a considerable quantity of gum, which is valuable for many ordinary purposes. It is something like gum Arabic. *Juries' Reports, M. E. Useful Plants. Wight.*

(34) ACACIA STIPULATA. *(D. C.)*

Amlooki, BENG.

The unarmed Acacia, flowers of a pink colour: grows in Travancore, Courtallum, Bengal, and Tenasserim Provinces. This is one of the largest trees of the genus Acacia. The timber is close-grained and strong. It is a native of the mountains north of Bengal, but is to be met with in most parts of the Peninsula. Under the Burmese name of "Seet," it furnishes a large heavy timber, and is found throughout the forests from Rangoon to Tounghoo,—wood red, adapted to cabinet making, furniture and other purposes.—*McClelland. Useful Plants.*

(35) ACACIA SUNDRA.

Carangally, TAM. | Sundra, TEL.

A very hard, heavy and durable wood, used

for posts and rice pestles. The tree is rather large and abundant, but the wood is not generally to be obtained in the market in planks of any size, although Mr. Rohde mentions he has obtained planks one foot broad. At Guntoor, Mr. Rohde states that posts, 5 feet long, are procurable, at 12 Rs. per 100; these are well suited for fencing, though the non-elastic nature of the wood is unfavorable to the holding of nails driven into it. The natives regard it as the most durable wood for posts in house building. A one inch bar sustained a weight of 500lbs. A resin similar to that yielded by the A. catechu is procured from this tree; in fact the two species are very nearly alike: the uncertainty of the prickles absent or present, even on the same tree, is a distinguishing characteristic of this one. Its bark has been tried but found of no value for tanning purposes.—*Juries' Reports. Useful Plants. Rhode, Wight.*

(36) ACACIA VERA. *Syn.* A. nilotica. Mimosa nilotica. Αχανθος αιγυπτιχη. This tree affords two products, one natural, the other artificial, namely the acacia juice and gum arabic. The Acacia juice, (Akakia of Dioscorides and Eastern writers), is a solid, heavy, shining, brittle, dark coloured substance, inodorous, insipid at first, flavour astringent, powder brown, soluble in water which it colours red. Dioscorides, and before him Hippocrates, have described and highly lauded the properties of this juice. It is obtained by pounding the unripe fruit, and expressing the juice; this is thickened before the sun, and then placed in bladders in which drying gradually takes place. The little bladders of akakia found in Europe contain about 5 or 6 ounces each; it is sold in the bazars of Bengal in thin, very black cakes, about the size of a rupee—*O'Shaughnessy pp* 299,300.

Gum Arabic. Vern Kapitha, *Sans.* Kavit goond. *Duk.* Sumug Arabee, *Arab.* Gum is consumed in immense quantities by dyers and glaziers, and enters into a great number of pharmaceutical preparations. Its nutritive qualities admit of no rational doubt, although M. Majendie denies that it can support life, chiefly because it contains no nitrogen; its composition being carbon 13, hydrogen 12, oxygen 12 equivalents. The natives of the countries along the banks of the Niger, the Moors of the interior of Africa, the Negro gum collectors of the forests of the Gambia, as well as some tribes of Bedouins, subsist almost exclusively on this principle. Gum exudes spontaneously, or its afflux is promoted by incisions in the bark. The *Acacia vera* is the only tree of the African desert, and its leaves yield the camel the sole forage it can meet in those arid regions.—*O'Sh. page* 300.

(37) ACALPHYA BETULINA. Nat. Ord. EUPHORBIACEÆ. MONÆCIA MONADELPHIA. *Sex. Syst.* Chunnie marum, TAM.

Wood to be obtained about 18 inches in diameter; hard and heavy; not of much value to carpenters.—*Wight.*

(38) ACALYPHA INDICA (*Linn.*) *Sex*: *Syst*:

Kooppamaynie, MAL. Cupameni, TAM. TEL. Kooppie, DUK. | Mookto-joori, Shwet Busunda, Moorkanta, BENG.

A small annual, common every where in the Peninsula and Bengal. This plant, is easily distinguished by the singular cup-shaped involucre which surrounds the flowers. The root bruised in hot water is employed as a cathartic, and the leaves as a laxative, in decoction; mixed with common salt the latter are applied externally in scabies. The powder of the dry leaves is given to children, in worm cases: as is also a decoction of them, with the addition of a little garlic. The juice of the same part of the plant, together with that of the tender shoots, is occasionally mixed with a small portion of margosa oil, and rubbed on the tongues of infants for the purpose of sickening them, and clearing their stomachs of viscid phlegm. The Hakeems prescribe it in consumption.—*Useful Plants. Honigberger, O'Shaughnessy, page* 562. Wight also figures A. mappa.

(39) ACANTHUS ILLICIFOLIUS. HOLLY LEAVED ACANTHUS. Every muddy bank in the Tenasserim Provinces is relieved by crowds of a handsome blue flowered plant with leaves like a holly, and hence called the holly-leaved Acanthus. The Burmans say its roots are a cure for the bites of poisonous snakes.—*Mason.*

(40) ACARUS FARINÆ, or meal mite, occurs, though rarely, in flour, and is never present unless when damaged: Any flour, therefore, containing this insect, is in a state unfit for consumption. It is believed to be of more frequent occurrence in the flour of the leguminosæ than of the gramina—*Hassall.*

(41) ACER CAUDATUM (Wallich), the LONG-POINTED MAPLE. It is a native of the highest regions of Nepaul, of Sirmoor, Kumaon, and Srinaghur.—*Eng. Cyc.*

(42) ACER CULTRATUM (Wallich), the CURVE-KEYED MAPLE, is a large tree, native of the regions towards the Himalayas, in Kumaon and Srinaghur.—*Eng. Cyc.*

(43) ACER LÆVIGATUM (Wallich), the POLISHED MAPLE. Leaves oblong, taper-pointed, slightly serrated, shining, green beneath. Flowers white. It is found in the woods of the higher mountains of Nepaul, and also in the Alps of Sirmoor, where it acquires a trunk thirty or forty feet high and from three to four feet thick. Its growth is slow; its timber is said by Dr. Wallich to be used by the inhabitants of Nepaul for rafters, beams, and similar building purposes.—*Eng. Cyc.*

(44) ACER OBLONGUM, OVAL-LEAFED MAPLE: an ever-green tree, of rapid growth, native of the northern parts of India, growing both in Nepaul and Kumaon. It is probably confined to the hot valleys of those regions, for it has been

found incapable of supporting the climate of England.—*Eng. Cyc.*

(45) ACER STERCULIACEUM (Wallich), the SHADY MAPLE, is a large tree, with a trunk often three feet in diameter; found in Nepaul. —*Eng. Cyc.*

(46) ACER VILLOSUM (Wallich), the SHAGGY MAPLE, is a very large tree, found on the Himalaya Mountains, approaching the limits of perpetual snow, in Sirmoor and Kumaon.—*Eng. Cyc.*

(47) ACETIC ACID, PYROLIGNEOUS ACID.
Acidum Aceticum. LAT.

A well-known acid, obtained by the fermentation of saccharine matter, and the distillation of wood. It is employed in the preparation of the acetate of lead, in many of the pharmaceutical compounds, and also as an antiseptic. Acetic acid is important in a manufacturing point of view from its being the sour principle of vinegar. This acid occurs ready formed in some plants, and is produced during the spontaneous fermentation of many vegetable and animal juices. All liquids containing alcohol are capable of passing into the state of vinegar; and hence the manufacturers find it convenient to employ those liquors, such as wine, beer, toddy, &c., in which the vinous fermentation is complete. When these liquids are exposed to the atmosphere, at a certain temperature, a new chemical change is induced, whereby oxygen is absorbed, and the alcohol gradually passes into acetic acid.—*Tomlinson: Faulkner.* Dr. O'Shaughnessy discovered that much pyroligneous acid passes over along with other gases, in preparing the charcoal for the Bengapore powder works. In Germany a strong acetic acid is obtained cheaply and rapidly by causing a mixture of one part of spirit, four water, and about 1000th part of honey or yeast to filter into a cask containing wood shavings, and provided with holes to secure a free circulation of air. A very large surface being thus exposed the alcohol is rapidly converted into acetic acid. The fluid drops from the cask into the receiver and should be repassed over the shavings four times. The action is most effective when the temperature ranges from 75° to 100°. This is a process well calculated to succeed in India. Teak shavings well boiled in water and subsequently steeped in good vinegar should be employed. The casks should be provided with a perforated tray at top to receive the mixture, the perforations being about the size of a quill, and furnished with cotton wicks to moderate the flow of the liquid. The tray should also have four air-holes an inch in diameter, with glass tubes to permit of the circulation of air.—*Beng. Phar. p.* 233.

(48) ACHIMENES. GESNERACEÆ.

Very ornamental flowering plants, of easy culture; the scaly tuberous roots, by which they are propagated, must be carefully preserved during the dry weather, by occasionally moistening the earth in which they are kept, and after the commencement of the rains, the imbricated buds, which they produce under ground, may be divided and planted out.—*Riddell.*

(49) ACHRAS SAPOTA.
Seemy Eloopie Marum, TAM.

A valuable fruit tree, the fruit of which is known as the Sapodilla plum; wood hard and close grained. The seeds are aperient and diuretic; in over doses they are dangerous. The bark is said to be a good substitute for Cinchona. The *Tamil* name of this tree is liable to be confounded with Mimusops and Bassia. It is a native of South America; and, in India, only grown as a fruit tree. It has been introduced into the Dekhan from Goa. The fruit is generally brought to Bombay for sale in December, from Goa.—*Jaffrey, Riddell.*

(50) ACHYRANTHES ASPERA, *(Linn.)* Nat. Ord. AMARANTACEÆ. PENTANDRIA MONOGYNIA. *Sex: Syst:*

Nahi-ooroovie, TAM.	Agarch, DUK.
Cadelari MAL.	Lal-chirchiri, HIND.
Outeraynie, TEL.	Upanga, BENG.

A herb, about 3 feet high. Very common in Travancore, Coromandel and Bengal. In some parts of India, the natives use the root as a tooth brush. The seeds are given in hydrophobia, and in cases of snake-bites, as well as in ophthalmia, and cutaneous diseases. The flowering spikes, rubbed with a little sugar are made into pills, and also given internally, in hydrophobia. The leaves taken fresh and rubbed to a pulp are considered a good remedy applied externally to the stings of scorpions. The ashes of the burnt plant mixed with conjee is a native remedy in dropsical cases. The *A. fruticosa* is also given in cases of dropsy. Mr. Jaffrey mentions that, A. aspera, although seldom eaten alone, is in general use in what is called by the natives "calavay-keeray," mixed greens.—*Useful plants. Honigberger. Jaffrey.*

(51) ACHYRANTHES LANATA. (Ainslie, vol. ii. p. 393.) *Vern.* Khul ka jur, *Duk.* Astma bayda, *Sans.* Apanga, *Beng. Syn.* Illecebrum lanatum, Roxb. ii. 504. The root is deemed to be demulcent, and is prescribed in strangury. It is quite common in Colombo, and called Pot kudapala.—*O'Shaughnessy page* 354.—Wight in his Icones, figures. A alternifolia, 732: aspera, 1777: bidentata, 1779: brachiata, 1776: diandra, 722: ferruginea, 721: fruticosa, 1778: lanata, 723: lappacea, 731: Monsoniana, 725: muricata, 732: orbiculata, 1783: prostrata, 733: rubrofusca, 1778: scandens, 724: sericea, 726: triandra, 727.

(52) ACIDS. Tezab, HIND: PERS. Acidum. LAT.

Acids are distinguished by the following general properties:—1. Their taste is for the most part sour; and the stronger kinds are acrid and corrosive. 2. They generally combine with water in every proportion, with a condensation of volume and evolution of heat. 3. With a few exceptions they are volatilized or decomposed at a moderate heat. 4. They usually change the purple colours of vegetables to a bright red. 5.

They unite in definite proportions with the alkalies, earths, and metallic oxides, and form the important class of compounds, called Salts. Acids form a very numerous and important class of bodies in chemistry and in many of those arts and manufactures in which chemical processes are concerned. Perhaps the most important acid, in a manufacturing point of view, is the SULPHURIC, NITRIC, HYDROCHLORIC, ACETIC, CARBONIC, TARTARIC, CITRIC, OXALIC, ARSENIOUS, and other acids are also important objects of commerce. Some acids are gaseous, others fluid, and others solid. Some cannot exist, except in combination with water or with a base, such as acetic: others, as anhydrous sulphuric acid, exist without either. Most of the acids are colourless, but chromic is red: Some are inodorous, as sulphuric; others pungent as hydrochloric: Some are comparatively fixed, as the phosphoric; others can be converted into vapour at a moderate heat, as sulphuric; others are volatile at all temperatures, as the hydrochloric.—*Tomlinson. Faulkner.*

(53) ACKER WOOD, a fancy wood of a cinnamon colour.—*Faulkner.*

(54) ACONITUM, a genus of plants belonging to the natural order *Ranunculaceæ*. From very early times it has borne the same name, and has been known for the dangerous properties of many of its species. They are all hardy herbaceous plants, many of them of great beauty; and are so easily cultivated, that one of them, *A. Napellus*, is found in every cottager's garden in England. The English call them Wolf's Bane. Poisonous properties are probably found in all the species of the genus. *A. cammarum*, *A. lycoctonum*, and *A. anthora* are certainly dangerous. None of them, however, not *A. Napellus* itself, can be compared for fatal energy with the dreadful "Bikh" or "Bish" of Nepaul, the *Aconitum ferox*, which seems to possess the concentrated powers of all the European species.—*Eng. Cyc.*

(55) ACONITUM FEROX *(Wall.)* Nat. Ord. RANUNCULACEÆ. TRIGYNIA POLYANDRIA. *Sex: Syst:* (*Vern.* Bish. Meetha Teetia. Metha zuher. Ati Singeca Bish, Bishnak) Off. The *root*. Mahoor. HIND. A native of the Himalayan mountains, Sirmoor, Kumaon, and Nipal, and one of the most celebrated articles in Indian medicine and toxicology. The plant was first identified and described by Dr Wallich in his Plantæ Asiaticæ Rariores. This plant is found at high elevations sometimes at 10,000 feet above the sea, and Dr. Wight asserts, that wherever within the tropics we meet herbaceous forms of Ranunculaceæ, we may feel assured of having attained an elevation sufficient to place us beyond the influence of jungle fever. The root of this species of Aconite is highly poisonous, equally fatal taken internally or applied to wounds, but the effects of the aconite are witnessed in a concentrated state when the extract is introduced into a wound. Mr. Pereira, in some experiments made some years ago, found that one grain of the spirituous extract introduced into the peritoneal sac of a rabbit killed it in 9½ minutes. A preparation of the root is much used in all the hilly districts in Northern India to poison arrows for the destruction of wild beasts. We seldom however obtain the root sufficiently fresh in the plains to produce such effects as would explain its alleged utility for this purpose. It has been used on several occasions to poison wells and tanks, and doubtless might be made a formidable means of defence against the invasion of the territories in which it abounds. The Goorkhas say that they could so infect all the waters with the dreadful root that no enemy could advance into their mountain fastnesses. The tigers are destroyed by the poisoned arrows being shot from bows fixed near the tracks leading to their watering places. A tiger shot from a bow in Assam was found dead at only sixty yards from the spot, so soon did the poison take effect. The roots of the Assam variety of Aconitum ferox, are sold in small wicker baskets, small, black, and very fibrous. Those of the Nipal variety are about the length of the thumb, tapering to a point, black and wrinkled; fracture white, in best specimens, resinous and transparent. The natives of India think that its effluvia will even poison the air where the plant grows. In medicine the Bish is chiefly employed by the natives in the treatment of leprosy, fever, cholera, and rheumatism. In the Taleef-i-Shireef it is directed never to be given alone, but, mixed with several other drugs: it is recommended in a variety of diseases, as cholera, intermittent fevers, tooth-ache, snake-bites, and especially in rheumatism, as an external application. In Europe the wolf's bane or monk's hood (A. Napellus) has long been deemed efficient in many painful and spasmodic affections. The extract has been generally employed, commencing with half of a grain repeated thrice daily, and gradually increased until a tingling sensation of the affected part is produced. From three to five grains daily have thus been taken not only with impunity, but with the effect of checking or even removing many forms of nervous disease.—*O'Shaughnessy page* 166. *Useful Plants. Honigberger.* ACONITINA or bikya is a formidable poison, 1-10th of a grain killed a goat in one of Dr. O'Shaughnessy's experiments in 12 minutes. The animal evinced severe distress and died in convulsions. The pupils were widely dilated. It is not given internally, but is used as an ointment, one grain being mixed with a drachm of lard. It is an invaluable local application in many forms of neuralgia, especially in tic douloureux. It almost immediately occasions a tingling sensation in the part, then numbness, and relief of the pain.—*Ben. Phar. page* 265. An Extract of Aconite, was prepared from the

A. ferox by Dr. O'Shaughnessy. One-tenth to quarter of a grain was to be given in pills, with crumbs of bread, thrice daily, in chronic rheumatism, neuralgia, and tic-doloreux. It is, however, a dangerous internal remedy, and not so manageable as the tincture. Externally one drachm of the extract is used in an ointment with an ounce of lard as an application in tic doloreux, sciatica, &c. This was intended to be a substitute for the London and Edinburgh extracts, which are preparations from the expressed juice of the leaves of the aconitum napellus.—*Beng. Phar. page* 286.

(56) ACONITUM HETEROPHYLLUM. Nat. Ord. RANUNCULACEÆ. TRIGYNIA POLYANDRIA. *Sex: Syst:* Atees, HIND.

The root of this species of Aconite, which is known by the name of Atees in northern India, has long been celebrated in Indian Materia Medica as a tonic and aphrodisiac medicine. The plant was first described and identified by Dr. Wallich (see Plant: Asiat: Rariores), and has received additional notice from Prof. Royle. It occurs in abundance on the lofty mountains of Choor Shalma and Kedarnath, and varies greatly in the size and form of its leaves, from which circumstance it derives its specific name. The root is composed of two oblong tubera, of light ash colour externally, white internally, and of pure bitter taste. Under the name of *atees*, however, and very like the true root, there is commonly sold in the bazars of Bengal an insipid and totally inert substance, which O'Shaughnessy believes to be the dried tubera of the Soota mooli, or *Asparagus sarmentosus*. The true bitter atees is devoid of any astringency, yields to water 18 per cent, to alcohol 32. In any trial of this medicine prescriptions should invariably give the vernacular name, to prevent confusion with the formidable aconite of the preceding article. Honigberger mentions that the roots of Acon. heterophyllum, as found in the Himalayahs, besides being considered by the Hakeems to be tonic and aphrodisiac, are given also in pectoral affections, coughs, &c.—*Useful Plants. Honigberger. O'Shaughnessy p.* 166-8.

(57) ACORNS.

Glands; FR.	Glandes; LAT.
Eicheln, Eckern; GER.	Schedudii; RUS.
Ghiande; IT.	Bellotas; SP.

Acorns are the seed or fruit of the oak. Their taste is astringent and bitter. In England they are but rarely used, except for feeding hogs and poultry. Several species of oak are indigenous in the Tenasserim Provinces, and on the hills of India.—*Mason. Faulkner.*

(58) ACORUS CALAMUS *(Linn.)* Nat. Ord. ACORACEÆ. HEXANDRIA MONOGYNIA. *Sex: Syst:* Sweet flag. Ακορον Diosc.

Sweet-flag, ENG.	Vyamboo, or Vashampoo or Wussumboo, MAL.
Vassamboo, TAM.	Shwet-buch, BENG.
Vudya, TEL.	Buch, DUK.

Acorus Calamus, Sweet flag, a native of Ampoyna, Ceylon, Nipal, Khassia Hills, Malabar, Bourbon, and Burmah, grows in damp marshy places. It yields the calamus aromaticus of the shops. When dry it occurs in the shops in longitudinal pieces, wrinkled and marked with projecting points. The whole plant is aromatic, but the root alone preserves the flavour in drying. Taste rather bitter, but stimulant and spicy. It is a favorite medicine among the Hindoos as a stimulant in flatulency and similar states. An aromatic bitter principle exists in the rhizomes of this plant; for which reason they are regarded as useful additions to tonic and purgative medicines, being much given to children in cases of dyspepsia, especially when attended with looseness of bowels. Beneficially employed also in chronic catarrh and asthmatic complaints. The leaves of the American species of Acorus are said to be noxious to insects and are never eaten by cattle. They are used for tanning leather, and perfuming various substances. Pereira has remarked that the rhizomes might be easily substituted for more expensive spices or aromatics. In Constantinople they are made into a confection, which is considered a good stomachic, and is eaten freely during the prevalence of epidemic disease; they are supposed moreover to be an antidote for several poisons. The leaves contain an essential oil to which they owe their fragrance, and which in England is used by the perfumers mixed with the farina of the rhizomes in the manufacture of hair powders. As a tonic in intermittent fevers, the rhizome has been successfully given when bark has failed. It is of a pale brown colour, with whitish scars on the lower side; in taste it is pungent, and slightly bitter. Rheede states that on the Malabar Coast, a bath made of the infusion of the root is considered an efficacious remedy for epilepsy in children. The sweet cane, or sweet flag, is cultivated by the Burmese to a small extent for its medicinal properties.—*O'Shaughnessy. Useful Plants. Mason.*

(59) ACORUS VERUS differs much from A. calamus, and has been attributed erroneously to the Gentiana Chirayta. The *Calamus aromaticus* of the ancients is referred by Royle to the *Andropogon Calamus aromaticus.—O'Shaughnessy, p.* 626.

(60) ACTEA SPICATA, Baneberry. A native of the Caucasus and Siberia. Roots astringent; the whole plant acrid and poisonous.

(61) ACTEA ACUMINATA, (Wall.) is found on the Choor and Acharanda mountains.—*O'Shaughnessy, page* 170.

(62) ADAMANTINE SPAR. This mineral is now more commonly denominated *Corundum* or *Corund* by mineralogists, the name given to it in India, from which country it was first brought to Europe. The first specimens of it were sent by Dr. Anderson, of Madras, to Mr. Berry, a lapidary in Edinburgh, as the substance used in India to polish masses of crystal and all other precio

stones, except the diamond. It was examined by Dr. Black, who ascertained its peculiar nature, and from its great hardness he called it Adamantine Spar. With the exception of the diamond, it is the hardest substance known. It contains about 90 per cent. of alumine, a little iron, and a little silica, is usually of a pale grey or greenish colour, but is also found of various tints of red and brown. It is usually met with in rough ill-defined crystals, in granite, and sometimes in primary limestone, and is found in China, many parts of India, and occasionally in different parts of Europe. *See* CORUNDUM. *Emery*, the well-known substance used in the cutting and polishing of glass, in polishing steel, making razor-straps, and similar purposes in the arts, is a granular variety of Corundum, usually very much mixed with iron ore. It is chiefly imported from the Isle of Naxos, in the Grecian Archipelago, but is also found in Saxony. Small portions, mere mineral specimens, have been found in Southern India. The *Sapphire* is a remarkable instance how the mysterious chemistry of nature in the mineral kingdom produces from the same elements substances the most different in external form; this beautiful precious stone yielded by the analysis of Chenevix 94 per cent. of alumine; and Tennant found in emery, when freed from its admixture of iron, 92 per cent. of the same earth. The sapphire is, after the diamond, the most valuable of gems; it is usually dark blue, but also occasionally colourless, and the precious stones called by lapidaries *Oriental Ruby*, *Oriental Topaz*, *Oriental Amethyst*, and *Oriental Emerald*, are red, yellow, violet, and green Sapphires, distinguishable from the other gems of the same name which have not the prefix Oriental, by their greatly superior hardness and greater specific gravity. Sapphires are found in gravel and sand in the island of Ceylon and in Pegu, but they have never been seen in a matrix. They are also occasionally found in gravel in different parts of Europe, and they have been met with of a clear blue colour and crystallised, in the lava of Neider Mendig, near Andernach on the Rhine.—*Eng. Cyc.*

(63) ADANSONIA DIGITATA: BAOBAB; Monkey bread: Ethiopian sour gourd; Lalo plant. Papara Poolia Marm. TAM. Excepting, perhaps, the Locust tree, it is the largest known tree, with the trunk of an immense size close to the ground, sometimes as much as thirty feet, but fast tapering and of little height in proportion. It is a native of the Western Coast of Africa, about Senegal and Sierra Leone, but it has long been naturalized in India, and from its many uses, is deserving of a place among the more useful plants of this country. The tree lives to a great age, whence it has been called "arbre de mille ans"; and Humboldt speaks of it as "the oldest organic monument of our planet." The foliage is sometimes abundant and the whole forms a nearly hemispherical mass of verdure from 140 to 150 feet in diameter, and sixty or seventy feet high. The pulp of the fruit is slightly acid and agreeable, and by the people of Africa is frequently eaten, while the juice expressed from it, mixed with sugar, constitutes a drink which is valued as a specific in putrid and pestilential fevers. The trunk of the tree is subject to a particular disease, owing to the attacks of a species of fungus which vegetates in the woody part, and which, without changing its colour or appearance, destroys life and renders the part so attacked as soft as the pith of trees in general. Such trunks are hollowed by the Africans into chambers, and within them are suspended the dead bodies of malefactors. There they become mummies, perfectly dry and well preserved, and are known by the name of Guiriots. The fruit contains several black seeds; in taste somewhat acid, but making a cooling and refreshing drink, especially in fevers. In Cairo, the pulp dried and powdered is administered medicinally in dysentery and diarrhœa. In Senegal, by the negroes the fruit is considered a preservative against the epidemic fevers of the country. The bruised leaves in a dry state form a substance called "lalo," which the Africans mix with their food and imagine to be useful in checking profuse perspiration. In Gaudaloupe the planters use the bark and leaves as a febrifuge. The oldest description of these trees is that of Aloysius Cadamosto, a Venetian, who, in 1454, found one growing at the mouth of the Senegal river, whose trunk in circumference was 112 feet. Adanson himself saw them of 29 feet in diameter and 70 feet in height, and remarks that other travellers had found trunks of 32 feet diameter. If the age of these trees can be correctly estimated by the annular rings visible on a horizontal section of the trunk, the antiquity assigned to trees of the above diameters must be, according to the calculations of Adanson and Perottet, upwards of 5,000 years. As a timber tree, it is useless, the wood being soft and spongy. Dr. Hooker says, "the tree is emollient and mucilaginous in all its parts." Among other uses in Africa, the leaves are made into fomentations and poultices for rheumatic affections of the limbs and irritable inflammatory ulcers. Its leaves are used for leaven; its bark furnishes indestructable cordage, and a coarse thread used for cloth and ropes. Ropes made from the bark are said to be very strong, and there is in Bengal a saying, "as secure as an elephant bound with a Baobab rope. On the sea coast the fishermen use the fruit as floats for their nets.—*Useful Plants. Riddell. Eng. Cyc.*

(64) ADDA, the Arabic name of a small species of lizard (*Scincus officinalis*) celebrated by the Eastern physicians on account of its pretended efficacy in the cure of elephantiasis, leprosy, and other cutaneous diseases, to which the Arabs and

inhabitants of Egypt are peculiarly subject; and of which they are as afraid as of the plague itself.—*Eng. Cyc.*

(65) ADENANTHERA PAVONINA.

Ani Gundemunie, MARM:	Ywaigyee, BURM.
Munjadi, TAM.	Manjatie, MAL.
Manseni kotta, TEL.	Ranjuna, HIND.
Rukta-chundun, BENG.	

This is a considerably large, handsome tree, called in England Red Sandal Wood, and to be met with in most of the forests of India. In Burmah it is not very plentiful, being widely dispersed, but found in sufficient quantity in the Rangoon, Pegu and Tounghoo districts. It is called *Rukta chundun* in the bazars of Upper India, a name which Dr. Royle observes is also given to the wood of *Pterocarpus santalinus*. The wood hard, and durable; red, yielding a dye and adapted to cabinet making. The seeds, are of a shining scarlet colour, with a circular streak in their centre, and used as weights by jewellers, and as ornaments in the form of beads, bracelets &c. Books represent these as usually weighing four grains, and they are in common use by the Burmese, as equivalent to that weight. The seeds, however, have to be selected for the purpose; many of them not weighing more than two or three grains each. A cement is made by beating them up with borax and water. The pulp of the seeds mixed with honey, is applied externally to hasten suppuration in boils and abscesses. The natives in Travancore have an idea that taken internally they are poisonous, especially when in a powdered state.—*McClelland; Mason; Useful Plants: Juries Reports, Madras Exhibition.*

(66) ADEPS MYRISTICÆ, a concrete oil obtained from nutmegs, by expression: sometimes erroneously called oil of Mace.—*Simmonds.*

(67) ADHATODA VASICA (*Nees.*)

Adatodey, TAM.	Bakus, BENG.
Adasara, TEL.	Uroos or Utarosha, SANS.
Malabar Nut, ENG.	Justicia Adatoda, Linn.

A shrub 8-10 feet: common in the Peninsula of India, Nepaul. All parts of the plant are bitterish and slightly aromatic, and supposed to be antispasmodic; and are given in cases of asthma and intermittent fever. The wood is soft, and much esteemed for making charcoal for gunpowder. *O'Sh. p.* 483. The leaves given in conjunction with those of the Solanum trilobatum (Todoovallay, TAM.) and S. Jacquini (Cundunghatrie, TAM.) are employed by the Vytians internally in decoction as anthelmintic.—*Ainsl. Roxb. &c. quoted in Useful Plants.* Wight also figures, A. Neilgherrica; and A. Wynaudensis.

(68) ADONIS. *Ranunculaceæ.* A flowering plant which derives its name from the blood red colour of most of the species, the plants thrive in the Dekhan, in any good soil, may be raised by seed, or by dividing the root, and sown or planted after the monsoon.—*Riddell.*

(69) ÆCEOLADES AMPULLACEA, SYN. SACCOLABIUM RUBRUM, AERIDES AMPULLACEUM, red saccolabium, with rosy flowers, is very handsome and quite abundant, in the Tenasserim Provinces. Lindley says it can scarcely be distinguished from *S. ampullaceum* of Wallich's catalogue. Wight gives a figure, 1683, of *Æ.* tenera.—*Wight. Mason.*

(70) ÆGICERAS FRAGRANS. A large shrub in the Tenasserim Provinces; when in bloom it is covered with small white flowers, which seem to have great attractions for the fire-flies. In moving up the streams near the sea-board on a dark night, these trees are often seen illumined with myriads of waving brightening wings, and making them look in the deep gloom, like superb candelabra hung with living lamps.—*Mason.*

(71) ÆGLE MARMALOS.

Vilva-marum, TAM.	Bel, BENG.
Coovalum, MAL.	Tanghul, MALAY.
Maradoo, TEL.	Ouk-sheet, BURM.

The Bel Fruit, or Bengal Quince, or Smaller Wood-Apple. A large thorny tree, with ternate leaves, native of all parts of the East Indies, which flowers during the hot season, and its large spheroidal fruit ripens after the rains. It is delicious to the taste and very fragrant. It has lately been brought into repute, when fresh and in conserve, as a remedy in dysentery: it had long been used in diarrhœa, and its aperient and detersive qualities and its efficacy in removing habitual costiveness, have been proved by constant experience. The mucus of the seeds is for some purposes a very good cement. The leaves abound in a volatile, fragrant, bitter, exciting oil. From the flowers of the Bengal quince a fragrant liquid is distilled in Ceylon, known as MARMALA WATER, which is much used as a perfume for sprinkling by the Natives. The fruit is smooth, resembling an orange, with a yellow hard rind, which is astringent and used in dyeing yellow. The roots, bark and leaves are reckoned refrigerant in Malabar. The bark of the former especially is given in compound decoctions in intermittent fevers, and the latter made into poultices in ophthalmia. When dried before it is ripe, the fruit is used in decoction in diarrhœa and dysentery; and when ripe and mixed with juice of tamarinds, forms an agreeable drink. The wood is light-coloured, variegated with veins, but said to be of no great value, which seems unlikely to be correct. *Ægle marmalos and Feronia elephanta*, the former the large, and the latter the small wood-apple, are found about towns and villages throughout the Prome district, and also about Tounghoo, more especially on the Shan side of the river, where they may be had in great quantity from the end of February to the month of July. Lest their resemblance to the fruit of *Nux-vomica* might give rise to accidents, the strong aromatic smell of the wood-apples, like that of all other fruit of the orange family, to which they belong, is the best test by which they may be distinguished from the *Nux-vomica* fruit, which is devoid of aroma.—*McClelland. Useful Plants. Mason, Riddell, Waring, Wight.*

and in Great Britain *German Tinder*. It is found in all the Indian bazars.—*Mason. Faulkner.*

(86) AGARICUS is the generic name by which all the species of mushrooms properly so called are collectively known. In France, in Italy, and especially in Russia, a useful aliment is afforded by a great variety of species which, although very common in Britain, it would be extremely dangerous to eat; and, on the other hand, even the dangerous *A. muscarius* is a species of food in Kamtschatka. The following characters will serve to distinguish such Agarics as are poisonous or suspicious:—1. Such as have a cap very thin in proportion to the gills. 2. Such as have the stalk growing from one side of the cap. 3. Those in which the gills are all of equal length. 4. Such as have a milky juice. 5. Such as deliquesce, that is, run speedily into a dark watery liquid. 6. And lastly, every one that has the collar that surrounds the stalk filamentous, or resembling a spider's web.—*Eng. Cyc.*

(87) AGATE, one of the inferior gems, and classed amongst the Earthy Minerals by Phillips, is found in great variety and abundance in many parts of India. Some of the agates and other silicious minerals in the amygdaloid rocks on the banks of the Seena river, between Sholapoor and Ahmednuggur, are of great size and in profusion, but the most beautiful are brought from Cambay. When agates are cut open, they display a singular variety of forms, in some cases resembling animals and plants, in others, zigzag lines, like the plan of a modern fortification from which this variety gets the name of *Fortification agate.* These lines are the edges of successive layers or deposits of the mineral, during the process of its formation. As the internal surfaces are capable of receiving a high degree of polish, Agates are much valued as ornamental stones, and are also manufactured into cups, rings, seals, handles for knives and forks, sword hilts, beads, smelling bottles, snuff boxes, &c. The "Burnishers" of the Book-binder and other mechanics, are made of agates. Agate is one of the numerous forms in which silica is arranged, and contains 98 per cent. of that mineral. Agate and other varieties of silicious stones are known in commerce, as Cambay stones, Godavery pebbles;—1. *Carnelian*, from carnis flesh, is one of the most common of these minerals, those of a flesh colour being most frequent; there are however various shades of red and yellow, but the deep clear red is the rarest and most valuable. Japan furnishes the chief supply of carnelians, but the best varieties are from Cambay, and exported from Bombay. Many antique gems are in carnelian, and the stone is much used for seals and beads. 2. *Calcedony*, from Chalcedon in Bithynia, opposite Constantinople, is a gem of a uniform milky white, or pale yellow colour: it often has a wavy structure; is found abundantly all through the great trap formation of the Dekhan, sometimes in large masses, and cups and vessels are formed from it.

(88) AGATHÆA SPATULATA. *Compositæ.* A flowering plant cultivated by Europeans in India, named from "Agathos" excellent, on account of its beautiful blue flowers. They are grown in light rich soil, and require only ordinary attention in watering.—*Riddell.*

(89) AGATHIS. The generic name given by botanists to the trees, known in common language by the name of Dammar and Kawrie Pines. These plants belong to the natural order *Coniferæ*, from all other species of which they are known, firstly, by their broad, lance-shaped, leathery leaves, the veins in which are numerous and nearly parallel, diverging a little at the base, and converging at the apex; and, secondly, by their seeds having a wing on one side instead of proceeding from the end.

(90) AGATHIS AUSTRALIS. *Coniferæ.*—The New Zealand pine, lately introduced from the Cape into the Horticultural Society's Garden Bombay: the Kawrie Pine grows, native, in New Zealand, in the forests of which it attains a considerable height, with a straight clean stem, which from its lightness and toughness, has been found well calculated for the masts of ships. It is distinguished from the Dammar Pine by its narrower and more acute leaves, and by its more rapid mode of growth.—*Eng. Cyc.*

(91) AGATHIS LORANTHIFOLIA The *Dammar Pine* or the *Pinus Dammara* of Linnæus, is a large tree found on the very summits of the mountains of Amboyna, Ternate, and in many of the Molucca Islands. When young it has something of the aspect of a young cedar, the wood of which it is said to resemble. In several of the European countries, it is occasionally cultivated in the hot-houses of curious persons; but is of little value except for its resin, which, when pure, is white, clear, and brittle as glass, but in time becomes amber-coloured. Its timber is represented to be light and of inferior quality, wholly unfit for any situation exposed to wet, but answering tolerably well for in-door purposes. Griffith mentions *Agathis loranthiflora*, as a member of the Tenasserim Flora, and Mr. Mason has seen the young plants of the tree to which he must refer. The leaf is precisely that of the dammer pine, but the tree is not known to yield any dammar. The wood is white, rather light, and bears considerable resemblance to some kinds of pine. It is used by native carpenters for various purposes, and the Burmese have a superstition that the beams of balances of their scales ought to be formed of this wood. They call it *theet-men*, the tree-governor.—*Mason. Riddell. Eng. Cyc.*

(92) AGATHOTES CHIRAYTA.

Chirayit Gentian, Eng.	Chiraeta, Duk. Hind. and Beng.
Sheelassetto, Tel.	Chirataka, Sans.
Kiriyatha, Mal.	
Shayraet, Tam.	

Syn. Gentiana Chirayta, Flem. As. Res. xi. p.

167, Roxb. Fl. Ind. ii. p. 71. Wall. Pl. Rar. 3 p. 33. t. 252. Nepal and the North of India, Morung Hills. This is perhaps one of the most esteemed of Indian medicinal plants. It is gathered when the flowers begin to decay, and is dried for use. All parts are extremely bitter, and are identical in composition with the common gentian, containing, according to Battley, malic acid, bitter extractive, resinous matter, gum, and salts, (*Royle*, p. 277). It is highly esteemed as a tonic and febrifuge all over India. The cold infusion is the form best suited for its use.—*O'Shaughnessy page* 459. Its bitter properties are in high estimation with European practitioners in India, who use it instead of gentian, for which it is a perfect substitute. The root is the bitterest part of the plant, and this bitter principle is easily imparted to water or alcohol. According to Mr. Battley's analysis of its chemical properties, "it contains a free acid, a bitter resinous extractive, with much gum, and chlorates, with sulphates, of potass and lime. No alkaloid has been detected in it; what is therefore sold as a sulphate of chiraytine is well known to be only the disulphate of quinia." It is best recommended in preparation as an infusion or watery extract, or a tincture, but not in decoction; even an infusion made with warm water is apt to produce headache. To form a cold infusion, a pint of water should not stand more than twenty minutes on half an ounce of the bruised plant. The following remarks are extracted from a modern writer on the subject of this useful medicine:—"Chirayta possesses the general properties of bitter tonics, but has at the same time some peculiar to itself, which fit it well for certain forms and complications of disease. Unlike most other tonics, it does not constipate the bowels, but tends to produce a regular action of the alimentary canal, even in those subject to habitual constipation. During its use the bile becomes more abundant and healthy in character. The tendency to excess of acidity in the stomach, with disengagement of flatus, is much restrained by its use. These qualities fit it in a most peculiar degree for the kind of indigestion which occurs in gouty persons. It may, when necessary, be associated with alkaline preparations or with acids; the latter are generally preferable. The same remark applies to its employment in the treatment of scrofula. As a remedy against the languor and debility which affect many persons in summer and autumn, nothing is equal to the cold infusion of this plant. It may be taken twice or even more frequently daily, for a considerable time; then discontinued, and afterwards resumed. Children take it more readily than most other bitters. It is found to be a very efficacious remedy in India against intermittents, particularly when associated with Guilandina Bonduc or Caranga nuts. The debility which is apt to end in dropsy is often speedily removed by infusion of Chirayta, to which is added the tincture formed of it with orange-peel and cardamoms. Its efficacy in worm-cases has procured for it the name of worm-seed plant. The extract is given with great benefit in some forms of diarrhæa and dysentery, particularly if combined with ipecacuan, the emetic tendency of which it very markedly controls."—In Dr. Fleming's Notes on 'Indian Medicinal Plants,' as quoted by Wallich, it is stated, "the dried herb is to be met with in every bazar of Hindustan, being a medicine in the highest repute with both the Hindu and European practitioners. It possesses all the stomachic, tonic, febrifuge, and antarthritic virtues which are ascribed to the Gentiana lutea, and in a greater degree than they are generally found in that root in the state in which it comes to us from Europe. It may therefore on every occasion be advantageously substituted for it. The efficacy of the Chirayta when combined with the Caranga nut in curing intermittents has been already mentioned. For restoring the tone and activity of the moving fibre in general debility, and in that kind of cachexy which is liable to terminate in dropsy, the Chirayta will be found one of the most useful and effectual remedies which we can employ. The parts of the plant that are used in medicine are the dried stalks with pieces of root adhering to them. A decoction of these, or which is better, an infusion of them in hot water, is the form usually administered." *Don in Lon. and Edin. Phil. Mag. Wallich Plantæ As. Rarior. &c. quoted in Useful Plants. See "Chiretta."*

(93) AGATI GRANDIFLORA.

Agathee, TAM.	Agati, MAL.
Agathi or Anisay, or Agisi or Avisi, TEL.	Buka, BENG. SANS.

This tree is commonly met with in gardens throughout the Peninsula, and easily recognized by its large bright scarlet flowers. The wood is soft and of no use, but the bark is a powerful bitter tonic; the leaves are aperient: and Rheede says, an infusion of them is given on the Malabar Coast in cases of catarrh, and are said to be aperient: the *legumes* are from twelve to eighteen inches long. There are several species of Agati, with a variety of variegated and red flowers; and the leaves and flowers of the white variety, known in Tamil as Agati-keera Poo, are used in soups, curries, and as greens; the pods are sometimes eaten, though seldom. This tree is much cultivated in Betel gardens, for shade, and as a trellis for the support and shelter of the Piper Betel. The legumes of the agati are a favorite vegetable with the natives of Burmah also, and the trees may be seen in perhaps every town and village in the Tenasserim Provinces.—*Jaffrey. Riddell. Mason. Useful Plants. O'Sh.*

(94) AGAVE AMERICANA.

American Aloe, ENG.	Rakus, HIND.
Anai Kuttalay, TAM.	

The common American Aloe, although not

indigenous, is now common in every part of India. It is a native of America within the tropics from the plains to elevations of 10,000 feet, and is now naturalized in the South of Europe. It is much valued as a hedge plant, but its chief importance arises from the excellent fibres which it yields. Not only are the latter procured from the leaves, but a ligneous fibre is contained in the root, familiarly known as the Pita thread. This is much used in the Madras Presidency. It is manufactured at a very slight expense, the usual mode of preparation being usually to cut the leaves and throw them into ponds for three or more days, when they are taken out, macerated, and scraped with a bluntish instrument; But the best thread is obtained by crushing the leaves, when fresh, and scraping them. *See Fibres.* It has been found that the leaf fibres are liable to rot owing to a milky viscid juice contained in them. This defect has however been considerably obviated by very hard crushing, or pressure between heavy cylinders which, by getting rid of all the moisture, renders them more pliable for weaving and other purposes. In Calcutta the fibres being submitted to experiments were found equal to the best Russian hemp. They are much used for lashing bales of calico. As log-lines for ships they are found to be very durable and far superior to ropes of hemp. In several experiments that have been made, especially by Drs. Royle and Wight, Aloe fibre rope has been found to be more powerful than either coir, country hemp, or jute. A bundle of the Agave fibre bore 270 lbs., that of Russian hemp only 160 lbs. Dr. Wight found some cord of it bore 362 lbs. In Tinnevelly it sells from 20 to 40 Rupees the candy of 500 lbs.; and at Madras 7 Rs. a maund. In 1853-54 were exported from the Western Coast, 3,65 cwt. valued at 21,506 Rupees. There is no doubt that the Aloe fibres deserve more particular notice as they are admirably suited for cordage, mats, ropes, &c., and might be advantageously used in the manufacture of paper. *See Aloe Fibre.* In Madras the plant is called the Petha-Kalabantha. In Mexico they prepare a fermented liquor from the stem by incision, called Pulque, and from this they distil an ardent spirit. In that country too the dried flowering stems are used as an impenetrable thatch. An extract of the leaves is used to make a lather, like soap, and the leaves, split longitudinally, are employed to sharpen razors on, serving the purpose of a strop, owing to the particles of silica they contain. Lastly, Lindley states that the roots are diuretic and antisyphylitic, and are brought to Europe mixed with Sarsaparilla.—*Penny Cyc. Royle's fibrous plants. Jury Rep. M. E. quoted in U. Plants.*

(95) AGAVE CANTALA. Roxb. Bakkul, also, *Cantala*: also *bans Keora* HIND. *Bamboo pandanus.* Dr. Royle considers the A. vivipera to be closely allied to this species, which he discribes as common in the Bengal Presidency, and growing freely in Malwa, yielding fibres from twenty to thirty inches in length, and on testing their strength Captain Thompson found them quite equal to the best Russian hemp.—*Royle p.* 8.

(96) AGAVE DIACANTHA. "Moogai." This plant is a native of Mexico, and yields fibres. It might be advantageously introduced into India.—*Royle p.* 44.

(97) AGAVE VIRIDIS. A specimen of fibre said to be from the *Agave viridis* was exhibited by the Cuddapah Local Committee at the Madras Exhibition of 1855. It was of fair quality, but it was probably the produce of the A. vivipira.—*Juries' Reports.*

(98) AGAVE VIVIPARA *(Linn.)*

Bastard Aloe, ENG. | Peetha kalabuntha, TEL.
Kathalay, TAM.

This is the most common species in the North-West Provinces. A good fibre, which is long in the staple, is procured from the leaves. The latter are allowed to rot in water for twenty days, are then beat on a plank and again thoroughly washed. A strong and useful cordage is made from them, as well as mats, ropes, &c. In South Arcot, these fibres sell at 30 Rupees the candy. In the Madras Exhibition of 1855, a good specimen of fibre from this plant was contributed by Dr. Kirkpatrick. It was long in the staple, clean and strong, and had been prepared without rotting, by the simple process of beating, scraping and washing. The manufacture of this, and of rope have been introduced as an employment for the Lunatics in the Asylum at Bangalore. The rope finds a ready sale in the bazar, and pays all the expenses of the manufacture, besides providing a few comforts for the industrious inmates.—*Useful Plants. Royle p.* 43; 44; 45. *Juries' Reports.*

(99) AGAVE YUCCAEFOLIA. A plant naturalised in India, capable of yielding fibres.—*Royle p.* 43.

(100) AGERATUM CERULIUM AND A. MEXICANUM, are flowering plants, well worth cultivating for their pretty flowers; propagated from seed and cuttings; will bloom throughout the year, if sheltered from the hot winds; must not be too much shaded; if cultivated in pots, use a sandy soil.—*Jaffrey. Riddell.*

(101) AGLAIA ODORATA. AURANTIACEÆ. —A flowering shrub with ternate and pinnate leaves, and very small yellow flowers in axillary racemes. It produces flowers of an agreeble perfume greatly admired by the Chinese.—*Riddell. Fortune.*

(102) AGLAIA SPECTABILIS. A large tree, met with along the banks of rivers in the Pegu and Tounghoo districts. It affords a light serviceable timber, somewhat stronger than the American Pine, and capable of being wrought with little labour. Wood, red-colored, strong and adapted for house-building.—*McClelland.*

(103) AGRIMONY, AGRIMONIA COMPOSITA (Royle), procurable in Indian bazars but said to be a product of Persia, probably from the Shiraz mountains. Is possibly the "Ghafez" of the Hakeems.—*Honigberger.*

(104) AGRIMONIA EUPATORIA. A native of all parts of Europe. It contains tannic and gallic acid, and a very small quantity of fragrant essential oil, the flavour of which resembles that of tea, for which agrimony is much used as a substitute by the poorer classes in Europe. Agrimonia Nipalensis is very closely allied to this.—*O'Shaughnessy page* 325.

(105) AGYNEIA COCCINEA. The roots of this curious flowered plant are used medicinally by the Karens.—*Mason.* Wight gives a figure, 1893, of A. bacciformis.

(106) AHVI MARAM, Tamul; or "steam-wood," from its emitting steam when the root is cut; is a Malabar tree, growing to about ten inches in diameter, and fifteen feet long: it is of little value, and not very durable; but at times it is used for inferior purposes in the frames of native vessels, in repairs, &c.—*Edye, Malabar and Canara.*

(107) AILANTHUS EXCELSA, XANTHOXYLACEÆ.

Peroo-marum, Tam. | Peru-marum, Mal. | Peddamanie. Tel.

This large tree resembles the ash in its general appearance and attains a large size. By one account the wood is said to be hard, close grained and heavy, fit for gun-stocks. In Bombay it is said to be much used in cabinet-making, but the correctness of this information may be doubted. What has been seen of it shows the wood light and white: it is used for making sword handles, and sheaths for spears also for catamarans. The wood is not durable. The tree flowers in January and February. It is common in the Northern Circars and about Baroach and Baroda.—*Riddell. Juries Reports. Useful plants. Jaffrey. Wight.* Wight gives, 1604, a figure of A. malabarica.

(108) AILANTHUS MALABARICA, *(DC.)*

Peroomarum, Mal. | Peru marum, Tam.

Travancore. Malabar. A large tree similar to the above with very few points of difference in its botanical character. It is common in Travancore, and has rather an ornamental appearance from its dark shining pinnate leaves. The bark has a pleasant and slightly bitter taste, and is given in cases of dyspepsia, and moreover considered a tonic and febrifuge. It yields a fragrant resinous juice known as *Mutlee-pal*, which was first noticed by Buchanan, who found the tree in the Annamullay forests. This reduced to powder mixed with milk and strained is given in small doses in dysentery, and reputed to be an excellent remedy, owing chiefly to the balsamic properties of the resin. The bark triturated with mango and mixed with rice is reckoned useful in cases of ophthalmia. Wight states that "the bark is rough, and very thick, studded with bright garnet looking grains apparently of a resinous nature, nor do they dissolve either in spirit or water.—*Ainslie. Wight. &c. quoted in Useful Plants.*

(109) AIR BLADDER. This is called also the Air Bag, Swim, or Sound. It is a peculiar organ with which the great majority of fishes are provided, and by which they are enabled to adapt the specific gravity of their bodies to the various pressures of the superincumbent water at different depths. It is composed of a lengthened sac, sometimes simple, as in the common perch, sometimes divided into two or more compartments, by a lateral or transverse ligature, as in the trout and salmon, and, at other times furnished with appendices, more or less numerous according to the particular species. In all cases, it is composed of a thick internal coat of a fibrous texture, and of a very thin external coat; the whole being enveloped in the general covering of the intestines. Although it does not appear that the air-bladder is connected with the function of respiration in fishes, it occupies the position, and has the same relations, as the lungs in reptiles. It is in fact, the homologue of these organs. Fishermen are well acquainted with the nature and functions of the air-bladder. They are accustomed to perforate this vessel with a fine needle in cod and other species which require to be brought fresh to market, sometimes from a very great distance. By this operation, the confined air is allowed to escape, and the fish constrained to remain quiet at the bottom of their well-boats, where they live for a very considerable period. The Cod-sounds, brought into Britain in great quantities from Newfoundland, are the salted air-bladders of these fishes. They are also largely imported into England from the East Coast of Scotland. The Iceland fishermen, as well as those of America, prepare isinglass of a very excellent quality from cod-sounds, though they are not acquainted with the method of clarifying it, which the Russians practise in preparing isinglass from the sound of the sturgeon.—*Engl. Cyc. p.* 103. Russian Isinglass is prepared from the sounds of the Sturgeon, *Accipenser sturio*, found in the Caspian and Black Seas and their tributary rivers. In America, from the *Labrus squeteague*, the intestines of the cod, *Morrhua vulgaris*: and in Calcutta, from the sounds of the Polynemus Sela, the *Sulea* of Bengal. *O'Shaughnessy, p.* 685. The sounds of two Madras fish, the *Korwa*, and *Kattali*, Tam., are so employed.

(110) AJMOOD.—Petroselinum Sativum, Parsley.

(111) AJWAIN SEED—*Ptychotis Ajwain.*

Amoos, Arab. | Ajwain, Hind.
Invance, Beng. | Nankhoah, Pers.
Azma, Guz.

The small fruit or seed possesses an aromatic

smell and rather warm pungent taste. The plant is known everywhere in India, and P. Sylvestris, Royle, is the Arab ajwain called by the Persians Nan-khoah, largely used as a carminative and in flatulent colic, and, Honigberger states, in stoppage of urine. It is propagated by seed and grown in square beds; in the Dekhan, the seed is sown in September and October, and sold at five pice the seer, the plant is grown by the Native gardeners for the seed only, which is used in curries.—*Faulkner, Honigberger, Riddell.* Care must be taken not to confound, under the native names, the seeds of the Ptychotis Ajwain with those of the poisonous khorasanee Ajwain, which are the seeds of the Hyoscianus or Henbane. The Ptychotis Ajwain seeds are very small, stalked, conical, pointed, streaked with yellow stripes, and stalks of the seeds of a bright yellow. Henbane seed, is grey, not ribbed or streaked, shape obscurely triangular, and flattened, surface rough and dotted. Other seeds, especially of umbelliferous plants, are sold under both these names.—*O'Shaughnessy.*

(112) AJUGA DEALSINGHI (perhaps A: reptans; A. fruticosa, or A. chamæpytes) from the lower ranges of the Himalayas where it is given in quartain ague. *-Honigberger.*

(113) AJUGA DECUMBENS, Don. Hills of Cashmere, where, from its manifold virtues, it is called jan-i-adm, i. e. the life of man. Given in tormina and inflammation of the gums.—*Honigberger.*

(114) ALABASTER. There are two kinds of white stone to which antiquaries and artists give this name: the one is a carbonate of lime: the other, a sulphate or gypsum. The compact crystalline masses deposited from water holding carbonate of lime in solution, called by mineralogists stalagmite, are often composed of layers having different degrees of translucency. The finest alabasters are from near Volterra in Tuscany. The true Alabaster however is a variety of gypsum or sulphate of lime, and is much employed in the arts for ornamental purposes, as in making vases, small statues &c. It is not known to occur in India, all the so called *Alabaster* images, ornaments &c. of Burmah, being fabricated from stalagmitic carbonate or the granular carbonate of lime. Alabaster is found near Derby, but it is inferior to the beautiful alabaster of Italy, which is semi-transparent when first raised from the quarry: but is subsequently rendered more opaque by being entirely surrounded and covered with cold water which is gradually raised to the boiling point. Alabaster occurs in the tertiary strata of Mont-martre near Paris and in the Tyrolese, Swiss and Italian Alps. It is remarkable for its softness, purity of colour, fragile character, and liability to crack. Once soiled, its purity can never be restored. Articles of delicate workmanship in this material are therefore preserved under glass.—*Mason. Tomlinson.*

(115) ALANGIUM DECAPETALUM.

Alingie-marum, Tam.	Anisarooly Mara, Can.
Angolam, Mal.	Bagh-ankia. Beng.
Akola, Hind.	

A small tree with whitish flowers; the petals vary on the same tree from six or eight to ten. The fruit is astringent, but eaten by the Natives. The wood is said by Roxburgh to be "beautiful," and Wight found it to sustain a weight of 310 lbs. but it wants size; he had never seen a ten inch plank. The roots are aromatic. It grows common in Guzerat, and in rocky places in Malabar, also in Assam. *-Jaffrey. Juries' Reports M. E. Wight. Useful Plants.*

(116) ALANGIUM HEXAPETALUM (*Lam.*)

Woodooga, Tel.	Akola, Hind.

Grows at Allahabad and in Malabar and Burmah. Roots are aromatic and said by the Malays to possess purgative properties. Fruit edible, but not pleasant to the taste. Wood is considered valuable.— *Useful Plants.*

(117) ALAUDINÆ, a sub-family of birds belonging to the order *Passerinæ*, and the family *Conirostres*, is thus characterised by Mr. Swainson: Bill cylindrical; nostrils concealed; wings very long; no spurious quill; the first, second, and third quills longest, and nearly equal: the rest considerably graduated; tips of the lesser quills emarginate; tail forked; head crested. (Sw.) Various species of larks are found in all parts of the globe, and are everywhere distinguished by their vigilance and their singing. They are peculiarly birds of the fields, meadows, and other open places. The conformation of their feet, except in a few instances, such as the woodlark, does not adapt them to perch upon trees. They accordingly always build on the ground, making in general a rather slight though neat nest, and laying about five eggs, usually of a grayish white, with specks of a brown colour. In Europe, they frequently rear two broods of young during the summer. —*Eng. Cyc. p.* 105.

(118) ALBATROSS (*Diomedea*), a genus of web-footed birds, comprising several species - the Albatross of China (*D. fuliginosa*, Latham); the Yellow and Black-beaked Albatross (*D. chlororynchos*, Latham); and the common Albatross (*D. exulans*, Linnæus). The common Albatross is the species which is most frequently met with in the seas of Southern Africa. It is the largest sea-bird known.— *Eng. Cyc. p.* 106.

(119) ALBUMEN OR ALBUMINE, from the Latin *Albumen*, the white of an Egg, is an organic nutritive principle, the chief ingredient in the white of eggs and in the fluid portion of the blood. It also occurs in the sap or juices of many vegetables, in the seeds of the cereal grasses, in many fruits, and barks of trees. The most characteristic property of albumen, connected with commercial purposes, is that of solidifying or co-agulating when exposed to a moderate heat, and this is taken advantage of in all countries to employ both the animal and vegetable product in

the clarification of syrups and other liquids. Albumen, in the form of fluid white of egg, is an effective antidote in poisoning with corrosive sublimate. Lime, baryta and strontia, form insoluble compounds with albumen, which harden on drying, and a lute formed by mixing slacked lime with white of egg and spread on strips of paper or linen, is useful in making tight the joints of chemical apparatus.—*Tomlinson.*

(120) ALCOHOL.

Esprit de Vin, Fr. Weingeist, Ger. | Spirito ardente, Spirito di vino, Aquarzente, It. Arrack, Vern.

Alcohol is the spirituous portion of fermented liquors, sometimes called *ardent* spirit. By carefully distilling fermented liquors, the alcohol, mixed with a portion of water, can be separated; forming a product, the properties of which differ according to the substances from which it is derived. Thus the fermented and distilled juice of the grape yields *brandy*; that of the sugar cane, *rum*; the wort of barley, which is generally malted for the purpose, yields *whiskey* and *spirits of wine*, and rice, produces *arrack*. Alcohol is a limpid colourless liquid, of an agreeable odour and strong pungent taste. It is extremely inflammable, burning with a pale, bluish flame, the heat of which is intense, and has no smoky deposit, which makes its use invaluable for the spirit lamp of the chemist. Alcohol has never been frozen, hence it is of great use in measuring low degrees of temperature. In the arts it is used as a solvent where water fails, hence its value in varnish making as it dissolves resins. It freely dissolves the essential oils and camphor, hence its use in chemistry and pharmacy. It also dissolves, sugar, soap, and oxalic, tartaric, gallic, benzoic, and other acids. It is extensively employed in the preparation of ether. Used internally, it is an agreeable stimulant in its various forms in fermented drinks, but its abuse is the cause of much want, suffering and disease. The quantity of alcohol in wine, beer, &c. is very variable. According to professor Brande, port and sherry and some other drying wines contain from 19 to 25 per cent of alcohol: the lighter wines of France and Germany about 12 per cent. Strong ale contains about 10 per cent: and ordinary spirits, as brandy, gin, and whiskey, 40 to 50 per cent, or occasionally more. —*Tomlinson. Faulkner.*

(121) ALE. The bitter ales of Messrs. Allsop and Co. and Messrs. Bass and Co. are manufactured at Burton-upon-Trent, and have for many years, been most extensively imported into India. Burton brewers have long been celebrated for their beer, and their success is generally supposed to be dependent on the quality of the well water used: but it is more probably that the fame has been acquired by the use of the best materials and employing great care in the process. On analysis, the water is found to contain a large quantity of sulphate of lime, a good deal of the sulphates of potash and magnesia, and a considerable amount of carbonate of lime: the lime and magnesia in the state of carbonate, being held in solution by carbonic acid, the excess of which is so great as to redden litmus paper. The Burton well water, therefore, is a *hard* water, and might be regarded as but ill-adapted for the purpose of brewing, but the boiling expels the excess of carbonic acid in the water, which kept the carbonates of lime and magnesia in solution: and these salts are precipitated. Again, the alkaline phosphates present in malt have the power of decomposing and precipitating sulphate of lime, phosphate of lime and a soluble alkaline sulphate being formed, and the greater part of the phosphate of lime so formed is redissolved in the acid formed during fermentation. The water, from being at first hard, thus becomes comparatively soft, and in this state is well suited for the extraction of the active properties of the malt and hops used in the manufacture of bitter beer. The water used is remarkable from its complete freedom from organic matter. The Burton ales speedily become bright and clear, never require finings to be employed; and are fit for use almost as soon as brewed. This is no doubt owing to the depurating power of lime, to the presence of which in the Burton water and its precipitation during the boiling, the transparency and brightness of the beer are attributable. An analysis shows the following results as the contents of an imperial gallon:—

	Messrs. Allsop & Sons, Brewed.		Messrs. Bass and Co. Brewed.	
	March 1851.	24th March 1851	For Home consumption 3rd March 1852.	For Home consumption 25th Nov. 1851.
	Grains.	Grains.	Grains.	Grains.
Sugar,	200	320	390	420
Gum,	2,080	2,110	3,930	2,660
Bitter Extract,	810	750	760	800
Total Solid,	3,090	3,180	5,080	3,880
Alcohol of spe: gr: 794	3,540	3,820	3,983	3,744
Water,	63,370	63,000	60,937	62,376
Per centage of Alcohol	70,000	70,000	70,000	70,000

The above general analysis shews that the bitter beers of Messrs. Allsop and Sons, and of Messrs. Bass and Co., contain only a moderate amount of alcohol, and an unusually large quantity of bitter extract, consisting of the extract of hops. The specific gravity of the beers brewed by Messrs. Allsop and Sons and Bass and Co. of various ages, was found to vary: the former from 1007 to 1020, and the latter 1008 to 1024; as a rule the solid contents and extractive matter of beer is greatest in the newest and strongest beers, and these are, to a considerable extent, indicated by the specific gravity. Dr. Hassal reports, that, after the most scrutinizing examination, microscopical, chemical and physiological, the examiners failed to detect any other ingredients than the products of malt and hops, and

the constituents of pure spring water. From the pure and wholesome nature of the ingredients employed, the moderate proportion of alcohol present, and the very considerable quantity of aromatic anodyne bitter, derived from hops, contained in these beers, they tend to preserve the tone and vigour of the stomach, and conduce to the restoration of the health of that organ when in a state of weakness or debility. These bitter beers differ from all other preparations of malt, in containing a smaller amount of extractive matter, thus being less viscid and saccharine, and consequently more easy of digestion; they resemble, indeed, from their lightness, a wine of malt rather than any ordinary fermented infusion, and they are strongly recommended by the Medical profession. The various firms, Messrs. Byass and Co.; Friend and Co.; E. and J. Hibbert; White and Price; Child and Co.; Wallis and Co.; Findlater, Mackie and Co.; Bovill, Kinahan; Halston, Crimp and Ward, under whose names beers appear in the market in India are merely agents for Messrs. Allsop and Bass. In the year 1853, there was exported from Great Britain, to Aden, British India, China, and Hongkong, 103,130 barrels of beer and ale, the declared value of which was £205,481, and in the four years 1852-53 to 1855-56 inclusive, Madras imported it to the value of Rupees 16,26,009. —*Hassal, page* 448. *Trade Statement. Commercial Reports.*

(122) ALEURITES TRILOBA (*Forst.*) Nat. Ord. EUPHORBIACEÆ.

Belgaum or Country Walnut, ENG.	Akrot, PERS. and HIND. MAL. and BENG.

This is a large and rather handsome tree, almost all parts of which are covered with a farinaceous substance. A useful, fine, clear, lamp oil is expressed with very little difficulty from the kernels of the nut, which yield more than 50 per cent. This tree has been introduced into India from the Society Islands; it grows to a large size; the fruit is roundish, two celled, each containing a nut resembling in flavor the filbert; the natives say the fruit when fresh is unwholesome and requires to be kept for one year before it may be eaten. But they are fond of it, it being very palatable, and something like the English Walnut. In the Sandwich Islands they are employed for candles. A number of them strung upon a stick will burn for hours, giving a clear and steady light. They are considered aphrodisiac in the Moluccas. A gummy substance exudes from the seeds, which the natives of Tahiti are fond of chewing. One great advantage attending the manufacture of oil from this nut is that it can be separated with much less labour and simpler machinery than the cocoanut oil, which requires great pressure to separate it from the kernel. The tree grows most readily from seed, and might be extensively cultivated: the quality of the wood is unknown. The cake after expression of the oil is a good food for cattle and useful as manure. According to Simmonds, "31½ gallons of the nut yield 10 gallons of oil, which bears a good price in the home market." About 10,000 gallons are yearly produced in the Sandwich Islands. In Ceylon it is manufactured, and there known as the kekuna oil. It is supposed to be a good substitute for rape oil.—*Lindley. Simmonds, Comm: prod. Jury Rep. M. E. &c. quoted in Useful Plants. Jaffrey, Riddell.* A. laceiferum is figured, 1915, by Wight

(123) ALEXANDERS. Smyrnum olusatrum and perfoliatum belong to the natural order, Umbelliferæ. The blanched stalks of this perennial herb are used in soups and salads; raised from seed, sown in drills, when the seedlings have attained a few perfect leaves, they require to be thinned out to the distance of 12 or 15 inches apart, they will bear transplanting, and are blanched by the leaf stalks being tied together and earthed up like celery.—*Eng. Cyc. Riddell.*

(124) ALGÆ. This tribe of plants comprehends the sea-weeds, lavers and fresh-water submersed species of similar habits. Many of these are edible, and are largely employed to burn into kelp, and as manure for grass lands. Laminaria saccharina, or the sugar sea-belt, is said to be eaten by the Icelanders, and is considered a great delicacy in Japan. Carrageen moss, *Chondrus Crispus*, is used in Ireland, as an article of food, and is sold in London as a substitute for Iceland moss. Another genus of the same order is *gelidium*, one of the species of which is said to be the substance collected by the swallows, to construct the edible nests of Java. Several other species of *gelidium* are made use of as food, in the East, being added to dishes to render the hot and biting condiments less pungent.—*Eng. Cyc.* Sea-weed is an article imported from abroad into China by junks, as well as collected on the Chinese coast; the foreign sort is principally the *leung fan tsoi*, from which agar-agar is made, but no particulars can be ascertained regarding the trade. In China, this sea-weed is eaten after merely cleaning and stewing it in fat or oil.—*Morrison.* Almost all the plants of this order yield soda and iodine on incineration. Until very recently they were collected in large quantities, and burned for the sake of the soda yielded by the ashes; after separating the alkali, iodine was obtained from the mother liquors. Although the trade in *kelp* (the local name in Britain for sea-weed soda) has been nearly annihilated by the plan for making soda from common salt, still sea-weed ashes constitute the sole source from which iodine is manufactured. The green *Conferva* which floats on the salt-water lake near Calcutta readily yields iodine. It should be dried, burned, the ashes packed in crucibles and heated to brighted redness. The residue treated with water, on evaporation yields a saline mass of muriate and sulphate of soda, chloride of potassium, and iodide of potassium and sodium. Mr. Royle informs us

that the natives of the districts at the base of the Himalayas use in the treatment of goitre a dried leaf "brought from a great distance," and which they call *gillur ke putta*, or goitre leaf. It much resembled fragments of a common fucus.—*O'Shaughnessy, page* 671.

(125) ALGAROBA BEANS. *Ceratonia Siliqua*, or *Prosopis pallida*. The seed pods or bean of the Carob tree, a tree common in the Levant or south of Europe. The pods contain a large proportion of sweet fecula, are used as food, and frequently by singers, being considered to improve the voice. During the peninsular war, the cavalry horses were fed principally on these beans, of which about 40,000 quintals are annually exported from Crete.—*Simmonds.*

(126) ALHAGI MAURORUM.

Camel's thorn. Syn.	Shuturkhar, Ooshuturkhar,
Hedysarum alhagi,	Juwansa, Hind.

A native of the deserts of Egypt, Syria, Mesopotamia, Persia, and India; very common about the Jumna, especially near Delhi; used for making tatties in upper India. Although it is certain that it is to this tree that the manna of the desert is to be referred, it is known that many others produce a similar exudation. This substance occurs in small, round, unequal grains, the size of coriander seed, of a yellowish white colour, caking together and forming an opaque mass, in which are found portions of the thorns and fruits of the plant; this manna is inodorous, its flavour is sweetly saccharine, followed by slight acridity. The turunjabin is never found in the shops of Europe, but in many parts of the East it is used as a substitute for sugar. Tournefort states that it is common on the Alhagis in the environs of Tauris in Persia; at Bosorah the manna is collected on a small thorny bush, also common in Khorasan, and called *el hadsje*. The turunjabin is in every respect like the manna of the sacred writings. The turunjabin is chiefly gathered in the neighbourhood of Tauris, where the plant grows abundantly. It is a natural exudation from the leaves and branches of the plant, which first appears in the form of a small drop as of honey, which increases to the size of a coriander seed. It is principally employed in Persia and is known as Persian manna, and employed as food for cattle. Two other species, A. camelorum, and A. nipalensis also yield a manna. A. Maurorum is said to grow also, in Delhi, the Mahratta Country and Sinde. The turunjabin is gathered by merely shaking the branches. At first it resembles drops of honey, but soon thickens into solid grains. At the hot season when almost all the smaller plants die, this puts forth its leaves and flowers. Camels and other cattle are very fond of the plant.—*Eng. Cyc. Useful Plants.* A good analysis of turunjabin is still a desideratum. As a medicine its effects correspond to those of the *ash manna.—O'Shaughnessy, page* 295.

(127) ALHAGI NIPALENSIS, Nipal Alhagi, (Don Pr. Fl. Nipal, p. 247,) is stated to afford manna. Mr. Royle however considers this species identical with the Alhagi Maurorum, and states on strong grounds that no manna is secreted by either in India, Arabia, or Egypt. Persia and Bokhara seem its proper districts, and hence the turunjabin is imported into India. In Calcutta it is difficult to procure it of good quality: when pure it sells in Bengal for 10 rupees the seer.

(128) ALIVERIE. Garden cress, *Haleem*, seeds of Lepidum sativum, used in medicine.—*O'Shaughnessy.*

(129) ALKALIES.—*Guz. Hind.* Khar. Are characterised by their peculiar hot, bitter, and caustic taste; by their changing the colours of the vegetable blues to green, and yellows to brown: and by their neutralising acids, and forming with them the various class of compounds, termed Salts. Alkalies are of extensive use in various chemical arts; as in the manufacture of glass and soap.—*Faulkner. Tomlinson.*

(130) ALKANET, DYERS BUGLOSS. *Anchusa Tinctoria.*

Ossetong, Dut.	Anchusa, It.
Orcanette, Fr.	Arcaneta, Sp.
Orkanet, Ger.	

A native of the Peloponnesus, the island of Cyprus and the deserts about Alexandria; but is cultivated in England, Spain and the south of France. The root yields a fine red colour to oils, wax, all unctuous substances, and to spirits of wine. Its chief uses are for colouring lip salves, ointments, staining wood and dyeing cotton, but it is also used for coloring many of the beverages sold under the name of Port-wine and the corks used for the bottles in which this fluid is sold. —*Tomlinson. Faulkner.*

(131) ALLAMANDA CATHARTICA (*Linn.*) Nat. Ord. Apocynaceæ. Aruli, *Mal.* Cayenne, Guiana, and coasts of Brazil, Calcutta. The leaves a valuable cathartic, used especially in painter's colic. In too large doses violently emetic and drastic. —*O'Shaughnessy page* 448. This showy climbing milky plant was introduced into India from Guiana in 1803. It has become quite naturalized, and is one of the handsomest ornaments of our gardens. If allowed to climb up large trees, the effect is very striking and beautiful, owing to the clusters of bright yellow flowers it is covered with. The whole plant abounds in milky juice. Its large yellow flowers blossom in succession throughout the year. It thrives best when allowed to ramble unrestrainedly.—*Lindley. Don. &c. quoted in Useful Plants. Riddell. Jaffrey.*

(132) ALLIGATOR, a name originally given by the British Colonists of the Southern States of the North American Union, to a large species of reptile closely resembling the Crocodile of Egypt, but which modern researches have shown to possess characters generically differing from those of that animal. The word is supposed to be a corruption of an old Indian name. According

to its modern acceptation among zoologists, the name is no longer confined to the species most commonly found in Carolina, Louisiana, and the other Southern States of the Union; but it is applied generically to all the other American species which agree with it in its most prominent and influential characters, and which have been called Caymans, Jacarés, &c. by the Spaniards, Portuguese, and Indians of South America. The characters which are proper to the Alligators, and by which they are distinguished from the crocodiles of the Old World, are by no means of such importance with respect to the influence they may be reasonably supposed to have upon the habits and economy of these animals as to warrant the formation of these reptiles into a distinct and separate genus. Their manners and habits are precisely those of the true crocodiles, and if they differ in certain minor details of structure, this difference should be considered not as a generic character, but as purely specific.—*Eng. Cyc. page* 120.

(133) ALLI is described by Edye in his Malabar and Canara list, as the Malayala name of a rather scarce tree which grows to about twenty feet high, and from twelve to fifteen inches in diameter. It produces he says a sort of fig, which the natives use medicinally.—*Edye, Mal. and Can.*

(134) ALLIUM, a very extensive genus of bulbous Monocotyledonous plants, belonging to the natural order *Liliaceæ*. The species are all remarkable for having, in a greater or less degree, the odour of garlic, and for the agreeable stimulating effects that accompany it. For this reason some of them have been objects of cultivation from the highest antiquity.—*Eng. Cyc. page* 126.

(135) ALLIUM ASCALONICUM, the Shallot, a native of Asia Minor, is in many respects similar to the chive, from which it is known by its larger leaves, its smaller and more deeply-coloured flowers, and by its stamens having alternately three points on the filaments.—*Eng. Cyc. page* 126. The Shallot, HIND: Pecaz, is cultivated in a light rich soil and propagated by dividing the clustered roots; it should be sown in beds at the commencement of the rains, and will give a crop during the cold weather.—*Riddell.*

(136) ALLIUM CEPA, the common Onion, HIND: Pecaz is too well known to require description. It is not certain of what country it is a native, but it has from time immemorial been cultivated in Egypt. Its varieties are not very numerous, considering that it is almost exclusively increased by seed.—*Eng. Cyc. page* 126.

(137) ALLIUM FISTULOSUM. Salad or Welsh Onion. This onion has little or no bulb, used in soups and salads, may be closely imitated by purchasing a few onions monthly from the bazar, and planting in any good soil. By this means young onions can always be had for the table.—*Jaffrey.* The Welsh Onion, is a native of Siberia, and is supposed to have gained its English name from having been imported originally from Germany, with the name Walsch, or foreign, attached to it.—*Eng. Cyc. page* 126.

(138) ALLIUM OPHIOSCORODON, Rocambole, or Spanish shallot, is very slightly different from garlic, being chiefly distinguished by its larger size in all the parts, and by the upper part of its stem being generally twisted spirally just before flowering.—*Eng. Cyc. p.* 126.

(139) ALLIUM PORRUM, the Leek, has, like many other cultivated plants, disappeared in a wild state, so that its origin is unknown.—*Eng. Cyc. page* 127.

(140) ALLIUM SATIVUM, Garlic, Luhsen, HIND: has been found wild in Sicily, and some parts of Province.—*Eng. Cyc. page* 126. Garlic seed oil is called, వెల్లగడ్డ నూనె Tellagedda nuna. TEL: வெள்ளைப்பூண்டுஎண்ணெய், Wulla poondoo yennai. TAM:

(141) ALLIUM SCHŒNOPRASUM, the Chive, is a little tufted plant, with slender, cylindrical, taper-pointed, dark-green leaves.—*Eng. Cyc. page* 126.

(142) ALLOY. Chemistry has made us acquainted with almost forty-three metals, of which not more than twelve are of great and extensive use in the industrial arts. These are iron, copper, lead, tin, silver, gold, mercury, zinc platinum, arsenic, antimony, and bismuth; in this limited list platinum is always employed in a pure state; iron, copper, lead, tin, silver, gold, and zinc, are also employed in certain cases, in a pure state, but in all those applications where hardness is a desirable quality, two or more metals are combined, so as to form an alloy, and the number of alloys may be increased to an almost unlimited extent. Hitherto not more than two or three hundred have however been made, and even of this number not more than about sixty have been studied with care. The alloy known as Type metal is composed of 1 part of antimony and 3 or 4 or 6 of lead, and a larger amount of lead produces an alloy adapted to the sheathing of ships. *Gun* metal is an alloy of 9 parts of copper and 1 of tin, and forms a tough red metal used for brass ordinance, one-sixth of tin produces the maximum degree of hardness, and one-fourth, the highly elastic sonorous *bell metal: Speculum* metal is two parts copper and one of tin. An alloy compo[illegible] of 8 parts of bismuth, 5 of lead, and 3 of [illegible]n, forms the *fusible metal*, which fuses in [illegible] water and even in a temperature of 198° [illegible] 200°. —*Tomlinson.* In the Travancore State, the workmen have been very successful in their fabrication of alloys, but the ingredients they use are not known.—*Juries' Reports M. E.*

(143) ALLSPICE; Allspice, Pimento, or Bayberry tree, *Eugenia Pimenta*, is a handsome tree,

often 30 feet high, a native of South America and the West India Islands, but is said to have been also introduced into the southern parts of India. The berries are the valuable part of the tree, and should be picked when they reach their full growth, before they begin to ripen. The leaves and bark participate in the warm aromatic properties for which the berries are celebrated, and are useful as a spice in cookery and as a stimulant in medicine. The fragrant odour of the berries being thought to resemble that of a mixture of cinnamon, cloves and nutmeg, has obtained for them the name of Allspice. A single tree has been known to yield 150 lbs. of the raw fruit or 100 lbs. of the dried spice. Mr. Mason mentions that on the sides of some of the highest mountains in the province of Tavoy, he repeatedly met with a tree, but never saw it either in fruit or flower, which the Burmese call "wild clove tree." The young branches and the leaves of this taste very strongly of all-spice, and he considers it a Eugenia, possibly E. pimenta. All-spice is rarely adulterated, owing, possibly to its low price.—*Eng. Cyc. Hassall. Mason.*

(144) ALMANDINE, or Precious Garnet, is that variety commonly employed in jewellery.

(145) ALMOND OIL.

Badam-ka-tel, HIND.	Ingudi-tailam, SANS.
Roughan-i-Badam, PERS.	Vadamcotty-yennay, TAM.

This is expressed from sweet and bitter almonds. It is inodorous, insipid, of a pale straw colour, limpid, and lighter than water. Sweet almond oil is used in medicine, and the bitter chiefly in confectionary. There are about 80 tuns of this oil annually imported into Britain, the price being about 1s. per lb. It is principally the produce of the Arzo tree, forests of which grow to the south of the Empire of Morocco, which produce an exceedingly hard species of Almond. Its fruit consists of two Almonds, rough and bitter, and in manufacturing the oil, they are well rubbed or shaken in a coarse bag, to separate a bitter powder which covers the epidermis; they are then pounded to a paste in marble mortars, and the paste subjected to a press. The Almond is supposed to contain 46 p. c. of oil, but from 5½ lbs. only 1lb. 6 oz. can be extracted by the cold process; and above 2 lbs. if heated iron plates be used. *Simmonds.* The oil of Almonds is the basis of the great part of the liniments, plasters, and ointments of the European pharmacists.—*O'Shaughnessy.*

(146) ALOE FIBRE; PITA FIBRE or PITA, is the commercial name given in Southern India to the fibres of the American Aloe, or *Agave Americana*, of the *A. vivipera* or bastard aloe, and to the fibres of Fourcroya gigantea. The A. viridis also is said to yield a fair fibre, and one is also obtained from the A. diacantha, the Moogai of Mexico; those of the Adam's needles, the Yucca gloriosa, or common leaved, and Y. Aloefolia, or Aloe-leaved Yucca, and Dr. Hunter also mentions the Y. angustifolia; Y. tenacissima; Y. filimentosa and Y. regia as species yielding fibres, to all of which perhaps the same commercial term is applicable. Two species of Agave, the *A. Americana*, and *A. vivipera*, have become so naturalised in many countries, but especially in the south of Spain, in Africa and India, into the last of which countries they have been introduced by the Portuguese from America, as to seem almost indigenous. They are not yet sufficiently abundant in Southern India to be employed to a very great extent for the production of fibre, but as they take root and grow readily, there is nothing to hinder their very extensive application, and it may be useful to many to repeat short descriptions of them here. *A. Americana*, or great American Aloe, has a short cylindrical woody stem, terminated by fleshy, spiny, bluish green leaves from two to six feet long, flowers once, on a tall flower stem, 20 to 40 feet. The species of Agave are not only ornamental as plants and useful as hedges, but are important for their products. The roots as well as the leaves contain ligneous fibres, "Nita" thread, useful for various purposes. The leaves are sometimes eight feet long, one foot broad, and five inches deep, and abound in fibres of great length, and these being tough and durable, they are separated for the purposes of making rope, the separation being effected by crushing or bruising, steeping in water, and afterwards beating. In applying them for the manufactures of fibres, it is very essential to have the sap removed as early as possible after the leaves are cut, and with this view a grooved cylinder press is found very effectual, while frequent beating removes a thick viscid milky juice, which, if allowed to remain after cleaning, imparts a stiffness to the fibre. The Aloe fibre is now a growing export from Southern India,—3,658 cwts in one year having been exported from the Western Coast valued at Rs. 21,506, and it is probable that the product of all the plants above named were included under that term. The exports from all the provinces of the Madras Presidency of hemp, and aloes' hemp, during the four years 1852-53 to 1855-56 have been as follows:

		Cwt.	Rs.
1852,-53	Hemp, ...	7,772	31,013
	Do. Aloes, ...	2,682	27,095
1853-54	Hemp, ...	6,112	27,113
	Do. Aloes, ...	3,658	21,506
1854-55	Hemp, ...	9,263	37,770
	Do. Aloes, ...	236	2,243
Total	Hemp, ...	23,147	95,896
Do.	Aloes' Hemp.....	6,576	50,844

The exports being chiefly to the United Kingdom, Bombay, Cutch, Guzerat, Sinde, Bengal and Indian French Ports. Aloe fibre was for several years employed in the Arsenal at Madras, as a substitute for English hemp, but its liability to rot, led to its discontinuance, and the case with which it

is cut prevented its employment as a tow for packing shot. It is possible that such unsuccess was owing to a want of acquaintance with the proper mode of preparing it, for in Mexico a highly prized thread is manufactured from the leaf fibre : and made into the ropes used in their mines and nets and rigging of ships. The famous hammocks of Panama are made of Agave fibre, and the nations of all the countries in which it is grown, use it largely.—*Hunter. Commercial Products.*

KATHALAI is the Tamul term applied to the Agave vivipera, the manufacture of fibres from which has been successfully accomplished in the Bangalore jail. The name of "silk-grass" also is applied to these fibres, as well as to those of the A. yuccæfolia. The fibres of the A. vivipera are said to equal in strength the best hemp. The A. cantala of Roxburgh is supposed to differ little from the A. Americana and its fibres could be equally turned to use. (*Syn.* Pita. Pita Kalabuntha. Cantala. Bans-keora.) As the economic uses to which all the parts of a plant can be put, are of much importance to the success of all agricultural operations, we may mention that, *Fourcroya gigantea* (Ventenat), known as the Sheemay Kathalay, is not an Aloe, although its fibre is usually so denominated. The fibrous plants here described are not natives of India, but have mostly been introduced from America. They are capable of enduring a great variety of climates, and are all rapidly extending over India, but they are not yet sufficiently abundant, the Fourcroya gigantea, especially, to yield the fibre in large quantities. F. gigantea produces a fibre five or six feet long, somewhat finer than that of the Agave fibres, but possessing similar properties. The F. gigantea is less abundant than the Agave, but is as easily propagated, and its leaves attain a length of ten feet.

YUCCA GLORIOSA, Adam's Needle, is not abundant in Southern India, but it grows readily, and might be easily propagated to a great extent. It yields a strong, white, fine, but rather stiff fibre, suited for the manufacture of cordage. It very soon becomes discolored by steeping, but is less liable to rot than some other fibres of this kind.

YUCCA ALOEFOLIA, produces a white, pliant and strong fibre, resembling that of the Agave in some respects, but is apt to be discolored by steeping, which he Agave is not.--*Royle. Riddell. Balfour's Exports and Imports. M. E. Juries' Reports.* Dr. Hunter has proved that the so called Aloe Plants yielding fibres are of great value, for a bundle bore 160 lbs when a similar one of Petersburgh hemp broke with the same weight. The fibre is two feet long, white and of fine quality, and readily takes colours. It was made from the A. perfoliata, *Kalabuntha*, which Dr. Royle supposes to be the same as his A. Indica.—*Simmonds. Useful Plants. Juries' Reports M. E. Mason. Faulkner.*

PULQUE. The saccharine and mucilaginous sap of the A. Americana may be made to flow by incisions in the stem : it readily ferments, and in Mexico, yields on distillation an agreeable ardent spirit, called, vino mercal. The incisions are made just before the flower scape is ready to burst. The dried flowering stems of A. Americana also afford an almost impenetrable thatch ; the fresh green leaves are cut up and given to cattle, and the centre of the flowering stem, split longitudinally, is by no means a bad substitute for a European razor strop, owing to minute particles of silica forming one of its constituents. The two products most deserving attention however are the extract which forms a lather like soap, and the fibre, known in Southern India as the pita. The Mexicans also make their paper of the fibres of Agave leaves laid in layers.

(147) ALOE INDICA (*Royle.*) Nat. Ord. LILIACEÆ.

Indian-Aloe, ENG.	Kunwar, DUK.
Kadenaka or Catevala, MAL.	Gheegowar. HIND.
Kuttalay, TAM.	Ghrito-komaree, BENG.
Kalabunda, TEL.	

It is the A. perfoliata of Willdenow. *Useful Plants.* It is a species with reddish flowers, common in dry situations in the North-west of India, probably the source of some of the common aloes (*musabhir*) of the bazars. It produces Cape aloes, and the coarse variety called the fœtid, *caballine*, or horse aloes.—*O'Shaughnessy, page* 665. This Aloe is chiefly planted to form hedgerows, and makes an excellent fence. It flowers in the rains, and the stem grows to the height of ten or twelve feet. The leaves make a good common cordage, or rope, used for mats, &c.--*Riddell.*

(148) ALOE LITORALIS, (*Kœnig.*) Nat. Ord. LILIACEÆ.

Sea-side, or small Aloe, ENG	Chini kala-bunda, TEL.
Sirrooghoo Kuttalay, TAM.	Chota-kunwar, DUK.
	Koomaree, BENG.

This species is commonly found growing near the sea-coast, and is readily distinguishable by the reddish colour of its leaves. It grows plentifully at Cape Comorin and the neighbourhood. A good kind of Aloes is procurable from it. The Natives attach much value to the juice of the leaves of this species, which they apply externally in cases of ophthalmia, and especially in what are commonly termed country sore-eyes. The mode of administering it is to wash the pulp of the leaves in cold water and mix it up with a little burnt alum. In this state it is applied to the eyes, being previously wrapped in a piece of muslin cloth. An ink is prepared by the Mahomedans from the juice of the pulp.—*Ainslie .&c. quoted in Useful Plants.*

(149) ALOE SOCOTORINA. Socotorine aloe. A native of the island of Socotra, leaves minutely serrated ; flowers scarlet at the base, pale in the middle, green at the point. Yields Socotorine aloes, also the true *hepatic* and *Mocha* aloes.—*O'Shaughnessy, page* 664.

(150) ALOE SPICATA. A native of the interior of the Cape of Good Hope, leaves distantly toothed, with a few white spots, the flowers filled with purplish honey,—*O'Shaughnessy, page* 665. The A. spicata is common in the Peninsula of India. It is a good hedge plant; and the leaves yield a useful fibre.—*Useful plants.*

(151) ALOE VULGARIS *(Lam.)* Nat. Ord. LILIACEÆ.

Common or Hedge Aloe, ENG. | Kuttalay, TAM.

The *Aloe vulgaris*, common aloe, *Syn.* A. Barbadensis, A. perfoliata, is a native of the East Indies, and now cultivated in many tropical and hot countries. The leaves are armed with spines, and are a little mottled; flowers yellow. This species yields the *Barbadoes aloes* of commerce, by some called *Hepatic* aloes.—*O'Shaughnessy, page* 664. The above plant, common in the Peninsula, is said properly to be a native of Greece, or as some say of the Cape Colony, but has long been naturalized in both Indies.—*Useful plants.*

(152) ALOES.

Mucibar, ARAB.	Catasha, MALAYALUM.
Comarika, CYNG.	Sibber, PERS.
Musumbir, DUK.	Carriaboolum, TAM.
Alia, HIND.	Mussumbrum, TEL.
Uloo-watan, MALAY.	

The drug called Aloes is the bitter, resinous, inspissated juice of the leaves of various species of an arborescent plant of the lily family, growing principally in tropical and sub-tropical regions, and having a wide extent of range, being produced in the Eastern Archipelago, the East and West Indies, Arabia, and the Cape of Good Hope. The drug is imported into England under the names of Socotorine; East Indian or Hepatic; Barbadoes; Cape and Caballine Aloes; and the various species of plants producing it, are the Aloe spicata, vulgaris, socotorina, Indica, rubescens, arabica, linguæ-formis and Commelina. The average imports into England was about 8,539 tons in 1841 and 1842, but it has lately much increased, and the greater portion is sent from the Cape. Aloes differs considerably in appearance and properties generally, according to the mode of preparation. The best kind is obtained by making transverse incisions through the leaves, and allowing the juice to drop out. This is evaporated to dryness by a gentle heat. Dipping the leaves in hot water facilitates the flow of the juice.—*O'Shaughnessy*, 665. The usual way, however, of extracting the substance is by making a transverse incision in the leaves or cutting them off at the base and scraping off the juice as it flows, if done in the former way, and allowing it to run in a vessel placed for the purpose, if in the latter. Pressure is made occasionally to assist the flow, but by this means large quantities of the mucilage are forced out and mix with the proper bitter juice which is proportionately deteriorated; for it must be recollected that the aloe contains a great deal of mucilaginous matter abundant towards the centre of the thick fleshy leaves. The Aloes after being received into a vessel are exposed to the sun or other heat by which means they become inspissated. The true *Socotorine Aloes* is the produce of A. Socotrina, which grows abundantly in the island of Socotra, in the Indian Ocean, growing spontaneously on the mountain limestone, from 500 to 3000 feet above the sea. It is sold at 13*d.* to 2*s.* a pound, and with that from Melinda on the Zanzibar coast and Macula on the Arabian shore, is exported to Bombay, furnishing the greater part of that sold in Europe as Socotorine Aloes. It is sent to England in packages of 150 to 200 lbs. wrapt in skins of the Gazelle, but sometimes in casks holding half a ton or more. It has a pleasant aroma, is somewhat transparent and of a garnet or yellowish red colour. It brought, in Liverpool, from 30*s.* to £6 the cwt. in 1853; according to Mr. Mason, A. Socotorina, grows in the gardens in the Tenasserim provinces. East Indian or Hepatic Aloes, so called from its liver colour, is believed to be the produce of A. arabica or perfoliata, which grows in Yemen, and is imported into Bombay, for re-export to Europe. Its colour is more dull than the other kinds, and it has a less pleasant aroma. A. Indica produces an inferior sort of the drug, in Guzerat, Salem and Trichinopoly, selling at the place of manufacture at from 2*d.* to 3*d.* a pound. *Barbadoes Aloes* is the produce of A. vulgaris, and is often passed off for the Hepatic. It is darker in hue than the East Indian sort, being darkish brown, or black, and the taste is more nauseous and intensely bitter. It is imported into England in calabashes or large gourd shells containing from 60 to 70 lbs. Socotorine and Hepatic Aloes, are imported into Bombay from the Island of Socotra and the Arabian Gulf. The greater portion of the former kind is re-exported in small barrels to England, and occasionally to Calcutta. In *Socotrine aloes* the colour is reddish brown. Its surface shining, structure transparent, fracture shelly, taste very bitter. The powder is of bright yellow colour; when burnt it evolves a very fragrant odour. The *true hepatic* aloes, also re-exported from Bombay, and probably the produce also of the Socotorine aloe, differs from this kind in being opaque and olive-colored.—*O'Shaughnessy. Caballine or Horse* aloes is the name given to the coarsest kind of Barbadoes aloes, and is only used in veterinary practice: it is obtained from Spain and Senegal. The *fœtid* or *caballine aloes* is now no longer found in commerce.—*O'Shaughnessy page* 665. *Cape aloes*: is the produce chiefly of A. spicata and A. Commelina, which grow wild in great abundance in the interior of the Cape Colony, and is exported in chests and skins: the produce of A. spicata, is of a yellowish colour and of a heavy disagreeable odour. *Ainslie. Lindl. Penny Cycl. &c. quoted in Useful Plants.*

Cape aloes is deep brown, shining, of greenish tint and resinous fracture, edges transparent and ruby coloured, powder greenish-yellow, odour strong. *Barbadoes aloes* is what is commonly termed *hepatic*. It is exported in gourds, ranges in colour from dark brown or black to red or liver colour, fracture dull or glossy, odour disagreeable, and increased by breathing upon the surface, powder dull olive yellow. Of late years the importation into England of the true Socotorine Aloes has considerably decreased. What is now shipped to Europe is sent usually round by Bombay, but Simmonds says, "Socotorine Aloes, although long considered the best kind, is now below Barbadoes Aloes in commercial value." *Kurachee Aloes* are intermediate in properties between the Socotorine and Dekhan kind.—*Ben. Phar.* 192. As a drug, Aloes is reckoned extremely valuable, and its medical properties are very numerous. Although aperient, unlike other cathartics, the effect is not increased if given in large doses beyond a certain point. To persons predisposed to apoplexy it is more beneficial than most other purgatives. The compound decoction is a valuable emmenagogue, particularly when combined with preparations of iron. The best mode of covering the unpleasant taste of Aloes when given liquid is in the compound tincture of lavender. Although Aloes are produced by most of the varieties of the above plants, Dr. O'Shaughnessy remarks that the quality of the product is apparently more dependent on soil, climate, and preparation, than on any specific difference in the plant. In the four years 1852-53 to 1855-56, Madras exported 515 cwt. valued at Rs. 4037: and imported last year to the value of Rs. 2686. In the year 1853, Britain imported to the extent of 33,333 lbs. of aloes from British India, and re-exported 157,506 lbs. to the various countries of Europe.—*Commercial Products.*

(153) ALOEXYLON AGALLOCHUM is a tree belonging to the natural order Leguminosae, which yields a scented wood, used by the Chinese in medicine and perfumery. *Aloexylon Agallochum*, Eagle or aloes wood, is a native of Cochin China. The wood is rather hard, in fragments of about one cubit in length, obtuse, furrowed, heavy, marbled ashy and brown, shining, brittle, very resinous; odour weak but agreeable, increased on friction, and very strong on burning the wood; flavour agreeable, balsamic and slightly bitter, and irritating to the throat. No analysis is on record of this substance; it is only known as a curiosity in Europe, but in the East it is deemed an invaluable tonic and stimulant remedy, a delicious perfume, and becoming offering for religious ceremonies. See AQUILARIA AGALLOCHA, (*Aquilarineæ*); also EXCŒCARIA AGALLOCHA, (*Euphorbiaceæ*.) Aspalathum wood is also supposed to proceed from this or the Aquilaria in a state of decomposition, but of this nothing is known with certainty. The Rhodes wood (Convolvulaceæ) has also been called "Aspalath."—*O'Shaughnessy, page* 314.

(154) ALONSOA GRANDIFLORA. SCROPHULARIACEÆ.—An ornamental plant called the "maskflower," the colour of which is scarlet, it is easily cultivated in rich mould and multiplied by cuttings or seed.—*Riddell.*

(155) ALPINIA, a genus of plants belonging to the natural order *Zingiberaceæ*. The species have thick tuberous horizontal roots. The stems are numerous and perennial, with lanceolate leaves, having a slit ligulate sheath. The flowers are in panicles, or loose racemes or spikes. The tube of the corolla is short, the inner limb 1-lipped. The filament of the stamens linear. The fruit is capsular and 3-celled with winged seeds. —*Eng. Cyc.* Wight in Icones figures *A. Allughas*, 2026; calcarata, 2028; nutans, 2027; Rheedii, 2026.

(156) ALPINIA ANGUSTIFOLIUM is a sharp-leaved species, and a native of marshy ground, in Madagascar. It is cultivated in the Mauritius. It has a deep blood-red calyx, and the outer segment of the corolla is red. The whole plant is aromatic, and the fruit constitutes the *Cardamomum majus* of the older writers.—*Eng. Cyc.*

(157) ALPINIA AROMATICA is a native of the valleys on the eastern frontiers of Bengal. The fruit has similar qualities to those of the true cardamoms, for which they are often sold to the druggists of India.—*Eng. Cyc.*

(158) ALPINIA CARDAMOMUM has a root-stock creeping under the surface of the soil like that of the ginger, but it is smaller. The stems rise obliquely to the height of from two to four feet. The leaves are alternate. Flowers in spikes, seated in lanceolate acute villous scarious ash-coloured bracts. The tube of the corolla slender. The anther double, with a large three-lobed convex crest. The fruit a capsule containing roundish angular dotted brown seeds. This plant is a native of the mountainous parts of Java and Sumatra, and is commonly cultivated in the gardens of India. The seeds are aromatic, and are used by the Malays instead of the true Cardamoms, which are the produce of the *Elettaria Cardamomum*. [ELETTARIA.] Sir J. E. Smith states that this plant is the *Amomum verum* of the older botanists.—*Eng. Cyc.* A. Cardamomum furnishes the best known sort of the clustered cardamoms. About 192 candies are grown annually in Travancore and 100 candies in Malabar. This product is in great request throughout India, fetching as high as £30 the candy of 500 lbs.—*Simmonds.*

(159) ALPINIA GALANGA (*Swz.*) Nat. Ord. ZINGIBERACEÆ.

Greater Galangal, ENG.	Koolinjan, DUK.
Pere-aretei, TAM.	Koolunjun, BENG.
Doomba-stacum, TEL.	Chitta-ratta, MAL.

Vern. Koolinjan, *Hind.* A native of Sumatra,

cultivated in the Indian archipelago; tubers slightly aromatic and bitter, the root-stock more so, pungent, acrid, and aromatic. They constitute the true galanga roots of the druggists, and are used for the same purposes as ginger.—*O'Shaughnessy, page* 652. Grows in the South Concan, Travancore and Chittagong. *A. Galanga* is a native of Sumatra, and is cultivated in the Indian Archipelago. Its roots are pungent, acrid, and aromatic, and are often substituted for ginger. They are sold by druggists under the name of *Galanga major.—Eng. Cyc.* The tuberous roots are the larger galangal of the shops and are used as a substitute far ginger: its taste is peppery and aromatic. They are given in infusion in fevers, rheumatism and catarrhal affections. In Cochin-China they are employed when fresh for seasoning fish, as well as for other economical purposes. Simmonds says the galangal root is much used in China, and is one of the articles of commerce, realizing in London 12 to 16 shillings per cwt. in bond. It has an aromatic pungent taste; the outside is of a reddish-brown; internally it is reddish-white. An inferior sort of galangal is got from A. Allughas, (*Roscoe*) the root of which is considerably aromatic. 1286 cwt. of galangal root, valued at 2,880 dollars were exported from Canton in 1850.—*Simmonds. Useful Plants.*

(160) ALPINIA RACEMOSA; Its root-stocks has the same aromatic and pungent properties as ginger.—*Simmonds.*

(161) ALSTONIA SCHOLARIS (*R. Br.*) N. Ord. APOCYNACEÆ.

Pala, MAL.	Eer-ellay palay, TAM.
Chatinn, BENG.	

Grows in Travancore, Coromandel and Assam. A handsome looking tree. Wood white and close-grained, but rather coarse. It is bitter-tasted and the bark is a powerful tonic, and much used by the natives in bowel complaints. The whole plant abounds in milky juice. In Assam, where the tree grows to a large size, and where it is called Loteeana, the wood is much prized for beams, and light work, such as boxes, trunks, scabbards, &c. The full grown tree is likewise found in the Travancore forests.—*Nimmo. Roxb. &c. quoted in Useful Plants.* Wight figures also A. venenata, 436.

(162) ALSTROMERIA. *Amaryllidaceæ:* tuberous-rooted flowering plants, mostly from South America, with every variety of colour: they may easily be cultivated in a mixture of sand and loam during and after the rains.—*Riddell.*

(163) ALTAMGHA, Turkish, literally red stamp. A grant under the seal of the former princes of Hindustan recognised by the British as conferring a title to rent free land in perpetuity, hereditary and transferable.—*Wilson.*

(164) ALTERNANTHERA SESSILIS. *Poonanghn Cunney-keeray,* Tam. This, in many parts of the country, is a common annual weed, greatly prized by the natives, who attribute to it very high qualities, considering the leaves food for kings. It sells at a high price, and the wonder is, from such being the case, that the gardeners do not attempt its extensive cultivation: used as greens.—*Jaffrey.* A. campestris 717, and A. sessilis, 727, are figured in Wight's Icones.

(165) ALTHÆA OFFICINALIS.—Hollyhock. *Vern.* Gool Khirree. *Off.* The root. This is a native of Europe and of Cashmere, and is used precisely as the marsh mallow. Besides gum, the root contains a large proportion of a crystalline acid, called the *aspartic,* combined with ammonia—the asparagin of Robiquet. This principle is prepared by slicing the roots and macerating the slices in cold water, filtering and evaporating the liquor.—*O'Shaughnessy, p.* 214.

(166) ALTHÆA ROSEA. One of the mallow family, grows wild in China and all over India, and is known to yield fibres. It is used medicinally, as in England. It is the parent of the many beautiful varieties of hollyhock, and yields a blue colouring matter, equal to Indigo. —*Royle. Eng. Cyc.*

(167) ALUM.

Shebb, ARAB.	Alumen, LAT.
Chinakarum, CYNG.	Zajbeluir, PERS
Aluin, DAN.	Pedrahume, PORT.
Putkarie, DUK.	Kwassze, RUS.
Alum, FR.	Puttaki, SANS.
Alaun, GER.	Allumbre, SP.
Phutkee, GUZ.	Paddicarum, TAM.
Phutkre, HIND.	Paddicara, TEL.
Allume, IT.	*Faulkner.*

Alum, is a common natural production, of which the salajit of Behar and Nipal is an example.—*O'Shaughnessy*; but the salajit of Nipal is a mixture of sulphuret of aluminium, sulphate of alumina and sulphate of iron; its composition is very uncertain.—*Beng. Phar. p.* 366. Alum is found in a reddish slate clay, or soft clay-slate in the valley of the Tenasserim, about forty miles below Matah at the forks; this, with an indurated sand from a neighbouring locality that also contains it, is the only alum that has been yet met with in the Provinces.—Alum is exported from China, in considerable quantities to India and the Archipelago. Great quantities are employed by the Chinese in purifying the water which they use for culinary purposes: they also use it in sizing paper for foreign printing. *Morrison's Foreign Commerce with China.* It will be seen from the above that it occurs naturally, but the Alum of commerce is not a natural product, being manufactured from Alum shale, alum rock, bituminous shale, and slate clay; and though an earthy salt is found native in small quantities, it has long been produced artificially. It is brittle, inodorous, has a sweetish astringent taste, and crystallises generally in transparent octahedrons. It is of great use in the arts, especially for preparing mordants in dyeing and calico printing. It is also used in

preparing and preserving skins: in candle making, for hardening and whitening the tallow; in paper-hanging it is mixed with the paste; and it is also used in medicine as an astringent and for collyria. In India it is used in dyeing the purple and deep red colours; by the tanners in preparing a soft white leather, and by the goldsmiths for brightening gold. The great importation of alum is from China, but it is obtained, according to Ainslie, in Jeypore and Travancore. It is largely imported into Bombay from China, but a superior kind is brought from Cutch, and it is found in the Tenasserim valley, about 40 miles below Matah in a reddish slate clay. In the process of manufacture, the shales are roasted, and after being reduced to powder the alum is obtained by washing. During the four years 1852-53 to 1855-56, inclusive, Madras imported 4859 cwt. valued at Rs. 26,103, chiefly from Penang, Singapore, Malacca and Bombay.—*Commercial Products.*

(168) ALUMINA, is an earth of common occurrence in the mineral kingdom, in a state of silicate; as in felspar and its associate minerals and in the various modifications of clay thence derived. Native alumina exists in the sapphire, the oriental ruby and topaz: corundum, adamantine spar and emery consist chiefly of alumina with a small portion of oxide of iron and silica. Alumina has a strong affinity for various organic compounds, and its use in dyeing and calico printing depends on its attraction for different colouring principles, and for ligneous fibre. If ammonia be added to a solution of alum in an infusion of cochineal or madder, the aluminous earth falls in combination with the red colouring matter and the liquor is left colourless. Colours thus prepared are called *Lakes.—Tomlinson.*

(169) ALYSSUM SAXATILE. *Cruciferæ*—These species of herbaceous plants are best adapted for borders. They are cultivated by seed in a common soil. Their flowers are all of a yellow colour.—*Riddell.*

(170) ALYXIA STELLATA, Malay Archipelago, Society and Friendly Islands. Bark contains benzoic acid, and is possessed of properties analogous to those of canella and winter's bark; now used in Germany in chronic diarrhœa and nervous disorders.—*Lindley. O'Shaughnessy, page* 448.

(171) AMARANTACEÆ, Amaranths, a natural order of Apetalous plants, many species of which are pot-herbs, and their seeds collected as grain crops. Dr. Wight gives figures of the following genera: Amarantus fasciatus, 717; frumentaceus, [illegible] *inamœnus*, 715; lanceolatus, 716; oleraceus, [illegible], 1371-2; polygamus, 713-4; polygonoides, 712; ?—719; polystachyus, 713; spinosus, 513; tenuifolius, 718; tristis (?), 514 and 713. As garden ornaments, some of them as A. tricolor, caudatus or "Love lies bleeding," Hypochondriacus or "Prince's Feather," are flowering plants. This last flower is found wild in the South of England. Many of the species are very common, and of a great variety of colours. A. tricolor is remarkable for its variegated leaves, the centre of which is red and pale yellow; propagated by seed only.

(172) AMARANTUS ANARDHANA. Its seeds are gathered and used as food.—*Honigberger.*

(173) AMARANTUS ASPERA.

Agareh ke jur, Duk. | Apamarga, Sans.
Lal chirchiri, Hind.

An infusion of the root is given as a mild astringent in bowel complaints. The flowering spike made into pills with a little sugar is a popular preventive medicine in Behar for persons bitten by rabid dogs. The root is used by the natives as a tooth-brush, the whole plant when macerated yields a considerable quantity of potash. —*O'Shaughnessy, page* 529.

(174) AMARANTUS ATROPURPUREUS.

Banspata lall auteeya, Ben. | Shegapoo Thundoo-keeray, Tam.

Is probably a variety of A. oleraceus, an annual with beautiful red foliage and diminutive flowers. It gives a good spinach though seldom used by Europeans.—*Jaffrey. O'Shaughnessy.*

(175) AMARANTUS CAMPESTRIS (*Wild.*)

Sirroo-keeray, Tam. | Tseeri-koora, Tel.

Is a small annual, with anthers of an orange-colour; flowering in May and June, and growing in Bengal, and Travancore. The root is considered a demulcent and given in decoction in cases of strangury. The leaf of this plant is among the potherbs of the Hindoos, and the leaves are eaten by the poorer classes.—*Ainslie. &c. quoted in Useful Plants.* Jaffrey mentions that campestris and (polygonoides ?) are prevalent weeds; commonly cultivated by the native gardeners for spinach—during the hot months: require to be used when 3 or 4 inches high; of rapid growth; should be sown every third or fourth week.—*Jaffrey.*

(176) AMARANTUS FRUMENTACEUS (called *kiery*) Poongh-keeray, *Tam:* grows in the Hills between Mysore and Coimbatore, seeds ground into flour. In the Calcutta Botanic Garden 40 square yards, sown in June, yielded 21lbs. of clean seed in September; the plant also grows from October to February, inclusive.—*O'Shaughnessy, page* 529. This plant is extensively cultivated in the Coimbatore district, chiefly for the flour of its seeds, which is a great article of diet among the natives.—*Useful Plants.* Under the name of Poongh-keeray, *Tam*: it is also cultivated by the hill people for the seeds, which are ground into flour, and form one of their principal articles of diet. The leaves are of a reddish brown color, and the plant averages in height from 4 to 6 feet.—*Jaffrey.*

(177) AMARANTUS GANGETICUS, is the *lall sag* of the Bengalees.—*O'Shaughnessy,*

page 528. The leaves of this plant are eaten as a spinach: it is generally sown broad-cast, and procurable all the year round.—*Riddell.*

(178) AMARANTUS LANCEOLATUS. *Vern.* Bans-pata nuteeya, bamboo-leaved amaranth, the leaves and tender tops are eaten by natives in their curries and used as emollient poultices.—*O'Shaughnessy, page* 528.

(179) AMARANTUS OLERACEUS. *Koollay Thundoo-keeray,* Tam: superior to A. campestris in every respect as a spinach; commonly cultivated in the gardens of Europeans, there are 3 or 4 varieties; one with red leaves, another with white stems, which are peeled and eaten as asparagus: A. giganteus, variety, is about 4 to 8 feet high, with a thick succulent stem, and is eaten as a substitute for asparagus.

(180) AMARANTUS POLYGAMUS.

Chumli sag, HIND. | Chumpa Nutceya, (var. *lal*), BENG.
Moollay-keeray, TAM.

This vegetable is commonly used during the hot weather. There are three or four varieties, with various colored leaves. It is one of the best of the Indian spinaches; it is raised from seed during the hot months; and requires to be sown thick and eaten when young. The lower class of natives are seldom able to purchase this vegetable, it being too costly; is generally used when 2 feet high under the Tamil name of Thundoo-keeray: leaves, stems, and roots are eaten at that age.—*Jaffrey.*

(181) AMARANTUS POLYGONOIDES.

Checloo nuteeya, BENG. | Chirakura, TEL.

Very small, and a common garden weed, used as a pot-herb, and deemed so wholesome that convalescents are ordered it in preference to all the other kinds.—*O'Shaughnessy, page* 528.

(182) AMARANTUS SPINOSUS. *Vern.* Kanta nuteeya, Mooloo keeray, *Tam.* thorny amaranth. Sharp spines in the axils of the leaves; a very troublesome weed during the rainy and cold seasons. Nearly all the species may be used as emollients for enemata, cataplasms, diluents, drinks, &c.—*O'Shaughnessy, page* 529. Jaffrey mentions this as an annual, troublesome weed; abundant; thorny; the small leaves have a dark spot in the centre; it makes tolerable spinach, though troublesome to gather. In Tenasserim, also, it grows spontaneously as a common weed, and in some parts of that province, the natives use it for a pot-herb.—*Mason.*

(183) AMARANTUS TENUIFOLIUS. *Vern.* Jeel chumli, *Beng.* Cultivated grounds near Calcutta. Stem none; a spreading plant close to the ground.—*O'Shaughnessy, page* 528. Jaffrey mentions A. tenuifolius under the name of *Katoo Sirroo-keeray,* Tam., as a weed with clusters of green flowers, proceeding from the axils of the leaves, stem much branched; found every where.

(184) AMARANTUS TRISTIS.

Kuppei-keeray, TAM. | Quoi-tota-kura, TEL.

Annual, and cultivated; held in great esteem by the natives. It may be cut down several times without destroying the plants, which are much used for food.

(185) AMARANTUS VIRIDIS, (*Linn.*) leaves are used as emollient poultices, *Amarantus viridis, lividus* (Gobura nuteeya, *Beng.*), and *A. oleraceus* (Sada nuteeya) are cultivated for culinary purposes; the tops of the young stems and branches of the last were formerly brought to table in India as a substitute for asparagus.—*O'Shaughnessy, page* 528.

(186) AMARYLLIS BELLADONA--EQUESTRIS—-MEXICAN—CAPE—-AMERICAN—-ASIATICA. Flowering plants which blossom during the rainy and cold season, and form a great ornament when judiciously planted amongst other border flowers. The colours are of every variety —red, white, pink, &c. The large flowering sorts are greedily devoured by birds and insects, and require much care to prevent their being destroyed. Propagated as all other kinds of bulbous roots.—*Riddell.*

(187) AMARYLLIS FRITTILARIA, or SNAKES' HEAD LILY.—From Amarysso, resplendent. The wild flower hangs pendulous, and is chequered with pale dark purple; specific name from Frittillas, a dice board. Most of the species are natives of China, the Cape of Good Hope, and America: they have, however, become quite acclimated in India, and are found almost in every flower-garden under the names of Mexican, Barbadoes, Turk's cap, Tiger lily, Parrot, &c.—The bulb, in one year, will produce from three to a dozen fresh plants. When grown in pots, a small hole should be left in the bottom, and the pots of sufficient size to admit the expansion freely of the bulbs, which, after the decay of the old flowering stalk, may be separated and transplanted: if in borders, they will blossom during the rains and cold weather, and even during the hot season.—*Riddell.*

(188) AMAZON STONE. A crystallised variety of felspar, of a beautiful apple-green colour. It is met with in the Ural Mountains and South America.

(189) AMBAREE. Poolchay fibre. Syn: *Ambaree* also *Taag.* also Pat in Western India:

Pallungoo, *Madras.*
Pooley Numajee, *Coimbatore.*
Gongkura, *Teloogoo.*
Masta Paut, *Bengalese.*
Ambayapata, *in Purneya, Chandana.*
Sunnee, *Scharunpore.*
Wilaitee (or foreign) Sunn, *Mudra.*
Kudrum, *in Behar.*
Dekanee Brown hemp, also Hemp, *Bombay.*

—*Royle, p.* 253, 254 *and* 257.

This fibre is obtained from the Hibiscus cannabinus, very generally cultivated all over India, and a very good quality of its fibre is exported from the Western Coast. The fibre of this plant, like that of Jute is sometimes called "Paut," also, in Bombay, Dekhanee hemp, to distinguish it from taag or Concanee hemp: also Indian "hemp." It is one of the "brown hemps" of Bombay, and is often confounded with the fibre of "Sunn," though the two plants

greatly differ, the sunn, crotalarca juncea, being known in Bombay as Taag. The length of the fibres of carefully cultivated Ambaree is from five to six feet: they are of a paler brown than ordinary Brown Hemp, harsher in feel and stick more together; but they are divisible into fine fibrils; possessed of considerable strength: well calculated for rope making, as also for coarse fabrics. Though esteemed by some of the natives of Western India, the hemp of the H. cannabinus, is not, either in strength or durability, so good as the true hemp, or as the Sunn or Brown Hemp of the crotalaria juncea. Its price in the Home market is probably the same as that of the Jute. Hibiscus cannabinus is an erect growing plant, of the height of about four feet. It is slightly prickled over the stem. The leaves have an acid taste, and are much used as a pot herb. There is a dark purplish coloured species, the leaves of which are used for a similar purpose; they are both grown all the year round, and sold in the Dekhan at five seers for one pice. —*Riddell.* The following is the strength of this fibre as tested by several scientific men.

Experiments of	Ambaree, Hibiscus cannabinus, broke with	Sunn, Crotalaria juncea, broke with
	lbs.	lbs.
Dr. Roxburgh,...	110 to 115	130—160
Dr. Royle, ...	150	190
Dr. Wight, ...	290	404

The exports of this fibre are included under the general term, hemp, and cannot therefore be distinguished from that of Sunn hemp.—*Royle, p.* 253 *to* 259.

(190) AMBER.

Umber, TAM. | Inkitreeyoon, ARAB.
Kahruba, DUK. HIND. and PERS. | Ambar, MALAY.

Is a transparent, brittle, light, hard substance; sometimes nearly colourless, but commonly yellow, or even deep brown. When bruised, it exhales a slight aromatic odour. It is susceptible of a good polish, and when rubbed becomes electrical. It is used in varnishes, as well as for ornamental purposes, such as the manufacture of rosaries, necklaces, mouth-pieces, armlets, &c. Amber is procurable in the bazars of all eastern nations. It is chiefly obtained on all extended lines of sea-coast, has been brought from Europe, America, Africa and the islands south of Asia. It is found after storms, when it is either picked up on the beach or sought after by men who walk up to their necks in the

from Grossdirscheim to Pillau. It has al found in Poland, Saxony, Siberia and Gre also, at Cramer in Norfolk and on the Yo coast, and is occasionally found in sand a formations. Ainslie mentions that it h found in the Dekhan, of a fine quality, b scarce; also occasionally in Travancore, a copal is often sold in the bazars as Amb is found on several islands of the Indian pelago and in small quantities on the c China and Tunking. Its value in countries, where it is used for ornaments, cense and in medicine, has latterly dim having been superseded by cheaper an odoriferous substances. A considerable po the Amber in the markets of the East is l from Eastern Africa, but a substance kn false Amber, possibly fossil copal, is in into China, from India, and sold in Ca prices, almost as great as those which the article bears. A gum scorched with produce a yellowish brown color, is oc ally sold in India as Amber. Accord the recent researches of Göppert, ambe indurated resin, derived from various t the family of the coniferæ, which resin i in a like condition in all zones, beca usual original depositories, viz. beds of coal, have been formed almost every whe der similar circumstances. The Amber in the North of Ava, are described by Dr field as ocurring in a lignite formation, a fossil copal of the Vencully cliffs near T drum is associated with lignite. Tran pieces of a lively yellowish brown colour best, and when embedding insects, the p China is much enhanced. Opaque an pieces are almost valueless.—*Mason. Fa Tomlinson. Eng. Cyc.*

(191) AMBERGRIS.

Anbar, ARABIC. | Anbar, MALAY.
Mussumbra, CYNG. | Shahboi, PERS.
Umber, HIND & DUK. | Min-Umber. TAM.

Has no connexion with amber, or ambar, being a concretion from the int of the spermaceti whale, Physeter m phalus, and is generally supposed to morbid product analogous to biliary and not to be found in the healthy a 362 ounces have been taken from the bo small whale. It is obtained in warm cli floating on the sea, and thrown on the Ambergris of good quality is solid, opaqu bright gray colour; which is darkest ext and intermixed with yellow or reddish stri little black spots within; gives off an ag flavor when heated, or rubbed, or handle when cold it has but little taste or smell

apparently smooth and homogenous. Ambergris is brought from the Arabian Gulf, Zanzibar, Madagascar, Surinam, Java, Japan, but most of it is picked up after storms on the shores of the numerous islands of the Indian and Pacific Oceans. It is used as a perfume and stimulating aromatic. —*Tomlinson. Faulkner.*

(192) AMBER, LIQUID. The Liquid-amber of commerce is a product of three species of plants belonging to the natural order of Balsamifluae of Blüme, which has been altered to Balsamaceæ by Dr. Lindley. The name of this substance is derived from *Liquidum*, fluid, and *Ambar* the Arabic name of Amber. The three species all form fine trees, and occur in the Levant, Mexico, North America, Java and Tenasserim. Liquid-ambar altingea is a superb forest tree, occurs on the mountains of Java, at elevations of 2000 or 3000 feet above the level of the sea, also on the coast of the Tenasserim provinces, where it is indigenous, and in some places quite abundant, (Malay, Rasamalay; Burmese, Nan-tu-yoke.) Indeed a considerable stream in the province of Mergui derives its name from this tree, in consequence of its growing so thick on its banks. The bark of L. altingia has a hot and bitterish taste, and yields a fragrant balsam or liquid storax, although there is no proof that the liquid storax known in Europe is obtained from it, and it does not grow near the localities where liquid storax has so long been obtained. L. styraciflua a large, fine tree, is the species found in Mexico, and the United States, in the latter of which it is called sweet gum, and the fragrant liquid exudes, though not very copiously, from incisions in the stem. This is called Liquid-ambar, Oil of Ambar, and Copalm Balsam, and in this form has a pleasant balsamic odour and an aromatic bitter taste. This becoming dry, forms what is called soft or white Liquid-ambar, which resembles very thick turpentine, [illegible] a feebler odour than the liquid balsam, and contains less volatile oil, but more benzoic acid. L. orientalis is a native of Cyprus and parts of the East Indies. Dr. Pococke, as quoted by Dr. Lindley, states that it is called Xylon Effendi (the Wood of our Lord), in Cyprus, where it produces an excellent white turpentine, especially by incisions in the bark. It is also said to be produced on the island of Cabross, at the upper end of the Red Sea, near Cadess, which is three days' journey from Suez. The product of the L. Altingia is said to be mixed with the substance obtained by boiling the branches of Styrax officinale, or acting upon them with oil, spirit or naphtha. The subject is interesting as connected with ancient commerce, inasmuch as old writers mention a liquid with the solid storax, the mia-saileh and Mia yahseh of the Arabs. In all its states Liquid-amber is used to mix with Balsam of Peru. L. cerasifolia of Wallich (Sedgwickia cerasifolia of Griffiths) grows in Assam, but it is not known if it yields any balsam.—*Eng. Cyc. Mason.*

(193) AMBOOSIE, DRIED MANGOES.

Amurya, Guz. | Amboosie; kucherian, Hind.

Is the flesh or pulp of green mangoes, cut into oblong pieces, salted and dried in the sun, when it assumes a brownish colour. It is used as an ingredient in curries by the natives of India, to which it imparts an agreeable acid taste. Goa Amboosie is most prized on the west of India, but is made everywhere. —*Faulkner.*

(194) AMBOYNA WOOD, LINGOA WOOD. A fragrant wood of various colours, used in cabinet work in England. Localities, Ceram, and Amboyna. At the Great Exhibition of 1851, it was sent from Singapore.—*Faulkner. Lond. Ex. Juries' Reports.*

(195) AMETHYST.

Amethyste, Fr. | Amethystus, Lat.
Amethyst, Ger. | Ametisto, Port.
Amatista, It. | Ametisto, Sp.—*Faulkner.*

Amethyst. This name has been applied to two precious stones of essentially different natures. The *Oriental Amethyst* is a rare variety of *Adamantine Spar* or *Corundum*. The *Occidental*, or *Common Amethyst*, is a variety of quartz or rock crystal, which is met with in many parts of the world, as India, Siberia, Sweden, Germany, Spain, &c. It occurs in various forms, as massive, in rounded pieces, and crystallised.—*Engl. Cyc. page* 142. Common Amethysts of great magnitude, in regular crystals, are obtained near Hyderabad in the Dekhan. The amethyst is principally distinguished from common quartz by its colour, which is occasionally of every shade of violet, or rather purplish-violet, and this in the perfect amethyst is pretty equal throughout the crystal: very commonly the summits only of the crystal are amethystine, the lower part being nearly colourless, or tinged with green. By long-continued heat the colour is destroyed and the crystals become white and opalescent.—*Eng. Cyc. page* 143.

(196) AMHERSTIA NOBILIS. This is the finest [illegible]s tree in Chin India. It is of low stature with slender pendulous branches clustered under its tufted summit of lively green, and draperied with large pea blossom shaped flowers of brilliant red and yellow, which hang down from its graceful arches in tassels more than a yard long. It was discovered by Dr. Wallich on the Salwen near Trockla, and named by him after Lady Amherst the Noble Amherstia. It has been introduced into England where every tree is said to be worth fifty pounds. When one flowers, it produces quite a sensation from the Thames to the Tweed. A botanical correspondent in the North of England writes: "I dont hear whether the Amherstia which flowered near London last year is going to do so again this, but doubtless it will, and we shall soon hear of it."

" Ho, Trockla! thy tide
Hath a beautiful bride,
The child of an iris-wreathed shower;
With vails flowing down
From her emerald crown,
Whose fringes unfold
In scarlet and gold,
A glorious sight,
Ever graceful and bright—
The queen of proud Ava's wild bower.

There sweet-blossomed trees
Are wooing the breeze
O'er highland, and dingle, and glade,
But though they allure
With their fragrance so pure,
The Amherstia is fairest,
The noblest, the rarest;
Nor all the rich flowers
Of Albion's bowers
Can vie with its purpling shade." *Mason.*

In Calcutta, it was considered rather difficult to manage, but Fortune mentions that it was succeeding admirably under the treatment of Mr. Scott, the head gardener.—*Mason p.* 360.

(197) AMIANTHUS, MOUNTAIN FLAX.—A mineral in silky filaments, which, when mixed with oil, may be woven into a fire-proof cloth. It is sometimes used as a lamp-wick. Localities, Scotland, St. Neverne in Cornwall, Corsica, and the United States of America.—*Faulkner.*

(198) AMMANIA VESICATORIA, (BLISTERING AMMANIA.) *Vern.* Dadmaree, Bunmurich, BENG. An annual found in wet land during the rains, 6 to 36 inches high, has a strong smell like muriatic acid; leaves exceedingly acrid, employed by the natives as blisters in rheumatism; and Ainslie states that the fresh leaves bruised and applied to the part intended to be blistered perform their office in half an hour, and most effectually. Dr. O'Shaughnessy made trial of this article in eight instances; blisters were not produced in less than 12 hours in any, and in three individuals not for 24 hours. The bruised leaves had been removed from all after half an hour. The pain occasioned was absolutely agonizing until the blister rose. He says he should not be justified in recommending these leaves for further trial, they cause more pain than cantharides, and are far inferior to the plumbago (lal chitra) in celerity and certainty of action. Wight also gives figures of A. pentandra and A. rotundifolia.—*O'Shaughnessy, page* 331.

(199) AMMONIA is formed during the putrefactive fermentation of organic substances which contain nitrogen; also by heating animal matters such as bones, hoofs, horns &c. in iron cylinders; but the great supply is obtained from the gas-works of Europe, the ammoniacal liquor which comes over with the tar, during the destructive distillation of coal, being converted by various processes into sulphate, hydrochlorate, or carbonate of Ammonia. Common smelling salts are the sesqui-carbonate of Ammonia.—*Tomlin-*

(200) AMMONIA LIQUID, SPIRITS OF HARTSHORN, VOLATILE ALKALI, is a limpid, colourless fluid, exceedingly volatile, has a pungent smell, and a caustic taste; and is one of the most useful stimulants in the *Materia Medica.*

(201) AMMONIA, HYDROCHLORATE OF,

Sal Ammoniac, ENG. | Sohaga and Noshadur, PERS.
Navacharum. TAM. | DUK. AND SANS.
Urmeena, ARAB.

This valuable salt is the nowshadur of the bazars, where it is found in a sufficiently pure state for its more important uses, but it can be purified by a simple method of refining. Muriate of Ammonia is a volcanic product, but is also the result of the decomposition of many animal matters; the dung of camels when roasted with common salt, yields it in sufficient quantities to be the chief source of the salt in India and Egypt. Indeed, it was first obtained in Egypt near the temple of Jupiter Ammon, whence its name, by sublimation from the soot of camels dung. It is now manufactured largely in Europe, by combining hydrochloric acid, either directly, or indirectly, with ammonia obtained from the decomposition of animal matter. In France, by the distillation of bones, in iron retorts, but in Britain, from the ammoniacal salts contained in the liquor resulting from the distillation of coal in the gas works. Sulphuric acid is added, and the sulphate of ammonia thus produced, is decomposed by muriate of soda. Muriate of ammonia is sold in the bazars of India in thick fibrous semi-translucent cakes, devoid of smell, of bitter acrid taste. It sublimes when heated, dissolves in its own weight of boiling, or three times its weight of cold water. The hot water solution yields a copious deposit of fine feathery crystals. During its solution in water, the temperature falls several degrees, and this property is accordingly turned to account where ice is not procurable as a mode of cooling various beverages, or to aid the condensation of vapours in pharmaceutical experiments. This salt is very little prescribed internally: a lotion composed of one part of muriate of ammonia, dissolved in 24 parts of rectified spirit, and the same quantity of distilled vinegar, is much used as an external application to bruised parts and indolent tumours.—*Beng. Phar. p.* 259. It is used by tinmen to clean the surface of their metals and to facilitate the soldering of iron and copper and prevent the oxydation of the copper. It is also sometimes employed by dyers, to brighten their colours. It is employed, in solution as a repellant in cases of inflammation and tumours: it is exhibited as a diuretic by the Tamul practitioners in ascites and anasarca, and is also supposed by them to be a useful remedy in certain female obstructions, and uterine morbid enlargements. Sal Ammoniac, mixed with common salt, forms a powerful refrigerating mixture; when dissolved

merce, used for dissolving gold, instead of nitro-hydrochloric acid. It is also used in small quantities in steam boilers, to prevent the formation of calcareous deposits.—*Ainslie. Tomlinson.*

(202) AMMONITES, as the Ammonites were evidently principal agents for keeping within bounds the mollusks, &c. the crustaceans, and perhaps fishes of the periods prior to the Chalk formation, and belonging to the latter epoch, we should expect to find them widely distributed. Accordingly, they occur in Europe, Asia, and America, in strata apparently of the same date. In some instances, the genera and even the species are identical. Dr. Gerard found in the Himalaya mountains, at an elevation of 16,000 feet, *Ammonites Walcottii* and *Ammonites communis*, fossils that are found in the Lias of Lyme Regis. M. Ménard met with one in the Maritime Alps at an elevation of 1500 toises. Their numbers must have been great. M. Dufresne informed Lamarck that the road from Auxerre to Avalon in Burgundy was absolutely paved with them. The individual agency too of some of these carnivorous instruments for preserving the balance of marine animal power must have been of no small importance. Lamarck says that he has seen Ammonites of two feet (French) in diameter. Mr. James Sowerby and Dr. Mantell record ammonites in the chalk with a diameter of three feet and Dr. Buckland states that Sir T Harvey and Mr. Keith measured Ammonites in the Chalk near Margate which exceeded four feet in diameter; and this in cases where the diameter could have been in a very small degree enlarged by pressure. Ammonites occur in great abundance in the supra-cretaceous strata between Trichinopoly and Pondicherry.—*Engl. Cyc. page* 149.

(203) AMMONIACUM, from *Dorema ammoniacum.* (Don *Linn. Trans.* xvi. 601.) *Vern.* Oshak, *Pers.* This plant grows in Persia, plains of Yerde Kaust, and Kumisha in the province of Irak, and near the town of Jezud Khast, in very dry plains, and gravelly soil exposed to the sun. (*Lindley.*) The stem and fruits yield abundance of Ammoniacum resin.—*O'Shaughnessy, page* 364. This gum resin is imported into Bombay from the Persian Gulf, and re-exported to different countries.—*Faulkner.* It is obtained by incisions in the plant, and occurs in two forms,—first, in voluminous masses of yellowish colour, enclosing white almond-like tears, the whole being of plastic consistence, and very impure; secondly, in tears of irregular form, white or yellowish, opaque, rather solid, agglutinated or distinct, compact, brittle, of glassy fracture, and free from impurities. Its odour is faint and peculiar, taste sweetish and then bitter. It is partially soluble in water, ether, alcohol, alkaline solutions and acetic acid. Its *medical effects*, are similar to, but less powerful than, asafœtida: It is principally employed as an expectorant in the chronic catarrhs and asthmas of old persons. It is also applied externally as a warm and stimulating plaster.—*O'Shaughnessy, page* 365.

(204) AMOMUM, a genus of plants of the natural order Zingiberaceæ.

(205) AMOMUM ANGUSTIFOLIUM. Roxb. Fl. Ind. i. 39. A native of Madagascar, cultivated in the Mauritius; the fruit is the *greater cardamoms* of the old writers.—*O'Shaughnessy, page* 650.

(206) AMOMUM AROMATICUM. Roxb. Fl. Ind. i. p. 45. *Vern.* Morung elachi, *Hind.* —*O'Shaughnessy page* 650. This is a native of Chittagong and the valleys of the Eastern frontiers of Bengal; the fruit has similar properties to those of the true cardamoms, for which they are often sold to the druggists of India.

(207) AMOMUM CARDAMOMUM. Roxb. Fl. Ind. i. p. 37. *Vern.* Elachi, *Beng.* Java, Sumatra, and mountainous parts of India.—*O'Shaughnessy, page* 655. This seems the round and clustered cardamom of the shops. It is a garden plant in India: the seeds are aromatic, and are used by the Malays instead of the true cardamoms, *Elettaria cardamomum.*

(208) AMOMUM DEALBATUM, is *the Burra elachi* of Sylhet.—*O'Shaughnessy, page* 650.

(209) AMOMUM GRANA PARADISI. Paradise grains, Malaguetta pepper. A native of the coast of Guinea near Sierra Leone. *O'Shaughnessy, page* 650. The *A. grandiflorum* of the same locality yields seeds of very different and camphor-like flavour.—*O'Shaughnessy, page* 650. The cardamoms of commerce are the capsules, which are gathered as the seeds ripen, are dried in the sun, and are then fit for sale. The smaller capsules or lesser cardamoms are the most valuable.

(210) AMOMUM MAXIMUM, according to Pereira, yields the *great winged* cardamoms, referredby Lindley to *Elettaria.*—*O'Shaughnessy, page* 650.

(211) AMOMUM NUTAR. Under this name Dr. Riddell describes a flowering plant throwing out long branches with drooping panicles of wax-like flowers, a native of some of the Eastern Islands, which has never been known to give seed. The only flower approaching near it in beauty, is one of the parasites blossoming in May at Mahabuleshwar.—*Riddell.*

(212) AMOORA (AGLAIA) ROHITUKA. Nat. Ord. MELIACEÆ.—Andersonia Rohituka, *Roxb.* Sphœrosacme R.,

Chemmarum, MAL.	Tikhta-raj, BENG.
Hurin-hura, or Khana, HIND.	Khayau-kayoe, BURM.

From the seeds, where the trees grow plentifully, the natives extract an oil which they use for many economical purposes. *Roxb.* This tree is scarce, but found in the Tounghoo Forests. Wood, white colored, adapted to every

purpose of house-building. It grows also in Travancore and Bengal.—*McClelland. Useful Plants.*

(213) AMORPHOPHALLUS CAMPANULATUS *(Blume.)* Nat. Ord. ARACEÆ.

Telinga Potatoe, ENG.	Karoonay-kalungoo, TAM.
Karuna, MAL.	Ol, HIND.
Muncha kunda, TEL.	

The roots of this plant are very nutritious, on which account they are much cultivated for the purpose of diet. They are planted in May, and will yield from 1 to 250 maunds per beegah, selling at the rate of a rupee a maund. The roots are also used for pickling. They are acrid when raw, and are employed medicinally in boils and ophthalmia. Wight says, that "when in flower the fetor it exhales is most overpowering, and so perfectly resembles that of carrion as to induce flies to cover the club of the spadix with their eggs." A very rich soil, repeatedly ploughed, suits it best. The small tuberosities found in the large roots are employed for sets, and planted in the manner of potatoes. In twelve months they are reckoned fit to be taken up for use; the larger roots will then weigh from 4–8 or more pounds, and keep well if preserved dry. The Natives of India employ them for food in the manner of the common yam, and they are very generally raised by the Burmese and Karens. It is much cultivated in Madras.—*Jaffrey. Mason, Useful Plants.* Wight also figures A. margaritifer, A. sylvaticus, and A. bulbifer.

(214) AMPHIDESMA, a genus of marine bivalve shells, which are found in the sand on the sea-coast of tropical climates. The shells are oval or rounded, sometimes rather twisted and slightly gaping behind. They have two hinge teeth in each valve, and often distinct compressed lateral ones. The elastic cartilage is placed in a small triangular cavity just behind the hinge teeth. The cartilage has opaline reflections, and the cartilages of some large shells, as the mother-of-pearl shells, are sold by the jewellers under the name of Peacock-stone, or Black Opals. They are not so much used now as formerly, but they are still much sought after on the continent, especially in Portugal.—*Eng. Cyc. page* 185.

(215) AMPHIDONAX KARKA (*Lindl.*) Nat. Ord. GRAMINACEÆ. Arundo karka. *Retz. Roxb. fl. Ind.* i. 348. Dárma, *Beng.* grows in Bengal and the Peninsula of India. The common Durma mats at Calcutta are made of the stalks of this reed split open. In Sinde the culms are made into chairs and the flower stalks are beaten to form fibres which are there called Moonyah. These are used for strings and ropes, &c. &c.—*Royle. Roxb. &c. quoted in Useful Plants.*

(216) AMPHILOBIUM MUTISII. *Bignoniaceæ*—A pretty climber with purple flowers, well adapted for trellis work, in India.—*Riddell.*

(217) AMPULLARIA, a genus of fresh-water spiral univalve shells, which are found in the rivers and ponds of India, Africa, and South America. They are of a globular or rather depressed form, are covered with a thick olive or black periostraca, and often banded. Their mouth is ovate, with the lips complete all round, and often slightly thickened or reflexed. —*Engl. Cyc. page* 188.

(218) AMYGDALEÆ (Drupaceæ of Lindley), a sub-order of the natural order Rosaceæ. The leaves and other parts of the plant yield hydrocyanic acid, owing to which the species are all more or less poisonous: but other parts free from this acid, or possessing it in very minute quantity, as the succulent fruit and the kernel, are valuable articles of food, on which account they are much cultivated. The peach, nectarine, plum, cherry, almond, apricot, prune, damson, and bullace are produced by different species of this order, and many of them are considerable articles of import into India. The bark of *Amygdaleæ* yields a gum, which has similar properties to gum Arabic; and an astringent substance which gives some of the species so much efficiency in fevers, that their bark has been compared in utility to Peruvian bark.

(219) AMYGDALUS, a genus of plants, the type of the sub-order *Amygdaleæ*, comprehending the almond, and the peach and nectarine, besides a few bushes, the chief interest of which arises from their gay appearance.—*Engl. Cyc: p.* 188.

(220) AMYGDALUS COMMUNIS, common almond.

Louz, ARAB.	Amygdalæ dulces, LAT.
Kataping, BALI.	Louzan, MALAY.
Waloo luway, CYNG.	Baddam, PERS.
Baddam, DUK	Amendo. PORT.
Amandelin, DUT.	Mandel, RUS.
Amandes, FR.	Inghurdi, SINS.
Mandeln, GER.	Almendra, SP.
Buddam, GUZ.	Parsie vadamcotty, TAM.
Badam, HIND.	Parsie badam-vittooloo, TEL.
Mandorli, IT.	
Kateping, JAV.	

Faulkner.

Var. A. sweet, *Var.* B. bitter. A native of the Himalayas, the Mauritius, Taurus, Caucasus, and Hindoo Kosh; cultivated in Europe, abundant in Cashmere. Of this plant, there are two varieties of fruit, the sweet and the bitter almonds of commerce. The sweet almond contains 24 per cent of albumen and 54 per cent of fixed oil, the latter forming the principal product of the tree. It is colourless, very slightly yellow with difficulty congealed, taste sweet, smell light, agreeable and resembling that of the seeds. In all its properties and uses, it is nearly identical with olive oil: and forms the basis of the greater part of the liniments and ointments of the European Pharmacopœias. *Var.* B. *The bitter almond.*—(Kurwa Badam, *Beng.*) The fruit is smaller than that of the preceding variety: in every other respect the structure and appearance of the trees and fruits seem to correspond. The taste, composition, and properties are however totally different. This leads almost irresistibly to the conclusion that there must ex-

ist specific anatomical differences between the trees. It has indeed been asserted, but on very inadequate grounds, that the sweet and bitter fruits have been gathered from the same tree. Others state that culture will change the bitter to the sweet, as it has changed the sour crab to the delicious apple, and the bitter, half poisonous wild potatoe to its present state. On this point Lindley observes, that the sweet and bitter almond are only varieties of each other, chiefly differing in the quantity of prussic acid their seeds contain. No opinion is to be treated with more respect than that of Lindley on all botanical matters, but Dr. O'Shaughnessy expresses his belief that no prussic acid has yet been traced in the sweet almond. The sweet and bitter kind are imported into the northern parts of India from Ghoorbund, and into the southern parts from the Persian gulf. When the bitter almond deprived of its epidermis is subjected to cold pressure, it affords a large quantity of thick fixed oil, identical with that procured from the sweet almond. When the oil cake thus obtained is reduced to powder and distilled with water, a volatile oil passes over, of golden yellow colour, of strong odour of prussic acid, extremely poisonous, and depositing crystals on exposure to the air. This oil contains a large quantity of hydrocyanic acid; the oil combines with alkalies forming soaps and a *benzoate* of the base; acted upon by nitric acid it is also oxydized, and the same acid produced. It is very soluble in alcohol and sulphuric ether.—*O'Shaughnessy, pages* 319-20.

(221) AMYGDALUS PERSICA (Peach tree.) Shuft Aloo, *Pers*: This tree was introduced into Europe from Persia, where the fruit is very fine, and called Kulloo and Kardee-aroo, and Khookh, *Arab.* It is also found of fine quality in Mysore and China, and cultivated with success in Bengal and the Dekhan. The three varieties of this fruit met with in the Dekhan are a large round white sort, of a delicious flavor; the flat China; and a small thin-skinned description, more resembling an apricot in appearance, and much harder than the others. The peach is easily cultivated by seed or layers. A seedling will throw out blossom in the second year, and be ten or twelve feet in height: it requires to be carefully pruned, wintered, and watered. No branches should be allowed to grow on the stem closer than three feet from the ground; all spurious and misplaced shoots should be rubbed off before gaining strength to exhaust unnecessarily the juices of the tree; and all distorted leaves, the work of insects, of parasitic plants, mildew, &c. should be picked off and destroyed. The kernels of the peach should be carefully removed from the shell, and in no ways injured, required for planting: they should be sown small beds at the commencement of the rains, but eighteen inches apart, and as soon as the s are fit for removal, a good sized ball of earth must be taken up with the roots, to prevent the root fibres from receiving injury. All the buds around the stem had better be rubbed off by the hand, as far as requisite, and a proper shape be given to the tree, by cutting out all the superfluous spurs and their branches. The time for opening the roots of the peach is after the close of the rains: then remove the earth with care, so as not to injure the roots, for the space of three feet round the stem; pull off all the leaves, and cease to water the tree until the blossom buds appear; then cover up the roots with good loam mixed with old rotten manure; water freely every third or fourth day, until the fruit begins to ripen, when you must be guided by circumstances. It is necessary sometimes to thin the fruit, and also to put the peaches in bags, as they begin to ripen, otherwise the birds destroy them. In the Dekhan, peaches first come in about February, and with care may be continued until the rains commence, after which the excess of moisture received by the leaves and roots causes the fruit to swell and burst.—*Riddell.* The flowers are purgative, but also narcotic. Dr. Christison relates the case of a gentleman who was poisoned by taking them in salad as an aperient. The leaves and kernels on distillation yield abundance of prussic acid. The fermented fruit gives an excellent brandy, chiefly manufactured in the United States of America. The bark gives a large quantity of gum during the hot season.—*O'Shaughnessy, page* 222.

(222) AMYRIDACEÆ, *Amyrids*, a natural order of plants, consisting of tropical trees or shrubs, the leaves, bark, and fruit of which abound in fragrant resin. The species are natives of tropical India, Africa, and America. This order is remarkable for yielding various fragrant resins as Myrrh, Frankincense, and other products. The Frankincense of India is the produce of a species of Boswellia. Olibanum is yielded by *Boswellia serrata.* Myrrh is obtained on the Abyssinian coast from the *Balsamodendron myrrha. B. Opobalsamum* yields the Balm of Mecca. Bdellium is produced in Africa by *B. Africanum.* American Elemi comes from *Icica Icicariba.* Resin of Courina from *I. ambrosica,* The gum Elemi of commerce is said to be yielded by several species of *Amyris.* (Lindley, *Vegetable kingdom.*)—*Engl. Cyc. p,* 189.

(223) AMYRIS COMMIPHORA. This tree grows in India: its wood and resinous juice have a strong balsamic smell: its gum is called *Meisakshi,* Tel. and Hind. and *Mysashee,* Tam. —*Riddell.*

(224) AMYRIS HEPTAPHYLLA. *Amyridaceæ.* Karn-phul, HIND.—A shrub with alternate pinnate leaves, and small yellow flowers; the leaves when bruised have the smell of anise. —*Riddell.* Between the Pegu and Tounghoo districts the leaves of this tree, both dry and in a green state, are a favorite spice to the inhabi-

tants of that part of the country, where it grows plentifully.—*McClelland.*

(225) ANABAS, (from ἀναβαίνω, to ascend), *Tellee*, also *Pannei-eri*, TAM. *Palmyra Climber*, the name given by Cuvier to a genus of Acanthopterygious osseous fishes, remarkable for the power possessed by the species of living for some time out of water, and making their way on land. This power depends on a structure characteristic of the family of which it is the type, part of the pharangeals being labyrinthiform; that is to say, divided into a number of irregular lamellæ, more or less numerous, forming cavities and little cells capable of retaining a certain quantity of water. This apparatus is so protected that, when the animals are out of their native element, the evaporation of the contained water takes place very slowly, and the gills are kept moist, by means of which remarkable provision the fishes of this family are enabled to leave the rivers and marshes where they usually reside, and to travel over land for considerable distances, creeping among the herbage or along the ground. Although this fact has been but recently known to modern naturalists, the ancients appear to have been well acquainted with it, and Theophrastus has recorded the existence in India of certain little fishes which leave the rivers for a time, and again return to them: he doubtless alludes to the *Anabas* and its allies. —*Engl. Cyc. p.* 189. The genus *Anabas*, of which there is but one species, the Anabas scandens (*Perca scandens* of Daldorf, *Anthias testudineus* of Bloch), is distinguished by a well-marked character, the borders of its opercle, subopercle, and interopercle being denticulated, whilst the preopercle is not so, nor even distinctly marginated. The head is round and broad, the muzzle is very short and obtuse, the eye placed very near its extremity. The mouth is small, and large scales cover the head. The body is oblong, compressed centrally and behind. The lateral line is interrupted at its posterior third, recommencing a little lower. The tail is somewhat rounded. The whole body is covered with large scales. There is a single dorsal and an anal fin, nearly equal in height, and in both the spinous rays prevail.—*Engl. Cyc. p.* 189. In colour it appears to vary, being brown or bluish-black or dark green, paler beneath and having violet fins. In form the individuals are constant and reach the length of 6 inches.—*Engl. Cyc. page* 189. This fish inhabits all parts of India and the Indian Archipelago, living in marshes and in the back-waters, and feeding on aquatic insects, and Dr. Cantor, observed it at Chusan. Respecting its habits there has been much discussion. In 1797 a Danish gentleman, M. Daldorf, communicated an account of its habits to the Linnæan Society of London, in which he stated that he had observed it in the act of ascending palm-trees near marshes, and had taken it at a height of no less than 5 feet above the surface of the water, effecting its movements of ascent by means of its fins and tail and the spines of its opercles, in a similar manner to that by which it progressed along the ground. Another Danish observer, M. John, published a similar statement, adding that it is called in Tranquebar by a name which signifies palmira Tree-Climber. Other European naturalists, who have equally observed it in its native countries, such as Reinwardt, Leschenault, Hamilton and Buchanan, whilst they record its habit of creeping on the ground and living a long time out of water, deny or omit all mention of its power to ascend trees but we have frequently seen it climbing up rough surfaces.—*Engl. Cyc. page* 189.

(226) ANACARDIACEÆ, ANACARDS, or Cashew Tribe—are woody plants, abounding in an acrid resin: the juice is often used as a varnish, for which it is well adapted in consequence of its turning hard and black when dry. The extreme acridity of its fumes, however, which are apt to produce severe inflammation in many constitutions, render it dangerous to use: the Rhus or Sumac, the Pistacias Mango and Anacardium are genera of this order.—*Eng. Cyc.*

(227) ANACARDIUM OCCIDENTALE (*Linn.*)

Cashew-nut tree, ENG.	Parunkimavah, MAL.
Cola-Mavah, TAM.	The-ho-thayet, BURM.
Higilee Badam, Cajoo, HIND.	Jidi memidi, TEL.

This tree, indigenous to the West Indies, grows all over India, Burmah and the Tenasserim provinces, where, though scarce in the forests of Pegu, it is largely cultivated about Phoungyee houses and in groves near towns. It sometimes grows to a large size, and its wood is dark in colour, but not deemed of value in carpentry; it makes the best charcoal for iron smiths. It is very ornamental when in leaf, bearing sweet-smelling flowers, succeeded by a pea-shaped fruit of a yellow and red colour. The nut hangs at the end of the fruit outside; and is of a kidney shape. The fruit is very acrid and astringent. The pericarp of the nut produces a black acrid oil, which, owing to its caustic properties, is often applied to floors or wooden rafters of houses to prevent the attacks of white ants. It requires however to be used cautiously. This oil is called Cardole, also Cashew Apple oil, and is a powerfully vesicating agent. A valuable substringent gum is obtained from the trunk of the tree, useful as a good varnish, and ma[illegible] substitute for gum Arabic. It sho[illegible]aking a fair lected while the sap is rising. It i[illegible]uld be col- useful where the depredations of i[illegible]ctus particularly to be guarded against, and is use[illegible]insects require by the bookbinders, who wash t[illegible] and in S. America solution of it, in order to keep [illegible]eir books with a ants. The kernels, when roast[illegible]t thaway moths and [illegible]d, are edible and

wholesome, and are used for imparting a flavour to Madeira Wine. Ground up and mixed with cocoa they make a good chocolate. The juice which flows from an incision in the body of the tree will stain linen so that it cannot be washed out. The caustic oil of the coats of the nut is applied to warts, corns, ulcers, &c., but it is said that the vapour of the oil when roasting will produce violent swelling and inflammation. Martius says, "The sympathetic effect of the nut borne about the person upon chronic inflammations of the eyes, especially when of a scrofulous nature, is remarkable." The bark of the tree is given internally in infusion in syphilitic swellings of the joints. Lastly, an edible oil, equal if not superior to olive or almond oil, is procured from the nuts, and the fresh juice of the flower-stalks is used in lemonade. Wine and vinegar are also made of it by fermentation. The seeds or nuts form an article of commerce, and are said to yield a spirit by distillation, superior to rum or arrack and described as a powerful diuretic. The astringent juice of the fruit is highly recommended as a remedy in dropsical habits.—*Lindley. Pereira. Ainsl. &c. &c. quoted in Useful Plants. Riddell. McClelland. M. E. Jur. Rep. Jaffrey.*

(228) ANAGALLIS ARVENSIS, or pimpernel, is common in Europe and in India during the cold season; is an acrid drastic cathartic once much prescribed in insanity, epilepsy and dropsy. Wight in his Icones 1205 gives figures also, of A. cœrulia; A latifolia.

(229) ANAGALLIS INDICA. *Primulaceæ.*—A flowering plant, a native of Nepal, colour blue, of easy culture and propagated by cuttings, in any common soil.—*Riddell.*

(230) ANAMIRTA COCCULUS. (*W. & A.*) N. O. MENISPERMACEÆ. *Syn. A. paniculata, Colebrooke. Menispermum Cocculus L.—M. heteroclitum. Roxb.*

Kaka-collie, TAM.	Kakmari, HIND.
Kaki-chempoo, TEL.	Polla, or Kakandaka-conu. veh, MAL.

The seeds are called Kakmari ke beenj in the bazars. This is a strong climbing shrub, with the bark corky, ash-coloured, and deeply cracked into fissures; leaves roundish, acute, very slightly cordate, sometimes truncate at the base, hard, leathery, shining, smooth, with five digitate ribs, six inches long and as many broad: stalks shorter than the leaves, tumid at both ends; flowers in lateral compound racemes. Drupes two or three, globose, cotyledons distinct, linear, oblong, very membranous.—(*Lindley's Flora Medica. p.* 41) It is a native of Malabar, Travancore, the Circar mountains, and the Eastern Islands, is cultivated in the Botanical Garden of Calcutta and according to Dr. Helfer is indigenous in the Tenasserim Provinces. The seeds of this species are well known in commerce under the name of Cocculus indicus, or "*Coques du Levant*;" they are roundish, kidney-shaped, enclosed in a blackish brown, dry and wrinkled perisperm, within which the fruit is white, bivalvic and unilocular; the kernel is oily. They are devoid of smell, of extremely bitter taste, and poisonous in moderate doses. These properties are due to the presence of a peculiar principle named *Picrotoxic acid.* This acid is prepared by making a watery extract by acetate of lead; filter, evaporate to dryness in a water bath, dissolve in spirit, filter a second time, and continue evaporating and redissolving until the extract is perfectly soluble in alcohol and water. It now consists of picrotoxic acid and colouring matter. The latter may be separated by the careful addition of a small portion of water; the colouring matter is removed, and the picrotoxic acid remains. The seeds are poisonous to all animals, and even to vegetables. The general effects produced on the former are nausea, vomiting, tetanic convulsions, and insensibility; ten or twelve grains of the picrotoxic acid are sufficient to destroy a dog. Marcet proved by experiments that a solution prepared with an extract made with the seeds have killed a bean plant in twenty-four hours. Cocculus indicus is largely employed in Australia in destroying the parasitic animals which attack the skins of sheep. It is also used for stupifying fish; mixed with crumbs of bread and thrown into ponds, the fish which eat the crumbs become intoxicated, float on the surface, and are easily taken. It is well known that fish thus caught are exceedingly dangerous. It has been said that the seeds are often added to beer, which they render more intoxicating, but the truth of this accusation, has not been confirmed. The only use of the Cocculus indicus in medicine is as an external application, as a powder or ointment, to destroy vermin in the hair, and in the treatment of some cutaneous diseases. A considerable quantity of "Cocculus indicus" seeds is exported from Malabar and Travancore, and shipped for the London market, where the prices vary from 18 to 24 shillings per cwt. The exports from Travancore alone for 1854-55, were upwards of 75 candies. The imports for the English market are about 240 tons annually.—*O'Shaughnessy. Mason. Ainsl. Simmonds. Lindley. &c. &c. quoted in Useful Plants.*

(231) ANANAS SATIVUS (*Schult.*) Nat. Ord. BROMELIACEÆ. HEXANDRIA MONOGYNIA. Sex. Syst.

Pine-apple, ENG.	Ananas, DUK.
Pooreethee, MAL.	Ananas, TEL.
Anasie, TAM.	

The Pine Apple grows profusely in the Malay Peninsula, the Moluccas, the Philippine Islands and China, and it seems to have been introduced into India by the Portuguese, but it is now domesticated, indeed in parts almost wild. The delicious flavour of the fruit is well known. The plant succeeds well in the open air as far North as 30°, while in the southern parts of the Peninsula of India they form hedges, and will grow with little care and in almost any soil. The flav-

our of the fruit is of course greatly heightened by cultivation, being somewhat acrid in its wild state. The plants are remarkable for their power of existing in the air without contact with the earth, and in South America they may be seen in abundance hanging up in the gardens and dwelling-houses, in which situations they will flower profusely, perfuming the air with their delicious fragrance. The most important use of the Pine-Apple plant undoubtedly consists in the fine white fibres yielded by the leaves. These have been formed into the most delicate fabrics, as well as fishing lines, ropes, &c. Unlike other fibres they are not injured by immersion in water—a property much increased by tanning, which method is constantly used by the natives. In Malacca and Singapore a trade is carried on with China in these fibres, which are there used in the manufacture of linen-stuffs. As a substitute for flax they are perhaps the most valuable of Indian fibres. Dr. Royle states, "that a patent was taken out for the manufacture of thread from the Pine-Apple fibre, because, when bleached, it could be manufactured the same way as flax. The process of bleaching by destroying the adhesion between the bundles of fibres renders it much finer, and hence enables it to be extended between the rolls in the process of spinning." The Juries Reports in the Madras Exhibition of 1855 mentions its fibre as being fine, white and strong, of considerable length, very silky and susceptible of being split into the finest threads: very fine specimens of this were exhibited by the Madras School of Arts as tow, hackled flax, and refuse for making string. Also as thread, string, and line: clean specimens of the fibre were contributed from Cocanada, South Arcot, Tanjore, Bolarum, and Tranquebar. According to experiments by Dr. Royle, pine-apple fibre prepared at Madras bore 260 lbs., and some from Singapore 350 lbs. A rope of the same broke at 57 cwt. In other experiments a 12-thread rope of plantain fibre broke at 864 lbs., and a similar rope of Pine-Apple fibre at 924 lbs. *Royle. Ainslie. quoted in Useful Plants. Jury Rep. Mad. Ex.*

(232) ANANAS STRIATIFOLIA. RIBBON-LEAVED PINE APPLE. This is a very ornamental variety of the pine apple that has been introduced from Malacca, into the Tenasserim Provinces.—*Mason.*

(233) ANATHERUM, a genus of grasses, belonging to the group of which species yield fragrant volatile oil. *A. muricatum* now Andropogon, is the *Vetian* of the French and the *Khuskhus* of the Hindoos. Its fragrant roots are employed in making tatties, covers for palanquins, &c. It is administered medicinally, and has stimulating and diaphoretic qualities. *A nardus* is also, on account of the volatile oil it contains, called Ginger-Grass, or Koobel.—*Eng. Cyc. p.* 193.

(234) ANATIDÆ (*Leach*), the Duck kind, a group formed by Dr. Leach to include his genera formed by the great genus *Anas* of Linnæus [Ducks.]—*Eng. Cyc. p.* 193.

(235) ANCESTROLOBUS CARNEA (Zoungali, Burm.) and A. MALLIS. (Yinbya, Burm.)

These two timber trees, are plentiful in the Pegu and Tounghoo forests. The timber grows very tall, but seldom exceeds three feet in girth. Wood, dark-brown.—*McClelland.*

(236) ANCHOR.

Lungur, ARAB.	Lungur, PERS & HIND.
Ancre, FR.	Ancora, IT.
Anker, GER.	Ancla, SP.
Loolee, GUZ.	*Faulkner.*

A well known heavy hooked iron instrument, for fixing a vessel in a road-stead or harbour.—*Faulkner.* The Anchors for the larger sailing vessels are wholly imported into India. The *sheet, anchor, bower, spare, stream, kedge and grapnel,* are names given to anchors of various forms and sizes. The patent anchors of Mr. Stuard have one arm; as also have some of those of Lieutenant Rodgers, who has patented two single armed compound anchors, and a third which has two arms. His improvements are perhaps the greatest that have been made.—*Tomlinson.*

(237) ANCHOVY (*Engraulus*, Cuvier),

Anchois, FR.	Acciughe, IT.	*Faulkner.*

A genus of Abdominal Malacopterygious Fishes, separated by Baron Cuvier from the *Clupeæ*, or Herrings of Linnæus. The genus, as at present constituted, consists of six or seven species, all of diminutive size, and, with the exception of the common Anchovy (*E. encrasicholus*), and a nearly allied species distinguished from it by M. Cuvier (*E. meletta*), are all inhabitants of the tropical seas of India and America. Whether these latter wholly agree with the European species in the savour and other qualities of the flesh, for which it is so highly esteemed, is a doubtful question; at all events the fishing of the native species for export, has never been attempted in America or India. The common Anchovy of commerce is a small fish, not much longer than the middle finger, of a bluish-brown colour on the back, and silvery-white on the belly. It abounds in the Mediterranean along the shores of Spain, Italy, and Greece; in the Atlantic, it is found along the coasts of Portugal and France, and occasionally has been taken off the shores of England and Holland, as well as in the Baltic. Considerable fisheries of Anchovies are established along the coasts of Provence and Catalonia; but the most productive of all is off Gorgona, a small island west of Leghorn. If, when the barrels are open, the fish are found to be small and firm, round-backed, with a silvery-white skin and red flesh, and a plump compact form, they are probably the true anchovy; if, on the contrary, they taper very much towards the tail, or are of a dark brown colour without, and have flabby pale-coloured flesh, they will probably turn out to be the Sardine (*E. meletta*), another Mediterranean species frequently mixed with real anchovies, or

even sold separately as the genuine fish. The true Anchovy, Engraulis encrasicholus of Fleming (Lycostomus) grow from four to seven inches in length. The true Anchovy when bottled has the head and intestines removed; but the scales and fins, with the exception of the pectorals are allowed to remain. The fish is of small size, silvery, and rather flat, and the flesh of a salmon colour, but increases to a deep beautiful pink colour, when it is twelve months old. Anchovies are imported into England in barrels in brine made with rock-salt, and bottled in England; but of 28 samples of bottled Anchovies examined by Dr Hassall, in 1852, nearly all were found adulterated, with Dutch fish, Sicilian fish, Bole Armenian and Venetian red, not a third part consisting of true Gorgona Anchovies. The commercial value of "French fish," possibly an *Engraulis*, is about one-half that of the Gorgona Anchovy; that of the "Sicilian fish," is at least one-third less than the Gorgona Anchovy; and the "Dutch fish," also possibly an *Engraulis*, is likewise of very inferior value, and greatly inferior as an article of diet: sprats and sardines are also sold as real Gorgona Anchovies, but the sardine is a white fish.—*Hassall. Eng. Cyc.* The species of Engraulis at Madras are three in number; the Netteli or Teran Goonie, *E. albus*, is caught in the great nets, in immense numbers and by Europeans, highly esteemed for the breakfast table; and one about 6 inches long is very delicate eating. The Tamil names of the others are *Pota Nelteli* and *Maper Netteli*. (See ENGRAULIS.) *Jerdon.* The *gna-ping-nai-say*, of the Burmese coast and Tenasserim provinces, is considered by Dr. Morton to be the *E. Meletta*, or common sardine; but Mr. Mason, has no doubt it is an Engraulis.—*Faulkner. Mason.*

(238) ANCHOVY PASTE. Dr. Hassall's recent analysis of this substance showed the entire samples to be highly and even vividly colored with very large quantities of bole Armenian, and adulterated also with flour.—*Hassall.*

(239) ANCHOVIES, ESSENCE OF. No condiment is more generally known and esteemed than anchovy sauce. It was in use among the Romans, and was one of the kinds of sauce called Garum, which appears to have formed an indispensable article of seasoning in their most expensive and luxurious dishes. Dr. Hassall found the whole of the samples analyzed by him, to be adulterated with the ferruginous oxide, bole Armenian.—*Hassall. Eng. Cyc.*

(240) ANCHUSA TINCTORIA, Alkanet. A native of Europe, the root extensively used in dyeing. For this root those of the *Onosma echioides*, and *O. tinctoria* have been substituted. The *Onosma emodi* (Wall.) of the Himalayas is closely allied to this, and is called *Maha runga* from the intensity of its colour. The alkanet of Constantinople is produced by a different order of plants altogether, being the root of the Alcanna vera, (Natural order, *Salicariæ*.) *Fee.* —*O'Shaughnessy, page* 498. Its *red* principle Alkanet, or Orcanet, occurs in masses of brown colour, resinous fracture, melting at a low heat, soluble in alcohol, ether, and the fatty oils, which assume a red colour, remaining still transparent; less soluble in water, forming blue compounds with potash, soda, baryta, and with lime, decomposed by hot sulphuric acid, changed into oxalic acid by the nitric acid. The alcoholic solutions treated by several metallic re-agents afford some beautiful lakes. Orcanet is only employed in pharmacy as a colouring matter for ointments and pomatums. Its chief use is as a dye stuff, and for colouring sugared sweetmeats for confectioners.—*O'Shaughnessy, page* 496. The Anchusa plants are annuals and perennials, easily cultivated, and for ornamental purposes, may be planted in open borders; their colours are deep blue, and in some cases varied with red and white. —*Riddell.*

(241) ANDROGRAPHIS. Wight, in his ICONES, gives figures of the following species, viz. A. Ceylanica, 1560; echioides, 467; lobelioides, 1557; Neesiana, 1561; paniculata, 518; serpyllifolia 517; viscosula, 1559; Wightiana, 1558. We notice the following.

(242) ANDROGRAPHIS PANICULATA (*Wall.*) ACANTHACEÆ. *Syn.* Justicia paniculata, *Roxb. Fl. Ind.* i. p. 118.

Kala megh, BENG	Kiriatha, MAL.
Kalupnath, or Muha tita (great bitter), HIND.	Creat, DUK.
Kiriat, TAM.	Nella, TEL.

It is the Cara-caniram of Rheede, and in some parts of India it is known as the Vella-Vaymboo. A native of dry ground under the shade of trees; flowers in the wet and cold seasons. Celebrated as a stomachic bitter, and used in cholera and dysentery. It is the basis of the celebrated "*Drogue amere*," a compound of mastic, frankincense, resin, myrrh, aloes, and creat root, steeped in brandy for a month, and the tincture strained and bottled.—*O'Shaughnessy, page* 482. It is an annual plant, and according to Ainslie, it was originally brought from the Isle of France. It is cultivated in Tinnevelly and other districts; and is now found wild in Bengal and probably in the Peninsula. It is one of the plants from which the Chiretta of the bazars is obtained. See CHIRETTA.—*Ben. Phar.* 210.

(243) ANDROPOGON CALAMUS AROMATICUS is supposed by Dr. Royle to be the calamus aromaticus of the ancients; yields a volatile oil, erroneously termed oil of spikenard; the true spikenard of the ancients is supposed to have been obtained from the Nardostachys Jatamansi, a plant of the Valerian family. Dr. Royle regards this andropogon as the plant which yields the oil of Nemaur, known in Southern India as the Roosa Grass oil, which differs but little either in appearance or quality from the Lemon grass oil, is used for the same purposes and forms a good

substitute for the more expensive cajaput oil.—*O'Shaughnessy. Royle. Jur. Rep. M. E.*

(244) ANDROPOGON CITRATUM (*DC.*) Nat. Ord. GRAMINACEÆ.

Lemon-grass, or Sweet-rush, ENG.	Ghunda-bela, HIND.
Camachie-pilloo, TAM.	Sireku MAL.
Kamachie-kussoo, TEL.	Gnudho-bena, BENG.
	Sa ba-len, BURM.

A. schœnanthus, *Linn.*—Cymbopogon schœnanthus.—*Spreng.* This lemon-grass is a native of Arabia, but is cultivated in India, in the West Indies, Ceylon, Burmah, Tenasserim, and the Moluccas. The active principle of the leaves seems to reside in the essential oil which they contain, and which is obtained by distillation. This is known in commerce as "Lemon grass oil," and forms an important article of export from Ceylon, amounting in value to nearly £7,000 annually. It may be seen covering all the Kandian Hills, and so long as it is young, it is the best possible pasture for cattle. This species of grass is very hard, and grows to the height of seven feet or even higher, and has a strong but extremely pleasant acid taste. It derives its name, from having, when crushed, an odour like that of the lemon, so strong, that after a time it becomes quite heavy and sickening although grateful and refreshing at first. It is cultivated all over the Tenasserim provinces; a decoction of the leaves is deemed by the people efficacious in cholic. The leaves are used in India as a kind of Tea, and are deemed tonic and slightly stimulant. It is now cultivated very generally throughout the West Indies, in the gardens of the planters, as an elegant and powerful aromatic, and was doubtless introduced from the East. An infusion of the fragrant leaves, which are bitter and aromatic, is given to children as an excellent stomachic. It is also diaphoretic. Mixed with butter-milk the leaves are used in cases of ringworm; and the white centre of the succulent leaf-culms is used to impart a flavour to curries. The oil is of a light straw colour, but becomes red if kept long. It is much used in perfumery, as the oil of Verbena.—*Roxb. Lindley. Ainsl. Simmonds. &c. Mason. Useful Plants.*

(245) ANDROPOGON DIGITALIS, is mentioned by Simmonds, as Kus-kus grass, the oil of which, from Ulwar in Rajpootanah, was shown in the Exhibition of 1851.

(246) ANDROPOGON ESCULENTUM. Mr. Mason mentions that several species of andropogon, as the genus is described by Roxburgh, are among the most abundant of the grasses of Burmah, and one of these Dr. McClelland describes under the name of *Andropogun esculentum*, or Lemon grass, (Tsablain, Burmese) cultivated in small quantity in every village throughout the country, and to be had in all the bazars. It is a valuable article, and in a dry state might be found profitable for export. Mr. Jaffrey mentions that A. esculentum, (*A. Narthum-pilloo*, Tamil) is used in Madras to perfume water, which the people drink, and that a proportionate quantity imparts a pleasant flavour to tea.—*McClelland. Jaffrey. Mason.*

(247) ANDROPOGON IWARANCHUSA (*Roxb.*)

Iwaran-kusha, BENG.

Andropogon Iwaranchusa, this Roosa oil, has long been supposed to be the celebrated grass oil of Nemaur, but Dr. Royle, does not recognise the correctness of this opinion and refers the Nemaur oil to the A. Calamus Aromaticus, It is probable, however, that the several species furnish oils of similar characters. A. Iwaranchusa is a native of the low hills at the base of the Himalayas, and is also found at Asseergurh and in Malwah, generally. The roots of this fragrant grass are used by the Natives in northern India in intermittent fevers. In habit and taste it is similar to the A. citratum. The oil of A. Iwaranchusa is used as a stimulant internally and externally, much in the same manner as oil of cajeput.—*O'Shaughnessy.*

(248) ANDROPOGON MARITIMA? (Martini?) is mentioned by Simmonds as having been shown at the Great Exhibition of 1851, under the name of Newar oil and prepared at Agra from this species, but it is probably the following plant.—*Simmonds.*

(249) ANDROPOGON MARTINI (*Roxb.*)

Koobell, HIND.	Roussa-grass, ENG.

A fragrant oil is extracted from this species of grass known as the Grass Oil of Nemaur. It is also known as the ginger-grass oil. It is valuable as a rubefacient, and is employed as a substitute for Cajeput oil. The grass has a strong aromatic taste, scenting the milk of those animals which feed on it. It is considered by Dr. Royle to be the Sweet Cane of Scripture. It is frequently applied externally in rheumatic affections, being obtained by distillation. The scent is very fragrant and aromatic, and the colour is a pale straw. Much used in perfumery, and medicinally as a stimulant and diaphoretic. It has the power in a most remarkable degree of preventing the hair of the head from falling off after acute diseases, such as fever, or after confinement or prolonged nursing. It even restores it after it has fallen off. But it must be strong and pure, and not that usually sold by perfumers.—*Lindley. Royle. Pereira. &c. quoted in Useful Plants.*

(250) ANDROPOGON (ANATHERUM) MURICATUM.

Cuscus-grass ENG.	Khus-kus, BENG.
Vette-vayr, TAM.	Bena-useer, HIND.
Cooroo-vayroo, or Kussa-voo, TEL.	Pan-yen, BURM.

The Anatherum (Andropogon) Muricatum, a scented grass, grows naturally all over India, and the roots of which are much employed by the European residents, as well as by the Natives, for the manufacture of fans and thinly worked into bamboo frames, as screens, which, when damped with water, are employed for the purpose

of cooling the heated atmosphere in dwelling-houses during the hot winds. These are known as the Khuskhus tatties. An Atr or perfumed oil from this grass was shown at the Exhibition of 1851. In Burmah, the Karens, as well as the Burmese, cultivate little bunches for its fragrant roots. An infusion of the root is used medicinally as a gentle stimulant, and a grateful drink in feverish cases. The roots reduced to powder are given in bilious affections, and mixed with milk and applied externally, as cooling applications to the skin when irritated. They are fragrant, and aromatic to the taste, and contain a volatile oil, which is imported into England for perfumery. An ointment prepared with the oil has been employed in removing pediculi from the hair. A weak infusion is frequently given in cases of gout and rheumatism.—*Ainsl. Roxb. Pereira. &c. quoted in Useful Plants. Jur. Rep. Madras Exhibition. Mason.*

(251) ANEMONE, WIND-FLOWER; a genus of plants belonging to the natural order Ranunculaciæ, and consists of lowly herbs, usually perennials, with white or purple, or scarlet or even yellow blossoms, and which are succeeded by a cluster of grains, each terminated by a long, silky, feathery tail. On this account they are cultivated as ornamental flowering plants, but the Anemones possess, in common with others of the order, an acrid property. In cultivating them, in India, Dr. Riddell remarks that they require a strong rich loamy soil, at least a foot and a half in depth, and well mixed with old decayed vegetable manure, so that it may retain a moderate share of moisture. If not grown in beds, they must be in pots of a large size, and this will no doubt be found the best method of culture, enabling advantage to be taken of situation or such other circumstances as may be desirable. The plants should occasionally have the earth loosened around the roots, and the stems earthed up, taking care that the crowns of the tubers are never exposed, otherwise they will be seriously injured; they should be grown or kept only in such spots as may benefit by the morning and evening sun. In the selection of roots, choose those of a moderate size and form, without any hollow in the centre: when fresh, the roots are exceedingly brittle.—*Riddell. Eng. Cyc.*—*Anemone pulsatilla*, and *nemorosa* are described by Fee, Lindley, and others, as exceedingly acrid and corrosive. *Anemone cernua*, according to Siebold, is in high repute among the Chinese as a tonic bitter, under the name of Hak-too-woo.—*O'Shaughnessy, page* 160.

(252) ANETHUM GRAVEOLENS. Dill water is a commonly used carminative for the relief of flatulence, flatulent colic, and the hiccough of infants; and may be advantageously combined with a few grains of Magnesia or aromatic confection. In Pegu, Dill is occasionally seen, and the seeds are constantly for sale in the bazars. This plant is the *aneethon* of Dioscorides; and of Matthew's gospel, rendered in the received version *anise*. The Burmese do not distinguish it from carraway.—*Mason*. The Hakeems of Northern India believe the use of Dill seed promotes the secretion of milk, and they are given in flatulency.—*Honigberger. Useful Plants.*

(253) ANETHUM PANMORI. *Syn. Fœniculum Panmorium.*

Sonf. Panmuhori, HIND.

A native of various parts of India. Root white, nearly fusiform, and almost simple. Used in India as an aromatic in food and in medicine.—*O'Shaughnessy, page* 360.

(254) ANETHUM SOWA (*Roxb.*) Nat. Ord. APIACEÆ.

Sowa Dill, or Bishop weed, ENG.	Soya, HIND.
Satha-kooppa, TAM.	Sowa, Shuta-pooshda, HIND.
Saddapa, TEL.	Shatha-kooppa, TEL.
Shubit, ARAB.	Soolpha, BENG.
	A graveolens, WALL.

This plant grows in Bengal and is cultivated in the Peninsula, Burmah &c. Fruit aromatic and carminative and used by the natives in their curries and for medicinal purposes, especially to relieve flatulence and colic. The best form for adults is probably that of a few drops of the essential oil on sugar, or dissolved in spirit. By distillation the fruits of this and the next species yield a pale yellow volatile oil, sp. gr. 881, soluble in alcohol, ether, and in 144 parts of water.—*O'Shaughnessy, page* 366. Bruised and boiled in water and mixed with the roots, the seeds are applied externally in rheumatic and other swellings of the joints. The leaves applied warm and moistened with a little oil are said to hasten suppuration.—*Useful Plants.*

(255) ANGELICA ARCHANGELICA, *A. officinalis*, North of Europe in watery places. Root large, fleshy, branched, resinous, abounds in essential oil. The root is fragant, pungent, bitterish sweet at first, leaving a glowing sensation in the mouth, and exciting salivation. A good aromatic tonic; candied with sugar it is used in Europe in chronic colds, and as a diaphoretic; insects destroy it very speedily.—*O'Shaughnessy, page* 361. As a flowering plant in India, it requires to be raised annually from seed, should be sown in a well prepared bed and thinned, when 2 inches high, to 1 foot or 18 inches apart.

(256) ANGELONE GRANDIFLORA.—Commonly called Indian Larkspur, a flowering plant, very useful for flower borders; easily propagated by cuttings, growing in almost any situation, and constantly in flower; color blue.—*Riddell.*

(257) ANGELY, OR ANGILICA, according to Edye, the Malayalam and Tamil name of a tree which grows to two and a half and three feet in diameter, and from fifty to sixty feet high. It is described by Edye, as used for large canoes and snake-boats, and, if kept oiled, is very dura-

ble. Also, as used for planks, for native vessels, in consequence of its being very tough, and well fitted to hold the yarns where the planks are sewed together, which is the case with all the flat bottomed boats on the coast, where there is a surf on the beach, as at Madras, for the massula boat; at Mangalore and Calicut, for the manchee boats, &c.; and many of the pattamahs are fastened by paddings of coir on the joints of the planks &c.—*Edye, Malabar and Canara.*

(258) ANGUSTURA, CUSPARIAN BARK. A valuable tonic obtained from the stem and branches of the *Galipea Cusparia*. It breaks with a short and resinous fracture, is covered with an ash-coloured epidermis, is internally smooth, and of a dull brownish-yellow colour. Its odour is rather nauseous and fishy, and has a strong bitter flavour, accompanied by a peculiar and somewhat aromatic pungency. The plant is found in the warmer parts of South America, especially in the neighbourhood of Angostura in Columbia.—*Faulkner. O'Shaughnessy.*

(259) ANIME, GUM. This gum-resin is of a pale brownish colour, and is met with in commerce partly in translucent and somewhat unctuous grains or tears, and partly in large brittle masses. The commercial article is doubtless the product of three trees, the American Gum Anime or Courbaril Locust tree, the "Hymenœa Courbaril," also the Vateria indica or Gum Copal tree, and the V. Roxburghii, which yields almost a precisely similar resin. For ordinary purposes, these may be used indifferently; but Gum Anime is distinguished from copal (*Hind.* Chandroos), to which it has a great resemblance, in being readily soluble in alchol, and softening in the mouth. Mr. Mason mentions that the Courbaril locust tree has been introduced from South America into the Tenasserim Provinces and is easily propagated; the Vateria indica is a native of the Peninsula of India, and V. Roxburghii of the Tenasserim Provinces. Gum Anime is extensively used in the composition of varnishes, but in countries where it occurs indigenously, for flambeaux and tapers. It is a product when the tree is in a sickly state. It is yellowish, transparent, hard and friable; occurs in irregular fragments with brilliant and smooth fracture: it softens in the mouth and the true Anime is more soluble in alcohol than copal to which it has a great resemblance.—*Mason. O'Shaughnessy. Faulkner.*

(260) ANISEED.

Aneeson, ARAB.	Mungfi, Adis-manis, JAV.
Kadis-manis, BALI.	Anisum, LAT.
Anys, DUT.	Jeera-manis, MALAY.
Sonf, DUK.	Razyean-i-roomie, PERS.
Graines d'Anis, FR.	Anis, PORT.
Anis, GER.	Sataphuspha, SANS.
Anisu, GUZ.	Sumbu, TAM.
Anise, HIND.	Sumpu, TEL
Anise, IT.	Tsa-moun-tsa-bah, BURM.

Aniseed, the seeds of an umbeliferous plant, Pimpinella anisum, grows in China, Europe, Egypt, Persia and India. It is usually sown in a light soil after the rains, and allowed to remain where sown, thinning out the weaker plants. It is an aromatic, sweetish warm tasted seed: is an article of the *materia medica*, and is also used by confectioners and by the native physicians. It has the same virtues as carraway seed. The kinds met with in Bombay are the English and Persian.—*Faulkner. Riddell. Mason. Eng. Cyc.*

(261) ANISE, STAR. FLOWERED ANISEED.

Badian khutai, ARAB.	Skimmi, JAPAN.
Pa-co hu-huei-hiam, CHIN.	Badian-i-khotai, PERS.
Anas phool, DUK.	Anasepoo, TAM.
Badian, HIND.	

Star Anise: Badian-i-khutai or Chinese Anise, is the fruit of the *Illicium anisatum*, a small tree which grows in China, Japan and the Philiphines, and the name of *Star* is applied to them from the manner in which they grow, the pods being in small clusters joined together at one end, and diverging in five rays. They are prized for the volatile oil obtained from them, and for their aromatic taste. The barks have a more aromatic flavor than the seeds, but they are not so sweet. In China, their most common use is to season sweet dishes: In Japan they are placed on the tombs of friends and presented as offerings in the temples. They are chiefly exported direct to India, England, and the north of Europe, at the average value of 8½ dollars per picul. In 1850, 695 piculs were exported from Canton, valued at 8,200 Spanish dollars. In India they are much used in seasoning curries and flavouring native dishes, and large quantities are used in Europe in the preparation of liqueurs. 3,000 piculs of Anise are exported annually from Cambodia, and, in 1848, 81 piculs of oil of Aniseed, valued at 11,900 dollars, were exported from Canton.—*Morrison. Simmonds. Faulkner. O'Shaughnessy.* In preparing a spirit of Anise, the Star Anise, may be used instead of common Anise—*Beng. Phar. p.* 412.

(262) ANISOCHILUS CARNOSUM (*Wall.*) Nat. Ord. LAMIACEÆ DIDYNAMIA GYMNOSPERMIA. *Ser. Syst.*

Thick-leaved Lavender, ENG.	Litakee.pungerie, DUK.
Karpoorawullie, TAM.	Kautoo-kunka, MAL.
Kurroowehloo, TEL.	

A small plant, growing in the clefts of rocks among mountains in the Northern Circars, Malabar and Mysore. The fresh juice squeezed from the leaves of this plant and mixed with sugar and gingely oil, is used as a cooling liniment for the head. Leaves and stems are given in infusion to children in coughs and colds. The plant also yields a volatile oil.—*Ainsl. Rheede. &c. quoted in Useful Plants.* Wight also figures A. albidum, A. dysophylloides, A purpureum, A. suffruticosum.

(263) ANISOMELES MALABARICA. (Malabar Cat Mint.)

Pemayrutie, TAM.	Bootan kooshum, SANS.
Moga beerakoo, TEL.	

Syn. Ajuga fruticosa, *Roxb. Fl. Ind.* iii. p. 1.

Nepeta malabarica, *Ainslie*, vol. ii. p. 294, grows in the East Indies, the Isle of France, and is very common in Travancore. Ague patients are made to inhale the vapour arising from an infusion of this plant; this causes copious sweating. The leaves are bitter, astringent, and somewhat aromatic; they are given in infusion in the latter stages of dysentery, and in intermitting fevers to the quantity of an ounce and a half twice daily (*Ainslie.*) The juice expressed from the slightly warmed leaves is prescribed for children in fever, from dentition. The entire plant is deemed emmenagogue in the West Indies.—*O'Shaughnessy, page* 482. Wight gives also a figure of A. ovata.

(264) ANNELIDA (Cuvier), an extensive division or class of animals, established by modern naturalists partly at the expense of Linnæus's heterogeneous class of Worms (Vermes). It was Baron Cuvier who, in 1802, first proposed to distinguish the Annelida as a class, chiefly on account of their blood being of a red colour, as in the leech, and circulating by means of a double system of complicated blood-vessels. The name is derived from the Latin word annulus, a ring, because the animals arranged under this division always have their bodies formed of a great number of small rings, as in the earth-worm. Their external covering, or skin, is soft and pliable; and their bodies, having no bony skeleton, are soft and in general more or less of a cylindrical form. The *Annelida* are for the most part oviparous, but the leeches and earth-worms deposit what are termed capsules, or membranous cocoons, containing many embryo young. There is little variety in their mode of life. Some live in fresh and others in salt water; and others, like the Hair-worm (Gordius), are amphibious. Some species construct tubes in the interior of stones, or in shells, which they perforate, or in madrepores. Some species again form calcareous cases, or cement around them various foreign substances, particularly sand. The sedentary species are timid, and when taken from their retreats can neither escape nor defend themselves. The *Errantia*, on the other hand, are frequently very nimble, and can defend themselves well by means of their bristles. The principal family of this order is the *Hirudinidæ*, which comprehends not only the leeches properly so called, which live by sucking the blood of various animals, but also includes many other worms which derive their nourishment in a totally different way, and present corresponding differences in organisation. The affinities between the leeches and some of the setiferous Annelidans, as various species of *Nereis*, *Lumbricus*, *Planaria*, *&c.* are so close that they hardly admit of being arranged in separate orders, and others of the Leech tribe may even be confounded with some species of *Lerneæ* or *Epizoa*. The ancients appear to have only known the most common species of Leeches. Aristotle makes no mention of them, and they do not appear to have been used in medicine in the time of Hippocrates. Pliny describes them very clearly under the name of *Hirudines* and *Sanguisugæ*, and distinguishes two species. The Sea Leech is distinctly mentioned by Belon, Rondelet, and by all the writers on natural history since the revival of letters. More recently, Linnæus increased our knowledge of the number of species, of which he describes eight in the 12th edition of the 'Systema Naturæ.' Muller afterwards discovered five or six others, so that Gmelin, in his edition of the 'Systema Naturæ,' enumerated fourteen species. Since then, Shaw, Leach, Dutrochet, Savigny, Milne-Edwards, and others, have found many more, and the introduction of new zoological methods, has caused a necessity for arranging these various species in different genera. The True Leeches are all destitute of branchiæ or special organs of respiration; and this function has been supposed to be effected by means of the skin generally, but M. Milne-Edwards has recently stated (as was before observed by Cuvier) that "there exists in these Annelidæ a series of small membranous sacs, each of which communicates externally by a minute orifice situated on the ventral aspect of the body: these sacs derive from the numerous vessels which ramify upon their parietes a considerable quantity of blood; water penetrates into the organs, and seems to subserve a true respiratory purpose." But though the species of the family *Hirudinidæ* are not provided with distinct branchiæ, these organs are found in the genus which is generally associated with the True Leeches. In *Sanguisuga*, Sav., *Jatrobdella*, Blain., the anterior sucker has its upper lip divided into several segments. Its aperture is transverse, and it contains three jaws, each of which is armed on its edge with two ranges of very fine teeth, which enable these leeches to penetrate through the skin without making any dangerous wound. This genus contains the true Medicinal Leeches, eight species of which have been enumerated: the most common is the *Sanguisuga medicinalis*, *Hirudo medicinalis*, Linn: which is a native of all the stagnant fresh waters.—*Eng. Cyc. page* 212. *See* LEECH.

(265) ANOLA, HIND. Fruits of Emblica officinalis, roundish, blackish, grey, very wrinkled, obscurely six-sided; nut three-celled, each shell with two shining seeds.—*O'Shaughnessy.*

(266) ANOMATHECA CRUENTA. *Iridaceæ.*—A pretty flowering plant, showy when planted in a bed by itself, producing abundance of blossom of red and lilac colours, cultivated easily from seed.—*Riddell.*

(267) ANONACEÆ, ANONADS, the CUSTARD-APPLE-TRIBE, a natural order of plants consisting of tropical or subtropical trees and bushes, that usually abound in a powerful aromatic secretion, which renders the flowers of some

highly fragrant, the leaves of others a grateful perfume, and the dried fruits of many so highly aromatic as to vie with the spices of commerce; among these last is the Ethiopian Pepper of the shops, which is yielded by the fruit of *Uvaria aromatica*. Of others of this order, the fruit is succulent and abounds in a delicate juice, which renders it a pleasant article of food. Under the name of Sour-sop, Sweet sop, and Custard-Apple, many kinds are cultivated in the East and West Indies and South America. Finally, the bark of some separates readily into fibres which make excellent cordage: a large tree, called in Brazil Pindaiba, and by botanists *Xylopia sericea*, is advantageously employed for this purpose.—*Eng. Cyc. page* 214.

(268) ANONA CHERIMOLIA.—A succulent fruit of a dark purple colour containing a soft sweet mucilage, and is much esteemed by the Peruvians.—*Riddell.*

(269) ANONA MURICATA. Sour Sop. This fruit, resembling the custard apple, is sometimes cultivated by Europeans in the Tenasserim provinces.—*Mason.* This fruit tree grows also in India but it is a native of the West Indies. It grows to about the same size as the Bullock's Heart. The fruit is of a greenish colour when ripe, and has a rough thorny appearance: the flavour is very peculiar, differing from the other species of the Anonaceæ: the scent resembles that of black currants; the seeds are similar to those of the custard-apple. The fruit ripens in March; and in the West Indies is considered very cooling in fevers. It bears only once a year. The wood is inferior.—*Riddell. M. E. Juries' Reports.*

(270) ANONA RETICULATA. Bullock's Heart.

Ram-Phul, Hind. | Nona, Malay.
Rama Seta marum, Tam. |

This fruit tree grows to a large size. The fruit is so called from its fancied resemblance to the heart of the animal. The colour is a dark brownish red. When ripe, it is a soft, sweetish, pulpy fruit, but has not the fine flavor of the custard apple. It is ripe from November to June, but not much esteemed by Europeans.—*Riddell.* It is found in native gardens in India and Burmah.—*Mason. M. E. Juries' Reports. Crawford, Dict.*

(271) ANONA SQUAMOSA (*Linn.*) Nat. Ord. Anonaceæ.

Custard apple, Eng. | Ata, Beng.
Attha marum, Mal. | Ame-sa, Burm.
Seeta phul, Duk. | Sri-kaya, Malay.

This species, as well as the A. reticulata, (Sweet-sop, or Bullock's-heart,) and the A. muricata, (Sour-sop,) has long been naturalized in the East Indies. The fruit is delicious to the taste, and on occasions of famine, has literally proved the staff of life to the natives. This fruit was cultivated in the Burmese time to a great extent, and with much success, on the slopes of the hills about Prome on both sides of the river. Since our occupation of the country, the plantations have fallen into neglect, and although supplies of the fruit are still furnished, yet these are so to a much more limited extent, and as the plants now receive no care, the fruit will soon become scarce. This and similar sub-acid fruits form a considerable article of food to the Burmese, to whom they serve as a substitute for flesh-meat, being eaten with rice as an ordinary article of their daily provisions.—*McClelland.* It is very generally cultivated all over India, and grows wild in many parts of the Dekhan. The tree when cultivated and pruned, during the hot season, produces fruit afterwards of double the usual size. Dr. Royle says that the leaves of this plant have a heavy disagreeable odour, and the seeds contain a highly acrid principle fatal to insects, on which account the natives of India use them powdered and mixed with the flour of gram (Cicer arietinum) for washing the hair." A few leaves and some seeds put into a bed infested with bugs dispel these pests immediately.—*Royle. Gibson. &c. quoted in Useful Plants. McClelland. Riddell. Crawford.*

(272) ANT.

Cheonti, Hind | Irmboo, Tam. | Chima, Tel.

The Ants (*Formica*), are well known insects, which have attracted attention from the earliest ages, on account of the singular economy and extraordinary industry, manifested by the different species. Dr. Jerdon has given the following catalogue of the species found in Southern India, which he arranges according to St. Fargeau, who, in the 1st volume on the Hymenopteres in the Suites a Buffon divides the ants into four tribes, viz:—1st Tribe, Les Myrmicites, females with a sting. 1st segment of abdomen of 2 knots. This includes the following genera. 1st Cryptocerus. 2d Atta. 3d Ocodoma, differing from Atta in its larger head, and the presence of spines. 4th Eciton. 5th Myrmica.—2d Tribe, Les Ponerites, females with sting. 1st segment of abdomen of one knot only. It includes the genera Odontomachus and Ponera.—3d Tribe, Les Formicites, females without a sting. 1st segment of the abdomen of one knot only, and it contains the genera *Polyergus* and *Formica*.—Many of our Indian Ants cannot be well referred to any of these genera, but as it is probable that some new genera have been formed by recent writers, Dr. Jerdon in general contents himself with referring most of his species to one or other of those here characterized, and the following are his own remarks. "Following the arrangement of St. Fargeau, we have first the tribe of *Myrmicides* and the first genus mentioned by him, Cryptocerus, being American exclusively, we come to the genus *Atta* of Latreille, from which St. Fargeau has separated *Ocodoma*, the chief distinction being the spines which exist either on the head or thorax of the latter, which moroevet is said to have the head of variable size, whilst in Atta it is said to be usually not of a large size.

We have in India species belonging apparently to both groups which I shall now endeavour to describe.

(273) "TRIBE, MYRMICIDES. Gen. *Atta*. I possess 6 species of Ants, all of small size, which appear to belong to this genus, having a sting, two knots in the first segment of the abdomen, antennæ not concealed in a cleft, thorax without spines, and short palpi.

(274) "*Atta minuta*, new species. *Worker* barely 1-12th of an inch long, head oblong, eyes minute, advanced; thorax narrow; abdominal pedicles long, narrow, the first much more raised than the 2d; antennæ gradually thickening, of a rufous colour, with the abdomen somewhat darker or fuscous. Female about ⅓d of an inch long, similar in form to the Worker, abdomen larger proportionally, and head smaller. This minute species makes a temporary nest in various situations, in an empty box, between the back of a book and its leaves, even among the loose pages of a book, in an empty shell, &c. &c. Nothing is used in its construction, a shelter from the light merely being sought for. It is perhaps not very numerous in individuals, one wingless female is generally found in the nest. It is very common in the Carnatic and most of India, but I have not seen it in Malabar. It appears to prefer dead animal matter to saccharine or vegetable products.

(275) "*Atta destructor*, new species. *Worker* about 1-10th of an inch long, head oblong, not so long in proportion as in the last; eyes small, more medial than in the last, antennæ short; thorax narrow, slightly grooved, abdominal pedicles long, narrow, first higher than the second, abdomen oval; colour rufous, abdomen glossy brown. I have not seen the female. They live in holes in the ground, or in walls, &c., and are very numerous in individuals. They prefer animal to vegetable substances, destroying dead insects, bird skins, &c. &c., but also feed greedily on sugar. They are common in all parts of India, and often prove very troublesome and destructive to the naturalist.

(276) "*Atta domicola*, new species. *Worker* about 1-6th of an inch long, head oblong; eyes moderate size, medial; antennæ rather long, jaws strongly 4 toothed, thorax very slightly notched, abdominal pedicles narrow, first much raised, second slightly so, abdomen ovate, legs longish, head, thorax, and legs, deep red brown, abdomen blackish. This species of Ant does not seem to be common. I have only hitherto procured it at Nellore in a hole in a house, and I only saw one kind of individual.

(277) "*Atta rufa*, new species. *Worker* 1-8th to 1-6th of an inch long, head short, oblong; eyes rather small, medial; antennæ rather short, with the two last joints much enlarged; jaws linear oblong, strongly toothed; thorax slightly grooved, first abdominal pedicle lengthened, narrow in front, wide behind and much raised, second broader, not so high—of an uniform glossy rufous colour, with the end of the abdomen somewhat darker. *Warrior* variable, about ¼th inch long, head large, very square, slightly notched behind, smooth; eyes advanced, lateral; jaws oblong, quite entire, blunt; antennæ short, otherwise as in the ordinary Worker. Female about 7-24th of an inch long, head small, diamond shaped, eyes very large, 3 large ocelli on the top of the head, antennæ *not* geniculate, short; all the joints nearly equal; thorax thick in front, depressed behind, abdomen long; oval wings reach beyond abdomen. This Ant is the only one of the true *Atta* that has two kinds of neuter individuals, and in its form and general habits it approaches much to the next genus, Ocodoma; but as it wants the spines on the thorax I have referred it to Atta. It is very common in Malabar, but is also found in the Carnatic: it is found in holes under ground, about gravel walks, mud walls, and often appears in houses, coming through a hole or crevice in the floor, or wall. From a colony of them, every now and then, vast numbers of the winged females (and males) issue forth just before sunset attended as far as the window by swarms of the neuters of both kinds. Its favorite food is dead insects and other matter, but it also carries off seeds like the Ocodoma, chaff, &c. &c. It stings very severely, leaving a burning pain that lasts for several minutes.

(278) "*Atta dissimilis*, new species. About 1-10th of an inch long, head oblong, rounded; eyes moderate, antennæ suddenly thickening at the last joint, thorax very slightly grooved, abdominal pedicles narrow above, both equally raised, first rather more conic than the second; abdomen long oval, colour blackish throughout. I have only found this Ant in small numbers on trees in Malabar.

(279) "*Atta floricola*, new species. *Worker* not 1-17th inch long; head oblong square; eyes small, advanced; jaws linear, pointed, antennæ very short, last joint suddenly enlarged; thorax very slightly grooved, abdominal pedicles about equal, narrow, raised, abdomen long oval; thorax and legs dark rufous, head and abdomen glossy dark brown. I have obtained this very small Ant, of which I have only seen one kind of individual, in small numbers on flowers and leaves at Tellicherry, and it appears to feed solely on vegetable secretions.

(280) "*Gen. Ocodoma*. We now come to a set of Ants extremely numerous over all India, and comprising several species very nearly alike and probably confounded together by those who have not examined them thoroughly. Almost all the species that I have seen have two kinds of neuters, one of them of very large size compared with the ordinary Workers, and which are usually called Warriors. Some points in the history of the economy of these Ants have caused much interest

among naturalists at home with regard to the food of these little creatures. The chief distinction of *Ocodoma* from *Atta* consists in the former having some small spines on the thorax.

(281) "*Ocodoma malabarica*, new species. *Worker* $\frac{1}{8}$th of an inch long, head oval, eyes moderate, jaws rounded, triangular, pointed, and finely serrated; antennæ long and slender; thorax doubly notched and with some small tubercles especially two in the usual situation of the thoracic spines; first abdominal pedicle small and *conic*, second large, rounded; head, thorax and legs, rufous, abdomen blackish; legs long. *Warrior* $\frac{1}{4}$th of an inch long; head enormous, rugose, striated, deeply notched behind; eyes minute, advanced, lateral; jaws triangular bluntly toothed, and with an appendage at their base; thorax very rough, tubercled, with two minute rudimentary spines; first abdominal pedicle small, narrow, barely raised; second large, broad, raised, rounded; antennæ short; antennæ, legs, and abdominal pedicles rufous, the rest of the body blackish. This species of Ant appears to form a link between the two Genera *Atta* and *Ocodoma*, as shown by the rudimentary state of the thoracic spines. I have found it chiefly about houses, it runs rapidly, lives both on insects and other animal matter, and on sugar, bread, &c. At first sight I mistook it for a small species of Formica, mentioned hereafter, Formica vagans.

(282) "*Ocodoma providens*. (*Sykes*)? *Worker* about $\frac{1}{7}$th of an inch long; head somewhat *orate*, *bulging* slightly at the sides, and narrowed behind, notched posteriorly and with two points, rough and granulous; eyes moderate, central, thorax slightly grooved with two small spines on its posterior angles; first abdominal pedicle pointed, second longer, broader and rounded; *Warrior* with jaws pointed and finely toothed; thorax very rough; length $\frac{1}{4}$ inch, head large, otherwise similar. I am by no means certain if this be Colonel Sykes' species or not, and, indeed, without actual comparison, it would be very difficult to decide, so similar are the general features of these small Ants, of which I possess four very closely allied species from Southern India, and have only collected these from two or three localities, so that many other allied species may still exist. The habits and manners of all are very similar. They live under ground, making, for their size, a large series of excavations. Their common food I suspect to be animal matter, dead insects, &c. &c., which at all events they take readily, but they also carry off large quantities of seeds of various kinds, especially small grass seeds, and more especially garden seeds, as every gardener knows to his cost. They will take off cabbage, celery, radish, carrot and tomato seeds, but are particularly partial to the light lettuce seeds, and in some gardens, unless the pots in which they are sown be suspended, or otherwise protected, the whole of the seeds sown will be removed in one night. I have also had many packets of seeds (especially lettuce) in my room completely emptied before I was aware that the Ants had discovered them. I do not know, however, if they eat them or feed their larvæ on them, though for what other purpose they carry them off I could not divine. I have often observed them bring the seeds outside their holes, as recorded by Colonel Sykes, and this I think generally at the close of the rainy season, but in some cases I had reason to believe that it was merely the husks, of which I have seen quite heaps, and that the Ants did not take them back to their nests. If any of the forementioned seeds be sown out at once in a bed, most likely in the morning the surface of the whole spot will be found covered over with little ridges, the works of these creatures, and the few seeds that perhaps remain, dug all round, and being carried off sometimes above ground, at other times under ground. Their galleries and subterranean passages are often very extensive, and it is no easy matter to dig down to their nest to see what becomes of the seeds. I have not procured the male or female of this species.

(283) "*Ocodoma diffusa*, new species. *Worker* about $\frac{1}{8}$th of an inch long; head somewhat oval, nearly smooth, with a few scattered granules, slightly emarginate behind; eyes moderate size; thorax deeply grooved, with two small spines posteriorly: first abdominal pedicle very pointed, conic; second rounded of equal height: head, thorax and legs rufous; abdomen brown. *Warrior* $\frac{1}{4}$th inch long, jaw strongly toothed, head large, much striated, deeply notched behind; thorax more deeply grooved and tubercled; otherwise as in the Worker. This species appears to be spread over most of India, and has similar habits to the last.

(284) "*Ocodoma diversa*, new species. *Worker* about 7-48th of an inch long, head oblong, nearly smooth, emarginate behind; eyes small; jaws triangular, toothed; thorax but slightly grooved and with two longish spines posteriorly; first abdominal pedicle broadly conic, second rounded; head, thorax and legs dark marroon, abdomen blackish. *Warrior* nearly $\frac{1}{2}$ inch long, head very large, nearly smoothed, slightly striated; jaws lancet-shaped entire; eyes small, somewhat advanced, antennæ short, otherwise as in the Worker. I procured this Ant in the Wynaad where it is not uncommon. The difference between the worker and the Warrior is greater than in any other Indian species.

(285) "*Ocodoma affinis*, new species. *Worker* $\frac{1}{8}$th of an inch long; head nearly square, almost smooth, with only a few striæ; eyes nearly medial, smallish; jaws triangular, with two strong teeth at the external angle of the jaw, and two smaller at the internal angle; thorax very slightly grooved, with two curved spines posteriorly, first abdominal pedicle very narrow, long, conic pos-

teriorly, not much raised; second rounded, of equal height, broader; head, legs and thorax rufous; abdomen dusky. *Warrior* nearly 7-16th of an inch long; head and jaws striated, eyes very minute, head notched anteriorly; antennæ inverted in a deep groove; metathorax elevated; no palpi apparently. This Ant is very common in Malabar; is nearly allied to, but differs from, *Ocodoma diversa* in the toothed jaws of the Warrior, &c. &c.

(286) " *Ocodoma minor*, new species. *Worker*, length about 5-48th of an inch, entirely rufous, head oblong, smooth; eyes small; jaws long, somewhat triangular, toothed, last tooth prolonged; thorax slightly grooved, with two small spines in its posterior extremity; abdominal pedicles slightly raised, first long, conic; second rounded; both narrow above. Female 5-8th of an inch long, head nearly square, slightly notched behind, three ocelli on top of head; eyes large medial, head striated with a hollow for the base of the antennæ; jaws triangular, bluntly toothed at the two angles; antennæ short; thorax much raised anteriorly, and with two small posterior spines; abdomen long, oval, large. I, on one occasion, only, found a single individual presumed to be the female, which had lost her wings, under a stone in a garden at Tellicherry, surrounded by numerous workers, who were busy tending her, and removing some eggs or larvæ. It is the only female I have seen of this genus, and is well characterized by its large eyes, and ocelli.

(287) " *Ocodoma quadrispinosa*, new species. *Worker* nearly 1-8th of an inch long, head smooth; eyes small; thorax with two small spines anteriorly, and two large curved spines posteriorly; first abdominal pedicle long, raised, rounded behind; second also rounded, blunter, of equal height; head, legs, and thorax dark rufous; abdomen blackish brown. I have not seen the Warrior (if any) of this race, which I found during the monsoon forming a small temporary mud abode round the head of flowers abundant in Malabar. It appeared to be feeding on the vegetable secretions surrounding the seeds. Of these seven species of Ocodoma the first and last are very distinct from all the others, the first by having only rudimentary spines, and the last by having four spines instead of two. *Ocodoma minor* is readily distinguished by its smaller size; and the other four are most readily distinguished *inter se*, by the jaws of the Warriors, which in No. 10 is entire; in 11, with two teeth at each angle; in 9, with moderately strong teeth throughout its extent; and in 8, with the jaw very finely toothed.

(288)" *Gen. Eciton*. The characters of this genus are thus given by St. Fargeau. " Antennæ entirely " free, head elongated, and the thorax without " spines; maxillary palpi long, of 6 joints; jaws " linear; wings unknown." I have got four species of Ant which perhaps may be ranged under this genus, of which only one species is described, and that from South America, but it is more than probable that they will form a new genus, to which however I will not attempt to impose a name. My species have a long slender body, oblong head, large eyes, short antennæ, inserted very near the mouth, linear or oblong jaws, and sting very severely.

(289) " *Eciton ? rufonigrum*, new species. *Worker*, length about 11-24th of an inch; head square; attennæ short, first joint thickened; very long palpi, eyes large, lateral, posterior; jaws somewhat linear, oblong, with two strong teeth at the external angle, and bluntly toothed in the rest of its extent; thorax slightly grooved; abdominal pedicles very little elevated, first very long; abdomen long, ovoid; thorax, legs, abdominal pedicles and antennæ rufous, head and abdomen black. This Ant is very common in the Carnatic, less so in Malabar. It makes its nests in holes of trees, old palings, bamboo rafters and such like; it does not care for sweets, is never seen on flowers, but devours dead animal matter. I have not seen the female. It stings very severely.

(290) " *Eciton nigrum*, new species. *Worker*, length 9-24th of an inch, head long, eyes large, medial; antennæ short, the first joint not being so long as the head; jaws somewhat square, bluntly toothed; thorax low, barely grooved; both abdominal pedicles long, rounded, low; abdomen long, oval; sting very large. Colour uniform black. Female, length 11-24th of an inch, differs from the Worker only in having wings. This Ant like the last is rare in Malabar, but tolerably common in parts of the Carnatic; it has the same habits as the last, living in holes of trees, &c., and feeds in the same manner. On cutting open a dead branch on which they had formed their nest, many winged females, and larvæ and pupæ were found in different states of development.

(291) " *Eciton rufipes*, new species. *Worker*, length 11-48th of an inch; head oblong; eyes very large, slightly advanced; thorax considerably grooved, abdominal pedicles long, low; abdomen long, ovated, black, with rufous legs. I have only found this species on one occasion under a stone in the Salem district, and know not if it has the dendrophilous habits of the two last.

(292) " *Eciton minutum*, new species. *Worker*, about 1-6th of an inch long, black throughout, very slender; legs rather thick; palpi much exposed. I regret that I have not at present a specimen of this little Ant to describe from more fully. Its general structure however is exceedingly similar to that of its congeners, from which its small size sufficiently distinguished it. I have found it both in the Carnatic and in Malabar, almost always on trees, but do not know if it has its nest in holes of the wood or otherwise. Though

scarce in individuals, it is by no means rare, and I hope to be able to describe it more fully hereafter.

(293) "*Gen. Myrmica.* Gen: Char: Antennæ sufficiently exposed; head triangular, without spines; maxillary, palpi long, of six joints; jaws triangular; three cubital cells in the upper wings, the third incomplete, &c. Such are the characters assigned to this genus by modern authors. Whether the following species all belong to it or not I cannot decide, but judging from their differences I imagine that they form at least three groups. In the first group I shall place two or three nearly allied species, one of which has already been described by Col. Sykes as a *Myrmica*, so that this may be considered the typical group. Of this I have what I imagine to be three species, but all very closely allied to each other.

(294) "*Myrmica diffusa*, new species. *Worker*, rather more than 1-9th inch long; head wider than thorax, oblong, triangular, striated; antennæ rather short, basal joint barely longer than the head, inserted near the mouth; eyes large; thorax notched, with two small spines on the posterior angles, curving backwards; first abdominal pedicle longish, somewhat heart shaped, excavated, second obovate; both very slightly raised: abdomen triangular; head and body rufous; abdomen dark glossy brown. Female—head not wider than the thorax, which is not spined; length 5-12th of an inch; wings not so long as abdomen. Male—head very small, eyes large; antennæ with the first joint not elongated; no spines on thorax, which is much raised; wings reach beyond abdomen; length 1-7th of an inch. This is a well known and widely diffused species, being found throughout India. It makes its nest in holes in branches of trees, runs with its abdomen turned upwards almost over its head, especially when excited, and feeds on honey and other vegetable secretions. Occasionally they appear to form their nest among the roots of moss, orchideæ, and various epiphytic plants; at least this is the case in Malabar: and I cannot detect any marked difference of species, although it is possible that the two races may be distinct. It is very pugnacious, and bites very severely, not appearing to use its sting much.

(295) *Myrmica rufa. Worker*, length 9-48th of an inch, head shorter, proportionally, and eyes larger; thoracic spines longer, straighter; 1st abdominal pedicle longer and less raised than in the last; entirely of a rufous colour. This is a very closely allied species, and is found in the same localities as the last. Had I found it in a different tract of country, I would have perhaps considered it as a climatal variety, but its large size, and the few points enumerated above lead me to view it as distinct. Its habits are similar.

(296) "*Myrmica Kirbyii. Sykes?* I regret that I have mislaid my copy of the Entomological Transactions in which this Ant and several others were described, but the similarity of the nest and its general description led me to conclude that the species procured by me is identical with Colonel Sykes' one. Is very closely allied to the two last, has its thorax larger, rough, and much ridged; its thoracic spines larger; first abdominal pedicle somewhat diamond shaped; second, heart shaped; the abdomen strongly ridged longitudinally; head, thorax and legs dark marroon; abdomen dark brown. Length 7-48th of an inch. I have found this species chiefly in the elevated forests of the Wynaad. I cannot say that I have met it below the ghauts. It forms a considerable nest of some papyraceous materials, usually of an oval form, and placed round a small branch which supports it. It is very numerous in individuals, countless swarms issuing from it on being disturbed and boldly attacking the assailant both with teeth and sting. It feeds on honey of flowers and other vegetable secretions.

(297) "*Myrmica fodiens* new species. *Worker*, length 1-12th of an inch; head rounded, triangular striated; eyes large, posterior; jaws somewhat linear, four toothed; thorax raised in front, depressed posteriorly with two small spines on each side in front, and two tubercles above these, and two large nearly horizontal spines at the posterior extremity of thorax; first abdominal pedicle long, narrow, raised behind; second raised, rounded; abdomen somewhat triangular; head thorax, legs and abdominal pedicles marroon colour, abdomen shining brown. *Female*, head rather smaller proportionally, finely striated; eyes larger, three ocelli; jaws blunt without teeth; antennæ scarcely longer than the head; thoracic spines less developed; abdomen larger. This is one of the most common and abundant Ants in Malabar, I do not remember to have seen it in the Carnatic. It seldom enters houses, but otherwise appears to take the place of *Formica indefessa*, which is not found in Malabar. It feeds chiefly on honey and other vegetable secretions, but also will take dead animal matter. It also occasionally feeds on the secretions of the..... ... and is also found in the train of caterpillars feeding on leaves. It makes large excavations under ground, generally having the entrance round the trunk of a tree, and it forms considerable heaps of fine earth round the mouth of the nest. It runs, unlike the last species, with its abdomen turned downwards under the abdominal pedicles. It appears to form the type of a very distinct group from the last.

(298) "*Myrmica? tarda*, new species. *Worker*, length 1-6th of an inch; head somewhat triangular, square behind, of same width as thorax; eyes rather small, quite lateral, somewhat posterior; antennæ short, thick, inserted near the mouth; thorax short, square, ending in two spines on each side; it and the head rough and shagreen-

ed; abdominal pedicles much raised, long, narrow; abdomen triangular, also shagreened; head, thorax, legs, abdominal pedicles, brick red; abdomen dusky, dark blue. This is a very curious looking Ant. It lives in holes in the ground in small societies, and feeds on vegetable secretions. It moves very slowly. It is found both in the Carnatic and Malabar.

(299) *Myrmica? cæca*, new species. Ocodoma? *Worker*, length 1-5th of an inch; head somewhat oval, rather small; no eyes; antennæ short, thick, inserted near the mouth; an oblique groove on each side of forehead for the laying of the antennæ; jaws triangular, hooked at the tip, and finely serrated; thorax narrow, of uniform width, granulose, with an elevation posteriorly ending in two small spines; abdominal pedicles raised, rounded, pointed backwards, the first the highest; abdomen long, oval; head, thorax, and legs reddish brown; abdomen glossy brown. I found this curious Ant only once, under a stone in the Wynaad.

(300) "*2nd Tribe. Ponerites.* The single species of Ant which I place under this head appears to correspond pretty well with the characters of the genus which have already been given.

(301) "*Odontomachus rufus*, new species. *Worker*, length 1-4th of an inch; head bulging at the sides, narrowed in front; eyes of moderate size: anterior antennæ rather long, slender; jaws closely approaching at their base, long, linear, with three strong pointed teeth at the end; thorax narrow; abdominal pedicle raised, pointed and conic; abdomen long, oval; head, thorax and legs rufous; abdomen, dark brown. I obtained this Ant under stones in a jungle in the Salem district, and know nothing of its habits. I have since obtained one individual also in the Wynaad, which may be the warrior of this species—if the society consist of different individuals. It is 11-24th of an inch long, and appears only to differ, besides its larger size, in having the eyes smaller, and more advanced, the teeth of the jaw blunt, and the thorax finely striated.

(302) "*Harpegnathos, New Genus.* Gen: Char: Jaws scythe-shaped, pointed, and finely serrated; head oblong, notched behind; eyes very large situated at the anterior extremity of the head; antennæ rising between the eyes; abdominal pedicle slightly raised. I cannot class this remarkable Ant as an Odontomachus, and have therefore been compelled to institute a new genus for its reception; some of the characters given may not be generic, but till other species are discovered it is difficult to say which are, and which are not, of generic value.

(303) "*Harpegnathos saltator*, new species. *Worker*, 1-6th of an inch long; head long, granuled; jaws with a strong tooth near the base pointing downwards and inwards, and thence gradually tapering to the tip, and finely serrated; thorax barely grooved; abdominal pedicle small, low, ovate; abdomen very long; sting large; head and abdomen blackish brown, thorax and legs rufous.—Length 3-4th of an inch. I have not seen this remarkable Ant in the Carnatic. I first saw it at Tellicherry, and subsequently in other parts of Malabar. It is also found in the Mysore country, as I learn from Mr. Hamilton, a most talented and industrious Amateur Entomologist. I have given it the name of *saltator* from its power of making most surprising jumps which it does when alarmed or disturbed. It is very pugnacious, and bites, and stings very severely. It makes its nest under ground, generally about the roots of some plant. Its society does not consist of many individuals. It appears to feed on insects, which it often seizes alive.

(304) "*Gen. Ponera, Lat.* Its generic characters have been given above.

(305) "*Ponera sculpta. Worker*, length from 5-17th of an inch to nearly ½ an inch; head oblong, pointed in front and rounded behind; jaws large, triangular, armed with alternately a large and a small tooth; eyes very large, nearly medial; antennæ inserted on a line just in front of the eyes, rather long; thorax nearly uniform in width and height; abdominal pedicle raised, pointing forwards, with two small spines; abdomen long, cylindric; legs long; the whole body curiously sculptured, being channeled and grooved in different directions, longitudinally, circularly, obliquely, giving a peculiar *dull* appearance; colour blackish green. This is one of the commonest species of Ant in Malabar, extending from the level of the sea up to the top of the Neilgherries. It lives in the ground in small societies, often making its nest in a flower pot, occasionally under a large stone. It does not work in concert, being generally seen solitary. It lives on animal substances, but apparently will also take vegetable matter. I have seen two fighting for a ripe seed of the Lantana. I have not met with the female of this species.

(306) "*Ponera stenocheilos*, new species. *Worker*, length 3-8th of an inch; head large square behind, pointed and advancing anteriorly, widest in front of the eyes which are large; antennæ long; jaws very long, linear, ending in a strong tooth externally and a smaller one at the internal angle; thorax narrow; abdominal pedicle raised, rounded, pointing backwards; abdomen very long; sting large; legs long; colour dingy greenish brown. I have found this Ant very rarely in Malabar, and know nothing of its habits.

(307) "*Ponera processionalis*, new species. *Worker*, length 1-3rd of an inch; head oblong, advanced anteriorly; eyes medial, large; antennæ moderately long, thickened at the end; jaws triangular, strongly four toothed; thorax wide, not grooved; abdominal pedicle of equal width with the thorax, square, truncated; colour shining black. I have met this species over most of India. It lives in the ground in very numerous

societies, is most frequent in jungly districts. Occasionally a vast column of them, 3 or 4 deep, may be seen crossing a road, and I have traced the column for 40 and 50 yards. It stings very severely.

(308) "*Ponera affinis*, new species. *Worker*, length 1-3rd of an inch, head oblong, notched behind, advanced anteriorly; jaws triangular, strongly toothed; antennæ thickened at the tip; eyes somewhat anterior, moderately large; thorax slightly grooved; abdominal pedicle pointed, thin; abdomen oval colour dingy black. I have only procured this Ant once in Malabar and know nothing of its habits.

(309) "*Ponera rufipes*, new species. *Worker*, length 9-16th of an inch; head oblong; eyes anterior small; antennæ short and thick; jaws triangular, finely toothed; thorax not furrowed, truncated posteriorly; abdominal pedicle wide, thick, truncated, and excavated posteriorly; abdomen long, the division of the joint strongly marked; body rigid, furrowed, and channeled throughout; antennæ, legs, and end of abdomen dark rufous; rest of the body dull black. I have procured this Ant only on one occasion, hitherto, in Malabar.

(310) "*Ponera pumila*, new species. *Worker*, length about 1-5th of an inch; head oblong; eyes rather small, advanced; jaws triangular, strongly toothed; antennæ thickened; thorax smooth: abdominal pedicle long, square; abdomen long, cylindric; dull black, with rufous legs and antennæ. I found this Ant in Malabar, where it is rare.

(311) "*3rd Tribe. Formicites.* We now come to the last family containing those Ants that have no sting, and the abdominal pedicle of one knot only. It comprises two genera, Polyergus and Formica; but I do not think we possess any species of the former genus.

(312) "*Gen. Formica.* This genus comprises two distinct forms, the one with spines on the thorax, the other unarmed, which certainly ought to form two genera, inasmuch as this distinction is made to separate Atta from Ocodoma.

1st, without spines on the thorax.

(313) "*Formica compressa*, FABR.? Syn. F. indefessa, Sykes. *Worker*, length 4-10th to ½ an inch; head oblong, notched behind; eyes medial, of moderate size; jaws triangular, toothed; antennæ long; thorax widened anteriorly; abdominal pedicles somewhat diamond shaped above, much raised and thin as seen laterally; legs rufous, the rest of the body black. *Warrior*, 6-10th of an inch long; differs from the ordinary *Worker* in the head being proportionally much larger, and the jaws having blunt teeth. *Male*, length 4-10th of an inch; has a small triangular head, lateral eyes, three ocelli, the thorax raised in front, and the abdominal pedicle broader; wings do not reach to end of abdomen. *Female*, 5-8th of an inch long; very similar to the male, has the jaws strongly toothed, somewhat oblong; and the abdomen proportionally large. This species, well known in India as the black Ant, is found throughout every part of this country which I have traversed, except the Western Coast where I have never seen it. It appears to me that it is most probably the species described by Fabricius whose name I have accordingly adopted. It lives in very numerous societies in the ground, the entrance to the nest being often round the trunk of a tree, or close to some building. The Warriors are very numerous. Their food is chiefly vegetable secretions, sugar, &c., and Colonel Sykes has given an interesting account of the devastations committed by them on preserves, sugar, &c., which I regret that I cannot transcribe, having mislaid the volume of the transactions of the Entomological Journal in which it appeared. They bite rather severely, but the pain is quite momentary. At certain times great numbers of the winged males and females are seen at the mouth of the nest, and they remain there for several days. When they take wing, they do so in vast numbers, and always at night.

(314) "*Formica angusticollis*, N. S. *Worker* ½ an inch long; head long, oblong, ending posteriorly in a narrow neck; eyes posterior, of moderate size; jaws triangular, strongly toothed; antennæ long; thorax low, narrow, uniform; abdominal pedicle conical, high, narrow; abdomen oval; colour dull black, with antennæ and legs rufous. *Warrior*, 8-12th of an inch long; head very large, notched posteriorly; eyes much smaller; otherwise similar. I have only found this Ant in forests in Malabar and always sing-

(315) "*Formica smaragdina*. *Worker*, length about 4-10th of an inch; head long, triangular; antennæ long; eyes large, medial; jaws triangular, pointed, with sharp teeth; thorax not furrowed; abdominal pedicle, long, low, narrow, linear; legs long: colour of an uniform pale rufous. *Male* 7-24th of an inch long; head diamond shaped; eyes lateral, small; thorax raised in front; abdomen small; wings reaching beyond the abdomen; of a rufous colour. *Female* 7-10th of an inch long; head short, triangular; eyes lateral; three ocelli; thorax very large, with abdominal pedicle wide in the middle as viewed from above, very thin laterally; abdomen large; wings reaching beyond abdomen; entirely of a pale shining green colour. This Ant is well known in Malabar, and the wooded parts of Travancore, but is rare in the Carnatic, where I have only seen it in one or two large mango groves. It forms a nest of living leaves which it draws together without detaching from the branch, and unites with a fine white web; sometimes a nest is above a foot in diameter but usually smaller. The society consists of a vast number of individuals, and in large nests we find males and females and males, both with and without wings at all times of the year. They are

bold and pugnacious, and bite very severely. They live chiefly on vegetable secretions, and are very partial to the flowers and buds of some of the Loranthi, which abound on the Western Coast. They often form a temporary web round the flowers or sometimes round the fruit of various trees, viz. the Eugenia malaccensis, Artabothrys odorotissima, &c. apparently only for the purpose of feeding undisturbed, they will however also sometimes feed on decaying animal matter. It is said that the web they form is occasionally used for writing on in the N. W. Provinces of India, and that the Ants are made use of to destroy a nest of wasps that may have established themselves in a house. In this case they are said to destroy all the wasps but become so infuriated, that their own indiscriminate attacks are nearly as bad as those of their foes. In gardens they are most partial to mango trees, and also to the large leaves of the Jamei Malae, (Eugenia malaccensis), but in the jungles they select a vast number of trees, or rather make no selection at all.

(316) "*Formica longipes*, N. S. *Worker*, length 1-5th of an inch; in form exceedingly similar to the last; head more oblong than triangular; eyes more posterior; antennæ very long; abdominal pedicle shorter, proportionally; abdomen a longer oval; legs very long of a pale rufous colour throughout, tinged with dusky on the abdomen. This Ant is found in all the forests of India living in holes in the ground, in tolerably numerous societies, and feeding on vegetable secretions. I have not seen it at any distance from the jungles. At Tellicherry, for example, I have never seen it, but as soon as you go a little inland and get into the jungle you meet with it. It is often found about bungalows and out-houses.

(317) "*Formica timida*, N. S. *Worker*, length 9-24th of an inch long; head oblong, oval; eyes large, posterior; jaws triangular, strongly toothed; thorax smooth; abdominal pedicle raised, conical; colour dingy rufous, darkest on the head, and tinged with dusky on the abdomen. All the body covered with long scattered hairs. *Warrior*, ½ an inch long; differs from the ordinary *Worker* in the head being much larger proportionally, and notched posteriorly; thorax thicker; and the abdomen shorter. *Female*, like Worker, but somewhat larger, with wings, and 3 ocelli. *Male*, 7-24th of an inch long; thorax much elevated; eyes large; head small; 3 ocelli; wings reach beyond the abdomen. I have only found this Ant on the Malabar Coast where it is very common, living chiefly on vegetable secretions. It has its nest under ground. It is very different in habit from the other large red Ant (F. smaragdina) being most timid, and if approached or touched, dropping to the ground at once and hiding itself. It does not always confine itself to vegetable matter. On one occasion I had a box of pigeons containing some squabs placed in a room on the floor. I next morning found several of the squabs dead covered with these Ants, chiefly however the warriors

(318) "*Formica stricta*, N. S. *Worker*, length 7-20th of an inch; head nearly square, slightly narrowed anteriorly; jaws rough, triangular strongly toothed; eyes large, posterior; prothorax wide, metathorax narrowed; post-thorax in the form of a rounded raised narrow platform ending in two points, and truncated; abdominal pedicle blunt, rounded, raised; abdomen short oval; antennæ rufous, head and thorax dull greenish black, shagreened; abdomen shining glaucous green; legs shining black. I have found this Ant on flowers in Malabar, but have not seen its nest; it is not a very common species

(319) "*Formica cinerascens*, *Fabr.*? *Worker*, length 3-8th of an inch; head large, eyes rather small posterior; jaws strongly toothed; thorax wide in front, narrowed behind, with two glands on each side above; abdominal pedicle elevated, conic; abdomen oval; colour dull black, except the abdomen, which is glaucous green, and somewhat pubescent. *Female* ½ inch long nearly; head smaller, thorax not so wide; abdomen long oval; wings not reaching to the end of abdomen. *Male* 3-12th inch long; similar in form to the female, but with much narrower abdomen, and head still smaller proportionally. *Warrior* 5-12th of an inch long; head large; antennæ short; eyes minute. This species lives in the ground in small societies. I have only seen in the Carnatic. It is described as having the head fulvous, and a triangular spot on the abdomen, but as it is said by Fabricius to have been sent from Tranquebar, in the vicinity of which I have seen our present species, I think they are probably identical, and that the difference of colour is accidental, especially as there are only two species common in the Carnatic with glaucous abdomen, this and our F. rufoglauca.

(320) "*Formica velox*, new species. *Worker* length 5-24th inch to 6-24th; head long, oblong, eyes posterior, large; jaws strongly toothed; antennæ long; thorax smooth; abdominal pedicle raised, somewhat rounded, wide above; abdomen with the divisions of the segments strongly marked; legs long, colour dull blackish, with the abdomen greenish pubescent. This Ant is very common in Malabar and I think is also found in the Carnatic. It frequents flowers, especially delighting in those that have great quantities of pollen, such as the Cucurbitaceæ, Hibisci, &c. It runs very speedily, and is very easily alarmed, dropping to the ground on being touched. I have not succeeded in finding its nest.

(321) "*Formica rufo-glauca*, new species *Worker*, 7-24th inch long, head long, oblong, eyes large, posterior; jaws strongly toothed; thorax not grooved; abdominal pedicle raised conic, wide above; abdomen fine silky glaucous green; head, thorax and legs bright rufous

Warrior, 9-24th inch long, head large; eyes much smaller; antennæ shorter; abdominal pedicle flattened posteriorly; abdomen short and triangular; colour similar. I have found this Ant only in the Carnatic in small societies living in holes in the ground. It is possible that this may turn out to be Fabricius' species *cinerascens*.

(322) "*Formica vagans*, new species. *Worker* 3-24th inch long, eyes large, medial; antennæ long; abdominal pedicle raised, rounded; legs very long. *Female*, 3-24th inch long; the thorax shorter and wider, and abdomen very large, wings reaching beyond the abdomen. This little Ant is exceedingly common in the Carnatic, but I have not yet seen it on the Malabar Coast. It takes up its quarters in any sheltered spot in a house, under a box, a stone, a hole in the wall, or such like places, and when disturbed flits with great speed to another suitable spot. Its society is very numerous in individuals and there are many females and males, sometimes with, at other times without, wings. It feeds both on vegetable and animal substances preferring the former like all the true Formica.

(323) "*Formica assimilis*, new species. *Worker*, exceedingly similiar to the last. Length, 3-24th of an inch, differs in its colour chiefly being of a shining reddish black, in its eyes being apparently large, the thorax narrower, and in being covered all over with scattered white hairs, I have found it frequenting flowers in Malabar, but not abundant.

(324) "*Formica phyllophila*, new species. *Worker*, length 7-48th of an inch, eyes small, anterior, jaws triangular; thorax slightly furrowed posteriorly; abdominal pedicle thin, low, linear; abdomen large triangular; legs, antennæ, rather short: colour shining brown black. This little species forms a temporary nest between two leaves usually, or sometimes in a head of flowers; it lives in small societies, and feeds entirely on vegetable secretions.

(325) "*Formica nana*, new species. *Worker*, length not 1-12th inch; eyes anterior, thorax wide; abdomen long, elliptical; head and thorax brown; antennæ, legs, and abdomen pale whity brown. This very minute species is found in all parts of India and is very abundant in Mysore: from its very small size it is noticed with difficulty. It feeds on flowers and vegetable secretions.

2ndly. With spines on the thorax.

(326) "*Formica indificans*, new species. *Worker*, 5-24th of an inch long; head triangularly ovate, elevated; eyes moderate; jaws strongly 3 toothed; thorax wide anteriorly, narrowed behind, with two small spines anteriorly pointing forwards, and two large ones behind, pointing upwards and backwards, and two rudimentary spines or points behind and beneath these latter; abdominal pedicle square, raised with two large upright spines, and a smaller one on each side; abdomen short; head and abdomen rufous, thorax dark glossy brown. *Female*, 1-3rd inch long, similar to the worker; 3 ocelli on top of head; wingless. This Ant makes a small nest about ½ inch, or rather more, in diameter, of some papyraceous material, which it fixes on a leaf. I have opened two, each of which contained one female and 8 or 10 workers. It is very rare, and I have only seen it in Malabar.

(327) "*Formica sylvicola*, new species. *Worker*, 3-12th long; head narrowed in front, and rounded behind; eyes posterior, salient; antennæ inserted in front of the eyes, with a strong crest bordering their insertion internally; jaws short, with 5 teeth, the upper one much the longest and bent; thorax, wide; with two spines on its anterior angles, and two stronger ones posteriorly pointing backwards and upwards; abdominal pedicle large, square, ending behind in two large curved spines pointing backwards and outwards, and two points or tubercles behind and between them; abdomen short, oval, colour dull black, abdomen shining glaucous green. *Female*, 9-24th inch long, differs in the anterior thoracic spines being apparently shorter, and in having 3 ocelli; wingless. This Ant has the same habits as the last, but is not found except in the jungles. It appears very closely allied to *F. hastata* of Latreille from India, and to several other species said to be from Southern Asia; and as some of these *may* be found in India, I add here a brief description of them taken from St. Fargeau's work on Hymenoptera.

(328) "*Formica serspinosa*, Latr. Body black, covered with a fine silky yellowish down, especially on the abdomen; head oblong; narrowed posteriorly: antennæ long; posterior angles of the head salient; jaws large, triangular, with 3 or 4 teeth; eyes small globular, salient; thorax with two spines anteriorly on its lateral angles, and two on the posterior extremity pointing backwards; abdominal pedicle thick, rounder in front, truncated posteriorly with 2 spines *almost as large* as those on the posterior extremity of thorax; length 7 2-3rd lines (French); from Southern Asia.

(329) "*Formica hastata*, Latr. Black, finely shagreened and slightly hairy, head short; antennæ long; jaws short with small teeth, and a larger curved one at the end; space between the antennæ elevated with an arched crest on each side; eyes small, round; thorax cubical, compressed, its surface flat and the ridge on each side sharp, anteriorly wide and square with a spine on each side at the numeral angles, strong, sharp, straight, and reaching to the head; its posterior part truncated with a strong spine at each angle pointing obliquely upwards; abdominal pedicle large, triangular, with its upper edge concave, a small tooth in the middle, and a strong arched spine on its lateral angles directed backwards, with a little tooth beneath each. Length 4 lines. Hab. India.

(330) "*Formica reluceus*, Latr. Exceedingly e the last (*F. hastata.*), differs in the following ints—body covered with silky, golden, shin- ; down, with a few larger hairs ; thorax with o spines anteriorly and none posteriorly ; ab- minal pedicle with 4 spines, the upper ones irly straight ; length 4 lines. From Southern ia.

(331) "*Formica Ammon*, Latr. Very like the o last, body black, striated, with a few hairs ; orax ashy ; anterior angles advanced ; posterior- the lateral angles prolonged into a large, aight spine, pointing backwards ; abdominal licle large, triangular ; with the upper angles olonged into a very long curved spine, directed ckwards ; abdomen covered with a silky gold- down—length 2 1-5th lines. From Southern ia.

(332) "*Formica carinata*, Fabr. Head rounded, ck ; thorax black, divided into three by two p transverse lines ; the anterior portion with pine on each side directed forwards ; and the sterior part with two small straight spines ; dominal pedicle large, square with two raised rp bent spines. Length ? of medium size. uthern Asia."

"I have very little doubt but that many more cies of Ants will be discovered even in the uthern portion of the Peninsula, and I myself pe to add others to the present list, and more ecially to gain additional information on their its."

(333) ANT-EATER (*Myrmecophaga*, Linnæ- , a genus of *Edentata* distinguished by their al want of teeth and their hairy covering. The ter circumstance separates them from the Pan- lins (*Manis*), or scaly Ant-Eaters of Africa and ia, which they resemble closely in other re- cts, as well in their general anatomy as in their d and habits. These two genera form a small t very distinct family of Cuvier's order *Eden- a.—Eng. Cyc. page* 223.

(334) ANTHEMIS NOBILIS.

Camomile, or Chamomile, ENG. | Baboone phool, PERS. and HIND.

Off. The flowers. A native of Europe and rsia. Besides essential oil and bitter matter, nomile flowers contain gum, resin, and traces tannic acid. Camomile flowers afford in Eu- e a cheap and efficient antispasmodic and bit- tonic. They are much used in infusion as vehicle for other medicines employed in the atment of hysteria, colic, suppressed menstru- on, &c. The warm infusion taken freely after trate of antimony and ipecacuanha much faci- tes the action of these emetics. The powder been employed to the extent of two drachm es as a preventative of ague, and it is stated, good authority, with much success. The es- tial oil is in proportion more powerful as an ispasmodic than the other preparations, but is titute of tonic or emetic properties.—*O'Shaugh- sy, page* 413. In doses of two drams of the powdered leaves, they are reputed febrifuge. Ex- ternally they are used in infusions as fomenta- tions, and occasionally as enemas.—*Eng. Cyc. Waring.*

(335) ANTHEMIS PYRETHRUM.

Pellitory, ENG. | Akurkura, or Akurakarra HIND. TAM. and TEL.

Anacyclus Pyrethrum, D. C. Pyrethron. Diosc. iii. p. 86. A native of the south of France, Bar- bary, &c. *Off.* The roots. Akurkura or Pyre- thrum root is used as a masticatory to relieve toothache : enters into the composition of certain snuffs, and the powder is used in large quanti- ties by the Mahomedans to excite transpiration, being rubbed on the skin ; it is used internally also as a cordial and stimulant in lethargy and palsy, and in certain stages of typhus fever. Dr. O'Shaughnessy was acquainted with two remark- able cases of spontaneous salivation of the most obstinate form, which after resisting every other treatment for more than three months, were ef- fectually cured by this root.—*Dr. O'Shaughnessy, pages* 413, 414.

(336) ANTHERICUM ANNUUM—*Liliaceæ*, This genus of flowering plants comprises both bul- bous and shrubby species, and may be grown in a light loamy and sandy soil, the shrubby species can be propagated by cuttings, and the bulbous kind from off-sets.—*Riddell.* Wight gives a figure of A. tuberosus.

(337) ANTHISTIRIA. Mr. Mason noticed in the Karen jungles a large grass with lax panicles and very long awns belonging to this genus.—*Mason.*

(338) ANTHRACITE from *Anthrax* Gr. Charcoal, a black, light, mineral, called also blind- coal, because it burns without flame ; and glance-coal from its lustre. *See* COAL.

(339) ANTIARIS SACCIDORA (*Dulz.*) Nat. Ord. ARTOCARPEÆ. MONÆCIA MONANDRIA. *Sex. Syst.*

Sack tree, ENG. Araya-affjely, MAL. | Juggoory, Kurwat, CAN. MAH. Chundul, HIND.

This gigantic forest tree is indigenous on the western side of India, as in the ravines at Khandhalla and the jungles near Coorg, and is known as the Sack tree, the Sacks made from it being in general use for carrying rice, and are sold for about 6 annas each. In their manu- facture a branch is cut corresponding to the length and diameter of the bag wanted. It is soaked a little, and then beaten with clubs until the inner bark separates from the wood. This done, the sack formed of the bark, is turned in- side out and pulled down, and the wood is sawed off, leaving only, carefully untouched, a small piece to form the bottom of the sack. The natives also strip the bark of this tree into large pieces, soak it in water, and beat it well, when it be- comes white and furry, and in this state, the Hill people use it as clothing. Paper is also made from the bark. The inner bark is composed of very strong tenacious fibres, and seems excellent-

ly adapted for cordage and matting. The nuts are intensely bitter, and contain an azotized principle, which may prove an active medical agent. In the Northern Concans, the natives call the tree Jugooory and Kurwut; also Chundul. On wounding the fruit a milky viscid fluid exudes in large quantities, which shortly hardens, becoming of a black and shining colour, and of the consistency of bees-wax. —*Royle. Useful Plants. Eng. Cyc.*

(340) ANTIARIS TOXICARIA (Leshenault.)

Upas tree, ENG. | Anchar, MALAY.
Ipo toxicaria, PERS. |

A native of Java. The juice of this tree is one source of the half fabulous Upas poison. The tree is often over 100 feet in height, its bark pale and smooth, its leaves oval, coriaceous, hairy, juice viscous, bitter, white or yellow, flowing abundantly from incisions, and concreting into a gummy resinous mass. The *Upas antiar* poison is prepared in an earthen vessel with this juice, which is mixed with the seed of the Capsicum frutescens, and various aromatics. This poison at first acts as a purgative and emetic, then as a narcotic, causing death by violent fits of tetanic convulsions. The *Upas tiente* poison is prepared from a strychnos, and differs from this substance. —*O'Shaughnessy, page* 579. Upas, in Javanese, "poison", or "venom", is the sap of some plants of the Malay and Philippine Islands yielding poisonous juices, which, by concentration, produce a poison of considerable activity which has been sometimes employed by the ruder natives to render their weapons deadly. The most potent of these plants in Java are the Anchar, the Antiaris toxicaria, this large forest tree, and the Chetek, Strychnos tiente, a climbing shrub. In all these cases, the poison, even when fresh, is far less active than that of the cobra snake, for the most powerful will take an hour to kill a dog, which the venom of the hooded snake would certainly accomplish in half the time To effect a fatal purpose, too, it is necessary that the poisoned weapon should be left in the wound, and not withdrawn, so that the probability is that few human beings have ever lost their lives by means of these poisons.—*Crawfurd, Dictionary, page* 442.

(341) ANTIDESMA BUNIAS (*Spreng.*) N. Ord. STILAGINACEÆ. DIŒCIA PENTANDRIA. *Sex: Syst:*

Noelha-tahlie, TAM. Ariyaporiyan, MAL.

A middle sized tree, growing in Coromandel, Malabar, Assam, and Nepaul. The shining deep-red fruit is subacid, and esteemed for its cooling qualities. The bark is used for making ropes, especially in Travancore. It is one of the numerous plants whose leaves are considered a remedy against the bites of poisonous snakes. The leaves are acid and diaphoretic, and, when young, are boiled with pot-perbs, and employed in India in syphilitic affections. In Assam it grows to rather a large size, with the trunk 12 or 14 inches in diameter. The timber is greatly affected by immersion in water, becoming heavy and black as iron. Dr. Wight under the same Tamul name of Nolhæ talie marum, நல்லதாளிமரம், styling it Antidesma alexiteria, says, it is a common enough jungle tree and a very handsome one.—*Wight. Useful Plants.*

(342) ANTIDESMA DIANDRUM, is found on the Travancore mountains, yields a tolerable timber, which is useful for various purposes. —*Roxb. Lindley &c. quoted in Useful Plants.*

(343) ANTIDESMA PANICULATA.

Byitzin, BURM.

A small crooked timber, of a close grain, found in the Rangoon, Pegu, Tounghoo, and Tharawaddy Forests; wood red, adapted to cabinet making.—*McClelland.*

(344) ANTIDESMA PUBESCENS (*Linn.*)

Pollaie, TEL.

This tree grows in the Northern Circars, is similar to A. Bunias, and the bark is used for making ropes. The succulent drupes are eaten by the natives.—*Roxb. quoted in Useful Plants.* Wight, in *Icones*, gives figures of A. acuminata, 1991; Bunias, 819; lanceolaris, 766; paniculata, 820; tomentosa, 767-8.

(345) ANTILOPEÆ in Zoology, ANTELOPES, a family of Ruminating Mammals, belonging to the Hollow-Horned group, and distinguished by the following characters: —The horns conical, bent back, cylindrical, or compressed, and ringed at the base. The knee (or wrist) in the middle of the fore-leg. The occipital plane of the skull forms an obtuse angle with the frontal plane. Core of the horns thin, consisting of dense bone, often with a clear sinus as the base within. Teats two or four; feet-pits in hind-feet and generally also in the fore ones. —*Eng. Cyc. page* 232. The following are the better known genera of this family in Southern and Eastern Asia, and Northern Africa.

(346) *Pantholops Hodgsonii* (*Antilope Hodgsoni*, Abel), the Chiru (Hind.) is believed to be the Unicorn of the Bhotias, and supposed by Colonel Smith to be the animal which Ælian describes under the name of *kemas*, (see Homer's 'Iliad,' X. 361.) an opinion founded upon very slight and not easily tenable grounds. The whole length of this animal, from the muzzle to the root of the tail, is about 5 feet, its height 3 feet; the tail is 8 inches long; the head, from the nose to the root of the horns, 9 inches; the ears 4 inches, and the horns measured along the curves, upwards of 2 feet. The horns grow upright from the skull, are strongly compressed on the sides, bent slightly backwards at first, and afterwards, point gradually forwards, thus assuming a lyrate form, but less strongly marked than in the common gazelle; they are surrounded, to within 6 inches of the points, with from 15 to 20 annuli, forming prominent knobs in front, but more obscure on the sides and rear; the last 6 inches are smooth and round, and the points rather attenuated. The legs are long and slender; but the symmetry of the head is destroyed by two

large fleshy tumours about half the size of a hen's egg, which grow close to the outer margins of the nostrils, as well as by a profusion of bristly hair which surrounds the mouth and nose. The body is furnished with two different kinds of hair, a long external coat of the usual quality, and a short interior one of fine close wool. The prevalent colour of the latter is uniform grayish blue, and the outer coat is likewise of the same colour of the base, but it is tipped with reddish fawn, and thus gives the whole of the upper parts a tawny hue, through which the lower tinge is but faintly visible the belly and interior of the limbs are white, the nose and face black, and a dark brown band passes down the front of each leg. The Chiru, according to the information obtained by Mr. Hodgson, inhabits the elevated plains of Tibet, but never approaches the mountains, and is altogether unknown on the Indian side of the great Himalayan chain. It is gregarious, residing in herds of many hundreds on the open plains, extremely shy and difficult to approach, posting sentinels in all directions where the herd feeds or reposes, and flying with astonishing velocity on the first alarm or intimation of danger. When brought to bay, however, the males defend themselves with courage, and in confinement are sometimes mischievous, and should be always approached with a considerable degree of caution. They are very jealous and pugnacious and in their contests often break off one of their long horns—hence the belief in their being Unicorns. Like most other Ruminants, they are extremely fond of salt, and during the summer months unite in large herds to visit the beds of this mineral, which abound throughout Thibet, advancing under the guidance of an experienced leader, and as usual posting sentinels to prevent surprise.—*Eng. Cyc. p.* 236.

(347) *Procapra gutturosa*; *Antilope gutturosa*, Pallas), the Dzeren, the Hoang Yang, Whang Yang, or yellow goat of the Chinese, is nearly 4½ feet in length, and 2 feet 6 inches high at the shoulder; the body also is large and corpulent, and the legs shorter than is common to the Antelopes in general; the horns are black, lyrated, and marked to within a short distance of their points with prominent transverse rings: the suborbital sinuses are small; the laryux large and salient, forming, particularly in the old bucks, a prominent lump on the throat; upon the prepuce of the same sex there is likewise situated a bag about the size of a hen's-egg, which contains a waxy substance similar to that produced in the analogous organ of the musk animal, but without any kind of odour; the tail is short, and the knees furnished with small bunches of hair, but scarcely sufficiently long and distinct to merit the name of brushes, the summer coat is of a grayish fawn-colour above, and white beneath; that of winter almost entirely white, being tinged but slightly with a grayish yellow shade on the back and sides. The females resemble the males in colour, but are rather of smaller size, and without horns; they want the sac on the abdomen, and have two teats.—The Dzerens inhabit the dry arid deserts of Central Asia, Tibet, China, and Southern Siberia, particularly the great desert of Gobi; and prefer the most sandy and stony plains, feeding upon such scanty herbage as these localities supply, and avoiding water, to which they appear to entertain a marked aversion. They are remarkably swift, take prodigious leaps and when frightened, will occasionally pass over 20 or 25 feet at a single bound. In spring and summer they form small families which live apart from one another, but in the beginning of winter they unite into large flocks, always under the guidance of an experienced old buck. They never run, even when pursued, in a confused crowd but form single files, and follow closely in the footsteps of their leader. They rarely emit any voice. When taken they are easily tamed, and appear to have rather a predeliction for the domestic state, often mixing with flocks of sheep, and approaching human habitations during the severity of the winter season. Their flesh is tender and well tasted, and they are a favourite object of chase with the Moghuls and Tartars.—*Eng. Cyc. p.* 236.

(348) *Procapra picticauda*, the *Ragoa* or *Goa*, is an animal described by Mr. Hodgson as an inhabitant of Tibet It has brown hair with rufous tips; the inside of the ears and limbs white, and tail black. It is perhaps *P. gutturosa* in its summer coat.—*Eng. Cyc. p.* 337.

(349) *Gazella Dorcas* (*Antilope Dorcas*, Pallas), the Gazelle, the Algazel, the Corinne, is 3 feet 6 inches in length, 1 foot 9½ inches high at the shoulder, and 1 foot 10½ inches at the croup; the head is 6 inches long, the horns 9½, the ears 4¾, and the tail, with its terminating tuft, 8 inches. The Gazelle is found in Egypt, Barbary, and some say also in Asia Minor; but it is very questionable whether the animal of the Levant does not really belong to a different species. It lives in large troops upon the borders of the Tell, or cultivated country, and the Sahara, or desert. When pursued it flies to some distance, then stops to gaze a moment at the hunters, and again renews its flight.—*Eng. Cyc, p.* 338.

(350) *Gazella subgutturosa* (*Antilope subgutturosa*, Guldenstadt), the Ahu and Jairou, is of a pale brown colour, the upper part of the sides with a broad rather paler streak, the face-streak indistinct; the lower part of the sides, belly, hinder side of fore and front side of hinder limbs, and anal disk, white; the streak on the haunches dark brown; the end of the tail black. It inhabits all the central parts of Asia, Persia, Daüria, the country around Lake Baïkal, and from the eastern limits of Great Bucharia to the shores of the Hellesport. It associates with its own

species in extensive flocks, frequents the open uncovered plains and naked hills of moderate elevation, and feeds principally upon the *Absinthium ponticum*. The flesh is much esteemed, and of an agreeable taste.—*Eng. Cyc. p.* 238.

(351) *Gazella ruficollis* (*Antilope ruficollis*, H. Smith), the Andra, is a beautiful species of Eastern Africa, discovered on the barren wastes of Nubia by Rüppel, and in Senaar and Dongola by Hemprich and Ehrenberg. The whole length of this species is 5 feet 4 inches, its height at the shoulder 3 feet; the length of the head is 8 inches that of the horns 12½ inches, and that of the tail 9 inches. The horns are precisely similar to those of the Mohr, *Gazella Mohr*, as are likewise the general form and proportions of the body. This species is gregarious, and resides in flocks on the desert between Nubia, Dongola, and Kordofan.—*Eng. Cyc. p.* 240.

(352) *Tragops Bennettii* (*Antilope quadricornis*, Blainville), the Chikara, Ravine-Deer, Goat Antelope, Kalsiepie, or Black-Tail, is of a bay-brown colour, and has the end of the nose and tail black; the face streaked; chest, belly, and inside of limbs, white, the feet are black or brown. The Kalsiepie, or Black-Tail, so called by the Mahrattas on account of the deep black colour of the tail, and distinguished by the name of the Goat Antelope by the Europeans, is found on the rocky hills of the Dekhan, and, according to the report of Colonel Sykes, differs from many other antelopes in not being gregarious, there being rarely more than three or four found together in the same company, and not unfrequently a solitary individual.—*Eng. Cyc. p.* 241.

(353.) *Antilope Bezoartica* (*A. cervicapra*, Pallas), the Sasin, or Common Antelope, is remarkable for the form and beauty of its horns, which compose a spiral of two or more turns, according to the age of the animal. This beautiful animal is, when full grown, about 4 feet in length, and 2½ feet high at the shoulder; the head, measured from the nose to the root of the horn, is 7 inches long, the ears 5½ inches, and the tail, without the hair, 6 inches. The legs are long and delicate; the body round, but light, and well formed; the head small; the eye large, lively, and expressive; the years long and cylindrical, the suborbital sinus particularly developed, and in continual motion; and the horns forming a complete spiral of two or three turns, wrinkled at the base, distinctly annulated in the middle, and smooth for a couple of inches next the points. The females, and young males for the first three years of their age, are of a uniform tawny-brown on all the upper parts of the body, with a light silvery band passing longitudinally from the shoulder to the hips, about six inches below the spine, on either side; the breast, belly, and interior of the fore arms and thighs are white; as is likewise the under surface of the tail, which is rather broad, and furnished with a small tuft of black hairs at the extremity. After their third year, the males begin to assume the adult colours of their sex, and gradually darken on all the upper parts of the body, till they finally become almost entirely black above and white beneath; the nose, lips, and a large circle round each eye being likewise white, but the light bands of the sides completely obliterated. The hair is uniformly short and close over the whole head, body, and extremities, except on the knees, which are furnished with tufts of long bristles, forming new small knee-brushes. The Sasins are so swift that it is useless to slip greyhounds after them; as, unless taken by surprise, which their extreme precaution seldom allows, it is impossible to overtake them, and experience has convinced the Indian sportsmen that the dogs are more likely to be injured in the chase than the game. The bounds also which these animals occasionally take, either for their own amusement or over the long grass when pursued, are said to be almost inconceivable. Captain Williamson, in his splendid work on the 'Wild Sports of the East,' assures us that he has seen an old buck Antelope lead a herd of females over a net at least 11 feet high, and that they frequently vault to the height of 12 or 13 feet, and pass over 10 or 12 yards at a single bound. They reside on the open plains of India, where they can see to a great distance in every direction, live in large families of from 5 or 10 to 50 or 60 grown females to a single male, and when they feed, or lie down to ruminate, detach a number of the young bucks to a distance of 200 or 300 yards on every side to watch over the common safety. Nothing escapes the notice of these careful sentinels; every bush or tuft of grass that might be suspected to conceal an enemy is strictly and attentively examined, and on the first alarm the whole herd betakes itself to flight, following closely in the footsteps of the old buck, and is soon beyond the reach of pursuit. The venison is dry and unsavoury, and being held in small esteem, consequently holds out no inducement either to the occasional sportsman or to the professional Indian hunter. The species extends over every part of India, from the borders of Persia to the most eastern parts of which Europeans have any distinct knowledge. It is found on rocky open plains, avoids woody localities and the thick cover of the forest; nor is there any certainty of its existing beyond the limits of India, though many zoologists, from Ray to Hamilton Smith, are of opinion that it likewise inhabits some parts of Africa. The fakeers and dervises polish the horns, and form them into a kind of offensive arms by uniting them at the base; these they wear at their girdles instead of swords and daggers, which their vows and religious character prevent them from using.—*Engl. Cyc. p.* 243.

(354) *Tetracerus quadricornis* (*Antilope quadricornis*, Blainville), the Chousingha, is about 2 feet 9 inches in length from the muzzle to the

root of the tail; the tail itself is 5 inches long, and the height at the shoulder about 1 foot 8 or 9 inches. The superior or common horns are about 3 inches long, smooth, black, pointed, erect, and moderately divergent, bending very slightly forwards, and without the least indication of annuli. The spurious or additional pair of horns are placed in front of these, immediately between the orbits, and consist of short, erect, blunt stumps, about three-quarters of an inch in length, 1½ inch in circumference at the base, and of the same smooth and black appearance as the real horns. The head is 7½ inches long, the ears 4¾ inches, erect and pointed, the general colour of the upper parts is uniform bright bay, and that of the under parts silvery white, more or less mixed with sandy-coloured hairs; the lips are bordered with black. The females differ from the males by the absence of horns, and likewise by being of a lighter colour, which character is conspicuous at a very early age, and continues throughout life. This species, as well as the *Tragops*, called Chikara by the Hindoos, is common in all the wooded parts of India, particularly in Bengal, Bahar, and Orissa; it is monogamous, and lives in pairs in the forests and thick jungle, being exceedingly wild and active, and rarely suffering a state of confinement, unless taken young. During the rutting season the male becomes particularly mischievous, and it is then dangerous to approach him, as he butts at everything within his reach; the female produces two young at a birth, but the period of gestation has not been recorded. Baron Cuvier supposes, and apparently with reason, that the ancients were acquainted with this species, and that the Four-Horned Oryx of Ælian refers to the modern Chikara.—*Eng. Cyc. page* 244.

(355) *Tetracerus Iodes*, the Rusty-Red Chousingha, is an Indian species described by B. H. Hodgson, Esquire,—*Eng. Cyc. p.* 244.

(356) *Tetracerus paccervis*, the Full-Horned Chousingha, is another Indian species.—*Eng. Cyc, page* 244.

(357) *Tetracerus subquadricornutus*, the Jungli burka, is distinguished by its front pair of horns being rudimentary and tubercular. It is a native of the Bombay side of India, and there are four specimens, two male and two female, in the collection of the British Museum.—*Eng. Cyc. page* 244.

(358) *Capricornis Sumatrensis* (*Antilope Sumatrensis*, Desmarest), the Cambing Outan, or Sumatran Antelope, first noticed by Mr. Marsden in his 'History of Sumatra,' is about 4½ feet in length, and 2 feet 3 inches high at the shoulder. The horns are 6 inches long, very thick at the base, and much attenuated, sightly and uniformly curved backwards. The muzzle is distinct and well formed; the lachrymal sinuses open by a small circular aperture. The Cambing Outan, or Wild Goat, so called by the Malays, inhabits the hilly forests of Sumatra, and is described by Mr. Marsden as being of a wild character, extremely active and sure-footed, with much of the habit and character of the common Goat and Ibex, of which it has the roving fearless eye and bold undaunted bearing.—*Eng. Cyc. p.* 259.

(359) *Capricornis Bubalina* (*C. Thar*, Ogilby), the Thaar, Thar, Serow, or Imo, is of a gray, brown, blackish washed colour, with the crown and dorsal streak black; the nose, chin, inside of ears, lower part of mane and legs below the hocks, whitish. It is a native of Nepaul, and is principally known by the drawings and specimens presented by B. H. Hodgson, Esquire, to the British Museum. The Thar inhabits the central region of Nepaul, at an equal distance from the snows of the Himalayan range on the one hand, and the sultry heats of the low plains of India on the other. It is the most common of all the wild ruminants which are found in that country, and its chase is the favourite exercise and amusement of the hill tribes. Its flesh is indeed coarse, but there is plenty of it; and these rude people are easily satisfied on the score of quality, provided the quantity be sufficient. Its habits are wild and solitary; it is seldom found in herds, however small; the grown males, especially, live apart in the mountains, and never seek the society of their species, except during the rutting season. As might be supposed from its heavy make and short stout limbs, it is a slow runner, and is soon brought to bay; but it leaps well, and makes its way over broken ground with greater ease than in open level situations. It is found from the eastern confines of Nepaul to the banks of the Sutlej, but abounds especially towards the east. The Thars differ from the Antelopes in being stout clambering animals, but they are not allied to the Ox-Tribe.—*Engl. Cyc. p.* 259.

(360) *Capricornis crispa*, the Japanese-Goat Antelope, has a harsh crisp brown or brownish fur, with whitish sides, white cheeks, and legs black-brown. It is a native of Japan.—*Eng. Cyc. p.* 259.

(361) *Nemorhedus Goral* (*Antilope Goral*, Hardwicke,) the Goral, is of a gray-brown colour, minutely dotted with black; cheeks, chin, and upper part of throat, white. The Goral was first described by General Hardwicke in the 'Linnæan Transactions.' It inhabits Nepaul, and lives in large herds upon the elevated plains which crown the lower ridges of the Himalayan mountains. It is wild and fleet, and when pursued, flies to the rocky hills, where it easily escapes the hunter, and is indeed rarely taken, except by stratagem. Its flesh is considered excellent venison. It is entirely confined to the cold upper regions of Nepaul, and is incapable

of bearing the sultry heat of the plains of Hindustan.—*Engl. Cyc. p.* 259.

(362) *Alcephalus Bubalis* (*Antilope Bubalis*, Pallas), the Bubale, or Bekker-el-Wash, is about the size of the largest stag, and is particularly remarkable for the great length of its head, and its narrow, flat, and straight forehead and face. It is called Bekker-el-Wash, or Wild Ox, by the Arabs, and is common in every part of Northern Africa, living in numerous herds on the confines of the Tell or cultivated parts, and the Sahara or Desert, and also, according to Captain Lyon, upon the mountains south of Tripoli. Barbary seems to be the chief habitat of the species, but it sometimes happens that a few individuals find their way across the desert to the banks of the Nile, where, however, they stray from their native habitat. At the same time, it is to be observed that its representation occurs among the hieroglyphics of the temples of Upper Egypt. Dr. Shaw informs us that the Bubale is naturally of a familiar disposition, that the young calves frequently mix with domestic cattle, and soon learn to attach themselves to the herd without attempting to escape afterwards. They fight like the common bull, by lowering the head, and striking suddenly upwards with the horns, which are formidable weapons either for attack or defence. —*Engl. Cyc. page* 263.

(363) *Portax Tragocamelus* (*Antilope picta*, Pallas), the Nil-Ghau or Nyl-Ghau, one of the largest and most magnificent Antelopes known, being upwards of 4 feet high at the shoulder, inhabits various parts of India, whence it has often been brought to England, where it lives and breeds, and is not an uncommon animal. The face of this species is long and narrow; the muzzle large and naked; the horns about 7 inches long, small, round, and black, rather distant at the base, nearly parallel throughout their whole length, pointed and slightly curved forwards; they are perfectly smooth and without annuli, but rather triangular at the base, and gradually rounded and attenuated towards the points. The lachrymal sinuses are large; the ears 7 inches in length, broad and rounded like those of an ox; the neck deep and compressed like that of the horse, not round and cylindrical as in the stag and most other Antelopes; and the tail broad, equally covered with hair on the sides and at the root, but terminated by a long black tuft, and descending to the houghs. The legs are small and well-formed, the anterior rather longer than the posterior; and the spinous processes of the dorsal vertebræ so much elevated between the shoulders as to give the animal the appearance of having a small hump. When at rest, the feet are gathered close under the body, and the tail turned in between the hind legs. The hair is uniformly short and close upon every part of the head, body, and limbs, excepting along the top of the neck and on the shoulders, where it is long, stiff, and upright, forming a thin erect mane which extends from between the ears half way down the back, and on the middle of the throat, where there is a species of beard composed of stiff bristly hair. The general colour is a uniform slaty-blue on the upper parts in the male, and tawny-red in the female; on the under parts uniform white in both sexes. The limbs and face are almost brown, and the lips, chin, and under surface of the tail, white. There is a large white spot on the throat, and two smaller ones on the cheeks under the lachrymal sinuses; the pastern joints are marked in front with one spot, and in rear with two conspicuous spots of the same colour, which contrast strongly with the dark brown of the surrounding parts, and have suggested the specific name of *Antilope picta* which was given by Pallas to this animal. The Nyl-Ghau resides in the dense forests of India, whence it occasionally makes excursions very early in the morning or during the night, to feed upon the corn-fields of the natives which happen to be situated in the vicinity of the jungle. It is a vicious animal, of very uncertain temper, and as it is both powerful and resolute, and frequently turns upon its pursuers, it is seldom made an object of chase except by the more energetic youth of the company's services. The usual method which the shikarrees, or professional hunters, employ for its capture is to shoot it from an elevated platform when it comes out at night or early in the morning to feed on the confines of the jungle; this being likewise their mode of destroying tigers, wild boars, and other beasts which they dare not attack openly. Even in confinement, and when domesticated from birth, the violent and changeable temper of the Nyl-Ghau cannot be trusted. Previous to making an attack, it drops upon the fore-knees, advancing in this position till within a proper distance, then darting suddenly forwards with the velocity of an arrow, and with a force which no ordinary animal can withstand. Yet, notwithstanding its vigour and resolution, it is the most common prey of the tiger, which the shikarrees often destroy in the very act of devouring the mangled remains of this animal; for, when these are discovered, the hunters always erect their platforms in a convenient situation in the neighbourhood of the carcass, knowing by experience that the tiger is sure to return on the following night to glut himself at leisure with the produce of his previous chase. The Nyl-Ghau has often bred in confinement, both in India and in Europe. The period of gestation lasts eight months, and two young are most commonly produced at a birth. At first the young males are of the same reddish-brown colour as the females, and only assume the grayish-blue shade proper to their sex on arriving at maturity: their growth is, however, rapid, and they attain their adult size in the second or third year of their age. —*Eng. Cyc. page* 268.

(364) ANTIMONY, SULPHURET OF,

Anjana-kahloo Unjuncle, TAM.
Surmah, PERS. MALAY; DUKH; & HIND.
Ismud: kohul, ARAB.
Nelanjanum; Lanjanam, TEL.
Spiesglas, DUT.
Antimoine Sulfure; FR.
Spiesglanz; GER.
Ungen; HINDO.
Sulfuroo d'Antimonio; IT.
Antimonium; LAT.
Antimonia; RUS.
Sauvira; SANS.

This, or a substance sold for it, is to be found in every Eastern village, it being used by the Native Medical practitioners, also the Mahomedan women, who apply it to their eyelids to give brilliancy to the eye. Sulphuret of Antimony has been found in the Vizianagrum Zemindary, but the greater part of the mineral brought to India comes from the Eastern Islands, Burmah and the Malay Peninsula, where it occurs in immense quantities, It is a very abundant mineral in Province Amherst, and is often met with on the mountains that bound the valley of Thoun-gyeen. Mr. O'Riley found it at the sources of the Ataran and large quantities of the ore have been dug up in the neighbourhood of Maulmain, but there was no demand for it in Calcutta whither it was sent, and operations have been suspended. Mr. Piddington made the following report on specimens of the ore that were sent to him; "We received some time ago from Messrs. Fowle and Lonsdale of Maulmain, a box containing upwards of thirty specimens of ores from the Antimony Mines near that place, with a request that they might be examined, their desire being of course to ascertain carefully and certainly, if they contained any, and what, proportion of the precious metals. One of the ores sent up was forwarded as 'supposed antimonial silver.' Now, in complicated ores of this description, this sort of examination requires great care, time, and often repeated analysis, before a negative can safely be pronounced from a small specimen, to assure the miner or smelter who works on a large scale that nothing of value exists in his ores, and these references have thus occupied a very considerable portion of time and labor, and as is often the case in such investigations, have proved wholly unfruitful. Antimony, iron, arsenic, and sulphur with bismuth, and in one instance a trace of molybdena being all which can be discovered in them. The results have been sent to Messrs. Brightman, but are not worth detailing or printing. I have suggested, however, to these gentlemen that they may find it well worth their while to sink a shaft for a change of ores.' As I now understand their operations, they seem to be occupied with what one might call mere surface-digging rather than mining, and the pronouncing, as we must now do, that these ores contain nothing of value, is not to be understood as saying that the locality contains nothing, but merely that the ores *at the surface* have not been found valuable; which in Cornwall, and I think in Germany, is often thought to be a favorable indication.—*Mason.* The metal was found for the first time in Borneo, in 1823, on the North Western coast of that island. It exists in several places there, but mines of it have been worked only in Sarawak. The ore is, as usual, a sulphuret in a matrix of quartz, and at present furnishes the chief supply of Europe, being exported from the emporium of Singapore, to the yearly amount of about 1560 tons.—*Crawfurd, Dictionary, p.* 13. Perhaps the most valuable of all the samples of this ore, which have been received in the Madras Museum, is that from the mines of Sir James Brooke in Sarawak. Ores of iron, and manganese and galena are very often sold in the Indian bazaars, as Surmah, or Sulphuret of Antimony. Great Britain receives the larger portion of its supply of Antimony from Singapore, to which place it is brought from Borneo. It is imported in the shape of ore, and commonly as ballast. Its chief localities are Saxony, Cornwall, Spain, Mexico, Siberia, the Eastern Islands, and Martaban in Pegu. It is brought to Bombay from Siam and the Persian Gulf. This metal is generally of a lead-gray colour, possessing considerable splendour, and is met with compact, and in rhombic prisms of considerable size, and variously modified. When sulphuret of antimony is roasted in contact with the air, oxide of antimony is formed, which unites with that portion of the sulphuret which has not been decomposed. In this way several oxy-sulphurets are formed, which melt, and yield in cooling, some brown vitreous substances, known in commerce as glass of antimony, liver of Antimony or crocus. Glass of Antimony consists of 8 parts of oxide and 1 of sulphuret. It is transparent and of a reddish yellow colour. Crocus contains 8 parts of oxide and 2 of sulphuret; it is opaque and of a yellow red colour. Liver of Antimony is opaque and of a deep brown colour; it consists of 4 parts sulphuret and 8 parts oxide. Sulphuret of Antimony occurs both massive and crystallised, but the most common form is radiated. When obtained by fusion, free from its associated matters, it is known in commerce as *crude antimony*. Metallic antimony or regulus, is obtained from crude antimony, by roasting and mixing with it charcoal and soda. Antimony is dissolved by hot hydrochloric acid, with evolution of hydrogen, and the production of a chloride formerly called butter of antimony, a substance sometimes used with sulphate of copper for bronzing gun-barrels, the iron decomposing the chloride and depositing a thin film of antimony on its surface. The chief alloys of antimony are *type metal*, consisting of 4 lead and 1 of antimony; Stereotype metal, 6 lead and 1 antimony, music-plates consisting of lead, tin and antimony; Britannia metal, consisting of 100 parts of tin, 8 antimony, 2 of copper, and 2 bismuth. Pewter is sometimes

formed of 12 parts of tin and 1 part antimony. Antimony is also used in the preparation of some enamels and other vitreous articles, and much employed in modern medicine as antimonial powder and tartrate of antimony. James's powder is said to consist of 43 parts of phosphate of lime, and 57 of oxide of antimony.—*Madras Museum. O'Shaughnessy. Crawfurd. Mason. Faulkner. Tomlinson.*

(365) ANTIRRHINIUM MAJUS. Snap-dragon. A flowering plant cultivated for its beauty. It is a native of England, but in India, succeeds well during the cold months, the seed should be sown during the rains, it grows best in a well drained soil, not too rich, it often lives through the hot weather, young plants are preferable.—*Jaffrey.*

(366) ANTS, WHITE. *See* TERMITES.

Termites, LAT.	Shelloo, TAM.
Dewuk, HIND.	Cheddooloo, TEL.

Sets of sugar-cane and other substances are said to be protected from White Ants by steeping them for half an hour in a mixture of assafetida, 8 chittacks; mustard seed, 8 seers; putrid fish, 4 seers; bruised butch root or maddar 2 seers, with sufficient to mix them into the thickness of curds, but the poisonous influence of the butch on vegetable life is known and cannot be recommended where the product is to be eaten. A small quantity of arsenic with a few ounces of burned bread, pulverized flour or oatmeal, moistened with molasses, made into a dough and placed near their tumuli, is said to insure their destruction. *Simmonds.* The wood oils, from the various species of Dypterocarpi, applied to wood, prevents, it is said, the dry rot, and the attacks of White Ants; and the addition of catechu to the oil greatly increases its preservative powers.—*Simmonds.*

(367) ANSER INDICA. The Indian goose, occurs at Silligoree.—*Hooker Him. Journ: Vol.* I. *page* 399.

(368) APHELANDRA CRISTATA, is a useful shrub in India either for pot or border cultivation, being easily propagated from cuttings: requires a rich soil and plenty of water; native of the West Indies. Flowers, orange colored. —*Jaffrey.*

(369) APIUM GRAVEOLENS, (Celery) *Vern.* Kurufs, *Arab.* A native of marshy grounds in Europe, the Caucasus, Mexico, the Levant and Affghanistan, and now cultivated in Bengal. When wild, it is acrid and poisonous; when cultivated, blanched, aromatic, fragrant, and nutritious. The seeds are sold in every Bazar, and used as stimulants by the native practitioners. The roots are also employed in medicine, they are white, spindle-shaped, oval, and branched; odour increased by drying. The essential oil dissolved in strong spirit gives an essence, a drop of which will communicate a strong and fine flavour of celery to a tureen of soup. A tincture of the seeds has been introduced into the Bengal Pharmacopœia.—*O'Shaughnessy, page* 357.

(370) APIUM INVOLUCRATUM is the *Rhadunee* of Bengal, and *Ajmod* of Hindostan. —*O'Shaughnessy page* 357. Dr. Irvine (*General Med Top. of Ajmere p.* 124.) describes Ajmod or Ajmot, the Apium involucratum as a species of sunallage: very hot and carminative, good in dyspepsia much used in all mesalihs and as brought to Ajmeer from Harrowtee and Mewar: and sold at four seers for one rupee: the same author mentions Khorasani Ajmot, as very hot and carminative.

(371) APONOGETON MONOSTACHYON *(Wild.)* Nat. Ord. JUNCAGINACEÆ.

Parua-kalanga, MAL.	Kotee-kalangoo, TAM.
Ghechoo, HIND.	Nama, TEL.

A Perennial aquatic plant: with tuberous roots: which grows in the Peninsula of India. It is found in shallow standing water and the beds of tanks, flowering during the rainy season. The natives are very fond of the small tuberous roots as an article of diet. They are said to be as good as potatoes, and esteemed a great delicacy.—*Roxb. Ainsl. Madr. Ex. Jur. Rep. Useful Plants.*

(372) APPLE. This term is applied in India to the fruits of several plants, and we have the Cashew Apple; the Custard Apple; Love Apple; Pine Apple; Rose Apple; Greater Wood Apple and Lesser Wood Apple, and the Apple, Pyrus mala, of England, is cultivated in the higher table lands of India.

(373) APPAREL, Articles of apparel form a considerable branch of trade in India; and in the Madras Presidency alone the aggregate value of the Imports and Exports in the four years 1852-53 to 1855-6, amounted to Rupees 33,38,387.

IMPORTS.	1852—53 Rs.	1853—54 Rs.	1854—55 Rs.	1855—56 Rs.	Total value.	
Boots and Shoes, ...	15,136	17,061	14,879	12,280	59,356	Imported from United Kingdom, Bombay, and Bengal.
Breeches, ...	1,705	.....	.....	.....	1,705	Wholly from Bombay.
Buttons, ...	2,439	2,004	3,383	3,402	11,228	Chiefly from United Kingdom.
Gloves, ...	.....	... ..	11,673	9,455	21,124	Do. from do. and France
Gold thread and lace, ...	67,026	78,194	1,03,997	1,87,510	4,36,727	Do. from do. Ceylon, Bengal, and Bombay
Hosiery, ...	37,691	50,206	59,702	32,164	1,79,763	Do. from do. Bengal, and Bombay.
Haberdashery, ...	36,883	34,181	35,346	26,635	1,33,045	Do. from do. Bengal, and China.
Hats and Caps, ...	20,169	38,248	24,676	19,909	1,03,002	Do. from do. Bengal, Bombay, and France.
Millinery, ...	2,82,568	3,23,825	2,64,065	2,47,809	11,17,547	Do. from do. France, Bengal, and Bombay.
Wearing apparel, ...	1,82,178	1,59,316	1,77,144	1,63,561	6,82,199	Do. from do. Bengal, Bombay, Pegue, France Ceylon, and America.
Do. do. Military,	68,592	76,219	64,916	37,592	2,47,319	Do. from do. and Ceylon.

Exports.	1852—53 Value. Rs.	1853—54 Value. Rs.	1854—55 Value. Rs.	1855—56 Value. Rs.	Total value. Rs.	
Boots and Shoes, ...	9,643	17,614	26,203	14,875	68,335	Exported chiefly to Pegue, New South Wales, Bengal, Bombay, Ceylon, China, and America.
Gold thread and lace, ...	.....	1 289	5,217	... ..	6,506	Do. to Indian French Ports and United Kingdom.
Haberdashery, ...	... ..	1,069	7,284	1,575	9,928	Do. to Bengal, Basscin, Rangoon, and Indian French Ports.
Hats and Caps, ...	1.271	... ..	1,130	.....	2,401	Do. to Bombay, Ceylon, Arabian and Persian Gulfs.
Hosiery, ...	.....	.....	1,765	.....	1,765	Do. to Rangoon and Moulmein.
Millinery, ...	... ..	7,393	.....	7.303	14,696	Do. to Bengal, Bombay and United Kingdom.
Wearing apparel, ...	15,777	29,51:	54,825	40,143	1,40,254	Do. to Pegue, New South Wales, Ceylon, United Kingdom, Bengal, Bombay, and Malacca Straits.
Do. Military,... ...	56,215	7,398	32,982	4,892	1,01,487	Do. to Bengal, Arabian and Persian Gulfs, Pegue, United Kingdom, and Malacca Straits.

(374) APRANG, also *Rangbharat*, *Damlakwaypi*, *Hira-dukhan*. A gum resin. A beautiful kind of kino, brought to Ajmere from Bombay: considered very astringent. It is given in intestinal hemorrhages and is also used in enamelling on gold: four tolahs are sold for one rupee. —*Irvine, General Med. Top. of Ajmere, p.* 126.

(375) APTIMUN, also *Amr-bel*; Is the yellow coloured parasite so often seen on babul trees, all over India, and very common at Ajmere. The entire plant is used in medicine: it is a creeper: is given in "munjus," which is a diluent form of medicine, employed preparatory to giving a purge.—*Irvine, General Med. Top. of Ajmere, page* 125.

(376) APTIMUN WILAYTI. Extract of the Aptimun plant from Bombay: and used in the same way as the plant: one tola is sold for eight annas.—*Irvine, General Med. Top. of Ajmere page* 125.

(377) AQUILARIACEÆ, a small natural order of plants, belonging to the incomplete Exogens, and all natives of the East Indies, among its genera are Aquilaria, Ophiospermum and Gyrinops.

(378) AQUILARIA AGALLOCHA, Aloe or Eagle Wood. Roxb. Fl. Hind. ii. 42.

Aquloogin, Arab. | Aood-i-Hindee. Pers. | Ugooro, Sans.

Roxburgh describes this as an immense tree, a native of mountainous tracts E. and S.E. of Sylhet, lat. 24° to 25° N., flowering in April, and ripening its seed in August. He regarded the tree as that which furnished the real Calambac or Agallochum of the ancients: in this opinion Dr. Royle coincides, and adduces much valuable evidence in its support; at the same time that he admits that a wood of similar properties may be afforded by other trees, especially the Aloexylum agallochum of Loureiro, referred by Decandolle to the Leguminosæ. A kind of aloe wood is moreover produced by the Excaecaria agallochum, of the natural order of Euphorbiace. A third kind is imported from Malacca and Siam. In Persian works, three kinds are described under the names of *Aood-i-sumudree, Aood-i-Hindee, Aood-i-kimaree*, probably the Al-ee-mericum of Aboo Hanifa. (*Royle.*) Dr. Roxburgh mentions his having received plants from Malacca of the supposed eagle tree, and that they were in a flourishing condition; Dr. Hamilton met the plant near Goalpara, and Dr. Roxburgh also obtained it from Sylhet. The chief consumption of aloe wood is in Siam and China, where it is burned in the temples. Merat and De Lens inform us it was used in Napoleon's imperial palaces as incense. The wood is heavy, yellowish white, shaded with green; fibrous, spongy, and resinous, its taste aromatic, its odour in combustion very agreeable.—*O'Shaughnessy, pages* 274-75. Mr. Mason is of opinion that the A. agallocha or Aloexylon agallochum produces the fragrant substance called lignaloes, or wood-aloes, which is offered for sale in all the bazars on the Tenasserim Coast, and is the produce of a tree that grows on the Mergui Islands. It is imported into Mergui by the Selungs, who, as they profit from the trade, endeavour to keep all in ignorance of the tree from which they obtain it. Gesenius says the Hebrew and Greek names are "derived from the Indian name of the tree, *agil*, Sanscrit *agaru* and *aguru*." Had he read Pali he would have been able to approach the word nearer than he has done, through the Sanscrit, for there, besides *agaru*, the Sanscrit word, we have *agalu* and *aggalu*, which come sufficiently near the "Indian name agil," and the Greek aggollochun: but it would take a pretty thorough Etymologist to get aloee, the New Testament word, out of any of them. There is, however, another Sanscrit and Pali word with which Gesenius does not appear to have met, *lauha*. This is manifestly the parent of aloe, and by transposition, not uncommon in Hebrew, of the Hebrew name also: although rendered aloes in the English version, no two plants are more dissimilar than this, and the common aloes. —*Mason.*

(379) AQUILARIA MALACCENSIS, the Bois D'Aigle, or Eagle wood, is a native of Malacca, and produces a whitish wood. It is the A. ovata of some botanists.

(380) AQUILARIA SECUNDARIA. This gives the true Aloewood, Lignum Aloes or Agallochum, of our Materia Medica, and used in perfumery. Its wood, in a healthy state, is said to be white and inodorous, but is subject to the attacks of disease, which cause the secretion of a resinous matter,

and the wood then becomes coloured and gives out a powerful scent. The secretion resembles camphor in many of its properties and has a bitter flavour, hence its name Aloe-wood.—*Eng. Cyc.*

(381) AQUILEGIA, literally the Water Gatherer, because the leaves collect water in their hollow, is a small genus of plants, commonly called Columbines belonging to the order *Ranunculaceæ*, of which several species are cultivated in the gardens of Europe. Species are found in the North of Asia, or in North America. They are all acrid plants, but much inferior to Aconite in their medicinal properties: hence little attention has been given to them.—*Eng. Cyc. page* 283.

(382) AQUILEGIA ALPINA. *Ranunculaceæ.*—COLUMBINE. In India the several species of Aquilegia, are very ornamental flowering plants, and grow in any moderate good soil, they increase plentifully by seed.—*Riddell.*

(383) ARACHIS, a genus of plants belonging to the natural order, Leguminosæ.

(384) ARACHIS, HYPOGÆA *(Linn.)* Nat. Ord. LEGUMINOSÆ: DIADELPHIA DECANDRIA. *Sex. Syst.*

Ground nut, Earth-nut, Manilla-nut, ENG.	Velaiatee-moong, DUK. Moong-phullee, BENG.
Vayer or Nelay-cadalay, TAM.	Kachang-tanah, K. China, K. Japun, MALAY.
Vairrenegaloo, TEL.	

This species is properly indigenous to South America, but is extensively cultivated in the Peninsula of India for the sake of the oil yielded by the seeds. It is found in abundance in the bazars of the Tenasserim Provinces, where it is consumed in large quantities by the natives, and with the exception of the cocoa-palm, it is, of all the oil-yielding plants, the most extensively cultivated in the Malayan Archipelago. The Arachis hypogæa, or ground pea, is known in the Malayan countries under the several names of Kachang-tanah, Kachang-China, and Kachang-Jápun, meaning ground, Chinese, and Japan pulse. *Crawfurd, Dic: page* 13. The Arachis hypogæa is particularly remarkable from the manner in which its fruit is produced. Instead of hanging down from among the leaves in the manner of other plants, this conceals itself in the earth, in which it is deeply buried at the period when it becomes ripe, a phenomenon which happens thus:—The young fruit, instead of being placed at the bottom of the calyx, as in other kinds of pulse, is found at the bottom and in the inside of a long slender tube, which looks like a flower-stalk. When the flower has withered, and the young fruit is fertilised, nothing but the bottom of this tube with its contents remains. At this period a small point projects from the summit of the young fruit, and gradually elongates, curving downwards towards the earth. At the same time the stalk of the fruit lengthens, until the small point strikes the earth, into which the now half grown fruit is speedily forced, and where it finally ripens in what would seem a most unnatural position. When mature, it is a pale-yellow wrinkled oblong pod, often contracted in the middle, and containing two or three seeds the size of a hazel-nut. These are considered a valuable article of food in Africa, and the tropical parts of Asia and America, and they are sold in the streets and bazars of every town in India. In flavour the nuts are as sweet as an almond, and they yield when pressed, clear straw colored oil, in no respect inferior to that of olives. It is believed by the natives of Bengal to be aperient, but it produces only the same effects as olive oil, given to the same patients and in the same quantities. The oil-cake affords excellent food for cattle.—*O'Shaughnessy, page* 304.—The plant will only grow in a light sandy soil, in which its pods can readily be buried, and it requires a climate as hot at least as that of the south of France. Its stems grow from one to two feet high; its leaves are composed of four broad and blunt leaflets; and its flowers are small and of a pale yellow colour. These seeds are roasted in America, and are considered a good substitute for chocolate. The oil which is expressed from them is much used in China and India for lamps, and is preferable to any other in the manufacture of soap. In Europe, a bushel of ground-nuts produces one gallon of oil when expressed cold: if heat be applied, a still greater quantity is procured, but of inferior quality. The nut, according to Dr. Davy, abounds with starch as well as oil, and a large proportion of albuminous matter, and in no other instances had he found so large a proportion of starch mixed with oil. The leaf is something like that of clover, and affords excellent food for cattle, and the cakes after the expression of the oil form a good manure. Under favourable circumstances, the nuts will produce 43 per cent of oil, and the quantity is much increased by heat and pressure. It is cultivated in the neighbourhood of Calcutta, the oil being used for pharmaceutical purposes, and especially for lamps and machinery. A great quantity of the oil is annually exported from the Madras territories, as will appear from the following account of this valuable product extracted from the Juries' reports:—"In the year 1848-49, 37,000 gallons were shipped, but in the two following years the exports exceeded 100,000 gallons. It has however fallen to 57,207 gallons in 1852-53. It is said to be used for adulterating gingely oil in North Arcot, where it costs from Rs. 1-8, to 2-12, per maund. In the Nellore District, the seeds are procured at Rs. 1-8 per maund, and in Tanjore about 200 acres are cultivated, producing annually 75 candies of oil, at Rs. 2-6 per maund. Its value in London, in January 1855, was £47-10 per ton." Simmonds has remarked upon this useful product:—"This oil is good for every purpose for which olive or almond oil is used. For domestic

purposes it is esteemed, and it does not become rancid so quickly as other oils. Experiments have been made on its inflammable properties, and it is proved that the brilliancy of light was superior to that of olive oil, and its durability was likewise proved to be seven minutes per hour beyond the combustion of the best olive oil, with the additional advantage of scarcely any smoke." And further, " that the culture of the Arachis in warm climates, or even in a temperate one, under favourable circumstances, should be encouraged, there can be but one opinion, especially when it is considered that its qualities are able to supersede that of the olive and the almond, which are but precarious in their crops. * * * I am informed by an American merchant that he cleared 12,000 dollars in one year, on the single article of ground or pea nuts obtained from Africa. Strange as it may appear, nearly all these nuts are transhipped to France, where they command a ready sale; are there converted into oil, and thence find their way over the world in the shape of olive oil, the skill of the French chemists enabling them to imitate the real Lucca and Florence oil, so as to deceive the nicest judges. Indeed, the oil from the pea nuts possesses a sweetness and delicacy that cannot be surpassed." There are two varieties of this plant grown in Malacca, also in Java, one with white, the other with brown seeds. It is there known as the Katjang oil. So useful a plant should be more extensively cultivated in Southern Asia. It will thrive well on a light sandy soil, and is very prolific. In some parts of America it will yield from 30 to 80 bushels of nuts per acre. On the Western Coast of Africa it is planted to a great extent. *Eng. Cyc: Ed. Phil. Mag. Simmonds. Jury Rep. Mad. Ex. &c. quoted in Useful Plants. O'Shaughnessy.* Of the oil, under the term Ground Nut or Manilla oil there was exported from the Madras Presidency, in the four years 1852-53 to 1855-56 chiefly to the United Kingdom, Bombay, and the Indian French ports, to the amount of 334,024 gallons, valued at Rs. 2,12,896.

(385) ARALIA. About Yoksun, in Sikkim, which occupies a very warm sheltered flat, many tropical genera occur, such as tall bamboos of two kinds, grasses allied to the sugar-cane, scarlet *Erythrina*, and various *Araliaceæ*, amongst which was one species whose pith was of so curious a structure, that Dr. Hooker had no hesitation in considering the then unknown Chinese substance called rice-paper to belong to a closely allied plant. The Chinese rice-paper, has long been known to be cut from cylinders of pith which has always a central hollow chamber, divided into compartments by septa or excessively thin plates. It is only within the last few years that the above supposition has been confirmed, by Sir William Hooker receiving from China, after many years of correspondence, specimens of the rice-paper plant itself, which very closely resembles, in botanical characters as well as in outward appearance of size and habit, the above Sikkim plant. The natives of Sikkim collect the leaves of many Aralias as fodder for cattle, for which purpose they are of the greatest service in a country where grass for pasture is so scarce: this is the more remarkable since they belong to the natural family of ivy, which is usually poisonous. The use of this food however gives a peculiar taste to the butter. In other parts of Sikkim fig leaves are used for the same purpose, and branches of bird-cherry, a plant also of a poisonous family, abounding in prussic acid—*Hooker Him: Journ. Vol. I. p. 359.*

(386) ARALIE, Porrel, Attu, Itti, are the Malayalum names of a tree which grows to about forty feet in height, and two feet in diameter; it is used by the native carpenters of Malabar for the planks in vessels, and is said by them to be a valuable wood. This tree the Hindu people worship and respect, and consider of great importance and value.—*Edye. Mal. Can.*

(387) ARANGOES. *Guz. Hind.* Chussace. A term applied to large rough cornelian beads, of various sizes and shapes, made in Cambay, and formerly extensively used in the African slave trade.—*Faulk.*

(388) ARBOR ALBA. Its leaves furnish a portion of the Cajeput oil of Commerce.—*Simmonds.*

(389) ARCHIL: ORCHIL; CUDBEAR. A violet dye, obtained from several species of lichen the most important of which are Roccella tinctoria and R. fusiformis. The dye of this makes litmus, so largely used by manufacturers under the name of Archil or Orseille des Canaries. Also from Lecanora perella, or Orseille de terre, and L. tartarea or cudbear. Archil readily yields its colouring matter to both water and alcohol; and dyes a lilac colour, but with other hues, it is merely added to enhance or brighten their colour; but the colour produced from archil is of a very fleeting character: hence the usually rapid fading of lilacs, in silks. A beautiful violet colour is imparted to marble, by archil, and this is less fugitive than other forms of this dye.—*Tomlinson.*

(390) ARDDA, the Malayalum name of a tree which grows to about ten inches in diameter, and twenty feet high: it is used, in conjunction with the other woods, in country vessels.—*Edye. Mal. and Can. &c.*

(391) ARDEA (Vieillot), the heron, a genus of birds under which Linnæus comprehended the cranes and several other divisions now formed into distinct genera by modern naturalists. M. Vieillot followed Buffon in making four divisions of the Herons; but Temminck, who has paid peculiar attention to these birds, arranges them under one genus and two sections.—*Eng. Cyc. page 292.*

(392) ARDISIA CRENULATA. *Myrsinaceæ.*—This genus contains handsome species of flowering plants of easy culture in a good soil, and easily increased by cuttings from the root, the A-elegans, lanceolata, solanacea, are natives of India.

(393) ARDISIA HUMILIS, is a common shrub at Tavoy, growing down to the plains; but its habitat, in the Indian Peninsula, is "the eastern slopes of the Neilgherries, in subalpine jungle."

(894) ARDISIA AMHERSTIANA, grows on the coasts of the Tenasserim provinces.—*Mason Riddell.* Wight in Icones figures *A. Doma*, 1212; humilis, 1212; *litoralis*, 1212; *oleracea*, 1212; *paniculata*, 1215; *pauciflora*, 1214; *pentagona*, 1213; rhomboidea, 1213; *solanacea*, 1212 *umbellata*, 1212.

(395) ARECA CATECHU (*Linn.*) Nat. Ord. PALMACEÆ.

Areca Palm, ENG.	Supearic, DUK.
Paak-marum or Camooghoo, TAM.	Adaka or Cavooghoo, MAL.
Poga chettoo, TEL.	Gooa, BENG.
Pinang, MALAY.	Koonthee. BURM.
Jombi: JAV.	Rapo, BUGIS.
Banda, BALI.	Bongs, TAGALA & BISAYA.

Judging by these names the probability is that the tree is indigenous in each country. It is a slender graceful palm, an object of extensive culture in all tropical India, and grows freely in all the islands, from Sumatra to the Philippines, in which it seems to have as many distinct names as there are languages, attaining a height of 30 or 40 feet, with a tuft of feathery leaves at the extreme top, and the trunk only a few inches in diameter. In appearance, the Areca Palm is perhaps the most elegant of the whole species of palms; It is met with all over India and the Eastern Archipelago, but chiefly in Malabar, N. Bengal, Nepaul and the S. W. coast of Ceylon; is extensively cultivated by the Burmese, and to a small extent by the Karens. It thrives luxuriantly on that coast, and Mr. Mason remarks that a grove of betel palms, with their slender, cylindrical stems peering fifty or sixty feet upward, waving their green plumes, and fragrant flowers, presents a scene of sylvan beauty rarely to be excelled under our tropical sky.

> "Thus winds our path through many a bower
> Of fragrant tree and giant flower—
> While o'er the brake so wild and fair
> The betel waves his crest in air;
> Yet who in Indian bowers has stood
> But thought on England's 'good greenwood;'
> And blessed beneath her palmy shade
> The hazel and her hawthorn glade;
> And breathed a prayer, (how oft in vain!)
> To gaze upon her oaks again."

The *A. catechu*, in the Dekhan, requires to have either matting or straw tied round it to prevent its splitting from the dry winds; when this happens, it immediately decays. It flowers there at all seasons; and the seed when ripe should be sown, if young plants are required, at about eighteen inches apart. This palm forms a very striking appearance in gardens when mixed with the cypress alternately. The nut is hard and peculiarly streaked, and used in turnery for small ornamental work, the wood is used in Travancore for spear handles and bows, for which it is well suited, being very elastic, the structure of the wood is like that of palms in general, and might be used in turnery for small objects.—*M. E. Juries' Reports. Useful Plants.* It yields the betel-nut of commerce. These nuts when young, are, in conjunction with other things prescribed in decoctions, in costiveness and dyspepsia. They are much relished by the natives, being chewed with the leaf of the betel pepper, Piper betel, spread with chunam. It sadly discolours the teeth, but the natives imagine that it fastens them, and cleans the gums. A strong decoction of the nut is used in dyeing. A tree will produce annually, on an average, three hundred nuts. By some they are considered to have astringent and tonic properties. Roasted and pounded, they make an excellent charcoal powder for the teeth. *See* BETEL NUT. The catechu which they yield is of a very inferior quality. There are two preparations of it which are respectively called by the Tamools, Cutta-camboo and Cash-cuttie; in Teloogoo, Kansee, and in Dukhanie, khrab-cutta and acha-cutta. The first (Cutta-camboo) is chewed with the betel leaf. The other is the astringent used medicinally. *See* CATECHU. Like most of the Palm tribe, the trunk is much used for ordinary building purposes. The spathe which stretches over the blossoms of this tree, and which is called Paak-muttay, is a fibrous substance with which the Hindoos make vessels for holding arrack, water, &c.: also into cups, dishes and small umbrellas. It is so fine that it can be written on with ink. It will produce fruit at five years, and continue to bear for twenty-five years. Unlike the Cocoa Palm, it will thrive at high regions, and at a distance from the sea. In the Eastern Islands, the produce of the tree varies from 200 to 1,000 nuts annually. They form a considerable article of commerce with the Eastern Islands and China, and are also one of the staple products of Travancore. The nuts are gathered in July and August, though not fully ripe till October. In the latter country the nuts are variously prepared for use. "Those that are used by families of rank, are collected while the fruit is tender; the husks or the outer pod is removed; the kernel, a round fleshy mass, is boiled in water; in the first boiling of the nut, when properly done, the water becomes red, thick and starch-like, and this is afterwards evaporated into a substance like catechu; the boiled nuts being now removed, sliced and dried, the catechu-like substance is rubbed on the same, and dried again in the sun, when they become of a shining black, ready for use. Whole nuts without being sliced are also prepared in the same

)rm for use amongst the higher classes, while ipe nuts, as well as young nuts in a raw state, re used by all classes of people generally, and ipe nuts preserved in water with the pod are lso used." When exported to other districts, ie nuts are sliced and coloured with red catechu, s also the nut whole in the pods The average mount of exports of the prepared nuts from ravancore is from 2 to 3,000 candies annually, xclusive of the nuts in their ordinary state, great uantities of which are shipped to Bombay and ther ports. According to the last survey, there ere upwards of a million trees in Travancore. he following mode of extracting the catechu om the nuts in Mysore, is taken from "Heyne's acts, on India":—"The nuts are taken as ey come from the tree, and boiled for some ours in an iron vessel. They are then taken at, and the remaining water is inspissated by ntinual boiling. This process furnishes Kassu, most astringent terra japonica, which is black d mixed with paddy husks and other impuri-es. After the nuts are dried, they are put into fresh quantity of water and boiled again; and is water being inspissated, like the former, elds the best or dearest kind of catechu called oony. It is yellowish-brown, has an earthy acture, and is free from the admixture of foreign dies." The nuts are seldom imported into ngland. The catechu has of late years superded madder in the calico works of Europe for eing a golden coffee brown, 1 lb of this being ual to 6lbs. of madder. In 1852, the value of reca nuts exported from Ceylon alone to Brit-h Colonies and Foreign States, amounted to 2,230.

(396) ARECA DICKSONII. On the mountains of Travancore and Malabar, a wild species, e A. Dicksonii, is found in great abundance. f this, the poorer classes eat the nuts as a bstitute for the common betel nut, but no her part of the tree appears to be employed r any useful purpose.—*Ainslie. Lindley. Simmds. M. E. Juries Reports. Useful Plants.*

(397) ARECA VESTIARIA, is so called om clothing being made of its fibres.

(398) ARECA GRACILIS, is a Sikkim Palm.

(399) ARENARIA. Flowering plants of no eat beauty, chiefly of a white color, and grow sandy soil.—*Riddell.* Wight in Icones, 949, ures A. Neilgherriensis.

(400) ARENGA SACCHARIFERA.

gwire or Gomuti Palm, ENG.	Anas or Anome, MALAY.
e Tree. Nawa or Nama, Am-boynese, Aren, JAVANESE.	The Sap or Juice, Sa-gen. Jav. The Gossamer, Karvel. JAV.
no, TERNATE.	The Hair, Makse, Amboy-nese, DUK JAV.
nchons, Macassar, Mandar, also Akel, PORT.	Ijo or Eju, or Gomuti, JAV.
gwan also Sagwire, SPAN.	

This, is one of five species of the genus *Arenga*" which chiefly inhabit the islands of e Indian Archipelago, although they also grow the continent of Asia. They are, all of them, ndsome trees, their favorite localities being dense shady forests and in the neighbourhood of rivers and rivulets; it comes into bearing about the seventh year, and flowers once only during its life time. It was so highly thought of by Dr. Roxburgh, that he introduced it largely into India, where the natives have taken kindly to them. Its commercial products are its wine, the "Barum" or "Baru," and its Eju or Gomuti. q v. The Gomuti is the only one of this genus of any commercial importance. It occurs in abundance, in a wild state, throughout the islands of the Indian Archipelago, and yields a horse hair like substance, Javanese *Duk*: *Malay*, Ijo or, Eju or Gomuti, which has given the name to the tree. The Gomuti attains a height of thirty to forty feet, and its leaves, when very young, are eaten like the American Cabbage palm. (Oreodoxa oleracea, Mart.) The fleshy outer covering of the fruit of the Gomuti, when macerated, affords a fiery liquor, appropriately denominated "hell-water," by the Dutch, and the seed, or rather the albumen when freed from its noxious covering, is made into sweetmeat by the Chinese. It yields Sago, Palm wine, Gomuti Sugar and the Baru.—*O: V:*

(401) ARGEMONE MEXICANA (*Linn.*) N. Ord. PAPAVERACEÆ.

Yellow-thistle or Mexican-poppy, ENG.	Feringie-datura or Peela, DUK.
Brumadundoo, TAM.	Buro shial kanta, BENG.
Bruhmadundie, TEL.	

An annual herbaceous plant, abundant all over India, easily recognized by its prickly, thistle-like leaves, and bright yellow flowers. It is a native of South America, now naturalized, and exceedingly common about Calcutta; the seeds have been said to be used in Jamaica as an emetic, a thimbleful being bruised with water. Barton describes them as being more powerfully narcotic than opium. But Dr. now Sir B. O'Shaughnessy, subjected the seeds to numerous experiments, and never found them to shew any emetic or narcotic influence; they contain a bland colourless oil resembling that of the poppy, and which can be used in ounce doses without producing any purgative effect. This oil, known as the "koorookoo," attracted much attention at the Exhibition of 1851. The juice, which exudes on wounding or bruising this plant, is of a bright yellow colour, and is used by the natives as an application to indolent ulcers, and to remove specks on the cornea. It has by some writers been described as possessing the activity of gamboge. Samples of the oil were produced at the Madras Exhibition. It is cheaply procurable in the bazars, and is used chiefly for lamps. The mass from which the oil is expressed is found to be extremely nutritious to cattle. The plant would form a valuable article of husbandry.—*O'Shaughnessy, Simmonds. Useful Plants.*

(402) ARGHEL. Cynanchum Arghel, the leaves of this plant are employed in Egypt for the adulteration of Senna leaves.—*Simmonds.*

(403) ARGYREIA BRACTEATA (*Choisy.*) N. O. CONVOLVULACEÆ, Ipomœa bracteata, *Heyne herb. A. bracteata. Wall. Cat.* 1419, (Sanscrit) *Samudra patta?* A twining shrub, growing in Madras, and Coromandel, filled with milky juice. Decoctions of the leaves are used by the natives as fomentations in cases of scrofulous enlargement of the joints: the boiled leaves being used as poultices at the same time.—*Wight, quoted in Useful Plants.*

(404) ARGYREIA CUNEATA. Purple Convolvulus. A large and elegant creeper, flowers during the rains and cold weather: of rose and purple colour, common throughout the country, the leaves are covered below with a mealy down; whilst the upper surface has a dull green appearance, and is applied by the natives to act as a discutient.—*Riddell.*

(405) ARGYREIA MALABARICA. (*Choisy.*)

Kattu Kalangu, MAL. | Paymoostey, TAM.

Convolvulus Malabaricus, *Linn.*—Ipomœa Malabarica, *Roem and Schult.*—*Rheede* XI. t. 51. Grows in Mysore, Malabar, and common on the ghauts. USES, &c. Root cathartic. The plant is considered by farriers a good horse medicine.—*Ainsl.*

(406) ARGYREIA SPECIOSA (*Sweet.*)

Samutra-cheddei, TAM. | Samudra Shoka or Googulee, HIND.
Samudra-stogam, MAL.
Samutra-patra, TEL.

Ipomœa speciosa, *Sims.*—Lettsomia nervosa, *Roxb.* A twining shrub growing in Malabar and in forests and hedges in the Peninsula of India. It is found wild in the Dhoon. Leaves are used by native practitioners in the preparation of emollient poultices, and also in cutaneous complaints, being applied externally to the parts affected.—*Ainsl. quoted in Useful Plants. O'Sh.* Wight, in Icones, gives figures of *A. acuta*, 1356: aggregata, 1356-9: *cuneata*, 890: cymosa, 839: *elliptica*, 1356: *festiva*, 1356, fulgens, 1357: *hirsuta*, 891: pomacea, 888: *setosa*, 1356-60: speciosa 851-1360: tilifolia, 1358.

(407) ARISTOLOCHIA. *Aristolochiaceæ.*—These are mostly climbing plants, some of the species being natives of India, growing in any good soil.—*Riddell.*

(408) ARISTOLOCHIA ACUMINATA. This plant bears large drooping flowers of a dark purple colour, the root is exceedingly bitter, and is said to be an antidote to the bite of poisonous snakes.—*Riddell.*

(409) ARISTOLOCHIA BRACTEATA (*Retz.*) Nat. Ord. ARISTOLOCHIACEÆ.

Addatticapalay, TAM. | Cattra-bangha, SANS.
Gaddday-gadda purra, TEL.

A small creeping plant, flowers nearly all the year, grows on the Coromandel Coast in cultivated places, and in Travancore. Every part of this plant is nauseously bitter. In cases of tormina, two of the fresh leaves are rubbed up with water and given once in 24 hours. Infusion of the dried leaves given as an anthelmintic: fresh bruised and mixed with castor oil, they are considered a valuable remedy in obstinate cases of itch. The fresh leaves applied to the navel of a child are said to have the effect of moving the bowels. The same, fried with castor oil and made into a ball the size of an orange, relieves horses when suffering from gripes. The leaves beaten up with water are given internally in cases of snake-bites: also in infusion in boils and inflammatory attacks.—*Roxb. Ainsl. Lindl. &c. quoted in Useful Plants. Faulk.*

(410) ARISTOLOCHIA INDICA (*Linn.*)

Indian Birthwort, ENG. | Ishwurmool, BENG.
Hari, SANS. | Caykhoaica, COCH. CHIN.
Perumarundoo, Talashroobe, TAM. | Saesander, Satasanda; CYNG.
Doolagovila, Eesaravayroo, TEL. | Isrievayl, DUK.
Perumurundoo kadalewegam, MAL. | Isarmel, HIND.
Wallas, JAV.
Hari, Ishwari, SANS.

A perennial twining plant, a native of Bengal growing every where, the root is like that of sarsaparilla, perennial. The root is nauseously bitter, and is given as an emmenagogue, and in paroxysms of gout. It is also considered by the native practitioners to be a valuable remedy in the diarrhœa of children proceeding from dentition. The dose given in India, to an adult, of the decoction of the root, is an ounce to an ounce and a half twice daily.—*O'Shaughnessy, p.* 568. A valuable antidote to snake-bites, being applied both externally and internally. Mixed with honey, the root is given in white leprosy, and the leaves internally in fever. The root, leaves, stalks, and bark of this shrub are bitter; the taste of the fruit is accompanied with a slight degree of aromatic warmth, and is reckoned by the native doctors a valuable remedy in bowel affections.—*Ainslie. Lindl. &c. quoted in Useful Plants.*

(411) ARISTOLOCHIA LONGA, and *A. rotunda*, natives of the south of Europe, are found in the medicine bazars of India, under the names of *Zurawund tuweel* (Pers. *duraz*, long) and *Zurawund mooderuj* (Pers. *gird*, round,) with *aristolochia* as the Greek name.—*O'Shaughnessy, page* 568. Aristolochia longa and A. rotunda are products of Cashmere. The roots of the former are given by the Hakeems, in diseases of the womb, ulcers and affections of the gums: the latter in itch, leprosy, for drying up sores, destroying lice; and intestinal worms, also for promoting the renal and menstrual secretions.—*Honigberger.* A. longa, Zurawand-tuweel, Pers. occurs in whitish, twisted pieces, the size of a finger, and nearly tasteless. The Guaco of the Caraccas, so celebrated as an antidote to snake poison, and the trials of which in hydrophobia by Dr. Elliotson attracted such notice some years since in London, is asserted by Dr. Hancock to belong to this family.—*O'Shaughnessy, p.* 569.

(412) ARISTOLOCHIA SACCATA. In Sikkim, in the valley of the Teesta, are many fine plants, but Dr. Hooker especially noticed the Aristolochia saccata, which climbs the loftiest trees, bearing its curious pitcher-shaped flowers

near the ground only; its leaves are said to be good food for cattle.—*Hooker, Vol.* II, *p.* 7.

(413) ARIZEMA (Arhizoma) GRACILE, abounds in the Himalayas: the roots are considered by the Hakeems to be an excellent remedy against every description of animal poison.—*Hoffigberger.*

(414) ARMENIACA VULGARIS, or Apricot.

Burkook, Khoobance, Mishmish, Bakurkhanee, Vern. | Albaricoque, Sp.

Is common about villages in the Himalayas, where it is also called Zurd-aloo, Chooloo, and Chinaroo. Oil of the finest kind is made by expression from the kernels, sold separately in the Bazars under the name of Badam kohee, or hill almonds. The oil is clear, of a pale yellow colour, and smells strongly of hydrocyanic acid, of which it contains usually about 4 per cent.—*O'Shaughnessy, pages* 222-23.

(415) ARMOSIA DASYCARPA.

Thitwajee, Burm.

This tree is found here and there widely scattered in the Swar and other Forests North of Tounghoo. Wood red, equivalent to mahogany. —*McClelland.*

(416) ARNEE MUSLINS. The town of Arnee, situated in the collectorate of Chingleput, of the Madras Presidency, is still celebrated for the muslins it produces, though the first kinds are now only manufactured on order. The Arnee colored muslins for ladies dresses exhibited at the Madras Exhibition of 1855 were considered deserving of commendation and were of a quality very far superior to that which is generally made for sale. They appeared to have been manufactured expressly for the Exhibition. The muslin next in quality was exhibited by Ruthnum Moodely, and deserved commendation. A piece of Arnee Muslin, priced Rupees 122½, attracted much attention and praise. The fineness and delicacy of its texture afforded clear proofs of what the Native workman can achieve under adequate inducement. The Jury considered the Arnee muslin (white) exhibited by I. Gooroomoorthy Chetty to be an excellent specimen, fine in quality, soft to the touch, even in the thread, which was country made, and of good color and texture, and awarded the exhibitor a 2d Class Medal.—*M. E. Jur. Rep.*

(417) ARNOTTO. BIXA ORELLANA.—

Orleaan, Rokoe, Dut. | Oriana, It.
Rocou, Fr. | Oriana, Port.
Orlean, Ger.

Annatto, Annotta, *Bixa orellana*, is now naturalised in India and Burmah and the Eastern Archipelago, but its native country is Cayenne, from which it has spread into the hottest parts of South America, and the West Indies, where it is extensively cultivated on the banks of rivers, and gives its name to the Bay of Annatto, on the North of Jamaica. It is likewise grown at the Hawaiian Islands, Tongataboo, Rio Janeiro, Peru, Zanzibar. The Arnotto is a thick extract obtained, it is said, from the seeds as well as from the soft sticky rind of the plant, and it is met with in commerce of two sorts. Flag or Cake Arnotto, is furnished almost wholly by Cayenne, from which it is brought to England in square cakes, weighing two or three pounds, each wrapped in banana leaves, from which it gets the name of Flag Arnotto, and packed in cases. A superior kind called Roll Arnotto, is a harder and more concentrated extract. The rolls are small, not exceeding two or three ounces in weight. It is hard, dry and compact, brownish on the outside, and of a beautiful red colour within. It is grown in India and Burmah; in the latter country it is extensively cultivated: the dyers obtain a red dye from its fruit. In England dyers obtain the red colour called aurora, and the liquid sold under the name of Nankin dye is a solution of Arnotto in potassa and pure water. A solution is also made in alcohol, and used in varnishing and lacquering: in Britain it is used for giving more or less of an orange cast to the simple yellows; as an ingredient in varnishes; and for colouring cheese and butter. The consumption of Arnotto in great Britain has greatly increased of late years. Formerly, it amounted to but little more than 50,000lbs. in later years, the imports have been as follows;

	lbs.	Retained for Home consumption.
1834	252,981	
1835	163,421	
1839	303,489	224,794
1840	408,469	330,490
1847	270,000	296,821
1849	162,400	145,824
1850	391,504	231,280

In the Madras Exhibition of 1855, many good specimens of fruits and seeds were exhibited. A specimen of Cake Arnotto, of a thick pasty consistence, prepared by macerating the seeds was forwarded by Lieut. Colonel Grant, from Trivandrum. An orange colouring matter is obtained in this way. This is soluble in alkalies, by which means it is fixed to silk or wool; sometimes, as appears to have been the case in Col. Grant's specimen, the colouring matter is mixed with oil before drying.—*Mason, Simmonds. M. E. Jur. Reports. Tom.* It is used as an ingredient, for tinging cheese and butter, to which it imparts various shades of colour from yellow to red and it is also mixed with chocolate, oils, spirits and varnishes as a colouring material. As Arnotto dissolves in milk, the colouring matter is diffused in the milk previous to its manufacture into cheese and butter. The Spaniards also employ it, for coloring their soups, deeming it wholesome and stomachic. Arnotto is soluble in alkalies, by which means it is fixed to silk or wool. The colour obtained from fresh pods of the plant, is so superior to that of either the flag or cake Arnotto as to lead to the conclusion that

the method of preparing these, which is by a great degree of heat and fermentation, is injurious to the colour.

(418) AROOSHA OR CHITTAGONG FIBRE, *Callicarpa Cana*, is prepared, in Chittagong from the inner bark of the plant.—*Royle.*

(419) ARRACK.

Arak, Rak ; DUT.	Araco, IT.
Arac, FR.	Araca, PORT.
Arrack, Rack ; GER.	Arak, RUS.
Arrack, HIND.	Arak, SP.

Like the word alcohol, in England, Arrack is a term applied in most parts of India and the Indian Islands, to designate every sort of spirituous liquor, however obtained. From the various substances employed in its manufacture, in the several countries, its strength and taste are found to vary much in different places. Perhaps along all the sea-board of eastern countries, where the various palms most abound, the toddies,—the sap or Palm wines of the cocoanut, Cocos nucifera : of the date palm, Phœnix dactilifera : the Palmyra, Borassus flabelliformis ; or the Caryota urens, are the materials chiefly employed for making Arrack. After this juice is fermented it is distilled and rectified, and it usually yields about an eighth part of pure spirit. The three principal kinds known in commerce however are the arrack of Batavia, Goa and Columbo, That from Batavia is the strongest, and is distilled from a mixture of 62 parts of molasses, 3 of toddy, or palm wine, and 35 of rice. The last of which Crawfurd states to be boiled ; and, after cooling, a quantity of yeast is added and the whole pressed into baskets, in which condition it is placed over tubs, and left for eight days, during which time a liquor flows abundantly from the rice. This liquor is distilled and then mixed with the molasses and toddy, which is all left to ferment for a week in large vats ; after the fermentation is over, the Arrack is distilled one, or two, or three times, according to the strength required. That made at Java is chiefly for home consumption, but is also exported to China or India, very little is brought to China, and altogether in Junks. Another statement however describes the Batavia or Java Arrack as obtained by distillation from molasses and rice, with only a small admixture of toddy. The Arrack produced at Goa, is sweeter than that which comes from Java, and being made entirely from toddy, by repeated distillation, it is preferred by the Hindus to the Batavian, on that account, though it is an inferior spirit, containing only one-seventh of pure alcohol.—*Morris.* Arrack in one part of Ceylon, is distilled from the fermented Palm wine of the Cocoanut Palm, and is prepared in certain districts of the Southern province of the Island, under licenses from the Government, but for many years past the only Exports have been to the Indian Presidencies and some of the Eastern Islands. Similar to the Indian practice, in Ceylon, the right of vending Arrack in shops and bazars, is rented out and realizes about £55,000 : the shipments of Arrack have fallen off, from 1000 pipes in 1845, to 520, in 1850. *John Capper* in Asiatic Soc. Journ. Vol. XVI. London 1856 p. 274. It should be remembered, however, that, in Ceylon—three Palms yield sugar, the coco-nut palm (*Cocos nucifera*), the Palmyra Palm (*Borassus flabelliformis*), and the kittal or jaggerry Palm (caryota urens). From each of these palms the juice of the flowering stalk is collected under the name of toddy, and from it sugar, known in the East as jaggery, is regularly prepared ; but it is from the Palmyra Palm that nearly all the Palm sugar is obtained. It is from the saccharine matter of the coco-nut Palm that Arrack is made in Ceylon. This palm becomes productive there in about six or seven years : in collecting toddy, the spathe is stripped off from the spadix before it has fully expended ; the spadices are afterwards beaten between pieces of hard wood, and slices are cut with a sharp knife so as to allow the juice to flow out. Each spadix continues to yield juice for about 40 days, at nearly the average rate of half a gallon in 24 hours. When it is intended to prepare jaggery from the toddy, great care is taken by burning pieces of wood in the small earthen vessels attached to the flowers, and rubbing their interior with charcoal, to remove any impurities likely to promote fermentation : and as an additional precaution chips of the bark of the Vateria Indica are placed in each, so as to retard fermentation. The jaggery of the central province of Ceylon, is entirely made from the Caryota urens juice, which yields a much larger quantity of sugar than does that of the other two palms, and of a quality much more highly prized by the natives. When toddy is collected for the purpose of making Arrack, no care is taken to prevent fermentation, and as it is brought from the trees it is poured into wooden vats in which that process rapidly advances. If attention be not paid to the fermentation, acetic acid is formed, and this often causes the Arrack to take up lead from any portion of that metal with which it may be brought into contact. Dr. Smith, in Edinburgh New Phil : Journal Vol. IV. No. 1 July 1856 p. 175. In most parts of the East Indies, a very intoxicating spirit is prepared from the Mahowa flower, Bassia latifolia, the petals of which contain sugar. It is largely distilled in Bhandoop, a place situated about 20 miles from Bombay, *Faulkner.* And the Mahowa with the inner part of the white keekur tree, Vachelia farnesiana, perhaps all over India, form ingredients in the manufacture of the spirit sold under the name of "Arrack" in every bazar.—*Faulkner, O'Shaughnessy.* Arrack in Madras is made from the Velvelam Puttai Acacia leucophlœa bark and Palmyra jaggery ; the quantity required for one still, being 1 viss of the bark and 18½ of the sugar, the produce

being 4½ gallons. Its cost of manufacture to the Government is 5 annas a gallon, and it is sold to the retail dealers in the city and within the boundary of ten miles at Rs. 3 per gallon, but to all beyond the limits for Rs. 1 8 per gallon. The Jaggery is usually imported from Tinnevelly and from the Northern Circars. Pariah Arrack is a phrase employed by the humbler Europeans in India to designate a highly pernicious liquor, distilled or adulterated with the nux vomica, datura, cannabis sativa and other intoxicating drugs. In the four years 1852-53 to 1855-56, inclusive, Madras.

Exported.		Imported.	
Quantity. Gals.	Value. Rs.	Quantity. Gals.	Value. Rs.
57,567	71,572	2,26,177	2,80,995

The imports principally from Ceylon and Bombay and the exports to Cutch, Pegue and Ceylon.

(420) ARROWROOT.

Kooa maoo, TAM.	Kooa-ka-neshasteh, also, Tikhur, HIND.
Arrow-root-kalung, TAM.	Pen-bwa, BURM.

This is alike an imported and a largely exported article, into and from several of the countries of Southern Asia. The name was originally applied to the rhizome or root of Maranta arundinacea, in consequence of its supposed efficacy in counteracting the effects of wounds inflicted by poisoned arrows. Of late years, however, the signification of the term has been much extended, and it is now employed to designate almost every fecula or starch, which bears any resemblance to the true Maranta Arrow-Root, no matter how various the countries or dissimilar the plants may be, from which it is obtained; and few persons are perhaps aware of the great diversity in these particulars. In the great Exhibition of 1851, there were present the Arrow-roots of Trinidad, Bermuda, British Guiana, Montserrat: Jersey, Guernsey: Van Diemen's land, Western Africa; and East Indian varieties from Assam; Calcutta, Calicut; Rutnagherry: Vizagapatam; Borneo, Java, and Ceylon. The West Indian Arrow-root is obtained from the Maranta arundinacea, M. allongia, and M. nobilis; also from the Canna glauca and C. coccinea: to both of which the local name of tous les mois, or tulema is applied. In the East Indies, Arrow-Root is prepared from the Maranta arundinacea, also from M. ramossissima, a Sylhet species. The Maranta arundinacea was introduced in 1840-1841, into Rutnagherry, by the Collector, Mr. Elphinstone, where it throve extremely well, though it is not grown to any extent. It was introduced into the Tenasserim Provinces, several years ago, by Mr. O'Riley, and is beginning to be largely cultivated. The Arrow-root made is not inferior in quality to any imported; while it is sold for half the price, at a good profit. A gentleman at Tavoy lately sold a considerable quantity for exportation and had orders for more than a thousand pounds of the next crop.—*Mason.* At the Madras Exhibition of 1855, *Arrowroot,* from the Maranta arundinacea, was exhibited from Chittoor and Royapoorum. The plant is extensively cultivated at both places, and the article is considered of excellent quality. The Chittoor Arrow-root was remarkably pure, a fine impalpable powder without odour, and without taste. Mr. Spears of Royapoorum sent a large quantity of good Arrow-root, which was considered an equally valuable farina, if manufactured with equal care. The Rutnagherry Arrow-root is prepared principally from the "kut-cherra" or perhaps "kutchoora," which seems to be a term general in that part of India applied to all the species of curcuma. The kutchoora grows in all the villages of the Southern Kokun and that prepared in the jail sells at 4¼ to 4⅓ annas per lb. The kutchoora of the Mahabaleshwur Hills seems to be the Curcuma montana. Indeed in the East Indies large quantities are prepared from different species of curcuma, all of which have not been clearly ascertained, but the C. angustifolia and C. leucorrhæa are recognised; In the Madras Exhibition of 1855, Arrow-root from the C. angustifolia and C. montana of Roxburgh, was exhibited from Canara, Cochin, and Travancore, where it has been, for many years past, prepared in large quantities, and, from Travancore, it is a regular article of export. The West Indian Arrow-root, Maranta arundinacea, is now however, extensively cultivated at Chittoor in North Arcot and Royapoorum, a suburb of Madras, at both of which places the flour prepared is considered of excellent quality. It is also cultivated near Calcutta, where the manufacture of Arrow-root has long been carried on. The Mergui Arrow-root was formerly prepared from the Tacca pennatifida, but it was not found to agree with some constitutions. As above mentioned, several years ago, the Maranta arundinacea *(pen-bwa* BURM.) was introduced by Mr. O'Riley, and the Arrow-root prepared from it is not inferior to any imported, and can be sold at half the price of the imported article at a good profit. The M. dichotoma (*then,* BURM). also grows at Mergui. Amongst other vegetable substances from which starches that might serve as substitutes for Arrow-root, could be prepared, may be mentioned the Nelumbium seeds, from the N. speciosum, and seeds of the Trapa bi-spinosa (Singhara, HIND) which abound so much in starch that it may be easily separated from them. Both are employed as articles of diet among the natives of Southern Asia. Arrow-root from the Nelumbium speciosum was exhibited in 1851, from Cuttack. At the Madras Exhibition of 1855, the small tuberous roots were exhibited of the Aponogeton monastachyon, Roxb: which are dug up in swampy places and eaten by the natives who call them Madura kotee kalangoo. Under the name of Pannam kalingoo, the people of Southern

India and Ceylon eat the first shoot from the planted palmyra nut, Borassus flabelliformis, panamarm, TAM. It is the germ of the future tree, and is about the size of a thick leek, and nearly white. According to Simmonds, recent experiments have proved that a farina superior to Arrow-root can be obtained from it, prepared in the same way, and that 100 roots, costing three annas, yield one and a half to three pounds of the flour. The starches from these substances, however, may require to be further investigated, and they are mentioned here merely with that view. But in commerce, the flour or farina of *Manihot utilissima* is imported into England under the name of Brazilian Arrow-root. Potato-flour or Potato Arrow-root, sometimes called *British or English* Arrow-root, is prepared by rasping and grinding the well cleaned tubers of *Solanum tuberosum* into a pulp. Arum Arrow-root is procured from the tubers of the Arum maculatum, the common "cuckoo pint;" "wake robin," and "lords and ladies:" it is chiefly prepared in Portland Island; hence is generally called Portland Arrow-root. The Tacca Arrow-Root of Otaheite is obtained from the tubers of *Tacca oceanica*: it is usually designated Otaheite Arrow-root. The difficulty and confusion arising from the multitudinous sources from which this product is obtained are further increased by the variety of names given to it in the market, where it is known as West Indian, Jamaica, Demerara, Bermuda, St. Vincent, East Indian, Brazilian, African, Guinea, Sierra Leone, Portland, British, and a variety of other Arrow-roots. Pure and unadulterated Maranta Arrow-root should be of a dull and opaque white colour, crepitating or crackling when pressed beneath the fingers; and when treated with about twice its weight of concentrated hydrochloric acid, it should yield an opaque paste. The Tacca Arrow-root from T. oceanica is a white starch-like powder, having a slightly musty odour; and is sold under the names of Otaheite Arrow-root, South Sea Islands Arrow-root, and Williams' Arrow-root. Potato-starch or Potato Arrow-root forms a white and somewhat glistening powder, which crackles like genuine Maranta Arrow-root, when pressed between the fingers. The Curcuma or "East Indian" Arrow-root, as exported to England, principally from Calcutta, has a white and a brown variety. The white is the best; the powder when pressed between the fingers feels less firm, and does not crepitate to the same extent as the Maranta Arrow-root. The two varieties can, however, be distinguished from each other, only with certainty by means of the microscope. Amongst traders, the principle adulterations consist of mixtures of the cheaper Arrow-roots or starches, with those of better quality and then selling the mixtures under the name of the higher priced article. Potato-flour: Manihot or tapioca-starch and Sago starch, all being employed for this purpose. Mr. Mason mentions that a spurious kind of Arrow-root has long been made at Mergui from the same plant as that which yields the sago. But medical men have decided that it contains properties which render it unsuitable for the sick, and chemical analysis has developed that it contains only half the nutritious qualities of the genuine Arrow-root. Under the name of Palagunda or Hill Arrow-root, the Madras Revenue Commissioner, Mr. Elliot, sent a small supply of a starch from the Rajahmundry district, to the Exhibition of 1851, but it has never reappeared, and its source is unknown to me.—*Mason. Hassall. M. E. Jur. Reports. Simmonds, Faulkner.*

(421) ARSENIC. Arsenic is a metal resembling steel in colour, crystalline, volatile below a red heat, vapor of strong garlic odour, readily oxydised: with one equivalent of oxygen it forms the arsenious, with two equivalents the arsenic acid. With sulphur it forms the yellow sulphuret, orpiment, and the red, realgar.—*Beng. Phar. p.* 313.

(422) ARSENIC, WHITE, OXIDE OF, ARSENIOUS ACID.

Turabul halil, ARAB.	Arseneo uxeno, IT.
Sulfeid sumbool, DUK.	Acidum arseniosum, LAT.
Arsenic oxyde natiff, FR.	Wrongon, MAL.
Weisse arsenik, GER.	Sumbulfar, PERS.
Soomul, Sumbool-khar, HIND.	Vullay pashanum, TAM.
Sunchya, HINDO.	Telapashanum, TEL.
	Warungun putih, MALAY.

Is white, brittle, faintly sweetish in taste, more or less translucent; sometimes it has a yellow, reddish, or blueish tinge, owing to the presence of iron, sulphur, and other impurities. It is used in the manufacture of glass, dyeing, medicine, &c. Localities, Bohemia, Saxony, Persia, &c. That met with in commerce in Bombay, is brought from the Persian Gulf; the arsenic sold by chemists, is obtained from England, and is generally in the form of powder.—*Faulkner.* The substance popularly known under this name, is one of the oxides of the previously noticed metal, namely, arsenious acid, or white oxide of Arsenic. This acid, combines with bases, forming arseniates, many of which occur in nature, Arsenic also occurs as a sulphuret, and is frequently found in combination with other sulphurets, as with sulphuret of iron, forming arsenical pyrites. Traces of arsenic are to be found in many minerals and in their products, as in sulphuric and sulphurous acids, in zinc, sulphuret of antimony &c.—*Tomlinson.* White Arsenic is obtained in China by sublimation from the native sulphuret of arsenic or Hartal and is largely exported to India.

(423) ARSENIC, RED—(Bi-Sulphuret of), REALGAR, RED ORPIMENT.

Zurnelk-surkh, ARAB.	Zurnek-surkh, ARAB. PERS.
Lall-sumbool, DUK.	Manahsila, SANS.
Lall-sumbool, Munseel; HIND.	Koodiraypal-pushanum, TAM.

Is brittle, inodorous, tasteless, and insoluble in water. It is used as a colouring substance, as well as in pyrotechnical compounds. Localities,

China, Persia, Bohemia, Saxony. The red arsenic met with in Bombay is imported from China and the Persian Gulf, and is known by the name of *Munseel.—Faulkner.* There are several combinations of arsenic and sulphur; one such compound, *Realgar* Bi-sulphuret of arsenic occurs native, in brilliant red crystalline masses. It is used in the preparation of "White Indian Fire," which consists of 24 parts of saltpetre; 7 of sulphur, and 2 of realgar, finely powdered. This composition burns with a white flame of great brilliancy. Realgar is of a beautiful orange colour and is used in painting.—*Tomlinson.*

(424) ARSENIC, YELLOW, (Ter-Sulphuret of), YELLOW ORPIMENT.—

Ursanikoon, ARAB.
Hurtall, DUK.
Orpiment, FR.
Orpiment, Ranschgelb; GER.
Hurtal, HIND.
Orpimento, IT.
Auripigmentum, LAT.
Zerneik-zurd, PERS.
Haritalaka, SANS.
Oropimenti, SP.
Aridurum, Yelliekood-pashanum, TAM.
Warangan or Barangan, MALAY.

Generally occurs massive, and lamellar, of a bright lemon or golden-colour, inodorous, and insoluble in water. It is used in dyeing, calico printing, &c. Localities, S. America, Saxony, China, Persia, &c. The yellow arsenic met with in Bombay, and known by the name of *Hurtal*, is imported from China and the Persian Gulf.—*Faulkner.* Orpiment, (or king's yellow) ter-sulphuret of arsenic, (As. 1, s. 3,) is found native, and is also prepared by the action of sulphuretted hydrogen or hydro-sulphurets in a solution of arsenious acid. It is of a yellow colour, fusible, volatile, soluble in alkalies, insoluble in acids, decomposed and oxydized by boiling with nitric acid. It unites with bases to form salts termed sulpho-arsenites, and is reduced to the metallic state by being heated with the black flux. The paint called kings yellow, is usually adulterated with lime and sulphur. YELLOW ORPIMENT is much used by the Tamil painters, in preparing a yellow pigment. "Native Orpiment, the auri pigmentum of the ancients, is of a brilliant yellow colour. It is used in dyeing and calico printing. *Ainslie.* The various compounds of arsenic are to be obtained in every bazar in India, and the native medical practitioners, painters &c. considerably employ them. None of the compounds of Arsenic have been discovered to be products of Southern India, but they are imported largely. The white oxide from Bengal, the red and yellow sulphuret from Burmah, where it is found in great quantities, as also from China and Japan and the Persian gulf. It also occurs in the Mergui islands. It is now known that Arsenic, sulphate of copper, verdegris and other poisonous minerals, when employed to steep grain, previous to sowing, with the view of preventing smut, prove injurious to the health of the sowers and to those who eat the bread made from it. A preparation of sulphate of soda and lime answers with equal effect.—*Tomlinson, Simmonds.*

(425) ARTEMISIA, an extensive genus of plants belonging to the natural order *Compositæ*, and remarkable for the intense bitterness of many of its species. It is easily recognised by the multitude of fine divisions into which its leaves are usually separated, and the numerous clusters of small, round, drooping, greenish-yellow, or brownish flower-heads, with which its branches are loaded. The flowerets are all tubular, but those in the circumference of each head are very imperfect. Artemisia *acetica*, a Persian species, is said to have a strong odour of vinegar. Artemisia *Chinensis* yields the material from which moxas are made, that are burned upon the human body as a cautery in cases of gout and rheumatism. Artemisia *Maderaspatana* and Artemisia indica are used by the Indian medical practitioners. The flower-heads of A. Sieberi, Lercheana, contra, and pauciflora constitute the drugs called semen contra, or semen cinœ, which are used as vermifuges. The same part of A. Vahliana yields the Persian Wormseed, or semen cinœ Levanticum; and that of A. cœrulescens, the semen seriphii or Barbotine. A. camphorata and A. Gallica are used in France also as anthelmintics under the name of Sanguerie or sanguerite.—*Eng. Cyc. pages* 312 and 313.

(426) ARTEMISIA ABSINTHIUM. Absinth, *Afsunteen*, is afforded from this herb, and other species of Artemisia.—*Ben. Phar.* 270.

(427) ARTEMISIA CONTRA. Semen-contra of the Levant, Aleppo, and Alexandria. A native of Persia. Odour strong, nauseous, and balsamic, taste analogous, rather bitter, hot, durable, and very disagreeable; on chewing this substance a most distinct sensation of coolness is experienced. The vermifuge properties of this celebrated medicine reside in a volatile oil, and resinous extract; 500 parts of *semen-contra* furnish two of essential oil, of light lemon-colour, of bitter and burning taste, of smell resembling that of peppermint.—*O'Shaughnessy, page* 416.

(428) ARTEMISIA DRACUNCULUS.—*Tarragon.* A salad much used by the French, raised from seed and division of the plant; culture similar to mint.

(429) ARTEMISIA INDICA, Indian Absinth. Native of Nipal.

Afsunteen, ARAB.
Mustaroo, DUK.
Duna, and Murwa, HIND.
Dana, SANS.

This is a substitute for the A. absinthium, the wormwood of Europe, but weaker.—*O'Shaughnessy, page* 444.

(430) ARTEMISIA JUDAICA. Worm Seed. Saheba, *Avicenna.* Indian Worm Seed, Indian Semencontra. A native of Judea, Arabia and Cochin-China. The semen contra of Barbary is more coloured than that of the East; it is cheaper, and of more certain origin. Both varieties resemble each other in quality; one only being smooth and green, the other downy and grey.

The source of Semen-contra was long attributed to the Zedoary plant.—*O'Shaughnessy, page* 416. Indian worm seed finely powdered and sifted, is a popular worm remedy, especially in the round and long worms of children: the dose is three to ten grains given in honey or milk.—*Beng. Phar. p.* 406.

(431) ARTEMISIA CHINENSIS, a native of China and Siberia. The moxa, a slow caustic, is prepared from the down of this plant. It is made into conical masses, and burns like tinder, when touched by a spark or any red hot body.—*O'Shaughnessy, page* 417.

(432) ARTEMISIA VULGARIS.

Nagdowna, Hind.

This is a native of Europe, but the Moxa of Japan is prepared with the leaves and stalks of a neighbouring species.—*O'Shaughnessy, page* 415.

(433) ARTICHOKE. Cynara scolymus, Of four species, only two are cultivated for use. They have large pinnatifid leaves, erect, and about two or three feet long. From the centre arises a long stalk, which gives off branches, on the top of which is a large round head composed of numerous oval scales enclosing the florets sitting on the receptacle, commonly called the artichoke bottom, and which, with the fleshy part on the base of the scales, is the only part eaten. The two sorts grown are, the French conical spine-leafed, and round Dutch globular-headed. The seed may be sown in June, and continued during the rains; the soil should be light and of a good loamy description; the seed sown at least six inches apart. When they are in four or six leaves, they may be transplanted in rows, and in open situations and good soil, three or four feet asunder. The ground should be of a light consistence and well manured. Let the trenches be about six inches deep, and at least from one to two feet broad: they will require occasional irrigation if the weather is dry, after having been well watered by the hand. When first removed, at the latter end of the rains, and the plants have arrived at almost their full size, a small black fly collects upon them in the greatest abundance, and destroys the whole of the leaves. This also happens to plants raised from seed sown in October, or at the close of the rains. When the plants, in January, February, and March, have arrived at their full perfection, they may be propagated from slips that grow on the side of the old plants, which wither and dry as soon as the fruit is ripe and gone to seed. Care must be taken in removing both plants and shoots, that a sufficient quantity of earth is taken up with the roots, so that the spongioles are uninjured. When they appear to have taken root well, let the ground occasionally be loosened round them, and the stalks well earthed up. The best means of preserving the plants from being destroyed by the fly, is to cover the leaves well over with ashes from the kitchen. The seed from Europe, the Cape, Persia, and Hindoostan, all grow well, but those which have succeeded best with Dr. Riddell were from the upper provinces of Bengal: they were of the large globular kind, and from being acclimatised, he thought they did not suffer so much from the fly as others. More than one head should not be allowed on each stalk: pick all the others off. If a piece of stick is run through the stalk, across under each head, he thinks that it tends to enlarge it. The seed may be collected whenever ripe, which is mostly in May or June. The largest and finest heads do not always give the most seed, often the reverse. Young artichoke shoots if blanched may be eaten as salad.—*Riddell.*

(434) ARTICHOKE JERUSALEM. Helianthus tuberosus. Cultivated for the tubers attached to the roots, may be lifted annually, after flowering, and kept like potatoes for three months, or they may be allowed to remain for years in the same situation, if kept clear of weeds and the ground annually top dressed with manure; cooked similar to potatoes, and sometimes fried.—*Jaffrey.*

(435) ARTOCARPACEÆ, *Artocarpads*, the Bread Fruit Tribe, a natural order of plants nearly related to *Urticaceæ* (the Nettle Tribe), from which it is so difficult to separate them by any precise character that there are many who consider them nothing more than a section of *Urticaceæ*. The species are all found in the warmer parts of the world, and many of them are natives of the tropics only Their milk, which is always acrid, renders some of them intensely poisonous, as the Upas Tree of Java [Antiaris], and certain Indian species of Fig [Ficus]; nevertheless, if the milk is naturally absent from any particular part of an Artocarpad that part becomes eatable and even wholesome. Thus the fruit of the cultivated fig, up to a short period before its maturity, remains milky, and at that time it would prove exceedingly unwholesome; but when ripe the milk disappears, is replaced by sugar, and the fruit becomes, as all know, extremely wholesome. Many species are known, some of which, as *Artocarpus chaplasha* and *hirsuta*, are large trees, and yield valuable timber in the forests of Bengal and Malabar.—*Engl. Cyc. page* 318. The A. incisa of the West Indies and Eastern tropics is the celebrated Bread fruit Tree, the bark of which is stripped and beaten into cloth. *A. integrifolia* of India, the Jack or *kantal*, as also the A. Laecucha, of India, have similar properties, and they are frequently cut down on account of their wood. It may be also mentioned that the *Trap* Tree, which furnishes the Gutta used as bird lime in the Malayan Peninsula and at Singapore the fibres of its bark are used for cordage, fishing lines and nets; the *Chowat Kurnal*, similar to the above, from Baram River, also the *kumut* or bark cloth, worn by the Karens when mourn-

ag for the dead, from the river Barum, and Glam, ree bark, from Borneo, which furnishes a paper ike bark much used in caulking the seams of essels, are all supposed by Dr. Royle to be spe- ies of Artocarpus.—*Royle. Fib. Pl. p.* 341.

(436) ARTOCARPUS, SMALL BREAD-FRUIT. This yields an orange-colored fruit resembling in aste a custard apple, and in appearance a fig, ut it is a species of artocarpus, which Mr. Mason cannot find any where described, though ot scarce in the Tenasserim forests.—*Mason.*

(437) ARTOCARPUS CHAPLASHA (*Roxb*). N. O. ARTOCARPACEÆ. A large tree: grows in Chittagong and Assam. From this immense ree canoes are made for river use where the tree rows. The wood is also useful for many other urposes, particularly when required to be used nder water.—*Roxb. quoted in Useful Plants.*

(438) ARTOCARPUS COMMUNIS. BREAD-RUIT. The true seedless bread-fruit tree is ultivated at Penang, and has recently been in- roduced into Mergui, where it is said to flourish. —*Mason.*

(439) ARTOCARPUS ECHINATA. MOUN-AIN JACK.

Kanæ Kyatha, TAM.

This a large tree very common about the Balaghaut and Wynaad. The wood, though ap- arently good, is not used in Southern India. n the Tenasserim Provinces, however, the moun- ain jack is deemed a valuable timber by the na- ives, especially for canoes. Wallich says: "It pro- luces a sort of caoutchouc, with which the Bur- nese pay their boats." But Mr. Mason ima- ines this is a mistake, as the Burmese almost niversally pay their boats with a substance that s produced by a bee, mixed sometimes with lammer. It produces an echinated, agreeably cid fruit. The leaves of the young trees are ashed like some species of oak.—*McIvor. M. E. Mason.*

(440) ARTOCARPUS HIRSUTA (*Lam.*)

Anjelie, ENG.	Ayenee, MAL.
Anjelee, TAM.	

This is the Artocarpus pubescens of Willd. nd Ainslie, a native of the coast, not extending ar inland. It is a large tree used on the coast or making canoes and such like purposes. It bounds in the Forests of "Malabar" and is in- ligenous also in the Tenasserim Provinces. It is large handsome tree well suited for affording hade. It yields the Anjely wood so much used on he Western Coast for house-building, ship's rame-works, &c. As a timber, it is esteemed par- icularly useful. The fruit is the size of a large range, and abounds in a viscid juice, which freely lows from the rough rind if touched: this is manu- actured into bird lime. The pulpy substance which surrounds the seeds is much relished by he natives, being almost as good as the Jack- ruit. The bark is occasionally used in Canara for preparing a brown dye.—*Roxb. Wight. &c. quoted in Useful Plants. Joffrey. Mason. Wight.*

(441) ARTOCARPUS INCISA. BREAD FRUIT TREE.

Nengka, MALAY.

A tree of slow growth, to be found in gardens about Madras, but is a native of the South Sea Islands. This bread-fruit tree is cultivated in a few gardens at Tavoy and Maulmain, and bears very well; but the fruit is of that variety which is full of seeds and is of no value. It grows to a tole- rably large size in Bombay, and is also to be met with in some parts of the Dekhan, where it bears a fruit the size of a large orange, or small pumplemose, with a muricated rind. It seldom ripens in Bombay, the fruit falling off in the cold season. Like the jack, it bears fruit both on the branches and roots. The fruit, cut into slices and fried, has something of the flavor of a sweet potato dressed in a similar manner. It will grow from cuttings, and requires a light soil, with care, and watering at first. The bark of the Artocarpus incisa, or Bread-fruit tree, strip- ped, and then beaten and prepared, makes a kind of cloth with which the South Sea Islanders clothe themselves. At Tahiti, clothing made of it, and worn chiefly by the common people, was more common than that made from the paper mulberry, though inferior to it in softness and whiteness.—*Royl. p.* 341. It is extensively cul- tivated throughout the Malay Archipelago.— *Crawfurd Dic. Riddell. Mason. Juries Reports M. E. page* 24.

(442) ARTOCARPUS INTEGRIFOLIA (*Linn.*)

Indian Jack-tree. ENG.	Sukun, MALAY.
Pilavuh, TAM.	Kluwi. MALAY.
Panasu, TEL.	Tambul, MALAY.
Phunus, DUK.	Kuntal, BENG.
Pilavoo, MAL.	

A valuable timber tree common all over India which grows rapidly to about 2 feet and a half in diameter; and yields a wood much used for making furniture of every description, for which it answers remarkably well. It is in much request in Ceylon. It is said to be su- perior in color to mahogany, when well po- lished: the wood is yellow when cut, but turns to various dark shades of brown, and improves by age. When made into tables and well kept, it soon attains a polish little inferior to mahogany. It is well known as the Jack fruit tree in Eng- land, where the wood is used for cabinet and marquetery work, likewise for the backs of brushes. It does not bear great alternations of dryness and moisture. It affords an excellent fancy wood for tables, chairs, frames &c. and the root of the older trees is dark-colored, and ad- mirably adapted for picture-frames, and carving- work of all kinds: besides the uses described it is valued for grain measures. In Ceylon it is in general use to the South and West for building: beams, rafters, doors, and furniture are all made of it. There the tree is of rapid growth and very

fruitful: the fruit is used green and ripe; the kernels of the ripe fruit boiled or toasted answer all the purposes of Spanish chesnuts. It is not a common timber in the Circars, though some good trees are occasionally procurable from the hill Zemindaries—resembling mahogany in colour and appearance. The fruit which grows to an enormous size, issues direct from the trunk or stem, to which it hangs by a peduncle, has a rough coated appearance, hanging like a large green bag; the scent is very disagreeable. It is not in much request by Europeans, although the seed when roasted resembles a chesnut in flavor. The finest fruits sometimes grow on the roots, and will be found from the cracking of the earth above them. When this fruit tree is grown in native gardens and the stem is forked, they generally place a large stone between the branches: the reason for this is not known. In the Tenasserim Provinces, the Jack is perhaps more abundant than any other fruit, except the plantain. It is invaluable to the natives, but is an indifferent fruit to Europeans. The tree is large, and affords a very dark grateful shade, and when the fruit, which is often as large as a man's head, is hanging all around its branches it is a grand object. The fruit of the Jack when green is used in curries; the outside is cut off in thin slices and the remainder used; when ripe, the pulp and seeds are used similarly. A few miles below Coonoor on the Neilgherries, these trees produce single fruits, weighing between 50 and 60lbs. There are several varieties, but what is called the honey-jack is by far the sweetest and best. The seeds themselves when roasted are also much prized as a diet among the poorer classes. The leaves are given to goats and other cattle, and are said to be very fattening. In Travancore, the Jack-tree is a monopoly, and yields an annual tax to the Sircar. The juice which exudes from the trunk is said to check the progress of glandular swellings, and the young leaves are frequently applied externally in cutaneous affections. Bird lime is manufactured from the juice. The word Jack, is a corruption from the Sanscrit word 'Tchackka,' which means the fruit of the tree. There are no less than thirty or forty varieties in Malabar. The situation of the fruit varies with the age of the tree, being first borne on the branches, then on the trunk, and in very old trees on the roots. In Travancore, in propagating, they put the whole fruit in the ground, and when the seeds germinate and grow up they tie the stems together with straw, and by degrees they form one stem, which will bear fruit in 6 or 7 years.—*Martyn's Mill. Dict. Rees' Cycl. &c. Quoted in Useful Plants. Jaffrey, Mason. McClelland. Crawfurd.*

(443) ARTOCARPUS, or Trap tree, of Singapore, furnishes the Gutta used as bird lime; and the fibres of its bark are used there for fishing lines, cordage and nets.—*Royle. Fib. Pl. page.*

(444) ARTOCARPUS LAECUCHA, LACOOCHA BREAD-FRUIT.

Dephul, Beng. | Pain-nai. Burm.

Grown in Burmah and Bengal, and is rather common in gardens. The whole tree and unripe fruit contain much tenacious milky juice. The roots are used for dyeing yellow. The male spadix is acid and astringent, and is eaten by the natives in their curries. In the Tenasserim Provinces, this fruit is usually designated by Europeans "a kind of a fig;" but it is a species of artocarpus, occasionally raised near native houses. Dr. Royle thinks it may be found to yield fibres. *Artocarpus integrifolia* is the jack, *A. chaplasha*, the lesser or thorny Jack, and *A. laecucha*, the small Jack. The fruit of all three varieties is prized by the Burmese as an article of food, especially the first, which grows to great perfection every where throughout the province with little care.—*McClelland. Mason. Useful Plants.* Wight also figures lanceæfolia 679.

(445) ARTOCARPUS POLYPHEME, Champadah, of botanists, a fruit of the same natural family with the jack and bread-fruit; smaller than the first, but of more delicate flavour, is greatly esteemed by the Malays. It seems to be an indigenous plant of the Archipelago, and even there to be limited to the Western parts of it, such as Sumatra, the Malay Peninsula, and their adjacent islands.—*Crawfurd Dictionary, page* 93.

(446) ARUM. This genus of plants belongs to the Natural Order Aroideæ. In temperate climates, all these plants are herbaceous, but in tropical latitudes, they become shrubby or arborescent. All contain an acrid principle, volatile and soluble in water, and separable by washing from the fecula with which it is combined. A. maculatum, a native of Europe. A. triphyllum, of N. America, and A. serpentaria or dracunculus, of the South of France. A species of the Arum is cultivated in the Dekhan for the sake of its leaves, which form a substitute for spinach. Wight, in *Icones*, gives figures of A. bulbiferum, 783; companulatum, 782-85; colocasia, 786; cucullatum, 787; curvatum, 788; cuspidatum, 784; divaricatum, 790; flagelliforme, 791; fornicatum, 789-92; gracile, 793; Indicum, 794; maritiferum, 795; montanum, 786; odorum, 791; Orixense, 801; sessiliflorum, 800; sylvaticum, 802; trilobatum, 803; viviparum, 893.

(447) ARUM COMPANULATUM grows on the Himalaya Hills, its tubercular root is knobby and as large as a man's head. Used as food and made into pickles.—*Honigberger.*

(448) ARUM COLOCASIA. Egyptian ginger, the "Taro"-kuchoo, Bengalee: the roots are large, tuberous, white internally, containing fecula in great abundance, cultivated in America, Madeira, the Polynesian Islands, Greece, Egypt, Zanzibar and India. The tubers of this arum are

the chief food of the inhabitants in a great part of Egypt, and are also much used in Bengal. The root of Arum colocasia, (Colocasia esculenta and C. macrorhizon) is an important esculent root in the Polynesian Islands.—*Simmonds.*

(449) ARUM ESCULENTUM is the coco of Bourbon and of the West Indies where whole families live on this article of food.

(450) ARUM LYRATUM, (*Roxb.*) is a native of the Circar mountains, the roots of which are eaten by the natives, and reckoned very nutritious. They require, however, to be carefully boiled several times, and dressed in a particular manner, in order to divest them of a somewhat disagreeable taste.—*Roxb. quoted in Useful Plants.*

(451) ARUM MONTANUM (*Roxb.*) This is a native of the mountainous part of the Northern Circars where the root is employed to poison tigers.—*Useful Plants.*

(452) ARUM ODORUM, the Fragrant Arum, (Peing-ma-ha-yaw, Burm.) is cultivated in Burmah as a medicine, and is a most singular plant. It has a stem one or two feet high and six inches in diameter resembling a low palm, while its leaves are gigantic cabbage leaves three or four feet long by two or three wide. The flowers are said to be fragrant. The natives cultivate it, not for food, like the other species of arum, but, as they say, for medicine.

(453) ARUM ORIXENSE, Arum of Orissa,
Ghet kuchoo, BEN.

Grows in various parts of India, tubers exceedingly acrid while fresh, used as a counter-irritant in poultices; also as an application in snake bites. They are likewise given internally in doses of from 20 to 30 grains. Roxburgh describes this Arum as a most powerful stimulant in proper hands.—*O'Shaughnessy. Eng. Cyc. Simmonds.* A poultice of Orissa arum (Ghet Kuchoo) bruised to pulp, with tepid water, any quantity, is a stimulant rubefacient and counter-irritant, applied to indolent buboes and tumors by the native practitioners, and with frequent advantage.—*Beng. Pharm. page* 390.

(454) ARUM RAPIFORME, (*Roxb.*) grows in India.

(455) ARUM RUMPHII. A farina is prepared from this Arum, in the Polynesian Islands.—*Simmonds.*

(456) ARUM TRIPHYLLUM, Linn. Dragon's root. *Syn.* Arisæma atrorubens. *Blume.* A native of North America; when the acrid principle is volatilized the rhizoma yields a fine fecula like arrow-root.—*O'Shaughnessy, page* 625.

(457) ARUNDINA, a beautiful purple grassy-leaved orchid, was abundantly in flower on the hill-top, and the great white swallow-tailed moth (*Saturnia Atlas*) was extremely common, with tropical butterflies and other insects.—*Hooker Him. Jour. Vol.* II. *page* 305.

(458) ARUNDO KARKA. *Sur*, SINDEE, grows in Sind, where its culms, sur koo janee, are made into chairs, and its flower-stalks beaten to form the fibres called Moonyah. These are made into string or twine (Moonyah jo naree), and into ropes (Moonyah jo russa).—*Royle Fib. P. page* 32.

(459) ASAFŒTIDA, (*Narthex Assafœtida.*)

Hilteeth, ARAB.
Hing, BENG.
Duivels dreck, DUT.
Asafœtida, FR.
Teufelsdreck, GER.
Hing, HIND.
Asafœtida, LAT.
Angu, MALAY.
Ungoozeh, PERS.
Hinga, Hingoo, SANS.
Asafetida, SP.
Perungyum, TAM.
Ingoova, TEL.

A fetid gum-resin, having a nauseous, somewhat bitter, biting taste, and an excessively strong, fetid, alliaceous smell. It is an article of the *Materia Medica;* and is used by all classes of Hindus as a condiment with their food. The gum is brought to Bombay from the Persian Gulf, and is occasionally re-exported in small quantities to England. The British consumption is about 10,000lbs. a year.—*Simmonds. Faulkner.* Asafœtida is much used by the Burmese doctors, but the gum is imported.—*Mason.* The gum is the product of the Narthex (Ferula,) Asafœtida, which grows in Persia, the neighbourhood of Herat, mountains of Daristan and Belochistan, and on the Hindu-kosh at 7000 feet. The celebrated gum resin asafœtida, is obtained by slicing the roots. A milky juice exudes, which dries rapidly into a fœtid, pasty, bitter and pungent mass. The odour of Asafœtida needs no comment. It has gained for the gum resin the epithet of the "*devil's dung*;" the taste is bitter, acrid, and very durable. Unless triturated with the carbonate of ammonia, Asafœtida is with difficulty reduced to powder. Asafœtida occurs in commerce in shapeless masses of waxy consistence, with small transparent brittle and white tears. The fracture is vitreous, at first white, and passing to red by contact with the air, a property which distinguishes it from all other gum-resins. Another and much more valuable kind of Asafœtida is sometimes met with in the bazars and druggists' shops. It is in tears, or semi-transparent whitish granulations, free from impurities, and of most powerful odour; this kind is readily reduced to powder, and is much valued by European druggists. In India it is but rarely met with, and readily meets purchasers at a high price. For *Medical uses,* Asafœtida is a powerfully carminative and stimulant tonic, devoid of acrid and irritating properties. It produces a sensation of heat, and increased secretion in the alimentary canal, with eructation; head-ache, and giddiness are often experienced, and the urinary and genital organs seem to be sometimes materially excited. It is chiefly used in hysteria, hypochondriasis, flatulent colic proceeding from dyspepsia, in chronic catarrh, and in spasmodic asthma not connected with disease of the heart or lungs. In worm affections too it is often employed with benefit.—*O'Sh. p.* 363.

(460) ASALOO. A small plant cultivated about Ajmeer, the seeds are heating, and promote the secretions; they are also taken in milk to strengthen the body; much used in mesalihs of camels; to the taste are bitter and hot.—*Irvine Gen. Med. Top. p.* 124.

(461) ASARABACCA. *Asarum europœum.*

Asaroon, ARAB.	Oopana, SANS.
Assaret, FR.	Mootricunjayvie, TAM.
Haselkraut, GER.	Cheppoo-tatako, TEL.
Tuckir, HIND.	

Leaves remarkably kidney-shaped. Roots quadrangular, thickness of a goose quill, knotted, contorted, and having usually white fibres at each knot. Odour of the leaf none, of the roots pepper-like, especially when bruised, taste of the leaves acrid, of the roots less so. The acridity diminishes by age, and finally disappears. The leaves and roots of the Asarum are emetic in doses of from 40 to 60 grs. infused in eight ounces of water. It only acts well while fresh. In larger doses it is cathartic; the powder of the leaves used as snuff causes violent sneezing. Until the introduction of ipecacuanha into Europe, the Asarum was used for most of the purposes for which the South American drug is now employed. The dried plant is sold in the Indian bazars under the name of *Asaroon.* Royle states however that a hill plant, called *Tuggur*, is generally substituted for it.—*O'Shaughnessy, page* 569.

(462) ASBESTUS, AMIANTHUS. The long and silky fibres of Amianthus have been employed in the manufacture of a fire proof cloth: and as lamp-wicks.—*Tomlinson.* It is found in several parts of India, and largely in Salem and Mysore.

(463) ASCLEPIADACEÆ, *Asclepiads*, a natural order of Exogenous Plants, known from all others by the single character of its grains of pollen adhering together within a sort of bag which occupies the whole of the inside of each cell of the anther, and when it falls out sticks to glands of a peculiar character occupying the angles of the stigma. The roots of the whole order appear to be acrid and stimulating, and some of them, as *Tylophora asthmatica* and *Secamone emetica* are employed as emetics. The Cow-Plant of Ceylon, or Kiriaghuna Plant (*Gymnema lactiferum*), yields a milk which the Cingalese make use of as food. Species of *Cynanchum* act as purgatives. The leaves of Solenostemma Argel are used in Egypt for adulterating senna. Several species yield caoutchouc, whilst others afford indigo.—*Eng. Cyc. page* 319.

(464) ASCLEPIAS, a genus of plants of the above natural order, Asclepiadaceæ, many of the species of which possess powerful medicinal properties, and many are handsome border flowers and worthy of cultivation. The buds of A. stipitacea, are eaten by the Arabs: the whole plant of A. aphylla may be eaten. A., now Calotropis gigantea, of India is poisonous: the milky sap of A. lactifera, is drunk as a wholesome food, while the milky juice of A. laniflora and A. procera is acrid and irritating, and is used with butter and lard as an ointment for itch; that of A. procera being applied to hides for removing the hair before tanning.—*Eng. Cyc.* As flowering plants this genus thrives well in any good light soil, requiring room to spread and shew their blossoms, they are readily grown from seed which are produced in abundance.—*Riddell.* Wight, in his Icones, gives figures of nineteen species, Asclepias acida; annularia: cordifolia: echinata: herbaeea, laurifolia: longistigma: montana: ovalifolia, pallida, parasitica, pendula: pseudosarsa: racemosa: tenacissima: tenuissima, tinctoria: tingens: and volubilis.—*Riddell.*

(465) ASCLEPIAS CURASSAVICA is known as Indian Root, or Bastard Ipecacuan, or Ipecacuanha plant, and has emetic properties. It is a pretty little annual, with a small saffron and orange-coloured flower, is quite common in the Tenasserim Provinces. The root is emetic, and is so used by the negroes of the West Indies.

(466) ASGANDH, Isgandh, Ashwagandah Physalis flexuosa. This plant is commonly found all over India: the roots are employed medicinally, and are considered good in rheumatic and dyspeptic disorders, especially those accompanied by flatulency; they are of a warm nature, calculated to promote all the secretions. The root is not given alone; but is combined with other medicines and mesalihs.—*Irvine, Gen. Med. Top. page* 123.

(467) ASPARAGUS, a genus of plants belonging to the natural order LILIACEÆ. It is comprised by some botanists under the order Asphodeleæ. The species eaten under the name of Asparagus is the *A. officinalis.* There are a great number of species, natives of Asia and Africa, which are cultivated in the gardens of Europe, rather as matter of botanical interest than on account of their beauty or utility. The roots of *A. racemosa* and *A. adscendens* are employed medicinally in the North of India.—*Engl. Cyc. page* 322. Wight also figures A. Asiaticus.

(468) ASPARAGUS ACEROSUS. WILD ASPARAGUS. There is an indigenous species of asparagus in the Tenasserim Provinces, which produces a passable substitute for the English vegetable, to which, however, it is much inferior. It bears a sweet-smelling flower, and is deserving of cultivation as an ornamental plant.—*Mason.*

(469) ASPARAGUS ADSCENDENS (*Roxb*). Grows in Rohilcund. Root medicinal, and considered a good substitute for Salep in Northern India.—*Roxb. Quoted in Useful Plants.*

(470) ASPARAGUS OFFICINALIS. A very delicate vegetable raised from seed, takes 4 years to come to a proper size for the table, ought not to be eat before the 4th year; the seedlings, when one year old, should be planted in well prepared beds raised 3 inches above the surrounding level; three years after being trans-

lanted they will produce a crop if the beds have een annually top dressed with decayed leaves, nd manure. A little salt sprinkled over the eds once a year during the rains, will be useful) the plants. Native of the sea coast, a very xpensive vegetable to grow in any country.—*affrey*. Dr. Riddell observes, that the species re many, but this one only cultivated for use. The ıethod of first raising the plants from seed, is ither by sowing broad-cast, in beds of six feet quare, or in long beds of about two feet broad, here they are to remain. If sown in square eds, when the grass is about six or ten inches igh, and begins to bear small flowers, it may hen be transplanted, and must be carefully taken ıp with a sufficiency of earth attached to the oots, and planted in trenches at least six inches leep and eighteen broad. Between each trench hould be a space of one foot or more. The ılants may then be laid down in double rows in he trench prepared at six or eight inches asunler,—perhaps a greater distance may be better. The roots must be carefully covered, and well vatered. The beds cannot be of too rich and ight a soil, and must be kept clear of weeds, nd watered as occasion requires. When the asaragus is sufficiently strong to commence workng the beds after the stalks have gone to seed, he watering should be discontinued, and the stalks allowed to dry and wither ; then uncover carefully the roots, being cautious not to injure the crowns, cut or twist off the stalks, and cover up the crowns again with rich manure about two inches high ; then turn over upon it the spare ground that has been left between the trenches. Thus you will have in the middle of the rows a water-course, which will serve to irrigate the plants below. The watering must now be continued daily if necessary, which will cause the plants to send shoots up through the loose soil above them, and, if well managed, the grass will be white and fine. Before putting down the plants in trenches, plenty of good manure should be well dug into them, so as to form a rich soil for the roots to strike in. After the grass has been cut, and the shoots are getting thin, cease working the beds and let them go to seed, when they may be again worked. You will seldom get more than two crops in the year from the same beds, therefore you should have them in succession. He does not know of any animal, except rats, destructive to the roots: flooding with water is the only remedy.—*Riddell.*

(471) ASPARAGUS RACEMOSUS (*Willd.*)

Sada-bori, HIND.	Challa, TEL.
Suth-moolie, BENG.	Wari, MAL.

A straggling climbing shrub : common in Travancore and the Dekhan. This plant, says Roxburgh, will perfume the air to a considerable distance, owing to the delightful fragrance of its flowers. The root boiled in milk is given in bilious affections. It is necessary to remove the bark previous to administering it, as it is considered poisonous. The leaves boiled and mixed with ghee are applied externally to promote suppuration in boils and tumours.—*Roxb. Ainsl. quoted in Useful Plants.*

(472) ASPARAGUS SARMENTOSUS (*Willd.*)

Shtawari, MAL.	Tsulla-ghedaloo, TEL.
Tanncer-vittang, TAM.	Suffaid-mooslie, DUK.

A climbing shrub, found in Travancore and the Peninsula. The root, which is long, white, and fleshy, is bruised and soaked in water, and the latter, if drunk, is said by the natives to be a remedy in preventing small-pox from running into the confluent kind. In Ceylon, the root is mixed with milk and eaten (*Ainsl.*) and by the Chinese, it is made into a preserve, and also candied.

(473) ASPHALT. ASPHALTUM : called also *Mineral pitch, Jew's pitch : compact bitumen* and *Maltha* : Arabic *Hajar-ool moosa.*—Asphalt is found on the shores of the Dead Sea : at Arlona in Albania : also at Coxitambo in Cuenca in South America, and abounds also in the West Indian Islands of Barbadoes and Trinidad, forming in the leeward side of the latter island a lake or plain, called *the Tar lake*, and by the French *Le Brai*, from its resemblance to and answering the purposes of ship pitch. It is said to be a preventative of cholera, as, also, to kill the teredo. In many parts of the woods, this substance is found in a liquid state, being held in solution by *petroleum* or naphtha. *See* PETROLEUM. At one time, Asphalt was lauded to an inordinate degree, as a roofing and paving material, and in consequence soon fell into unmerited neglect. Where damp has to be resisted, it is useful, and in the Mauritius, Ceylon, and India, where it has been used, it is found impervious to wet, white ants or vermin, and as it does not vegetate, rot or decay, it is superior to wood, chunam (or country lime) as a flooring material.

(474) ASPIDIUM. Both in Sikkim and Nepaul, the watery tubers of this fern are abundantly eaten.—*Hooker, Him. Jour. Vol.* I. *p.* 292.

(475) ASS, a well-known and useful domestic animal, whose good qualities are too frequently undervalued, from being contrasted with those of the horse, without considering the different nature of the treatment which these two quadrupeds receive—the care and attention bestowed upon developing the form and cultivating the spirit of the one, and the neglect and ill usage to which the other is too generally subjected. The ass is despised and neglected only because we possess a more noble and powerful animal in the horse ; and if the horse were unknown, the care and attention which is lavished upon him, being transferred to his now neglected and despised rival, would have increased the size and developed the mental qualities of the ass to an extent which it would be difficult to anticipate, but which eastern travellers who have observed both

animals in their native climates, readily acknowledge. In Persia, and Arabia, the ass is a very different animal from what he is in India and in Western Europe. There, instead of being neglected and despised, half-starved and treated with cruelty, care is taken to cultivate the breed by crossing the finest specimens; even the Wild Ass is procured for this purpose, the pedigrees of the different races are carefully recorded, and the size, strength, and symmetry of the ass so much improved that he is rendered equal to the horse for most purposes, and in some cases even his superior. "The asses of Arabia," says Chardin, "are perhaps the handsomest animals in the world; their coat is smooth and clean; they carry the head elevated, and have fine and well-formed legs, which they throw out gracefully in walking or galloping. They are used only for the saddle, and are imported in vast numbers into Persia, where they are frequently sold for considerable sums and being taught a kind of easy ambling pace, are richly caparisoned, and used only by the rich and luxurious nobles." The ass is properly speaking a mountain animal; his hoofs are long and furnished with extremely sharp rims, bearing a hollow in the centre, by which means he is enabled to tread with more security on the slippery and precipitous sides of hills and craggy places. The hoof of the horse on the contrary is round and nearly flat underneath. The wild ass, called Koulan by the Persians, is still common in many parts of Central Asia. It stands much higher on its limbs than the common ass, its legs are longer and more slender, and it is altogether a more graceful and symmetrical animal. The mane is composed of short erect hair of a dusky colour and rather a woolly texture; the colour of the body is a uniform silvery gray, with a broad coffee-coloured stripe extending down the back from the mane to the tail, and crossed on the shoulder by a transverse band, as in the domestic variety. The Koulan inhabits the parts of central Asia from 40° N. lat. to the northern confines of India. They migrate from north to south according to the season. In summer they are commonly found about Lake Aral, but in autumn they collect in vast troops under the conduct of a regular leader, and proceed towards the south, arriving at Cutch and Guzerat in October or November, and returning northward again in the middle of spring. The Persians and Tartars hold the flesh of the koulan in high esteem, and hunt it in preference to all other descriptions of game. Olearius assures us that he saw no fewer than thirty-two wild asses slain in one day by the shah of Persia and his court, the bodies of which were sent to the royal kitchens at Ispahan; and we know from Martial that the epicures of Rome held the flesh of the Onager, or wild Ass, in the same estimation as we do venison (Epig. xiii. 97).—*Eng Cyc. page* 327.

(476) ASSAM, the valley of Assam is rich in natural productions, it possesses gold, tea, caoutchouc, lac and ivory. It abounds in silk, its two principal indigenous varieties of this article, being the *muga* and the *eri*. A dress made of *muga* is prized beyond all others, by the Assamese. Of woods, thirty-six species, applied to various useful purposes, have been described by Major Hannay as belonging to Upper Assam. Most of them are light, strong, and durable; while not a few combine with these qualities a fine grain, which renders them well adapted for articles of furniture. The spices of the country comprise, in addition to such as are commonly cultivated in Bengal, black pepper, long pepper, cardamums, tejpatra or malabathrum leaf, and jubrang, the capsule of a species of xanthroxylum, peculiar to the country and described as aromatic, fragrant and highly pungent.—*Dr. Taylor.*

(477) ASTER, a genus of plants belonging to the natural order *Compositæ.*—*Engl. Cyc. page* 329. These are named from Aster, a star: and furnish nearly every variety of colour. Some beautiful additions from Germany are striped and of larger size than the Chinese; the colours are, deep red, striped, pale red, pale red striped with white, dark blue, dark blue striped, pale blue, pale blue striped, yellow tinged, white, silver white, flesh coloured, grey, &c. They are propagated by seed sown at the end of the hot weather, and continued during the rains. The plants should have at least eighteen inches of space between them, and the soil rich and light. If grown in pots, the varieties are easily kept distinct, and the seed preserved as soon as the plant withers and dries. A succession of flowers may be continued until the hot season. Mr. Jaffrey observes that of the plants flowering in India the asters are of so short a duration they will scarcely remunerate for the trouble taken to raise them. Mr. Mason mentions that a species of aster, or christmas daisy, is seen occasionally in European gardens, in Tenasserim. —*Riddell. Jaffrey. Mason.*

(478) ASTERACANTHA LONGIFOLIA (*Nees.*) N. O. ACANTHACEÆ.

Neer-moollie, TAM.	Kanta-koolika, BENG.
Neer-goobbie, TEL.	Wahel-schulli, MAL.
Gokshura, HIND.	

Barleria longifolia, *Linn.*—Ruellia longifolia, *Roxb. fl. Ind.* III. 50. This small, annual plant may commonly be met with in Malabar and Travancore by the side of paddy-fields and other damp situations. The roots are considered tonic and diuretic, and administered in decoction. They are also employed in dropsical affections, and gravel.—*Ainsl. Rheede. &c. quoted in Useful Plants.*

(479) ASTRAGALUS, a genus of plants belonging to the natural order *Leguminosæ.* It has the calyx 5-toothed; the keel of the flower obtuse; the stamens diadelphous: the legume

bilocular or half-bilocular from the upper suture being bent in so much. The species are shrubs or under-shrubs, are very numerous, and above 250 have been described by botanists. Many of them are cultivated, most of them being hardy plants, but they are not remarkable for their beauty.—*Engl. Cyc. page* 331.

(480) ASTRAGALUS VERUS, Goat's-Thorn, is a small bush with pinnated gray leaves, terminated by a spiny midrib and half-covering clusters of axilla pale yellow flowers. It grows in the Levant. Its gum forms part of that used as Tragacanth. It is a natural exudation from the plant, but many other species of *Astragalus*, *A. strobilifera*, the *A. gummifer* of Mount Lebanon, the *A. creticus* of Crete and Ionia, and the *A. aristatus* of the Peloponnesus and Cyprus also afford large quantities of this very valuable gum. Several Astragali are common on the higher levels of the Himalayas, but have not yet been discovered to yield tragacanth. This gum forms the basis of some medicinal lozenges and styptic powders. In the arts it is highly valued as an ingredient in dye stuffs, and a glaze for calico and silks.—*O'Shaughnessy, page* 294.

(481) ASTRAPÆA WALLICHII, *Byttneriaceæ*.—A shrub; leaves angularly lobed, very soft to the touch; flowers in large compact umbels, scarlet with yellow anthers; having rather an unpleasant scent.—*Riddell.*

(482) ASYSTASIA COROMADELIANA. *Acanthaceæ*.

Midday-keeray, TAM.

A common weed in hedges; flowers either lilac, or white; the leaves are used mixed with others as greens.—*Jaffrey.*

(483) ASYSTASIA FORMOSA. This plant is a native of India, and abounds on the Coromandel Coast; the flowers are purple, and it is readily grown from seed.—*Riddell.*

(484) ATALANTIA MONOPHYLLA (*DC.*) Nat. Ord. AURANTIACEÆ. MONADELPHIA OCTANDRIA. *Sex. Syst.*

Wild-lime, ENG.	Trichilia spinosa, WILD.
Caateyaloo-miche marm, TAM.	Limonia pumila, BURM.
Turræa virens, KŒN.	

Simple leaved Atalantia. Like others of the orange tribe, this yields a clear white, very fine and close grained timber, hard and durable, though never found large enough to become an article of general utility. It is a native of the East Indies, is a small tree, its wood hard, heavy, very fine and close-grained: of a white or pale yellow colour, and very suitable for cabinet work, if procurable of sufficient size and in sufficient quantities. It grows in Malabar and on the Coromandel coast.—*Wight. Jur. Rep. M. E. Useful Plants.* Wight also figures A. floribunda.

(485) ATHANASIA ANNUA. *Compositæ*. A genus of Cape plants cultivated in India, many of the flowers very pretty, of a yellow colour, generally known as one of the everlasting flowers, grows in a light soil.—*Riddell.*

(486) ATRIPLEX HETERANTHA. *Thoyah keeray*, TAM.—A common weed; the leaves of which are used as greens, makes an excellent vegetable: is to be found in abundance in Southern India. Is also cultivated.—*Jaffrey.*

(487) ATR, (Arabic); UTR; ITR; OTTAR, AND OTTO, for it is spelled in all these varied forms: is a fragrance, perfume, or essence of flowers, though by Europeans the term is confined to that from roses. An *atr-dan* contains the Atr, and the perfumer, druggist or chemist, is called Attar. The perfumes sold under the name of Atr are as various as are the flowers, from which they are extracted, and the term has the same extent in India, as the word perfume in English. At the Hyderabad Exhibition of 1854, there were exhibited ten kinds of Atr; those from Aurungabad, were named Sohag: Panch: Bahar; Amber; Mootheea, Minbohvin Jasminum: Pandanus Odorotissimus; four from Hyderabad were named Mujmoorah, one from the Lawsonia inermis: and another called the Rahut i-Rooh; literally Heart's Ease. In addition to the above, in the Madras Exhibition of 1855, we observed from Hyderabad, the Atrs, named

Chumbaley,	Banjeree,	Sona Manthre,
Ryatroo,	Burmookee,	Nohrutten,
Inah,	Dhoolpend,	Sandal,
Kaserah,	Cuscus,	Muzmah.
Chumpah,	Moleserree,	
Gool,	Rowseh,	

They are sold by weight and vary in price from 4 Annas to 5 Rs. per tola.—*M. E.*

(488) ATR, ATTAR, ATHER, UTR, OR OTTO OF ROSES, is a highly valuable and delightful perfume. It is an essential oil prepared in several countries in the East, and has this remarkable composition, that it is a compound of two oils, one liquid and the other solid and inodorous. At Ghazipore in Bengal, the Attar was always made at the beginning of the season when the nights are cool. To procure the oil, the roses are put into the still and the water passes over gradually as in the rose-water process. After the whole has come over, the rose-water is put into a large metal Basin, which is covered with wetted muslin, tied over to prevent insects or dust getting into it, and being let about two feet into the ground, which has been previously wetted with water, it is allowed to remain quiet during the whole night. In the morning early, the little film of Attar which is found on the surface of the Rose-water during the night, is removed by means of a feather and carefully placed in a phial. Day after day as the collection is made, it is placed for a short period in the sun, and after a sufficient quantity has been procured it is poured off clear, and of the colour of amber, into small phials. Pure Atr has, at first, a pale greenish hue, but

in a few weeks it becomes of a pale yellow. It is generally calculated that 100,000 roses will produce 180 grains of Atr, and the price of 100,000 roses varies from 40 to 70 rupees; and the tolah, 180 grains, of the Atr is sold at 80 and 90 rupees. At this price, as may be supposed, it is rarely if ever used even by the wealthiest of natives, and the native courts employ the atrs or perfumed oils prepared by their own distillers from the Jasmine (J. sambac and grandiflora) and bela and Lemon grass (Andropogon schœnanthus). The Roosa oil, the oil of Neemaur (Andropogon Jwaranchusa), Attar of khuskhus, A. digitalis; Newar oil (A. maritima) a volatile oil, erroneously called oil of spikenard, is met with in the shops and obtained from a plant named by Dr. Royle Andropogon Calamus aromaticus. See also Citronella oil: Patchouly: Ægle marmelos; Jasmine, Gingelly, Moringa, Sandal wood oil.

(489) ATRIPLEX ANGUSTIFOLIA, Europe, seed said to be emetic. *A. hortensis*, Tartary, (orache) is of the same reputed properties. —*O'Shaughnessy, page* 524.

(490) ATROPA ACUMINATA, Royle.

Ustrung, VERN.	Luckmuna, BENG.
Merdum Seeah, ARAB.	Luckmunee, HIND.
Yebruj, PERS.	

These names are of very doubtful correctness, but are given on Ainslie's authority. *A. acuminata*, (Royle) exists in Kunawur, on the northern face of the Himalayas. The *Mandragora*, or mandrake, the root of which was so celebrated in the magic rites and toxicology of the ancients, is known in the bazars of Central Asia and the north of India. Its properties are identical in nature with those of A. belladonna but weaker in consequence of drying and decomposition of the atropia.—*O'Shaughnessy, page* 466.

(491) ATTI, Hatey or Arti, is given by Edye as the Tamil name of a Ceylon tree which grows from two to three feet in diameter, and from twelve to twenty feet high. It is used for general purposes in small country vessels. He states that it produces the wild fig.—*Edye, Ceylon.*

(492) ATTALI, the Tamil name of a tree in Ceylon which is of little value. It grows to about ten or twelve inches in diameter, and eighteen feet long. It produces a flower, and then a seed-pod, which is used as a medicent.—*Edye. Ceylon.*

(493) AUCKLANDIA COSTUS. An annual of general occurrence about Rangoon and every part of that district. It affords the *Patchakoo oil* of the Madras list.—*McClelland.*

(494) AULAX. *Proteaceæ*, A species of flowering plants which grow from one to two feet high, in a sandy soil bearing yellow flowers. —*Riddell.*

(495) AURACARIA CUNNINGHAMII, Australian or Moreton Bay Pine. A remarkable but tender species, forming vast forests along the shores of Moreton Bay in Lat. 14° to 29° S, and on the alluvial bank of the Brisbane River lat. 27° to 30° S. It attains from 100 to 130 feet in height, with a circumference of upwards of 14 feet, having a clear stem to 80 feet. It is growing in the Horticultural garden, Madras. "The introduction of 'Australian,' as timber trees is worthy the attention of Government.—*Jaffrey.*

(496) AURANTIACEÆ, Citron Worts, or the Orange Tribe, are Dicotyledonous Polypetalous Plants, and the Orange, Lemon, Lime, Shaddock, Pompelmoose, Forbidden Fruit and Citron are the produce of this order. The Wampa, a fruit highly esteemed in China and the Indian Archipelago, is produced by Cookia punctata. The fruit of Glycosmis citrifolia is delicious; and that of Triphasia very agreeable. The Ægle Marmelos is used in medicine and a perfume is made from its rind.

(497) AURICULA, a genus of Phytophagous or Plant-Eating *Trachelipodous Mollusca*, whose organs of respiration are formed for breathing air.—*Engl. Cyc. page* 349.

(498) AURICULA MIDÆ (Lam.) *Voluta Auris Midæ* (Linn.) the Midas's Ear of collectors, is a good example of the genus. It is said to be an inhabitant of the East Indies. Lamarck also names the Moluccas as its locality.—*Eng. Cyc. page* 349.

(499) AVA GEM-SAND, comes from the neighbourhood of Ava, and sometimes one of the Shan articles of merchandise. It consists of small fragments of nearly all the precious stones found in the country, but garnet, beryll, and spinelle are its principal constituents, more especially the last, which seems to constitute nearly three-fourths of the whole mass. A single handful will contain specimens of every shade, black, blue, violet, scarlet, rose, orange, amber yellow, wine yellow, and white.—*Mason.*

(500) AVENA SATIVA. *Βρωμος* and *Βρομος.* Cultivated in Bengal, in the Dekhan and Guzerat. *Groats* or cutlings are the bruised oat seeds freed of the pericard. They are much used for preparing gruel for invalids; *porridge*, an excellent article of hospital diet, is made by stirring groats or oatmeal into boiling water until the mixture thickens. It is eaten with milk, butter, or sugar. Oats grow spontaneously in Sicily near Marsama, where barley also occurs, and have been found by Anson in the island of Juan Fernandez.—*O'Shaughnessy, paye* 635.

(501) AVERRHOE BILIMBI (*Willd.*) Nat Ord. OXALIDACEÆ.

Blimbing Basi. also	Wilumpi, MAL.
Blimbinghas, MALAY. [ENG.	Bilimbi, BENG.
Bilimbi or Cucumber tree,	Kamarunga, HIND.

A small tree, timber of doubtful value, with an intensely acid fruit, which cannot be eaten raw: A syrup made from the fruit, and a conserve of the flowers are both esteemed in fevers, and bilious disorders. This fruit is commonly made into pickles or preserves, or candied. The

juice has a pleasant, acid taste. The leaves are slightly sensitive to the touch. The Bilimbi tree is grown generally in India; and in the Tenasserim Provinces it bears profusely. Its juice is an excellent agent for removing iron-mould. To the Malays it answers the same purposes as the citron, the gooseberry, the cucumber and the caper in Europe.—*Useful Plants. Jaffrey. Mason.*

(502) AVERRHOE CARAMBOLA (*Willd.*) The Kurmul or Kumruk.

Blimbing manis, MALAY.	Cumurunga, BENG.
Tamara-tonga, or Kamaranga, MAL.	Tamartun Pullum, TAM.
Meetha-kumarunga, DUK.	Zoung-yah, BURM.

This beautiful tree originally came from Ceylon. It is now commonly to be met with in the Peninsula, and has been introduced from the Moluccas into the Tenasserim Provinces, where it flourishes well, and is now quite naturalised. The fruits, which contain an acid watery pulp, are good when candied or made into syrup. They also make good pickles and tarts, and the juice of the sour variety, is very useful in removing iron-moulds from linen. Leaves are a good substitute for sorrel. Root, leaves, and fruits, are medicinal, and the latter is used for dyeing and other purposes. There are however two varieties, the acid and sweet—*Mason. Averrhoe carambola*, in the Tenasserim Provinces, is scarce and only found near towns. It is grown about Rangoon and many places in the interior for its acid fruit, which is employed like the unripe *Papaya*, and many other green sour fruits, in curry, and highly prized as a wholesome dish by the Burmese. Wood, dark brown.—*McClelland.*

(503) AXE STONE, a silicate of alumina and magnesia, is a hard tough stone of a greenish colour. Syn: Jade, Nephrite and Ceraunite.

(504) AYAPANA. The dried leaves and twigs of Eupatorium Ayapana used in medicine. —*O'Shaughnessy.* An Infusion of Ayapana is a very agreeable diaphoretic and mild tonic. Dose, two fluid ounces thrice daily. The Ayapana is a favorite remedy among the native practitioners. —*Beng. Phar. page* 298.

(505) AZADIRACHTA INDICA (*Ad. de Juss*) Nat. Ord. MELIACEÆ.

Neem or Margosa tree, ENG.	Vepa, TEL.
Weppa, MAL.	Neem, BENG.
Vaypum, TAM.	Thembau ka makah, BURM.

This is a beautiful tree, generally diffused in India, and one which may be said to be equally useful as ornamental, for its fruit, bark &c., are employed in medicine, and it comes into full foliage in the very midst of the hot weather, when nature generally is seeking repose. Its chief virtues reside in the bark, which has a remarkably bitter taste, and has been much employed, especially of late years, as a fair substitute for Cinchona. The natives consider it a most useful tonic in intermittent fevers and chronic rheumatism, administering it either in decoction or powder. The dried leaves are used as poultices, powerfully preventing glandular tumours from coming to maturity. In various diseases of the ears, eyes and teeth, they are successfully administered in many ways. Dr. Wight says, 'The leaves beaten into a pulp, and externally applied, act like a charm in removing the most intractable form of psora and other pustular eruptions.' On the decline of the small-pox, it is almost invariably the custom of the natives to cover the body with the leaves of this tree. The timber is hard and durable, fit for ship-building, and carts; and some of the samples, produced by Mr. Rohde, equalled the best fancy woods. Some of the finest furniture wood seen by Mr. Rohde was from an old tree of this description; it is, when old, very hard and difficult to work, but beautifully mottled. The wood is compact and durable, used for making cart wheels, &c. The tree is greatly venerated by many of the Hindoo tribes, and, like the shrew tree in England is often resorted to by the friends of insane people, who pass the sick person through a cleft of the tree or a stem which having parted and reunited forms a circular opening. Dr. McClelland says that it is plentiful in the Prome district only; where it is a large, but soft timber, only fit for flooring. Wood, light-brown.—*McClelland.* From the pericarp of the seed an acrid bitter oil is expressed, which is a useful remedy in leprosy, and is moreover anthelmintic and stimulant, being used externally in cases of foul ulcers, and as a liniment, in headaches and rheumatic affections. It is obtained either by boiling or expression, is of a deep yellow colour, and is much used for burning in lamps. There is a steady increase in the exportation of this oil from Madras, chiefly to Ceylon; the quantity in 1852-53 being upwards of 3,000 gallons. The oil and the seeds, after being skinned, are employed to kill insects in trees, and the hair, and the kernels, powdered and mixed with water, for washing the hair. A gum is also got from the bark, used medicinally as a stimulant. A kind of toddy, called Vaypumkulloo, is procured from the young trees, which is said to be a good stomachic.—*Ainsl. Rowb. Jury Rep. M. E. Wight. &c.* The Neem bark, although containing a powerful bitter, does not seem well suited for tanning purposes. A poultice of the leaf, viz. Nim leaves bruised and moistened with tepid water, is a favorite application among the native practitioners, in swelled testis.—*Beng. Phar. p.* 391. Mr. Mason states Linnæus placed this tree in the same genus as the Melia, pride of India, which it much resembles, but the leaves are more intensely bitter. It is cultivated by the Burmese for its medicinal qualities, for which it is famous all over India. The bark has been successfully used in India as a substitute for cinchona; the bitter oil of the fruit is a valuable an-

thelmintic; the seeds are used in the destruction of insects; and "the leaves," remarks Dr. Wight, "beaten into a pulp, and thus externally applied, act as a charm in removing the most intractable forms of psora, and other pustular eruptions." It differs from all the other species in having a one-celled, one-seeded nut, though the germ has uniformly five cells with one or two ovula in each. Roxb. ii. p. 394. The author of the "Mukhsun-ul-udwieh" describes four kinds of Neem or Melia—1st, Nim; 2nd, Bukayun; 3rd, Dek; 4th, an unknown species, which Royle supposes to be the Melia composita of the Peninsula—1st. *Nim*, (Melia Azadirachta. Azadirachta Indica. Margosa tree). Every part of this tree, especially the bark, is bitter; the bark is also astringent, the leaves are bitter and very nauseous; from the ripe pericarp of the fruit a very bitter fixed oil is expressed; the trunk of the tree yields gum, and the young trees when tapped yield a saccharine sap or toddy, capable of undergoing the vinous fermentation. The leaves are employed all over India as poultices to tumours and [illegible]en sores; the seeds (*nimbuolee*) blanched, powdered, and mixed with water, are used for cleaning the hair. The bark is considered by native practitioners as amongst their most valuable tonics, and is given with aromatics in fever and rheumatism; in Java the bark is considered vermifuge, the dose being half a tea-cup full of a decoction twice daily. The oil is also thought anthelmintic, and is applied externally to foul ulcers, and used as a liniment in rheumatic and spasmodic affections, and in headaches from exposure to the sun. The wine or toddy is believed to be stomachic, the dose being one ounce and a half every morning. Dr. White of Bombay used the bark of this tree as a substitute for Cinchona, and found its success nearly equal as a febrifuge remedy. Mr Skipton has related a case of hysteria (Trans. Med. Phy. Soc. Calcutta, vol. i. p. 123) in which a decoction of the leaves was used with the best effect.—2d. *Bukayun*, (Ban. Azad-i-durukt, Melia Bukain, or Sempervirens—Maha nimba.) The seeds are called Hub-ool-Ban, and are considered emetic, laxative, and anthelmintic, the bark bitter and anthelmintic.—3d. *Dek*. (Melia azadarch. Persian lilac, Hill margosa.) In general and medicinal properties this species corresponds with the first.—*O'Shaughnessy, pages* 244-245. Ainslie (Mat. Med. Indica) was well acquainted with the Margosa or Neem tree and its febrifuge reputation. At page 456, vol. ii. of 2nd edition of his Mat. Medica Indica, published nearly 30 years since, he describes the Melia Azadirachta "as a large and beautiful tree common in most parts of India, trunk often crooked but thick, wood of a pale yellow, and the bark of a dark purple color: the branches extend very wide, the leaves are scattered about the extremities of the branches, and are from one to two inches long: leaflets opposite, or nearly so, about six pair, sickle-lanced, serrate, of a light green color, and not of an unpleasant odour. The flowers which are small, white, and fragrant, are produced on long branching panicles from the sides of the branches; the fruit is kidney-formed, at first green, then turning yellow, and at last changing to a purple." The *purple* change in the ripe fruit here described by Ainslie however is a mistake. The fruit of the Melia sempervirens (genus Melia) is purple, but that of the Melia Azadirachta is always yellow or greenish yellow when ripe. This tree is well known throughout the plains of India. It flowers early in April, and in some places, in March. The flowers are sweet, and at evening and early morning load the air with perfume. The fruit ripens in July. From the ripe seed a bitter oil, the kurwa tel of the bazars, is obtained by expression. This oil is plentiful in all the Indian bazars, and is extensively used by native practitioners as a medicine and in external application. The medicinal properties of the oil require careful investigation. Dr. Cornish thinks it possible that it may afford a good substitute for the very nauseous compound of cod liver oil and quinine now extensively prescribed at home in scrofulous and Phthisical cases. The bazar oil is generally badly prepared and adulterated with cheaper oils, but Dr. Cornish has used it occasionally as a substitute for "fish oil" with good effect. The bark from the smaller branches is tolerably smooth on the surface, of a dullish purple color, with a shining surface. It is marked by longitudinal lines of ash-colored epidermis, from $\frac{1}{4}$ to $\frac{1}{1\frac{1}{2}}$ of an inch apart. These lines do not run more than two or three inches continuously, but are irregularly broken off and superseded by other lines running in a parallel direction, and so on to the end of the branch. On making a section of a recent specimen of the bark, the outer or "suberous" layer will be found of a bright purple color. This darkens on exposure to the air, and blackens speedily, if cut with a steel knife. This portion of the bark has an astringent taste, and is not very bitter. The inner bark or "liber" is almost white. It separates easily from the outer layer, and is the thicker of the two. If a small portion of it be chewed in the recent state, it has at first a sweetish taste, followed quickly by a powerful and lasting bitter. The bitter is somewhat aromatic and not unpleasant. Ainslie (Mat. Med. Indica, vol. ii. p. 454) describes the bark "as bitter and astringent, and by no means unpleasant to the taste: it is considered by native practitioners as amongst their most valuable tonics. They generally give it in powder, or in decoction in conjunction with some aromatic, in fevers, and also in chronic rheumatism; in fact, it is used for almost every purpose that the cinchona is in Europe." Ainslie further remarks, that Dr. White, late of the Bombay Establishment, considered the Margosa

to be equal to Cinchona as a febrifuge. Statistical analysis goes far to prove that the Margosa is quite as effective in the treatment of intermittent fevers as the old established remedies, cinchona and arsenic.—*Dr. Cornish in Indian Annals*, No. VII., *page* 113.

(506) AZALEA, in Botany, is the name of a genus belonging to the natural order *Ericaceæ*, and consisting of shrubs remarkable for the beauty and fragrance of their flowers; on which account they are very generally cultivated in Europe. By some botanists the genus is esteemed the same as rhododendron, in which it is accordingly sunk; and it must be confessed that it is difficult to point out any positive character except the thin and generally deciduous leaves by which *Azalea* can be distinguished from *rhododendron*. The Azalea is indigenous to China, where it is found wild on every hill side. About Hong-kong and Canton it is usually found high upon the sides of the mountains, from 1000 to 2000 feet above the level of the sea. In latitude 25° north, in the province of Fokien, it is met with in less elevated situations, from 500 to 1000 feet high; and when we reach Chusan, in latitude 30° north, we find it growing plentifully on the lower sides of all the hills, and never, or at least rarely, at a high elevation.—*Fortune, page* 333. The genus is numerous and remarkable for its variety of colours, the plants thrive in a light loamy soil, and are easily grown from seed, only requiring to be kept moderately moist.—*Riddell.*

(507) AZALEA AURANTIACA. This is one of a beautiful genus of plants, admired for its white, orange, purple, scarlet, and variegated flowers, which it produces in great abundance. It grows freely from seed, requiring a light soil. Each plant should be grown separately in a pot.—*Riddell.*

(508) AZALEA INDICA. (Linnæus.) This and the following are the most beautiful plants which exist in the rich flora of China, where they far exceed in splendour of appearance the camellias, moutans, chrysanthemums, and roses of that favoured climate. This forms a bush varying in height from two to six feet, with the branches usually drooping, and covered when young with rigid brown hairs. There are many varieties, of which the brick red, the double purple, and the variegated are the principal.—*Eng. Cyc. page* 358.

(509) AZALEA LEDIFOLIA, (Hooker.) This native of China is less impatient of cold than the last, from which it chiefly differs in its leafy calyx, evergreen less rusty shining leaves, larger flowers, and more numerous stamens. There are two varieties, the white and the royal purple, or Phœnicean.—*Eng. Cyc. p.* 358.

(510) AZALEA OBTUSA. Some varieties of it with semi-double flowers, were seen by Mr. Fortune in full flower, highly prized by the Chinese. The colour of this species is brilliant and dazzling in China. A beautiful variety, quite new, had small semi-double pink flowers, which it produced in great profusion. This will be a great favorite in England when its merits are known. Its novel colour, small leaves, and neat habit will render it most desirable for bouquets and for decorative purposes. He named it *Azalea amœna*, and it is now in England.—*Fortune, p.* 329.

(511) AZALEA SINENSIS (*A. pontica; A. sinensis*, 'Botanical Register,' plate 1253.) was introduced into England from China by the late Mr. W. Wells, of Redlerf, about the year 1826, and supposed to be a native of that country.—*Eng. Cyc. page* 358.

B

(512) BABAI. Ocymum pilosum. Ciliated Basil. This is very common in all the Ajmere fields: the leaves have a very fragrant smell, exactly like verbena: the plant is used to prevent the approach of insects, especially of bugs: the seeds are mucilaginous.—*Irvine, Gen. Med. Top. of Ajmere, p.* 180.

(513) BABAR, or ALLOW or BICHOO, a stinging nettle described by Mr. Charles Gubbins and sent by Captain Rainey from Simla, from which place he had sent other specimens of fibrous material: thread is prepared from its fibres. It grows in all the valleys about Simla and Subhathoo.—*Royle, page* 376.

(514) BABLAH, NEB-NEB. The rind of the fruit of the *Mimosa cineraria*. It is used as a substitute for the more expensive dye stuffs, and for communicating shades of drab to cotton. The plant is a native of Senegal and the East Indies.—*Faulkner.*

(515) BABOOL GUM, largely produced and well known in commerce as the produce of the *Acacia arabica*. It is largely used in India as a substitute for the true Gum arabic, the produce of the Acacia vera.—*M. E. Jur. Rep.*

(516) BABOON, *Cynocephalus*, Cuvier, a genus of *quadrumana*, or four-handed animals, which forms the last link in the chain that unites the *Simiadæ*, properly so called, with the lower animals. The most marked and prominent of the characters which more immediately distinguish the baboons from the other *Simiadæ* consists in the great prolongation of the face and jaws and in the truncated form of the muzzle, which gives the whole head a close resemblance to that of a large Dog, the word cynocephalus, meaning in

the Greek, "dog-headed." In their native mountains, the ordinary food of the Baboons is berries and bulbous roots; but in the vicinity of human habitations, they make incursions into the cultivated fields and gardens, and destroy a still greater quantity of grain and fruits than they carry away with them. The *Cynocephalus Hamadryas*, Linn. the "Derrias," is found in Africa and Asia, being found in the mountains of Arabia. It measures upwards of 4 feet when standing erect.

(517) BABOONA-SUFAID, A white root imported into Ajmere from Bombay and used as an aphrodisiac.—*Gen. Med. Top. of Ajmere, p.* 128.

(518) BABOONA-SOORKH, ANTHEMIS NOBILIS. The root is imported via Bombay; is taken as an aphrodisiac, and general tonic: sells at one rupee a seer.—*Gen. Med. Top. of Ajmere, p.* 128.

(519) BACON. *Fr.* Lard; *Ger.* Speek. The flesh of the hog, salted and dried. It is a coarse food, and as that prepared in India is very liable to induce disease of the bowels, its use should be avoided.

(520) BADGER, *Meles*, Cuvier, a genus of plantigrade carnivorous animals. The genus extends throughout the whole of Europe, North America and Northern and Central Asia. The number of species is very limited, and all writers follow F. Cuvier in excluding the Indian Badger, with the object of making it the type of a new genus, though, for what reason, it would be difficult to say, since the dental system of this animal has never been properly described, and in all its other characters, it differs in no respect from the common badger. —*Eng. Cyc. Meles collaris*, the Indian Badger, called Bhalloo-Soor or Bear Pig, is scarce, but to be met with about the hills. It is about the size of, but stands higher upon its legs than, the common Badger, and is at once distinguished by its attenuated muzzle ending in a truncated snout, like that of a common hog, and by its small, and nearly naked tail. The whole height of this animal is about 20 inches, and the length of its tail about 9 inches. It has the body and limbs of a bear, with the snout, eyes, and tail of a hog. Its ears are short, completely covered with hair, and surrounded by a slight border of white. They are exceedingly fierce and will attack a number of dogs.—*Eng. Cyc.*

(521) BADLA. At Bombay a kind of gold or silver thread, the Bombay tariff valuation of which is Rs. 1 8 0 per tola.

(522) BAEBOTRYS. *Schreb: gen. N.* 318. A genus of plants of the order Pentandria monogynia; of which several species are described by Roxburgh. *B. indica*, a large shrub, a native of Chittagong, flowers in February, March and April. *B. ramentacea*, Muimooriya, HIND. is indigenous in Sylhet. It grows to be a pretty large shrub, blossoms in March and April, and the seeds ripen in October and November. *B. nemoralis*, also a Sylhet species, with the same vernacular name, is a pretty large, very ramous upright shrub. *B. glabra*, a native of Chittagong, where it flowers in March; is a slender tree, with straight smooth branches and leaves. *B. tetrandra*, is a native of the Moluccas.—*Roxb. Vol.* I. *p.* 557 to 560

(523) BAGU, in the Malay; and WAGU, in Javanese; the *Gnemium gnetum* of botanists.—*Crawfurd Dic. p.* 26.

(524) BAHIRA, Terminalia bellerica; Belleric Myrobolan is the name in Ajmere of the fruit of this tree brought from Malwa, Kotah and other places, it is very astringent; considered cooling, and given in hematuria, much used in dyeing, and in mesalihs; is common in all bazars: and sells at eight seers for one rupee.—*Gen. Med. Top. of Ajmere, p.* 128.

(525) BAHU, a land measure in Java equal to 71 acres.—*Simmonds.*

(526) BAJRA. Hind. Pencillaria spicata. This is a very common grain in India, not so heating as Jawarie, and made into cakes or porridge. Sown in fields at the commencement of the rains.

(527) BAKING. The egg and custard powders, used in lieu of leaven or yeast, are combinations of carbonate of soda and tartaric acid, mixed up with wheaten flour, or other kinds of starch, and are often coloured with turmeric or chromate of lead; the latter ingredient is decidedly injurious to health, and if in large quantities, is poisonous; it is extremely doubtful how far any of these preparations may be used with safety to the public.—*Hassall.* As many Mahomedans object to eat the fermented loaf bread of Europeans, the following receipt for unfermented bread may be found applicable:—Flour 1 lb. bicarbonate of soda 40 grains, cold water ½ a pint, muriatic acid 50 drops. The following is a receipt for the preparation of egg or Baking Powder:—carbonate of soda, 56 lbs., tartaric acid, 28 lbs., potato flour, 1 cwt., turmeric powder ¾ lb.—*Hassall.*

(528) BAKKUL. The fibrous bark of the roots of certain trees, which is used in Malwa, as a cheap substitute for string and cord.—*Royle.*

(529) BAKLA, Duk.—Vicia Faba.—Garden Bean. This is cultivated at the same season and manner as the kidney bean.—*Riddell.*

(530) BAKLA ZUN, Duk.—Phaseolus Vulgaris.—Kidney Bean, dwarf.—*Riddell.*

(531) BALACHONG.

Balachan, MALAY. | Trasi, JAV. | Bagon, PHILLIP.

This is the name of a condiment made of prawns, sardines, (Engraulis meletta,) and other small fish, pounded and pickled. The proper Malay word is balachan; the Javanese, trasi; and the Philippine, bagon. This article is of universal use as a condiment, and is one of the largest articles of native consumption throughout both the Malay and Philippine Archipelago. It

is not confined, indeed, as a condiment to the Asiatic islanders, but is also largely used by the Burmese, the Siamese, and Cochin-Chinese. It is, indeed, in great measure essentially the same article known to the Greeks and Romans under the name of Garum, the produce of an Engraulis, a mediterranean fish.—*Crawfurd Dic. page* 27. A mild description of Balachong is made in Bombay, and sold as an item in Indian Oilmen's Stores.—*Faulkner.*

(532) BALAS RUBY, a term used by lapidaries to designate the rose-red varieties of spinel. It should be carefully distinguished from the Oriental ruby, the sapphire, a gem of much greater variety and value.—*Eng. Cyc. page* 374.

(533) BALBEJ OR BALTEJ. The tariff valuation of this, in Bombay, is Rs. 4 per cwt.

(534) BALÆNA, (from a Greek word) is the Latin name of the Common or Greenland Whale, and, adopted by naturalists as a generic term, to comprehend all the other species which agree with it in their zoological characters. See CETACEA.—*Eng. Cyc. page* 372.

(535) BALANOPHOREÆ. This order contains several parasitic plants, such as the extraordinary Rafflesia, and the Cytinus hypocistus, a small plant found on cisti trees in Europe, and which yields the substance long known in medicine as hypocistus juice. This is supposed to be an extract of the plant, and owes all its properties to the presence of an abundance of gallic acid.—*O'Shaughnessy, p.* 569.

(536) BALANOPHORA, is a curious leafless parasite in the Zemu valley in Sikkim, growing abundantly on maple there. This species produces the great knots on the maple roots, from which the Tibetans form the cups mentioned by MM. Huc and Gabet. Dr. Hooker was so fortunate as to find a small store of these knots, cleaned, and cut ready for the turner, and hidden behind a stone by some poor Tibetan, who had never returned to the spot: they had evidently been there a very long time.—*Hooker Him: Jour. Vol.* II. *page* 47. The Lepchas drink out of these little wooden cups, which are very curious on several accounts; they are very pretty, often polished, and mounted with silver. Some are supposed to be antidotes against poison and hence fetch an enormous price; these are of a peculiar wood, rarer and paler-coloured. Dr. Hooker has paid a guinea for one such, hardly different from the common sort, which cost but 4d. or 6d. MM. Huc and Gabet graphically allude to this circumstance, when wishing to purchase cups at Lhassa, where their price is higher, as they are all imported from the Himalaya. The knots from which they are formed, are produced on the roots of oaks, maples, and other mountain forest trees, by the above described parasitical plant, known to botanists as *Balanophora*—*Hooker Him. Jour. Vol.* I. *page* 132.

(537) BALANOPHORA GIGANTICA, is a favourite astringent remedy in Burmah.—*O'Shaughnessy, page* 569.

(538) BALANITES ÆGYPTIACA. *Rutacea.*

Nunjoonda wood tree, ENG.	Hingenbet, DUK.
Nunjoonda maium, TAM.	

This is a small thorny tree with alternate bifoliate leaves, and greenish white flowers; fruit about the size of an egg, covered with a smooth dry cortex; it flourishes in black soil.—*Riddell.* Dr. Lindley says that its leaves are slightly acrid and have the character of possessing anthelmintic properties: the fruit when ripe can be eaten without inconvenience; A fat oil called zachun is extracted from the seeds. The fruits are said to be mixed in commerce with Myrobolans. Its wood is of no value and only good for fuel.—*Jaffrey. Wight. Balanites ægyptiaca* is common about Delhi, and in the Doab as far as Allahabad, and especially on the banks of the Jumna. (Royle, p. 154.) Dr. Roxburgh describes the pulp as exceedingly bitter, and having an offensive greasy smell; the nut is used in native fire-works, the kernel being scooped out the shell is filled with gunpowder, and explodes with a very loud report. —*O'Shaughnessy, p.* 258—260.

(539) BALANUS, a genus of sessile cirrhipeds, or barnacles, most widely diffused and to be found upon almost all bodies, whether fixed or moveable, that offer an opportunity for it to attach itself to them, and are immersed in the sea: colonies of Balani are to be found on rocks left dry at low water, on ships, on timber, whether floating or at rest, on lobsters and other crustaceans, and on the shells of conchifers and mollusks. The Balanus psittacus sometimes attains the length of 5½ inches and a diameter of 3½ inches and is a very common and esteemed food.—*Eng. Cyc.*

(540) BAL-CHUR, (Valeriana Jatamansi. Spikenard?) Found near standing water at Ajmere, the roots are small and knotty, and fine like hair, hence the name: have a sweet scent: are tasteless: used to heat, strengthen and excite the system. One tola is the dose. Are very much used also in hair mesalihs; price, two seers for one rupee. Also the name of a grass, the roots of which are like fine hair, sweet-scented, and much used in cleaning the hair. This latter grass is the Andropogon schænanthus.—*Gen. Med. Top. p.* 128.

(541) BALLAST.

Baglast, DAN.	Neerum, HIND.	Lastre, SP.
Ballast, DUT.	Savorra, IT.	Ballast, SW.
Lest, FR.	Lastro, PORT.	FAULKNER.
Ballast, GER.	Balast, RUS.	

Ballast is from the Anglo-Saxon wood *be-klæsten* to lade a ship. The heavy materials, stone gravel or iron, placed in the hold of a ship in order to make the centre of gravity correspond with the trim and shape of the vessel. Iron

ballast is alone used in the Royal Navy, but in merchantmen it is of various kinds, and masters are obliged to declare the quantity they bear and discharge it at certain places. Many excellent ports have been ruined by ballast being discharged in havens, roadsteads &c.—*Tomlinson.* Many of the raw products of the world, the small value of which would not bear the expense of freight, are yet conveyed from country to country as ballast.

(542) BALLS AND BATS. These materials for the cricketers are imported wholly from England, and in the four years, 1852 to 1856, Madras received to the value of Rs. 13,938.

(543) BALM. Mellissa officinalis. A pot herb, the young tops and leaves of which are used in cookery, and, when dry, as tea; raised from seed, cuttings, &c. All pot herbs should be cut, to dry, when in flower, and dried in the shade.—*Jaffrey.*

(544) BALSAM.

Balsem, DUT.	Balsam, GER.	Balsamum, LAT.
Baume, FR.	Balsamo, IT.	Balsamo, SP.

A general term applied to various medicinal resinous juices obtained from trees. Those of most importance in commerce will be found described under their respective heads.—*Faulkner.* Many of the fragrant resins belong to the natural order of plants, the Amyridaceæ, *Amyrids*, consisting of tropical trees or shrubs, the leaves, bark, and fruit of which abound in fragrant resin. The species are natives of tropical India, Africa, and America. This order is remarkable for yielding various fragrant resins; as Myrrh, Frankincense, and other products. The Frankincense of India is the produce of a species of Boswellia. Olibanum is yielded by *Boswellia serrata*. Myrrh is obtained on the Abyssinian coast from the *Balsamodendron myrrha*. *B. Opobalsamum* yields the Balm of Mecca. Bdellium is produced in Africa by *B. Africanum*. American Elemi comes from *Icica Icicariba*. Resin of Courina from *I. ambrosica*. The gum Elemi of commerce is said to be yielded by several species of *Amyris*. (Lindley, *Vegetable kingdom.*)—*Eng. Cyc. p.* 189.

(545) BALSAMINA, THE BALSAMS, one of the two genera of which the natural order Balsaminaceæ consists. It differs from Impatiens in having all its anthers 2 celled, its stigmas distinct, and the valves of its fruits curling inwards when bursting. There are numerous species, several of which have very handsome flowers. They are chiefly found in the damper parts of the East Indies; but the only one that is much known in Europe is the common Garden Balsam (*Balsamina hortensis*), which, in its double state, has been an object of cultivation since the earliest records of modern horticulture. This plant, which is supposed to be found wild in the mountainous parts of Sylhet, in the form of what botanists call *Balsamina tripetala*, is one of those species which not only has a tendency to vary with double flowers, but has also the power of continuing to produce them when renewed from seeds. On this account it particularly deserves the attention of the cultivator, especially as it may be brought by art to a state of beauty equalled by few plants. All that is necessary in order to secure fine Balsams, is, first to save the seed with great care from the finest and most double flowers only, throwing away all whole coloured and single blossoms; and secondly, to cultivate the plants with a due regard to the natural habits of the species. A native of the hot damp shady woods of Sylhet, it is incapable of bearing much drought or bright sunshine. In Britain it is raised in a hot bed, treated with great care as a tender annual, grown in rich soil, sheltered from excessive sunlight, and kept constantly in a damp atmosphere, but freely and fully ventilated. It should not however be stimulated into extremely rapid growth until the plants have become stout bushes and the flowers have grown to the size of small peas. At that time the plants should have all the heat and moisture they can bear, and the most brilliant flowers the plant is capable of producing will be the result. In the latter stage of growth great care is still to be taken to expose the plants fully to air.—*Engl. Cyc. page* 375. Dr. Riddell mentions that, in India, Balsams require to be sown thinly in a box or seed pan; after the *plants* are 2 or 3 inches high they should be transplanted out singly in well manured soil, if to be grown in pots, they should be put in small sized ones at first and re-potted into larger, when requisite, which will be, when the small pots are filled with roots. The soil best adapted for culture is, 2 parts strong loam approaching in appearance to brick earth, and 2 parts well decayed manure, with a *little lime*, which will aid in preventing mildew, so destructive to the Balsam: the pots should be well drained and the plants must never be neglected in watering; seeds may be sown every month. Balsams, on the Khasia Hills, are next in relative abundance (about twenty-five), to the orchids, both tropical and temperate kinds, of great beauty and variety in colour, form and size of blossom.—*Hooker Vol.* II. *page* 281.

(546) BALSAMODENDRON, a genus of oriental trees belonging to the natural order *Amyridaceæ*, and remarkable for their powerful balsamic juice.—*Engl. Cyc. page* 376.

(547) BALSAMODENDRON GILEADENSE. Roughan Balsan, HIND. and PERS.

Balsam of Mecca or Gilead. Protium gileadense. Syn. Amyris gileadense. A middle sized tree, a native of Arabia, Ethiopia, and the East Indies, introduced into the Calcutta Garden in 1798. M. Fee ascribes to this tree three distinct products; Balsam of Mecca, a wood called Xylobalsamum, and fruits termed Carpobalsamum. Tradition is rich in anecdotes re-

lative to the origin of this balsam; the Mahomedans affirm that it sprung from the blood of the slain in Mahomet's conflict with the tribe of Harb, and that the prophet used the Balsam for the resuscitation of the dead. (Fee.) It is much used in medicine by the Hakims as a stimulant, tonic, and somewhat astringent remedy, and as an external application to indolent sores. It is also employed as a perfume and cosmetic. The Opobalsamum and Carpobalsamum require no particular notice.—*O'Shaughnessy, page* 285. Balasamodendron Gileadense is supposed to be that described by Theophrastus. It is described as a middle-sized tree, with the leaflets growing in threes, and the flowers single. But it is probable that, as other balsam trees are found in the same places, and produce the same substance, they are in fact nothing but varieties of the same species. They produce three different substances: 1, Balm of Mecca, or Balm of Gilead, or Opobalsamum; 2, Xylobalsamum; and 3, Carpobalsamum; the first obtained from the trunk of the balsam-trees by simple incision; the second by boiling the branches and skimming off the resin as it rises to the surface of the water; and the third by simple pressure of the fruit. They are no longer met with even in gardens, about Gilead in Palestine.—*Engl. Cyc, page* 376. Balsam of Mecca mixture:—To prepare this mixture of Mecca Balsam, take of Acacia or white mooslie mixture eight fluid ounces, Balsam of Mecca (Roghen balsan) two fluid drachms, rub well together. In use, it is a valuable stimulant and tonic, much prized by the Mahomedans of India. Dose, half a fluid ounce to one ounce, three times daily.—*Beng. Phar. page* 375.

(548) BALSAMODENDRON KATOF has fewer spines, and downy and more distinctly serrated leaves. Its wood, which is red and resinous, is a common article of sale in Egypt. Whatever may be the product of this species, which Forskal states to produce the myrrh of commerce, it is now certain that this substance is yielded by *Balsamadendron Myrrha*, which Ehrenberg found on the frontiers of Nubia and Arabia, bearing a substance identical with the myrrh of the shops. It is therefore no longer to be doubted that the suggestion of Bruce, that it is the produce of a kind of Mimosa—a most improbable circumstance, by the way—originated in some incorrect observation.—*Eng. Cyclo. page* 377.

(549) BALSAMODENDRON MYRRHA, is a small scrubby tree found in Arabia Felix, near Gison, scattered among species of *Acacia, Euphorbia*, and *Moringa*. Both its wood and bark have a strong and remarkable odour. The branches are stiff, short, and spiny; the leaves composed of three obovate unequal leaflets, with distinct crenatures, and the fruit a narrow, oval, furrowed, plum, surrounded at the base by the persistent calyx.—*Engl. Cyc. page* 377. *Myrrh*, a natural gum-resin, the source of which was long doubtful, was observed by Ehrenberg to exude from the bark of the abovementioned species of balm, much in the same way as gum tragacanth exudes from the *Astragalus verus*. It is at first soft, oily, and of a yellowish-white colour, then acquires the consistence of butter, and by exposure to the air becomes harder, and changes to a reddish hue. As met with in commerce it is of two kinds, that which is called Myrrh in Tears, and that called Myrrh in sorts.—*Eng. Cyc. p.* 377. Dr. Von Martius mentions a white Myrrh, which has a very bitter taste like colocynth, and an external appearance like ammoniacum; it is probably ammoniacum treated with tincture of colocynth. Another false myrrh may be distinguished by its transparency and less bitter taste. —*Eng. Cyc. p.* 377.

(550) BALSAMONDENDRON OPOBALSAMUM, the Balessan of Bruce, has a trunk from six to eight feet high, furnished with a number of slender branches ending in a sharp spine. The leaves consist of from five to seven sessile, obovate, entire, and shining leaflets, within which are placed the small flowers, which grow in pairs on short slender stalks, and are succeeded by small oval plums; this is to be distinguished from the B. Gileadense.—*Eng. Cyc. page* 376.

(551) BALSAMODENDROM ZEYLANICUM, is mentioned as a fifth species, producing oriental Elemi, which is very different from the American kind; but of this too little is known to enable us to do more than advert to its existence. —*Eng. Cyc. p.* 377.

(552) BALSAM OF PERU.

Baume-de-Peru, Fr. | Balsamum peruviauum, Lat.
Peru vianischer balsam, Ger. | Balsamo de Quinquina. Sp.

A resinous fluid of the consistence of syrup, of a brown colour, fragrant aromatic smell, and a pungent bitterish taste. It occurs in two states, *black* and *white*, and is procured from a tree (*Myroxylon Peruiferum*), which grows in the warmest parts of South America.—*Faulkner.*

(553) BALUNGOO.—Seeds of Dracocephalum Royleanum: mucilaginous and slightly aromatic, black, ⅛ of an inch long, pointed.—*Royle.*

(554) BALUTA; Balote, Balute or Bara Balute, so named either from being twelve in number or from the amount set apart for them being divided into twelve parts: the village servants in India who with the inferior servants Alute and Nárákárú vary in number in different parts of India, from 6 to 27, and have different names. In most cases the offices are paid by recognised fees and perquisites, by allotments of corn at harvest time, or by portions of land held rent free or at a low quit rent. In most cases the offices are hereditary, and are ca-

pable of being mortgaged or sold. They are a municipality and could be employed to the benefit of the country.—*Wilson.*

(555) BAMBOO.

Bambou, Fr.	Preng, Jav.
India-nischer rohr, Ger.	Buluh, Mal.
Bans. Bumboo, Hind.	Moorngal, Tam.
Bambu, It.	Edur Bangoo, Tel.

Bambusa, the *Bamboo,* is a genus of grasses, of which it is the most gigantic: is well known for its great economical importance, but consisting of species which are very imperfectly understood by botanists. The purposes to which different species of Bamboo are applied are so numerous that it would be difficult to point out an object in which strength and elasticity are requisite, and for which lightness is no objection, to which the stems are not adapted in the countries where they grow. The young shoots of some species are cut when tender, and eaten like asparagus. The full grown stems, while green, form elegant cases, exhaling a perpetual moisture, and capable of transporting fresh flowers for hundreds of miles: when ripe and hard they are converted into bows, arrows, and quivers, lance-shafts, the masts of vessels, bed-posts, walking-sticks, the poles of palanquins, the floors and supporters of rustic bridges, and a variety of similar purposes. In a growing state the spiny kinds are formed into stockades, which are impenetrable to any but regular infantry, aided by artillery. By notching their sides the Malays make wonderfully light scaling-ladders, which can be conveyed with facility where heavier machines could not be transported. Bruised and crushed in water, the leaves and stems form Chinese paper, the finer qualities of which are only improved by a mixture of raw cotton and by more careful pounding. The leaves of a small species are the material used by the Chinese for the lining of their tea-chests. Cut into lengths and the partitions knocked out, they form durable water-pipes, or by a little contrivance are made into excellent cases for holding rolls of paper. Slit into strips they afford a most durable material for weaving into mats, baskets, window-blinds, and even the sails of boats. Finally, the larger and thicker truncheons are exquisitely carved by the Chinese into beautiful ornaments. It is however more especially for building purposes that the bamboo is important. According to Marsden, in Sumatra, the frame-work of the houses of the natives is chiefly composed of this material. In the floorings, whole stems, four or five inches in diameter, are laid close to each other, and across these stems laths of split bamboo about an inch wide are fastened down with filaments of the rattan-cane. The sides of the houses are closed in with the bamboo opened, and rendered flat by splitting or notching the circular joints on the outside, chipping away the corresponding divisions within, and laying it in the sun to dry, pressed down with weights. Whole bamboos often form the upright timbers, and the house is generally roofed in with a thatch of narrow split bamboos, six feet long, placed in regular layers, each reaching within two feet of the extremity of that beneath it by which a treble covering is formed. Another and most ingenious roof is also formed by cutting large straight bamboos of sufficient length to reach from the ridge to the eaves, then splitting them exactly in two, knocking out the partitions, and arranging them in close order with the hollow or inner sides uppermost; over which a second layer, with the outer or convex sides up, is placed upon the other in such a manner that each of the convex pieces falls into the two contiguous concave pieces, covering their edges; the latter serving as gutters to carry off the rain that falls upon the upper or convex layer.—*Engl. Cyc. p.* 578. Mr. Morrison has also prettily described the use of Bamboo and the *bamboo ware.* He says the uses of this plant are so numerous, that it is almost as easy to enumerate them by saying what the plant is not used for as by describing them. The shoots are boiled, pickled and comfited; the roots are carved into fantastic images, or cut into lantern handles and canes, the tapering culms are used for all purposes that poles can be applied to in carrying, supporting, propelling and measuring; for the props of houses and the ribs of sails; the shafts of spears, the wattles of abattis, and the handles and ribs of umbrellas and fans; the leaves are sewed into rain-cloaks, and thatches; the epidermis, cut into splinths of various sizes, is woven into baskets of every form and fancy, plaited into awnings, and twisted into cables. It furnishes the bed for sleeping, the chopsticks for eating, the pipe for smoking, and the broom for sweeping; the matress to lie upon, the chair to sit upon, the table to eat on: the food to eat and the fuel to cook it with, are also derived from it:—the ferule to govern with, and the book to study from: the tapering plectrum for the lyre, and the dreaded instrument of the judge; the skewer to pin the hair, and the hat to screen the head; the paper to write on, the pencil to write with, and the cup to put the pencil in; the rule to measure lengths, the cup to gage quantities, and the bucket to draw water; the bird-cage, the crab-net, the fishpole, and the sumpitan, &c. &c., are one and all furnished by this plant, whose beauty when growing is commensurate to its usefulness when cut down. Bamboo ware as chairs, screens, couches, &c., is largely exported from China, but no account of the amount or direction has ever been kept.—*Morrison, p.* 171. Of bamboos on the Khassia Hills there are fifteen, and of other grasses 150, which is an immense proportion, considering that the Indian flora (including those of Ceylon, Kashmir, and all the Himalaya), hardly contains 400.—*Hooker Vol.* II. *p.* 281.

Uspar, Uspet, Uspit, Usken, Uskong, Uktang, Usto, Silee, Namlang, Tirra, and Battooba, are some of the names given to Bamboos on the Khassia Hills. Writing regarding the Bamboos of the Tenasserim Provinces, the *Bambusa spinosa*, (*thorny bamboo*), *Bambusa gigantea*, (*gigantic bamboo*,) *Bambusa nana* (*Penang, or China bamboo*), Mr. Mason remarks, that bamboo is there used for all purposes to which timber is usually applied. Most of the native houses in the Provinces are built principally of Bamboos tied together with ratans. Cots, seats, and tables are often formed of the same material. The Karens have names for seventeen species or varieties, one of the strongest of which is covered with large thorns, and makes an impenetrable fence; but the China bamboo, which has been introduced from Penang, makes the closest and prettiest hedge, and when cut annually, looks like an English quick-set hedge. The gigantic bamboo, the largest bamboo in the world, is indigenous, but in the southern provinces is seen only in cultivation. He mentions that a FUNGUS, like a mushroom, grows at the root of the bamboo in these Provinces, hence called the bamboo-fungus, which is regarded by the natives as quite a specific for worms. It has also been introduced into European practice, and is regarded by some physicians as superior to any anthelmintic in the Materia Medica. Mr. Mason also adds, that the young shoots of some species of bamboo are sold in the market for a vegetable. They are also used by Europeans for a pickle and a preserve, and in times of scarcity the seeds of the bamboo have often been used by the Karens as a substitute for rice.—*Mason*. The following comprise the principal of the Bamboos of Southern and Eastern Asia.

I. *Asiatic Bamboos, with the Flowers either in Spikes or Panicles.*

(556) BAMBUSA ARUNDINACEA. Roxb. (Bans, Hind. and Beng). Spiny. Its leaves are very narrow, covered with asperities on the margin and upper surface. It is common in rich, moist soil, among the mountains of India. The stems grow in clusters, from 10 to 100, from the same root-stock, and are straight for 18 or 20 feet. When in flower it is usually destitute of leaves, and as the extremity of every ramification is covered with blossom, the whole tree seems one entire immense panicle. Its seeds are used as rice. Tabasheer is found in its joints.

(557) BAMBUSA STRICTA, Roxb. Somewhat spiny. Flowers in extremely compact whorls. Said to be a smaller species than the last: it grows in a drier situation, has a much smaller cavity, and is very straight. Its great strength, solidity, and straightness, render it much fitter for many uses. From this the shafts of lances are made in India.

(558) BAMBUSA VULGARIS, Wendl. Not spiny; leaves very narrow, covered at the edge

and on the upper surface with asperities. Found in the East Indies, whence it is thought to have been carried to the West. Its stems are from 20 to 30 feet long, and as thick as a child's arm.

(559) BAMBUSA SPINOSA, Roxb. Strongly armed with both single and compound spines; leaves very narrow, and rarely more than six inches long. (*Behor Bans*, Bengal.) Common about Calcutta, and in the south of India, forming an impenetrable jungle; also often cultivated round Indian villages. It has a smaller hollow than most of the others, and is consequently stronger than many of them. Dr. Roxburgh describes it as rising in such dense tufts as to appear like a single trunk at some distance; and by help of their spiny branches so bound together that it is a most arduous task to cut down an old clump of them. The stems are from 30 to 50 feet long.

(560) BAMBUSA TULDA, Roxb. Not spiny; leaves broad, rounded or heart-shaped at the base. (*Tulda Bans*, Beng.; *Peka Bans*, Hind.) Common all over Bengal. Its growth is so rapid that the stems which are sometimes as much as 70 feet long and 12 inches in circumference, rise to their full height in about 30 days. Before their lateral shoots are formed, they are described as resembling fishing-rods of immense size. The young thick shoots, when about two feet high, are tender, and form an excellent pickle. It is chiefly used for scaffolding and for covering the houses of the natives; it is found to last much longer, if steeped in water some time before being used. Of this species Dr. Roxburgh mentions several varieties. *Jowa Bans* is a larger variety, with longer and thicker joints; *Basini Bans* has a larger cavity, and is chiefly used to make baskets. *Behoor Bans* is of a small size, very solid and strong, much bent to one side, and armed with numerous strong thorns. A staff of it is placed in the hand of every young Brahmin when invested with the sacerdotal robe. It is probably a distinct species.

(561) BAMBUSA BALCOOA, Roxb. Not spiny; leaves narrow, heart shaped at the base. (*Balcoo Bans* in Bengal.) A native of Bengal, and even more gigantic than the last. It is reckoned by the workers in bamboo the very best for building purposes. Previously to being used, it is immersed in water for a considerable time. Two varieties are distinguished *Dhooli Balcoo*, the larger, and *Balcoo Bans*, which is smaller and stronger, with a less cavity.

(562) BAMBUSA BLUMEANA, Schultes. Armed with triple recurved spines: leaves very narrow, quite smooth, suddenly tapering into a short stalk. A native of Java. Stems about as thick as a child's arm.

(563) BAMBUSA AGRESTIS, Poir. Stems crooked, at the lower part very spiny; leaves narrow, small, smooth. On mountains, and in dry

and desert places in all China and Cochin China; it is common also in various islands in the Malay Archipelago, its crooked, sometimes creeping, stems and rugged aspect distinguish it. The trunk is a foot thick, and the joints (we presume near the base) a foot and a half long, and often nearly solid.

(564) BAMBUSA THOUARSII, Kunth. Stems very much branched. Found wild in Madagascar, where however it is not believed to be indigenous.

(565) BAMBUSA MITIS, Poir Stems perfectly unarmed; leaves very narrow, and clasping the stems at their base. Cultivated in the fields and hedges of Cochin China, and found wild in Amboyna, where several supposed varieties exist. Its stems grow 30 feet long, and are said by Rumphius to be the strongest of all the species, although its sides are thin. It is sometimes as thick as a man's leg.

(566) BAMBUSA MAXIMA, Poir. Stems very straight, branching only near the summit, and densely covered with spines. The most gigantic of all the species, from 80 to 100 feet high, and sometimes as thick as a man's body. Its wood is however very thin. It is found wild in Cambodia, Bally, Java, and various islands of the Malay Archipelago.

(567) BAMBUSA ASPERA, Schultes. Stems covered all over with a sort of white mealy down. Found at the foot of mountains in Amboyna, with stems from 60 to 70 feet high, and as thick as a man's thigh. It does not branch, but emits little hard spine-like roots at its nodes.

(568) BAMBUSA APUS, Schultes. Leaves very large, taper-pointed, and gradually narrowing to the base, extremely scabrous at the edge. Another gigantic species, with the dimensions of the last, growing on Mount Salak, in Java.

(569) BAMBUSA BITUNG, Schultes. Leaves very large, taper-pointed, narrowed at the base into a sort of bristly, very short stalk, very scabrous at the edge and on the upper surface. Found in Java with the last, and remarkable for its extremely broad and scabrous leaves. Its dimensions are not stated.

(570) BAMBUSA NIGRA, Loddiges. Not spiny. Stems slender, swelled at the nodes, dark-brown, and polished, not more than a man's height. Leaves narrow, very smooth, rounded and narrowed at the base into a short stalk; ligule with long stiff fringes. A native of the neighbourhood of Canton where its beautiful slender stems are cut for the handles of parasols, walking-sticks, &c. It is by far the most patient of cold, having been living for several years without protection in a morass in the garden of the London Horticultural Society, and is no doubt capable of being acclimated in the south-west of England or on the west coast of Ireland.

(571) BAMBUSA ARISTATA, Loddiges. Stems slender, smooth, not spiny. Leaves very smooth, narrowed gradually at the base into a short stalk with downy fringed sheaths. Ligules divided into very long coarse fringes. Nodes mealy when young. Native of the East Indies. A very elegant species, related to the last.

(572) BAMBUSA NANA, Roxb. A native of China. It makes most beautiful close hedges.

(573) BAMBUSA PUBESCENS, Loddiges. Not spiny. Young shoots, leaf-sheaths, and leaves on the under side, covered with short down. A very remarkable species, obtained by the English from the collections of France. Its native country is unknown. The stems are 30 feet long, and an inch and a half in diameter.

(574) BAMBUSA STRIATA. Not spiny. Stems slender, polished, yellow with green stripes. Leaves narrow, rather glaucous on the under side tapering into a short stalk at the base, quite smooth, except a few short black hairs on the sheaths. A native of China. Often cultivated in the hot-houses of England on account of its beautiful variegated stems. Grows about 20 feet high.

(575) BAMBUSA GLAUCA, Loddiges. Not spiny. Stems very slender, green. Leaves very small, not downy, taper pointed, almost heart-shaped at the base, covered on the under surface, with very close bright glaucous bloom. Leaves scarcely above an inch long, and not more than two lines broad. A native of India. A very remarkable species, not growing above 2 feet high, with entangled branches.

II. *Asiatic Bamboos, with the Flowers not Panicled, but in simple Terminal Whorled Spikes.*

(576) BAMBUSA VERTICILLATA, Willd. Leaf-sheaths covered with stinging hairs. Stems whitish. Fifteen or sixteen feet high, and, when full-grown, of a pale colour, which becomes nearly white in drying. The hairs of the leaves occasion so much itching, that this kind is troublesome to collect. It is the *Leleba alba* of Rumphius, who says the edges of its leaves are so sharp as to wound the gatherers. It is found in Amboyna.

(577) BAMBUSA ATRA. Leaf-stalks covered with stinging hairs. Stems black and shining; very like the last, and found also in Amboyna. It chiefly differs in the colour of the stems. It is the *Leleba nigra* of Rumphius.

(578) BAMBUSA PRAVA. Leaves very large, stiff, and broad, extremely hispid, with stinging hairs. The most common in Amboyna, forming large woods, which come down to the coast. It flourishes equally in dry and moist situations, and is readily known from the others of this section by its very large leaves, which are as much as 18 inches long and 3 or 4 inches broad.

(579) BAMBUSA PICTA. Joints very long, variegated with white and green. Leaves narrow and not very hairy. Common in Cerama, Kelanga, Celebes, and some other Malayan islands. Its joints are as much as 4 feet long and about

2 inches thick : the wood is thin, and it is consequently used principally for light walking-sticks ; it is however extremely strong.

(580) BAMBUSA AMAHUSSANA. Joints short. Leaves with stinging hairs on the upper part of the stem, but smooth near the ground. Less straight, and more short jointed than any of the preceding species of this section. Its wood is very thick. Grows in Amboyna and Manipa.

(581) BAMBUSA MULTIPLEX, Lour. Stems long-jointed, not spiny. Leaves stingless, narrow, and clasping the stems at their base. Cultivated in the north of Cochin China for hedges Its leaves are very narrow, and of a brownish-green. The stems are about 12 feet long and an inch thick.

(582) BAMBUSA TABACARIA, Poir. Stems slender, very straight, of nearly equal thickness, branched ; with very long rough joints. Wild in the black and argillaceous soil of Amboyna, Manipa and Java, in the plains and moister parts of the mountains. Its stems are nearly solid, and excessively tough and hard. The joints are 3 or 4 feet long, and not thicker than the little finger. When polished they make the finest pipe-sticks. The outside is so hard, that it emits sparks of fire when struck by the hatchet. The species runs very much at the root.—*Eng. Cyc. pages* 378 to 380.

(583) BAMBOO PAPER. When travelling in the Himalayas, Dr. Hooker observed a manufactory for making paper out of the bamboo. Large water-tanks were constructed in the fields for the purpose of steeping the bamboo stems. They appeared to be steeped for a length of time in some solution of lime. They were then taken out and beaten upon stones until they became quite soft, or till all the flinty matter which abounds in their stems was removed.—*Hooker Him. Journ. page* 311.

(584) B'DELLIUM.

Aflatoon, ARAB.	Mukl, PERS.
Gugula, CYNG.	Kookul, TAM.
B'dellium, FR.	Gugula, TEL.
Googul, GUZ. HIND.	

Bdellium, commonly called a gum, is in reality a gum-resin, but its origin has been a subject of doubt. It would appear that there are several kinds of Bdellium, the source of two of which seems now to be ascertained, the others continue matters of controversy. The Bdellium of the ancients, said by Pliny (xii. 9) to be brought from Bactria and other parts of Asia, still comes from Asia. The Bdellium of Africa is yielded by the *Balsamodendron Africanum*. Dr. Royle says that Indian Bdellium is produced by a species of *Balsamodendron*, called by Dr. Roxburgh *Amyris Commiphora* ('Fl. Ind.' ii., p. 244), *Amyris Agallocha* ('Calcutta Catalogue,' p. 28), the native name of which is Googul. (Royle, 'Illustrations of the Flora of the Himalaya,' part vi., p. 176.) The opinion of its being obtained from a palm, either the *Lontarus domestica* (Gærtn.) or the *Borassus flabelliformis*, is very improbable. This substance occurs in masses of variable size and shape, sometimes as large as a walnut, in oblong or angular pieces of a yellow, red, or brownish colour. The clearest pieces are transparent ; the odour is weak and peculiar, the taste bitter, balsamic, and resembling myrrh or Venice turpentine. It is tolerably brittle at the ordinary temperature of the atmosphere, but with a slight increase of heat, the finer kinds may be kneaded between the fingers. Its specific gravity is 1·371. Resembling myrrh in appearance, it also resembles it in its effects upon the human system, and is often fraudulently substituted for it ; it is however weaker, while it is more dissgreeable and acrid. [Balsamodendron] It was formerly used in many compounds and plasters, such as Diachylon. It is now disused in Britain ; but is to be found intermixed with gum-Arabic. The Sicilian Bdellium is produced by the *Daucus Hispanicus* (Decand.), the *D. gummifer* of Lamarck, or perhaps the *D. gingidium* (Linn.), according to Boccone ('Museo di Piante Rare della Sicilia,' &c., tom xx.), which grows on the islands and shores of the Mediterranean. The Egyptian Bdellium is conjectured to be produced by the *Borassus flabelliformis* (Linn.), the *Chamærops humilis*, or the *Hyphœne cuciphra* (Pers.) The Bdellium mentioned in the second chapter of Genesis is obviously a mineral, and has no reference to the substances above mentioned.—*Eng. Cyc. p.* 400. Bdellium, in the Bombay tariff valuation, is rated at Rs. 4 per cwt. The Bdellium met with in Bombay, is imported from Cutch and the Persian Gulf. It is re-exported to China and to England under the name of Myrrh. At the Madras Exhibition of 1855, of the *Bdellium* from the Amyris Commiphora, two varieties were exhibited—the solid gum, and the balsamic fluid, as obtained from the tree, and living specimens of the balsamic tree were sent to the Horticultural Gardens of Madras by Surgeon Lovell.—*M. E. Jur. Rep.* The Commiphora Madagascarensis, (Lindley) is the Amyris Commiphora, (Roxb.) the Balsamodrendron Commiphora, (Wight and Arnott). It is a native of Sylhet, Assam and Madagascar, and blossoms in the Calcutta Botanic garden about February and March, but seldom ripens its seed. Dr. Ainslie, (Vol. 1. p. 29) gives an excellent summary of all the information extant when his work was written.

(585) BANANA.

Mouz, HIND. | Waray-pullum, TAM. | Andi-pundoo, TEL.

The plantain and Banana tribe of plants, MUSACEÆ, are found in the hot tropical parts of the world, and are all conspicuous for their size, among herbaceous plants. They form a spurious stem of considerable thickness, by their leaves, which, as they rise from the root-stock, sheath at their bases, and encircle each other enveloping layer within layer the slender

flower and fruit stalk. Every part of the plant abounds in fibres, as well the sheathing as the exposed parts of the leaves, and their fruits furnish a portion more or less large of the daily food of the people. One species of this very useful tribe of plants is the Musa textilis, of the Philippine Islands, which furnishes the important article of commerce known as Manilla Hemp. The edible varieties extend through the Indian Archipelago, northwards as far as Japan, while in China are found M. coccinea and M. Cavendishii. Again M. glauca is indigenous along the Malayan peninsula. Dr. Helfer mentions that 20 varieties are found in the Tenasserim Provinces, and M. ornata grows in Chittagong. In the valleys of the south of the Peninsula of India and of the Dindigul mountains, M. superba is found. The common edible varieties of M. paradisiaca, or musa sapientum, flourish even in the poorest soils and also near brackish water. The natives of Bengal generally prefer the larger and coarser fruited kinds, called plantain, to the smaller and more delicately tasted fruit, known as the banana, which is alone esteemed by Europeans. Major Munro has seen the wild plantain at 7000 feet above the sea, in the Khondah slopes of the Neilgherries. That cultivated in Nepal has been called M. nepalensis, and a similar species may be seen growing below the Mussoorie range, as well as near Nabu. The fruit however in all these situations consists of little else than the hard dry seeds. A similar variety of M. sapientum, having seeds surrounded with a gummy substance, instead of a pulp-like fruit, was found by Dr. Finlayson, on Palo Ubi, near the southern extremity of Cambodia. In Batavia, also, there is stated to be a variety full of seeds, which is called Pisang batu or Pisang bidju—that is, seed plantain. See *Manilla Hemp*: *Plantain fibre.*—In Khasia the name of the wild Plantain is Kairem, and the cultivated Kakesh.—*Hooker Him. Jour. Vol.* II, *page* 268. The Malays reckon forty varieties of the cultivated banana, and the Philippine islanders carry them to fifty-seven, both people having a distinctive epithet for each variety. The qualities are as various as those of apples and pears in Europe, the ordinary sorts being very indifferent fruit.—*Crawfurd Dic. page* 31. In the West Indies the Banana and Erythrina are mingled with the Cacao trees to guard the Cacao from the rays of the sun without depriving them of heat.—*Simmonds, page* 15.

(586) BANDALA. The name given in the Philippine Islands to the fibre extracted from the harder and stronger outer layers of the Manilla Hemp plant, *Musa textilis.* It is employed in the fabrication of cordage.—*Royle.*

(587) BANDANA. A term applied to a particular style of calico printing; also to a kind of silk or cotton handkerchief with bright figures, &c. upon a red or dark ground.—*Faulkner.*

(588) BANDICOOT. In Australia (*Perameles*, Geoff. St. Hilaire), a genus of marsup mammals, which appears to occupy, in Austr lia, the situation which the shrews, tenrecs, a other Insectivora fill in the old world.—*Cyc. page* 381. In India, it is the name given the *Mus giganteus*: which see.

(589) BANE. Flea-bane, Insect-bane, Mu quito-bane, Bug-bane, Rat-bane &c. There a few residents in India who have not suffer from the attacks of insects, and from their d predations; and it may be useful to be awa that many substances are known to po sess properties, the influences of which a avoided by noxious creatures and annoyi vermin. It is supposed that some species of *Ar* will drive out the termites or white ants, b this point is not yet fully ascertained. T whole family of "Apocynaceæ," termed "do banes," are truly so. One of them, the Nerin piscidium, common in the Khossia or Sylh mountains, and the bark of which contains mu useful fibre, proves deadly to fishes.—*Dogs* refu to sleep on rugs beneath which mint has be placed, and this simple plant thus affords a goo means of ensuring cleanliness. *Deer* refuse to a proach crops, in which the safflower, Cartham tinctorius, has been intermixed. White mustar sown round vegetables, as the cabbage, preven the inroads of *caterpillars.* *Snakes* are said avoid the fennel plant as well as all places whe the fennel seed (Nigella sativa) is strewed, (Sy Siah Daneh, *Pers*: Magrela, *Bengal*; Kala jir *Hind*:) The rasped wood of the oleander employed as ratsbane. To destroy flies in E ropean countries, a decoction of quassia, place in a plate, is frequently had recourse to. I Southern India, plants of the "Ghi-gowar" " Kulbunda," the Aloe perfoliata, are suspende with their roots upwards, with a longitudin incision in each leaf, to permit the aroma of th juice to become apparent, and disperse mu quitos from the room. Flies, fleas and musqu toes, avoid rooms in which branches of penny royal have been suspended. Fortune mentio that the Chinese expel musquitoes from the rooms and boats, by the smoke of pastilles. In In dia they are smoked out by burning chips of woo A species of ant, *Formica smaragdina*, well know in Malabar and the wooded parts of India, is em ployed in the North-West Provinces to destroy th nests of wasps that have established themselv in a house. In this case they are said to destro all the wasps, but become so infuriated that the own indiscriminate attacks are nearly as bad a those of their foes. Honigberger states that twig of the walnut tree, Juglans regia, is kept i a room, as a means of dispelling flies. The sam author mentions that bitter almonds are poisor ous to wild beasts; and when writing on th *Conyza anthelmintica*, (Vernonica anthelmintic *Serratula anthelmintica*) he adds that when flea

bane is roasted, flies take to flight, and when sprinkled on the floor, fleas disappear.—*Honigberger, p.* 261. &c. Dr. Hooker mentions that Clerodendron leaves, bruised, are used to kill vermin, flyblows &c. in cattle.—*Hooker Him. Jour. Vol.* I, *p.* 387. The Inula Pulicaria, or *Flea-bane*, a common road side plant in Britain, strewed or burned in any place, destroys *gnats* and *fleas*: and the same properties are attributed to the common Ox-eye daisy of England, *Chrysanthemum leucanthemum*. A powder, the *Poudre mismaque*, is sold in Paris, in boxes at from two to twenty francs, warranted effectual for destroying immediately, bugs, fleas, ants, lice, black beetles, caterpillars and all insects. "Camomille rouge" the beautiful red Pyrethrum (P. carneum, formerly chrysanthemum coccineum), in England a pretty garden, ornamental flower, is a dread enemy to the Caucasian, Persian, Koordish and Russian fleas. It is prepared from the flower heads of the plant which, when dried and crushed, form the famous Persian flea powder. When used by being sprinkled in beds &c. it kills all disagreeable and hurtful insects, and a small quantity of the spirit distilled from it, destroys insects in green houses, or can be applied to vegetable life in the open air against green fly, house fly &c. without injuring the plants. A half tea-spoonful of the powder sprinkled between the sheets will effectually dispel all fleas, bugs and lice, gnats and musquitos, and it is said also to destroy maggots which breed in wounds, a property which the valuable *Decamulle* gum of India, the gum of the Gardenia lucida, also possesses. More than twenty villages in the district of Alexandropol are occupied in the cultivation of the red chamomile, and thirty-five tons of this flea powder are manufactured annually for Russian use, in Trans-Caucasia alone, being equal to about 40,000 kilos of powder from 80 millions of pounds weight of fresh flowers. The red Pyrethrum is now largely cultivated in various circles and governments of Southern Russia. The flower heads lose vastly in weight by drying, and to get one pound of dried flowers, 1000 lbs of the fresh are required. It begins to flower in June and lasts more than a month. The flowers are plucked in dry weather, and a good collector will pluck 30 to 80 lbs. daily. They should be dried in the shade and care taken to stir them frequently. The Pyrethrum powder, seems the same as the well known Pire-oti of Koordistan, is largely imported into Turkey and was lately greatly used in the barracks and hospitals of Turkey and the Crimea, by the English and French officers: it accomplishes very effectually the destruction of fleas &c. Mr. H. H. Calvert, at first, considered the plant might be a Pulicaria, a Matricaria or Anthemis; but, that the Pire-oti is the powder of the half ripe flower heads of Pyrethrum carneum, there now seems no doubt. The Pyrethrum carneum, does not grow in India, but its introduction merits favorable consideration. The property it possesses, of dispersing the vermin which infest beds and bed rooms, probably depends on the pungent oil it contains; but until its introduction into India, attention might be directed to other species of pyrethrum and to the allied genus of chrysanthemum, or christmas flower, as likely to contain an oil with properties similar to the flea-bane. The red Mr. Mason mentions two species of pyrethrum, P. indicum, and P. sinense, as growing in the Tenasserim Provinces. The odour of the common fever few, of Britain, P. parthenium, is peculiarly disagreeable to bees, and these insects may be easily kept at a distance by a person carrying a handful of the flower heads: perhaps, also, the "*akarakarum*" of India, the Pyrethrum officinale or common pellitory, may have equal power. Allusion has been made to the well known Chrysanthemum, or Christmas flower, as likely to possess an oil of similar character, and perhaps possessing similar properties to that of pyrethrum. One species, the C. Indicum, the common Gool Dawadee, and of which there are several varieties, grows all over India, and is at any rate worth a trial, as indeed is every other unexpensive suggestion, which holds out a promise of increasing the comforts of the sleeping room. It is the habit of the Natives of India, to suspend in their houses a few branches of the milk hedge (Euphorbia tirucalli), to destroy fleas. They likewise make pastilles containing sulphate of copper, "Neela toota," *Hind.* which when burned destroy bugs, musquitoes and fleas, using three or four in a day. The sherifah or custard apple seed, disperses vermin. Flies are reported never to settle on the tree or its fruit, though ants will attack both. Bugs have a great antipathy to the leaves of the custard apple, and instantly quit a bed in which they are placed, and Dr. Irvine mentions that *Balai*, the roots of Ocymum pilosum have the same effect. The leaves of the American species of the sweet flag are said to be noxious to insects and to be never eaten by cattle. Sweet-flag, ENG.; Vaesamboo, TAM.; Vudya, TEL.; Vyamboo or Vashampoo, MAL.; Shwet-Buch, BENG.; Buch, DUK. The Gum Anime, is a protection against the attacks of insects; and colocynth is useful for protecting shawls and feathers against their inroads. Camphor-wood is valuable for the construction of chests and almirahs, as its powerful odour protects the contents from the ravages of white ants and other insects.—*O'Shaughnessy, page* 545. The leaves of the various Margosa trees, Melia and Azaderachta, dried and kept in books, are much used by the people of India to preserve them from the attacks of insects. To prevent injury to furs, feathers, books, papers and clothes that are lodged in trunks, book cases &c.; it is useful to place along with them small packets of camphor; or little cups of camphor dissolved in

alcohol; packets of the seeds of the small fennel flower, Nigella sativa, the "*kala jira*" of the bazars: pieces of the roots of the Aconitum ferox, the dreadful "*bish*;" "*Ati Singeea bish*," or bishnak of the bazars, may also be used, but its highly poisonous effects on animal life, require its use to be had recourse to with the greatest precautions. Insects are very destructive to books in India and the pastes or gums employed in the bindings, form special objects for the attacks of certain tribes: it may be useful to be known, therefore, that insects refuse to attack the gum of the cashewnut fruit, and that a little sulphate of copper or blue vitriol mixed with the rice or flour paste, used for joining papers, very effectually keeps these destructive pests at a distance. The leaves of the Justicia gandarussa, Lin.; Caar noochi, Tamul; Nalla Wawalee, Tel; Neela Nirghoondee, Sans., dried and powdered, are used as a preservative to keep insects from books. "Our boatmen, says Fortune, who heard us talking about the musquito, asked Sing-Hoo why he did not go and buy some musquito tobacco, which they said might be had in the village, and which would drive all the musqitoes out of the boat. I immediately despatched him to procure some of this invaluable substance. In a few minutes he returned with four long sticks in his hand, not unlike those commonly used for burning incense in the temples, only somewhat longer and coarser in appearance. He informed me they cost only two cash each—certainly cheap enough if they answered the purpose. Various substances are employed by the Chinese to drive away musquitoes. This which we had just purchased was made with the sawings of resinous woods—I believe procured from juniper-trees—and mixed with some combustible matter to make it burn. A piece of split bamboo, three or four feet in length, is then covered all over with this substance. When finished it is as thick as a rattan or a small cane. The upper end of the bamboo has a slit in it for hooking on to any nail in the wall, or to the roof of a boat. When once lighted, it goes on burning upwards until within six inches of the hook, beyond which there is no combustible matter, and it then dies out. A somewhat fragrant smell is given out during combustion, which, at a distance, is not disagreeable. Sometimes the sawdust is put up in coils of paper, and is then burned on the floors of the houses. Various species of wormwood are likewise employed for the same purpose. The stems and leaves of these plants are twisted and dried, and probably dipped in some preparation to make them burn. The musquito has a mortal aversion to all these substances and wherever they are burning, there the little tormentors will not come. I procured the sticks in question, and burnt them daily, after this; and although the insects were often swarming when I entered the boat or an inn, the moment *their* "tobacco" was lighted they quickly disappeared, and left me to sit at my ease, or to enjoy a refreshing sleep. Whoever discovered this precious tobacco was a benefactor to his country, and should have been honored with the blue button and peacock's feather at the least. But I suppose, like all other Chinese discoveries, it is so old that the name of its original discoverer cannot now be traced.—*Fortune's Tea Districts, page* 180.

(590) BANGLES.

Bangreean, Hind | Wallacel, Tam. | Gazloo, Tel.

This is the name given to the wrist and ankle rings so generally worn by orientals. The Chinese make them of a clouded or plain vitreous substance to imitate jade stone or chalcedony. They are packed in boxes containing a thousand pairs, each box estimated to weigh a pecul.—*Morrison, page* 171. Bangles are imported into and also exported from Madras. In the last four years, the imports were to the value of Rs 1147, chiefly from Bombay. The exports were in number 19,53,000, of the value of Rs. 3,078 and to Bombay and Sinde. The following is the tariff valuation of Bangles, in Bombay:—

Country Glass Bangles	Rs.	150	per Cwt.
Broken do. do. do.		3½	do.
China gilt, glass do. do.		8	per 100 pairs.
Do. not do. do. do.		4	do.
Lac Bangles..... .. do.		5	per 1000.

(591) BANGRA. The name of a cloth fabricated from the gigantic stinging nettle of the Nipal and Sikkim Hills. The fibres of which are mentioned by Dr. Campbell and applied for this purpose. The preparation is the same as the "Pooah," but the Bangra is harder and stiffer than Pooah, and not adapted to making cordage and nets.—*Royle.*

(592) BANOPHSHA. The "Banophsha" of the Eastern bazars is the dried plant of the Viola odorata. The infusion is a good nauseant and diaphoretic.—*Beng. Phar. page* 305.

(593) BANYAN TREE, Bar-ka-jhar, *Hind.* See Ficus Indica. Some of these trees cover an immense space. In the Botanical Gardens at Calcutta, the great Banyan tree, which is still the pride and ornament of the garden, Dr. Falconer ascertained satisfactorily to be only seventy-five years old. Annual rings, size, &c. afford no evidence in such a case, but people were alive a few years ago who remembered well its site being occupied, in 1782, by a kujoor (Date-palm), out of whose crown the Banyan sprouted, and beneath which a Fakir sat. It is a remarkable fact that the banyan hardly ever vegetates on the ground; but its figs are eaten by birds, and the seeds deposited in the crowns of palms, where they grow, sending down roots that embrace and eventually kill the palm, which decays away. This tree is now eighty feet high, and throws an area, 300 feet in diameter, into a dark, cool shade. Had

this tree been growing in 1849 over the great palm-stove at Kew, only thirty feet of each end of that vast structure would have been uncovered: its increase was proceeding so rapidly, that by this time it could probably cover the whole. Larger banyans are common in India; but few are so symmetrical in shape and height. As the Banyan tree gets old, it breaks up into separate masses, the original trunk decaying, and the props becoming separate trunks of the different portions. —*Hooker Him. Jour. Vol.* II. *p.* 246.

(594) BAPCHI. Seed of a small bush found near Ajmeer; is very mucilaginous, cooling and demulcent: is taken in sherbet.—*Gen. Med. Top. of Ajmere, page* 128.

(595) BAQUAIS OR VACOA. The general name given in the Mauritius to a species of Pandanus, the screw pines. One of these appears to be the P. sativus of Du Petit Thouars, but, according to Mr. Henley, is P. Vacoa. It is described as growing to the height of 30 feet, when left unpruned. The leaves are cut every second year, beginning when the plant is three years old, and each plant yields enough for two large bags. The preparation of the fibre must begin with the leaves, immediately they are removed from the trees. This consists first, in splitting the leaves into fillets which are from three fourths to one inch broad at the base, but taper to a point, and are from three to four feet in length. One of them will support the weight of a bag of sugar, or about 140 lbs. without breaking. Mr. Henley states that the leaves of the other species with which he is acquainted, are comparatively weak. Dr. Roxburgh (Fl. Ind. c. iii. p. 741) has described the purpose to which the species most common in the Mauritius is applied, and having observed the valuable uses to which the plant was put to there, he recommended its introduction into India, in some of the dry southern parts of which, it would, no doubt, though slow of growth, be a valuable acquisition, from the facility with which good sacking may be manufactured from its leaves. This has never yet been effected. The plant is remarkable for the aerial leafless roots which it sends down to support its stem, and which are of so fibrous a nature as to be employed for making paint brushes for common purposes.—*Fib. Pl. Royle, p.* 36.

(596) BARASAMA. The leaves of various species are known in the Calcutta bazar as Buchu, and may be used in infusion and decoction for Uva Ursi. The infusion and decoction is a useful astringent bitter, having a special tendency to remedy purulent and mucous discharges from the kidneys and bladder; dose one to four ounces, repeated according to the effect.—*Beng. Phar. p.* 281—298. A tincture of Buchu, is an astringent diuretic, valuable in chronic diseases of the urinary organs in dose from one to two fluid drachms.—*Beng. Phar. page* 422.

(597) BARB, the name of a noble breed of horses reared by the Moors of Barbary and Morocco, and introduced into Spain during their dominion in that country, where however it has been suffered to degenerate greatly since their expulsion. The noble race of Barbary horses commonly called Barbs are of rare occurrence even in their own country, where the tyranny of the governors holds out no inducement to private individuals to rear an animal, of which they may be deprived without scruple or compensation, by the first man in power who happens to fancy it. It is only among the wild nomadic tribes of the desert, whose roving habits and inhospitable country place them beyond the control of the ordinary powers of the state, that this breed exists in perfection. The common horse of Barbary is a very inferior animal, which, if originally derived from the same source as the noble race of Barbs, has greatly degenerated. In the beauty and symmetry of their forms, however, even the latter are far from excelling: their valuable qualities, and in these they are perhaps unequalled by any other breed in existence, are, unrivalled speed, surprising bottom, abstinence, patience and endurance under fatigue, and gentleness of temper.—*Eng. Cyc. p.* 383.

(598) BARBIROUSSA, or Horned Hog of travellers. This wild hog inhabits the woods of Java, Celebes, and others of the larger Sunda Isles. Its upper tusks are of great length, and curved form, and grow upwards and backwards like the horns of the *Ruminantia*. It is probably the *Sus tetraceros* of Elian.—*Eng. Cyc. page* 359.

(599) BARILLA.

Kali, ARAB.	Barriglia, IT.
Soda, DUT.	Solda Barilha PORT.
Soude, FR.	Socianka, RUS.
Soda Barilla. GER.	Barilla, SP.
Sajeekhar, GUZ HIND.	Applicarum, TAM.

An impure carbonate of soda, obtained by lixivating the ashes of sea weeds. The best quality is of a blueish gray colour, and the commoner kinds of a colour approaching to black. It is used in the manufacture of soap, glass, and in bleaching, &c. Localities, Spain, Sicily, Canary Islands, and Persia. It is brought to Bombay from the Persian Gulf, and is known in the bazars by the name of *Sajeekhar.*—*Faulkner.* Barilla; Kelp; Salsola Soda and Natron are all Carbonates of Soda. Two species of Salicornia and one of Salsola, are extremely abundant on the Coromandel Coast, and Dr. Roxburgh was of opinion that they might be made to yield Barilla sufficient to make soap and glass for the whole world. At the Madras Exhibition of 1855, Captain Blagrave contributed a specimen of Barilla, or crude subcarbonate of Soda, prepared from the ashes of "Salicornia Indica," and the jury remarked that this is a source, from which large quantities of alkali might be procured, as these saline plants grow abundantly in the salt marshes and back

waters of this presidency. But it is doubtful, whether even taking into consideration the cheapness of labour, the manufacture could come into competition with the more economical processes for procuring this substance from dhobee's earth (native carbonate of soda), or from sea salt. The genus Mesembryanthemum is rich in alkaline carbonates, and usually frequents the Sea Shore. Dr. Helenus Scott received the Gold Medal of the Society of Arts, for sending from Bombay the mineral alkali.—*Prod. Res. Royle, p.* 75-76. Mineral Soda or Saji Matti of Bengal, the Applicarum of the Tamul people, occurs in immense quantities in many parts of Bengal, especially in the districts of Monghyr, Purnea, and Cawnpore. It contains from 40 to 50 per cent of carbonate of Soda, with organic matters, clay, sand, and oxide of Iron. The salts can be extracted by washing the mineral without incineration, but the organic matter is dissolved at the same time and gives a deep brown solution from which pure crystals cannot be obtained. The firing destroys this substance, and then the solution is colourless, but care must be taken not to push the heat beyond low redness, for the alkali, at a higher temperature combines with the sand and clay, and the whole runs into a green glass, insoluble in water. The earth of a large tract of unproductive land in the Puttoocottah and Trevandy Talooks of Tanjore is greatly impregnated with impure carbonate of Soda, and a small export trade goes on of Dhobie's earth. In the years 1826 to 1830, the late Mr. Hart and Dr. McLeod commenced working it on the large scale, and about 1000 tons of barilla containing 25 per cent of pure alkali, and equal to the best Spanish, was the estimated produce.—*Scientific Records of the Madras Government.* In Europe, this salt is prepared either by burning sea weeds and lixiviating the ashes, the product being termed kelp and barilla, or by decomposing common salt by sulphuric acid and then roasting the resulting sulphate with chalk, sawdust, and fragments of iron. The mass when washed gives the carbonate of Soda.—*O'Shaughnessy.* The celebrated Natron lake of Loonar, produces six principal varieties of Salt, to which the natives give the following names. 1. Dulla—2. Numuck Dulla—3. Kupphul—4. Pappree—5. Rhooskee, and 6. Mahd Khar. Dulla and Numuck Dulla are used for dying silks, fixing colors,—also as medicine, and in the manufacture of bangles;—of Khuppul, there are two kinds, one of greater value than the other;—this salt is used in fixing the red dyes of cloth. Puppree is used in the manufacture of bangles, of which there are two manufactories near the lake. When these are in full operation, bangles are manufactured in large quantities, each man being able to manufacture from 6 to 700 daily. The eyesight of these men fail soon, owing to the entire want of protection from the glare of the glass furnaces. Some are employed, also, in the baking of a cake called papur, and by the native hukeems as an antacid in dyspepsia. There is also an inferior description of Puppree. Bhooskee is a white saline salt, left as a deposit on the margins of the lake, and is principally used in the manufacture of soap. Madhkar, is an inferior kind of Bhooskee, used by Dhobies in bleaching clothes. The purest salt is found close to the saline springs, and the other salts, in their order, as entered above, are found on receding from that point towards the margin of the lake. —*Dr. Smith.*

(600) BARJURI. Bark of the root of a climber found in Rajwarra, is tasteless, one fourth of a tola is a dose, is given to women after childbirth, in "luddoo," said to augment the secretion of milk, to relieve the after pains, and to strengthen.—*Gen. Med. Top. p.* 127.

(601) BARK.

Putta, Tam. | Kusher, Arab.
Putta, Tel. | Chal, Guz. Hind.

The outer rind or covering of trees. Bark, in Vegetable Physiology, is the external coating of the stem and branches of plants, ensheathing the wood. In woody *Exogens* it separates spontaneously from the wood in spring and summer, and in herbaceous plants of the same class it may be easily removed with a little care; but in *Endogens* and *Acrogens* it is so continuous with the central part of the stem that it can never be divided except by violence, and by lacerating the tissue which lies immediately below it. This difference arises from the manner in which the plants of these three great natural classes respectively grow. Exogens add annually new matter to the inside of their bark and the outside of their wood, which renders it necessary that a spontaneous separation of wood and bark should take place in order to make room for the newly-generated substance; but Endogens, which grow by addition to their centre, and Acrogens, by elongation of their point, require no such separation.—*Eng. Cyc. page* 389. The outer rind of plants, just described, in some cases yields an astringent principle called tannin, highly useful in medicine and the arts. The most important kinds of bark in a commercial point of view, are, undoubtedly, Oak bark, Peruvian bark, and the barks of some of the Acacias. Oak bark is powerfully astringent, 3½ lbs of it being equal to 2¼ lbs of galls: to 3 lbs of sumach: to 7½ lbs of the Leicester willow: to 11 lbs of the bark of the Spanish chestnut: to 18 lbs of Elm bark: and to 21 lbs of common willow bark. The importance of Oak bark has however been greatly diminished since the introduction of the Sumachs as *Rhus cotinus*, the Venus sumach, and *R. coriaria*, the hide or *elm leaved sumach*: also of the *Divi-divi*, or *Cæsalpinia coriaria*: of *Valonia*, the acorn cups of *Quercus Ægilops*, of Catechu and Gambir, from the Acacia cate-

chu and Uncaria Gambir: of the Indian Myrobolans, the Mimosa or wattle bark of Australia, the cork tree bark of Spain and willow bark. Next in importance to Oak bark, is the Peruvian or Jesuit's bark, of which three principal kinds are known in commerce, the pale, red and yellow. The pale bark is the produce of *Cinchonia longifolia* and is the original Cinchonia of Peru. It is received in chests covered with skins, each containing 200 lbs., consisting of pieces 8 or 10 inches long, and singly or doubly quilled or rolled inwards. It is of a pale fawn or cinnamon colour, and has very little odour when dry, but the decoction is agreeably aromatic. The taste is a fine bitter, but austere. The second, or red bark, is obtained from *Cinchonia oblongifolia*, grows in the Andes, and is received in chests weighing from 100 to 150 lbs. each. This kind is mostly in flat pieces of various sizes, with occasionally some that are quilled, the internal bark being woody and of a rust red colour. Red bark has a weak peculiar odour, and a less bitter, but more nauceous taste than the other barks. The third, a yellow bark, is the produce of *Cinchonia cordifolia*, of Santa Fe and Quito, and is packed in chests containing 90 to 100 lbs. each, in pieces from 8 to 10 inches long, some quilled, but the greater part flat. The interior is yellow, approaching orange colour. It has nearly the same odour in decoction, as the pale, and has a more bitter and less austere taste. The Peruvian bark trees are said to have been naturalized in India; The Reverend Mr. Livingstone, in his travels, discovered great forests of them in South Africa. —*Tomlinson.*

(602) BARLERIA, a genus of plants belonging to the natural order *Acanthaceæ*, and characterised by the spiny processes of its bracts, the large size of the upper and lower sepals, and its funnel-shaped corolla, which is often so twisted that the upper segment becomes lowest. The species are natives of various parts of the East Indies. A few of them have been introduced into English gardens, of which *Barleria lupulina*, with its large bracts resembling hops, and *B. prionitis*, a common swamp-plant in Java, are the most remarkable. In Europe, however, they all require to be cultivated in a hot-house, and are propagated readily by cuttings.—*Eng. Cyc. page* 391. In addition to those noticed below, Wight, in his Icones, gives figures of *Barleria Courtallica; Cuspidata; Hochstetteri, longiflora and nitida.*

(603) BARLERIA BUXIFOLIA, Cara-schulli, Rheede. A native of Malabar and Mysore; it blossoms during the hot season.—*Roxb.*

(604) BARLERIA CÆRULEA,

Dasee, Beng.

This is a flowering shrub, cultivated for the sake of its numerous large and beautiful light blue flowers. It is a native of the moist, shady valleys amongst the mountains of the Northern Circars, and also of Bengal.—*Roxb.*

(605) BARLERIA, CILIATA Roxburgh. Grows in the northern parts of Bengal.

(606) BARLERIA CRISTATA, is a large very ramous shrub, found in gardens about Calcutta and wild in the forests of Sylhet.—*Roxb.*

(607) BARLERIA DICHOTOMA. Roxb.

Sada Jatee, Beng.

(608) BARLERIA PRIONITES.

Kooruntuka, Sans.	Mooloo govinda, Tel.
Kanta-jatee, Beng.	

This is one of the most common and at the same time most elegant of the small shrubby plants of India. It is in flower all the year round and every soil and situation seems to suit it equally well.—*Roxb.*

(609) BARLERIA PURPUREA. A shrubby spreading plant, with opposite, sub-rotund nearly sessile leaves; spines in axillary pairs longer than the leaves; flowers solitary, large, of a beautiful pink colour.

(610) BARLEY.

Shair, Dhourra, Arab.	Gerstengraupen, Ger	Orzo, It.
Ryg, Dut.	Jow, Guz. Hind.	Hordeum, Lat.
Orge, Fr.	Pers.	Fatschmea, Rus.
		Cebada, Sp.

This grain is cultivated in most parts of Europe, Asia, and Africa. Barley is sometimes brought to Bombay from the Persian Gulf, and also from Candahar, &c. via Kurrachee. It is grown on the Neilgherry hills, and is to be had in the Dekhan.—*Faulkner.* There are several distinct species of Barley, but the Hordeum distichon, or two-eared barley, is that commonly cultivated in England. As met with in commerce, the seeds or grains are usually enclosed in the Palæ or husks: denuded of these they form "Scotch or pot barley;" when rounded they constitute "pearl barley," and this again reduced to powder is called "patent barley."—*Hassall.* "This last grain," says Crawfurd, speaking of the Malay Peninsula barley, (*Hordeum hexastichon,*) "is not known to the natives, and when we pointed it out, they imagined it to be unripe grains of wheat." Notwithstanding this testimony, the Burmese have a name for barley which frequently occurs in their books. It constitutes one of their seven kinds of *saba* or cereal grasses, and its corresponding Pali name is identical with the Sanscrit name of barley.—*Mason.* Barley is one of the cheapest of the grains found in the Bazars of Kaira in Guzerat.—*Spry's Suggest. page* 41.

(611) BAROMETER, from two Greek words meaning measure of weight, is one of the most wonderful instruments ever contrived for assisting the philosopher in searching out the laws of the wonderful ocean of air in which we live. There are several kinds in use, the *common Barometer*, the lower priced articles of which, are generally so inaccurate as to be useless: the *Water Barometer*, 40 feet long invented by Professor Daniell,

which is extremely sensitive of the fluctuations in the height of the air; and the *Aneroid Barometer*, invented by M. Vidi of Paris, the action of which depends on the effect produced by the pressure of the atmosphere on a metallic box from which the air has been exhausted and then hermetically sealed.—*Toml.* The following table shews the mean altitude of the Barometer at some remarkable places and elevations in India.

Places.	Feet in height above the sea level.	Barometer mean.
Level of the sea, ...	000,00	30 00
Calcutta, (*Chandpal ghat*,).....	15	29 893
Titalya, ...	275	29·570
Benares, ...	300	29·464
Saharunpore, ...	1013	28 766
Seringapatam, ...	2412	27·568
Chira Punji,.	5000	24·900
Nepal Residency,.	4400	25·330
	5000	24·797
Darjeeling, ...	6957	23·408
Ootacamund, Nilgiris,	7221	23·054
	10,000	20·499
2 miles, ...	.....	20 290
	15,000	16 941
3 miles, ...	.....	16 680
	20,000	14 000
4 miles, ...	.....	13 720
5 ditto, ...	.....	11 280
10 ditto, ...	.....	4·240
15 ditto, ...	.....	1·600
20 ditto, ...	.....	0·950

O'Shaughnessy, page 18.

(612) BARRINGTONIA, WHITE FLOWERED. There is a species of Barringtonia in the Tavoy and Mergui jungles with drooping spikes of white flowers three or four feet long; and which would be much admired if introduced into the cities. The leaves are very large and lyre-shaped, and both flowers and foliage would contrast well with the other trees around it. The species is not described in any of the books to which Mr. Mason could refer.—*Mason.*

(613) BARRINGTONIA ACUTANGULA. *Myrtaneæ.*

Sumundur phal, also Hijjul, HIND. | Radami, TAM. Kyai-tha, BURM.

A large tree, flowers in pendulous racemes of a dark scarlet colour, fragrant; fruit oblong, four sided sharp angles. *Barringtonia acutangula* is most plentiful in the Tharawaddy district. The wood is hard and of fine grain, red, and equivalent to mahogany. It is used in constructing carts.—*McClelland.* It is also a native of Chittagong, and is found in a clump of trees at Saharunpore, near Mr. Grindall's house, (*Royle*, p. 216.)—*O'Shaughnessy, page* 337. In the Tenasserim Provinces, this tree, which Mr. Mason calls the scarlet flowered Barringtonia, bears long pendulous bunches of scarlet flowers, and is very abundant in the forests, to which it is a great ornament.—*Mason.*

(614) BARRINGTONIA RACEMOSA. This stout timber tree is a native of the Moluccas, the delta of the Ganges and Malabar. Its root is slightly bitter, and considered by the Hindus to be aperient, cooling, and febrifuge.

(615) BARRINGTONIA SPECIOSA.

Kyai-gyee, BURM.

This large and beautiful tree is a native of Pegu, the Tenasserim Provinces, the Malay Archipelago, and the South Sea Islands. It is very plentiful in Pegu. Its wood is red, hard, of a fine grain, and equivalent to mahogany. It is used in the construction of carts.—*Roxb. McClelland.* The fruit is mentioned by Ainslie as being used in Java for intoxicating fish.—*O'Shaughnessy, page* 337.

(616) BARTAM, Eugeissonia tristis, Griff. A palm growing on the hills about Ching, Malacca and Penang. The leaves are used in Penang in making mats for the sides of houses, also for thatch, and for all the purposes to which those of the Nipa fruticans are applied.

(617) BARTONIA AUREA. *Loasaceæ.*—A beautiful species, for garden culture, the flowers of a yellow and white colour, opening at night effusing a sweet odour; they should be planted close together, so that the ground may be covered with its leaves.—*Riddell.*

(618) BARTUNG. Seed of a bush, brought from Delhi considered cooling, and astringent, used in sherbets, in diarrhœa.—*Gen. Med. Top. page* 126.

(619) BARU, *Malay*; Kawal, *Javanese*: is a gossamer-like substance, found at the base of the petioles of the Gomuti palm, the Arenga saccharifera. It is imported into China where it is applied like oakum, for caulking, and also for tinder.

(620) BARUNG SADAB. Leaves of a plant from Delhi; heating and as such used in medicine to cure flatulency and dyspepsia; sells at two rupees for one seer.—*Gen. Med. Top. of Ajmere, page* 129.

(621) BARYTES OR BARYTA, the *Oxide of Barium.* This is found in the earth in combination with acids, principally the sulphuric and carbonic. Native *Sulphate of Barytes*, known by the name of *Heavy Spar*, also *Hepatite* and *Bologna Spar* is found near Kurnool and other parts of India. It presents itself in various forms as crystalline, fibrous, saccharoid, compact, and earthy. The crystals are usually tabular, in modified rhombic and rectangular prisms. Its degree of hardness is from 3 to 3·8, and the specific gravity from 4·3 to 4·7. Some varieties are fetid when rubbed. It is composed of sulphuric acid 34, and barytes 66. It decrepitates before the blowpipe, and fuses with difficulty. It is distinguished by its heavy specific gravity from *Celestine* and *Arragonite*, and from the various carbonates by not effervescing with acids. *Heavy Spar* is often associated with the ores of other metals. *Eng. Cyc. page* 392. This substance

is much used in the arts. It is ground up and used as white paint, and also for adulterating white lead. Mixed with equal parts of white lead, it is sometimes called *Venice White*; and another variety, with twice its weight of of barytes, is called *Hamburgh White* ; and another, with one-third white lead, is called *Dutch White*. The barytes in these mixtures seems to prevent the white lead from being tarnished by sulphuretted hydrogen,and they are therefore prepared for some kinds of painting. The variety called *Bologna Spar* is highly phosphorescent after calcination. *Allomorphite* is a synonym of *Heavy Spar*. Cawk is a massive variety. *Dreelite* is a sulphate of barytes and lime.—*Eng. Cyc. p.* 392. Sulphate of Barytes occurs in quantity in Kurnool.

(622) BASALT, a hard dark-coloured rock of igneous origin. The chemical composition is variable, as appears from different analyses, two of which, by Beudant and Phillips, are as follows :—

	24 Beudant. Beaulieu.	Phillips. Saxony.	Difference.
Silica, ...	59·5	44·50	15·00
Alumina, ...	11·5	16·75	5·25
Lime, ...	1·3	9·50	8·20
Magnesia,... ...	0·0	2·25	2·25
Soda, ...	5·9	2·60	8·30
Potash, ...	1·6	0·00	1·60
Oxide of Iron, ...	20·2	20·00	0·20
Oxide of Manganese,	0·0	0·12	0·12

Basalt is a rock of very extensive occurrence on the surface of the earth, and is very frequently detected in the vicinity of volcanoes, both extinct and active. The greatest mass of volcanic rocks yet observed is that noticed by Colonel Sykes in the Dekhan, constituting the surface of many thousand square miles of that part of India. This immense mass consists of greenstone and amygdaloid, and is either massive, prismatic, or globular, occurs in horizontal beds, and is traversed by dykes which sometimes cross each other. Except the hollow of the Loonar Lake there is no trace of any crater in this volcanic region ; and indeed this is the case with numerous other volcanic districts, whence it has been inferred that such tabular masses have not been ejected from a conical vent similar to those of volcanoes, but that the fluid of which they are formed rose through cracks and fissures while in a highly liquid state, spreading out in sheets of melted matter over the adjacent rocks. As Basalt is frequently columnar, it is a rock which has excited much popular attention, and travellers have been sometimes induced to describe rocks as basaltic merely because they were columnar, which however is a character that this rock possesses in common with many others of igneous origin. When Basalt occurs in horizontal tabular masses, and is columnar, the columns are generally perpendicular. When basalt forms the substance of a perpendicular dyke, cutting through other rocks, and is columnar, the columns are usually horizontal. Basaltic columns are sometimes also curved, and of this mode of occurrence there is a beautiful example in the island of Staffa.—*Eng. Cyc. page* 393.

(623) BASELLA ALBA. Malabar night-shade or White Basil, or Indian Tea. Eng.

Badroojee Abbeez, ARAB.
Suffeid Toolsie, DUK. GUZ. HIND.
Viswa-tulasi, SANS.
Cunja koray, TAM.
Kooka tolasie, TEL.
Butsalla-hura, TEL.
Alla-batsala, TEL.
Poi, also Bun-Poi, BENG.

The natives of the Coromandel Coast reckon five varieties of this, three of which are cultivated and two wild ; the Yerra or Poha-batsalla, the Mattoo batsalla, and the Pedda batsalla. But Roxburgh was inclined to regard them all as varieties of one species and to think B. Japanica of Burmann, another.—*Roxb.* This is a twining plant, with succulent stems and leaves, which the natives of India and Burmese cultivate for spinage ; and it is said to be not inferior to the common English spinage, which belongs to the same natural family.—*Mason.* The leaves of the white basil, have a pleasant aromatic taste, and an agreeable smell. An infusion of them is used as tea by both Europeans and natives in India. The juice of the leaves is prescribed by native practitioners in doses of a tea-spoonful thrice a day, to a child suffering from catarrh.—*Faulkner.*

(624) BASELLA RUBRA. POOTIKA, *Tam.* MALABAR NIGHTSHADE.—Perhaps a variety of B. alba A succulent plant of the same genus, only with red leaves, and is used as the former ; grows in any garden soil from seed, but requires sticks for it to climb upon.—*Jaffrey.*

(625) BASIL. Ocymum Basilicum and minimum. Herbs used in salads, and soups, raised from seed, require little care in the culture : almost weeds in Madras.—*Jaffrey.*

(626) BASILISK, a genus of Saurian reptiles, belonging to the Iguanian Family, and comprises only two species. One of these, the crested basilisk, the *Basaliscus Amboiensis* (Daudin), is an inhabitant of Amboyna and the Islands of the Indian Archipelago. It is upwards of 3 feet long, of a green colour, marked with white lines on the head and neck, brown on the back and tail, and silvery white on the belly, irregularly dotted with numerous white points. It keeps in the vicinity of rivers and fresh-water ponds, where it loves to bask on the branches of the trees which overhang the stream. On the first appearance of danger it drops into the water, and conceals itself beneath some rock or stone, whence it may be taken with the naked hand or a noose, for it is a timid animal. It is caught for the sake of its flesh, which is white and as tender as chicken, and in taste is said to resemble venison. The female deposits her eggs in the sand, and leaves them to be hatched by the sun, paying no attention afterwards to her young progeny.—*Eng. Cyc.*

(627) BASKETS.

Corbeilles, Fr.	Kumpa, Tel.
Korbe, Ger.	Koota, Maleal.
Tokra, Guz. Hind.	Canastas, Port.
Paniere, It.	Korsinu, Rus.
Kooray, Tam.	Canastas, Canastos. Sp.

Well known articles of various shapes and sizes, made of willows, twigs, rushes, splinters of bamboos, canes, &c. according as these are most abundant in the various countries of the world. Country bamboo baskets, in the tariff of Bombay, are valued at Rs 4 per hundred. Baskets in India, are generally made of bamboo, of palm leaves or of rattans or canes; basket making is a coarse kind of weaving, and in India is an art pursued by Hindoo races of the mixed castes, but the facility with which a knowledge of it can be acquired renders it a favorite employment for the blind. —*Tomlinson. Faulkner.*

(628) BASSIA, a genus of plants belonging to the natural order *Sapotaceæ*. It has a calyx of four or five leaves, a monopetalous fleshy corolla, with its border generally 8-parted, and a great number of stamens. The ovary terminates in a long taper style, and contains from six to eight 1-seeded cells. The fruit has a pulpy rind, with not more than three or four cells, the remainder, being abortive. The species are found in the East Indies and in Africa, where they are of great economical importance on account of the abundance of a sweet buttery substance which is yielded by their seeds when boiled.—*Eng. Cyc. p.* 396.

(629) BASSIA BUTYRACEA.

Indian Butter Tree, Eng.	Yel-pote, Lepcha.
Fulwa or Phulwara, Hind.	

The Indian Butter-Tree is found wild in Nepal and Sikkim and on the Almora hills in India, where it grows to a considerable size, its trunk sometimes measuring 50 feet in height, and 5 or 6 feet in circumference. It has broad, oval, long-stalked leaves, from 6 to 12 inches long, smooth on their upper surface, hairy on their under. The flowers, which appear in January, are large and pale-yellow, hang down near the tips of the branches, from the axils of the leaves, and generally grow three together. They are succeeded by smooth pulpy fruits, about as large as a pigeon's egg usually containing two or three roundish light-brown seeds which ripen in August. From these is produced a fat-like substance, which is a kind of vegetable butter, concerning which we find the following information in the 'Asiatic Researches,' by Dr. Roxburgh: — "On opening the shell of the seed or nut, which is of a fine chestnut colour, smooth and brittle, the kernel appears of the size and shape of a blanched almond. The kernels are bruised on a smooth stone, to the consistency of cream, or of a fine pulpy matter, which is then put into a cloth bag, with a moderate weight laid on, and left to stand till the oil or fat is expressed, which becomes immediately of the consistency of hog's lard, is of a delicate white colour and is solid at 95°. Its uses are in medicine, being highly esteemed in rheumatism and contractions of the limbs. It is also much valued, and used by natives of rank as an unction, for which purpose it is generally mixed with an *utr* (aromatic oil) of some kind. Except the fruit, which is not much esteemed, no other part of the tree is used. After the oil has been expressed, the dregs are employed by the poor as food. This Phulwara Butter will keep many months in India without acquiring any bad colour, taste, or smell, and might no doubt be substituted advantageously for animal butter. The timber is of no value, being nearly as light as that of the semul, or Cotton-Tree (*Bombax heptaphyllum*)."—*Eng. Cyc. page* 396. *Hooker. O'Shaughnessy.*

(630) BASSIA LATIFOLIA. (Mowa tree, Roxburgh).

Ipei, Tam.	Epi, Tel.	Madooka, Sans.

Bassia latifolia, the Mahwa, Madhaca, or Madhooka, is a native of the mountainous parts of the Circars. It is very common in several parts of India and is deciduous in the cold season. The tree has oblong leaves, and a corolla, with a very protuberant tube. It is a native of the mountainous parts of the Northern Circars and of Bengal, where it forms a middling sized tree. Its wood is hard and strong, and proper for the naves of wheels; its flowers contain sugar; they are eaten raw by the natives and by jackals, and they yield by distillation a strong intoxicating spirit. From their seeds a considerable quantity of semi-solid greenish-yellow oil is obtained, which is found useful for the supply of lamps; it is, however, inferior to that of the Bassia butyracea. It is curious that this oil (Epi oil ఎప్ప నూనె, Epi nuna, Tel. இலுப்பை எண்ணை, Elloopoo yennai, Tam.) stains linen or woollen cloth as animal oil does, while the fatty substance of the Bassia *butyracea* possesses no such property, but when rubbed on cloth leaves no trace behind.—*Engl. Cyc. page* 397. On the apices of the flowers of this plant, before they open, there is frequently a drop of a whitish, soft, tasteless resin to be found.—*Roxb. Madras Ex. Juries Reports.*

(631) BASSIA LONGIFOLIA.

Yepa, Tel.	Yelloopai, also Ennay carray marum, Tam.
Mohe-ka jhar Hind.	

An Indian Oil-Tree. It is a large tree, a good deal like B. latifolia, but its leaves are narrower, and its flowers much more fleshy. It is a native of the peninsula of India, and is found in plantations along the southern coast of Coromandel. In the southern part of the Tenasserim Provinces also, a large timber tree is indigenous, from the seeds of which the natives express an oil which they eat with their food, and use for other purposes. It is a species of bassia, and does not differ sufficiently from the tree which produces the illiepie oil of Hindustan to constitute a new species. It may therefore be regarded, with Mr. Mason, as

the Bassia longifolia. In the southern part of the Tenasserim Provinces, this bassia is quite abundant in a few localities; and it is said to afford a timber in no way inferior to teak.—*Mason.* Mr. Rohde adds; This is, I believe, the Ippi of the Teloogoo country and is valued for keels of ships and for planking below the water line. Exposed to the wind and sun in the log, it rends into strips, it is considered a good wood for trenails, it is comparatively free from the attacks of the Teredo navalis, it is procurable among the logs brought down the Godavery. At Trichinopoly, the carpenters state that a hard straight grained, rather heavy wood sold as Shemonotti is a species of Ippi.—*Rohde.* In the Wynaad, it is known as Oodagoo marum, and is there an ordinary sized tree: its wood being much used on the Malabar side for building.—*McIvor. M. E.* The wood is as hard and durable as teak, so that this is one of the most generally useful trees found on the continent of India.—*Eng. Cyc. page* 397. In some parts of India, the flowers of this tree are roasted and eaten by the peasants, or bruised and boiled to a jelly, and made into small balls, which are sold or exchanged for fish, rice, and various sorts of small grain. Its fruit is yellowish, and yields by pressure a valuable oil, which is used by the poorer natives of India for their lamps, to make into soap, and instead of better oil, for cookery. Its semi-solid oil (ఎప్పనూనె, Eppa nuna TEL. இலுப்பு யெண்ணை, TAM. Elloopoo yennai; Mohay-ka-tael HIND.) in Southern India, is seldom sold in the bazar, but the seeds are collected, and the oil manufactured by the Natives for private consumption. The seeds contain about 30 per cent of oil of a bright yellow colour. 12½lbs of seed, in the ordinary native rude way of expressing, produce 2 English gallons of oil. The oil or its seed may form an important article of export as a putty oil. It is procurable in South Arcot at Rs. 25 per candy, or Rs. 1-4-0 per maund--in Bellary at 3 8 0, in Bhopaul at Rs. 31-2-0. In Tanjore, it may be had to the extent of 2,702 candies at the rate of 2-8-8 per maund. This oil makes excellent candles and soap. Its chief use is, however, for burning in lamps, and as a substitute for butter in native cookery. The very great difference in colour, consistence and flavour, observable in specimens of this oil, is entirely attributable to the mode of preparation, and to the presence in some cases of a very large proportion of mucilage and other extraneous matter. A bright colored specimen from Tanjore, on being treated with dilute sulphuric acid, proved remarkably pure, samples of the same oil from Rajamundry and Tinnevelly were equally good, but those from Nellore and Mysore deposited a large amount of mucilage.—*Madras Exhibition Jur. Report.* In medicine the oil is used externally to cure the "Itch" and other cutaneous disorders; and the leaves, milk of the green fruit, and bark, are boiled in water as a remedy in rheumatic ailments.

(632) BASSIA PARKII, is believed to be the Shea-tree, or African Butter-plant, which is a very important article of African internal commerce; and which it would apparently be extremely desirable to introduce into the West and East Indies as a new source of internal wealth. This is the plant which is frequently spoken of by Park, who, in his 'Travels in Africa,' found the people everywhere employed in collecting the fruit of the shea-trees, from which they prepare a vegetable butter. These trees grow in great abundance all over part of Bambarra. They are not planted by the natives, but are found growing naturally in the woods; and in clearing wood-land for cultivation, every tree is cut down but the shea. The tree itself very much resembles the American oak, and the fruit, from the kernel of which, first dried in the sun, the butter is prepared by boiling the kernel in water, has somewhat the appearance of a spanish olive. The kernel is enveloped in a sweet pulp, under a thin green rind; and the butter produced from it, besides the advantage of its keeping the whole year without salt, is whiter, firmer, and to Park's palate of a richer flavour than the best butter he ever tasted made of cow's milk. The growth and preparation of this commodity seem to be amongst the first objects of African industry in this and the neighbouring states, and it constitutes a main article of their inland commerce.—*Eng. Cyc. page* 397.

(633) BAST. The peculiar structure of Exogenous plants is well seen on making a transverse section of the stems or branches, thus exhibiting rings of wood and layers of bark: but, in the stems of annual exogens, we see, in the centre, a circle of white cellular tissue, called pith, and round it a layer of wood like matter, which, in some plants, is called *boon* or *shove.* This is surrounded by layers of cellular tissue, which, when examined longitudinally, form a tubular sheath, enclosing the other parts. It is in some plants composed of long and tough elongated cells or fibres, which are sometimes called Bast, and is covered externally by a delicate skin or cuticle. It is these Bast fibres which are separated from the flax and hemp plants and familiarly known by these names. If we proceed to examine the transverse section of the branch or tree of an exogenous plant, we see a number of rings, proportioned to its age. In the centre is the pith. This is usually small when compared with the bulk of the wood, and is surrounded by a longitudinal canal, called the medullary sheath, and which contains spiral vessels. Outside of this are the rings of wood formed of vessels and of wooden tissue, those near the centre, called the *heart-wood* are denser and more highly coloured than those which are more external. Of these, the youngest are known by the name of *sap-wood,*

and are those most recently formed, as, in these trees, all additions of wood form on the outside of the growth of previous years. On the outside of the layers of *wood*, we find the part called bark, this also being composed of a series of layers, the oldest of which are on the outside, and may in some trees be seen splitting and scaling off in a withered and dried state. The new layer of bark will however be found inside of all, and next to the young wood. The structure of this part can be best examined in the bark of a young shoot. It will be found to be composed of two layers of cells, which receive different names from botanists, having the delicate epidermis or cuticle on the outside : but in the inside of all, the layer consists of tough, elongated cells and vessels, and is called *liber* or *Bast*. This part is very conspicuous in the lime tree of Europe which by the stripping of its bark, yields the bast of which Russia mats are made. In the East Indies, species of Grewia, of Hibiscus, and of Mulberry, are remarkable for this product and will be found mentioned under their proper names, as also the Theng-ban-shaw ; the Pa-tha-you Shaw, the Shaw-phyoo : the Ngau-tsoung-shaw : Shau-nee and Ee-gw-ot-Shaw, of Arracan.—*Royle Fib. Pl. p.* 80. 129, 199, 236, and 237 ; Mr. Jaffrey at the Madras Exhibition of 1857, exhibited a very powerful new bast from the Eriodendron anfractuosum.—*Madras Ex. Jur. Report.*

(634) BASTARD CEDAR. Vide CEDRELA TOONA.

(635) BATATAS, the Malayan name of a Convolvulaceous plant, the root much eaten in the South of Europe before the cultivation of the potato, which both became a substitute for it, and appropriated its name. It has generally been considered a species of *convolvulus* ; but Professor Choisy, in his recent classification, has erected it and a few others into a peculiar genus, distinguished by having an ovary with four cells, in each of which there is only one seed.—*Eng. Cyc. page* 398.

(636) BATATAS EDULIS.

Vullee-kalungoo, TAM. | Nutr-allo, HIND.

This is the *Convolvulus Batatas* of authors : the sweet Potato is the only species of any general interest. This plant, originally found wild in the Malayan Archipelago, has been gradually dispersed over all the warmer parts of the world, where it is still an object of culture for the sake of its roots, which, when roasted or boiled, are mealy, sweet, and wholesome, but slightly laxative. It is a perennial plant, with long creeping stems, leaves variously lobed and angled, and pale purple flowers about an inch long. It is impatient of cold, and consequently unfit for cultivation in the northern parts of the world ; but it is a productive agricultural plant in many warm countries. It is partially cultivated in the south of Spain and of France, whence its roots are sent to the markets of Madrid and Paris, where they are held as a delicacy. They however have the great fault of keeping badly, being very apt to become mouldy and to decay, unless extraordinary pains are taken to preserve them dry. They are sometimes raised in the hothouses of the curious in England. There are two or three varieties cultivated in the Tenasserim Provinces and the potatoe like roots are used in various ways. It is very abundant, but is vastly inferior both in size and quality to the sweet potatoe of the Southern States of America.—*Mason.*

(637) BATATAS——? Four small roots were sent from Australia by Mr. Dowdeswell, and planted by Mr. Rohde at Guntoor, whence it has been already largely distributed. It has been in daily use as a vegetable for the last six months, and is preferred to the common sweet potato, as being less sweet and more farinaceous.—*Juries Reports.*

(638) BATATAS JALAPA has none of the properties of the plant after which it is named.—*Eng. Cyc. page* 398.

(639) BATATAS PANICULATA. (*Convolvulus paniculatus*, Roxb. Fl. Ind. i. 478.) East Indies generally. Bhoomi koomra, BENG. Root perennial, tuberous, young shoots round and smooth. The large tuberous root is cathartic.—*O'Shaughnessy page* 505. It has beautiful dark purple flowers.—*Riddell.*

(640) BATATAS PENTAPHYLLA.—Stems twining, very hairy, flowers to the rains, cream coloured.—*Riddell.*

(641) BATHS. Places constructed purposely for washing the body, with hot, cold or tepid water : a practice, the healthful effects of which has been recognized by all nations. It was one of the legislations of Moses, and many eastern nations exalt ablution and bathing into religious observances. The functions of the skin cannot be preserved in healthy activity, nor the changes of climate effectually guarded against without the frequent use of the bath. The warm, tepid, cold, or shower bath, as a means of preserving health, ought to be of as common use as a change of apparel. Baths in India are generally constructed of the staves of casks, but these are apt to grow mouldy. Perhaps the best material and easiest procured is wood, which has been soaked in linseed oil, or wood varnished with the coach builders varnish. On a large scale baths are economically heated by steam. The sickly, the aged, the weak, and the intemperate should avoid the use of the cold bath, which should seldom be used in the higher table lands of India, even by the strong.—*Tomk.*

(642) BAUHINIA, a genus of plants belonging to the natural order *Leguminosæ*. Linnæus applied the name very happily to commemorate the merits of the two Bauhins, for the genus is remarkable for its leaves being generally divided into two twin lobes. The species are usually

twining plants, found in the woods of hot countries, and often stretching from tree to tree like living cables, forming with other plants an almost insurmountable obstacle to the traveller who would penetrate the recesses of a tropical forest. Some of them, however, are small trees, as for example *Bauhinia porrnta*, which in Jamaica is called Mountain Ebony, because its wood is sheathed with black. Their flowers are often very beautiful, for which reason they have long been cultivated in the hot-houses of Europe; but they are too impatient of the wretched treatment they usually receive in stoves to flourish and produce their noble blossoms. So long as these plants are cramped in earthern pots Europe must not hope to see those noble flowers which are described by the travellers who have visited the forests of America and India.—*Eng. Cyc. p.* 400. A thousand feet above Punkabaree in the outer Himalaya the prevalent timber is gigantic and scaled by climbing Leguminosæ, as BAUHINIAS and Robinias, which sometimes sheath the trunks or span the forest with huge cables joining tree to tree.—*Hooker, Him. Jour. page* 108. In the Tenasserim Provinces, a scandent species of bauhinia creeps up to the tops of the highest trees. It has very large leaves, and its flowers have the fragrance of mignonette. It approaches Vahl's bauhinia in size and habit, but its petals are red and yellow while in that they are said to be white. It is probably one of the species named by Wallich.—*Mason.* The bark of *Bauhinia racemosa* and *parviflora* has been employed in making ropes. A brownish-coloured gum is said by Roxburgh to be yielded by *Bauhinia retusa.* A gum is also collected from *Bauhinia emarginata* in the Deyra Doon, which is called Sem-ke-gond. The flowers and buds of *Bauhinia tomentosa* are dried, and used in India as remedies in dysentery. Their astringency is probably due to the presence of tannin, and one species, *Bauhinia variegata*, has a sufficient quantity of this substance in its bark to render it useful in tanning. The leaves of various Bauhinias are used in Brazil under the names of Unha de Boy, or Ox-Hoof, as demulcent remedies.—*Eng. Cyc. p.* 400. Loudon calls bauhinia, mountain ebony, and the wood, though not much like ebony, is quite hard and might be applied to many useful purposes. To the five species which are enumerated among the Burmese flowering plants, may be added a small timber tree bearing a sour leaf, and a pod containing sweet pulp, like the honey locust of America. Its twin leaf is that of a bauhinia. —*Mason.*

(643) BAUHINIA ACUMINATA.

White Bauhinia, ENG. | Mandareh, TAM. also
Chitka, also Cauchun, BENG. | வெள்ளைமந்தாரமரம்
Cuchunar, HIND. | Vella Munthara marum, TAM.

This plant grows in India and Burmah. It is the B. candida of Ainslie, which some botanists think a variety of koochnal (B. variegata) a larger and more common tree.—*Wight.* Mr. Mason calls it a handsome shrub, with large blue-white flowers. It grows rapidly from seeds, and flowers in the second or third year.—*Mason.* Its wood, hard, and veined, is black, called by the inhabitants of America Mountain Ebony. It is in flower most parts of the year.—*Roxb.* Bauhinia acuminata, is described by Dr. Riddell as a shrub with white flowers.—*Riddell.*

(644) BAUHINIA ALBIDA.

Vellay-munthary-poo, TAM.

The flower buds of this pretty tree yield an excellent vegetable for curries, but it is not generally known that it can be so used; the flowers are very handsome when open being almost pure white, with a sweet odour.—*Jaffrey.* This is perhaps the species called by Roxb. B. candida.

(645) BAUHINIA ANGUINA.

Nag-poot, HIND.

An extensive and rambling shrub, with flexuous compressed stems and small white flowers. This Bauhinia is highly ornamental.—*Riddell.*

(646) BAUHINIA BRACHYCARPA.

Bwai-jin, BURM.

Attains to nearly three or four feet in the Tenasserim Provinces, its wood is white coloured and adapted for fancy work and cabinet making. —*McClelland.*

(647) BAUHINA CANDIDA, *Willd.*

Kuvidara also Yooga putra, SANS | Kana-raja, HIND.

A small handsome tree flowering at the commencement of the hot season.—*Roxb.*

(648) BAUHINIA DIPHYLLA, Grows in Nellore, where it is called *Yepi,* Tel.—*M.E. Jur. Rep.*

(649) BAUHINIA MALABARICA. This pretty large tree is a native of Malabar, where it blossoms in October and November.—*Roxb.*

(650) BAUHINIA NITIDA. WHITE BAUHINIA.

Kana raja. HIND.

Cultivated in gardens at Kotah.—*Irvine Gen. Med Top. p.* 191.

(651) BAUHINIA PARVIFLORA. Bwai-jin. Attains three or four feet in girth, and is very plentiful throughout the Tounghoo and Prome Forests. The Wood, white colored, adapted for fancy work and cabinet making.—*McClelland.*

(652) BAUHINIA PURPURESCENS.

சிகப்பு மந்தாரை மரம், Segapoo Munthari marum. A small tree, with beautiful purple flowers: quality of wood unknown.—*Jaffrey.*

(653) BAUHINIA PURPUREA.

Deva-Kanchun, BENG. | Shegaypoo-munthari-poo,
Sona, HIND. | TAM.

This tree grows to a large size on the mountains of India, *Roxb.* Its fragrant flowers are of a deep rose colour; it flowers at the commencement of the rains.—*Riddell. Jaffrey.*

(654) BAUHINIA RACEMOSA.

Maloo, climber, Maloo Malijhun or Patwa Mawal or Ada, TEL. | Atche marum. TAM. Maweel Ghila, HIND.

This is B. parviflora of Roxb., not mentioned by Ainslie. The tree is small but the heart wood exceedingly hard and fine. The bark furnishes a kind of natural rope, being merely peeled and slightly twisted when it is ready for use.—*Wight.* This is found all over India. Along the forests of the Sewalik Hills and the hot valleys of the Himalaya from the doons of the North West to the valley of Assam, may be seen this magnificent climber, with its two lobed leaf, hanging in elegant festoons from the tops of lofty trees, which, from the distance from the roots to the stems, one is at a loss to imagine how it could have ever ascended. But occasionally a half killed tree discloses the mode of its progress and indicates the destruction it must have created in the forest. With the bark of this plant, which when stripped off is of a reddish brown colour, the natives of these mountains make ropes ; the stems are usually cut in July and August : the outer bark being stripped off is thrown away and the inner is used for ropes, as wanted, by being previously soaked in water, and twisted when wet. It is also said to be boiled and beaten with mallets, which renders it soft and pliable, for being twisted into ropes and strings, for charpaes. The fibre makes very strong ropes, but it is not over durable, and rots if kept constantly in water. Though not collected for sale, it is abundant all along the foot of the mountains. Major Swetenham describes its strong coarse ropes as answering well for suspension bridges. Specimens of the fibre and rope made from it were sent to the Exhibition of 1851.—*Royle p.* 296. *Jaffrey. Madras Museum.*

(655) BAUHINIA RETUSA, Roxb. Grown in the Calcutta Botanical gardens ; yields a brownish mild gum.—*Roxb.*

(656) BAUHINIA RICHARDIANA—Introduced from Madagascar, of this wood we have no knowledge. The trees in this country being still young.—*Hort. Garden* 58.

(657) BAUHINIA SCANDENS. ESCULAPEAN ROD BAUHINIA. Mr. Mason mentions that he has never seen the flowers of this species but they are mentioned as small. The tree is remarkable for its contorted stem, and it is said to have been, remarks Loudon, the origin of Esculapius' snaken rod which he brought from India. Bauhinia scandens, in its properties and uses, is similar to the B. racemosa. It is not uncommon about Gowhatti, and is a common species in Silhet. Its fibre is used by the Nagas, and cloth made therefrom was sent to Major Jenkins by Major Hannay. A line made from the fibre sustained for forty-five minutes, 168 lbs, having stretched six inches only in three feet, and therefore is almost of the same strength as the best Sunn Hemp of Bengal. But Captain Thompson reported that, whether from the nature of the material or the mode of preparation, he found the fibre so harsh and stubborn and to so stick together that the heckles tore it to pieces and injured its strength. —*Mason, page* 68. *Royle, page* 296.

(658) BAUHINIA TOMENTOSA, Ains. YELLOW BAUHINIA. காட்டாத்திமரம் Caat Attie (ebony, Ains.) also திருவலவெகாண்டை Theerovalaconnaie, TAMIL. Usamaduga, SANS. A native of Ceylon, Malabar, and Coromandel ; the dried buds and flowers are used in dysentery.—*O'Shaughnessy, page* 317. This bears a large sulphur-coloured flower, and the upper petal has usually a deep purple spot on the inside. A large shrub never exceeding 12 feet in height. Wood very hard but too small to be of any great value in commerce. The native physicians use the buds and young flowers in certain dysenteric cases.—*Jaffrey.* This like the B. racemosa, atche marum, is a strong very dark coloured wood, hence we presume, the name *ebony.* Even the younger branches show the heart-wood very dark brown, the bark of this is also employed as extempory cordage. The plant furnished to Dr. Wight under the name of Caat Attie was the *bauhinia racemosa.—Wight.*

(659) BAUHINIA TRIANDRA, (*Roxb.*) This is a native of Bengal ; when in flower is one of the most beautiful of the Bauhinias. Its trunk is strait and of considerable size.—*Roxb.*

(660) BAUHINIA VAHLII. CHAMBOOLEE. Duk. An immense scandent shrub ; leaves about a foot in breadth, with rounded lobes ; legumes pendulous, from twelve to twenty inches long, covered with a brown velvet down. —*Riddell.*

(661)BAUHINIA VARIEGATA : VARIEGATED BAUHINIA.

Kuvidara. SAN. Ructa-kanchun, BENG. | Kuchnar, HIND. Irkumbalitha, CAN.

Common in India, Burmah and at Ajmeer. When in blossom the tree is very splendid, and the fragrance delightful. The flower buds are eaten as a vegetable. This tree would be highly ornamental in compounds.—*Gen. Med. Top. p.* 191. *Jaffrey, Riddell. M. E. Jur. R.* Mr. Mason says that when in blossom this is a very handsome tree.—*Mason.*

(662) BEAD PLANTS. Several plants in India produce bright coloured seeds, used as beads, amongst these is the red seed with a black eye, of the *Abrus precatorius,* which is also used by the Burmese as a weight. Mr. Mason informs us that the Karens in the southern provinces cultivate one or two species of Job's tears for the seed. The Pwos plant a species with round seeds which are used to ornament the borders of their tunics, but they are never seen on a woman's gown. The Sgaus on the contrary, cultivate a species bearing an oval seed, and use them merely for embroidering female dresses. In Amherst Province, the Pwos seldom appear in their native costume, and many deny that their tribe

ever had any other than that which they now wear, which is Burmese.—*Mason.* The *Abrus precatorius* is a native of the East Indies, but is found in the tropical parts of Africa and America. The seeds are in much request as ornaments, and are strung together as beads, with shells and other hard seeds, also as rosaries, hence the name precatorius. The common variety are red, with a black spot, whilst other varieties produce various coloured seeds. The leaves and roots secrete the sweet substance which characterizes the liquorice plant, (*Glycyrrhiza glabra*,) and in the East and West Indies it is called wild liquorice and used for the same purposes. Beng. Sweta : Koonch : Tamul, Condumiunie. The shining scarlet seeds of the *Adenanthera Pavonina*, are used as weights, by jewellers, and are made into ornaments, in the form of beads, bracelets &c. The round, hard, black seeds contained in the hairy pericarp of the *Canna Indica*, Krishna Tamara, TEL : Kata-bala : Kull Valei munnie, TAM : Seela rumba, SANS : Ukkil bar ke munkeh, HIND : Sabba jaya, HIND : are made into necklaces and other ornaments. The UTRASUM BEADS, are the very rough seeds of the *Elæocarpus lanceolatus*, *Utrasum*, TAM : *Oodraj*, DUK : They are brought to India from Java, of which country the tree is a native, are about the size of small nutmegs, and are made into bracelets for European ladies. The Sheva Brahmins and Pundarums, religious devotees of the Sheva sect of Hindoos, who live by alms, wear them round their heads and necks and form them into rosaries. The dark colored oval seeds of the *Caryota urens*, are made into buttons, and used as beads by Mahomedans, *koondel-panei munnie* TAM. *Erim panna*, CAN. The dark colored roundish seeds *Kodda panei munnie*, TAM : of the Corypha umbraculifera, are used as beads by Hindo devotees, the Taders, or Dassari wanloo, who live on alms. The *Tolasee Beads*, *Tolasee vayr munnie*, TAM : Toolsi ke munké, DUK : are made from the root of the holy basil, Ocimum sanctum, a plant sacred to Vishnu and held in esteem by all his followers, the Brahmins and Taders of which sect, wear it round their necks and arms. A very handsome bead is made from polishing the betel nut, called by the Tamil people Paak munnie.—*Ainslie, &c.*

(663) BEADS.

Paternosters, DUT.	Munke, HIND.
Rosaires, FR.	Corone, IT.
Rosen-kraaze, GER.	Kulkooroo, MAL.
Munneeara, GUZ.	Coronas, SP.

These small wares are formed of glass, ivory, wood, cornelian, and other materials, and used as rosaries, necklaces, &c. The glass beads manufactured in China are sent wholly to India or the Archipelago ; those for India are shipped to Bombay. Five boxes are estimated to weigh a pecul : 1345 boxes were shipped in 1836, at $. 18 per box. In the four years 1852-53 to 1855-56 inclusive, the import of beads into the Madras Presidency was to the value of Rs. 1,37,722, and the value of the exports for the same period was Rs. 24,491.

(664) BEANS, FRENCH—WHITE, BLACK, AND YELLOW.—These beans are runners and dwarfs ; they should be sown in rows about two feet apart, and may commence at the close of the hot winds. The dwarf white are preferable at the early part of the season, as they bear sooner than the other sort, which require sticks at least six feet high, and strong, so that they may stand the rain and wind ; may continue to plant them until March with success. All that is necessary is not to put them too close, and to remove caterpillars that are found upon them during the months of July and August. These beans are very hardy, and grow well in almost any soil. The Portuguese bean, or Chevaux de Frize, is cultivated like all other beans. Its pod has four fringed angles, the edges jagged : they are dressed like French beans. All the other sorts are grown in the same manner.—*Beans, Broad and Windsor*, should be sown in the cold weather, in drills, the same as peas, each bean at six inches apart ; the rows sufficiently separated to admit a person to pass between them for picking, weeding, &c. The best time in the Dekhan for sowing is in November, and if the ground is light and well manured, there is no chance of failure. Dr. Riddell recommends the seed to be changed every season. Rats and porcupines are very destructive to them.—*Riddell.*

(665) BEAR, the English name for a family of Plantigrade Mammalia, forming a natural group, with six incisor teeth and two canine teeth in each jaw, twelve molars in the upper and fourteen in the lower jaw, pentadactyle or five-toed feet, armed with strong claws, and a short tail. The bears exhibit but a comparatively small carnivorous development, for notwithstanding their strength, their dentition, particularly in the form of the crowns of their molar teeth, indicates a propensity bordering on the frugivorous exclusively.—*Eng. Cyc. p.* 401.

(666) *Ursus Euryspilus* (Helarctos Euryspilus of Horsfield), the Bornean Bear, differs from the Malayan Bear principally in having a large orange-coloured patch, deeply notched at its upper part upon the chest. The individual which was exhibited in the Tower of London, and from which Dr. Horsfield wrote his description, measured along the back from muzzle to tail 3 feet 9 inches. It was obtained in Borneo when very young, and during the voyage was the constant associate of a monkey and other animals. In confinement, its manners greatly resembled those of the Malayan Bear. Its habits in a state of nature do not appear to be known, but are most probably similar to those of the Malayan species. Dr. Horsfield, speaking of its habits in captivity, says, " The Helarctos readily dis-

tinguishes his keeper and evinces an attachment to him. On his approach it employs all its efforts to obtain food, seconding them by emitting a coarse but not unpleasant whining sound. This it continues while it consumes its food alternately with a low grunting noise; but if teased at this time, it suddenly raises its voice and emits at intervals harsh and grating sounds. Our animal is excessively voracious, appears to be disposed to eat almost without cessation. When in a good humour, it often amuses the spectators in a different manner. Calmly seated in its apartment, it expands the jaws, and protrudes its long and slender tongue as above described. It displays on many occasions not only much gentleness of disposition, but likewise a considerable degree of sagacity. It appears conscious of the kind treatment it receives from its keeper. On seeing him it often places itself in a variety of attitudes to court his attention and caresses, extending its nose and anterior feet, or suddenly turning round exposing the back, and waiting for several minutes in this attitude with the head placed on the ground. It delights in being patted and rubbed and even allows strangers to do so; but it violently resents abuse and ill treatment, and having been irritated, refuses to be courted while the offending person remains in sight. The individual whose manners are here described fell a victim to its voracity; during the hot weather of the summer of 1828, it overgorged itself one morning, and died within ten minutes after the meal. Its skin is preserved in the Museum of the Zoological Society.—*Eng. Cyc. p.* 411.

(667) *Ursus Isabellinus*, Isabella-coloured Bear. Dr. Horsfield first described this species from a skin forwarded from the mountains of Nepaul. The skull had been removed, but the front teeth in both jaws and the claws remained. —*Eng. Cyc. p.* 408. "Our animal," says Dr. Horsfield, "is of a habit decidedly different from that of several species of Ursus from the same part of the world, which have been recently added to the systematic catalogues, namely, the Ursus Thibetanus, the Ursus labiatus, and the Ursus Malayanus. All these have a jet-black fur, a semilunar mark of a white colour on the breast, and other peculiarities affording types of sub-genera, among which Prochilus and Helarctos have been defined. Our animal, on the contrary, appears to resemble the European bears in its structure, as far at least as can be determined from the parts which have been preserved in the specimen. Among these the claws afford the best means of comparison; they are small, obtuse, and straight: while those of the Asiatic bears above mentioned are large, strongly curved, acute, and fitted for climbing." It is a native of the whole Himalayan range, and is so light-coloured as to have led to the supposition that it was another form of the white Bear.—*Eng. Cyc. page* 408.

(668) *Ursus labiatus* (Melursus Lybius, Meyer), Labiated Bear or Sloth Bear. This uncouth animal, on its arrival in Europe about sixty years ago, was taken for a Sloth, and obtained the name of Bradypus pentadactylus and Ursinus, Five-fingered Sloth, Sloth Bear, or Ursine Sloth. By the two last names it was formerly shown in menageries; and Bewick gave an excellent portrait of it in his 'Quadrupeds,' as "an animal which has hitherto escaped the attention of naturalists." Meyer called it a Melursus; and Fischer a Chondrorhynchus. It is the Bradypus ursinus of Shaw (though it bears no relation to the true Sloths either in structure or habits); the Ursus labiatus of DeBlainville; and the Ursus longirostris of Tiedemann; the Ours Paresseux and Ours Jongleur of the French. The short limbs, the depressed air of the head, surmounted by the hillock of a back, and the whole colour of the apparently unwieldy mass, give the idea of deformity, and make it a favorite with the Indian mountebanks or jugglers, who rely much on the attraction of its ugliness. The cartilage of the nose is capable of extension, and the lips of considerable protrusion, as may be seen if the spectator hold a morsel of fruit or biscuit at a proper distance for exciting the animal to exert this faculty. The muzzle is elongated, and, with the ends of the feet, is whitish or yellowish. The forehead rises almost abruptly from the muzzle. The fur, with the exceptions above noticed and that next mentioned, is deep black, with here and there some brown spots, and is rather long, particularly round the head in old individuals. Upon the under side of the neck and breast is a white mark resembling the letters V or Y. In bulk it is about the size of the Brown Bear. The food of this species in a state of nature is said to consist of fruits, honey, and the white ants, which are so destructive. It inhabits the mountainous parts of India, where its retreat is stated to be in some cavern. Major (now Colonel) Sykes noticed it in the Dekhan.

(669) *Ursus Malayanus*, (Raffles, Helarctos Malayanus, Horsfield), the Malayan Bear, the Bruang of the Malays, is jet-black, with the muzzle of a yellowish tint and has a semilunar white mark upon the breast. The sagacity of the Malayan Bear is said to be great, and its liking for delicacies extreme. The honey of the indigenous bees of its native forests is supposed to be a favorite food; and certainly the extreme length of the tongue is well adapted for feeding on it. Vegetables form the chief diet of this bear, and it is said to be attracted to the vicinity of man by its fondness for the young shoots of the cocoa-nut trees, to which it is very injurious; indeed Sir Stamford Raffles found those of the deserted villages in the Passumah district of Sumatra destroyed by it. It has not unfrequently been taken and domesticated.—*Eng. Cyc. page* 410.

(670) *Ursus Thibetanus*, (Helarctos Tibetanus), the Tibet Bear.—M. Duvancel discovered

this species in the mountains of Sylhet, and Dr. Wallich found it in those of Nepaul. The Tibet bear has the neck remarkably thick, and the head flattened, the forehead and muzzle forming almost a straight line. The ears are of a large size. Its clumsy limbs support a compact body, and the claws are comparatively weak. Its general colour is black; but the lower lip is white, and there is a large mark of the same colour, somewhat in the form of the letter Y supposing the stem of the letter to be placed in the middle of the breast and the forks to pass up in front of the shoulders. In bulk it is about intermediate between the Sloth Bear (Prochilus labiatus) and the Malayan Bear (Ursus Malayanus). Mr. Bennett, in his "Tower Menagerie," gives a figure and description of one which was brought from Sumatra, and could not be prevailed on to touch flesh either raw or cooked, bread and fruits forming his only food. In his disposition he was moderately tame, and particularly fond of play.—*Eng. Cyc. page* 408.

(671) BEATY, OR CARROO MARUM, Tamul: Blackwood, Dalbergia latifolia. Common in Wynaad on open and grass lands, where the tree attains a great size.—*McIvor. M. E.*

(672) BEAUMONTIA GRANDIFLORA. *Apocynaceæ.* A gigantic climbing shrub; flowers in February, and is very showy. Native of Nepal. This magnificent Apocynaceous climber was found by Dr. Hooker in the Terai, east of Siligorec, in full bloom, ascending the loftiest trees, and clothing their trunks with its splendid foliage and festoons of enormous funnel-shaped white flowers.—*Hooker Him. Jour. Vol.* I. *page* 401.

(673) BEAVER, the English name for the genus Castor (Cuvier), one of the order of rodent or gnawing animals (Rodentia, Cuvier, Glires, Linnæus), with 2 incisors, or cutting teeth, and 8 molars in each jaw, 20 in all, and particularly distinguished from all the rest of that order by a broad horizontally-flattened tail, which is nearly oval, and covered with scales.—*Eng. Cyc. p.* 415. The Little Beaver is the *Castor Zibethicus* of Linnæus, *Fiber Zibethicus* of Cuvier, *Ondatra* of Lacepede, the Musk-Rat of Canada, and Musquash of the Cree Indians. (Musquash.)—*Eng. Cyc. page* 419. The tails of this animal form a considerable article of import into India.

(674) BEH-DANA, Pers. The seeds of the quince (Pyrus tomentosa); but those brought to Ajmere appear more like dried mulberry seeds (Morus nigra): the tree in Cabul is called "bai"; the seeds are demulcent and cooling: very mucilaginous: are used in sherbets: one seer costs four rupees.—*Gen. Med. Top. page* 128.

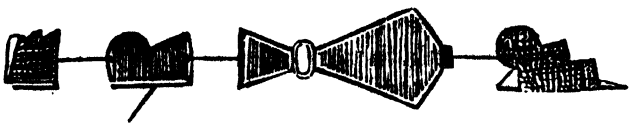
(675) BEDER WARE. The tutenague work of Beder has been described by several observers, Dr. Heyne, Dr. Buchanan Hamilton, Captain Newbold and Dr. Smith. It is a metallurgical compound of considerable interest, named Bedery, from Beder, a city situated about sixty miles to the north-west of Hyderabad. The articles are always greatly admired for the elegance of their form, as well as for the gracefulness of the patterns with which their surface is covered. Though the groundwork of this composition appears of a blackish colour, its natural colour is that of pewter or of zinc. Dr. Heyne informs us that it is composed of copper sixteen ounces, lead four ounces, tin two ounces. These are melted together, and to every three ounces of the alloy sixteen ounces of spelter, that is of zinc, is added, when the alloy is melted for use. But to give the whole the black colour which is esteemed, probably from bringing out the pattern, it is dipped into a solution of sal-ammoniac, saltpetre, common salt, and blue vitriol.—*Royle, Arts &c. of India, page* 471. Dr. B. Hamilton saw of zinc 13,360 grains, copper 460 grains, and lead 414 grains, melted together, and a mixture of resin and bees-wax introduced into the crucible to prevent calcination. It was then poured into a mould made of baked clay, and the article handed over to be turned in a lathe. Artists then inlay flowers or other ornaments of silver or of gold They first smear it over with sulphate of copper and water, which gives the surface a blackish colour, and enables the artist more easily to distinguish the figure which he draws—this he does with a sharp-pointed instrument of steel, and cuts it with small chisels of various shapes, and then with a hammer and punch fills the cavities with small plates of silver, which adhere firmly to the Bedery. It is then polished and stained as described above. The various articles made from it are vases, wash-hand basins and ewers, hookah-bottoms, spittoons, cups and dishes, small boxes and weights. These are inlaid commonly with silver, but sometimes with gold. The patterns are usually as much to be admired as the forms of the vessels. Though usually called Bedery, sometimes Vidry, it is also manufactured at other places. According to Captain Newbold, "The mould of the vessel is first prepared, in the usual manner, of clay turned into shape on a wheel: over the smooth surface of the mould a coat of wax and *rall* (rosin) in equal proportions, with a little oil is laid, of the thickness of the sides of the vessel required: over the wax another thick coat of clay is applied. Gradual heat is next resorted to, to harden the clay part of the mould; but principally to melt out the wax, which of course leaves a vacuum on the space it occupied. Into this space the molten alloy is poured, cooled, the mould broken, and the vessel in rough taken out polished and set aside, to receive a black colour preparatory to inlay, from a smearing of *Mor tuta* (Blue vitriol). The alloy itself is of a pewter white colour and is composed of the following proportions:—1 Seer *Just* (Zinc) to 1 Chittak or 6 Shahi pice weight of *Tamba* (Copper). The pattern of the ornamental device, to be inlaid

either in silver or gold, is next drawn lightly with a steel point on the blackened surface of the vessel, and then cut out to the depth of the inlay required, with a tiny delicately pointed chisel, worked by a small hammer. A thin bit of paper is pressed into the excavated pattern to receive the impression—taken out and placed upon a thin plate of silver (the inlay) which is itself laid out evenly on a bed of mixed wax and *rall* (rosin), and cut into the exact shape of the impression. The cut-out bit of silver is then pressed into its corresponding cavity engraved on the side of the vessel, and firmly inserted by means of a steel-point. This done over all parts of the vessel, it is again polished preparatory to receiving its finishing coat of black. This is done by subjecting the vessel to a gentle heat and smearing it with a mixture composed of: 1 Tola (B'hur) *Shorah ki Mutti* (Saltpetre) 3 Mashas—*Nousagur* (Sal Ammoniac) ground up into the consistence of cream with brackish water. After allowing this mixture to lie upon the vessel for a few hours, it is washed off with a little brackish water. The inlaid silver devices are little altered in colour, but the intervening portions of alloy remain of a permanent dead black. He witnessed the whole process of inlaying and could not help admiring the precision, lightness of touch, and celerity with which it was performed by a Lingayet, which caste and a Jaina are the only persons skilled in the art. It seems divided however into three branches. The mould maker, smelter and inlayer.—*Extract of a Letter from Captain T. J. Newbold, to the address of Major General Fraser.* Bedery does not rust, yields little to the hammer, and breaks only when violently beaten. According to Dr. Hamilton it is not near so fusible as zinc or tin, but melts more easily than copper. —*Royle, Arts &c. of India, page* 472. The most recent observer, however, is Dr. George Smith, who thus records the results of his examination of the process :—" On passing through Beder about two months ago, I thought it will be well, to make a few enquiries into the mode of manufacturing the unique and elegant ware, commonly called Bedery; accordingly I procured two workmen, who, partly showed and partly explained to me the several stages of the manufacture; the information thus obtained may assist those desirous of imitating this beautiful ware. Suppose the vessel to be made, resembling in form the common small hookah bottom (1):

(1)

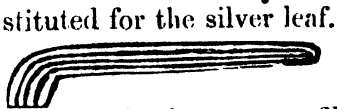


The steps of the manufactures are as follows: A mass of finely pounded and sifted old laterite dust mixed with cow dung, is put upon a rude lathe, and when dry is carefully turned into the correct shape. The lathe is rude and simple and is



(2)

turned either by the hand alone, or by a short rope attached to a small piece of wood (2): with the other hand the workmen holds a sort of chisel, with which he cuts and smooths the model. The model thus carefully prepared, is next covered with a mixture of wax and oil boiled together: when dry, the whole mass is again turned, carefully thinned and smoothed. Over this coating is plastered a second layer of laterite dust moistened with water, but without cow dung—this coat is rough, and is not subsequently smoothed down. The next stage consists in boring two openings in the composite mould, and in placing it in the fire—the effect of this being to melt in the intermediate layer of wax, and thus to leave a vacant space for the reception of the alloy. Into this space is poured the alloy (consisting of copper 1 part and pewter 4). The vessel has now a dull leaden look; it is hard, but easily cut. This model or shell is carefully turned and smoothed. Upon the smooth surface of this shell, the pattern is etched by hand, a small pointed graver being used. This etching is done rapidly. The workman next takes a small chisel and hammer, and following the lines of the pattern, cuts it deeply and expeditiously, scooping out the tracing of the little leaves &c., and leaving an indented but rough surface. This rough surface is next smoothed down by hammering gently with another blunt pointed chisel, and the space is then ready for the process of inlaying. Thin plates of very pure silver are taken, and the little leaves are cut out with a small hammer and chisel—each little leaf is then raised separately by the chisel and finger tip, and hammered gently but carefully into the depression intended for it. This part of the process is tedious. In the more durable kinds of Bedery ware silver wire is substituted for the silver leaf. The vase in this state



's rough and requires smoothing—this is done with a common file and with a curved scraper of a rude and clumsy form. The hole in the bottom of the vessel is filled up with lead and is smoothed down—finally the vase is gently heated, and whilst warm, it is blackened by the application of a powder supposed to consist of chalky earth and muriate of ammonia—this imparts a brilliant black polish to the shell, and careful hand rubbing brings out the lustre of the silver. The value of the ware depends upon the thickness of the silver inlaying—the common ware of the bazars rarely lasts long. Inlaying is also executed in the same way with copper leaf, but the artistic effect, I think,

is inferior to the silver. The price of a small hookah bottom like that described, varies in Beder, from 7 to 10 Rupees."

(676) BEEF, POTTED. Beef prepared in this mode has been found often adulterated with Bole Armenian, to heighten the colour.—*Hassall.*

(677) BEEF-WOOD. CASUARINA MURICATA. A hard, close-grained, reddish wood, variegated with dark and whitish streaks. It is chiefly used in England in forming borders, to works in which the larger woods are employed. It is procured from New South Wales.—*Faulkner.* Beef-wood is imported into the United States in considerable quantities, for various purposes where a hard heavy wood is required, and the casuarina on the Tenasserim Coast (*Casuarina muricata*) can furnish almost any quantity of this timber, but it is very little used. Roxburgh says it resembles toon in appearance. The natives call it by the same name as the pine.—*Mason.*

(678) BEER. Biere, FR. ; Bier, GER.

A fermented liquor made from the malt of barley, and flavoured with hops. Beer is extensively used in India, and is solely imported from Great Britain in hogsheads, and in small quantities bottled.—*Faulkner.* At nearly all periods in the world's history and among nearly all nations, the art of making a fermented drink from some kind of grain appears to have been known ; but of all the cereals, barley is the best adapted to the making of beer. In India the bitter pale ales of Messrs. Bass and Allsop, are used to the almost entire exclusion of all others.—*Tom.* See ALE.

(679) BEERA or BEEREE, (pan ka) a small packet of betel leaf.

(680) BEESHA, a genus of grasses nearly allied to *Bambusa*, with which it is actually combined by some botanists, but from which it differs, according to the concurrent testimony of all authors, in the otherwise incredible circumstance of its seeds being inclosed in a fleshy pericarp. Two species are known, both of which have the aspect of the spineless bamboos. Of these *Beesha baccifera* is found on the mountains of Chittagong, where it is called Pagu Tulla, growing in dry places on the sides of hills, where the upper stratum of soil is sandy. It perishes after yielding its fruit. It yields more or less Tabasheer, of a silicious crystallisation ; sometimes it is said the cavity between the joints is nearly filled with this, which the people call Choona, or Lime. ('Flora Indica,' ii. 197.)—*Beesha Fax* is a smaller species, not above 18 feet high. It is found in Amboyna and other parts of the Malayan Archipelago, where it is applied to many useful purposes. It is the Arundarbor cratium of Rumphius's Herbarium of Amboyna.—*Eng. Cyc. page.* 434.

(681) BEES' WAX, YELLOW.

Peela moom, HIND. | Ten-muricoo, TAM, | Mynum, TEL.

Secretion of the bee, Apis mellifica. Bees wax is the chief source of the wax of commerce, and is an organic product of considerable importance In its natural state it is more or less yellow, and has an odour of honey ; it is brought into the market, after allowing the honey to drain from the honey-comb, and then boiling the combs in water, frequently stirring to prevent burning. The wax thus obtained is melted a second or a third time and pressed through hair bags, of increasing fineness, allowing the molten substance to drop into cold water to firm it and prevent sticking. Another process, however, has been recommended, and it is commendable from its simplicity, viz. to put the combs into a pot with water and nitric acid, one quart of the former to one ounce of the latter, and after boiling it allow them to cool, the pure wax floats on the surface and two layers of dregs settle, the inferior one being almost worthless. This is sometimes adulterated by pease-meal ; but, to purify it, melt and strain through cloth, and the meal remains on the strainer. It is adulterated also with tallow, which cannot be detected, but by the smell. The quantity of Bees wax exported from Madras was 56,602 lbs. in 1853-54, valued at Rs. 19,914. Bees wax has been introduced into China by foreigners from the Indian Archipelago and Europe, though the Chinese also collect it themselves. In the islands where the bees are found, the natives collect the wax from the nests in the forests, disregarding the honey, which is little in quantity and worthless. The islands of Timor and Timorlaut afford bees wax in sufficient quantity to form an important article of export : the Portuguese there send away 20,000 peculs annually to China and India, at a prime cost of $5 per peeul ; Chinese junks import it through Macao. The consumption is small. In the eastern parts of China, the product of the tallow tree (*Stillingia sebifera*), and beef and hog's tallow in the south, are used in the manufacture of candles. Wax is only employed to incase the tallow or lard, which, from the heat of the climate and its unclarified condition, never becomes hard.—*Morrison, p.* 141. Bees wax has always been a considerable article of exportation from the Islands of the Archipelago, chiefly the produce of the wilder parts of them.—*Crawfurd, p.* 445.

(682) BEET. This important plant belongs to the natural order Chenopodiaceæ, which also includes Spinach, Orach, Mercury, Goose-foot &c. Beet, now much known in England by its German name of Mangel Worzel, has afforded a new source of sugar, capable of being produced in Northern Countries.—*Tom.* Dr. Riddell remarks that in the Dekhan, Beet root is grown from seed and thrives best in a light grey soil. The seed may be sown in the latter end of May, and transplanted either in rows or beds. This crop will not produce such large roots as those sown later, but with care some roots fit for salad may be

forthcoming in September; and Dr. Riddell advises the plants being grown on ridges during the rainy season. The leaves, when not too large, of both species, are used and eaten as spinage. The plants should be at least a foot apart, and in transplanting them, care must be taken to draw the root up unbroken, and the hole in which they are put should with a dibble be made quite even, and the plant put in straight. They may be transplanted at any period of their growth, except when going to seed, which all the early sown is apt to do. Fresh seed, if procurable, is to be preferred, though, if seed grown in the Dekhan were sent to another part of the country it would thrive well. Beet-root is always the finer for not being transplanted. The soil cannot be too light, and should be of a rich, old vegetable manure. Mr. Jaffrey observes that this well known esculent root, is used in salads, as a pickle, and preserve; the best are the small varieties; it is raised from seed, and requires a deep, well prepared soil, sown in drills or broad cast. When the plants have formed a few leaves, they ought to be thinned out to about 9 inches apart.

(683) BETA BENGALINENSIS. Bengal Beet. *Palak Sag.* The leaves only of this vegetable are eaten: when boiled it resembles spinach in flavour. The roots are tough and stringy. It may be sown in beds or rows. The leaves shoot out again after being cut down

(684) BETA CICLA. *White Beet.* Leaves used in salads; the midrib of the leaves as a substitute for asparagus; treatment similar to red beet.

(685) BETA MARITIMA. *Sea Beet.* Requires a sandy soil; used as spinach, or a pot herb, raised from seed; of little value.

(686) BEG-BANUFSHA. Root of a small plant brought from Delhi; used as a fine scent in medicine, and in compounding Atrs.

(687) BEGONIACEÆ. Begoniads; a natural order of Exogens, consisting of three genera, Begonia, Eupetalum and Diplocliuium. The species are 159, and are found exclusively in the dampest parts of the tropics in both the new and old world, particularly in Asia and America.—All the species of the genus, Begonia, of whch the order principally consists, have irregular fleshy leaves, often richly coloured with crimson, succulent stems, and neat looking pink flowers, growing in a few flowered panicles. Most of the species at present described may be procured in a living state in the gardens of Europe. The roots of the various species of Begonia are astringent and slightly bitter. B. Malabarica and B. tuberosa, with others, are used as potherbs in the countries where they grow. Endlicher says that some of the Mexican species are drastic purgatives.—*Eng. Cyc. p.* 435.

(688) BEGONIA. A genus of the natural order Begoniaceæ. Natives of the tropics. In cultivating them as flowering plants they require a rich vegetable soil, mixed with pieces of charcoal. They are propagated from cuttings which require to be kept somewhat dry till they root, and by division of the roots also; seed is very uncertain.—*Riddell.* The great yellow-flowered Begonia was abundant in the Bablang pass in the Sikkim Himmalaya, and its juicy stalks were cut by the travellers to make sauce (as we do apple-sauce) for some pork which they expected to get at Bhomsong; the taste is acid and very pleasant.—*Hooker, Him. Jour. Vol.* I. *p.* 29.

(689) BEGONIA. *Sp.*: A pretty little annual, a species of begonia: is common in the neigbourhood of both Tavoy and Maulmain.—*Mason.*

(690) BEGONIA RENIFORMIS. An herbaceous succulent plant, flowers of pale pink colour, and fragrant. Native of the moist forests of India.

(691) BEHAR HILLS, *Acanthaceæ* is the prevalent natural order, at Tope Chooney in the Hills of Behar, consisting of gay-flowered Eranthemums, Ruellias, Barlerias, and such hot-house favourites. Other plants gathered here, and very typical of the Flora of this dry region, were Linum trigynum, Feronia elephantum, Ægle marmelos, Helicteres Asoca, Abrus precatorius, Flemingia; various Desmodia, Rhynchosiæ. Glycine, and Grislea tomentosa very abundant, Conocarpus latifolia, Loranthus longiflorus, and another species; Phyllanthus emblica, various Convolvuli, Cascuta, and several herbaceous Compositæ.—*Hooker, Him. Jour. Vol.* I. *p.* 16.

(692) BEKH-KURPUS. Root of a small plant, comes from Delhi; heating; one seer costs two rupees.—*Genl. Med. Top. of Ajmere, p.* 30.

(693) BEKH-UNJUBAZ. Red colored root of a plant, that is brought from Delhi; considered as cooling and astringent.—*Genl. Med. Top. of Ajmere, p.* 130.

(694) BEL, BELGAR. Fruit of the Ægle marmelos: Cratæva marmelos: Bengal quince. The leaves are sacred to Mata jee (from the milk of whose breast this tree is believed to have sprung up). The punsaris of Ajmere believe that one pice's size of the bark of the root of this tree, rubbed up with ghee, will, if given soon, recover a person who has taken an overdose of opium.—*Genl. Med. Top. of Ajmere, p.* 128. Mr. Adolphus, London, 1853, mentions that the Bel fruit is described in the works of Ainslie, Persoon, Roxburgh, Sir W. Jones, Royle and others. It is the fruit of the Ægle or Cratæva marmelos of Linnæus, and is generally, although incorrectly, termed the Bengal quince, as it is one of the Auranthaceæ or orange tribe. This fruit has already received some notice when describing the Ægle marmelos; but we may here observe that a chemical examination of the Bel fruit shews it to contain tannin, either pure or in conbina-

tion; a large amount of mucilage; a concrete essential oil; and an aromatic as well as a bitter principle. It would also appear that a sedative or narcotic property exists in one or other of these. According to Lindley, a decoction of the root and bark of *Ægle marmelos*, is used on the Malabar Coast, in hypochondriasis, melancholia, and palpitation of the heart: a decoction of the leaves in asthmatic complaints, and the fruit, a little unripe, is given in diarrhœa and dysentery. Roxburgh adds that the fruit is most delicious to the taste, exquisitely fragrant and nutritious, but laxative. The decoction of the dried fruit is aromatic, slightly bitter and astringent, gummy and mucilaginous, something like a mixture of a decoction of quince and pomegranate, but bearing an aroma peculiar to the Bel. Different from most vegetable astringents, however, its use does not confine the bowels, but appears rather to strengthen and regulate their action. Its great value is doubtless in diarrhœa and chronic dysentery. The Bel preserve or jelly is a gentle but effectual laxative. It is eaten at meals, like marmalade, every morning, and acts moderately on the bowels during the day. This is found very useful to women and children, whom it is injurious to accustom to continual purgation.

(695) BELEMNITES, are officinal in Arabic medicine.—*Honigberger, p.* 242.

(696) BELGAUM WALNUT OIL, ALEURITES TRILOBA—HIDJLEE BADAM KA TEL. (HIND). The Moluccа tree which produces the "Lumbang nut" grows plentifully near Hyderabad. The nuts yield a very large per-centage of oil, and the tree is found to be very prolific. The nuts, strung upon a thin strip of bamboo and lighted, will burn like a candle; a notice of this interesting substance may be found in the Transactions of the Agri-Horticultural Society of India, Vol. VIII. p. 220.—*Mad. Ex. Jur. Rep.*

(697) BELLIS, from bellus (pretty), a genus of plants belonging to the natural order Compositæ. DeCandolle enumerates five species belonging to this genus. One of them the B. perennis, is the comman daisy, and is a native of Great Britain and all Europe. There is a double variety called Large double, another Double-quilled, and a proliferous variety known by the name of Hen-and-Chickens. These varieties assume various colours, from deep red to pink and white. They are easily cultivated, and form pretty plants for edges and borders, and continue in blossom a long time.—*Eng. Cyc. p.* 437. In India, a species of this well known flower is easily cultivated by seed after the rains, it thrives best in a rich loamy soil, and should be grown in pots.

(698) BELAMCONDA, See MORŒA CHINENSIS.

(699) BELL METAL.

Klokspys, DUT.	Glockengut, GER.
Metal de Fonte ou de cloches, FR.	Kolokhnaja-mjed, RUS.
	Campanil, SP.

An alloy consisting of three parts of copper and one of tin, of which bells are made. *The bells of Tanjore* are excellent in tone, superior in finish, and very moderately priced.—*Faulkner.*

(700) BEN TREE. In India, the Moringa pterygosperma: in Egypt, Guilandia moringa.

(701) BEN-NUTS, the fruit of *Moringa pterygosperma*, from which Ben-Oil, much used in perfumery, is obtained.—*Engl. Cyc. page* 440.

(702) BEN OR MORINGA OIL, MORINGA PTERYGOSPERMA.

Morunghy yennai, TAM.	Sahujna, HIND.
Moronga noona, TEL.	

Ben nut oil has long been valuable on account of the lengthened period, which it may be kept without contracting rancidity. The tree, from which the "nuts" are obtained, is common in all parts of Southern Asia, the flowers, leaves and fruit are eaten by the natives, and the rasped root is used by Europeans as a substitute for horse-radish, to which circumstance it owes its common name of "horse-radish tree." The oil however is seldom made in India, nor does it now form an article of export. In the Tenasserim Provinces, the tree which yields the celebrated oil of ben is very abundant, though Mr. Mason is not aware that any oil is pressed from the seeds in these Provinces. But in the West Indies, the oil of this tree is used for salad oil, and because it does not congeal or turn rancid, is employed by watchmakers, and for retaining the aroma of delicate flowers.—*Mason.* A ben oil is also procured from the seeds of the *Guilandia moringa*, which grows in Ceylon, Arabia, Egypt, and Ethiopia. The oil is inodorous, and does not generally become rancid, nor freeze readily, and is consequently much used by perfumers in the manufacture of scented oils.—*Faulkner.* Many delicious perfumes might be obtained by means of the ben oil from various flowers, especially from those of two species of Hedychium and a species of Dendrobium, on the Western coast of India, which we have no doubt would be highly prized at home.

(703) BENJAMIN, BENZOIN.

Lúban, ABAB.	Benzoinum, LAT.
Caloowell, CYNG.	Cominyan, MAL.
Loobance-ood, DUK.	Sambranee. MALEAL.
Benzoin, FR.	Luban, PERS.
Benzoe, GER.	Kaminian, PALEM.
Looban, GUZ. HIND.	Devadhupa, SANS.
Belzuino, IT.	Bengui, SP.
Menian, JAV.	FAULKNER.

In Upper India, Benjamin is the name given to the resin of Boswellia thurifera, but it is generally applied to the resin of the *Styrax Benzoin*, Benjamin tree, which grows in Sumatra, Borneo, Siam, and Java. It is a lofty tree, loaded with rounded branches with whitish and

downy bark. Benjamin occurs in dry and hard grey masses, rather shining, brittle, formed of ovoid, whitish tears, like stripped almonds, and placed as it were in a cement of a greenish red porous mass. Fracture resinous. Sp. gravity 1092. Odour sweet, peculiar, very agreeable, increased by friction, taste sweetish, subresinous, balsamic, irritating, powder yellowish grey, disposed to cake. With the resin generally sulphuric acid strikes a deep red colour. The Styrax benzoin occurs chiefly in Java and Sumatra. The balsam is obtained by incisions practised in the trunk of the tree after it has attained the age of five or six years. The resin is white, and transparent at first. About 3 lbs. are given by each tree, for six years. Benjamin is a word of Hebrew origin. It is most likely that the Hebrews applied the term to some other similar balsam, and that it has in the lapse of time been adopted for the present article.—*O'Shaughnessy, page* 430, 431. The white or superior Benjamin, is distinguished by the term *Cowrie luban* in India. Benjamin is chiefly employed to yield Benzoic acid, also as a cosmetic, and as an incense in Roman Catholic and Mahomedan countries. Real Benjamin is imported into Bombay from Singapore, and an inferior or factitious description from Calcutta.—*Faulkner*. Crawfurd mentions that the Stryax benzoin tree is raised from the seed, is of moderate size, and confined to the Islands of Sumatra and Borneo. In the first, in the country of the Bataks, and in the last, on the northern coast of the Brunai territory. The trees produce Benzoin when seven years old.—*Crawfurd, page* 50. Benzoic Acid is procured from this substance. The word *Benzoin* has also been given by Hayne to the plant which yields the resin.—*Eng. Cyc. p.* 445.

(704) BENZOIN ODORIFERUM. Nees. *Syn.* Laurus Benzoin, *Linn.* Oil of the berries aromatic, bark highly stimulant, and tonic.—*O'Shaughnessy, page* 548.

(705) BENZOIN NEESIANUM. Nipal berries, have a smell of cajeput oil. A bush 8-10 feet high, bark highly aromatic and tonic, infusion of twigs vermifuge, berries yield aromatic oil. The name Benzoin has been applied to this genus from its strong odour of Benjamin, but it is not to be mistaken for a source of that article.—*O'Shaughnessy, page* 558.

(706) BENT GRASS. The species of *Agrostis* have this name.—*Eng. Cyc. p.* 445.

(707) BENTEAK. See LAGERSTRŒMA MICROCARPA. This timber tree is common in Wynaad and on the western ghauts; wood prized for making coffee cases.—*McIvor. M. E.*

(708) BERBERIS, a genus of plants belonging to the natural order *Berberidaceæ*, among which it is immediately known by its shrubby habit, berried fruit, and the presence of glands upon its petals. It is also remarkable for the irritability of its stamens, which, when the filament is touched on the inside with the point of a pin or any other hard instrument, bend forward towards the pistil, touch the stigma with the anther, remain curved for a short time, and then partially recover their erect position: this is best seen in warm dry weather. The species of this genus are interesting both for their utility and beauty. The value of the bark and root of the Common Barberry for dyeing leather and linen of a yellow colour is well known. Dr. Royle has shown that this property exists in the species of India, especially in *Berberis aristata*; and it has been ascertained by Vauquelin that a plant found on the Neilgherries (*Berberis tinctoria*) is inferior to few woods for dyeing yellow. The acid quality of the fruit has rendered all the species more or less esteemed; that of *B. aristata* and *B. Nepalensis* is dried by the mountaineers of India as raisins, and sent to the plains for sale. The bitterness and astringency of the bark has caused them to be received into the list of useful medicinal plants; and it has been ascertained by Dr. Royle that the λυκιον ινδικόν (Lycium Indicum) of Dioscorides, concerning which so much doubt has always existed, was an Indian species of Barberry now called *Berberis Lycium*. (Royle's 'Illustrations of the Botany of the Himalayan Mountains, &c. p. 63). The species of *Berberis* are obviously divided into two great groups, of which the first has undivided leaves, like the common Barberry, and the others are pinnated, after the manner of the leaf of an ash tree. Botanists call the latter Mahonias. Ash-Barberry may be taken as their English designation.—*Eng. Cyc. page* 442. In the lower and outer Himalayas, B. Asiatica is almost the only species found in Kumaon. B. lycium is found in Gurhwal, and it is likely more abundant to the westward. B. aristata is the common Barberry of the upper regions in the outer hills. The other varieties of B. aristata are all from the forests of the higher ranges in the interior of the mountains. B. vulgaris *var*: is the species found among the snowy mountains themselves, and is probably more abundant to the westward in the drier vallies cut off from the rains. B. concinna is a form of the highest regions also, but rather of the wetter climate, and reaches into Sikkim. There is much doubt as to the actual number of species. Roxburgh, in his Flora Indica, gives three species. B. Asiatica, B. augustifolia; B. pinnata. He also describes a species mentioned by Captain T. Hardwicke, as B. illicifolia.—Vide Asiat. Researches, Vol. vii. page 357. Wight and Arnott give two species, viz. B. tinctoria and B. Leschenaultii, which latter they mention as perhaps not distinct from B. Nepaulensis. Lindley, in his Vegetable Kingdom and Natural System of Botany, mentions merely the B. vulgaris and Asiatica. Royle states that the most remarkable and best known Indian species of Berberis are B. Nepaulensis, B. Wallichiana, B. Asiatica and B. aristata: to these a new species from Ku-

nawar has been added. He also describes the B. lycium. Madden, in his description of the Turaie and outer mountains of Kumaon, mentions that the Berberis illicifolia, as noted above, is identified by Roxburgh with B. Asiatica, and states that, unless an abrupt change occurs at Mussoorie, the B. Asiatica is the B. lycium of Royle. It is known at Mussoorie by the name of Kingora, whereas in Kumaon "Kilmora" is the term used. Don again identifies the B. augustifolia with the Berberis aristata. The B. pinnata Roxburgh mentions as so like the Ilex Japonica of Thunberg, that he thinks that they are identical; thus we are left in a dilemma whether to put this plant down as a Berberry or a holly. Gerard mentions, in his tour through Kunawar, that the Berberry is very plentiful at the elevation of 10,000 feet, he does not however describe the plant. We find that the B. Asiatica is found at very nearly the same elevation and possibly the B. Kunawarensis, and it may prove by further investigation to be the same plant. We find then from enumeration of the above, an aggregate of eleven species is procured which may safely be reduced to the five or six, as borne out by the researches of various authorities: Berberis Vulgaris; B. Wallichiana; B. Asiatica; B. Aristata; B. Nepaulensis. In general terms, they may be called "spring shrubs with yellow flowers and acid berries." They inhabit essentially the northern hemisphere and chiefly mountains; being very common in the hilly regions of India. Dr. Griffith found Barberry growing with Viburnum and Bucklandia, in the Churrah hills, at 5,921 feet; it is well-known in the Neilgherries; and indeed, forms an important part of the woody vegetation of Indian mountains generally. It does not, perhaps, grow at a lower elevation than 3,500 feet, though one kind is common at 10 and 11,000. In Kumaon and Gurhwal the B. lycium and B. aristata are very abundant: the former (vernacular Kilmora), is confined to low, and the latter (Chitra) to high, elevations. The Barberry is a very hardy shrub, and easily propagated. It has been seen (the B. aristata), at the foot of the "everlasting snows" far beyond the limits of forest, (in a land of rhubarb and wild sheep :) but stunted to a level with the mountain gooseberry, by the side of which it grew. All the Barberries are characterized by a sweetish acidity, caused by oxalic acid in the leaf and berries. In some countries the latter are dried in the sun like raisins; by the presence of a strong yellow colour in both bark and wood used as a dye and by an extreme astringent bitterness, pervading more or less the entire shrub, but residing chiefly in the bark. In this astringent bitterness exists the efficacy of Barberry as a febrifuge; and it is best found in the bark of the root.

(709) BERBERIS ARISTATA, Chitra, Hind.

Bristle-leaved Barberry.—Spines 3-parted, simple, or wanting; leaves obovate, acute, shining on both sides, with a few bristle-pointed teeth on either edge; racemes always more or less compound and corymbose. A native of the mountains of Hindustan, extending from the Himalayas down the Neilgherry Hills as far as Adam's Peak in Ceylon. It is a hardy sub-evergreen bush in English gardens.—*Eng. Cyc. page* 443. Fruit sun-dried, used as raisins. Bark and root used for making *Rusot*.

(710) BERBERIS ARISTATA, (D. C.) *var.* Chitra, Hind. Binsar, Nainee tal ke, Hind. From 6,500—10,000 feet. The commonest form of this species have longish fruit and branched pedicels and long thin peduncle. *Berberis aristata*, D. C.) *var. floribunda*, Hook and Thorp. (Dwali, 8,500 to 10,000 feet. This form has larger and rounder fruit than the last, of a dark purple colour, the peduncle thicker and pedicels one flower; the clusters of flowers much larger than the last. *Berberis aristata*, (D. C.) *var. Nainee*, 7,000—8,000 feet. This is somewhat intermediate between the two last. *Berberis aristata*, (D. C.) *var. petiolaris*, Wall. (Dudutoli 8—10,000 feet). The leaves of this variety are much thinner in their texture than any of the others, being membranous not coriaceous; the lower end of the leaf gradually tapers off so as to give the petiole the appearance of being winged, whence the name petiolaris. Its bark and root is used in making Rusot.

(711) BERBERIS ASIATICA, Raisin Barberry. (Huding-Nioong-Mari, Hind.) Spines small and weak, simple or 3-parted; leaves oblong or obovate, acute, somewhat glaucous beneath, either entire or coarsely or even finely toothed; flowers in short compact racemes not longer than the leaves. Found in Nepaul and Kumaon very abundantly, forming a tall bush with the habit of the common European Barberry. The fruit is round, covered over with a thick bloom, and has altogether the appearance of the finest raisins. It is produced abundantly in Britain, where the plant is now not very uncommon. The very short racemes are the principal distinction of this species when in flower.—*Eng. Cyc. page* 442. *Berberis Asiatica*, (Rox.) *var. tinctoria*. (Almora &c. 3,000—7,500). This is the common Barberry of the lower and outer hills; the peduncle of the flower raceme is very short indeed there is hardly any, numerous pedicels springing out in a thick cluster all together. The leaves harsh and more coriaceous than any of the preceding. It is used for dyeing yellow. Dr. Riddell remarks that this tree is found in the hills of Nepal, and most probably on the Neilgherries. He met with it first in Deyrah Dhoon. There is a large and small blue fruited sort, as well as the red. He had never seen it in

the Dekhan. The trees have blossomed in the Botanical Gardens at Calcutta.

(712) BERBERIS CARAGANÆFLORIA, a Chinese plant with the points of the leaves hardened into spines.—*Eng. Cyc. page* 444.

(713) BERBERIS CONCINNA, Hook and Thorp—angulosa, Wall. Ramri and Pindari 9,000—12,500. A small shrub, only a foot and a half high, flowers solitary, red fruit, the leaves and stems very spiny. In the Ryott valley in Sikkim at Laghep, Iris was found by Dr. Hooker abundant, and this small bushy barberry (*Berberis concinna*) with oval eatable berries. The north wall of the house (which was in a very exposed spot) was quite bare, while the south was completely clothed with moss and weeds.—*Hooker Him. Jour. Vol.* II. *p.* 197.

(714) BERBERIS FLORIBUNDA, Many Flowered Barberry. Perhaps a variety of B. aristata. Spines very stiff, and 3 parted; leaves oblong or oblong-lanceolate, nearly entire or toothed in various degrees, sometimes very deeply and coarsely veined; flowers in long loose slender racemes. Apparently extremely common in the whole of the north of India, where it forms a tall bush, varying considerably in the size and form of the leaves, and in the degree in which they are toothed, but always well marked by its slender, pendulous, or erect racemes of flowers which are much longer than the leaves, and in no degree corymbose. It is to be found occasionally in the more choice collections of England. Out of accidental variations in its mode of leafing and flowering, the spurious species called *B. affinis* and *B. ceratophylla* have been constituted.—*Engl. Cyc. p.* 443.

(715) BERBERIS INSIGNIS, a plant of the Sikkim Himalaya. It is a magnificent species, and forms a large bush with deep green leaves seven inches long and bunches of yellow flowers. —*Hooker, Him. Jour. Vol.* I. *page* 364.

(716) BERBERIS KUNAWARENSIS, is found in Kunawar and employed for Rusot.

(717) BERBERIS LESCHENAULTII (the *Berberis acanthifolia* of some), a fine pinnated plant with round black fruit, found on the Neilgherry mountains at the elevation of 8,000 feet.

(718) BERBERIS LYCIUM; *Vern.* Chitra, Kushmul. Wood—dar huld and dar chob. Extract, hooziz, rusot, the λυχιον of the Greeks. Grows in the Himalaya. A watery extract called *Rusot* is prepared in the hilly districts of India from the sliced root, stem, and branches of this plant. This extract is to be found in all the bazars, and is much employed by the native practitioners. Dr. Royle has very ably traced the history of this substance, and identified it perfectly with the celebrated λυχιον ινδικον of Dioscorides, the *Hoosiz hindee* of the Arabs. Alone, or rubbed with equal parts of opium and alum, and diffused through water, it is used as

an external application in incipient or chronic ophthalmia, being applied around the eye. Dr Playfair, Dr. Royle, and other high authorities speak in very favourable terms of the success of this practice. *Rusot* of best quality is a pale yellow, uniform, pasty extract, soluble in water and alcohol, to which it communicates a brilliant yellow colour; exceedingly bitter to the taste, of rich heavy smell, blackened by salts of iron, precipitated by solution of gelatine, and consequently containing tannic and gallic acid. Dr. O'Shaughnessy was induced to use it internally as a tonic in consequence of the popular reputation in Europe of the bark of the common barberry, as a remedy for agues, being also aware that M. Buchner had used *Berberite* as a tonic as far as ten grain doses, with considerable benefit. Lastly, the intense bitterness of this principle, and its yielding azote on ultimate analysis, led him to anticipate utility in the treatment of periodical fevers. In his experiments he employed a specimen of extremely fine *rusot*, supplied by Dr. Campbell of Nepal, and also an extract prepared at the Calcutta Medical College from the bark and stems of the Berberis asiatica, obtained from Dr. Wallich from the Botanic Garden. Rusot is best given as a febrifuge in half drachm doses diffused through water, and repeated thrice, or still more frequently, daily. It occasions a feeling of agreeable warmth at the epigastrium, increases appetite, promotes digestion, and acts as a very gentle, but certain aperient. The skin is invariably moist during its operation, on the whole, we deem the rusot a most important accession to the Materia Medica, and worthy of being substituted in a multitude of cases for cinchona bark. Its aperient action renders it especially valuable. The rusot is manufactured in Nipal and the Dhoon, at about eight annas the seer. What is found in the Bengal bazars is often of a very inferior description, old, mouldy black, and mixed with half its weight of impurities. *Berberite* may be given in five-grain doses. It has not been employed much, as it is a preparation very troublesome to make in a pure state and as the administration of the extract and tincture prove so satisfactory. The pharmaceutical preparations of this genus generally are the Tincture made from the bark of the root, extract from the same, and an extract is also prepared from the wood of the stem and bark mixed, this latter is the Rusot of the Indian bazars. Berberine has also been obtained from the bark. The first of these preparations, viz. The tincture of the Root Bark, is considered by far the best mode of administering the medicine. In consequence of its containing all the active properties of the plant, and from its purity the dose necessary to be given is not bulky or so likely to cause nausea and sickness: it is prepared with Barberry bark 52 ounces, Alcohol 24; ditto From Berberis lycium and other species, common in the lower ranges of the Himalayas, of the

extract of bark and wood, there are several sorts of varying quality: the best are of a deep yellow colour, totally soluble in water, and made from the bark of the root. It is undoubtedly a powerful febrifuge, in which many have confidence and besides being tried extensively at the Medical College Hospital by Dr. W. O'Shaughnessy, it has been much used in Rohilcund, by Dr. Kirk, Stiven and Hay, and by Medical Officers before them, it acts especially as a diaphoretic, and in this respect its effects have often been compared to those of Warburg's drops, for they are both certain diaphoretics. Its use however, is not attended with the intense degree of discomfort, which in the first instance follows the administration of the drops. Part of the efficacy of Rusot is no doubt owing to the presence of Berberine which has been experimented with in Europe—however without any very striking effects. This alkaloid has not been used in India. But though its preparation be troublesome it should be made in considerable quantity from the Rusot, and have a fair trial given it. Rusot according to O'Shaughnessy, is best given as febrifuge in half drachm doses diffused through water, and repeated thrice or still more frequently daily. It occasions a feeling of agreeable warmth at the epigastrium, increases appetite, promotes degestion &c., and acts as a gentle but very certain aperient. He found it most useful in curing ague, but it has been employed with success in remittent fevers in the upper Provinces. Rusot is used extensively at some dispensaries in the North-West, and many in that part of India think it second to quinine only. The substance well deserves further investigation, especially as it appears to exercise a beneficial power over remittents as well as intermittents, (the great test of the value of a febrifuge) and the Bengal Medical Board not long ago took measures with the view of having its powers more fully tested, by the preparation on the large scale of the tincture, probably its best form for exhibition. The experiment has been in the main a successful one, and Rusot is the most promising of our Indian febrifuges. Royle mentions that a variety of B. lycium grows at Nandakni River at an elevation of 3,500 feet; the racemes of the flowers are simple, the peduncle being one or two inches long with short flowered pedicels. *Berberis lycium*, var. 2 Ramri 9,500 feet, said to be a form of B. aristata with the flower racemes like B. lycium from the sliced root stem and branches; the extract Rusot is prepared from it.

(719) BERBERIS NEPALENSIS, a native of the mountains of the North of India, where, according to Dr. Royle, it grows twelve feet high in shady places, at 5000 and 6000 feet of elevation; this is a noble species, and would in all probability succeed in Britain.

(720) BERBERIS SINENSIS, Chinese Barberry. Spines 3-parted or none; leaves lanceolate, very acute, much netted, entire or regularly toothed; flowers numerous, in drooping racemes, which are not much longer than the leaves. A native of the North of India and of China. Leaves leathery, evergreen; flowers solitary, or in clusters.—*Eng. Cyc. p.* 442.

(721) BERBERIS TINCTORIA. This is possibly a variety of B. asiatica. It yields a yellow colouring material, the colouring matter is found in the whole of the root, but in the stem it is only deposited round the pith and near the bark: the great bulk of the woody fibre contains no colour. The colour is quite as good as that of the root imported into England from Cologne and Hamburgh, and it would be profitable for India to export the extract.

(722) BERBERIS TRAGACANTHOIDES, with not more than one or two pairs of leaflets, is found along the banks of the river Kur, Tiflis.

(723) BERBERIS UMBELLATA, Wall, perhaps a variety of B. aristata—Duali 9,500—10,000 feet. A shrub like B. aristata but having the flowers in umbells or in racemes on which the pedicels are arranged in umbells.

(724) BERBERIS VULGARIS, Lin. *var.* cretica, Hook and Thorp (Bampa Pindari 9,000 feet.) A small shrub of four or five feet in height only found high up among the snowy mountains. It has a short raceme nearly simple. Red fruit. The bark of the B. vulgaris, (principally) is extensively used in Poland and Australia, to dye leather a deep yellow. Its ripe fruit is made into preserve and pickle.

(725) BERBERIS WALLICHIANA, Wallich's Barberry. Spines long, slender, 3-parted; leaves oblong, lanceolate, deep-green, sharp-pointed, finely serrated; flowers very numerous, in clusters shorter than the leaves. A native of Nepaul, and apparently of the higher part of the country. *Berberis atroviridis* is another name for this species.—*Engl. Cyc. page* 442. Leaves leathery, evergreen; flowers in racemes.

(726) BERGAMOT OIL, (OR OIL OF THE RIND OF THE BERGAMOT LIME,) Citrus Limetta. To prepare this, rasp the rind, express the raspings between flat porcelain slabs, allow the oil to settle, and then filter. The exquisite flavor of this oil is injured by distillation. It is used chiefly as a perfume, colour yellow, sp. gr. 0.888, freezes at 32°.—*Beng. Phar. p.* 378. Bergamot is also obtained by distillation from the root of the fragrant citron, the citrus. More than 22,000 lbs. of this essence was imported into England in 1848.—*Simmonds, page* 566.

(727) BERGERA KONIGII.

Bursunga, BENG.	Careypawkoo Kura, TEL.
Karivepa. TEL.	Kuroo apilai marum, TAM.
Karivepilli, TAM.	Bursunga, MAL.
Kristna neemboo, SANS.	Kurrepak, DUK.

The Koodia Neem, a small tree, a native of the mountainous parts of the coast. Indigenous, of easy culture, is common throughout the country;

ultivated also generally in gardens for its leaves, which retain their flavour when dry, (*O'Shaughnessy, page* 232), and are used to flavour curries, mullagatawny, chatnies, &c. and mixed in curry pastes nd powders; prepared in this country for transmission to England, and other parts of the world; he mixture of these leaves not only imparts a eculiar flavour to the above, but adds a zest to hem. It grows to a tree of tolerable dimensions, with pinnate leaves; strongly scented; flowers in February and March; fruit of a deep purple colour, wood hard and close grained; medicinally, the leaves are considered stomachic and onic, used raw in dysentery and when roasted are administered in decoction to stop vomiting. The bark and root employed as stimulants.—*Royle Ill.*

(728) BERRYA AMMONILLA.

Trincomallee wood, Eng. | Somendilla also Halmilile
Tircánamalay marum, Tam. | also Hameniel, Cyng.

Introduced from Ceylon to the continent of ndia; the wood is annually imported from Trincomallee, by which appellation it is known n the Madras market. It is highly esteemed or its lightness and strength, is straight grained—slightly pliant, tough and little affected by the atmosphere, and is employed in the construction of the Massoola boats of Madras (Wight,) t is also used for spokes of wheels, helves, handles, planes, frames, poles and shafts of carriages, it is inferior to *Saul* for spokes, and to he babool for some other purposes, but it is omparatively light and easily worked (Rohde) The market is still dependent on importation rom Ceylon.—*M. E. Jur. Rep.* Dr. Helfer nentions this tree, which produces the Trincomalee wood, as growing on King's Island opposite Mergui, and as a light, strong, valuable wood. —*Mason.* In the Tamil and Malabar of Ceylon, *Somendilla*: it is commonly called *Halmilile* and *Hameniel*, by the Dutch and Portuguese. The tree ields the best and most useful wood in Ceylon or naval purposes. It grows straight, from wenty to forty feet high, and from twelve to hirty inches in diameter. This tree, with the atin wood, was reported by Mr. Edye to be the nost plentiful and valuable found in Ceylon; and o be obtained at a moderate rate to answer the lemands of the navy in India: it may be considered superior to any wood for capstan bars, ross and trussel-trees, cask-staves, battens for ards, fishes for masts, boat-building &c. The ame authority states that at Madras, it is highly valued for coach-work from the toughness and ineness of its grain.—*Edye, Ceylon.*

(729) BERTHELOTIA LANCEOLATA, is plant which grows in the Punjab, but is seldom used by the Hakims—*Honigberger, p.* 243.

(730) BERTHOLLETIA, a genus of plants belonging to the natural order *Lecythidaceæ*, and named after Berthollet, the celebrated chemist. The only species is a tree of large dimensions, which forms vast forests on the banks of the Oronoco, and might with advantage be introduced into India. The fruit is figured and described by Humboldt as a spherical case as big as a man's head, with four cells, in each of which are six or eight nuts; its shell is rugged and furrowed, and covered with a rind of a green colour. The nuts are irregularly triangular bodies, having a hard shell, which is very much wrinkled, and which is fixed to a central placenta by their lower end; their seed, as is well known, is a firm oily almond of a pure white colour. They are sold in the shops of London under the name of Brazil Nuts. "The Portuguese of Para," says Humboldt, "have for a long time driven a great trade with the nuts of this tree, which the natives call Iuvia and the Spaniards Almendron; they send cargoes to French Guyana, whence they are shipped for England and Lisbon. The kernels yield a large quantity of oil well suited for lamps." The same traveller describes himself and his companion Bonpland as having found these nuts a great luxury when they were following the course of the Oronoco. For three months they had lived upon bad chocolate, rice boiled in water, always without butter, and generally without salt, when they met with a store of Bertholletia nuts. It was in the course of June, and the Indians had just gathered in their harvest of them. The kernels were found delicious when fresh, but unfortunately they are apt to become rancid on account of the great quantity of oil which they contain.—*Eng. Cyc. page* 448.

(731) BERYL, Aqua Marine. An ornamental stone differing little from the emerald except in colour. Localities, France, Brazil, Siberia, India, Burmah, and United States. Beryl is a mineral, among the varieties of which are found two of the most beautiful and costly gems with which we are acquainted, namely, the *Emerald* and the *Precious Beryl*. This species contains several varieties, of which the two known among lapidaries under the name of Emerald and Aquamarines or Precious Beryl, are the most worthy of attention. These varieties, though distinguished by some mineralogists as forming distinct species, differ however only in colour, the term Emerald being applied to those possessing the peculiar rich deep green so well known as the emerald-green, while all the other varieties are comprehended under the name of Beryl; those which are clear, transparent, and possess a good colour, present various shades of sky-blue or mountain-green, being the Aqua-marine or Precious Beryl. The colour of the Emerald is attributed to the small quantity of green oxide of chromium which has been found in the specimens from Peru; while the varieties in the tints of Beryl may be considered to be produced by admixtures of the oxides of iron, the yellow being the colour of the peroxides of iron, and the mountain-green and the various shades of blue

being the effect of varying quantities of the protoxide, to the presence of which the common bottle-glass owes its tint.—*Engl. Cyc. p.* 446. The following localities produce the finest Emeralds:—The mines in the Tunca Valley, situated in the mountains between New Granada and Popayan, and not far from the town of Santa Fé de Bogota, where, according to Humboldt, they are found in veins traversing clay-slate, hornblende-slate, and granite: the Henbach Valley, in the district of Pinzgau, Salzburg, where they occur imbedded in mica-slate, and are inferior in colour to those from Peru; varieties have also been lately found in some old mines in Mount Zabarah, in Upper Egypt, from which spot the ancients are supposed to have derived their emeralds.—*Eng. Cyc. p.* 449. Beryls are found in the sands of the Irrawaddy; and may probably be found in some of the rivers, that descend from the granite mountains in these provinces.—*Mason.* Amethysts, and Aqua marine chrystals are obtained from a mine near Cangium in Coimbatore. The amethysts seem wanting in depth of colour. The aqua marine stone are better in that respect, but small. They are procured from a deep well in the Cangium talook in considerable quantities, formerly they were worked to some extent but not now; owing to the quantity of water impeding, the work has been discontinued. The varieties known in commerce by the name of Beryl are found principally in Siberia and Brazil: in the former country it occurs in the granite district of Nestschinsk and also in the Uralian and Altai Mountains, sometimes in very large crystals, having been found upwards of a foot in length. In the granitic mountains of Odon Tchelon, in Daüria, three very interesting mines occur at different elevations in the mountain; in the lowest are found, irregularly disseminated through a mass of semi-decomposed granite mixed with ferruginous clay and nodules of Wolfram, prismatic crystals of Beryl of a greenish-yellow colour, rarely exceeding one inch in length. Some hundred feet higher occurs the second mine in a vein of micaceous clay, from which the most valuable crystals are obtained: their colour is of a pale but pure green, and their size frequently considerable. The third mine is situated in a vein of white indurated clay on the summit of a mountain; in this mine the varieties are usually of a pale greenish-blue, but sometimes they are found of a pure but pale sky-blue. They are here remarkably transparent. Imbedded crystals and massive varieties are also found at Limoges, in France: near Zwiesel, on the Rabenstein, in Bavaria; at Fimbo and Brodbo, near Fahlun, in Sweden; and likewise in some of the tin-mines in Saxony and Bohemia. An enormous specimen is also described in Silliman's 'Journal' as having been found at Acworth in New Hampshire, United States. Its dimensions are stated to be 4 feet in length and 5½ inches across the lateral planes, and weight to be 238 pounds. Specimens of Beryl have also been found in several of the primary districts of Ireland; those from the granite of the Mourne Mountains, in the county of Down, are the finest. In this locality they are associated with topaz, black quartz, felspar, and mica. In Scotland it is found in the granite at Rubeslaw quarry, near Aberdeen, and also in broken pieces in the sand of the rivers of that country.—*Engl. Cyc. p.* 449. The value of the Emerald depends not only on its size, colour, and brilliancy, but also on its being free from flaws, by which this gem is frequently greatly deteriorated in the eye of the jeweller. The following is the rate at which varieties of a fine colour and free from fissures may be procured, as stated by Beudant:

A stone of	5 grs.	from 100	to 120 francs.
,,	8	,, 240	francs.
,,	15	,, 1500	,,
,,	24	,, 2400	,,

Eng. Cyc. page 450.

(732) BETA, a genus of plants belonging to the natural order Chenopodiaceæ, among which it is known by its having large succulent roots, and a green calyx united halfway to a hard rugged nut. The species are found in Europe, the north of Africa, and southern and eastern Asia; four are cultivated as esculents, the others are mere weeds.—*Engl. Cyc. page* 450. See Beet.

(733) BETA BENGALENSIS, (palung), *Spinacia tetratacea* (Ispanack), and *Basella rubra* (pocc) are cultivated by the natives as articles of food. Of Basella, Roxburgh describes three wild, and two cultivated varieties. The *red beet* and *mangel wurzil* also afford abundance of amylaceous and saccharine matter.—*O'Shaughnessy, page* 524.

(734) BETA VULGARIS, Common Beet, is said to be found in a wild state along the whole of the sea-coast of the Mediterranean, and in Egypt; it is however chiefly known as a plant cultivated in gardens, for its carrot-like, sweet and tender roots. Several sorts are mentioned by writers on gardening, varying in the size, form, colour, and sweetness of their roots: of these however two are much more worth cultivating than the others, namely, the small red variety and the long yellow variety; they are the most delicate, the sweetest, and have the richest colour when served at table.—*Eng. Cyc. page* 450.

(735) BETEL LEAF.

Tambool, Arab.	Betela, Maleal.	Tambuli, Sans.
Pan, Duk.	Sireh. Mal.	Vettilei, Tam.
Pan, Guz. Hind.	Burg-i-tambool, Pers.	Tamola-akoo, Tel.
Suro, Jav.		

Betel Leaf, Piper Betel, belongs to the pepper family of plants and furnishes the celebrated leaf of the Southern Asiatics, in which they enclose a few slices of the areca nut and a little shell lime. This they chew to sweeten the breath and keep off the pangs of hunger. It is, also, slightly narcotic. The "*pan*," of the East Indies is even

a more extensive article of commerce than tobacco. Rumphius describes six species of this vine, besides several wild and uncultivated varieties. It is very easily reared in the Indian Archipelago, but in the Peninsula of India, it requires manuring, frequent watering and great care, and in the northern parts of Hindustan it becomes an exotic very difficult to rear. The vine affords leaves fit for use in the second year, and continues to yield for more than thirty, the quantity diminishing as the plants grow older. The leaf of the *Piper betel*, which, mixed with the fruit of the areca palm, commonly called betel nut, and quick-lime, forms a hot and acrid masticatory, is in almost universal use in India and the Malayan Archipelago. The Betel-leaf tree grows in almost every part of India. In the Tenasserim Provinces the Karens plant the vines on their uplands, where there are tall forest trees. The branches of the trunks are lopped off, leaving only the topmost boughs, and the vines readily climb up and weave their dark, glossy leaves all over the summits, making a betel-vine farm a most beautiful object. Karen boys and maidens engage in this leaf harvest with great zest, and it is not uncommon for young men, in seeking companions, to inquire who are the most agile climbers of *poo-lah*, or betel-leaf trees. The Karen forests produce a wild species of piper, the leaf of which is used as a substitute for the common betel-leaf.—*Mason.*

(736) BETEL-NUT, ARECA NUT, PENANG NUT.

Fooful, ARAB.	Fooful, PERS.
Puwak, CYNG.	Areca, PORT.
Sooparee, GUZ. HIND.	Kramuka, Guvaka, SANS.
Jambi, JAV.	Paaku, TAM.
Penang, MAL.	Vukka, TEL.
Araca, MALEAL.	

Betel-Nuts, or Areca-nuts, are the fruit of the Areca Catechu, or Faufel; they have a thin brown rind, and in size are intermediate between walnuts and hazel nuts. Their general substance is of a faint oily grey colour, thickly marked with curly streaks of dark brown or black. The betel-nuts, although softer, resemble ivory, and in the arts are made into necklaces, rulers, tops of walking sticks, walking sticks, and other small objects.—*Holtzappfel.* The Betel or Areca or Penang Nut palm is grown in many parts of the East Indies and Eastern Archipelago, from the Red Sea to the Pacific Ocean, and the people use the kernel of its fruit as a masticatory to a very great extent. It is of elegant growth and rises with a very erect and slender trunk to a height of forty or even sixty feet, the summit terminating in a tuft of dark green foliage; the trunk is seldom more than eighteen inches to two feet in circumference. The tree produces fruit from the age of five to its twenty-fifth year: it begins to blossom in March and April, and the nuts are fit to gather in the months of July and August and are fully ripe in September and October. Fourteen pounds is the average annual produce of a single tree. The fruit ripens only once during the year, but the nuts vary greatly in size, though their quality depends solely on the amount of astringent matter they contain, a point which is judged of by cutting them. If the white or medullary portion, which intersects the white or astringent part, be small, has assumed a bluish tinge, and the astringent part is very red, the nut is considered of good quality; but when the medullary portion is in large quantity, the nut is considered more mature, and, not possessing so much astringency, is not esteemed valuable. The quantity of nuts produced on the coast of Sumatra, is stated at 80,000 piculs. The quantity imported annually by the Chinese, amounts to 45,000,or 48,000,piculs, exclusive of that brought there from Cochin China. It is carried by the people of the East in pouches and presented to guests in the houses of the rich, in silver trays, wrapped in gold and silver leaf, and in this form becomes an essential part in all ceremonial visiting. Indeed among some of the inhabitants of the Eastern Archipelago, to refuse to accept betel nut when offered, would give irreconcilable offence. It is believed to sweeten the breath, strengthen the stomach, and preserve the teeth: and when chewed with betel leaf, the *piper betel*, (Linn.) gives the saliva a red colour which it imparts to the lips and gums. But only some nations chew it with the betel-leaf, others add to it lime, tobacco, gambir (an extract from the foliage of *Uncaria gambir*, Roxb.) and the leaves of various species of pepper. The best Betel nut of the Madras Presidency grows in the Nuggur district of Mysore, and in Travancore. It occurs in the market sliced and in whole nuts, also boiled and raw, or split and dried hastily over a fire, or dried slowly in that manner. That used by families of rank in Travancore, is collected while the fruit is tender, the husk or outer pod is removed; the kernel, a round fleshy mass, is boiled in water. In the first boiling of the nut, when properly done, the water becomes red, thick, and of a consistence like starch, which is afterwards evaporated into a substance like catechu and is indeed known by the same name. The boiled nuts being then removed are sliced and dried, the catechu like substance is rubbed over them, and, on being dried in the sun, they assume a deep black colour. Whole, unsliced nuts are also similarly treated, Nuts are fit for the slicing process in the months of July and August. Ripe nuts preserved in the pod are also in use. Nuts for exportation to Trichinopoly, Madura and Coimbatore, are prepared in thin slices, and colored or left in their natural hue. For Tinnevelly and other districts, the nuts are simply dried, or cut into two or three slices; nuts are exported in their pods to Bombay. 2000 candies on the average are annually exported from Travancore. In China they are met with both cut and

whole and the imports are mostly the growth of Java, Singapore, Sumatra and Penang. The number of the trees of the Betel Palm, in Travancore alone, is calculated at 1,02,32,873. It may give an idea of the great extent to which this masticatory is used in Southern Asia to notice the quantity and value of their Imports and Exports into the Madras Presidency alone, for the four years 1852-53 to 1855-56 inclusive.

	Imports.	
	Quantity.	Value.
Betel nut boiled.	Cwt. 2,09,827	Rs.11,63,361
Do. raw,	Cwt. 76,688 No. 1,05,13,23,180	„ 11,23,709
		Rs. 22,87,070

	Exports.	
	Quantity.	Value.
Betel nut boiled.	Cwt. 1,49,874	Rs. 7,80,646
Do. raw,	Cwt. 75,544 No. 2,44,39,600	„ 4,39,910
		Rs. 12,20,556

The Imported nuts were chiefly brought from the Straits of Malacca, Ceylon, Indian French Ports and Travancore; and the Exports were made to Bombay, the Concan, Cutch, Sind, Guzerat, Persian Gulf and Bengal.

(737) BETULA. A genus of plants of little importance in a medicinal view. The white birch yields a bark which the Kamschatdales chop up with the eggs of the sturgeon, and use as their ordinary food. The sap is acid, and an agreeable beverage, and may be kept for years without undergoing fermentation. There are numerous other economical uses to which the products of this valuable tree are applied.

(738) BETULA ACUMINATA, THE TAPERING-LEAVED BIRCH. Leaves ovate, lanceolate, somewhat simply serrated, taper-pointed, smooth, dotted beneath, leafstalks and twigs quite smooth; ripe catkins, very long, pendulous, cylindrical, crowded; their rachis and the bracts, which are auricled at the base, downy. Found on many of the mountains of Nepaul, and in the great valley of that country, following the course of rivers.—*Eng. Cyc. page* 452.

(739) BETULA BHOJPATTRA.

Bhurja, HIND.

Indian Paper Birch has the leaves oblong, acute, with nearly simple serratures, somewhat heart-shaped at the base: their stalks, veins, and twigs hairy; ripe catkins, erect, cylindrical, oblong; bracts smooth, woody, two-parted, blunt, much longer than the fruit, which has narrow wings. It is found on the Alps of Gurwal and Kumaon, where it was discovered by Dr. Wallich, who informs us that its thin delicate bark furnishes the masses of flexible laminated matter, of which great quantities are brought down into the plains of India for lining the tubes of hookahs. The Sanscrit name of the substance is Boorja. (Wall. 'Plant. As. Rar.', vol. ii. p. 7,) The bark of this species is of a pale cinnamon colour. It is nearly allied to *Betula papyracea* of North America.—*Eng. Cyc. page* 452. So late as the age of the Dramas, about the beginning of the Christian Era, Professor Wilson mentions that the Hindoos still used the inner bark of this Birch as paper.—*Royle, p.* 383.

(740) BETULA CYLINDROSTACHYA, Cylindrical spiked Birch, is found in Kumaon. —*Eng. Cyc. p.* 452.

(741) BETULA NITIDA, the shining birch, grows in Kemaon.

(742) BEZOAR, COW BEZOAR.

Faduj, Hejr-ul-bucher, ARAB.
Visagul, CYNG.
Ghyroon, Zehr-morah, DUK.
Bezoard, FR.
Bezoarsteen, GER.
Goorochundun, GUZ. HIND.
Gawzerah, Padzehr-kanie, PERS.
Bazar, PORT.
Gorochana, SANS.
Koroshanum, Vishih-kulloo, TAM.
Goliga, Mantika, Matika, MALAY.
Gerooda patsa rai, TEL.

There are several kinds of bezoar, all being concretions found in the gall-bladders or intestines of various animals. Some are prized for the fine yellow colouring matter in which they abound; others are celebrated in eastern works as remedies for snake bites, hydrophobia, &c. Bezoars are never used by European practitioners, and do not deserve the least confidence.—*O'Shaughnessy, page* 691. That known as Oriental Bezoar, was formerly used in medicine in Europe, and formerly in India a stone weighing an ounce was sold for £5 and one of 4¼ oz. for £100. When genuine, it varies in form, is smooth and glossy on the surface, of a dark green or olive colour, and in size is generally less than a walnut. The name was at first applied to a concretion found in the stomach of a goat in Persia, but is now used to designate similar substances found in various other animals, as the cow, horse, boar, camel, &c. That produced by the goat was formerly much prized as medicine, sometimes selling for ten times its weight in gold; but since its constituent parts have been ascertained, it has ceased to be sought after. Different animals produce bezoar, the composition of which differs often in the same kind of animal, as well as in dissimilar species. The oriental bezoar is formed of bile and resin; other kinds are found to be made of hair, others of wood, and some principally of magnesia and phosphate of lime. The true bezoar from Persia is counterfeited so well by pipe-clay and ox-gall that

even those have been deceived who procure the genuine from the animal. The genuine throws off only a small scale when a hot needle is thrust into it, and put into hot water it remains unchanged; when rubbed on chalk, the trace should be yellow, but green on quick lime. That found in the camel is highly esteemed as a yellow pigment by the Hindús. The cow bezoar is valued in the Chinese market at from $20 to $25 a catty, and is used by the Chinese solely as a medicine. The little which is brought there is from India.—*Morrison.* Crawfurd mentions that the Bezoar stones brought from Borneo are said to be obtained from the stomach and intestines of monkeys.—*Crawfurd, page* 52. Dr. Honigberger, p. 244, mentions that a Bezoar of the Eastern doctors (Padzuhr seeah, Pers: kanee zuhr, mohra, Ind.) is dark green serpentine, and a specimen in the Madras museum brought from Delhi by Mr. Charles Gubbins, as Zehr mohra, is undoubtedly, this mineral. While this part is passing through the press, a Mahomedan has called to offer for sale two large rings of "Zehr mora," both formed of a serpentine marble. Faulkner's description seems also that of serpentine, he says it has a smooth, glossy surface, and is of a dark green or olive colour. Localities, Borneo, India, &c. It is brought to Bombay from Guzerat and Malabar in small quantities, which is chiefly re-exported to China. Ainslie mentions that it is brought to India from Ceylon, Bussorah, and the sea ports in the gulf of Persia, also that as a medicine, Bezoar is supposed, by the native practitioners, to possess sovereign virtues as an external application in cases of bites of snakes or stings of scorpions. He adds that this calculous concretion appears to have been first used as a medicine by the Arabians. Razis, in the "Continens," describes it fully, and extols its good properties.—*Ainslie, p.* 6.

(743) BHABHUR, Eriophorum cannabinum, Royle; a sedge, employed in India for making ropes. It is very common in the Himmalayas, both in low valleys and at considerable elevations. —*Royle, p.* 34 and 389.

(744) BHAGULPORE. Hooker, in his 'Him. Jour. Vol. I. page 92,' mentions that he found growing here the *Tecoma jasminoides*, Erythrina; Adansonia Bombax, teak, banyan, peepul, sissoo Casuarina Terminalia Melia and Bauhinia.

(745) BHAI-BIRRUNG. The seed of a plant brought to Ajmere, from Harowtee, considered warm and used in mesulihs, and in prescriptions to promote digestion.—*Genl. Med. Top. p.* 126.

(746) BHAI-PHAMBA. The flowers of a plant brought to Ajmere from Harowtee, considered warm, and used to promote degestion.—*Gen. Med. Top. p.* 126.

(747) BHANG. Bhung, Cannabis sativa.

Subjah, Subjee, Sidhee, Duk. Guz. Hind.	Bengh, Pers. Banghie, Tam.

The larger leaves and capsules of the dried hemp plant are usually termed Bhang. They are used by the natives of India for making an intoxicating-drink bearing the same name, also for smoking.—*Faulkner.* The inebriating preparation made from the leaves of the ganja or Bhang the Cannabis sativa, is generally in a liquid form and is a fiercely intoxicating draught. Its recipe is, Hemp leaves, washed in water, 3 drams; black pepper, 45 grains; cloves, nutmegs and mace, of each 11¼ grains; triturate the ingredients with eight ounces of water, or milk, or with the juice of watermelon seed or cucumber seed: and strain. The spices render it more inebriating.—*Herklots.* The hemp-plant in tropical countries also exudes a gum, that is "a very powerful stimulating narcotic," which it does not produce in cold countries. The dried leaves under the name of bhang, partake of this narcotic principle, and are used all over India, to produce intoxicating effects. Under the Burmese government at Tavoy, no one was allowed to cultivate the plant without a licence from Government. Sometimes a general permission was given, and at other times a general prohibition would be issued.—*Mason.* Throughout India however the Bhang is one of the exciseable articles and the trees are taxed for revenue.

(748) BHANG-I-GUNDUNA, Duk. Allium tuberosum.—Indian Chive. This very much resembles the English chive; it is grown in square beds or rows and should be planted at the close of the rains; it is easy of culture either by slips or dividing the roots; it should be set about twelve inches apart, and when the bunches have increased to a large size, must be again divided. It is served in various ways for the table.—*Riddell.*

(749) BHARANGI. Verbesina prostrata. The bark of the stem of this small plant is brought to Ajmere from Harowtee, It is considered warm, and is used to promote digestion.—*Gen. Med. Top. p.* 126.

(750) BHENDEE. See Abelmoschus esculentus. Syn. Hibiscus esculentus.—Benday kaya. The long capsules, when green, are either boiled whole and eaten or sliced and put into soup or curries; the inside is filled with albumen, but, when dressed, not unpleasant. The seed is sometimes laid upon toast with butter, pepper and salt. Another species, A. moschatus, has a smaller capsule; the seeds when rubbed between the fingers have a strong scent of musk; the Arabs flavour their coffee with it.

(751) BHERE FRUIT. See Ziziphus Jujuba.

(752) BHIDAIRA. This is the root of a small bush found in Ajmeer, and brought from Delhi, has little taste: used in medicine; women take it during pregnancy, believing it can cause the womb to rise out of the pelvis when tardy in so doing.—*Gen. Med. Top. p.* 129.

(753) BHILAWA OR BHILAWUN, Hind.
Belader, ARAB. | Bhela, DUK. | Bhalataka. SANS.

Bhilawa, is the nut of a large forest tree, the Semicarpus anacardium, which is common throughout India; the acrid viscid oil which the nut contains, is used as an escharotic and as a counter-irritant: it leaves a mark for life: it creates great pain and often very intractable sores, but ignorant natives, unacquainted with the blisters of Europe, have a greater dread of them than of the Bhilawa. It is given in medicine in small doses, and is considered a stimulant and narcotic; is much used in the mesalihs of elephants; given in large doses, it renders these animals furious, is considered good in venereal diseases, especially of women. The farina of the anthers of the flowers, is very narcotic and irritating; people of a peculiar habit accidentally sleeping under the tree when in blossom, or even going near the flowers, are stupified and have their faces and limbs swollen: and the use of the Bhilawa as a counter-irritant very frequently causes the whole body and face to swell with erythematous inflammation and much constitutional disturbance. The mature corolla and the receptacle are fleshy and sweetish sour, and are eaten roasted or boiled as a vegetable, and aphrodisiac along with cocoanut and chironjie.—*Gen. Med. Top. p.* 127. The Bhilawa nut is worn on the arm, as a charm, in guinea worm.

(754) BHIRMI-SUGAN. Leaves of a small plant brought to Ajmere from Delhi employed in making scents.—*Gen. Med. Top. p.* 129.

(755) BHIRMI-VIDAYA. Leaves of a climber from mount Aboo, very stimulating, and, in Ajmere, used in the "seet," a disease simulating catalepsy.—*Gen. Med. Top. p.* 129.

(956) BHO-PHULLI. A small scandent plant, abundant about Ajmere. It contains a great quantity of mucus, and is used in great quantity, as an aphrodisiac, rubbed up with water and strained. It is also considered cooling, and is used in prescriptions as such.—*Gen. Med. Top. page* 127.

(757) BHULL. Like all large rivers which flow through an alluvial soil, for a very lengthened course, the Indus throws up patches of alluvial deposit at its mouth. In Sind, these are called bhulls, and they are in general of great value in the cultivation of the red rice of the country. They are dreary swamps and exist on both sides of the principal mouths of the Indus, in the Gora baree and Shah bunder pergunnahs, but produce a considerable portion of the rice consumed in Sind. —*Simmonds, p.* 293.

(758) BICHE DE MAR, SEA CUCUMBER.

Tripang, MALAY. | Beche de mer, PORT.
Biche de mar, biche-de Mer. | Hoy-shun, CHIN.
Sualla, Celebes. | Balate, PHIL.

Biche-de-mer or Tripang is the name given to a species of Holothuria, found in most of the shallow seas of the Malay and Philippine Archipelagos. The word tripang is Malay, and the animal is called by the people of Celebes, süala, which our traders write swalloe. It is the beche de mer, or sea-worm of the Portuguese, and our own "sea-cucumber," for in appearance and shape, although not in colour, for it is a dirty brown, it greatly resembles a cucumber. The esculent holothuria is by no means confined to the seas of the Archipelago; it is found in the upper part of the Gulf of Siam, and is so abundant on the northern coast of Australia that the people of Celebes, receiving advances from the resident Chinese, have been long in the habit of making annual voyages thither in quest of it. Gutted, dried in the sun and smoked, it is considered cured, and fit for its only market, that of China, to which many hundred tons are yearly sent for the consumption of the curious epicures of that country. The fishery of the tripang is to China what that of the sardine, tunny, and anchovy is to Europe. It is, for the most part, caught by hand, for it has little power of locomotion, but, in deep water, sometimes by diving. Mr. Windsor Earl, in his account of the fishery on the shores and banks of the Aroe Islands, where this animal appears to be very abundant, mentions that their great sources of wealth are the pearl and tripang banks, which lie on the eastern side of the group. These extend the entire length of the islands, and are often several miles in width, being intersected by deep channels, some of which will admit vessels of burthen. The tripang, or sea-slug, on that coast, is of several varieties. The greater portion is caught in shallow water, where it can be picked up off the bank without diving." See *Journal of the Indian Archipelago, Vol.* iv, *p.* 480. The tripang, although an article of considerable importance in the trade of the Indian Islands, is never found in the printed price-currents of an European emporium, because seldom dealt in by Europeans, which arises from nice or rather capricious distinctions in their quality, which no European is competent to appreciate. We can discover no mention of the tripang in the early Portuguese writers; which seems to be another proof that the Chinese, who carry on the trade and advance the funds, had not yet settled in the Archipelago when the Portuguese first appeared in it.—*Crawfurd Dict. page* 440. The Hon'ble Mr. Morrison mentions that it forms one of the important articles of commerce between the islands of the Indian Archipelago and China. That it is found on all the islands from New Holland to Sumatra, and also on most of those in the Pacific: but is produced in the greatest abundance on small coral islands, especially those to the south and east of the Sulu group. Among the islanders it is known by the name of *tripang*, the Chinese at Canton call it *hoy-shun*, which means *sea-ginseng*. It has but few powers of locomotion. It is sometimes two feet long; but its common length is from four to ten inches, and its diameter two or three. Its tentaculæ are short, and when the animal is cap-

tured are folded up under its body. It is taken with the hand by natives, who often dive for it; and after it has been cleansed, dried, and smoked it is fit for sale. For a long time the Chinese were the sole carriers of the article; but recently foreigners have engaged in the trade. In the market, it appears hard and rigid, and has a dirty brown color; when brought to the table, it resembles pork rind in color and consistency. The Chinese use it by-itself, or as an ingredient in other dishes, and consume large quantities under the belief that it is an aphrodisiac. The varieties into which they devide it are about thirty, varying in price from $80 down to $1½ per pecul, but unless one is well acquainted with the article it is impossible to distinguish them; a great deal of this article is imported into Macao, in junks and Portuguese vessels. In the Chinese tariff, all the sorts are arranged under the two heads of black and white.—*Morrison p.* 141 Mr. Faulkner mentions as its localities, the Eastern Archipelago, Australia, Mauritius, Ceylon, Zanzibar, &c, and that it is occasionally brought to Bombay from the latter place, and re-exported to China.

(759) BIGHA. Bigha, Beegha, corruptly Beegha, Beegah, Begah, &c. A measure of land, varying in extent in different parts of India. The standard Bigha of the Revenue surveys of the North-West Provinces is equal to 3025 square yards, or 5-8ths of an acre. In Bengal, the Bigha contained only 1600 square yards, or little less than 1-3d of an acre. In Benares it was, at the time of the settlement, determined at 3136 square yards. In other pergunnahs it was to 2025 to 3600, or to 3925 square yards. A kacha (an immature or crude) Bigha is in some places a third, in others only a fourth, of a full or standard Bigha. Akbar's Bigha contained 3600 Ilahi-gaz, which have been considered as equal to the 3025 square yards of the Bigha of Hindustan. Mr. Elliot specifies the following as some of the variations found in the Upper Provinces.

	Acres.	Bighas.	Biswas.	Kittas.
Farakhabad, ...	100 =	175	12	0
East and South Gorakhpur,	„ =	192	19	7
Allahabad and part of Azimgerh.	„ =	177	5	6
Part of Azimgerh and Ghazipur,	„ =	154	6	8
Bijnur, ...	„ =	187	19	15
In the upper Doab (Kachhu),	„ =	582	3	0

In Cuttack, the Bigha is now considered to be an English acre. The Maratha Bigha is called twenty pands, or 400 square kathis or rods, each five cubits and five hand-breadths: as the rod varies, so does the bigha: under the Aadil Shahi dynasty it was equal to 4683 square yards, or only 457 square yards less than an English acre. The Guzerat Bigha contains only 2844 square yards.—*Glossary of Indian Terms by Wilson, page* 85.

(760) BIHULL, is the inner bark of Grewia oppositifolia, and employed in the Himmalayas for making ropes.—*Royle.*

(761) BIJUCO; A fibre exhibited from Manilla, in the Exhibition of 1851. Its source is not known.—*Sleman.*

(762) BIJBAN, is the seed of a plant found in all Rajpootanah. It is heating, and used at Ajmere in aphrodisiac prescriptions.—*Gen. Med. Top. page* 126.

(763) BIKH. Bish; Vish; Visha, Ata visha. See ACONITUM. Bikh, or Bish, is the name given amongst the Hindoos to a most powerful and destructive vegetable poison. Dr. Wallich refers the plant to the Aconitum ferox, (*Engl. Cyc. page* 455.); but it seems to be a name given to the roots of the various Aconites, for Dr. Hooker, in one part of his journal, mentions that amongst the herbs he met with were many of great interest, as a rhubarb, and the Aconitum palmatum, which yields one of the celebrated "Bikh" poisons. Bikh, he adds, is yielded by various *Aconita.* All the Sikkim kinds are called "gniong" by Lepchas and Bhoteeas, who do not distinguish them. The *A. napellus* is abundant in the north-west Himalaya, and is perhaps as virulent a Bikh as any species. At another place he mentions that magnificent gentians grow in the Lachoong valley, also *Senecio, Corydalis,* and the *Aconitum luridum,* a new species, whose root is said to be as virulent as *A. ferox* and *A. napellus.* The result, however, of Dr. Thomson's and his examination of the Himalayan aconites (of which there are seven species) is that the one generally known as Aconitum ferox, and which supplies a great deal of the celebrated poison, is the common Aconitum napellus of Europe.—*Hooker Him. Jour. Vol* I. *p.* 168 and *Vol.* II. *p.* 108.

(764) BILE. Modern chemists regard bile as a soda-soap; and, as such, that of the ox, or ox-gall, is used in the arts, by painters in water colours, scourers of clothes, and many others, but from its green colour it requires, for many purposes, to be clarified or prepared. *Prepared gall* combines with colouring matters and pigments, and gives them solidity either by being mixed with or passed over them on paper. It adds to the brilliancy of ultramarine, carmine, green, and more delicate colours, and makes them spread more evenly upon paper, ivory, &c. Mixed with gum Arabic, it thickens the colours without giving a glistening appearance: it prevents the gum from cracking and fixes the colours so well, that others may be applied over them without running into them. Mixed with lamp black it forms a good imitation of China ink. A coat of ox-gall upon black lead or crayon drawings prevents the lines being effaced, and such drawings may be safely coloured by first mixing the colours with ox-gall. Miniature painters also use it for removing the unctuous matter from the surface of ivory; and when ground with the colours, it enables them to be spread easily and renders them fast. It is, also, useful for transparencies, by passing them over the varnished or oiled paper

and allowing it to dry. The colour is mixed with gall and then applied, and cannot afterwards be removed. It takes out spots of grease and oil, and is useful to the laundress in washing dresses, the colours of which would run or be removed by the ordinary process of washing. A small portion dropped into ink renders it fluid. To clarify gall, the fresh substance is allowed to settle for a day or two: the liquor is then poured off from the sediment into an evaporating dish, and exposed to a boiling heat, in a water bath until it is somewhat thick. It is then spread upon a dish and dried before the fire, in which state it may be kept for years in jelly pots covered with paper. When required for use, a piece, the size of a pea, may be dissolved in a table spoonful of water.—*Toml.*

(765) BID-ARI-KHAND. Root of a climber found in the Ajmere hills, considered of a warm nature, and used among a great number of ingredients of many prescriptions.—*Gen. Med. Top. p.* 126.

(766) BIGNONIA, a genus of plants named by Tournefort after the Abbé Bignon, librarian to Louis XIV. It forms the type of the monopetalous order of Exogens, *Bignoniaceæ*. They are usually climbing shrubs furnished with tendrils, having opposite, single, conjugate, ternate, pinnate, or digitate leaves. The flowers are mostly in terminal or axillary panicles. The corollas are trumpet-shaped, and are coloured variously, white, yellow, orange, purple, violet, or rose.—*Eng. Cyc. page* 454. There are betwixt 60 and 70 known species and varieties. In floriculture, they grow in any situation or soil; but do not succeed well in pots owing to their rapid growth. The leaves of Bignonia chica yield a red colouring matter. The bark and capsules of B. indica are astringent, and used in tanning and dyeing. The pleasant tasted and fragrant flowers of B. chelonoides (suaveolens) are described as being used as a cooling drink in fevers.—*O'Shaughnessy, page* 489. Mr. Mason mentions that the Karens often build their boats with the wood of a species of Bignonia, as the genus is defined by Roxburgh; and the timber, which is sometimes large, is frequently used in joinery.

(767) BIGNONIA CHELENOIDES. *Syn.* Bignonia suaveolens. பாதிரிமரம் Pathire marum, TAM. This tree is held sacred by the Hindoos, in consequence of which the wood is obtained with difficulty, and its quality unknown. It deserves attention, as the Bignoniaceæ in Brazil, where the trees attain a large size, furnish some fine timber.—*Jaffrey.* Its pleasant tasted and fragrant flowers are used to make a cooling drink in fevers.—*O'Shaughnessy, page* 408. *Mason.*

(768) BIGNONIA CHICA. Its leaves yield a red colouring matter.—*O'Shaughnessy, p.* 380.

(769) BIGNONIA CORONARIA, a large tree with white flowers, very plentiful in the Tharawaddy and Pegu districts; it and *Bignonia Spathoidea*, found throughout the province, both afford from their inner bark material for rope employed for local purposes. The inner bark of *Sterculia ramosa* also affords a strong and durable rope in common use.—*McClelland.*

(770) BIGNONIA INDICA, grows in Behar, and immense pods hang from its branches in its leafless state. *Hooker Him. Jour. Vol.* 1 *p.* 16. In the Tenasserim Provinces, its large terminal erect racemes, are often seen near the dwellings of the natives; and its seeds are frequently noticed on account of the large membranous wing with which they are surrounded.—*Mason.* Bignonia Indica, is a tree which grows more luxuriantly in the cold regions of the Himmalaya than in the botanical gardens of Hindostan; and might probably grow in the open air of Europe also. At Lahore, was received from the hills a gigantic pod, not less than half a yard in length and four inches in breadth—*Honigberger, p.* 244. The bark and capsules of this tree are astringent and used in tanning and dyeing.—*O'Shaughnessy, page* 480.

(771) BIGNONIA RADICANS. This ash-leaved trumpet-flower has stems with rooting joints; flowers in large bunches, of a scarlet orange colour: is of easy cultivation.—*Riddell.*

(772) BIGNONIA SPATHOIDEA. This large tree is found throughout the Tenasserim Provinces. It is plentiful and its inner bark affords a material for rope.—*McClelland.*

(773) BIGNONIA STIPUTALA. *Syn.* Spathodea stipulata. Stipuled triumpet flower tree. A common flowering tree throughout Tenasserim: this species of Bignonia bears a long twisted pod. It is common at Maulmain: and the flowers are often seen in bazars where they are sold for food. The tree enters the native materia medica, as affording a cure for psora.—*Mason.*

(774) BIGNONIA SUBEROSA. Cork-barked Bignonia.

Neemi Chambeli, HIND. | Cork marum, TAM.

A fine tree, with deeply cracked spongy bark, from which an inferior sort of cork can be made; quality of wood unknown. It is a native of the East Indies, and is common in gardens in India. This beautiful tree is of very rapid growth. The rough bark peels off in small pieces about once a year. In January the tree is covered with blossoms which are beautiful and fragrant in a high degree.

(775) BIGNONIA UNDULATA. Wave-leaved Bignonia. Bohira Reora, HIND.

A tree with drooping branches like the weeping willow; leaves covered with micaceous scales; flowers in lateral racemes, very large, orange-coloured, and scentless. It is a very common tree in Marwar and other parts of Rajwarra. When covered in the month of March with its immense quantities of orange-coloured blossoms, this tree is a most splendid object and would be

highly ornamental in compounds; the wood is fine grained and valuable, having a scent like the walnut leaf.—*Gen. Med. Top. p.* 200.

(776) BIGNONIA XYLOCARPA.

Vadencoorni marum, TAM.

A large tree, wood brownish yellow, rather close grained, employed for cabinet-making, takes a good polish in turning.

(777) BILIMBI.

Bilimbi, is the Malayan name of the acid fruit Averrhoa Bilimbi.—*Engl. Cyc. p.* 458.

(778) BINDRABUN, or Vrindawand, signifying a grove of "Toolsee" trees, is a town situated on the right bank of the river Jumna from over which in a boat, a most picturesque view may be obtained of it, presenting a panorama of of great beauty. The circumstance which imparts most to the sacredness of Bindrabun, is its having been the seat of the early revels of Krishna, the Apollo of the Hindoos; Mutra having been his birth place. While many a Hindoo Anacreon courts the muses with lays dedicated to this youth, prominent in Hindoo mythology, minstrels and maids join in soft strains towards his praise. Bindrabun, among other things, is now noted for the manufacture of pretty toys made of a composition that may be mistaken for mineral. Indeed the venders pass them off as such, and to enhance their value, declare that they are brought from Jeypoor, where articles of this description and marble toys especially receive a fine finish.—*Tour of India by French, p.* 214.

(779) BIRD LIME.

Glu, FR. | Vogelleim, GER. | Pania, IT. | Liga, SP.

An adhesive, tenacious, vegetable product, obtained from the inner bark of the holly by bruising, boiling in water, and fermentation. It has a bitter taste, and the appearance of linseed-oil. The substances now known in Europe under this name are the viscid juices of several trees. The most powerful of these, in Southern India, is obtained from a tree, which Mr. Lascelles calls the Palay, and reports that Lindley named it the Isonandra acuminata. The imports into England is now in great part from Turkey.—*Tom.*

(780) BIRD FEATHERS. Bird's feathers, from the cranes and king fishers, form a considerable article of trade in Southern Asia. The feathers of a large, green king-fisher, are exported from Madras, one lac at a time, to Singapore, to be used by the Malays, Javanese and Chinese. They sell there at 200 per cent profit. See FEATHRRS.

(781) BIRD-NESTS.

Indiaanische-vogelnestjes, DUT.	Ababel, HIND.
Nids de Tunkin, FR.	Nidi-di-Tunchino, IT.
Indianische-vogelnester, GER.	Susuh, JAV.
	Nidos-de-la China, SP.
	Sarang-burung, MALAY.

The Bird nests of Southern Asia are the esculent nests perhaps of several species, but certainly of the Lawit of the Javanese, a small dark-colored swallow, of a greenish hue on the back, a bluish one on the breast and no white mark. In Malay, the nest is called Sarangburung, of which our own name is a literal translation; and the Javanese name, expressed by one word, Susuh, is equivalent to it. The swallow producing the esculent nest is found all over the Malay and Philippine Archipelagos, on the Malabar Coast, and the Tenasserim Provinces, wherever there are caves to afford it shelter and protection, and these, as usual, are most frequent in the limestone formation. But Java and Borneo seem to be their chief resort. The celebrated caves of Karang-bolong (hollow rocks) situated in the province of Baglen in Java, and on the shore of the southern sea, may be taken as an example. The entrance into these caves is at the sea level, and at the foot of limestone rocks several hundred feet in height, in one place 200 perpendicular feet, before coming to the first ledge. The mouths of the caves are about 18 feet broad and 30 high, while, within, they expand to breadths of from 60 to 114 feet, and to heights of from 420 to 480, the sea penetrating them to the extent of one-fourth of their length, and in rough weather rendering them inaccessible. The descent of the collectors to the caves is effected by narrow rattan ladders, usually about 74 feet in length, attached at top to a stout tree. Within the caves there are bamboo scaffoldings, in order to reach at the nests, which are detached from the sides by the hand, and from the roof by hooks attached to long poles. There are three periods for making the collection, April, August, and December. The nest-gatherers are persons bred to their dangerous calling, and before the commencement of the first gathering, plays are acted in masks, and there is feasting on the flesh of buffaloes and goats to invoke the aid of the "lady queen of the south" (Nai ratu kidul), an imaginary being, without whose tutelary aid the work of robbing the nests would not, as they think, prosper. After the crop has been taken, the caves are hermetically sealed against human ingress. The whole annual gathering, which is effected at little cost, amounts to from 50 to 60 piculs yearly, or, on an average, to 7,370lbs. This, which is worth at Batavia about £18,000, forms a convenient and unobjectionable branch of the revenue of the Netherland government, since it is paid by strangers in the indulgence of a harmless folly. Esculent swallows' nests are by no means confined, as in the instance now given, to the sea-coasts, for we find them in caves in the interior both of Java and Borneo, and no doubt they exist also in other islands. On the north-western side of Borneo, and not far from the banks of the river Baram, birds'-nest caves are found 140 miles from the sea by the course of the river. They consist of three chambers, one of which is reckoned to be no less than 200 fathoms in length. These are the property of the power-

ful tribe of the Kayan, and like those of Karangbolong are carefully guarded.—*Crawfurd, Dic. p. 54 and 55.* The nests used by the Chinese, are brought principally from Java and Sumatra; though they are found on most of the rocky islets of the Indian Archipelago. The nests are composed of a mucilaginous substance, but as yet have never been analyzed with sufficient accuracy to show their constituents. It is supposed by some that the Gelidium corneum enters into their composition, but it is more probable that they are formed by mucus eliminated from the stomach of the swallow. Externally, they resemble ill-concocted, fibrous isinglass, and are of a white color, inclining to red; their thickness is little more than that of a silver spoon, and their weight from a quarter to half an ounce. When dry, they are brittle and wrinkled; the size is little larger than a goose-egg. Those that are dry, white, and clean, are the most valuable. They are packed in bundles, with split rattans run through them to preserve their shape. The quality of the nests varies according to the situation and extent of the caves, and the time at which they are taken. If procured before the young are fledged, the nests are of the best kind; if they contain eggs only, they are still valuable; but if the young are in the nests or have left them, the whole are then nearly worthless, being dark-colored, streaked with blood, and intermixed with feathers and dirt. The nests are procurable twice every year; the best are found in deep, damp caves, which, if not injured, will continue to produce indefinitely. It was once thought that the caves near the sea-coast were the most productive; but some of the most profitable yet found, are situated fifty miles in the interior. This fact seems to be against the opinion that the nests are composed of the spawn of fish or of biche de mar. The method of procuring these nests somewhat resembles that of catching birds in the Orkney isles. Some of the caves are so precipitous, that no one but those accustomed to the employment from their youth, can obtain the nests, 'being only approachable,' says Crawfurd, 'by a perpendicular descent of many hundred feet, by ladders of bamboo and rattan, over a sea rolling violently against the rocks. When the mouth of the cave is attained, the perilous task of taking the nests must often be performed by torch-light, by penetrating into recesses of the rock, where the slightest slip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf making its way into the chasms of the rock. After they are obtained, they are separated from feathers and dirt, are carefully dried and packed, and are then ready for the consumer. The Chinese, who are the only people that purchase them for their own use, bring them in junks to the Chinese market, where they command extravagant prices; the best, or *white* kind, often being worth $1800 per pecul, which is nearly twice their weight in silver. The middling kind is worth from $1200 to $1800; and the worst, or those procured after fledging $150 or $200 per pecul; it is according to these three qualities, that the duty is now levied. The most part of the best kind is sent to Peking for the use of the court. It appears, therefore, that this curious dish is only an article of expensive luxury among the Chinese; the Japanese do not use it at all, and how the former people acquired the habit of using it is only less singular than their persevering in it. They consider the birds'-nests as a great stimulant and tonic, but its best quality, perhaps, is its being perfectly harmless or useful in so far as it resembles gelatine. The labor bestowed to render it fit for the table is enormous; every feather, stick, or impurity of any kind is carefully removed; and then, after undergoing many washings and preparations, it is stewed into a soft, mucilaginous jelly. The sale of birds'-nests is a monopoly with all the governments in whose dominions it is found. It is estimated by Crawfurd that about 243,000 pounds, at value of $1,263,570, are annually sent away from the Archipelago, most of which is brought to China. Java alone sends about 27,000 lbs.; mostly of the first quality, estimated at $60,000. The most of the trade heretofore has been in the hands of the Chinese and Portuguese, and foreign merchants have had but little to do with it; no account of the amount or value of the importation can therefore be ascertained. This is the reason why the estimated importation is placed so low in the Tabular Statement, as it is perhaps not one half of the amount brought to China.—*Morrison*, 143. A few birds' nests of the esculent swallow are to be got from a rocky island about 20 miles South of Tellicherry, named Sacrifice Rock. Small quantities are occasionally brought to Bombay from the Malabar Coast, which are re-exported to China. Strange as it may seem that a taste for birds' nests should exist among any people, yet so strong is this taste in China, that the trade in birds' nests forms a very lucrative and extensive branch of commerce. Burnett, in his 'Outlines of Botany,' observes, "It has been estimated that 242,400 lbs. of birds' nests, worth in China £234,290 and upwards, are annually exported from the Indian Archipelago." The only preparation the birds' nests undergo is that of simple drying without direct exposure to the sun; after which they are packed in small boxes. They are assorted for the Chinese market into three kinds, according to their qualities, and the common price for birds' nests of the first sort at Canton is no less than 3,500 dollars the pecul, or £5 18s. 1½*d.* per lb; for the second, 2,800 Spanish dollars the pecul, and for the third 160. The Edible-nest swallows, or swiftlets, are so numerous in the limestone caves on the islets and islands on the Tavoy

coast, that the Government revenue from the bird-nest farm in 1847 was nearly eleven thousand rupees; but in 1849, it was more than four thousand rupees less. At Mergui they are not so numerous. The nests, which are taken before the bird lays its eggs, sell in China for about forty-five rupees the pound. In relation to the identification of the species, Mr. Blyth says: "As regards the *Hirundo esculenta* of Linnæus, there is no reason to suppose that this, as described, with yellow irrides and white-tipped tail, has any prototype in nature: the latter would be an anomaly throughout the Cypselidæ, but may refer perhaps to the white tail-markings of some real hirundo, erroneously supposed to be the constructer of the edible nests. Dr. Horsfield gives the species termed *lawet* by the Javanese as *Hirundo esculenta*, Osbeck stating that the specimens which he examined in Java, and those which he took to England, differ from Latham's description in being uniformly of a blackish colour, without a white extremity to the rectrices. Another species, the *linchi* of the Javanese, he gives as *H. fuciphaga*, Thunberg stating that 'its nest is constructed of mosses and lichens, connected with the same gelatinous substance which composes the edible nest of the preceding species.' In the Journal of the Indian Archipelago, the same two species are distinguished by the names *lawet* and *lintye*, and the nest of the latter is described to be without the least value. And, it is added: 'the residence of these swallows, or swiftlets, termed *lintye*, in the caves, contributes greatly to the injury of the holes, for which reason they are destroyed as much as possible at each gathering. The nests which they make are constructed of grass-stalks. They are, however, of the same form, and are as artfully made as the others.' 'Heer Hooyman likewise states, that besides the *lawet*, other species resort to the same caverns, which are named *momomo*, *boerongitam*, *boerong-zoekoe*, and *lintje*. 'These,' he adds, 'are very similar to each other, excepting the second, which has the head larger; and the feathers of all are entirely black. The nests which they construct are black and friable, composed of a light down,' (agglutinated?)—'An opinion prevails that the presence of these birds is injurious to the caverns, on which account they are driven away as much as possible.' Another writer in the same volume of the Bataviaasch Genootschap, mentions the *momos* or *boerongitam* (thus bringing together M. Hooyman's first two species,) as a large kind with plumed tarsi, indicating thus a true cypselus, which is probably the constructer of the nests assigned by Dr. Horsfield and others to the *linchi*. Assuredly, however, the *Collocalia fuciphaga*, *Hirundo fuciphaga*, (Thunberg,) *linchi* or *lintye* of the Javanese, identical upon comparison with Javanese specimens, would appear to be the sole producer of the numerous nests gathered on the rocky coasts of the Bay of Bengal: and the often quoted notice by Sir G. Staunton, in his account of the Earl of Macartney's Embassy to China, must refer either to *C. fuciphaga*, or to an entirely new species, which is hardly to be supposed in the locality. For, he remarks: 'the birds which build these nests are small grey swallows, *with bellies of a dirty white*. The white belly is characteristic of *C. fuciphaga*; and this particular species occurs abundantly on parts of the coast of the Malayan Peninsula, in the Nicobar Islands, and the Mergui Archipelago, and so high as on certain rocky islets off the southern portion of the coast of Arracan, where the nests are annually gathered and exported to China. From all this range of coast we have seen no other species than fuciphaga, nor does it appear that any other has been observed; and we have examined a multitude both of the adults and of young taken from the nests, collected in the Nicobars and preserved in spirit, all of which were of the same species. Still, what appears to be *C. nidifica* inhabits the mountains far in the interior of India, though hitherto unobserved upon the coasts; and it is worthy of notice that *C. fuciphaga* does not appear to have been hitherto remarked inland in this country." It may be here added that *C. fuciphaga* is constantly seen inland in these Provinces. The Karens in the valley of the Tenasserim in the latitude of Tavoy, are well acquainted with the bird, and they say it crosses the mountains to and from the interior every year. That it is the same species there can be no doubt, for the Karen name of the bird is "the white swallow," from its white belly.—*Mason.*

(782) BIRD OF PARADISE, ENG. Burung-devota, MALAY. lit. birds of the Gods. Manuk-dervata, JAV. With no family of birds has fiction been more busy than with the Birds of Paradise. The high value set upon them awakened the cupidity and the fraud of the Chinese, who made up from parrots, parakeets, and others, artificial Birds of Paradise, Ornithologists seem to agree in placing these birds either among the crows (Corvidæ) or in their immediate neighbourhood; and this, from the form of their beak and legs, and from their habits, to which we shall presently allude, appears to be their proper place.

(783) *Parotia sexsetacea, the Siflet.* This is the Paradisea aurea of Gmelin.

(784) *Lophorina superba.* The superb, is the Paradisea superba of Latham.

(785) *Concinnurus.* Of this genus, the *Cincinnurus regius* is the *Paradisea regia* of Linnæus and King-Bird of Paradise of Petiver, who has this note—"Brought from the Molucca Islands, and rarely to be seen here but in the cabinets of the most curious, as with Dr. Sloan, and in the repository of the Royal Society," and Le Manucode of Buffon, is given as an example.

(786) *Paradisea magnifica* of Latham, the P. apoda of Linnæus, is perhaps the most elegant of all these birds; is that which is best known and most often seen. It is the great Emerald, Le grand Emeraude, of the French. "The Birds of Paradise," says M. Lesson, or at least the Emerald, the only species concerning which we possess authentic intelligence, live in troops in the vast forests of the country of the Papuans, a group of islands situated under the equator, and which is composed of the Islands Arou, Wagiou, and the great Island called New Guinea. They are birds of passage, changing their quarters according to the monsoons. The females congregate in troops, assemble upon the tops of the highest trees in the forests, and all cry together to call the males. These last are always alone in the midst of some fifteen females, which compose their seraglio, after the manner of the gallinaceous birds." In order to shoot Birds of Paradise, travellers who visit New Guinea should remember that it is necessary to leave the ship early in the morning, to arrive at the foot of a teak-tree or fig-tree, which these birds frequent for the sake of their fruit—(our stay was from the 26th of July to the 9th of August)—before half-past four, and to remain motionless till some of the males, urged by hunger, light upon the branches within range. It is indispensably requisite to have a gun which will carry very far with effect, and that the grains of shot should be large; for it is very difficult to kill an Emerald outright, and if he be only wounded it is very seldom that he is not lost in thickets so dense that there is no finding the way without a compass. "The little Emerald Paradise-Bird feeds, without doubt, on many substances, in a state of liberty. I can affirm that it lives on the seeds of the teak-tree, and on a fruit called Amihou, of a rosy white, insipid and mucilaginous, of the size of a small European fig, and which belongs to a tree of the genus *Ficus*."—*Engl. Cyc. page* 474 *to* 478.

(786) BIRDS OF EASTERN AND OF SOUTHERN ASIA.

Aves, LATIN.	Patchi also Coorvi, TAM.
Ορνιθες, GREEK.	Pitta, TEL.
Parindah, PERS.	Chooree, DUK.
Taer: Moorgh, ARABIC.	Chiria, HIND.

It is from the Greek name that we derive the term Ornithology. Birds are a class of Vertebrated, Oviparous, Feathered Bipeds, generally formed for flight. We say generally, because, though their mechanism is, in its most perfect development, designed for enabling them to support their bodies in the air and to make progress in that medium, it is also calculated for motion on the ground and for perching on trees. Some families of Birds indeed, are framed entirely for moving on the ground, and others for that motion and for making their way both on the surface of the water and even for a short period below it, without the power in either case of raising themselves into the air; others have the power of supporting themselves in the air, through journies of several hundreds of miles, in their annual migrations. Birds appear to have been objects of interest from the earliest periods. In comparatively later times we find them mingling in the superstitions of Greece and Rome, as they still do with those of the people of Southern Asia, and it is evident that their history and habits were familiar not only to the Grecian husbandman and the augur, but to the great mass of the people. Without such a familiarity on the part of the Athenians, Aristophanes would hardly have ventured on introducing his audience to Νεφελακοκκυγία (see his play entitled "Ορνιθες," 'The Birds'); nor would other poets, Grecian and Roman, so often have referred to these animals as well-known harbingers of certain times and seasons.—*Engl. Cyc. p.* 460. The Birds of Eastern and Southern Asia have been described by several naturalists. In 1831, a Catalogue of birds collected on the banks of the Ganges and the Vindhian range of mountains by Major Franklin, was published in that useful compendium, the Proceedings of the Zoological Society of London. This comprised 156 species, of which more than 20 were described for the first time, many of them very common birds, as *Otus bengalensis*, *Thimalia chatarœa*, *Alauda gulgula*, *Mirafra phœnicura*, *&c. &c.* Notwithstanding the difference of latitude in which these were collected, there are only 6 or 7 which Dr. Jerdon has not since met with in Southern India, which shews the very great similarity of the ornithology of India throughout. In 1832, a catalogue of birds collected by Colonel Sykes in the Bombay presidency, was published in the same work as the last. In this are enumerated 226 species, of which above 40 are described for the first time, many of them common and abundant birds. This catalogue was undoubtedly the most valuable account of the birds of India published, and contains descriptions, with many highly interesting observations on the habits, food and structure of many of the species. Of those enumerated by Colonel Sykes there are about 9 or 10 which Dr. Jerdon, when writing in 1839, had not observed, most of which are probably peculiar to the more northern portion of the range of ghauts and neighbouring table-land. In that year, Dr. Jerdon published a catalogue of the Birds of the Peninsula of India, arranged according to the modern system of classification; with brief notes on their habits and geographical distribution, and descriptions of new, doubtful, and imperfectly described species. The total number of this catalogue was nearly 390: which, however, included of 10 of Colonel Sykes,' and nearly as many more observed by Mr. Walter Elliot, of the Madras Civil Service, who placed valuable notes on birds procured by him at Mr. Jerdon's disposal; by which, in addition to the new species added, this naturalist was enabled to

elucidate several doubtful points, to add some interesting information on various birds, and to give the correct native names of most of the species. Subsequent to this, Dr. Jerdon published a series of supplements to his catalogue of Birds, correcting some points and adding others; and those were followed by a paper from the pen of Lord Arthur Hay. Mr. B. Hodgson of Nepaul, furnished a large amount of valuable information on the ornithology of the Himmalaya; Captain Tickell of the Bengal army has also contributed largely to our stock of knowledge regarding the ornithology of Central India. The birds of the Tenasserim provinces have been largely described by the Reverend Mr. Mason, and those of Ceylon by Dr. Kelaart, but the most important writings have been a continued series of valuable articles from Mr. Blyth, who is the most constant in his pursuit of science, as he is the ablest naturalist in Southern Asia. It is to him, doubtless, that we are indebted for the recent valuable article in the 55th No. of the Calcutta Review, where it is remarked that "there are few persons, other than professed zoologists, who have an idea of the extent to which the feathered inhabitants of the British islands are found in Southern Asia, identically the same in species. In general, so limited are the opportunities which an ordinary Indian life allows for *field observation*, that the only familiar reminiscence of home which an European sojourner in the plains of India will recall to mind, among the feathered tribes of this country, is afforded by the pretty, little, clean-looking, sprightly Water Wagtail, usually the first and most welcome harbinger of the coming cold weather, and remaining with us so abundantly whilst it continues. This bird, and the harsh chattering of a very common kind of Shrike (*Lanius superciliosus*) in our gardens, are regularly the earliest intimations that most of us receive of the coming change of season; but a Snipe (*Gallinago stenura*) precedes them, which, though few sportsmen discriminate it from the common British Snipe, which makes its appearance somewhat later, is nevertheless a different bird, at once distinguished by having a set of curious pin-feathers on each side of its tail, whereas the British Snipe, which is equally abundant with us has a broad fan-shaped tail, as unlike that of the other as can well be. The pin-tailed is the common Snipe of the Malay countries; and is unknown in Europe, excepting as an exceedingly rare straggler from its proper habitat the east. But the Snipe is unobserved save by the many who delight in exercising their skill in shooting it, or who wonder to see it so soon in the provision-bazar; and our little piebald friend the Water Wagtail, in its season, and the common Sparrow, at all seasons, so abundant as to be overlooked and forgotten, are probably all that the European reader unversed in the study of ornithology will be able to recall to mind, as yielding associations of home; unless, perchance, he may also recollect the common small Kingfisher of this country, which differs from the British bird only in its more diminutive size. We have somewhere read of the delight expressed by one who had been many years in India, at seeing, upon his return to his native land, the Sky Lark rise from the sod at his feet, and mount higher, and still higher, till reduced to a mere speck in the heavens, or utterly lost to view, all the while making the air ring with its music. Had he ventured forth into the fields of any part of India, he would have seen and heard the very same; although the species (*Alauda malabarica*) is different, and may be somewhat inferior to the European Sky Lark in song, so far at least as regards variety in the notes; but there is really very little difference, so little that the two birds could assuredly not be distinguished by the voice alone, nor by the mode of flight. Examined, the common Indian Lark may be described as resembling the European Wood Lark in size and shape, with the plumage of the Sky Lark. It may, indeed, be remarked that even the Pied Wagtails of India (*Motacilla luzoniensis* and *M. dukhunensis*) are specifically different from those of Europe (*M. alba* and *M. Yarrellii*), however similar in appearance and habits; but the Grey Wagtail of Britain (*Calobates sulphurea*) is identically the same in India and Java, and a specimen has been seen in a collection from Australia. This delicate little bird, so clean and bright in its appearance, is of very general diffusion over Southern Asia during the cold season, being indeed much commoner than in Britain. The most abundant Lark, however, on the plains of Upper India and table land of the Peninsula, is the *Chándul* or Crested Lark, (*Galerida cristata*), which is also a European species, though of rare occurrence in Britain; and the song of this bird, also, its mode of delivery of it in the air, is not very unlike that of the Sky Lark, although it does not soar to so lofty an altitude. The community of species among the birds inhabiting or visiting India and the British islands is most remarkable among the diurnal birds of prey, and, as might be expected, among the wading and swimming tribes; but as these are mostly rare in Britain, and do not fall much under common observation, their presence in India fails to convey any sort of reminiscence of home. The relentless persecution by gamekeepers has now very nearly extirpated, as a permanent inhabitant of Britain, that fine handsome bird, the common European Kite (*Milvus regalis*); though, were it as numerous in England now as in the days of the Tudors, the Scavenger Kites of India (*M. Govinda*) might help to remind the British exile in this country of his distant home in the west. But whatever may be the amount of British species of birds actually obtained, in Lower Bengal for instance there is enough in the *ensem-*

life of the various birds under daily observation in Eastern and Southern Asia, to remind us of the present familiar ornithology of Great Britain. In Bengal, the newly-arrived observer from that region will particularly be struck with the number of birds of large size which he sees everywhere, even in the most densely populated neighbourhoods; flocks of Vultures, huge 'Adjutants' in their season, swarms of Kites in their season too, for they disappear during the rains,—and all three soaring and circling high in air as commonly as at rest,—Brahmini Kites, various other birds of prey, among which four kinds of fishing Eagle, including the British Osprey, are not uncommon,—water-fowl in profusion in all suitable localities, Herons especially of various kinds very abundant,—several sorts of Kingfisher, mostly of bright hues, the common Indian Roller, also a bird of great beauty, and the little bright green Bee-eater (*Merops viridis*) conspicuous everywhere, —the common Crow of India, of unwonted familiarity, impudence, and matchless audacity,—the different Mainas remarkable for their tameness, the Drongos or 'King Crows,' the *Sát-bhais* (or 'seven brothers') with their discordant chattering, two sorts of melodiously chirruping Bulbuls, the bright yellow 'Mango-bird' or Black-headed Oriole, the pretty pied Dhyali, the only tolerably common sylvan songster worthy of notice, the brilliant tiny Honey-suckers; also with musical voices, the lively and loud Golden-backed Woodpecker, and two monotonously toned species of Barbet, the pleasingly coloured Rufous Tree-magpie (*Dendrocitta rufa*), the noisy koel, remarkable for the dissimilarity of the sexes, and for parasitically laying in the Crows' nests, the Crested Cuckoos (*Oxylophus*) during the rainy season (parasitical upon the *Sat-bhais*), with other *cuculine* birds, especially the Coucol or 'Crow-Pheasant,' another noisy and conspicuous bird wherever there is a little jungle; and last, but not least characterestic, in this most summary presentment of the birds commonly observed in Lower Bengal, the harmonious cooing of two or more kinds of Dove, soothing to repose and quiet, and the loud screaming of flocks of swift-flying green Parakeets, with sundry other types all strange to the newcomer. While he misses the familiar types of home, the various Thrushes, Finches, Titmice, &c., which are feebly or not at all represented in the ordinary observed ornithology of this part of the world: the bright little *Iora* may perhaps seem to represent the Titmice, and the tiny 'Tailor-bird' the Wren; while the northern forms of Finches are replaced by the *Bayas* or 'Weaver-birds' with their curious pensile nests and the diminutive thick-billed *Munias*: but he will be much struck with the prevailing silence of the jungle, and the paucity of small birds even in the cold season, so different from the woods and gardens and hedge-rows of Britain, teeming with small feathered inhabitants, among which are so many pleasing songsters of all degrees of merit: of the swallows, occasionally and somewhat locally, a few of the *Hirundo rustica*, may be seen chiefly over water, and young birds of the past season; and along the river-banks, where high enough, the small Indian Bank Martin (*H. sinensis*) will occur abundantly; but the Swallows are replaced by two non-migratory Swifts, the common House Swift (*Cypselus affinis*) and the little Palm Swift (*C. balasiensis*). Let him travel, and wherever the telegraph-wires extend he will see the Roller and the 'King Crow' habitually perching on them, to watch for their insect prey: the former displaying his gaily painted wings to advantage, as he whisks and flutters about, regardless of the fiercest sun; and he will soon make acquaintance with the small white Vulturine bird, *Neophron percnopterus*, the 'Rachamah' or 'Pharaoh's chicken,' introduced as British, because a single pair has been known to stray so far beyond its ordinary haunts. Of the smaller British land-birds only few occur, and these are mostly rarities in the west; but the Wryneck is not uncommon, though little observed, and the European Cuckoo will now and then turn up, more frequently in the barred plumage of immaturity; the Hoopoe, too, is common, but is much too rare in England to awaken a reminiscence, and so with others. Of course we allude to the cold season, and to birds in their winter quarters. Among the Hawks, the Kestrel will occasionally be observed in extraordinary abundance; and Harriers (*Circus*) are often seen beating over the open ground; but the small waders are particularly common in all suitable places, including most of those found in Britain, in greater or less abundance. It would be tiresome to particularize further. But wonderful is the number of fishers, and vast indeed must be the consumption of their finny prey. Otters (*Lutra nair*) among the mammalia, but no Seals; and of birds, sundry fishing Eagles, and a great bare-legged fishing Owl, with various Kingfishers in abundance, numerous kinds of Heron in surprising numbers, Pelicans, Darters (*Plotus*), Pygmy Cormorants, and Grebes or 'Dabchicks;' besides Gulls, Terns, and rarely Skimmers (*Rhynchops*). Gulls, however, are less numerous than in Britain; and we have met with three species only, the common British *Larus ridibundus* and a nearly affined species, with the fine *L. ichthyaëtus* chiefly towards the mouths of the Gangetic rivers. Over the salt-water lake near Calcutta, we have seen a very uniformly scattered flight of the great White Egret, so prized at home, as far as the eye could reach in every direction, all pursuing one course to some favorite fishing-ground, and flying just above the reach of gunshot. The Gull-billed Tern is there one of the common birds, and the Whiskered Tern (*Hydrochelidon leucoparia*), replacing the Black Tern of the Kentish marshes; and the Peregrine Falcon

may not unfrequently be seen, well meriting the name of 'Duck Hawk' bestowed on it in North America: also great flocks of Longshanks (*Himantopus*) wading and seeking their subsistence in the expanse of shallow water. And yet we may pass for hours along the reed-fringed *nullahs* or water-courses in the immediate vicinity, and scarcely see a living thing or hear a sound in those watery solitudes; but the muddy banks are honeycombed with the footsteps of wild Pigs of all sizes, and various *Rallidæ* are swarming around, as the numbers of them captured in trap-cages abundantly testify. No sign whatever of the proximity of the great emporium of the east, within an hour's distance or less of its outskirts in a rude canoe; and human inhabitants, fowlers and fishermen or both combined, who have never seen Calcutta in their lives, and actually know not that they are living under the British Government! These men bring their captured produce to certain ghâts, and there sell to other people whose business it is to re-sell to the provision-bazar dealers. Of a number we once questioned, a few only had ever journeyed to Calcutta, and of them but one had seen the Government House! Passing from the delta of Lower Bengal, no matter in what direction, a considerable replacement of species may be observed, characteristic of the fauna of Behar and of the plains of Upper India to the west and north, and of the Burmese countries eastward: but it is not our object to proceed to minute details; nor even to treat of the assemblage of forms in different regions of the sub-Himalàyas, where those of Europe and of W. and N. Asia prevail more and more towards the N. W.: Malayan forms eastward, and Chinese types, and even species to a great extent, or, to express it more correctly, particular sub-Himalàyan genera and species, the range of which extends eastward to China. Again, on the highlands of the Peninsula of India, and still again in those of Ceylon, distinct species of the northern types occur, but *no different genera*. Thus the Jungle-fowl of N. India is replaced by a different species (*Gallus Sonneratii*) in the Peninsula, and by a third (*G. Stanleyi*) in Ceylon: and not a few similar instances might be adduced. We will quote Dr. G. Buist's highly graphic sketch of a curious ornithological incident observed annually in the island of Bombay. "Two events," he remarks, "strike with surprise the ornithologist on the approach of the monsoon. Nearly all the Kites, Hawks, Vultures, and other carrion-birds disappear from the seacoast, while the Crows begin to build their nests and hatch their young just at the season that seems most unsuitable for incubation, when the eggs are often shaken out, or the nests themselves are destroyed by the storm, and the poor birds are exposed, in the performance of their parental duties, to all the violence and inclemency of rain and tempest. At the instigation of a sure and unerring instinct, the carnivorous birds, as the rains approach, withdraw themselves from a climate unsuitable to the habits of their young, betaking themselves to the comparatively dry air of the Dukhun, where they nestle and bring forth in comfort, and find food and shelter for their little ones. The scenes connected with this, which follow the conclusion of the rains, are curious enough. While the Mahomedans bury, and the Hindus burn their dead, the Parsees expose their dead in large cylindrical roofless structures, called TOWERS OF SILENCE, where birds of prey at all times find an abundant repast. Their family cares and anxieties over for the season, the carrion-birds, which had left in May for the Dukhun, return in October to Bombay, and make at once for the usual scenes of their festivities, now stored with a three months' supply of untasted food. As they appear in clouds approaching from the mainland, the Crows, unwilling that their dominions should be invaded, hasten in flocks to meet them, and a battle ensues in the air, loud, fierce, and noisy; the fluttering of the wings, the screaming and cawing of the combatants, resounding over the island, till the larger birds succeed, and having gained the victory are suffered henceforth to live in peace. In Bengal, the Kites and Bramini Kites breed chiefly in January and February, and disappear during the rains. The adult 'Adjutants' make their appearance as soon as the rains set in, and becoming in fine plumage towards the close of the rains, depart at that time to breed in the eastern portion of the Sundarbuns upon lofty trees, and along the eastern coast of the Bay of Bengal upon trees and rocks. Vultures are permanently resident; and the Crows propagate chiefly in March and April, their nests being not unfrequently exposed to the fury of the nor-westers and destroyed by them altogether. As will be shewn in the sequel, a very large proportion of the feathered inhabitants of the British islands are equally natives of, or seasonal or irregular visitants to Southern Asia. Not a few migratory species are common to the polar circle and to Lower Bengal, and even further towards the equator, according to season: but the individual birds may not migrate so far north and south. The *Calliope camtschatkensis*, a delicate little bird much like a Nightingale, but with a brilliant ruby-throat, which is not rare in the vicinity of Calcutta during the cold season, arrives "early in April, with the snowfleck, in the Lower Kolyma district" in Northern Siberia, as we are told by Von Wrangell; that is to say, before the last of them have left Bengal: but it is remarkable that this bird has never been seen in the very numerous collections from the Himalaya examined hitherto; though another and non-migratory specie of the same genus (*C. pectoralis*), peculiar, so far as known, to the Himalaya, is of common occur-

rence in such collections. It is, however, enumerated in Mr. Hodgson's list of the birds of Nepal: still it seems to follow that the *C. camtschatkensis* does not breed extensively on this side of the snow; although the Bengal birds may not have to find their way quite so far as to Northern Siberia to pass the summer. The Hoopoe (*Upupa epops*), another species common in Southern Asia during the cold season, and on the table lands at all seasons, is, to all appearance, a bird of fluttering and feeble flight; but has repeatedly been observed, during the seasons of migration, at altitudes considerably above the limits of vegetation. "On the western side of the Lánák pass, about 16,500 feet, I saw a Hoopoe," writes Major Cunningham; and at Momay (14,000 to 15,000 feet elevation), under the lofty Donkia pass in Northern Sikhim, Dr. J. D. Hooker observed, in the month of September, that "birds flock to the grass about Momay; Larks, Finches, Warblers, abundance of Sparrows (feeding on the Yak droppings), with occasionally the Hoopoe: waders, Cormorants, and wild Ducks, were sometimes seen in the streams, but most of these were migrating south." Dr. J. D. Hooker's sketch of the grand but most desolate panorama beheld by him from the summit of the Donkia Pass (18,466 feet elevation) ought to be familiar to all readers; and he elsewhere remarks that "no village or house is seen throughout the extensive area over which the eye roams from Bhomtso, and the general character of the desolate landscape was similar to that which I have described as seen from the Donkia pass. The Kiang grazing with its foal on the sloping downs, the Hare bounding over the stony soil, the Antelope, the *Tchiru* and also the *Goa*, *Procapra picticaudata* of Hodgson, scouring the sandy flats, and the Fox stealing along to his burrow, all are desert and Tartarian types of the animal creation. The shrill whistle of the Marmot alone breaks the silence of the scene, recalling the snows of Lapland to the mind; while the Kite and Raven wheel through the air, with as steady a pinion as if that elevation possessed the same power of resistance that it does at the level of the sea. Still higher in the heavens, long black V-shaped trains of wild Geese cleave the air, shooting over the glacier-crowned top of Kinchinjhow, and winging their flight in one day, perhaps, from the Yaru to the Ganges, over 500 miles of space, and through 22,000 feet of elevation: one plant alone, a yellow lichen (*Borrera*) is found at this height, and that only as a visitor for, Tartar-like, it migrates over the lofty slopes and ridges, blown about by the violent winds. I found a small beetle at the very top, probably blown up also; for it was a flower-feeder, and seemed benumbed with cold." "An enormous quantity of water-fowl," remarks the same scientific traveller, Dr. Hooker, "breed in Tibet, including many Indian species that migrate no further north. The natives collect their eggs for the markets of Jigatzi, Giantchi, and Llassa, along the banks of the Yaru river, Ramchoo, and Yarbru and Dachen lakes. Amongst other birds, the *Sáras*, or giant Crane of India (see Turner's Tibet, p. 212) repairs to these enormous elevations to breed. The fact of birds characteristic of the tropics dwelling for months in such climates is a very instructive one, and should be borne in mind in our speculations on the climate supposed to be indicated by the imbedded bones of birds." We may remark that the *Sáras* (*Grus antigone*) also breeds south of the Himaláya; and that specimens too young to fly are occasionally brought for sale even to Calcutta. Turner, describing the lake "Ramtchoo," remarks,—"that it" is frequented by great abundance of water-fowl, wild-geese, ducks, teal, and storks, which, on the approach of winter, take their flight to milder regions. Prodigious numbers of saurasses, the largest species of the crane kind, are seen here at certain seasons of the year, and they say, that any quantity of eggs may there be collected: they are found deposited near the banks. "I had several of them given to me when I was at Tassisudon, during the rains; they were as large as a turkey's egg, and I remember being told that they came from this place; but whether or not they were those of the Sauras, I cannot venture to pronounce." We have known instances of the *Sáras* breeding in captivity, when a pair was allowed the range of a large walled garden (protected from Jackals) containing shallow inundated enclosures for the growth of rice: in these the nest is commenced under water, and raised for some inches above the surface; and the eggs are two in number, about $3\frac{3}{4}$ inches long by $2\frac{1}{2}$ inches broad, of a bluish-white, with a few distantly placed rufous specks and blotches. The nest of the European Crane (*Grus cinerea*), also a common Indian bird, is thus described by Major Lloyd, as observed by himself in Scandinavia. "It usually breeds in extended morasses, far away from the haunts of men. It makes its nest, consisting of stalks of plants and the like, on a tussock, and often amongst willow and other bushes. The female lays two eggs," &c. Again, Major Cunningham, in his 'Ladak,' &c., remarks that "the water-fowl swarm on the lakes and on the still waters of the Upper Indus. I have shot the wild Goose on the Thogji, Chanmo and Chomoriri lakes at 15,000 feet; and Col. Bates and I shot three Teal on the Suraj Dal, a small lake at the head of the Bhága river, at an elevation of upwards of 16,000 feet:" but the time of the year is not mentioned by this author. Those birds which are common to India and the polar circle appertain for the most part, as might be supposed, to the wading and web-footed orders; and a few of them are of very general dis-

tribution over the world, as especially the common Turnstone (*Strepsilas interpres*), which seems to be found on every sea-coast. The *Lobipes hyperboreus* is a little arctic bird, of rare occurrence even in the north of Scotland, Orkney and Shetland: but a specimen was not long ago procured near Madras, which is now in the Calcutta museum; and there also may be seen an example of the nearly related *Phalaropus fulicarius*, obtained so late in the year as May 11, 1846, in the Calcutta provision-bazar. The well-known naturalist of the Madras Presidency, Dr. T. C. Jerdon, obtained in Southern India a single example of a little Australian Plover, *Hiaticula nigrifrons*, which figures in his catalogue as a supposed new species by the synonyme *H. russata*. The Tibetan Raven is considered as a peculiar species by Mr. Hodgson, an opinion to which the Prince of Canino seems to incline: it may be presumed to inhabit the lofty mountains of Butan to the north, but the smaller crow of Southern Asia is the *C. splendens*; while the common black Crow of all India, *C. culminatus*, would seem to stand here alike for the 'Raven,' the 'Carrion Crow,' and the 'Rook!' The true Rook (*Corvus frugilegus*) however, is known to inhabit or visit the Peshâwur valley, Afghânistân, and Kashmir. The Rook of China and Japan is considered a distinct species, *C. pastinator* of Gould; and the Jackdaw (*C. monedula*) accompanies it in those countries, while the true northern Raven *Corvus corax* is met with not only there, but also over a great portion of the Punjâb. In other parts of India the comparatively small *C. culminatus* is popularly known to Europeans as "the Raven:" but the northern Raven would make a meal of one and not feel much the worse for it. Dr. Francis Buchanan Hamilton, remarking upon the hawking or falconry observed by him in the Shâhabâd district, mentions that "the only pursuit worth notice that he saw in several days' hawking was from a large bird of prey named *Jimach*, which attacked a very strong Falcon as it was hovering over a bush into which it had driven a Partridge. The moment the Falcon spied the Jimach it gave a scream, and flew off with the utmost velocity, while the Jimach equally pursued They were instantly followed by the whole party, foot, horse, and elephants, perhaps 200 persons, shouting and firing with all their might; and the Falcon was saved, but not without severe wounds, the Jimach having struck her to the ground; but a horseman came up in time to prevent her from being devoured." The *Wokhab* or *Ukab*, as it is also termed, is a small Eagle, very abundant in the plains of Upper India, the Dukhun, &c., bearing many systematic names, the earliest of which is *Aquila fulvescens*; for it is a different bird, not quite so large and robust, as the *Aq. nævioides* of Africa, with which it has been supposed identical. The Hon'ble Walter Elliot, of the Madras C. S., remarks that—"the *Wokhab* is very troublesome in hawking, after the sun becomes hot, mistaking the *jesses* for some kind of prey, and pouncing on the Falcon to seize it. He had once or twice nearly lost Shahins' (*Falco peregrinator*) in consequence, they flying to great distances for fear of the *Wokhab*," *i. e.* the Jimach. The principal species employed in Indian falconry are identical with those of Europe; namely, the *Bauri* of India, which is the Peregrine Falcon of the West; and the *Bâz* of India, which is the Goshawk or 'Gentil Falcon' of Britain. In a curious Persian treatise on the subject, by the head falconer of the Mogul Emperor Akbar, the various species used are enumerated, and may be recognised with precision: among them is the *Shangar*, which is clearly the Jer Falcon of the north; represented as extremely rare and valuable, taken perhaps once or twice only in a century, and then generally in the Punjab. The *Shahin* (*Falco peregrinator*), another favorite Indian Falcon, does not inhabit Europe, but is clearly the *Falco ruber indicus* of Aldrovand, rather than the small hobby-like Indian species (*F. severus*), on which Temminck bestowed the name *F. Aldrovandi*. With five or six exceptions only, the whole of the European diurnal birds of prey are met with in India, many of them being much commoner in this country; and they are associated with numerous other species unknown in Europe. The sport of falconry is widely diffused over Asia, even to the Malayas; but whether extending to China and Japan, we are unaware. It may further be noticed that the "quarry" hawked by Dr. Layard's Bedouin companions on the great plain of Mesopotamia, and rightly enough denominated by him a "Bustard," is no other than the Houbara (*Houbara Macqueenii*) of Sindh and Afghânistân; being a different species from that of Spain and North Africa (*H. undulata*;) and it appears that the former has most unexpectedly turned up, of late years, in England and Belgium, if not also in Denmark. The great spiny-tailed Swift of the Himalàya (*Acanthylis nudipes* of Hodgson) was obtained, a few seasons back, in England. Mr. Gould identifies this British-killed bird with his *Ac. caudacuta* of Australia, but it appears identical with the Himalàyan species; upon comparing Himalàyan specimens with Mr. Gould's plate, no difference can be detected. The great Alpine Swift (*Cypselus melba*) is common to the Himalàya, the Nilgiris, and high mountains of Ceylon, but the great *Acanthylis* of the Himalàya has never been observed in S. India, and is replaced in the Nilgiris, Ceylon, and also across the Bay of Bengal, (in Penang, &c.) by a distinct species, the *Ac. gigantea*. Gold and Silver Pheasants are inhabitants of China; but the Golden Pheasant, according to M. Temminck, inhabits not only China and Japan, but the northern parts of

Greece, as also Georgia and the Caucasus; and it has been met with even in the province of Orenbourg. M. Degland informs us, that M. Gamba, French Consul at Tiflis, met with this gorgeous bird in numerous flocks on the spurs of the Caucasus, which extend towards the Caspian sea; and that now it has gone wild and multiplied in some of the forests of Germany. In Southern Asia, the birds familiarly known as 'Bulbuls' must not be confounded with the Persian Bulbul, which is a species of true Nightingale (*Luscinia*), a genus very closely related to some of the small Thrushes of America. We have no true Nightingale wild in India; but the 'Shama' *Cercotrichas macrourus*, undoubtedly the finest song-bird of this part of the world, is not unfrequently designated the Indian Nightingale, a misnomer which only leads to confusion. It is common to India and the Malay countries; and there is a second species (*C. luzoniensis*) in the Philippines, and a third (*C. erythropterus*) in Africa. We may remark that the *Orocetes cinclochyncha* is also termed *Shama* in the Madras Presidency. Our esteemed Indian songster is *le Merle tricolor de longue queue* of Levaillant (*Oiseaux d' Afrique, pl.* 114). The *Bhim-raj* (*Edolius paradiseus*) is popularly denominated "the Mocking-bird" by Europeans. Several eminent naturalists persist in ignoring the very great differences between 'Storks' and 'Cranes,' in their appearance, habits, anatomy, modes of breeding, and everything, except that both happen to be long-legged birds. They do so by designating the *Hurgila* or 'Adjutant' (*Leptoptilus argala*) "the gigantic Crane." The three ordinary Indian Cranes (*Grus antigone*, *Gr. cinerea*, and *Gr. virgo*; the *Gr. leucogeranos*, occur rarely in the North West provinces. Now the words *Crane* and *Grus*, and the Hindustani names of the three common Indian species, *Saras*, *Kurranch*, and *Kakarra*, all have reference to the loud trumpeting of these birds, which have a curious internal conformation resembling that of the Trumpeter Swans; whereas the Storks are voiceless birds, having actually no vocal muscles, and can make no sound but by clattering their mandibles together, which they do pretty loudly. *Yunx indica* appears to be met with in Afghanistan and Tibet. Mr. Gould describes a kind of Nuthatch to inhabit the Himalayan masses towards Kashmir, but the bird in question is unknown in Central India properly so designated. The *Acrocephalus arundinaceus* (*Sylvia turdoides* of Temminck), and the *Acr. salicarius* (*S. arundinacea* of Temminck), and also the three common British species of *Phylloscopus*, have been noted by different authors as occurring in India; but however nearly the three Indian species of *Acrocephalus* may resemble their European compeers on a superficial view, it will be found, on minute examination that they have a somewhat different form of wing; and that their habits are appreciably diverse: the European species evince a marked preference for watery situations, and this can hardly be affirmed of the Indian. Even where such situations abound, they come more into gardens; moreover the song of the three Indian species is soft and melodious, devoid of the harsh babbling notes of the European *Acrocephali*, in common with most other "aquatic warblers." In India, various instances occur of closely affined Indian and European birds, which every ornithologist would at once pronounce to be distinct: *e.g Oriolus galbula* and *O. kundoo*; *Lanius excubitor* and *L. lahtora*; *Troglodytes europæus* and *Tr. sub-himalayanus*; *Certhia familiaris* and *C. himalayana*, *&c.*: and not unfrequently the exact European species inhabits this country, in addition to another which would otherwise be regarded as its counterpart or representative, or according to the views of some naturalists a mere local or climatal variety of the same species: thus *Circus Swainsonii* (the *pallidus* of Sykes) is regarded by Prof. Schlegel as a local variety of *C. cinereaceus*; had he said so of *C. cyaneus* it would be more intelligible, as the affinity is much closer with *cyaneus*; nevertheless, both *Swainsonii* and *cinereaceus* appear to be common throughout Africa, as both likewise are in India, inhabiting the same districts, and each remaining ever true to its distinctive characters; while *cyaneus* also inhabits the vicinity of the Himalaya, together with both the others. There are precisely the same grounds for regarding the European *Phylloscopus trochilus* and *Ph. rufus* as being 'climatal' or 'local' varieties of one species; only these birds happen to be better known, much as they resemble each other. Again, we have the true *Falco peregrinus* common in India, together with *F. peregrinator*, which would otherwise be regarded as its Indian counterpart: *Hypotriorchis subbuteo* found together with *H. severus*; *Hirundo sinensis* (the ordinary Indian Sand Martin,) together with *H. riparia*; *Cuculus canorus* (the European Cuckoo,) as also several affined species; and so on. In some cases, a European species may have two or more 'representatives' in India, or *vice versa*. Thus *Nucifraga caryocatactes* of the pine forests of Europe and Siberia is replaced by *N. hemispila* in those of the Himalaya generally, and by *H. multimaculata* about Kashmir; *Parus major* by *P. monticolus* and *P. cinereus*, if not also *P. nuchalis* (in addition to *cinereus*) in S. India; *Picus major* by *P. himalayanus* and *P. darjellensis*; *Accentor alpinus* by *A. nipalensis* and *A. variegatus*: while, on the other hand, *Lanius lahtora* in India is represented both by *L. excubitor* and *L. meridionalis* in Europe; *Sitta cinnamoventris* by *S. europæa* and *S. cæsia*, *&c.* Some ornithologists regard the *Passer domesticus*, *P. italiæ* (vel *cisalpinus*), and *P. salicarius* (vel *hispaniolensis*,) of Europe, as being local varieties merely of the same: yet they hold true to their

distinctive differences of coloring, wheresoever found; and examples of the last-named race from Afghanistan and the extreme N. W. of India differ in no appreciable respect from Algerian specimens with which we have compared them: moreover, this race is of far more gregarious habits even than *Passer domesticus*; a fact noticed of it alike in N. Africa and in Kohat. For the *Bauri* or Peregrine Falcon of India, Mr. Gould adopts Latham's name *F. calidus*, thereby implying a distinction from true *peregrinus*. It may be doubted exceedingly if any one difference could be detected. It is true, that many highly approximate races (considered, therefore, as species) do maintain their distinctness, even in the same region and vicinity; as *Falco peregrinus* and *F. peregrinator*, *Hypotriorchis subbuteo* and *H. severus*, *Circus cyaneus* and *C. Swainsonii* in India. *Coracias bengalensis* of all India meets, in the Punjab, &c., the European *C. garrula*; and we are unaware that it interbreeds with it: but in Asam, Sylhet, Tippera, and, more rarely, Lower Bengal, it co-exists with the *C. affinis*, specimens of which from the Burmese countries are ever true to their proper coloration, as those of *C. bengalensis* are from Upper and S. India; but we have seen every conceivable gradation or transition from one type of colouring to the other, in examples from the territories where the two races meet: so also with the *Treron phœnicopterus* of Upper India and the *Tr. chlorigaster* of S. India and Ceylon, which blend in Lower Bengal; and *Gallophasis albocristatus* of the W. Himalaya and *G. melanotus* of Sikhim, which produce an intermediate race in Nepal; and *G. Cuvieri* of Asam and Sylhet, and *G. lineatus* of Burma, which interbreed in Arakan, &c., so that every possible transition from one to the other can be traced, as demonstrated by a fine series of preserved specimens in the museum of the Asiatic Society in Calcutta. If inhabiting widely separated regions, the (assumed) distinctness of such races would be at once granted; as with *Phasianus colchicus* and the Chinese *Ph. torquatus*, which readily intermix and blend, wherever the latter has been introduced in Europe. How, therefore, with *Garrulus glandarius* and *G. japonicus*? *Turdus viscivorus* of Europe and the so called *T. Hodgsoni* of the west Himalaya? *Palumbes torquatus* and *P. casiotis* of the same regions respectively? These would probably soon blend more or less completely; whereas such races as those of the Crossbills, the *Bauri* and *Shahin* Falcons of India, the British *Phylloscopus trochilus* and *Ph. rufus*, and the different European Sparrows, maintain themselves persistently distinct; and this while the common Sparrow of India would probably blend with the British Sparrow (though considered distinct by some), if an opportunity should occur of its doing so.

The names, synonyms and localities of most of the Birds of these countries, are given in Mr. Blyth's catalogue, and are as follows:

Class AVES, Order I. SCANSORES. Fam. PSITTACIDÆ. Subfam. CACATUINÆ. (Cockatoos).

Genus CALYPTORHYNCHUS, Vigors and Horsfield.

(787) *C. galeatum* (Gould's *B. A.* Vol. V. pl. 14.)

Syn. Psittacus galeatus, Latham.
Callocephalon australe, Lesson.

Inhabits S. Australia; Islands in Bass's Straits; V. D. Land.

GENUS CACATUA, Brisson.

(788) *C. moluccensis* (Lear's *Psittacidæ*, pl. 2.)

Syn. Psittacus moluccensis. Gmelin.
Ps. rosaceus, Latham.
Cacatua rubrocristata, Brisson.
C. erythrolophus, Lesson.

Inhabits the Moluccas.

(789) *C. cristata* (Daubenton's *Pl. Enl.* 263).

Syn. Psittacus cristatus, L.
Cacatua leucolophos, Lesson.

Inhabits the Philippines.

(790) *C. galerita* (Lear's *Psittacidæ*, pl, 3; Gould's *B. A.* Vol. V, pl. 1.)

Syn. Psittacus galeritus Latham.
Cacatua chrysolophus, Lesson.

Inhabits (with local variation) N. Guinea, Australia, and V. D. Land.

(791) *C. sulphurea* (Lear's *Psittacidæ*, pl. 4).

Syn. Psittacus sulphureus, Gmelin.
Cacatua luteocristata, Brisson.

Inhabits Timor, &c.

Subfam. PSITTACINÆ (Parrots).

Genus CORACOPSIS, Wagler.

(792) *C. nigra* (Edwards, pl. 5.)

Syn. Psittacus niger, L.

Inhabits Madagascar.

Genus TANYGNATHUS, Wagler.

(793) *T. macrorhynchos* (Daubenton's *Pl. Enl.* 713).

Syn. Psittacus macrorhynchos, Gmelin (the male).
Ps. sumatranus, Raffles (the female).
Ps. pileatus, Scopoli } Young male?
Ps. marginatus, Gmelin }
Kiki, Sumatra (Raffles).

Inhabits Sumatra? Celebes; N. Guinea.

(794) *T. malaccensis* (Swainson's *Ill. Orn.*, 1st series, pl. 254).

Syn. Psittacus malaccensis, Latham (nec Gmelin).
Tana, Malayan.

Inhabits Malayan peninsula; Sumatra.

Genus PALÆORNIS, Vigors.

(795) *P. alexandri* (Edwards, pl. 292; *Nat. Libr., Psittacidæ*, pl. 2.)

Syn. Psittacus Alexandri, L.
Ps. cupatria, L. } The female.
Psittaca ginginiana, Brisson. }
Psittacus guinneensis, Scopoli (nec guineensis, Gmelin).
Ps. Sonneratii, Gmelin.
Palæornis nipalensis, Hodgson, As. Res. XIX, 177.

Chandana (*sandal-wood coloured*, alluding to the yellowish tinge of the under-parts and upper portion of the back), Beng. : *Karan suga* and *Kararia* of Nepal (Hodgson) : *Raee Totah (Royal Parrakeet)*, Hind. (Jerdon) : *Kyai Phoungkha ?* Arracan. Inhabits the Hilly regions of all India Proper, from the sub-Himalayas to Ceylon inclusive : Assam ; Sylhet ; Arracan ; Tenasserim.

(796) *P. torquatus* (Daubenton's *Pl. Enl.* 551).

Syn. Psittaca torquata, Brisson.
Psittacus Alexandri, var. B., Latham.
Ps. cubicularis, Hasselquist.
Ps. docilis, Vieillot.
Var. Sulphur Parrakeet, Shaw.

Tiya, or *Teeah* (imitative of voice), Hind. : *Tent'hia suga*, Nepal (Hodgson) : *Lybar Totah*, S. India (Jerdon) : *Kyaiggyot*, Arracan. Inhabits the Plains of India : Arracan, Tenasserim, and Malayan peninsula to the latitude of Penang. W. Africa (apud Swainson) : smaller variety.

(797) *P. bitorquatus (?)*

Syn. Psittacus bitorquatus (?), Kuhl.
Ps. torquatus, var. B. (?), Latham (2nd. edit.)
Psittaca borbonica torquata *(?)*, Brisson.

'Ring Parrakeet' of the Mauritius. Inhabits Mauritius. According to Latham *P. bitorquatus (i. e.* his *Ps. torquatus*, var. *B.*,) "inhabits the Isle of Bourbon, and other parts of the same latitude both in Africa and Asia." The last named habitat is extremely doubtful.

(798) *P. columboides*, Vigors, (Jerdon's *Ill. Ind. Zool.* pl. 18 ; and figured also in *Madr. Journ.* XI, 209).

Syn. Psittacus melanorhynchus, Sykes, P. Z. S. 1832, p. 96. (The female).

Muddun Gowr Totah, Hind. (Jerdon). Inhabits Nilgiris ; Malabar.

(799) *P. schisticeps*, Hodgson, *As. Res.* XIX, 178.

Syn. Conurus himalayanus (?), Lesson, in Belanger's Voyage.
Madhana suga, Nepal, Hodgson. The same name, slightly modified, which is applied to P. barbatus, and in S. India to P. columboides.

Inhabits the Sub-Himalayan region, exclusively.

(800) *P. cyanocephalus*, (Edwards, pl. 233 ; Daubenton's *Pl. Enl.* 264).

Syn. Psittacus cyanocephalus, L. } The female.
Ps. flaviterquis, Shaw. }
Ps. annulatus, Kuhl. }
Palæornis flavicollaris, Franklin. }
Psittaca bengalensis, Brisson.
Psittacus erythrocephalus, Gmelin.
Ps. ginginianus, Latham.
Ps. rhodocephalus, Shaw.
Var. Ps. narcissus, Latham (with coloured figure).

Faridi, and *Fariadi* (Plaintive), Bengal. *Tui suga* (the first or specific name imitative of cry), Nepal (Hodgson). *Tooeeah Totah*, S. India (Jerdon). *Totá bangáli*, Punjab. *Kyai-ta-ma*, Arracan. Inhabits the Hilly regions of all India Proper, Assam, Sylhet, Arracan, Tenasserim. It occurs also in open jungle, in the Bengal Sundarbans. To the westward, leaving the alluvial soil, it seems entirely to take the place of *P. torquatus*, which abounds throughout the Ganges delta.

(801) *P. Malaccensis* (Daubenton's *Pl. Enl.* 887 ; Levaillant, pl. 72 ; *Nat. Libr. Psittacidæ.* pl. 3).

Syn. Psittacus malaccensis, Gmelin (nec Latham).
Ps. erubescens, Shaw.
Ps. ginginianus, var. *C.*, Latham.
Ps. barbatulatus, Bechstein.
Barong Bayan, Sumatra (Raffles).

Inhabits Malacca ; Sumatra.

(802) *P. erythrogenys*, Blyth.

Inhabits the Nicobar Islands.

(803) *P. caniceps*, Blyth.

Inhabits the Nicobar Islands ; Malayan Peninsula (latitude of Penang).

(804) *P. barbatus*, (Swainson's *Ill. Orn.*, 2nd series, pl. 16 ; Daubenton's *Pl. Enl.* 517).

Syn. Psittacus barbatus, Ps. pondicerianus, et Ps. borneus, Gmelin.
Ps. bimaculatus, Sparrman.
Ps. javanicus, Osbeck.
Ps Osbeckii, Latham.
Palæornis nigrirostris, Hodgson (the female).
P. modestus, Fraser, P. Z. S. 1845, p. 16 (young female).

Madná (charming, pleasing), the red-billed bird : *Kajlá* (as having the black pigment, *kájal*, applied to the eyebrows ; alluding to the black loral line),—the black-billed : Hind. *Imrit Bhela*, Nepal (Hodgson). *Bettet*, Javanese. Inhabits the hilly parts of Bengal, Nepal, Assam, Sylhet, Arracan, Tenasserim, Malayan peninsula (to latitude of Penang), Sumatra, Java, and Borneo. It is extremely doubtful as an inhabitant of the Pondicherry coast, or any other part of peninsular India.

Subfam. PLATYCERCINÆ (Ground-Parrakeets)

Genus APROSMICTUS, Gould.

(805) *A. erythropterus*, (Gould's *B. A.* Vol. V, pl. 18.)

Syn. Psittacus erythropterus, Gmelin.
Ps. melanotus, Shaw.

Inhabits E. and S. Australia ; Timor ; N. Guinea

Genus PLATYCERCUS, Vigors.

(806) *Pl. flaviventris*, (Gould's *B. A.* Vol. V, pl. 24.)

Syn. Psittacus flaviventris, Temminck.
Ps. Brownii, Kuhl.
Ps. caledonicus ? Latham.

Inhabits V. D. Land ; Islands in Bass's Straits.

Sub-fam. LORIINÆ (Lories).

Section I. (With the tongue not filamented).

Genus ECLECTUS, Wagler.

(807) *E. polychloros*, (Edwards, pl. 231; Daubenton's *Pl. Enl.* 514),

Syn. Psittacus polychloros, Scopoli.
Ps. magnus et Ps. sinensis, Gmelin.
Ps. viridis, Latham.
Ps. lateralis, Shaw.
Muscarinus prasinus, Lesson.

Hira-mohan ('prized favorite'), Hind. Inhabits the Moluccas.

(808) *E. grandis* (Brown, *Ill. Zool.* pl. 6; Daubenton's *Pl. Enl.* 683).

Syn. Psittacus ceylonensis, Boddaert.
Ps. grandis et Ps. janthinus, Gmelin.
Ps. guebiensis, var., Latham.

Lal-mohan ('red favorite'), Hind. Inhabits the Moluccas.

Genus LORICULUS, Blyth.

(809) *L. pumilus* (Edwards, pl. 293, f. 2),

Syn. Psittacus pumilus, Scopoli.
Ps. galgulus, Shaw.

Seren-dak, *Sindada*, Malayan: *Serindit*, Sum. Inhabits the Malayan peninsula, where very common: also Sumatra.

(810) *L. vernalis* (Swainson's *Zool. Ill.*, 2nd series, pl. 1; and figured as identical with the preceding species, apud Wagler, in *Nat. Libr.*, *Psittacidæ*, pl. 24).

Syn. Psittacus vernalis, Sparrman.

Latkan, ('pendent'), Hind. *Kyai-tha-da*, Arracan: *Silindid*, and *Silinditum*, Jav. Inhabits the Hilly parts of India, from the sub-Himalayan region to S. India, also Assam, Sylhet, Arracan, Tenasserim, Java: in the Malayan peninsula it appears to be completely replaced by *L. pumilus*; and in the Philippines and also in Ceylon, by the next species.

(811) *L. philippensis*? (Edwards, pl. 6; Lear's *Psittacidæ*, pl. 41?)

Syn. Psittacus philippensis? Brisson.
Ps. asiaticus, Latham.
Ps. indicus, Gmelin.
Psittacula rubrifrons? Vigors, P. Z. S. 1831, p. 97.

Inhabits Philippines (?): Ceylon.

Section II. (With filamented tongue.)

Genus LORIUS, Brisson.

(812) *L. philippensis*, Brisson (Edwards pl. 170; *Pl. Enl.* 168).

Syn. Psittacus lory, L.
L. tricolor, Stephens.

Inhabits the Moluccas: Philippines?

(813) *L. domicella* (Edwards, pl. 171; *Pl. Enl.* 168; *Nat. Libr.*, *Psittacidæ*, pl. 18).

Syn. Psittacus domicella, L.
Ps. raja, Shaw.
Ps. rex, Bechstein.
Ps. radhea, Vieillot.

Inhabits the Moluccas.

(814) *L. garrulus* (Edwards, pl. 172; *Pl. Enl.* 216; Swainson's *Zool. Ill.* 2nd series, 1, pl. 12).

Syn. Psittacus garrulus et Ps. aurora, L.
Ps. moluccensis, Brisson.

Inhabits the Moluccas.

Subgenus EOS, Wagler.

(815) *E. rubra* (Edwards, pl. 173).

Syn. Psittacus ruber, Gmelin.
Ps. borneus, Latham.
Ps. cæruleatus, Shaw.
Ps. cyanonotus, Vieillot.

Inhabits Borneo, Celebes, &c.

(816) *E. cyanostriata*, G. R. Gray (*Ill. Genera of Birds*, pl. 103).

Syn. Lorius borneus, Lesson.
Blue-necked Lory, Latham.

Inhabits Borneo, Celebes, &c.

(817) *E. ornata* (Edwards, pl. 174; *Pl. Enl.* 522).

Syn. Psittacus ornatus, Gmelin.

Bangau, and *Bandhua*, Hind. (Names referring to a mode of dyeing silk, whence *bandhana* handkerchiefs, &c.) Inhabits Eastern Archipelago (Malayan peninsula apud Raffles, but this very doubtful).

(818) *E. novae guineæ*.

Syn. Psittacus novæ guineæ, Latham. } The young.
Ps ater, Scopoli. }
Ps batavensis, Latham,—the adult.

Inhabits N. Guinea.

Genus TRICHOGLOSSUS, Vigors and Horsfield.

(819) *Tr. hæmatodes* (J. and S., *Ill. Orn.*, 1st series, pl. 111; *Pl. Enl.* 61).

Syn. Psittacus hæmatodes, L.
Psittaca amboinensis varia, Brisson.

Inhabits the Moluccas; Amboyna. There have been seen several individuals devoid of the dusky marginings to the pectoral feathers, described as characteristic of this species.

Order II. RAPTORES. Tribe DIURNÆ. Fam, FALCONIDÆ. Sub-Fam. FALCONINÆ.

Genus FALCO, Lin.

(820) *F. gyrfalco*, L. (*Pl. Enl.* 210: Gould's *B. E.* pl.)

Syn. F. islandicus, Brunnich.
F. candicans, Gmelin.
F. grœnlandicus, Hancock.

Shanger Hind. Inhabits Northern regions

(821) *F. juggur*, Gray, (Hardw. *Ill. Ind. Zool.*)

SYN. F. luggur, Jerdon.

Juggur Falcon, and probably also *Justin Falcon*, Latham. *Jhaggar*, male; *Laggar*, female; *Hind*: *Luggadoo* (Jerdon), Telegu. Inhabits India generally. Common along the banks of the Ganges above the tideway; rare and accidental in Lower Bengal within the reach of the tides.

(822) *F. peregrinus*, L. (*Pl. Enl.* 421. 430, 469, 470).

SYN. F. barbarus, L.
F. communis, Brisson.
F. hornoticus and F. ater, Gmelin.
F. lunulatus, Daudin.
F. abietinus, Bechstein.
F. calidus, Latham.
F. anatum, Bonap.

Eauri, H. (female): *Bauri Batcha* (male), H. *Raja Wali*, Malay: *Sikap Lang*, Sum.: *Lagi Angin* of the Passummahs. Inhabits the Northern hemisphere chiefly: common in India, many adults remaining in Lower Bengal during the cold season, and especially frequenting the vicinity of jheels, to prey on the water-fowl which resort to them; hence they are tolerably numerous in the Sundarbans.

(823) *F. peregrinator*, Sundevall (Jerdon's *Ill. Ind. Zool.* pl. 12, 28.)

SYN. F. shahin, Jerdon.
F. sultaneus, Hodgson.
F. ruber indicus, Aldrovand.

Shahin ('royal') female; *Koela* ('charcoal'), male: H. Inhabits India generally; chiefly the hilly parts: much more rare in Lower Bengal than *F. peregrinus*.

(824) *F. chicquera*, Shaw (Lev. *Ois. d' Afr.*, t. 30; Gould's *Century*, pl. 2).

SYN. F. ruficollis, Swainson.
F. cirrhatus, var., and
Fasciated Falcon, Latham.
Probably F. biarmicus apud Vigne, P. Z. S. 1841, p. 6.

Tarmati, (*Turumtee*, Jerdon: *Toomtra*, Burnes), female; *Chetra* or *Chetoya*, male. H. Inhabits Asia and Africa; very rare in the S. of Europe: common in India.

Subgenus HYPOTRIORCHIS, Boie.

(825) *H. severus* (*Pl. Col.* 128).

SYN. Falco severus, Horsfield.
F. Aldrovandi, Reinwardt.
F. guttatus, G. R. Gray.
F. rutipedoides, Hodgson.

Jhuter quære (*Jata*, 'there goes?'), H.: *Allap Allap Gingeng*, Jav. Inhabits Himalaya, Java, Philippines: visiting the plains of Lower Bengal in the cold season, where somewhat rare.

(826) *H. subbuteo*.

SYN. Falco subbuteo, L.
F. barletta, Daudin.
F. pinetarius, Shaw?

Karjanna, *H.*: *Surkhpushtak* ('rufous-vent'), of Kabul (Burnes). Inhabits Europe, Asia, and Africa: visits Lower Bengal in the cold season where far from common.

Subgenus TINNUNCULUS, Vieillot.

(827) *T. alaudarius*.

SYN. Falco alaudarius, Brisson.
F. tinnunculus, Linnæus.
F. interstinctus, McClelland.
F. fasciatus, Retzius.
F. brunneus, Bechstein.

Khurmutia, *Kurrowtia*, *Karontea*, and *Narzinarzanak* ('tête à tête'), H.: *Nardunak*, Sinde: (Burnes): *Gyo-thin*, Arracan: *Allap Allap Sapi*, Jav. (Horsf.) Inhabits Europe and Asia: very common in Lower Bengal, where frequently seen in parties of 20 or 30 individuals, beating over the cultivated lands.

(828) *T. cenchris* (Gould's B. E. pl.).

SYN. Falco cenchris, Naumann.
F. tinnunculoides and F. xanthonyx, Natterer.
F. tinnunculariu, Vieillot.
F. Naumannii, Fischer.

Inhabits the warmer parts of Europe and Asia; and found near Calcutta; also N. Africa.

(829) *T. vespertinus* (*Pl. Enl.* 431: Gould's *E. E.* pl.).

SYN. Falco vespertinus L.
F. rufipes Beseke.
F. subbuteo, var., Latham.

Inhabits Europe and Asia.

(830) *T. æsalon* (*Pl. Enl.* 447, 468: Gould's *B. E.* pl.).

SYN. Falco æsalon and F. lithofalco, Gmelin.
F. regulus Pallas.
F. cæsius, Meyer.
F. intermixtus, Daudin.

Inhabits Europe and northern Asia, N. W. Himalaya?

(831) *T. punctatus* (*Pl. Col.* 45).

SYN. Falco punctatus, Cuvier.

Inhabits Madagascar; Mauritius.

Genus HIERAX, Vigors.

(832) *H. melanoleucos*, Blyth (J. A. S. XII, 179—*bis*). Inhabits Assam.

(833) *H. eutolmos*, Hodgson.

SYN. H. bengalensis apud Blyth, J. A. S. XII, 180 (bis)
Bengal Falcon, var, A., Latham.

Doung oo-uhouk, *Arracan*. Inhabits Nepal; Sylhet; Arracan.

(834) *H. fringillarius* (*Dict. Class. d'Hist' Nat.*, pl. 21: *Pl. Col.* 97).

SYN. Falco fringillarius, Drapiez.
Hierax malayensis, Strickland.
Malayan F. cærulescens, auctorum.

Seeap Belang, Penang: *Allap*, or *Allap Allap*, Java. Inhabits Western Malasia: replaced by other species in the more Eastern Islands.

Subfam. PERNINÆ.

Genus BAZA, Hodgson.

(835) *B. lophotes* (*Pl. Col.* 10).

Syn. Falco lophotes, Temminck.
B. syama, Hodgson.
Falco et Lepidogenys Lathami, Gray.
Lophotes indicus, Lesson.

Syama, ('*black*'), Nepal. Inhabits India generally; rarer to the South: not uncommon during the rainy season in Lower Bengal.

(836) *B. Jerdoni.*

Syn. Lophastur Jerdoni, Blyth, J. A. S. XI, 464.

Probably *Falco Reinwardtii*, Muller. Inhabits Malayan peninsula.

Genus PERNIS, Cuvier.

(837) *P. christata*, *Cuvier* (*Pl. Col.* 44).

Syn. Falco ptilorhynchus, Temminck.
P. Elliotti, Jameson.
P. maculosa, and probably P. torquatus, ruficollis, and atrogularis, Lesson.

Madhava, (from *Madhu*, 'honey'), Nepal (Hodgson): *Shahutela*, (from *Shahut*, 'honey'), H. (Jerdon). Inhabits India generally. Not rare in Lower Bengal.

Subfam. ELANINÆ.

Genus ELANUS, Savigny.

(838) *E. melanopterus* (Lev., *Ois. d'Afr.* t. 36).

Syn. Falco melanopterus, Daudin.
F. sonninensis et vociferus, Latham.
F. clamosus, Shaw.
E. cæsius, Savigny.
Petite Buse Criarde, Sonnerat.
Kotta Falcon, and (the young) Indian Falcon, Latham.

Kapasi, ('cottony'), H.: *Angkal Angkal*, Java. Inhabits S. Asia; Malayan Archipelago; and all Africa, if not also the extreme S. of Europe occasionally; common in Lower Bengal, and generally over India.

Subfam. CIRCAETINÆ.

Genus CIRCAETUS, Vieillot.

(839) *C. gallicus* (*Pl. Enl.* 413.)

Syn. Falco gallicus, Gmelin.
F. brachydactylus, Temminck.
F. leucopsis, Bechstein.
F. longipes, Wilson.
Aquila leucamphomma, Borkh.
A. pygargus, Brisson.

Sap-marilo, ('snake-killer'), Beng.: *Sampmar* (ditto), H.: *Mulpatu*, Can. Inhabits Europe, Asia, and Africa. Common on the plains of India, preferring an open country. It preys chiefly on snakes.

Genus HÆMATORNIS, Vigors.

(840) *H. cheela* (Gould's *century*, pl. 1.)

Syn. Falco cheela, Latham.
H. undulatus, Vigors.
Circaetus nipalensis, Hodgson.
H. et Buteo bacha, apud Franklin and Sykes.
F. albidus, Cuv., and Buteo melanotis, Jerdon, the young.

Tilai-baj ('spotted Hawk'), Beng.: *Sabchur* ('full-crested'), young. *Goomcan-mooryala*, Mahr.: *Doung-tswon*, Arracan. Inhabits India generally: extremely common in Lower Bengal; preferring a jungle country, with shallow jheels and tanks, where it preys much on frogs which it clutches in the mud.

(841) *H. bido.*

Syn. Falco bido, Horsfield., Lev. Ois d'Afr. t. 15.
F. bacha (?), Daudin.
F. cheela, var.?

Bido, Javan. Inhabits Malay countries, Africa?

Subfam. CIRCINÆ.

Genus CIRCUS, Lacepede.

(842) *C. æruginosus* (Gould's B. E. pl. 32).

Syn. Falco æruginosus, L.
F. rufus, Gmelin.
F. arundinaceus, Bechstein
Accipiter circus, Pallas.
Circus palustris, Brisson.
C. variegatus, Sykes.
C. rufus var. indicus, and C. Sykesi, Lesson.
Konta Falcon, Muskooroo Falcon, and Rufous-eared Falcon, Latham.

Ch'oa or *Mat Chil* ('Meadow Kite'), Beng. (generic): *Kutar*, and *Kulehsir* (capped), Hind. *Safid Sira* ('white-headed'), and *Tika Bauri* (Hawk with the *tika* frontal mark), (B. Ham). Inhabits Europe, Asia, and Africa.

(843) *C. cyaneus* (Gould's *B. E.* 33).

Syn. Falco cyaneus, Lin.
F. bohemicus, albicans, griseus, et montanus, Gmelin, &c. &c.
F. uliginosus (?), Gmelin.

Tupoos, or *Moosh-khor* (rat-eater), of Kabul (Burnes). Inhabits Europe and middle Asia: replaced on the plains of India by the next species.

(844) *C. Swainsonii*, A. Smith (Gould's *B. E.* pl. 34).

Syn. C. pallidus, Sykes.
C. dalmaticus, Ruppell.
C. albescens, Lesson.
Falco herbæcola, Tickell (?)
F. cyaneus, var. A, Latham.

Dast-mal ('hand-soiler'), Hind.: *Teea* (Burnes, from the voice), Derajat: *Pandouvi*, (B. Ham.); Inhabits India and Africa; very rare in Europe. Less common in Lower Bengal than C. cinerascens.

(845) *C. cinerascens* (Gould's *B. E.* pl. 35).

Syn. Falco cinerascens, Montagu.
C. Montagui, Vieillot.

Inhabits Europe, Asia, and Africa: all India; Ceylon.

(846) *C. melanoleucos.*

Syn. Falco melanoleucos, Pennant.

Pahatai, H.: *Ablak Petaha*, ('Pied Harrier'?; *Petaha*, &c. probably from the voice), Nepal, (H.) *Thin-kya*, Arracan. Inhabits India generally inclusive of Ceylon.

Genus POLIORNIS, Kaup,

(847) *P. teesa.* (*Hardw. Ill. Ind. Zool.*)

Syn. Circus teesa, Franklin.
Astur hyder, Sykes.
Zuggun Falcon, Latham.

Tisa, or *Teesa*, (from the voice), Hind. Inhabits Plains of India, where very abundant: never met with on the mud-soil of Lower Bengal, though appearing immediately this is quitted in a westerly direction: Tenasserim provinces; Malacca?

Subfam. ACCIPITRINÆ.

Genus ACCIPITER, Ray.

(848) *Acc. nisus* (*Pl. Enl.* 467, 412),

Syn. Falco nisus, L.
F. nisosimilis, Tickell, J. A. S. II, 571.
A. fringillarius, Ray.
A. Dussumieri apud Jerdon, Madr. Journ. X, 84.
Bassun Falcon, Latham.

Basha, female;—*Bashin*, male—Hind. Inhabits Europe, Asia, and N. Africa: in India, numerous in the hilly parts, rare and accidental on the alluvium of Lower Bengal.

(849) *A. nisoides*, Blyth (J. A. S. XVI, 727).

Syn. Falco soloensis (?), Horsfield.
F. cuculoides (?), Temminck, P. C. 110, 129.
Sumatran Acc. fringillarius of the Appendix to Lady Raffles's memoirs of Sir T. S. Raffles, p 549.

Sikap Ballam (?), Sum.: *Allap Allap Lallar* (?), Jav. Inhabits Malayan peninsula.

(850) *A. virgatus* (Jerdon's *Ill. Ind. Zool.* pl. 4, 29).

Syn. Falco virgatus, Temminck, P. C. 109.
Nisus minutus, Lesson (apud G. R. Gray).
A. besra, Jerdon; and the female
A. fringillarius apud Jerdon, Catal.
A. Dussumieri apud Sykes.

Basra (dimunitive of *Baz*, 'Goshawk'), and the male—*Dhasti* ('a handful', 'or held in the hand'), Hind. Inhabits India generally, but chiefly the hilly parts; also the Malay countries: rare and accidental in Lower Bengal.

Genus MICRONISUS, G. R. Gray.

(851) *M. badius* (*Pl. Col.* 308, 336).

Syn. Falco badius, Gmelin.
F. Brownii, Shaw.
F. Dussumieri, Temminck (nec apud Sykes's or Jerdon's Catalogues).
Accipiter dukhunensis, Sykes.
Calcutta Sparrow-hawk and Chippuck Falcon, Latham.

Shikra, from *shikar karna*, to pursue game), female, *Chippuck* (or *Chipka*, Jerdon, from the voice), male H. *Thinkyet-ma*, Arracan. Inhabits India generally and Malay countries, being numerous throughout India, and in Ceylon; not uncommon in Afghanistan.

Genus ASTUR, Bechstein.

(852) *A. palumbarius* (*Pl. Enl.* 418, 461, 423).

Syn. Falco palumbarius et F. gentilis, L.
F. gallinarius. Gmelin.
F. albescens, Boddaert.
Accipiter astur, Pallas.

az or *Baz Khani*, female. *Jurra*, male. Hind. The *Kurrungosh* is probably a variety. Inhabits Europe and Asia: in India, confined (or nearly so) to the sub-Himalayas.

(853) *A. trivirgatus* (*Pl. Col.* 303).

Syn. Falco trivirgatus, Reinwardt.
Astur indicus, Hodgson.
A. palumbarius apud Jerdon, Madr Journ No. XXIV, 85.
S. cristatus, G. R. Gray.
Spizaetus rufitinctus, McClelland, P. Z. S. 1839.

Gar (fort or Mountain) *Bazra*, *Manik* (esteemed) *Bazra*, *Kotesaor*, (fort-chieftain), H.: *Churiali*, (frequenting peaks), Nepal. Inhabits India and Malay countries; being confined to the hilly parts.

Subfam. THRASAETINÆ.

Genus PSEUDASTUR, Blyth.

(854) *Ps. pœcilonotus* (*Pl. Col.* 9).

Syn. Falco pœcilonotus, Cuvier.
F. skotopterus, Pr. Max.

Inhabits S. America.

Genus SPIZAETUS, Vieillot.

(855) *Sp. nipalensis.*

Syn. Nisaetus nipalensis, crested variety, Hodgson, J A S. V. 229.
N. pulcher. Ibid., J. A. S. XII, 305
Falco orientalis (?) et F. lanceolatus (?) Temminck and Schlegel.

Inhabits Himalaya, and mountain ranges N. of Sylhet.

(856) *Sp. limnaetus* (*Pl. Col.* 127, 134).

Syn. Falco limnaetus, Horsfield.
F. caligatus, Raffles.
F. niveus, Temminck.
Limnaetus unicolor, Vigors.
Nisaetus nipalensis, crestless variety, Hodgson, J. A. S. V. 229.
N. pallidus, ibid., young.
Lake Falcon, Bauj Eagle, and probably Jerwied Eagle, Latham.
Lang Tanjbikar, Sum. Wuru rawa Sav.
Var. Falco cristatellus, Temminck.
F. Lathami, Tickell.
F. cirrhatus (?), Gmelin.

Shah Baj, and *Sadal*, Hind. Inhabits India and Malay countries: the crested variety found chiefly in the peninsula of India.

(857) *Sp. alboniger.*

Syn. Nisaetus alboniger, Blyth, J. A. S. XIV, 173.

Inhabits Malayan peninsula (Penang, Malacca).

(858) *Sp. Kienerii.*

Syn. Astur Kienerii, de Sparre.
Spizaetus albogularis, Tickell, J. A. S. XI, 456.

Inhabits Himalaya; Central India.

Subfam. AQUILINÆ.

Genus EUTOLMAETUS, Blyth.

(859) *Eu. Bonellii* (Jerdon's *Ill. Ind. Orn.* pl. I.)

Syn. Falco Bonellii, Temminck.
Aquila intermedia, Bonelli.
Aq. fasciata, Vieillot.
Nisaetus grandis, Hodgson, J. A. S., V, 230.
N. niveus? apud Jerdon, Catal.
Genoese Eagle, Latham.

Moranga, or *Morangi*, Hind. Inhabits S. of Europe and Asia, and N. Africa. Nepal.

Genus AQUILA, Meyer.

(860) *Aq. chrysaetos.*

Syn. Falco chrysaetos, F. fulvus, at F. melanaetus L.
F. niger, Gmelin,
F. melanotus, Latham.
Aquila nobilis, Pallas
Aq. regia, Lesson.

Inhabits mountainous regions of Europe, Asia, and N. America, within the temperate zone, Himalaya and Nepal.

(861) *Aq. imperialis.*

Syn. Falco imperialis, Bechstein.
F. mogilnik, Gmelin.
F. ferox, and Brown-backed Eagle, Latham
Aquila heliaca, Savigny
Aq. bifasciata, Gray.
Aq. nipalensis, Hodgson, As. Res XVIII, pt II, 13. pl. 1.
Aq. chrysaetos apud Meyer, et Jerdon, Catal

Jumiz, or *Jumbiz*, Hind.: *Frus*, Bengal. *Wonio*, Arracan. Inhabits S. E. of Europe, Asia, N. Africa, Mymunseng, Aracan, and Nipal.

(862) *A. nævioides.*

Syn. Falco nævioides, Cuvier.
F. rapax, Temminck.
F. senegallus, Cuvier.
F. albicans, Ruppell.
F. choka, A. Smith.
A. fulvescens, fusca, et punctata, Gray.
A. vindhiana, Franklin.

Wokhal, also *Jimach* (vide J. A. S. XV, 8), Hind. Inhabits the Plains of India and Africa generally: but not found on the alluvium of Lower Bengal.

(863) *A. nævia.*

Syn. Falco nævius et F. undulatus, Gmelin.
A. malanaetus, Savigny.
A. clanga, Pallas.
A. bifasciata, Hornsch

Spotted Eagle, and *Brown-backed Eagle* var. A. Latham. *Kaljanga*, *Bakayari*. *Jiyadha* (B. Ham.) Inhabits S. E. of Europe, Asia, and N. Africa. Common in the Bengal Sunderbans, and found likewise in Central and S. India.

(864) *Aq. hastata.*

Syn. Morphnus hastatus, Lesson.
Spizaetus punctatus, Jerdon.
Limnaetus unicolor apud Blyth, J. A. S. XII, 128.

Jiyadha, and *Gutimar* ('Cocoon-destroyer'), H. Inhabits, Common in the Bengal Sunderbans, and found likewise in upper Bengal, and in Central and S. India.

Genus ICTINAETUS, Jerdon (nec Kaup).

(865) *I. malaiensis.*

Syn. Falco malaiensis, Reinwardt.
Aquila et Heteropus et Neopus perniger, Hodgson.
Nisaetus? ? ovivorus, Jerdon.
Black Eagle, Jerdon, Catal. and Supp

Inhabits S. E. Himalaya; Nilgiris; Malay countries.

Genus HIERAETUS, Kaup,

(866) *H. pennatus.*

Syn. Falco pennatus, Gmelin.
F. Legopus, Bengal variety, Latham.
Aquila minuta, Brehm.
Spizaetus milvoides, Jerdon
Butaquila strophiata, Hodgson.

Inhabits S. E. of Europe, and Asia: India generally.

Subfam. BUTEONINÆ.

Genus ARCHIBUTEO, Brehm.

(867) *A. hemiptilopus*, (J. A. S., XV, 1).

Syn. A. cryptogenys, Hodgson, Calc. Journ Nat Hist. VIII, 96

Inhabits Tibet; Sikim? Darjiling.

Genus BUTEO, Cuvier.

(868) *B. rufinus.*

Syn. Falco rufinus, Ruppell
B. canescens, Hodgson
B. longipes, Jerdon
Circus pectoralis (?), Vieillot.
Nasal Falcon, Latham

Chuha mar ('Rat-killer'), Hind. Inhabits India generally; plains and lower hills. In Lower Bengal, found only above the tideway of the river: also N. Africa.

(869) *B. vulgaris*, Bechstein (Jerdon's *Ill. Ind. Orn.* pl. 27).

Syn. Falco buteo, Lin
F. glaucopis, Merrem.
F. variegatus, versicolor, cinereus, et obsoletus, Gmelin.
B. mutans et fasciatus, Vieillot.
B. albus, Daudin.
B. communis, Cuvier.
B. Swainsoni, Pr. Bonap.
B. montanus, Nuttall.
B. rufiventer, Jerdon.

Inhabits Northern hemisphere; rare and to the northward only in America. The loftier hills only, in India.

(870) *B. pygmæus*, Blyth (J. A. S. XIV, 177).

Inhabits Tenasserim provinces.

Subfam. HALIAETINÆ.

Genus PANDION, Savigny.

(871) *P. haliaetus.*

Syn. Falco haliaenus, L.
P. fluviatilis, Savigny.
P. indicus, Hodgson
Bengal Osprey, Latham.

Match-morol, and *Bulla*, B.: *Mucherera*, H. (Jerdon); also *Match-manga*, H.: *Wonlet*, Arracan. It is of general distribution; the Australian race (*P. leucocephalus*, Gould,) alone

slightly differing. Common throughout India, in all suitable localities.

Genus PONTOAETUS, Kaup.

(872) *P. ichthyaetus.*

Syn. Falco ichthyaetus, Horsfield.
Ichthyaetus bicolor, G. R. Gray.
I. plumbeus, Hodgson, J. A. S. VI. 367

Match-morol ('Fish-tyrant'), Beng.: *Madhuya*, H. (B. Ham): *Jokomaru*, Java. Inhabits India and Malay countries: common in Lower Bengal.

(873) *P. nanus.*

Syn. Ichthyaetus nanus, Blyth, J. A. S. XI, 202, and XII. 304

Inhabits Malayan peninsula.

Genus BLAGRUS, Blyth.

(874) *Bl. leucogaster.*

Syn. Falco leucogaster, Gmelin.
F. blagrus (?), Daudin.
F. dimidiatus, Raffles
F. albicilla, var.?, Latham.
Ichthyaetus cultrunguis, Blyth, J. A. S. XI, 110 the semi-adult.
Haliaetus sphenurus, Gould, young.

Sampamar Eagle, the semi-adult; and *Maritime Eagle*, the adult, Latham. *T'hampa-mar* ('snake-killer'), Orissa; *Kohasa*, H.: *Langlaut*, Sum. Inhabits India; Africa (?); the Malay countries; Australia, and the vicinity of Calcutta.

Genus HALIAETUS, Savigny.

(875) *H. Macei.*

Syn. Falco Macei, Temminck.
H. albicilla apud Vigors and Horsfield.
H. ossifragus (?) apud Raffles.
H. fulvigaster, Vieillot.
H. albipes, Hodgson.
H. lineatus, (the young), and H. unicolor, (the semi-adult), Gray (Hardw. Ill, Ind. Zool.)

Matcharang, *Match-manggar*, *Korol*, or *Match-korol* ('Fish-Eagle'), and *Bala*, C.: *Kokna*, or *Oogoos* (Tickell): *Lang-laut*, Sum. Inhabits Northern India generally: abundant in Lower Bengal, and the vicinity of Calcutta.

Genus HALIASTUR, Selby.

(876) *H. Indus.*

Syn. Falco indus, Boddaert.
F. pondicerianus, Gmelin.
Milvus rotundicaudatus, Hodgson (young.)

Sankar Chil ('Shiva's kite'), *Dhobia Chil* ('Washerman's kite'), and *Ru-mabarik*, ('Lucky-faced,' *i. e.* propitious), Hind. *Khemankari*, Sanskrit. *Rutta Ookab*, Sind. (Burnes), also *Pilyo*: *Tswon-goung phyoo*, Arracan: *Lang-bondol*, Sumatra: *Ulang*, Java. Inhabits India and Malay countries: extremely common.

Genus MILVUS, Cuvier.

(877) *M. Ater.*

Syn. Falco ater et F. austriacus, Gmelin.
M. govinda, Sykes.
M. ætoleus, Lesson.
M. affinis, (?), Gould.

Chil (from the voice), or *Pariah Chil*, H. *Tswon bop*, Arracan. Inhabits India; Malayan peninsula (Penang); Australia? Rare in the eastern parts of Europe. An abundant summer visitant in Afghanistan.

Fam. VULTURIDÆ.

Subfam. VULTURINÆ.

Genus VULTUR, L.

Gidh, (Hind). *Shukuni*, Beng. *Gid Gerai*, Tickell.

(878) *V. monachus*, L.

Syn. V. cinereus, Gmelin.
V. arrianus Temminck.
V. imperialis, Tem. (p. c. 426), apud Jerdon (in epistolâ.)
Ægypius niger et vulgaris, Savigny.

Inhabits mountainous parts of Europe and Asia. Nepal, Assam.

Genus OTOGYPS, G. R. Gray.

(879) *O. calvus.*

Syn. Vultur calvus, Scopoli.
V. pondicerianus Daudin.

Molla-Gidh ('Priest Vulture'), H.: *Lal-mata Shukuni* ('Red-headed Vulture'), Beng. Inhabits India generally: common.

Subfam. GYPINÆ.

Genus GYPS, Savigny.

(880) *G. fulvus.*

Syn. Vultur fulvus, Gmelin.
V. Kolbii, Daudin (apud Dr. A. Smith and G. R. Gray).
V. percnopterus, Pallas (nec Linnæus).
V. leucocephalus, Meyer.
V. indicus apud Jerdon Catal.
Gyps vulgaris, Savigny.

Maha-dho of the Mahrattas. Inhabits Mountainous regions of the Old World: Nepal.

(881) *G. indicus* (Gray's *Ill. Gen. Birds*, pl.).

Syn. Vulture indicus, Scopoli and Latham.
V. bengalensis apud Temminck (Jerdon in epistolâ).
V. tenuiceps et tenuirostris, Hodgson.

Inhabits India and Malay countries: common.

(882) *G. bengalensis* (Hardwick's *Ill. Ind. Zool.*)

Syn. Vultur bengalensis, Gmelin, the young.
V. indicus apud Temminck (young, apud Jerdon in epistolâ).
V. chaguoun, Daudin. } Adult.
V. leuconotus, Gray. }

Lengta, Arracan. Inhabits India generally: very abundant. A summer visitant in Afghanistan.

Subfam. SARCORHAMPHINÆ.

Genus SARCORHAMPHUS, Dumeril.

(883) *S. papa, Pl. Enl.* 428).

Syn. Vultur papa, L.

Inhabits S. America.

Genus NEOPHRON, Savigny.

(884) *N. percnopterus*, *Pl. Enl.* 407, 429).

Syn. Vultur percnopterus Lin. (nec Pallas).
V. leucocephalus et V. fuscus Gmelin.
V. ginginianus et V. albus, Daudin.
V. meleagris, Pallas.
V. fulvus, Boddaert.
V. stercorarius, La Peyrouse.
Percnopterus ægyptiacus, Stephens.

Soongra, or *Soonda*, Scinde (Burnes). Inhabits warmer regions of Europe, Asia, and Africa: abundant on the plains of India; rare and accidental below the tideway of the rivers in Lower Bengal. A summer visitant in Afghanistan.

Subfam. GYPAETINÆ.

Genus GYPAETOS, Storr.

(885) *G. barbatus*, (Edwards, pl. 106).

Syn. Vultur barbatus et V. barbarus. Lin.
V. niger. Gmelin.
V. aureus. Brisson.
Falco magnus, S. Gmelin.
Phene ossifraga, Savigny.
Gypaetos grandis Storr.
G. alpinus, Daudin.
G. leucocephalus et G. melanocephalus Meyer.
G. meridionalis, Brehm.
G. barbatus. var. occidentalis et var. orientalis, Pr. Bonap.
G. hemachalanus. Hutton (with dark pectoral mark). J. A. S. III, 522.
Bearded Eagle, Latham.

'Golden Eagle' of English residents in the Himalaya. *Urgool*, Masuri (Hutton). *Cajeer*, or *Foomaee*, Kabul (Burnes). Inhabits Mountainous regions of Europe, Asia and, Africa.

Tribe II.—NOCTURNÆ.

Fam. STRIGIDÆ.

Subfam. BUBONINÆ.

Genus NYCTEA, Stephens.

(886) *N. nivea*, (Gould's *B. E.* pl. 43).

Syn. Strix nivea, Daudin.
Str nyctea. Lin.
S. candida. Latham.
N. erminea. Stephens.

Inhabits Arctic circle, migrating within the northern temperate zone.

Genus BUBO, Sibbald.

(887) *B. orientalis*, (*Pl. Col.* 174, 229).

Syn. Strix orientalis. Horsfield.
S. sumatrana, Raffles.
S. strepitans, Temminck.
B. et Huhua nipalensis, Hodgson.
H. pectoralis, Jerdon.

Inhabits Himalaya, S. India, and Malay countries.

(888) *B. maximus*, Sibbald (Gould's *B. E.* pl. 37),

Syn. Strix bubo, L.
B. atheniensis, Daudin.
B. europæus, Lesson.

(889) *B. bengalensis* (Gould's 'Century,' pl. 3).

Syn. Otus bengalensis Franklin.
Bubo cavearcus et Urrua cavearca. Hodgson.

Ghoogoo, H. (Jerdon). Inhabits India generally: Afghanistan: but not met with below the tideway of the rivers in Lower Bengal.

(890) *B. umbratus*.

Syn. Urrua umbrata. Blyth J. A. S. XIV, 180.
Strix coromander, coromandra, et coromandelica. auctorum ?
Str. coromanda. var., Latham.

Inhabits India generally.

Genus ASIO, Brisson.

(891) *A. otus* (*Pl. Enl.* 29).

Syn. Strix otus, L.
Str. soloniensis. Gm.
Otus europæus. Stephens.
O. communis. Lesson.
O. vulgaris, Fleming.

Inhabits Europe and N. Asia, Himalaya.

(892) *A brachyotus* (Gould's *B. E.* pl. 40).

Syn. Strix brachyotus, Gmelin.
Str. ulula, S. ægolius, et S. accipitrina, Pallas.
S. arctica, Sparrman.
S. tripennis. Schrank.
S. palustris, Smies.
S. brachyura Nilsson.
Brachyurus palustris, Gould.

Chota Ghooghoo, H. (Jerdon). Inhabits Europe, Asia, Africa, N. and S. America. Calcutta.

Genus SCOPS, Savigny.

(893) *Sc. aldrovandi*, Ray (Gould's *B. E.* pl. 48; Jerdon's *Ill. Ind. Orn.*, pl. 41, chesnut variety),

Syn. Strix scops, Linnæus.
Str. zorca et S. giu. Scopoli.
S. carniolica, Gmelin.
Sc. europæus Lesson.
Sc senegalensis, Swainson.
Sc. capensis. Smith.
Sc. sunia (chesnut variety), and S. pennata (grey variety). Hodgson.
Sc. malayanus. A. Hay.
Ephialtes spilocephalus, Blyth. J. A. S. XV, 8 (? Large specimen in immature plumage?
Otus Scops japonicus, Tem., apud G. R. Gray.
Strix bahkamæna (?), Pennant.

Chitta Gool, Telinga (Jerdon): *Chugad Kusial*, or *Sunya Kusial*, Nepal (H.) Inhabits Europe, Asia, and Africa. Himalaya, Pen: of India, Calcutta.

(894) *A. lempiji*, (*Pl. Col.* 99).

(Var. A. Malayan race, in general deeply tinged with fulvous.)

Syn. Strix lempiji, Horsfield.
Str noctula Reinwardt.
Scops javanicus, Lesson.

Lempiji, Java. (Var. B. Larger race, but seldom tinged with fulvous: inhabiting the Himalaya, Assam, Sylhet, and Arracan.) *Sc. lettia*, Hodgson. *Tharkavi Chugad*, or *Lattya Kudyal*,

resembling the last, but generally smaller and greyer in colour,—being, when slightly tinged fulvescent, the *Sc. lempiji* apud Jerdon of Malabar and Ceylon. *Sc. lettioides* et *griseus*, Jerdon Inhabits (in different varieties,) India, China (?), and the Malay countries. Malacca (the undoubted *lempiji*). Var. B.—N. W. Himalaya. Nepal. Arracan (Ramree.) Coromandel Coast (sent as *lettioides*, Jerdon): and two from Malabar (sent as *lempiji*.) T. C. Jerdon, Esq. (1844-6). Specimen (resembling last), from Ceylon. E. L. Layard, Esq. (1849).

Genus KETUPA, Lesson.

(895) *K. flavipes.*

Syn. Cultrunguis flavipes, Hodgson, J. A. S. XV. 364.

Inhabits Himalaya only (so far as hitherto observed).

(896) *K. ceylonensis.*

Syn. Strix ceylonensis, Gmelin.
Str. Leschenaultii Temminck.
S. Hardwickii, Gray.
S. dumeticola Tickell.
Cultrunguis nigripes, Hodgson.

Ulu (generic), H.: also *Amrai ka Ghooghoo*, H. (Jerdon): *Útúm*, Beng.: *Tee-dook*, Arracan. Inhabits India generally; Arracan; Tenasserim. Very common in Lower Bengal, near Calcutta.

(897) *K. javanensis*, Lesson.

Syn. Strix ketupa, Horsfield.
Str. ceylonensis apud Temminck.

Tamba, or *Ketombo Ratanapye*; *Hanta*; *Burong Pelow*; Malayan: *Blo-Ketupa*, Java. Inhabits Malayan peninsula and Archipelago: rare in Arracan. Specimen from Java.

Subfam. ATHENINÆ.

Genus NINOX, Hodgson.

(898) *N. scutulatus* (*Pl. Col.* 289).

Syn. Strix scutulata, Raffles.
Str. hirsuta, Temminck.
S. lugubris, Tickell.
Ninox nipalensis, Hodgson.
Athene malayensis, Eyton.

Kal Pancha, Beng.: *Choghud Besrah*, H. (Jerdon): *Kheng-boop*, Arracan: *Raja Wali*, Malayan. Inhabits India generally; Tenasserim provinces; Malayan peninsula; Sumatra: not rare in Lower Bengal. Madagascar (Dr. A. Smith, *Afr. Zool.* p. 163).

Genus ATHENE, Boie.

(899) *Ath. cuculoides* (Gould's 'Century,' pl. 4).

Syn. Noctua cuculoides, Vigors.
N. auribarbis, Hodgson.

D'zee-geet, Arracan. Inhabits Himalaya; Assam; Arracan; Tenasserim; China.

(900) *Ath. radiata.*

Syn. Strix radiata, Tickell, J. A. S. II. 572 (1833).
Athene erythropterus, Gould. P. Z. S. 1837, p 136
Noctua perlineata Hodgson.
N. cuculoides apud Jerdon, Catal.

Jungli Choghud, H. (Jerdon): *Chota Kalpancha*, Beng.: *Chugad*, Nepal (H.) Inhabits most parts of India; sub-Himalayan region: never on the alluvium of Lower Bengal, but appears immediately this is quitted in a westerly direction.

(901) *Ath. malabarica*, Blyth (J. A. S, XV, 280).

Syn. A. castanoptera apud Jerdon, Supp.

Inhabits Malabar.

(902) *Ath. castanotus*, Blyth.

Syn. Ath. castanoptera apud Blyth, J. A. S. XV, 280.

Inhabits Ceylon (where common).

(903) *Ath. brama* (*Pl. Col.* 68).

Syn. Strix brama, Temminck.
Str. persica? Nouv. Dict. d' Hist. Nat.
Noctua indica, Franklin.
N. tarayensis, Hodgson.

Katoria Pencha, Beng: *Chugad*, or *Chogpud*, H.: *Panglah*, Mahratta. Inhabits India generally to foot of Himalaya; extremely common in Lower Bengal: Persia (as about Erzeroum).

(904) *Ath. noctua* (Gould's *B. E.* pl. 48).

Syn. Strix noctua, Retzius.
Str. passerina apud Latham and Temminck.
S. nudipes, Nilsson.
Noctua veterum, Lichtenstein.
Athene gymnopus, (?), Hodgson.
Ath. bactrianus, Blyth, J. A. S. XVI 776.

Inhabits Europe; N. and W. Asia; Afghanistan; Himalaya (?); N. Africa.

(905) *Ath. passerina* (Gould's *B. E.* pl. 50).

Syn Strix passerina, Linnæus.
Str. pygmæa, Bechstein.
Str. acadica, Temminck.

Inhabits N. Europe and Asia.

(906) *Ath. Brodiei.*

Syn. Noctua Brodiei, Burton, P. Z. S. 1835 p. 152.
N. tubiger and Athene badia, Hodgson.

Inhabits Himalaya.

Subfam. SYRNIINÆ.

Genus SYRNIUM, Savigny.

(907) *S. Indrani* Gray's *Ill. Gen. Birds*, pl. 14.)

Syn. Strix indrani, Sykes (vide J. A. S. XVI, 463).
Ulula? et Bulaca newarensis, Hodgson.
B. monticola, Jerdon.

Newar, Nepal (H). Inhabits India generally, mountainous parts; Ceylon: Malayan peninsula.

(908) *S. sinense* (Hardw. *Ill. Ind. Zool.*)

Syn. Strix sinensis (?), Latham.
Str. orientalis, Shaw.

Inhabits most parts of India, to foot of Himalaya: not Lower Bengal (at least below the tideway of the rivers). China?

(909) *S. nivicolum*, Hodgson (J. A. S. XIV, 185; XV, 9; XVI, 464). [Remark. This is probably a Himalayan variety of S. aluco. Gould, distinguished by its generally larger size, darker colour, and the usually greater development of the transverse markings of the plumage.] Inhabits Himalaya.

Subfam. STRIGINÆ.

Genus PHODILUS, Is. Geoffroy.

(910) *Ph. badius* (Horsfield's *Zool. Res. in Java*, pl.).

Syn. Strix badia. Horsfield.

Wooo-wiwi, or *Kalong wiwi*, Jav. Inhabits Nepal; Sikim; Assam; Arracan; Malayan peninsula and archipelago.

Genus STRIX, L. (as restricted).

(911) *Str. flammea*, L.

Syn. S. javanica apud Sykes and Jerdon.

Lakkhi or *Jakkhi Pencha*, *B.*: *Kareya*, or *Kurail*, H., vulgo *Booree Chooree*, Jerdon. *Jilei*, Bhagulpore. Inhabits Europe and Asia: Africa? N. America? vicinity of Calcutta.

Genus GLAUX, Blyth.

(912) *Gl. javanica* (?), Jerdon's *Ill. Ind. Orn.* pl. 30).

Syn. Strix javanica de Wormb. apud Latham (vide J. A. S. XIV, 186).
S. treandida. Tickell, J. A. S. II 572.
S. longimembris. Jerdon.

Inhabits Plains of India: very rare on the mud-soil of Lower Bengal, within the reach of the tide. A specimen from S. India was presented by T. C. Jerdon, Esq. (1842).

Order III. INSESSORES. Suborder. PICÆ, L. (modified). Tribe. SYNDACTYLI, Cuv. (modified). Fam. BUCEROTIDÆ. Sub. fam. BUCEROTINÆ.

Genus BUCEROS, L. (*Dhan'es*, Beng., generic).

(913) *B. cavatus*, Shaw (*As. Res.* XVIII, pt. II, pl. Gould's *Century*, pl.).

Syn. B. bicornis (?). Lin.
B. homrai, Hodgson.

Ban Rao (Jungle King), Masuri: *Homrai*, Nepal: *Young-yeng*, Arracan: *Juggang Papan*, Sumatra: *Concan*, Malay. Inhabits extensive hill forests of all India; Assam; Arakan; Tenasserim; Malayan peninsula; Sumatra; Philippines?

(914) *B. rhinoceros*, (*Pl. Enl.* 934).

Syn. B. niger. Shaw (nec Vieillot).
B. sylvestris. Vieillot.
B. diadematus Drapiez.
} Young.

Juggang Danto, Malay: *Rangkok*, or *Jongrang*, Java. Inhabits Malayan peninsula and Archipelago.

(915) *B. hydrocorax*, L. (*Dict. Class.' Hist. Nat.*, *Atlas*, pl. 23, fig. 2.)

Syn. B. bicornis, var., Shaw.
B. cristatus. Vieillot.
B platyrhynchos, Pearson, J. A. S. X. 652.

Inhabits Moluccas.

(916) *B. pica*, Scopoli, (*Pl. Enl.* 813).

Syn. B. malabaricus. var. B. Latham.
B. monoceros, and probably B. violaceus, Shaw.

Bægma Dunnase, White, *As. Res.* IV, 119. Inhabits Indian peninsula; Ceylon? Goomsoor, Kuttack.

(917) *B. affinis*, Hutton, J. A. S. XVIII. Inhabits Deyra Doon.

(918) *B. albirostris*, Shaw, Vieillot, (Lev. *Ois. Rar.*, pl. 14).

Syn. B. malabaricus. Latham.
B. leucogaster. Blyth. J. A. S. X, 922 (the young).

Auk-khyeng, Arakan. Inhabits Mednapore district; Rajmahl; Monghyr; Nepal; Assam; Sylhet; Arakan; Tenasserim provinces: never in Malabar, or S. India: replaced by *B. affinis* in the Deyra Doon, which merely differs in being constantly of the larger size of *B. pica*.

(919) *B. intermedius*, Blyth (J. A. S. XVI, 994).

Syn. B. violaceus of Wagler. apud Lord A. Hay, Madr. Journ. XIII, 148.
Probably B. malabaricus of Sumatra, apud Raffles.

Inhabits Malayan peninsula (in latitude of Penang); Sumatra?

(920) *B. malayanus*, Raffles, (*Pl. Col.*).

Syn. B. anthracinus, Temminck.
B. bicolor Eyton.
B. Elliotti, A. Hay (vide J. A. S. XVI, 995).
B albirostris of Java (?). apud Horsfield.
Kiki (?). Malay: Angka Angka (?), Sum: Klinglingan (?), Java.

Inhabits Malayan peninsula; Sumatra; Java? Moluccas?

(921) *B. nigrirostris*, Blyth (J. A. S. XVI, 895).

Syn. B. malayanus apud Lord A. Hay, Madr. Journ. XIII. 151.

Inhabits Malayan peninsula.

(922) *B. birostris*, Scopoli, (Lev. *Ois. Rar.*, pl. 15).

Syn. B. ginginianus, Shaw.

Putteal Dunnase, *White*, *As. Res.* IV, 121. Inhabits India generally (nec Assam): never on the eastern side of the Bay of Bengal.

(923) *B. gingalensis*, Shaw (Lev. *Ois. Rar.*, pl. 23).

Syn. B. bengalensis, Gray.

Inhabits Malabar; Ceylon: never Bengal.

(924) *B. galeritus*, Temminck (*Pl. Col.*).

Syn. B. carinatus, Blyth, J. A. S. XV. 187.

Mati Sakawan, Malay. Inhabits Malayan peninsula.

(925) *B. comatus*, Raffles.

Syn. B. lugubris, Begbie, vide Ann. M.N. H. 1846, p. 405.

Inhabits Malayan peninsula; Sumatra.

(926) *B. exarrhætus*, Reinwardt (*Pl.Col.* 211). Inhabits Moluccas and Java.

(927) *B. panayensis*, Scopoli, (*Pl. Enl.* 780 781).

Inhabits Moluccas; Philippines.

(928) *B. nipalensis*, Hodgson (*As. Res.* XVIII, pt. 1, 2 figs. of female).

Inhabits S. E. Himalaya; hill ranges of Assam, and Munipur.

(929) *B. pasuran*, Raffles.

Syn. B. ruficollis apud Blyth, J. A. S. XII, 176.

Inhabits Cherra Punji; Arakan; Tenasserim provinces; Malayan peninsula; Sumatra.

(930) *B. plicatus*, Latham, Shaw (nec Drapiez).

Syn. B. obscurus, Gmelin.
B. subruficollis, Blyth, J.A. S. XII, 177.

Inhabits Arakan; Tenasserim provinces.

(931) *B. galeatus*, L. (*Pl. Enl.* 933).

Toko, and *Burong Gading*, Sum.: *Tibbang Mantooa*, Malay. Inhabits Malayan peninsula and archipelago.

Subfam. IRRISORINÆ.

Genus IRRISOR, Lesson.

(932) *I. erythrorhynchos.*

Syn. Upupa erythrorhynchos, Latham.
Inhabits S. Africa.

Fam. UPUPIDÆ.

Genus UPUPA, L.

(933) *U. epops*, L. (*Pl. Enl.* 52).

Inhabits Europe; Asia; N. Africa. Common in Bengal; also Nepal: generally replaced in S. India and Ceylon, as likewise in the Deyra Doon, by the next; though occurring in the Nilgiris.

(934) *U. senegalensis* (?), Swainson (vide J. A. S. XIV, 189).

Syn. U. minor apud Jerdon.

Inhabits S. India; Ceylon; Deyra Doon; W. Africa?

Fam. HALCYONIDÆ.

Genus DACELO, Leach.

(935) *D. monacha*, ——— ?

Syn. D. concreta, juv., Temminck.

Inhabits Celebes? Moluccas?

(936) *D. pulchella*, Horsfield (*Pl. Col.* 277; *Zool. Res. in Java*, pl.).

Tengki-watu. Jav. Inhabits Mergui; Malayan peninsula and archipelago.

Genus HALCYON, Swainson.

(937) *Match-ranga* (generic), or *Matchi-mar* (Masuri), H.: *Pin-ngyeng* (generic), Arakan, with the prefix of *Tsheng* for the larger species and *Glai* for the smaller: *Kaka*, Malayan.

(938) *H. leucocephalus*, L.

Syn. Alcedo capensis, L. (*Pl. Col.* 599).

Bang Kaka, Sumatra: *Tengke Buto*, Java. Malacca.

(939) *H. gurial*, Pearson (J. A. S X, 633.)

Syn. H. brunniceps, Jerdon, Madr. Journ. XIII, 143.
H. leucocephalus apud Horsfield, P. Z. S. 1839, p. 156.

Gurial, Beng.: *Malay Poymah*, Malabar (i. e. "Jungle King-fisher"), Jerdon. Inhabits India generally.

(940) *H. amauropterus*, Pearson (J. A. S. X, 635.)

Inhabits S. Bengal; Arakan; Tenasserim.

(941) *H. smyrnensis*, (*Pl. Col.* 232, 894).

Syn. Alcedo smyrnensis, L.
Ispida bengalensis minor, Brisson.

Sada-buk Match-ranga, Beng.: *Kilkila*, H. Jerdon: *Pilly kudua* (*loco*, or 'large'), Cingh. Inhabits India generally; Assam; Arakan; Tenasserim; Malayan peninsula; Ceylon; Syria.

(942) *H. gularis*, (*Pl. Col.* 135).

Syn. Alcedo gularis, Kuhl.
A. melanopterus, Temminck.
H. ruficollis, Swainson.
H. smyrnensis, var. albogularis, Blyth, J. A. S. XII, 928.

Tengke-arang, Java. Inhabits Java; Philippines: Madagascar (?) Vide. *Ann. M. N. H., n. s.*, 1848.

(943) *H. coromander.*

Syn. Alcedo coromander, Latham.
H. coromandelicus, Vigors.

Tengke-sambo, Java. Inhabits Nepal; Sikim; Bengal Sundarbans; Tenasserim; Coromandel?

(944) *H. atricapillus* (*Pl. Col.* 613).

Syn. Alcedo atricapilla, Latham.
A. albiventris, Scopoli (inapplicable).

Udang, Malay. Inhabits Eastern side of the Bay of Bengal; rare on the western: Bengal Sundarbans; Malayan peninsula and Archipelago; China.

Genus TODIRHAMPHUS, Lesson.

(945) *T. varius.*

Syn. Halcyon varia, Eyton, P. Z. S. 1839, p. 101.
Probably H. chlorocephalus (as distinguished from H. sacer), in Zool. Appendix to Lady Raffles's Memoirs of Sir St. Raffles, p. 655.

Tengke-cheger (?), Java. Inhabits Malayan peninsula; Sumatra; Java?

(946) *T. collaris.*

Syn. Alcedo collaris, Scopoli.
A. chlorocephala, Gmelin.
Malayan A. sacer (v. sanctus), Auct.
Var. T. occipitalis, Blyth, J. A. S. XV, 23, 51.

Tengke, Java. Inhabits Bay of Bengal, much more common on the eastern side; Tenasserim; Bengal Sundarbans; Sumatra; Java. Nicobar variety with broad white or rufous supercilium (*T. occipitalis*, Blyth). Ordinary variety, from the Nicobars. (Particularly bright.)

Genus CERYLE, Boie.

(947) *C. guttata* (Gould's 'Century,' pl. 5).

Syn. Alcedo guttatus, Vigors.
A. lugubris, Temminck.

Inhabits Himalaya.

(948) *C. rudis* (Edwards, pl. 9).

Syn. Alcedo rudis, L.
Ispida bitorquata, Swainson.

Phatka Match-ranga, B. Inhabits Asia and Africa; rare in the S. E. of Europe. Specimen from S. Africa, from Lower Bengal. Ordinary Asiatic variety (*C. varia*, Strickland) from the neighbourhood of Calcutta. Specimen from Greece.

Genus ALCEDO, Lin.

(949) *A. grandis*, Blyth (J. A. S. XIV, 190). Inhabits Sikim; Assam?

(950) *A. nigricans*, Blyth (J.A. S. XVI, 1180.)

Syn? A. curyzona, Temminck, Text de Pl. Col., and Kaup, Verhandlungen, &c., (1848), p. 77.

Inhabits Malacca.

(951) *A. ispida* L. (*Pl. Enl.* 77).

Inhabits Europe; W. Asia: Afghanistan?

(952) *A. bengalensis*, Gm. (Edwards, pl. 11). *Match-ranga*, B.: *Chota Kilkila*, H. (Jerdon). *Raja Whodan* (generic for all the small species), Malay: *Mal Pilli hudua (pinchi*, or 'small'), Cingh. Inhabits India generally; Burmah; Malacca; China.

(953) *A. moluccensis*, Blyth (J. A. S. XV, 11). Inhabits Celebes; Moluccas.

(954) *A. meningting*, Horsfield.

Syn. A. asiatica, Swainson, (Swainson's Zool. Ill., 1st series, pl. 50).

Binti, Sum.: *Meningting*, Jav. Inhabits Tenasserim provinces; Malayan peninsula and archipelago.

(955) *A. biru*, Horsfield (*Zool. Res. in Java*, pl.; Tem. *Pl. Col.* 239, f. 1).

Meningting Watu, or *Burong-Biru*, Jav. Inhabits Java.

Genus CEYX, Lacepede.

(956) *C. erythaca* (Jerdon's *Ill. Ind. Orn.*, pl. 25).

Syn. Alcedo erythaca et tridactyla, Pallas.
A. purpurea, Gmelin.
A. rubra, Boddaert.
C. microsoma, Burton.

Dein-ngyeen, Arracan; *Raja Whodan*, Malay. Inhabits India generally, but rare; Lower Bengal: more common on the eastern side of the Bay, southward to the Straits of Malacca.

(957) *C. rufidorsa*, Strickland (J. and S., *Ill. Orn.* pl. 552).

Syn. C. tridactyla apud Jardine and Selby.
A. madagascariensis, L., apud Latham.
A. purpurea, var., Shaw.

Binti Abang, Sum.: *Chuchack-wrang*, Jav. Inhabits Malayan peninsula; Java: never in India.

Fam. CORACIDÆ.

Genus CORACIAS, L.

(958) *C. pileata*, Reinwardt?

Syn. ? C. Temminckii, (Vieillot), (Vail. Ois. de Parad., t. 6).
C. papuensis, Quoy and Gaymard (Voy. de l' Astrolabe, Ois. t. 16).

Inhabits Celebes; Moluccas.

(959) *C. garrula*, L. (*Pl. Enl.* 486)

Inhabits Europe; N. Africa; W. Asia; N. W. India; Kashmir; Mooltan; Afghanistan.

(960) *C. indica Lin.* (*Pl. Enl.* 285; Edwards, pl. 326).

Syn. C. bengalensis, L.
Garrulus nævius, Vieillot.

Subzuk, and *Nil-kant*, H. (from the colours): *Tas*, *Mahr.* (from its call); *Karolowa*, Cingh. Inhabits India generally; replaced eastward by *C. affinis.*

(961) *C. affinis*, McClelland (Gray's 'Illustrated Genera of Birds,' pl.).

Nghet-kha, Arakan. Inhabits Assam; Arakan; Tenasserim provinces.

Genus EURYSTOMUS Vieillot.

(962) *Eu. orientalis* (*Pl. Enl.* 619).

Syn. Coracias orientalis, Lin.
Eu. fascicollis et cyanicollis, Vieillot.

Tiong Lampie, and *Tiong Batu*, Malayan. Inhabits India generally, China, and Malay countries; Ceylon.

(963) *Eu. pacificus* (Gould's B.A. Vol. II. pl. 17).

Syn. Coracias pacificus, Latham.
Eu. australis, Swainson.
Eu. orientalis apud Vigors and Horsfield. Lin. Tr. XV, 202.

Inhabits Australia.

Fam. MEROPIDÆ.

Genus ALCEMEROPS, Is. Geoffroy.

(964) *Alc. Athertonii* (Jardine and Selby, *Ill. Orn.* pl. 58).

Syn. Merops Athertonii, J. and S.
Bucia nipalensis, Hodgson, J. A. S. V. 360.
Merops cyanogularis, Jerdon.
Nyctiornis amherstiana, Royle.

Pya-too-ughet, Arakan. Inhabits Deyra Doon; Nepal; Assam; Arakan; Tenasserim; S. India.

(965) *M. amicta* (Swainson's *Zool. Ill.*, 2nd series, pl. 56; *Pl. Col.* 310).

Syn. Merops amictus, Temminck.

Inhabits Tenasserim Provinces; Malayan peninsula.

Genus MEROPS, L.

(966) *M. apiaster*, L. (*Pl. Enl.* 938).

Syn. M. galilæus, Hasselquist.
M. schæghagha, Forster.
M. chrysocephalus (?), Latham.

Inhabits Europe; W. Asia; Afghanistan.

(967) *M. persicus*, Pallas (Sav., Descript. de l'Egypt, tom. 1, pl. 4, f. 3).

Syn. M. ægyptius, Savigny.

Inhabits N. Africa; W. Asia; Sinde.

(968) *M. philippinus*, L. (*Pl. Enl.* 215.)

Syn. M. Leschenaultii, Levaillant.
M. javanicus, Horsfield.

Barai Barai, Malay. Inhabits India generally; Malay countries; Ceylon.

(969) *M. sumatranus*. Raffles (Griffith's *An. Kingdom*, VII, p. 422, pl.). Inhabits Malay countries.

(970) *M. erythrocephalus*, Latham (Swainson's *Zool. Ill.*, 1st series, pl. 8).

Syn. M. quinticolor, Vieillot.
M. urica, Horsfield.

Inhabits India generally (nec Lower Bengal); Malay countries; Ceylon.

(971) *M. viridis*, L. (Edwards, pl. 183; *Pl. Enl.* 749).

Syn. M. Lamarckii, Cuv.
M. orientalis, Latham.
M. indicus, Jerdon.
Var. M. coromandus, Latham.

Bans-pati. ('Bamboo leaf'), *H.*; *Hurrial, and Patringa*, H. (Jerdon). *Mo-na-gyee*, Arakan. Inhabits India generally; Arakan; Ceylon.

Tribe ZYGODACTYLI. Division I. (Devoid of cæca). Subdivision I. Climbers).

Fam. PICIDÆ.

Lukkurphor, Hind.: *Kat-tokra*, Beng.: *Kat-harya*, Masuri: *Theet-touk*, Burm.: *Glato*, Malay: *Tukki*, Sum.; *Peatuk*, Jav.: *Pilli hudua* (same name as for King-fishers), Cingh.

Subfam. CAMPEPHILENÆ.

Genus CAMPEPHILUS, G. R. Gray.

(972) *C. validus* (*Pl. Col.* 378, 402).

Syn. Picus validus, Reinwardt.

Inhabits Western Malasia. Malacca.

Genus HEMICERCUS, Swainson.

(973) *H. canente* (Lesson's *Cent. Zool.* pl. 73; Jerdon's *Ill. Ind. Orn.* pl. 40).

Syn. Picus canente, Lesson.
H. cordatus, Jerdon (rather smaller race).

Inhabits Burmese countries (Arakan, Tenasserim, Pegu): also S. India.

(974) *H. concretus*. (*Pl. Col.* 90, f. 1, 2).

Syn. Picus concretus, Reinwardt.

Inhabits W. Malasia; Malayan peninsula.

Genus HEMILOPHUS, Swainson.

(975) *H. pulverulentus* (*Pl. Col.* 389).

Syn. Picus pulverulentus, Tem.
P. javensis, fœm., apud Horsfield, *Lin. Tr.* XIII, 76.

Inhabits Burmese and Malay countries.

(976) *H. Hodgsonii*, Jerdon (*Ill. Ind. Orn.* pl. 5.),

Inhabits Neilgiris; Malabar.

(977) *H. javensis*.

Syn. Picus javensis, Horsfield.
P. leucogaster, Reinwardt.
'Great Malayan Woodpecker,' J. A. S. VI, 952.

Peatack cyam, Java. Inhabits Malay countries; Tenasserim.

(978) *H. funebris*.

Syn. Picus funebris, Valenciennes.
P. modestus, Vigors, P. Z. S.

Inhabits Philippines.

Genus CHRYSOCOLAPTES, Blyth.

(979) *Chr. sultaneus*.

Syn. Picus sultaneus, Hodgson, J. A. S. VI, 105.
P. strictus apud Jerdon, Catal.
P. strenus, Gould, mentioned P. Z. S. 1839, p. 165.

Inhabits India generally, chiefly the hill forests, rare in the plains: also Assam, Sylhet, Arakan, Tenasserim, and Malayan peninsula southward as far as Malacca.

(980) *Chr. goensis* (*Pl. Enl.* 696).

Syn. Picus goensis, Gmelin.
Dendrocopus Elliotti, Jerdon, Catal.
Chr. melanotus, Blyth, J.A.S. XII, 1005.

Inhabits Indian peninsula: rare in most parts; common in a few localities.

(981) *Chr. hæmatribon*.

Syn. Picus hæmatribon, Wagler.
P. spilolophus, Vigors, P. Z. S. 1830, p. 98 (the female).

Inhabits Philippines.

Genus BRACHYPTERNUS, Strickland.

(982) *Br. ceylonus (N. nat. Forsch.*, 13, *pl.* 4).

Syn. Picus ceylonus, Forster.
P. neglectus, Wagler.
P. erythronotus (?), et P. rubescens (?), Vieillot.

Inhabits Ceylon, where very common.

(983) *Br. aurantius* (Edwards, pl. 182; *Pl. Enl.* 695).

Syn. Picus aurantius, L.
P. bengalensis, Gmelin (nec Horsfield, Lin. Tr. XIII, 176).
P. nuchalis, Wagler.
P. tibetanus, Natterer.
P. psarodes, Lichtenstein.
P. hemipodius, Swainson.
Malacolophus? melanochrysos, Hodgson, J. A. S. VI, 109.
Br. micropus, Blyth, J. A. S. XIV, 194.
Var. P. chrysonotus, Lesson.

Inhabits India generally; Ceylon.

Genus TIGA, Kaup.

(984) *T. Shorei*, (Gould's 'Century,' pl. 49).

Syn. Picus Shorei, Vigors, P. Z. S. 1831, p. 175; J. A. S. XIV, 193.

Inhabits Himalaya, and hilly regions of S. India.

(985) *T. intermedia*, Blyth J .A. S .XIV, 193.

Inhabits Nepal; Assam; Sylhet; Arakan; Tenasserim; Penang; S. India

(986) *T. tridactyla*, (J. A.S. XIV, 163.)

Syn. Chrysonotus tridactylus, Swainson.
Picus tiga, Horsfield.

Tukki Besor of Malays, Sumatra. Inhabits Malay countries.

(987) *T. Rafflesii* (J.A. S. XV, 16).

Syn. Picus Rafflesii, Vigors.
T. labarum, Lesson.
T. amictus, Gray.

Inhabits Malayan peninsula; Sumatra.

Subfam. GECININÆ.

Genus GECINUS, Boie.

(988) *G. squamatus*(Gould's 'Century,' pl.48).

Syn. Picus squamatus, Vigors.
P. dimidiatus apud Hardwicke and Gray (nec Temminck).

Inhabits Himalaya.

(989) *G. striolatus*, Blyth, J. A. S. XII, 1000.

Syn. G. squamatus apud Jerdon, Catal.

Inhabits Himalaya, and hilly regions of S. India: occurs, though rare on the plains.

(990) *G. dimidiatus.*

Syn. Picus dimitatus, Temminck.
P. vitatus, Vieillot.
P. affinis, Raffles, apud Vigors, in Zool. App. to Lady Raffles's Memoir of Sir St. Raffles. p. 668.
G. viridanus, Blyth, J. A. S. XII, 1000.

Inhabits Arracan; Tenasserim provinces where common. Java.

(991) *G. occipitalis* (Gould's 'Century,' pl.47).

Syn. Picus occipitalis Vigors.
P. barbatus, Gray.
P. affinis (?), Raffles.

Inhabits Himalaya; Assam; Tippera; Tenasserim provinces; Sumatra?

Division III. (with crested nape.)

(992) *G. flavinucha.*

Syn. Picus flavinucha, Gould, P. Z. S. 1833, p. 120.
Dryotomus flavigula, Hodgson, J. A. S. V, 106.

Inhabits S. E. Himalaya; Assam; Arakan.

(993) *G. chloropus* (Hardw. *Ill. Ind. Zool.*)

Syn. Picus chloropus et chlorolophos, Vieillot.
P. nipalensis, Gray.
P. xanthoderus, Malherbe.

Inhabits Himalaya chiefly; N. India: rare on the plains.

(994) *G. chlorophanes* (J. A. S. XV, 16).

Syn. Picus chlorophanes, Vieillot.
P. chlorigaster, Jerdon, Madr. Journ. XIII, 139).
P. mentalis apud Jerdon, Catal.

Inhabits S. India; Ceylon.

(995) *G. malaccensis* (J. A. S. XIV, 192).

Syn. Picus malaccensis, Latham.
Le Pic de Malacca, Sonnerat.

Inhabits Malayan peninsula.

(996) *G. mentalis* (*Pl. Col.* 384).

Syn. Picus mentalis, Temminck.

Inhabits Tenasserim provinces: Malayan peninsula; Sumatra.

(997) *G. puniceus* (*Pl. Col.* 423).

Syn. Picus puniceus, Horsfield, Lin. Tr. XIII, 661.
Chrysonotus miniatus apud Eyton (?), P. Z. S. 1339, p. 106.

Tukki Bajukarap or *Belatu*, Malayan (Raffles). Inhabits Tenasserim; Malayan peninsula; Sumatra; Java.

Division IV.

(998) *G. pyrrhotis.*

Syn. Picus pyrrhotis, Hodgson, J. A. S. VI, 108.

Inhabits S. E. Himalaya.

(999) *G. rubiginosus.*

Syn. Picus rubiginosus, Eyton (nec Swainson, B. W. Afr. II. p. 150).
P. melanogaster, A. Hay, Madr. Journ, XIII, 153.

Inhabits Malayan peninsula.

Genus GECINULUS, Blyth.

(1000) *G. grantia* (J. A. S. XIV, 192).

Syn. Picus grantia, M'Clelland, P.Z. S. 1839, p. 165.

Inhabits Sikim; Assam.

Genus MEIGLYPTES, Swainson.

(1001) *M. pectoralis* (*Pl. Col.*)

Syn. Picus pectoralis, Latham.
P. marginatus, Reinwardt.
P. tukki, Lesson.
P. luridus, Nitzsch.
P. fasciolatus Lichtenstein.
Hemicercus brunneus, Eyto.n

Inhabits Malayan peninsula.

(1002) *M. tristis* (*Pl. Col* 197, f. 1).

Syn. Picus tristis, Horsfield.
P. poicilophus, Temminck.

Glato Bawan, Malacca: *Tukki Boreh* of Malays, Sumatra: *Platuk-watu*, Java. Inhabits Tenasserim; Malayan peninsula; Sumatra; Java.

(1003) *M. jugularis*, Blyth, J. A.S. XIV, 195. Inhabits Arracan; Tenasserim.

Genus MICROPTERNUS, Blyth.

(1004) *M. phaioceps*, Blyth, J. A. S. XIV, 195.

Syn. P. rufonotus, Malherbe.
P. rufus, Latham, apud Gray (nec Gmelin).
Rufous Indian Woodpecker, Latham.

Inhabits Bengal; Nepal; Assam; Sylhet; Arracan; Tenasserim provinces.

(1005) *M. gularis*, Jerdon, *Madr. Journ.* XIII, 139. Inhabits Indian peninsula.

Syn. Slight variety of preceding species?

(1006) *M. badius*.

Syn. Picus badius, Raffles.
P. brachyurus, Vicillot.

Tukki Kalabu of Malays (Raffles). Inhabits Malayan peninsula; Sumatra.

Subfam. PICINÆ.

Genus DRYOCOPUS, Boie.

(1007) *Dr. martius* (*Pl. Enl.* 596).

Syn. Picus martius, L.

Inhabits Europe; W. Asia.

Genus PICUS, L. (as restricted).

(1008) *P. leuconotus*, Bechstein (Naum. 35, t. 65),

Syn. P. cirris, Pallas (apud Gray).

Inbabits N. Europe.

(1009) *P. himalayanus*, Jardine and Selby (*Ill. Orn.* pl. 116).

Syn. P. assimilis, Natterer.

Inhabits N. W. Himalaya.

(1010) *P. darjellensis*, Blyth, J. A. S. XIV, 196.

Syn. P. majoroides, Hodgson.

Inhabits S. E. Himalaya.

(1011) *P. mahrattensis*, Latham (Gould's 'Century,' pl. 51).

Syn. P. hœmosomus, Wagler.

Inhabits India generally (but never on the alluvium of Lower Bengal).

(1012) *P. brunnifrons*, Vigors (Gould's 'Century,' pl. 52).

Syn. P. aurifrons, Vigors.

Inhabits Himalaya.

(1013) *P. Macei*, Vieillot (Hardw. *Ill. Ind. Zool.*)

Syn. P. medius from India, apud Latham.

Inhabits Bengal; Nepal; Assam; Tippera; Malayan peninsula.

(1014) *P. hyperythrus*, Vigors (Gould's 'Century,' pl. 50). Inhabits Himalaya.

(1015) *P. cathpharius*, Hodgson, J. A. S. XII, 1006. Inhabits S. E. Himalaya.

(1016) *P. rubricatus*, Blyth, (described as fine old male of No. 302 in J. A. S. XIV, 197). Inhabits Sikim.

(1017) *P. pygmæus*, Vigors, P. Z. S. 1831, p. 44.

Syn. P. trisulensis, Lichtenstein.

Inhabits N. W. Himalaya; Nepal.

(1018) *P. moluccensis*, Gmelin, (*Pl. Enl.* pl. 748, f. 2).

Syn. P. bicolor, Gmelin, apud Gray.
P. zizuki (?), Temminck.
Tripsursus auritus, Eyton.

Tukky lilit, Malayan; Sumatra. Inhabits Malayan peninsula; Java.

(1019) *P. canicapillus*, Blyth, J. A. S. XIV, 197.

Syn. Qu. Permanent variety of P. moluccensis.

Inhabits Arakan: Tenasserim Provinces.

(1020) *P. variegatus*, Wagler (nec Latham).

Syn. P. moluccensis, var. B, and Brown Woodpecker, Latham.
P. moluccensis, Hardw. and Gray Ill. Ind. Zool.
P. Hardwickii, Jerdon, Madr. Journ. XIII, 138.
Cawnpore Woodpecker, Latham.

Inhabits India, southward of the Himalaya.

(1021) *P. gymnopthalmos*, Blyth, J. A. S. XVIII. Inhabits Ceylon.

(1022) *P. validirostris*, Blyth (described and referred to *P. nanus*, Vigors, J. A. S. XIV, 197) Inhabits ——— ?

Subfam. PICUMNINÆ.

Genus PICUMNUS, Temminck.

(1023) *P. innominatus*, Burton, P. Z. S. 1835, p. 154.

Syn. Vivia nipalensis, Hodgson, J. A. S. VI, 107.

Wee-Wee, Nepal. Inhabits Himalaya.

Genus SASIA, Hodgson.

1024) *S. abnormis* (*Pl. Col.* 371, f. 3).
Syn. Picumnus abnormis, Temminck.
Inhabits Malay countries.

1025) *S. ochracea*, Hodgson, J. A. S. V, 778. Inhabits Nepal; Sikim; Assam; Sylhet; Aracan.

Subfam. YUNCINÆ.

Genus YUNX, Lin.

1026) *Y. torquilla*, L. (*Pl. Enl.* 998). Inhabits Europe and Asia: common in many parts of India, Calcutta, Ferozepore.

Subfam. INDICATORINÆ.

Genus INDICATOR, Vieillot.

1027) *I. xanthonotus*, Blyth, J. A. S. XI, 166, IV, 198 (Jerdon's *Ill. Ind. Orn. pl.—)*. Inhabits Sikim.

Subdivision II. (Perchers).

Fam. MEGALAIMIDÆ.

Genus MEGALAIMA, G. R. Gray.

1028) *M. virens* (Gould's 'Century,' pl. 46).
Syn. B. grandis, Gmelin.
Bucco virens, Boddaert.
Inhabits Himalaya; Assam; Cherra Punji: China.

1029) *M. lineata* (Tem. *Pl. Col.* 522).
Syn. B. lineatus, Vieillot.
B. corvinus, Tem.
Pho goung, Arakan. Inhabits Deyra Doon; Nepal; Assam; Sylhet; Tippera; Arakan; Tenasserim provinces; Sumatra (apud Vieillot).

1030) *M. caniceps* (Vail. *Barb.* t. 38, apud Gray).
Syn. B. lineatus apud Tickell. J. A. S. II, 579.
Bucco caniceps, Franklin,
Burra Bassunta, Central India: *Kootomra*, Tel.: *Kootoorya*, Mahr.: *Kootur-kasee*, Can.: *Kootooreal*, Cinghalese. Inhabits Indian peninsula, spreading northward to the Deyra Doon. Common in Meduapur jungles, and in Central India: replaced by a smaller and darker race in Ceylon. Specimens from the Nilgiris and specimens of rather smaller and darker-coloured race from Ceylon (*B. zeylanicus*? (Lin.)

1031) *M. viridis* (Jerdon's *Ill. Ind. Orn.*, pl. 26).
Syn. Bucco viridis, L.
Inhabits Nilgiris; Malabar.

1032) *M. flavifrons* (Vail. *Barb.* t. 55).
Syn. Bucco flavifrons, Cuv.
B. aurifrons, Temminck.
Inhabits Ceylon.

1033) *M. chrysopogon*, (*Pl. Col.* 285).
Syn. Bucco chrysopogon, Temminck.
Inhabits Malayan peninsula; Sumatra.

1034) *M. versicolor* (*Pl. Col.* 390).
Syn. Bucco versicolor, Raffles.
B. Rafflesii, Lesson.
Takoor, Malacca: *Takoo*, Sumatra (generic). Inhabits Malayan peninsula; Sumatra.

1035) *M. quadricolor.*
Syn Bucco quadricolor, Eyton, P. Z. S. 1839, p. 105.
B. malaccensis (?), Hartlaub, Rev. Zool. 1842, p. 337.
Inhabits Malayan peninsula.

1036) *M. armillaris* (*Pl. Col.* 89, f. 1).
Inhabits Malayan peninsula; Java?

1037) *M. asiatica* (Vieillot, *Gal. des Ois.*, t. 35).
Syn. Trogon asiaticus, Latham.
Capito cyanocollis, Vieillot.
Bucco cyanops, Cuv.
B. cæruleus, Dumeril.
Burra Bassunt-bairi, Bengal: *Koop-kha-loung*, Arakan. Inhabits Bengal; sub-Himalayan region to Deyra Doon, and valleys of the lower hills; Assam; Sylhet; Tipperah: rare in Arakan.

1038) *M. Franklinii.*
Syn. Bucco Franklinii, Blyth, J. A. S. XI, 167.
Inhabits S. E. Himalaya; Cherra Punji, Assam?

1039) *M. philippensis* (Tem. *Pl. Col.* 331).
Syn. Bucco philippensis, Brisson.
B. flavigula, Boddaert.
B. indicus, Latham.
B. flavicollis, Vieillot.
B. rubricollis, Cuv.
B. luteus, Lesson (albino variety, Jerdon.)
Chota Bassunt bairi, Bengal; *Kut-khora* and *Tambayut* ('Coppersmith'), H.: *Chanda*, Sumatra: *Engku*, Java. Inhabits India generally; nec Himalaya: Tippera; Chittagong; Ramree (Arakan); Tenasserim provinces; Penang; Sumatra; Java; Philippines; Ceylon.

1040) *M. rubricapilla* (Brown's *Zoology*, pl. 14)
Syn. Bucco rubricapillus, Gmelin.
Inhabits Ceylon.

1041) *M. trimaculata* (Tem. *Pl. Col.* 536, f. 1).
Syn. Bucco trimaculatus, Gray.
B. frontalis, Temminck.
B. Duvaucelei, Lesson.
B. australis apud Raffles (nec Horsfield).
B. cyanotis, Blyth (J. A. S. XIV, 465 (Arakan variety).
Ngel-pa-din, Arakan. Inhabits Malayan peninsula; Sumatra: with distinct variety in Arakan.

Genus MEGALORHYNCHUS, Eyton.

(1042) *M. Hayii*, Gray (apud G. R. Gray).

Syn. Micropogon fuliginosus, Temminck.
Calorhamphus sanguinolentus, Lesson.
Megalorhynchus spinosus, Eyton.

•*Ampis*, Sumatra: *Unkot Besea*, Penang. Inhabits Malayan paninsula; Sumatra.

Fam. CUCULIDÆ.

Subfam. CUCULINÆ.

Genus CUCULUS, L.

(1043) *C. sparverioides*, Vigors (Gould's 'Century,' pl. 53).

Syn. Ferruginous-necked Cuckoo (?), Latham.

Inhabits Himalaya; Nilgiris; Malayan peninsula.

(1044) *C. varius*, Vahl (Hardw. *Ill. Ind. Zool.*)

Syn. C. fugax, Horsfield.
C. Lathami, Gray.
C. tenuirostris, Lesson.
C. ejulans, Sundevall.
C. nisicolor, Hodgson, variety?
Bhrou and Bychan Cuckoo, and the young Sokagu, Cuckoo, Latham.

Chok-gallo, and *Popiya*, Beng.: *Kupuk*, or *Upuk*, H. (Jerdon). *Katti pitta* ('Sword bird'), Telugu. *Zuk-kat* (Custom-house bird), Dukhun. Inhabits India generally and Malay countries.

(1045) *C. striatus*, Drapiez.

Syn. C. micropterus, Gould.
C. optatus, Gould, 'Intr. to Birds of Australia.' (Doubtful.)
C. affinis, A. Hay, J. A. S. XV. 18 (large variety).
C. flaviventris apud Strickland (?), J. A. S. XIII, 390.

Bou-kotako, Beng.: *Kyphul-pucka* of hill-men, Masuri (Hutton). Inhabits India generally, and Malay countries: Australia? Rare in S. India.

(1046) *C. canorus*, Lin. (*Pl. Enl.* 811).

Syn. C. borealis, Pallas.
C. hepaticus, Sparrman, var.?

P'hu-p'hu, Deyra Doon. Inhabits Europe, Asia, and Africa, Darjiling, Calcutta.

(1047) *C. himalayanus*, Vigors (nec apud Gould's 'Century,' pl. 54).

Syn. S. saturatus, Hodgson, J. A. S. XII, 942. XV, 18.

Inhabits Himalaya generally: Tenasserim provinces.

(1048) *C. poliocephalus*, Latham (Gould's 'Century' pl. 54).

Syn. C. himalayanus apud Gould, Cent.

Inhabits Himalaya: S. India rarely.

(1049) *C. tenuirostris*, Gray (Hardw. *Ill. Ind. Zool.*).

Syn. C. flavus apud Lesson, et Jerdon, Madr. Journ. XI, 220: C. flavus, Ind. Var.?
C. lineatus (?), Lesson, Traité.
C. niger apud Blyth, J. A. S. XI, 908.
Pousya, Mahr. Inhabits India generally.

(1050) *C. merulinus*, Scopoli.

Syn. C. flavus, Gmelin.
C. pyrogaster, Drapiez.

Gedasse, Java. Inhabits Malay countries.

(1051) *C. Sonneratii*, Latham.

Syn. C. rufovittatus, Drapiez.
C. pravatus, Horsfield.

Inhabits S. India and Malay countries.

Subgenus SURNICULUS, Lesson.

(1052) *S. dicruroides*.

Syn. Pseudornis dicruroides, Hodgson, J. A. S. VIII, 136.
S. lugubris, Ind. Var.?

Inhabits India: Tenasserim provinces: Ceylon.

(1053) *S. lugubris*.

Syn. Cuculus lugubris, Horsfield.
C. albopunctatus, Drapiez.

Awon-Awon, Java. Inhabits Malayan peninsula and archipelago.

Subgenus CHRYSOCOCCYX, Boie.

(1054) *Chr. xanthorhynchos* (Horsfield's *Zool. Res. in Java*, pl.)

Syn. Cuculus xanthorhynchos, Horsfield.
Lampromorpha amethystina, Vigors, P. Z. S. 1831, p. 98.

Inhabits Tenasserim provinces: Malayan peninsula and archipelapo: Philippines: S. E. Himalaya (? Gray).

(1055) *Chr. chalcites* (?), Temminck (*Pl. Col.* 102, f. 2).

Syn. Cuculus malayanus (?), Raffles.
Chr. smaragdinus, Blyth, J. A. S. XV, 53 (nec Swainson).
Trogon maculatus, Gmelin, Brown's Ill. Zool. pl. XIII, fig. Sup. (but the specific name quite inapplicable).

Inhabits Hill regions of India generally; Arakan; Tenasserim.

(1056) *Chr. basalis*.

Syn. Cuculus basalis, Horsfield.

Inhabits Malayan peninsula and archipelago.

Genus EUDYNAMYS, Vigors and Horsfield.

(1057) *Eu. orientalis*.

Syn. Cuculus orientalis, Lin., the male.
C. punctatus, C. mindanensis, C. scolopaceus } Lin. } the female.
C. maculatus, Gmelin, }
Var.? C. indicus, Latham.
C. niger, Latham (Edwards, pl. 58).

Coël, H.: *Kokil*, Beng.: male—*Tuhu*; female *Chule*, Java: *Cowde-coha*, Cingh. Inhabits India, China, and Malay countries.

Genus OXYLOPHUS, Swainson.

(1058) *O. melanoleucos* (figured as the female *Edolio Cuckow* by Shaw).

Syn. Cuculus melanoleucos, Gmelin.
C. edolius, Cuvier.
Leptosomus afer apud Franklin and Sykes.

Popiya, Hind.: *Kolu Bubul*, Beng.: *Golli Kokila* ('Milkman Cuckoo),' Telugu. Inhabits India generally; Ceylon: rare on the eastern side of the Bay of Bengal, and never (?) in the Malay countries.

(1059) *O. coromandus* (*Pl. Enl.* 274, f. 2).

Syn. Cuculus coromandus, L.
C. collaris, Vieillot.

Inhabits India generally and Malay countries.

Subfam. PHŒNICOPHAINÆ.

Genus PHŒNICOPHAUS, Vieillot.

Cadow (generic), Malacca.

Subgenus DASYLOPHUS, Swainson.

(1060) *D. superciliosus.*

Syn. Ph. superciliosus, Cuv.

Inhabits Philippines.

Subgenus PHŒNICOPHAUS.

(1061) *Ph. pyrrhocephalus* (Pennant's 'Indian Zoology,' p. 5).

Syn. Cuculus pyrrocephalus, Forster.
Ph. leucogaster, Dumeril.

Malkoha, Ceylon (Pennant). Inhabits Ceylon.

(1062) *Ph. melanogaster* (*Pl. Col.* 349).

Syn. Cuc. melanogaster, Vieillot—the young?
Ph. calorhynchos, Temminck.

Inhabits Celebes: Moluccas.

(1063) *Ph. curvirostris* (Vail. *Ois. d' Afr.* t. 224).

Syn. Cuculus curvirostris, Shaw.
Ph. tricolor, Stephens.
Ph. viridis, Vieillot.
Cuculus melanognathus apud Raffles (nec Ph. melanognathus, Horsfield).

Inggang Balukar, Sumatra. Inhabits Malay countries.

Subgenus ZANCLOSTOMUS, Swainson.

(1064) *Z. diardi.*

Syn. Melias Diardi, Lesson.
Phœnicophaus tristis apud Blyth, J. A. S. XI, 928.

Cadow Kuchie, Malacca. Inhabits Malay countries.

(1065) *Z. sumatranus.*

Syn. Cuculus sumatranus, Raffles.
Phœnicophus Crawfurdii, Gray.

Sengdo, Sumatra. Inhabits Malay countries.

(1066) *Z. tristis* (Belanger, *Voy.* pl.).

Syn. Melias tristis, Lesson.
Phœnicophaus longicaudatus, Blyth.

Ban Kukil, Beng.: *Wa-pha-lai*, Arakan. Inhabits Bengal, Nepal, Assam, Arakan, Tenasserim provinces, Penang.

(1067) *Z. viridirostris*, Jerdon (*Ill. Ind. Orn.* pl. 3.)

Syn. Phœnicophaus Jerdoni, Blyth.

Kuppra Popya, Hind. *Wamaneh Kaki*, Telugu: *Handi Koota*, Ceylon (Daniell): *Mal candatta*, Do. (Layard). Inhabits Peninsular India; Ceylon.

(1068) *Z. javanicus* (Horsfield's '*Zool. Res. in Java*', pl.).

Syn. Phœnicophaus javanicus, Horsfield.
Coccyzus chrysogaster, Temminck.
C. rubrirostris, Drapiez.
Chalybeate Cuckoo, Latham.

Kaka Apie, Malacca: *Bubut Kembang*, Java Inhabits Malay countries; Tenasserim.

Genus RHINORTHA, Vigors.

(1069) *Rh. chlorophæa* (Belanger, *Voy.* pl. 1, the female).

Syn. Cuculus chlorophæus, Raffles.
C. sumatranus, Cuvier.
Phœnicophaus caniceps, Vigors.
Ph. viridirostris, Eyton.
Bubutus Isidorei et B. Davaucelei, Lesson.
Coccyzus badius, Gray.
Anadænus rufus et A. rufescens Swainson.

Slaya, *See-saya*, Malacca. *Búbút*, Sumatra. Inhabits Malay countries.

Genus TACCOCUA, Lesson.

(1070) *T. infuscata*, Blyth, J. A. S. XIV, 200.

Inhabits Tarai region bordering on Nepal and Sikim.

(1071) *T. affinis*, Blyth, J. A. S. XV, 19.

Inhabits Central India; Mednapur jungles; Rajmahl; Monghyr.

(1072) *T. sirkee* (Hardwicke's *Ill. Ind. Zool.*)

Syn. Centropus sirkee, Gray.
C. cuculoides, C. W. Smith, J. A. S. X. 658.

Coccyzus chrysogaster of Royle's list.

Inhabits vicinity of Cawnpore; Deyra Doon.

(1073) *T. Leschenaultii*, Lesson.

Syn. Zanclostomus sirkee apud Jerdon, Catal.

Inhabits S. India.

Genus CENTROPUS Illiger.

Mahúka, Hind.: *Kúka*, Beng.: *Atte Cuccula*, Cingh.: *Boop*, Arakan: *Búbút*, and *Kradok*, Malay.

(1074) *C. curycercus*, A. Hay (J. A. S. XIV, 551)

Syn. Cuculus bubutus apud Raffles (nec Centropus bubutus, Horsfield).

Inhabits Malayan peninsula; Sumatra.

(1075) *C. philippensis*, Cuvier (Horsfield's *Zool. Res. in Java*', pl.).

Syn. Cuculus ægyptius, var. γ, Latham.
Corydonyx pyrrhopterus, Vieillot.
Centropus bubutus, Horsfield.
C. castanopterus, Stephens.
C. fasciatus, C. W. Smith, J. A. S. X, 659.
Var. Polophilus sinensis, Stephens.

Inhabits S. E. Asia and its Archipelago.

(1076) *C. chlororhynchos*, Blyth, J. A. S. XVIII.

Inhabits Ceylon.

(1077) *C. viridis* (Brown's *Zoology*, pl. XIII, fig. *infra*).

Syn. Cuculus viridis, Scopoli.
C. bengalensis, Latham.
C. tolu apud Raffles.
C. lepidus et C. affinis, Horsfield.
C. pumilus, and probably C. melanops, Lesson.
C. dimidiatus, Blyth, J. A. S. XII, 915.
C. rectunguis, Strickland, Ann. Mag. N. H. XIX, 134.
Polophilus Lathami (?), Leach.

Inhabits India generally and Malay countries, more abundant in the latter.

(1078) *C. bicolor*, Lesson.

Syn. C. celebensis, Quoy and Gaymard, Voy. de l' Astrolabe.

Inhabits Celebes; Moluccas.

Fam. TROGONIDÆ.

Genus HARPACTES, Swainson.

(1079) *H. Hodgsonii*, Gould (*Mon. Trogonidæ*, pl. 34)

Htoo-ta-roo, Arakan. Inhabits Nepal; Assam; Sylhet; Arakan.

(1080) *H. kasumba* (Gould's *Mon. Trogonidæ* pl. 29).

Syn. Trogon kasumba, Raffles.
Tr. condea, Cuvier.
Tr. fasciatus, Tem. (nec Pennant).
Tr. Temminckii, Gould.

Kasumba, Sumatra. Inhabits Malayan peninsula; Sumatra.

(1081) *H. Diardi* (Gould's *Mon. Trogonidæ*, pl. 30).

Gumsoba, *Kuna somba* (*Kasumba ?*), Malacca. Inhabits Malayan peninsula; Sumatra.

(1082) *H. fasciatus* (Gould's *Mon. Trogonidæ*, pl. 31).

Syn. Trogon fasciatus, Pennant.
Tr. malabaricus, Gould.

Kúfni Churi of some, Hind.: *Kurna* Mahr.: *Kakurni Kukki*, Can. Inhabits peninsula of India; Ceylon.

(1083) *H. rutilus* (Gould's *Mon. Trogonidæ*, pl. 32).

Syn. Trogon rutilus, Vieillot.
Tr. cinnamomeus (?), Temminck.
T. Duvaucelei, Temminck.
T. fasciatus, var. B., Latham.

Ramguba, Malacca. Inhabits Malayan peninsula; Sumatra.

(1084) *H. oreskios* (Gould's *Mon. Trogonidæ* pl. 36).

Syn. Trogon oreskios, Temminck.

Inhabits Arakan; Tenasserim provinces.

Fam. CAPRIMULGIDÆ.

Subfam. PODARGINÆ.

Genus PODARGUS, Cuvier.

(1085) *P. Auritus*, Vigors (Gould's *Icones Avium*).

Syn. Bombycistoma Fullartonii, Hay, J. A. S, X, 573.

Inhabits Malayan peninsula.

(1086) *P. Javanensis*, Horsfield (Tem. *Pl. Col.* 159; Horsfield's *Zool. Res. in Java*).

Syn. ? P. cornutus, Tem. (the adult ?).

Inhabits Malayan peninsula, Java.

(1087) *P. affinis*, Blyth, J. A. S, XVI, 1180.

Inhabits Malayan peninsula.

Subfam. CAPRIMULGINÆ.

Chippuk, H. *Dub chooree*, also *Dubbuk chooree*, also *Undhee chooree*, H. *and* B: *Tukang*, Malayan. *Ugeet payeen*, Arakan; *Kuppo pitta* (Frog-bird), Telugu; also *As kappri gadu*, Tel.

Genus EUROSTOPODUS, Gould.

(1088) *Eu. cerviniceps* (Gould's *Icones Avium*).

Syn. Lyncornis cerviniceps, Gould.

Twun-dweng-nghat, Arakan. Inhabits Burmese countries.

(1089) *Eu. Temminckii* (Gould's *Icones Avium*).

Syn. Lyncornis Temminckii, Gould.
Caprimulgus imberbis, Temminck.
C. pulcher, A. Hay, Madr. Journ. XIII, 161.

Inhabits Malayan peninsula, Java.

Genus CAPRIMULGUS, Lin.

(1090) *C. indicus*, Latham (Jerdon's *Ill. Ind. Orn.* pl. 24).

Syn. C. cinerascens, Vieillot.
C. innotatus, Hodgson (juv.)

Inhabits India generally, Malayan peninsula.

(1091) *C. albonotatus*, Tickell, J. A. S, II, 580.

Syn. C. gangeticus, Blyth, mentioned Ann. Mag. N. H. 1843, pl. 95.
C. macrourus apud Blyth, J. A. S, XI, 586.
C. nipalensis, Hodgson, Gray, Zool. Misc.

Inhabits Northern and Central India: common in Lower Bengal.

(1092) *C. macrourus*, Horsfield (Gould's *B.* . Vol. II, pl. 9).

Inhabits Arakan, Tenasserim, Malacca, Java, . Australia; very rare in Lower Bengal.

(1093) *C. mahrattensis*, Sykes, P. Z. S. 1832, . 83.

Syn. C. atripennis, Jerdon, Ill. Ind. Orn., art. C. asiaticus.
C. asiaticus, var. C. (?), Latham.

Inhabits S. India, Ceylon.

(1094) *C. asiaticus*, Latham (Vaill. *Ois. d' fr.*, *t.*; Hardw. *Ill. Ind. Zool.*)

Syn. C. pectoralis, Cuv.
Bombay Goat sucker, Latham.

Bacca-meena, Cingh. Inhabits India generally.

(1095) *C. monticolus*, Franklin, P. Z. S. 831, p. 116.

Syn. Great Bombay Goat sucker, Latham.

Inhabits India generally, Arakan (Ramree).

(1096) *C. affinis*, Horsfield.

Inhabits Java. This is a diminutive of C. monicolus; wing 6½ Inches.

Fam. CYPSELIDÆ.

Subfam. CYPSELINÆ.

Genus ACANTHYLIS, Boie.

(1097) *Ac. caudacuta.*

Syn. Hirundo caudacuta, Latham.
Cypselus giganteus, Temminck.

Inhabits Nilgiris, Ceylon, Malayan peninsula, rarely Arakan.

(1098) *Ac. fusca* (Gould's B. A. Vol. II, pl. 10; Swainson's *Zool. Ill.*, *n. s.*, pl. 42; Delessert, *Souvenirs*, &c., pt. 2, pl. 9, and *Mag. de Zool.* 1840, *Ois.* pl. 20).

Syn. Hirundo fusca, Shaw.
Chætura australis, Stephens.
Ch. macroptera, Swainson, Zool. Ill.
Ch. nudipes, Hodgson, J. A. S, V, 779.
Cypselus leuconotus, Delessert.
Acanthylis caudacuta, (Lath.) apud Gould, loc. cit.

Inhabits S. E. Himalaya, and Australia (at least as figured by Mr. Swainson and by Mr. Gould).

(1099) *Ac. leucopygialis*, Blyth, J. A. S, XIII.

Inhabits Malayan peninsula.

Genus CYPSELUS, Illiger.

(1100) *C. melba* (Edwards, pl. 27)

Syn. Hirundo melba, Lin.
H. alpina, Scopoli.
Cypselus gutturalis, Vieillot.
C. gularis, Stephens.

Inhabits mountainous regions of the S. of Europe, Asia, and Africa. Rare in the British islands. Common in Central India, Nilgiris, &c.

(1101) *C. apus* (*Pl. Enl.* 542, fig. 1).

Syn. Hirundo apus, Lin.
Cypselus murarius, Tem.

Inhabits Europe and W. Asia: common in Afghanistan.

(1102) *C. rittatus*, Jardine and Selby (*Ill. Orn.* 2nd series, pl. 39),

Inhabits S. E. Asia, as China, and the Malayan peninsula and archipelago: common at Penang. N. W. Himalaya.

(1103) *C. leuconyx*, Blyth, J. A. S, XIV, 218.

Inhabits India generally: rare.

(1104) *C. subfurcatus*, Blyth, J. A. S. XVIII.

Syn. C. affinis, var., Strickland, P. Z. S. 1846, p. 99.

Inhabits Malayan peninsula.

(1105) *C. affinis*, Gray (Hardw. *Ill. Ind. Zool.*).

Syn. C. nipalensis, Hodgson, J. A. S, V, 780.
C. montanus, Jerdon, Madr. Journ. XIII, 144.

Ababil, Hind. Inhabits plains and lower hills of India generally; rare in the Dukhun; Ceylon.

(1106) *C. balasiensis*, Gray (Hardw. *Ill. Ind. Zool.*)

Syn. C. palmarum, Gray.

Inhabits most part of India: wherever the *Borassus* grows, to the fronds of which it affixes its nest. Arakan (Ramree). Common in Ceylon.

Genus COLLOCALIA, G. R. Gray.

(1107) *C. nidifica.*

Syn. Hirundo nidifica, Latham.
H. esculenta apud Horsfield.
H. fuciphaga apud Shaw.
H. brevirostris, McClelland, P. Z. S. 1839, p. 155.
H. unicolor, Jerdon, Madr. Journ. XI, 238; referred to Cypselus, ibid. XIII, 173; and termed C. concolor, J. A. S, XI, 886.

Wahalæna, Cingh. Inhabits Nilgiris, Ceylon, Sikim, Assam; and Malay countries.

(1108) *C. fuciphaga.*

Syn. Hirundo fuciphaga, Thunberg.

Inhabits rocky coasts bordering the Bay of Bengal, and of Malayan peninsula and archipelago.

Subfam. MACROPTERIGIINÆ.

Genus MACROPTERYX, Swainson.

(1109) *M. coronatus.*

Syn. Hirundo coronata, Tickell, J. A. S, II, 580; IV, 21.
M. klecho of India, Auctorum.

Inhabits jungles of Central and S. India, and of Ceylon.

(1110) *M. klecho* (Swainson's *Zool. Ill., n. s.*, pl. 74).

Syn. Hirundo klecho, Horsfield.
Cypselus longipennis, Temminck.

Inhabits Malayan peninsula, Java.

(1111) *M. comatus* (*Pl. Col.* 268).

Syn. Cypselus comatus, Temminck.

Inhabits Eastern Malasia; Sumatra?

Suborder PASSERES, L. modified. Fam. CORVIDÆ. Subfam. CORVINÆ (A.) Crows.

Genus CORVUS, Lin.

(1112) *C. culminatus*, Sykes (Hardwicke's *Ill. Ind. Zool.*)

Syn. C. orientalis, Eversmann.
C. corone, var., Franklin.
C. corax of Sumatra? Raffles.

Dand kag, Beng.: *Dhar kowa*, "*Dheri kowa* or *kurrial*"(Jerdon), Hind.: *Pahari kowa*, Deyra Doon: *Burong gaga-gaga*, Malayan. Inhabits India generally; Ceylon; Assam; Arakan; Tenasserim; Malayan peninsula; Sumatra?: also N. Asia (Eversmann). 'Raven' of Europeans in India.

(1113) *C. corone*, L. (*Pl. Enl.* 495).

Inhabits Europe; N. Asia? Japan? China?

(1114) *C. cornix*, L. (*Pl. Enl.* 76).

Inhabits N. Europe, and N. W. Asia: Japan (Temminck).

(1115) *C. splendens*, Vieillot (*Pl Col.* 425).

Kag or *Kak*, Beng.: *Kowa*, or *Path Kowa*, i. e. 'Common Crow'., Hind. *Dasi kowa*, Deyra Doon: *Cac-co*, Cingh. Inhabits India generally; Assam, Sylhet, Chittagong, and northernmost part only of Arakan, where its occurrence is of recent date.

(1116) *C. macrorhynchos*, Vieillot.

Syn.? Fregilus enea, Horsfield.

Inhabits vicinity of Straits of Malacca.

(1117) *C. frugilegus*, L. (*Pl. Enl.* 484.)

Inhabits Europe; Afghanistan; Kashmir; Japan (Temminck).

(1118) *C. monedula*, L, (*Pl. Enl.* 523).

Inhabits Europe; Middle Asia; Kashmir; N. Africa.

B. NUTCRACKERS.

Genus NUCIFRAGA, Brisson.

(1119) *N. hemispila*, Vigors (Gould's 'Century,' pl. 36., Inhabits Himalaya.

C. CHOUGHS.

Genus PYRRHOCORAX, Vieillot.

(1120) *P. alpinus*, Vieillot (*Pl. Enl.* 35).

Syn. Corvus pyrrhocorax, L.

Inhabits Alps, Himalaya, and other lofty mountain chains of Europe and Asia.

Genus FREGILUS, Cuv.

(1121) *Fr. graculus* (*Pl. Enl.* 255.)

Syn. Corvus graculus, L.
C. erythrorhamphus, Vieillot.
Fr. europœus, Lesson.
Fr. erythropus, Swainson.

Inhabits lofty mountain ranges of Europe and Asia: also high cliffs overhanging the sea.

Subfam. GARRULINÆ.

(A) MAGPIES.

Genus PICA, Brisson.

(1122) *P. bottanensis*, Ad. Delessert.

Syn. P. megaloptera, Blyth, J. A. S. XI, 193.

Inhabits Bootan.

(1123) *P. media* Blyth, J. A. S. XIII, 393, 1844.

Syn. P. sericea, Gould, P. Z. S. 1845, p. 2.

Inhabits China.

(1124) *P. caudata*, Ray (*Pl. Enl.* 488).

Syn. P. melanoleuca, Vieillot.

Inhabits Europe, N. Asia, and N. America west of the Rocky mountains range: variety common in Afghanistan.

Genus DENDRACITTA, Gould.

(1125) *D. leucogastra*, Gould, (*Trans. Zool. Soc.* Vol. I, pl. 12). Inhabits Nilgiris.

(1126) *D. rufa* (Vaill. *Ois. d' Afr.* pl. 59; Gould's 'Century,' pl. 42).

Syn. Corvus rufus, Scopoli.
Coracias vagabunda, Latham.
Pica rufiventris, Vieillot.

Hundi-chacha ('pan-scraper,' imitative of cry) and *Takka-chor* ('rupee-thief'), Beng.: *Maha, Lat*, H. (Jerdon).: *Mahtab*, and *Chand*, Sindee (Burnes). Inhabits India generally: plains and lower hills.

(1127) *D. sinensis* (Gould's 'Century,' pl. 43).

Syn. Corvus sinensis, Latham.

Kokiakak, Masuri. Inhabits Himalaya; China?

(1128) *D. altirostris*.

Syn. Crypsirina altirostris, Blyth. J. A. S. XII. 933, D. frontalis (?), McClelland, P. Z. S. 1839, p. 163.

Inhabits Sikim: Assam?

Genus CRYPSIRINA, Vieillot.

(1129) *Cr. varians* (Horsfield's *Zool. Res. in Java*: Lev. *Ois. d' Afr.* 56).

Syn. Corvus varians, Latham.
C. temia, Shaw,
Phrenotrix temia, Horsfield.

Chekitut, or *Benteot*, Java. Inhabits Tenasserim; Java.

Genus TEMNORUS, Lesson.

(1130) *T. leucopterus* (*Pl. Col.* 265).

Syn. Glaucopis leucopterus, Temminck.

Talong-gaga, or *Kolang-gaga*, Malayan. Inhabits Malayan peninsula and archipelago.

(B.) JAY-MAGPIES.

Genus CISSA, Boie.

(1131) *C. venatoria* (Hardw. *Ill. Ind. Zool.*).

Syn. Kitta venatoria, Gray.
Corvus sinensis (?), Boddaert.
C. speciosus (?), Shaw.
Corapica bengalensis, Lesson.

Inhabits S. E. Himalaya, Assam, Arakan, Tenasserim provinces.

(1132) *C. puella*, Blyth, J. A. S. XVIII.

Inhabits Ceylon.

Genus PSILORHINUS, Ruppell.

(1133) *Ps. magnirostris*, Blyth, J. A. S. XV, 27. Inhabits Ya-ma-dong mountains, separating Arakan from Pegu.

(1134) *Ps. occipitalis*, Blyth (J. A. S. XV, 27; Gould's 'Century,' pl. 41.)

Syn. Pica erythrorhyncha apud Vigors and Gould.
Corvus sinensis (?), Lin.
C. erythrorhynchos (?), Boddaert.
Coracias melanocephala (?), Latham.
Ps. albicapillus, Blyth (the young.)

Nil-khant, Masuri, Inhabits Himalaya: China?

(1135) *Ps. flavirostris*, Blyth (J.A.S. XV, 28.)

Inhabits Sikim; Kashmir (vide J. A. S. XV, 284).

Genus GARRULUS, Brisson.

(1136) *G. ornatus*, Gray (Hardw. *Ill. Ind. Zool.* Gould's 'Century,' pl. 38).

Syn. G. bispecularis, Vigors.

Inhabits Himalaya.

(1137) *G. gularis*. (Hardw. *Ill. Ind. Zool.* Gould's 'Century,' pl. 36, 40.)

Syn. G. lanceolatus, Vigors.
G. Vigorsii, Gray (the young).

Ban-sarra, of hill men (Hutton). Inhabits Himalaya.

Genus PERISOREUS. Fr. Bonap.

(1138) *P. infaustus* (Gould's 'Birds of Europe,' pl. 215).

Syn. Corvus infaustus, L.
C. sibiricus, Boddaert.
C. russicus. Gmelin.
C. mimus, Pallas.

Inhabits Northern regions of the Old Continent.

D. Insertæ sedis.

Genus LOPHOCITTA, G. R. Gray.

(1139) *L. galericulata* (Levaillant, *Ois. de Par.* pl. 42).

Syn. Corvus galericulatus, Cuv.
Lanius scapulatus. Licht.
L. coronatus. Raffles, (the female.)
Vanga cristata, Griffith's An. Kingd.

Burong Jeri, Malayan. Inhabits Malayan peninsula: Sumatra: Java.

Genus TURNAGRA (?,) Lesson.

(1140) *T. (?) striata* (Gould's 'Century,' pl. 37).

Syn. Garrulus striatus, Vigors.

Inhabits Himalaya.

Subfam. GARRULACINÆ.

Genus GARRULAX, Lesson.

(1141) *G. Belangeri*, Lesson (*Zoologie du Voy. de M. Belanger*).

Inhabits Tenasserim provinces; Pegu.

(1142) *G. leucolophos*, (Gould's 'Century,' pl. 18.)

Syn. Corvus leucolophos, Hardwicke.

Inhabits Himalaya; Assam; Sylhet; Arakan,

(1143) *G. chinensis.*

Syn. Lanius chinensis, Scopoli.
Corvus auritus, Daudin.
Turdus shanhu et T. melanopis, Gmelin.
Crateropus leucogenys, Blyth, J. A. S. XI, 180.

Inhabits China.

(1144) *G. albogularis.*

Syn. Ianthocincla albogularis, P. Z. S. 1835, p. 187.
Cinclosoma albigula, Hodgson, As. Res. XIX, 146.

Inhabits Himalaya.

(1145) *G. pectoralis.*

Syn. Ianthocincla pectoralis, Gould. P. Z. S. 1835, p. 186.
Cinclosoma grisa ire, Hodgson, As. Res. XIX, 146.
G. melanotis, Blyth, J. A. S. XII, 149. variety.

Inhabits Himalaya; Arakan; Tenasserim Provinces.

(1146) *G. moniliger.*

Syn. Cinclosoma moniliger, Hodgson, As. Res. XIX, 147.
Ianthocincla pectoralis (?) apud McClelland, P. Z. S 1839. p. 160,
G. McClellandii (?), Blyth, J. A. S. XII, 949.

Inhabits S. E. Himalaya; Assam: Tippera; Arakan; Tenasserim Provinces.

(1147) *G. cærulatus.*

Syn. Cinclosoma cœrulatum, Hodgson, As, Res XIX, 147,

Inhabits S. E. Himalaya.

1148) *G. ocellatus* (Gould's 'Century,' pl. 15).

Syn. Cinclosoma ocellatum, Vigors.

Inhabits Himalaya.

1149) *G. rufogularis.*

Syn. Ianthocincla rufogularis, Gould, P. Z. S. 1835, p. 187.
Cinclosoma rufimenta, Hodgson, As. Res. XIX, 148.

Inhabits S. E. Himalaya; Cherra Punji; Tipcra.

(1150) *G. squamatus* (Jardine and Selby's *Ill. Orn.*, 2nd series, pl. 4).

Syn. Ianthocincla squamata, Gould, P. Z. S. 1835, p. 47.
Cinclosoma melanura, Hodgson, As. Res. XIX, 147.

Inhabits S. E. Himalaya.

(1151) *G. subunicolor*, Hodgson (described J. A. S. XII, 952; XIV, 599).

Inhabits S. E. Himalaya.

(1152) *G. affinis*, Hodgson (described J. A. S. XII, 950).

Inhabits S. E. Himalaya.

(1153) *G. variegatus* (Gould's 'Century,' pl. 16).

Syn. Cinclosoma variegatum, Vigors.
G. Abeillei, Lesson.

Inhabits N. E. Himalaya.

(1154) *G. chrysopterus.*

Syn. Ianthocincla chrysoptera, Gould, P. Z. S. 1835, p. 48.

Inhabits S. E. Himalaya.

(1155) *G. erythrocephalus* (Gould's 'Century,' p. 17).

Syn. Cinclosoma erythrocephalum, Vigors.

Inhabits N. E. Himalaya.

(1156) *G. ruficollis* (Jardine and Selby's *Ill. Orn.* 2nd series, pl. 21).

Syn. Ianthocincla ruficollis, Jardine and Selby.
I. lunaris, McClelland, P. Z. S. 1839, p. 160.

Inhabits S. E. Himalaya; Assam; Sylhet; Tipperah.

(1157) *G. phœniceus* (Gould's *Icones Avium*).

Syn. Ianthocincla phœnicea, Gould.
Crateropus puniceus, Blyth, J. A. S. XI, 180.

Inhabits S. E. Himalaya.

(1158) *G. cachinnans* ('Madras Journal,' X, 255, pl. 7).

Syn. Crateropus cachinnans, Jerdon.
Cr. Lafresnayii, Ad. Delessert.
Cr. Delesserti, LaFresnaye (nec Cr. Delesserti, Jerdon).

Inhabits Nilgiris.

(1159) *G.* (?) *lineatus.*

Syn. Cinclosoma lineatum, Vigors.
C. setiferum, Hodgson, As. Res. XIX, 148.

Inhabits Himalaya.

(1160) *G.* (?) *imbricatus*, Blyth, J. A. S. XII, 951. Inhabits Bootan.

Genus ACTINODURA, Gould.

(1161) *Act. Egertoni*, Gould, P. Z. S. 1836, p. 18.

Syn. Leiocincla plumosa, Blyth, J. A. S. XII, 953

Inhabits S. E. Himalaya; Assam; Sylhet.

(1162) *Act. nipalensis.*

Syn. Cinclosoma nipalense, Hodgson, As. Rs. XIX, 145 (type of Ixops, Hodgson).

Inhabits S. E. Himalaya.

Genus SIBIA, Hodgson (*Sibya*, Nepal).

(1163) *S. picoides*, Hodgson (described J. A. S. VIII, 38).

Syn. Heterophasia cuculopsis, Blyth, J. A. S. XI, 187.

Inhabits S. E. Himalaya.

(1164) *S. capistrata.*

Syn. Cinclosoma capistratum, Vigors.
C. melanocephalum (?), Royle's list.
S. nigriceps, Hodgson.

Inhabits Himalaya.

Genus CUTIA, Hodgson.

(1165) *C. nipalensis*, Hodgson (J. A. S. XV, 772; XVI, 110).

Khatya, or *Khutya*, Nepal. Inhabits S. E. Himalaya.

Genus PTERUTHIUS, Swainson.

(1166) *Pt. rufiventer*, Blyth, J. A. S. XI, 183; XII, 954 (Gray's *Ill. Gen. Birds*).

Inhabits S. E. Himalaya.

(1167) *Pt. erythropterus* (Gould's 'Century,' pl. 11).

Syn. Lanius erythropterus, Vigors.

Inhabits Himalaya.

Subfam. LEIOTHRICANÆ.

Genus LEIOTHRIX, Swainson.

(1168) *L. argentauris.*

Syn. Mesia argentauris, Hodgson, Ind. Rev. 1838, p. 88.

Inhabits S. E. Himalaya.

(1169) *L. luteus.*

Syn. Sylvia lutea, Scopoli.
Tanagra sinensis, Gmelin.
Parus furcatus, Temminck.
Bahila calipyga, Hodgson. Ind. Rev. 1638, p. 88.

Inhabits Himalaya; China?

(1170) *L. strigula* (Ad. Delessert, *Souvenirs*, &c. pt. 2, pl. 8).

Syn. Siva strigula, Hodgson, Ind. Rev. 1838, p. 89.
Muscicapa variegata, Delessert, Mag. de Zool. 1840. Ois., t. 20.
L. chrysocephala Jameson.

Inhabits Himalaya.

(1171) *L. cyanouroptera.*

Syn. Siva cyanouroptera, Hodgson, Ind. Rev. 1838, p. 88.
Leiothrix lepida, McClelland, P. Z. S. 1839, p. 162.

Inhabits Himalaya ; Assam.

(1172) *L. ignitincta.*

Syn. Minla ignitincta, Hodgson, Ind. Rev. 1838, p. 32.
L. ornata, McClelland. P. Z. S. 1839, p. 162.

Inhabits S. E. Himalaya ; Assam.

(1173) *L. cinerea.*

Syn. Minla cinerea, Blyth, J. A. S. XVI, 449.

Inhabits S. E. Himalaya.

(1174) *L. castaniceps.*

Syn. Minla castaniceps, Hodgson, Ind. Rev. 1839, p. 33.

Inhabits Himalaya.

(1175) *L. vinipectus.*

Syn. Siva vinipectus, Hodgson, Ind. Rev. 1828, p. 89.

Inhabits S. E. Himalaya.

(1176) *L. chrysotis* (*chrysopterus ? seu leucotis ?*)

Syn. Preparus chrysotis, Hodgson, J. A. S. XIII, 938 ; XVI, 448.

Inhabits S. E. Himalaya.

Genus IXULUS. Hodgson.

(1177) *I. occipitalis*, J. A. S. XIV, 552.

Syn. Siva occipitalis, Blyth, J. A. S. XIII, 937.

Inhabits Sikim.

(1178) *I. flavicollis.*

Syn. Yuhina ? flavicollis, Hodgson, As. Res. XIX, 167.

Inhabits Himalaya (Masuri to Bootan).

Genus YUHINA, Hodgson.

(1179) *Y. gularis*. Hodgson (*As. Res.* XIX, 166.)

Inhabits S. E. Himalaya.

(1180) *Y. occipitalis*, Hodgson (*As. Res.* XIX, 166).

Inhabits S. E. Himalaya.

Genus MYZORNIS, Hodgson.

(1181) *M. pyrrhoura.* Hodgson, (J. A. S. XII, 984 ; XIV, 561).

Genus ERPORNIS, Hodgson.

(1182) *E. xanthlaema*, Hodgson J. A. S. XIII, 380.

Syn. E. xanthochlora, Hodgson, P. Z. S. 1845, p. 33.

Inhabits S. E. Himalaya ; Arakan ; Malayan peninsula.

Subfam. PARINÆ.

(A. *Paradoxornis* subseries.)

Genus CONOSTOMA, Hodgson.

(1183) *C. æmodius*. Hodgson (J. A. S, X, 856).

Inhabits Nepal.

Genus HETEROMORPHA, Hodgson.

(1184) *H. ruficeps* (J.A S. XII, 1010, pl.).

Syn. Paradoxornis ruficeps, Blyth, J. A. S. XI, 187.

Inhabits Sikim ; Bootan ; Arakan.

(1185) *H.* (? *Paradoxornis* ?) *caniceps*, Blyth, J. A. S. XVIII. Inhabits Sikim.

Genus SUTHORA, Hodgson.

(1186) *S. ruficeps.*

Syn. Chleuasicus, ruficeps. Blyth, J. A. S. XIV, 578.

Inhabits Sikim.

(1187) *S. nipalensis*, Hodgson (*Ind. Rev.* 1838, p. 32). Inhabits S. E. Himalaya.

(1188) *S. fulvifrons*, Hodgson (J. A. S. XIV, 579). Inhabits Nepal.

Genus FALCUNCULUS, Vieillot.

(1189) *F. frontatus* (Gould's B. A. Vol. II. pl. 79).

Syn. Lanius frontatus, Latham,

Inhabits E. and S. Australia.

Genus PARUS, Lin.

(1190) *P. flavocristatus*, Lafresnaye.

Syn. P. sultaneus, Hodgson, Ind. Rev. 1837, p 81. Melanochlora flavocristata et M. sumatrana, Lesson.

Inhabits Nepal ; Sikim ; Bootan ; Assam ; Malayan peninsula ; Sumatra.

(1191) *P. monticolus*, Vigors (Gould's 'Century,' pl. 29. f. 2.) Inhabits Himalaya.

(1192) *P. cinereus*, Vieillot (*Pl. Col.* 287, f. 2 ; Levaillant, *Ois. d' Afr.* pl. 139, f. 1).

Syn. P. atriceps, Horsfield, Lin. Tr. XIII, 160.
P. nipalensis. Hodgson. Ind. Rev. 1838, p. 31.

Inhabits Himalaya ; Assam ; Central and S. India ; Ceylon ; Java.

(1193) *P. xanthogenys*, Vigors (Gould's 'Century,' pl. 29, f. 1).

Syn. P. aplonotus, Blyth. J. A. S. XVI, 444.

Inhabits N. W. Himalaya ; Central and South India.

(1194) *P. spilonotus*, Blyth, J. A. S. XVIII.

Syn. P. xanthogenys apud Blyth, J. A. S. XVI, 445.

Inhabits Himalaya.

(1195) *P. rufonuchalis*, Blyth, J. A. S. XVIII.

Inhabits Tyne range, beyond Simla.

(1196) *P. melanolophos*, Vigors (Gould's 'Century,' pl. 30, f. 2). Inhabits N. W. Himalaya.

(1197) *P. rubidiventris*, Blyth, J. A. S. XVI, 445. Inhabits Nepal.

(1198) *P. dichrous*, Hodgson, J. A. S. XIII, 943. Inhabits Nepal.

(1199) *P. ionschistos*, Hodgson, J. A. S. XIII, 943. Inhabits Nepal.

Genus ORITES, Mœrrhing.

(1200) *O. erythrocephalus* (Gould's 'Century,' pl. 30, f. 1).

Syn. Parus erythrocephalus, Vigors.

Inhabits Himalaya.

Genus SYLVIPARUS, Burton.

(1201) *S. modestus*, Burton, P. Z. S. 1835, p. 154.

Syn. Parus sericophrys, Hodgson, J. A. S. XIII, 942; XVI, 446.

Inhabits Himalaya.

Genus ÆGITHALUS, Vigors.

(1202) *O. flammiceps*, Burton, P. Z. S., 1835, pl. 153.

Syn. Dicæum sanguinifrons, A. Hay, J. A. S. XV, 44.

Inhabits N. W. Himalaya.

Subfam. PARADISEINÆ.

B. Subseries with bills of medium length.

Genus PARADISEA, L.

(1203) *P. apoda*, Lin. (*Pl. Enl.* 254; Vieillot, *Ois. de Par.* t. 1.)

Syn. P. major, Shaw.

Inhabits N. Guinea.

(1204) *P. minor*, Shaw (Vieillot, *Ois. de Par.* pl. 2). Inhabits N. Guinea.

(1205) *P. rubra*, Cuvier (Vaill. *Ois. de Par.* t. 3).

Syn. P. sanguinea, Shaw.

Inhabits N. Guinea.

Genus CICINNURUS, Vieillot.

(1206) *C. regius* (*Pl. Enl.* 496; Vaill. *Ois. de Par.* t. 7).

Syn. Paradisea regia, L.
C. spinturnix, Lesson.

Inhabits N. Guinea.

Subfam. GRACULINÆ.

A. Maina and Starling subseries. Inhabiting Europe, Asia, and N. Africa.

a. Of more bulky form; gait saltatory.

Genus GRACULA, L.

(1207) *Gr. javanensis*, Osbeck (Edwards, pl. 17, lower figure).

Syn. Mainatus major, Brisson: described J. A. S., XV, 31.
M. sumatranus (?), Lesson.
Gr. religiosa, L., var. B., Latham.

Inhabits Malayan peninsula and archipelago; Nicobar Islands.

(1208) *Gr. intermedia*, A. Hay (J. A. S. XV. 32). *Paharia Maina*, Hind.: *Thale-gu*, Arakan, Inhabits Nepal; Assam; Arakan; Tenasserim Provinces.

(1209) *Gr. religiosa*, L. (Edward's pl. 17, upper figure).

Syn. Eulabes indica, Cuvier.
Pastor musicus, Daudin.
Mainatus javanus, Lesson, apud Jerdon, J. A. S. XII, 178 (bis).

Inhabits S. India; Ceylon.

(1210) *Gr. ptilogenys*, Blyth, J. A. S., XV, 285. Inhabits Ceylon.

Genus AMPELICEPS, Blyth.

(1211) *A. coronatus*, Blyth, J. A. S., XI, 194; XV, 32.

b. Of less bulky form; the gait ambulatory.

Genus ACRIDOTHERES, Vieillot.

(1212) *Acr. tristis* (*Pl. Enl.* 219).

Syn. Paradisea tristis, L.
Gracula gryllivora, Daudin.

Bhat Salik, Beng.: *Maina*, H.: *Bunnee*, or *Saloo* (Tickell): *Saloonku*, Mahr: *Gorwuntra*, Can. (Jerdon). *Dza-ret-mouk*, Arakan.

(1213) *Acr. ginginianus* (Vaill. *Ois. d'Afr.* t. 95, f. 2).

Syn. Turdus ginginianus, Latham.
Gracula grisea, Daudin (t. 95 f. 2).

Gang Salik, Beng.: *Ganga Maina*, H.: *Lali*, Sinde (Burnes.) Inhabits Bengal, Upper India, Scinde; Tenasserim Provinces.

(1214) *Acr. cristatellus*, (Edwards, pl. 19).

Syn. A cristatellus L.
Acr. fuliginosus Blyth, J. A. S. XIII, 362 (the young)

Inhabits China.

(1215) *Acr. griseus*.

Syn. Pastor griseus, Horsfield.
Maina cristalloides, Hodgson.
P. fuscus (?), Wagler.
P. mahrattensis (?), Sykes.

Jhont Salik (i. e. 'Cresta Maina'), Beng.; *Dza-ret-mouk-teng*, Arakan: *Jallak Sungu*, Java. Inhabits India generally (?); Bengal; Nepal; Arakan; Tenasserim; Penang; Sumatra; Java.

Genus STURNUS, Lin.

(1216) *St. temporalis*.

Syn. Pastor temporalis, Tem.

Inhabits China.

(1217) *St. contra*, L. (*Pl. Enl.* 280; Edwards pl. 187).

Syn. St. capensis, L.
Pastor auricularis, Drapiez.
P. jalla, Horsfield.

Ablaka, H.: *Guia-leggra*, Beng.: *Qwyai-dza-ret*, Arakan: *Jallak*, or *Jallak-uring*, Java. Inhabits India; Sumatra; Java.

(1218) *St. vulgaris*, L.

Syn. St. indicus, Hodgson.

Telia Maina, Hind.: *Saruk*, Kabul. Inhabits Europe; Asia: common in Himalaya. Upper Bengal?

(1219) *St. unicolor*, Marmora.

Inhabits N. Africa; Sardinia: and a more brilliantly glossed variety in Afghanistan.

Genus PSAROGLOSSA, Hodgson.

(1220) *Ps. spiloptera* (Gould's 'Century,' pl. 34).

Syn. Lamprotornis spilopterus, Vigors.

Puli, Masuri. Inhabits Himalaya.

Genus STURNIA, Lesson.

(1221) *St. sericea* (Brown's 'Zoology,' pl. 21).

Syn. Sturnus sericeus Latham

Inhabits China.

(1222) *St.* ? Inhabits Ceylon.

(1223) *St. erythropygia*, Blyth, J. A. S. XV, 34.

Inhabits Nicobar islands.

(1224) *St. Blythii* (Jerdon's *Ill. Ind. Orn.* pl. 22).

Syn. P malabaricus apud Jerdon, Madr. Journ. XI, 22.
Pastor Blythii, Jerdon.
St. dominicana (?), apud Blyth. J. A. S. XIII, 363

Inhabits India; Malabar.

(1225) *St. malabarica.*

Syn. Turdus malabaricus, Gmelin (No. 51, nec No. 125).
Pastor malabaricus, var., apud Jerdon, Madr. Journ XI, 23.
P. nanus (?) et Gracula cinerea (?), Lesson.

Pawi, Hind. Inhabits India generally (but somewhat local), Assam; Arakan; Tenasserim.

(1226) *St. Pagodarum.*

Syn. Turdus pagodarum, Gm.
T. melanocephalus, Vahl.
Sturnus subroseus, Shaw (apud G. R. Gray)

Monghyr Pawi, Beng. Inhabits India generally; Assam; Arakan (Ramree). Non-resident in Lower Bengal, but common in the jungles westward.

(1227) *St. cana*, Blyth, J. A. S. XIII, 365.

N. B. This is the young of a species nearly allied to, but distinct from, the next, some of whose reputed synonymes perhaps belong to it.

Inhabits China (Macao).

(1228) *St. daurica* (*Pl. Enl.* 627, f. 2).

Syn. Turdus dauricus et T. sturninus, Pallas.
T. dominicanus, Gmelin.
Pastor malayensis, Eyton.

Inhabits Malayan peninsula; China (?).

Genus CALORNIS, G. R. Gray.

(1229) *C. affinis*, A. Hay, J. A. S. XV, 36, 369.

Inhabits Tipperah; Arakan; Nicobar islands; Tenasserim (?)

(1230) *C. cantor* (*Pl. Col.* 199, f. 1, 2).

Syn. Turdus cantor, Gmelin.
T. chalybeus et T. strigatus, Horsfield.

Biang, *Kala loyang*, and *Burong Kling*, Malay: *Sling*, Java. Inhabits Malayan peninsula; Sumatra; Java.

Genus PASTOR, Temminck.

(1231) *P. roseus* (Edwards, 20; *Pl. Enl.* 250).

Syn. Turdus roseus, L.
T. suratensis, Latham.

Tillyer, H. (Jerdon). *Golabi Maina*, H. Beng.: *Bya*, Sinde (Burnes). Inhabits Europe, Asia and N. Africa; very common in Hindustan.

Genus ENODES, Temminck.

(1232) *E. erythrophrys* (Tem. *Pl. Col.* 267).

Syn. Lamprotornis erythrophrys. Tem.

Inhabits Moluccas, Java.

Genus MINO, Lesson.

(1233) *M. calvus* (*Pl. Enl.* 200).

Syn. Gracula calva, L.

Inhabits Moluccas; Philippines.

Fam. FRINGILLIDÆ.

Subfam. PLOCEINÆ.

Genus PLOCEUS, Cuvier.

(1234) *Pl. hypoxanthus ?* (*Pl. Col.*).

Syn. Loxia hypoxantha (?), Daudin.
Pl. philippinus apud Horsfield (Lin. Tr. XIII, 160.) et Temminck; nec apud Strickland, J. A. S. XII, 945.

Inhabits Java; Philippines.

(1235) *Pl. philippinus* (*Pl. Enl.* 135, f. 2).

Syn. Loxia philippina, T. (apud Strickland).
Pl. baya, Blyth J. A. S. XII. 249.

Baya, H.: *Chindora*, and *Tal Babie*, Beng. Inhabits India generally; Burmese countries; Malayan peninsula; Sumatra?

(1236) *Pl. manyar.*

Syn. Fringilla manyar, Horsfield, Lin. Tr. XIII, 160.
Euplectes flaviceps, Swainson.
Eu. striatus, Blyth, J. A. S. XI, 873, and XII, 181 (bis).
Eu. bengalensis (?) apud Jerdon, Catal.
Ploceus flaviceps (?), Cuv.

Inhabits Bengal; Nepal; Assam; Scinde; S. India; Java.

(1237) *Pl. bengalensis* (Edwards, pl. 189).

Syn. Loxia bengalensis, L.
L. regina, Boddaert.
Coccothraustes chrysocephala, Vieillot.
Euplectes albirostris, Swainson.

Sarbo Baya, Hind. Inhabits Bengal.

Subfam. ESTRELDINÆ.

Genus MUNIA, Hodgson.

(1238) *M. maja* (Edwards pl. 306, f. 1).

Syn. Loxia maja, L.
L. leucocephala, Raffles.
Maia sinensis, Brisson.

Inhabits Malayan peninsula; Sumatra.

(1239) *M. ferruginosa.*

Syn. Loxia ferruginosa, Latham.
La Maina, Buffon.

Inhabits Java.

(1240) *M. rubronigra*, Hodgson, *As. Res.* XIX, 153.

Syn. Lonchura melanocephala, M'Clelland, P. Z. S. 1839, p. 163.
Loxia malacca, Var, Lath.
L. indica, Lath.—Young?

Pora Munia: *Nukroul*, Masuri. Inhabits Bengal; Nepal; Assam; Arakan; Tenasserim. Nec *Chinese Sparrow*, Edwards, pl. 43, on which is founded *Coccothraustes sinensis*, Brisson, *Loxia malacca*, 3, Lin., *Malacca Grosbeak*, var. *A*, Latham, and which is also *Loxia atricapilla*, Vieillot, *Dict. Class. d'Hist. Nat.*

(1241) *M. malacca* (Edwards pl. 355).

Syn. Loxia malacca, L.
Coccothraustes javensis, Brisson.
Amadina sinensis apud Blyth, P. Z. S. XV, 36.

Nukl-nore, H. (Jerdon). Inhabits Indian peninsula; Ceylon; rare in Lower Bengal.

(1242) *M. undulata* (Edwards, pl. 40).

Syn. Loxia undulata and
L. punctulata, var. A, Latham.
L. bicolor, Latham, the young.
Munia lineoventer, Hodgson.

Tela Munia, H.: *Simbaz*, Masuri: *Sing baz* or *Sheen baz* (Jerdon). Inhabits India generally; Arakan; Tenasserim.

(1243) *M. punctularia.*

Syn. Loxia punctularia, L.
Fringilla nisoria, Temminck.

Inhabits Malayan peninsula and archipelago.

(1244) *M. molucca*? (*Pl. Enl.* 139, f. 2).

Syn. Loxia molucca, (?) L.
Munia acuticauda, Hodgson.

Inhabits Nepal; Malayan peninsula.

(1245) *M. pectoralis.*

Syn. Amadina pectoralis, Jerdon, J. A. S. XIII, 949, described in Madras Journ. XIII, 171.

Inhabits S. India.

(1246) *M. striata.*

Syn. Loxia striata, Latham.
Fringilla leuconota, Temminck.

Inhabits Indian peninsula; Ceylon; Arakan; not common in lower Bengal.

(1247) *M. melanictera*?

Syn. Fringilla melanictera (?), Gmelin.
Amadina leucogastra, Blyth, J. A. S. XV, 286.

Inhabits Malayan peninsula.

(1248) *M. malabarica.*

Syn. Loxia malabarica, L.
Lonchura cheet, Sykes.
Loxia bicolor, Tickell (nec Latham).

Sar Munia; *Piduri*, B.: *Chorga*, H. Inhabits India generally; Ceylon.

Genus ERYTHRINA.

(1249) *E. prasina* (Tem. *Pl. Col.* 96).

Syn. Fringilla prasina, Sparrman (nec Latham).
Fr. sphecura, Temminck.
Emberiza quadricolor, Gmelin.
E. viridis, Swainson.
Emberiza cyanopis (?), Gmelin.

Inhabits Indian archipelago.

Genus AMADINA, Swainson.

(1250) *A.* (?) *oryzivora* (*Pl. Enl.* 388; Edwards, pl. 41, 42).

Syn. Loxia oryzivora, L.

Inhabits Indian archipelago.

Genus ESTRELDA.

(1251) *E. amandava* (*Pl. Enl.* 115, f. 2, 3; Edwards, pl. 355, f. 1).

Syn. Fringilla amandava, L.
Fr. punicea, Horsfield, Lin. Tr. XIII, 160.
Fr. senegalensis, Vieillot (vide Dict. Class).

Lal or *Lal Munia*, H: *Lal* (male), *Munia* (female), Masuri. Inhabits India generally and Malay countries.

(1252) *E. formosa.*

Syn. Fringilla formosa, Latham.

Inhabits Central India.

Genus SCISSIROSTRUM, Guerin.

(1253) *Sc. Pagei.* Guerin (*Mag. de Zool*).

Inhabits Moluccas.

Subfam. PASSERINÆ.

Genus PASSER, Ray.

(1254) *P. indicus*, Jardine and Selby (*Ill. Orn.* pl. 115).

Charia, or *Chata*, B.: *Gourya*, H. Inhabits India generally; Ceylon; Arakan.

(1255) *P. pyrrhonotus*, Blyth, J. A. S. XIII, 946. Inhabits Scinde.

(1256) *P. salicaria* (Savigny, *Desc. Egypt. Nat. Hist.*, I, pl. f. 7).

Syn. Fringilla salicaria,
Fr. hispaniolensis, Temminck.

Inhabits N. Africa; Sardinia; Sicily; Syria; Afghanistan.

(1257) *P. cinnamomeus.*

Syn. Pyrgita cinnamomea, Gould, P. Z. S. 1835, p. 85.

Inhabits N. W. Himalaya.

(1258) *P. flaveolus*, Blyth, J. A. S. XIII, 946. Inhabits Arakan; Tenasserim.

(1259) *P. montanus* (*Pl. Enl.* 267, f. 1).

Syn. Fringilla montana, L.

Inhabits Temperate parts of Europe and Asia; China; Burmah; Malayan peninsula; Java.

Genus PETRONIA, Pr. Bonap.

(1260) *P. stulta* (*Pl. Enl.* 225).

Syn. Fringilla stulta et Fr. bononiensis, Gmelin.
Fr. petronia, L.
Petronia rupestris, Bonap.

Inhabits Afghanistan; W. Asia; S. Europe; N. Africa.

(1261) *P. flavicollis.*

Syn. Fringilla flavicollis, Franklin, P. Z. S. 1831, p. 120.

Raji, or *Jungli Churia*. H. Inhabits India generally, but not on the alluvium of Lower Bengal.

Subfam. FRINGILLINÆ.

Genus MONTIFRINGILLA (?), Brehm.

(1262) *M. (?) nemoricola.*

Syn. Fringillauda nemoricola, Hodgson, As. Res XIX, 158.

Inhabits Himalaya.

Genus FRINGILLA, L.

(1263) *Fr. montifringilla*, L. (*Pl. Enl.* 54, f. 2).

Syn. Loxia hamburghia, Gmelin.

Inhabits Northern and temperate parts of Europe and Asia; Afghanistan; N. W. Himalaya.

Genus PYRRHOSPIZA, Hodgson.

(1264) *P. punicea*, Hodgson, J. A. S. XIII, 953.

Syn. Propyrrhula rubeculoides, Hodgson, P. Z. S. 1845, p. 36.

Inhabits Himalaya; Tibet.

Genus PROCARDUELIS, Hodgson.

(1265) *Pr. nipalensis*, Hodgson.

Syn. Carduelis nipalensis, Hodgson, As. Res. XIX, 157.
Linota saturata et L. fusca, (?), Blyth, J. A. S. XI, 92-3.

Inhabits S. E. Himalaya.

Genus CARPODACUS.

(1266) *C. rodopepla* (Gould's Century, pl. 31, f. 1).

Syn. Fringilla rodopepla, Vigors.

Inhabits S. E. Himalaya.

(1267) *C. rodochrous* (Gould's 'Century,' pl. 31, fig. 2).

Syn. Fringilla rodochroa, Vigors.

Inhabits Himalaya.

(1268) *C. erythrinus?* (Vieillot, *Ois. Chant.* pl. 65).

Syn. Fringilla erythrina (?), Meyer.
Coccothraustes rosea, Vieillot.
Loxia madagascariensis, L.
Pyrrhulinota roseata, Hodgson, P. Z. S. 1845, p. 36.

Tuti, or *Eurkhar Tuti*, H. Inhabits India generally; Arakan.

Genus HÆMATOSPIZA, Hodgson.

(1269) *H. boetonensis?*

Syn. Loxia boetonensis? Latham.
L. indica? Gmelin, nec Latham.
Corythus sepahi, Hodgson, As. Res. XIX, 151.

Inhabits Himalaya.

Genus PYRRHULA, Mœrhing.

(1270) *P. nipalensis*, Hodgson, J. A. S. XIX, 155. Inhabits S. E. Himalaya.

(1271) *P. erythrocephalus*, Vigors (Gould's 'Century,' pl. 32). Inhabits Himalaya.

Genus PROPYRRHULA, Hodgson.

(1272) *Pr. subhimachala*, Hodgson.

Syn. Corythus subhimachalus, Hodgson, As. Res. XIX, 152.

Inhabits N. E. Himalaya.

Genus LOXIA, L.

(1273) *L. curvirostris*, L. (*Pl. Enl.* 218). Inhabits Europe; Afghanistan.

(1274) *L. himalayensis*, Hodgson, J. A. S. XIII, 952.

Syn. L. himalayana, Hodgson, P. Z. S. 1845, p. 35.

Inhabits Himalaya.

Genus CHRYSOMITRIS, Boie.

(1275) *Chr. spinoides* (Gould's Century, pl. 33, f. 2).

Syn. Carduelis spinoides, Vigors.

Inhabits Himalaya.

Genus CARDUELIS, Stephens.

(1276) *C. caniceps*, Vigors (Gould's Century, pl. 33, f. 1; Royle's *Ill. Him. Bot.* pl. 8, f. 2).

Syn. Fringilla orientalis, Eversmann, Shira. H.

Inhabits Middle Asia; Afghanistan; Kashmir, &c.

Genus LIGURINUS, Brisson

(1277) *L. sinicus* (*Pl. Enl.* 257, f. 3).

Syn. Fringilla sinica, L.
Loxia sinensis, Gmelin.
Lig. xanthogramma? apud Blyth, J. A. S. XIII, 956; vide XVI, 470.

Inhabits China.

Genus SERINUS (?), Brehm.

(1278) *S. (?) aurifrons.*

Syn. Emberiza aurifrons, Blyth, J. A. S. XVI, 476

Inhabits Tyne range, beyond Simla.

Genus COCCOTHRAUSTES, Brisson.

(1279) *C. melanoxanthus*, Hodgson, *As. Res.* XIX, 150. Inhabits S. E. Himalaya.

(1280) *C. carnipes*, Hodgson, *As. Res.* XIX, 151.

Syn. C. speculigerus (?), Brandt.

Inhabits Himalaya.

(1281) *C. icterioides*, Vigors (Gould's 'Century,' pl. 45). Inhabits N. E. Himalaya.

Subfam. EMBERIZINÆ.

Genus EMBERIZA, L. (*Gundam*, H).

(1882) *E. albida*, Blyth, J. A. S, XVIII. Inhabits Tyne range, beyond Simla.

Genus EUSPIZA, Bonap.

(1283) *Eu. simillima*, Blyth, J. A. S. XVIII.

Syn. Emberiza melanocephala of India, Auctorum.
Tanagra rudies (Mus Carls.), Lath.,—the female?

Inhabits S. India. (*N. B.* Differs from Eu. melanocephalus in its much smaller size; the closed wing measuring $3\frac{1}{4}$ in. instead of 4 in., &c.)

(1284) *Eu. luteola* (G. R. Gray, *Ill. Gen. Birds*, pl.).

Syn. Emberiza luteola (Mus. Carls, fasc. IV, t. 93). Latham,—the female.
E. icterica, Eversmann.
E. bruniceps, Brandt.
Loxia flavicans, var. A. Latham.

Inhabits Plains of India; Afganistan, &c.

(1285) *Eu. flavogularis*, Blyth, J. A. S. XVIII.

Syn. Emberiza aureola of India, Auctorum.

Inhabits Nepal; Tippera; Arakan.

(1286) *Eu. Lathami* (Jardine and Selby, *Ill. Orn.* pl. 132).

Syn. Emberiza Lathami Gray.
E. cristata, Vigors.
E. suberistata, Sykes (the female).
E. erythroptera Jardine and Selby.
E. nipalensis, Hodgson.
Fringilla melanictera, Gmelin.

Inhabits Plains and lower hills of India, China, &c.

(1287) *Eu. hortulana* (*Pl. Enl.* 247, f. 1).

Syn. Emberiza hortulana, L.
E. Buchanani, Blyth, J. A. S. XIII, 957.
E. chlorocephala apud Hodgson?

Inhabits Europe and Asia; India.

(1288) *Eu. melanops.*

Syn. Emberiza melanops, Blyth, J. A. S. XIV, 554.
E. chlorocephala of Nepal apud Hodgson (?), vide J. A. S. XV, 39.

Inhabits Tippera.

(1289) *Eu. fucata.*

Syn. Emberiza fucata, Pallas.
E. lesbia apud Temminck (nec Gmelin).
E. cia apud Jerdon, Catal.

Putthur Chirta, (H. Jerdon). Inhabits Bengal; Deyra Doon; S. India?

(1290) *Eu. pusilla?*

Syn. Emberiza pusilla(?), Pallas.
E. sordida, Hodgson, J. A. S. XIII, 958 (the female); male described, J. A. S. XV, p. 40.
E. (Oeyris) oinops, Hodgson, P. Z. S. 1845, p. 35.

Inhabits S. E. Himalaya.

(1291) *Eu. cia* (*Pl. Enl.* 30, f. 2; 511, f. 1).

Syn. Emberiza cia, L.
E. barbata, Scopoli.
E. lotharingica, Gmelin.

Inhabits Europe and Asia. Specimens from near Masuri. Capt. Hutton (1848).

Subfam. ACCENTORINÆ.

Genus ACCENTOR, Bechstein.

(1292) *A. nipalensis*, Hodgson, J. A. S. XII, 958; P. Z. S. 1845. p. 34.

Syn. A. immaculatus, Hodgson (in abraded plumage).
A. cacharensis, Hodgson (in first plumage).

From Nepal. B.

(1293) *A. variegatus*, Blyth, J. A. S. XII, 958 (described XI, 187). Inhabits Sikim.

(1294) *A. strophiatus*, Hodgson, J. A. S. XII, 959; P. Z. S. 1845, p. 34. Inhabits Himalaya generally.

(1295) *A. atrogularis*, Hutton, J. A. S. XVIII. Inhabits Tyne range, beyond Simla.

(1296) *A. mollis*, Blyth, J. A. S. XVI, 581. Inhabits Sikim.

Subfam. ALAUDINÆ.

Genus ALAUDA, L.

(1297) *A. arvensis*, L. (*Pl. Enl.* 363, f. 1).

Syn. A. cœlipeta, Pallas,
A. italica, Gmelin.
A. longipes, Latham,
A. dulcivox, Hodgson.
} apud G. R. Gray.

Inhabits Europe and Asia: Sub-Himalaya.

(1298) *A. gulgula*, Franklin.

Syn. A. gangetica, Blyth.
A. gracilis, Blyth, var.
A. leiopus, Hodgson, var.

Inhabits India generally.

(1299) *A. malabarica*, Scopoli.

Syn. A. deva, Sykes.

Inhabits S. India.

Subgenus CALANDRELLA, Kaup.

(1300) *C. brachydactyla.*

Syn. Alauda brachydactyla, Temminck.
A. calandrella, Bonelli.
A. arenaria, Stephens.
A. dukhunensis, Sykes.
Emberiza baghaira, Franklin.
E. olivacea, Tickell, J. A. S. II, 578.
Baay-geyra Lark, Latham.

Baghairi, H. *Ortolan* of Europeans in India. Inhabits Europe, Asia, and N. Africa. Common in India.

(1301) *C. raytal*, Blyth.

Syn. Alauda raytal, Buchanan Hamilton, J. A. S. XIII, 962, XV, 40.

Inhabits Dry sand-dunes of Ganges, Indus, &c.

Genus CALERIDA, Boie.

(1302) *G. chendoola.*

Syn. Alauda chendoola, Franklin.
A. gulgula apud Sykes.
Crested Calandre Lark, Latham.

Chendul, H. Inhabits Sandy plains of India.

(1303) *G. Boysii*, Blyth.

Syn. Certhilauda Boysii, Blyth, J. A. S. XV, 41.

Inhabits Bengal.

Genus MIRAFRA, Horsfield.

(1304) *M. Hayii*, Jerdon, J. A. S. XIII, 959. Inhabits Coromandel Coast.

(1305) *M. affinis*, Jerdon, J. A. S. XIII, 959. Inhabits Middle and S. India; Ceylon.

(1306) *M. erythroptera*, Jerdon, J. A. S. XIII, 958 (*Ill. Ind. Orn.*, pl. 38). Inhabits S. India.

(1307) *M. cantillans*, Jerdon, J. A. S. XIII, 960. Inhabits India generally; rare in Lower Bengal.

(1308) *M. assamensis*, McClelland, P. Z. S. 1839, pl. 162.

Syn. Alauda mirafra. Temminck (apud Jerdon, nec apud G. R. Gray).
Finch Lark. Latham.

Inhabits Bengal: Nepal; Assam.

(1309) *M. phœnicura*, Franklin, P. Z. S. 1831, p. 119. Inhabits S. India.

Genus PYRRHULAUDA, A. Smith.

(1310) *P. grisea* (*Pl. Col.* 269, f. 2).

Syn. Alauda grisea, Scopoli.
A. gingica Gmelin.
Fringilla crucigera. Temminck.

Chak Bharái; *Dhulo Cháta*, Beng; *Decora*, H., vulgo; *Dubhuk Chari* ('Squat Sparrow') H. (Jerdon). Inhabits India generally.

Fam. MOTACILLIDÆ.

Genus HETERURA, Hodgson.

(1311) *H. sylvana*, Hodgson, J. A. S. XIV, 556; P. Z. S. 1845, p. 33 (Jardine's *Contrib. Orn.* 1848, pl.). Inhabits Himalaya.

Genus ANTHUS, Bechstein.

Subgenus DENDRONANTHUS, Blyth.

(1312) *D. trivialis* (*Pl. Enl.* 660, f. 1).

Syn. Alauda trivialis, L.
A. minor, Bewick.
Anthus arboreus. Temminck.

Inhabits Europe and N. Asia; Himalaya.

(1313) *D. maculatus*.

Syn. Anthus maculatus et A. brevirostris, Hodgson.

Musaricki, H. (Jerdon). Inhabits India generally.

Subgenus ANTHUS, Auct.

(1314) *A. similis*, Jerdon (*Ill. Ind. Orn.* pl. 45).

Syn. Agrodoma similis, Jerdon. Madr. Journ. XI, 35.

Inhabits Nilgiris: N. W. Himalaya.

(1315) *A. Richardi*, Vieillot (*Zool. Journ.* Vol. I, pl. 14). Inhabits Europe, Asia, and N. Africa. Specimens from the vicinity of Calcutta.

(1316) *A. rufulus*, Vieillot.

Syn. A. agilis apud Jerdon (nec Sykes).
A. malayensis, Eyton.
A. pallescens apud Sundevall.
A. pratensis of Sumatra, Raffles.
Slender Lark, Latham.

Rugail, H. (Jerdon): *Lancha-lancha*, or *Hamba Puyu*, Sum. Inhabits India generally and Malay countries.

(1317) *A. striolatus*, Blyth, J. A. S. XVI, 435.

Syn. A. pelopus (?). Hodgson, G. R. Gray, Brit. Mus. Catal.

Inhabits Himalaya, S. India.

(1318) *A. montanus*, Jerdon, J. A. S. XVI, 435.

Syn. A. rufescens apud Jerdon, Catal.

Inhabits Nilgiris.

(1319) *A. campestris* (*Pl. Enl.* 661).

Syn. Alauda campestris, L.
A. rufescens. Bechstein. Temminck.
A. rufulus apud Jerdon, Catal.

Chilla, H. (Jerdon). Inhabits Europe, Asia, N. Africa. Specimens from near Mednapur.

(1320) *A. pratensis* (*Pl. Enl.* 661, f. 2).

Syn. Alauda pratensis, L.

Inhabits Europe, Asia, N. Africa.

(1321) *A. cervinus* (Denon's Egypt, *Hist. Nat.* pl.).

Syn. Motacilla cervina, Pallas.
Anthus rufogularis, Brehm.
A. aquaticus? apud Blyth, J. A. S. XVI, 437.

Inhabits S. E. Himalaya; N. Europe; N. Africa.

Genus NEMORICOLA, Blyth.

(1322) *N. indica* (Vaill. *Ois. d' Afr*, t. 179).

Syn. Motacilla indica Gmelin
M. variegata, Vieillot (nec Stephens),

Mhamula, H. (Jerdon). *Nyet Rahat*, Arakan. Inhabits India generally; Burmah; Malayan peninsula; Sumatra. Vicinity of Calcutta at all seasons.

Genus MOTACILLA, L. (as restricted).

(1323) *M. maderaspatana*, Brisson (nec Linnæus; Vaill. *Ois. d'Afr.* t. 184).

Syn. M. maderaspatensis, Gmelin.
M. maderas et M. variegata, Stephens (nec Vieillot).
M. picata. Franklin.
Pied Wagtail Latham.

Inhabits Hindustan generally; Rajmahl; Darjiling: never in Lower Bengal.

(1324) *M. alba*, L. (*Pl. Enl.* 652).

Syn. M. albida et M. cinerea. Gmelin.

Inhabits Europe and W. Asia; Afganistan? Very rare in the British Islands.

(1325) *M. dukhunensis*, Sykes, P. Z. S. 1832, p. 91.

Syn. M. alba apud Jerdon.

Dhobin, H. (Jerdon). Inhabits N. W., Central, and S. India. Afghanistan?

(1326) *M. luzoniensis*, Scopoli.

Syn. M. alba, var. γ, Latham.
M. leucopsis, Gould, P. Z. S. 1837, p. 78.
M. alboides, Hodgson, As. Res. XIX, 190.

Khanjan, H. Inhabits Bengal; Nepal; Philippines.

(1327) *M. hoarula*, L. (*Pl. Enl.* 18, f. 1; Edwards, pl. 259).

Syn. M. Sulphurea, Bechstein.

Inhabits Europe, Asia and its archipelago, Africa, and Australia. Specimen in summer dress, from Masuri.

Genus BUDYTES, Cuvier.

(1328) *B. citreola*.

Syn. Motacilla citreola, L.
M. scheltobriusk, Lepech.
B. calcaratus, Hodgson, As. Res. XIX, 190.

Zurcha, Kabul. Inhabits Asia generally, and E. Europe: Calcutta and Himalaya.

(1329) *B. viridis* (Brown's 'Illustrations,' pl. 33,—).

Syn. Motacilla viridis, Scopoli.
M. bistrigata, Raffles.
B. beema Sykes.
B. flava (? et neglecta apud Jerdon.
Wagtail Lark, Latham (young female.)

Pilkya, H.; *Bessit*, Java. Inhabits India generally and Malay countries; S. Europe? N. Africa?

(1330) *B. melanocephala*, Sykes, P. Z. S. 1823, p. 90; also of Lichtenstein? Inhabits S. E. Europe; W. and Middle Asia; Hindustan.

Fam. SPHENURIDÆ.

Genus MEGALURUS, Horsfield.

(1331) *M. palustris*, Horsfield (P. C. 65, f. 2); J. A. S. XIII, 372.

Syn. Malurus marginalis, Reinwardt.

Larri-angon, Jav. Inhabits Bengal; Tippera; Arakan; Java.

Genus SPHENURA, Lichtenstein.

(1332) *Sph. striata* (J. A. S. XIII, 373).

Syn. Megalurus? striatus, Jerdon, Madr. Journ. XIII, 169 (the female).
Dasyornis locustelloides, Blyth, J. A. S. XI, 602.

Inhabits Bengal; S. India.

Genus SPHENÆACUS (?), Strickland.

(1333) *Sph. (?) Burnesii*,

Syn. Eurycercus Burnesii, Blyth, J. A. S. XII, 374.

Inhabits Sindh.

Genus DUMETIA, Blyth.

(1334) *D. hyperythra*.

Syn. Timalia hyperythra, Franklin.

Inhabits Central India.

(1335) *D. albogularis*.

Syn. Malacocercus (?) albogularis, Blyth, J. A. S. XVI. 453.
Timalia hyperythra apud Jerdon, Catal.
Shah Dumri, H.? (Jerdon).

Inhabits S. India; Ceylon.

Genus MALACOCERCUS, Swainson.

(1336) *M. nipalensis*.

Syn. Timalia nipalensis vel. leucotis, et T. pellotis, Hodgson, As. Res. XIX, 182.

Inhabits Nepal.

(1337) *M. bengalensis* (Edwards, pl. 184, badly coloured).

Syn. Merula bengalensis, Brisson.
Turdus canorus, L.
Pastor terricolor, Hodgson, J. A. S. V, 771.

Sat Bhai ('seven brothers'), H.: *Chatarrhea*, B. Inhabits Bengal; Nepal; Assam; Deyra Doon; Ceylon.

(1338) *M. malabaricus*, Jerdon (*Ill. Ind. Orn.*, art. M. *griseus*).

Syn. M. Somervillei apud Jerdon, Catal.

Jungli Kur or *Kayr*, H. (Jerdon). Inhabits Malabar; sides of Nilgiris.

(1339) *M. griseus* (Jerdon's *Ill. Ind. Orn.*, pl. 19.)

Syn. Turdus griseus, Latham.

Keyr, H.: *Chinda*, or *Sida*, Telugu: *Kullu Koorari* ('Hedge-bird'), Tamool: *Kuliyan*, Malayalum (Jerdon). Inhabits Carnatic, and its immediate vicinity.

(1340) *M. rufescens*, Blyth, J. A. S. XVI, 453. Inhabits Ceylon.

(1341) *M. Malcolmi* (Hardwicke's *Ill. Ind. Zool*)

Syn. Timalia Malcolmi, Sykes.
Garrulus albifrons, (Gray and Hardw.)
Pale-eared Thrush, Latham.

Ghoghoye, H.; *Gongya*, Can.; *Kokutti*; Mahr. (Jerdon). Inhabits S. India: Cawnpore district.

(1342) *M. subrufus*, Jerdon.

Syn. Timalia subrufa, Jerdon, Catal.
T. pœcilorhyncha, de la Fresnaye.

Inhabits S. India: Wynaad, and along the margins of the W. Ghats.

(1343) *M. Earlei*, Blyth, J. A. S. XIII, 369.

Syn. M geochrous, Hodgson.

Inhabits Bengal; Nepal; Tippera.

(1344) *M. caudatus*.

Syn. Cossyphus caudatus, Dumeril.
Megalurus isabellinus, Swainson, 2¼ Cent.
Timalia chatarrhœa, Franklin.

Dumri, H.; *Huni*, Tam.? (Jerdon); *Hedo*, and *Laila*, Sindh. Inhabits India generally.

Genus DRYMOICA, Swainson.

(1345) *Dr. criniger.*

Syn. Suga criniger, Hodgson, As. Res. XIX 183.

Inhabits Himalaya.

(1346) *Dr. sylvatica.*

Syn. Prinia sylvatica, Jerdon, Madr. Journ. XI. 4.

Inhabits Nilgiris.

(1347) *Dr. robusta*, Blyth, J. A. S. XVIII. Inhabits Ceylon. Specimen presented by E. L. Layard, Esq. differs from *Dr. sylvatica* in its darker shade of colour above, and larger and stronger bill and legs, which last appear to have been of a deep reddish brown colour: the flanks and sides of the breast are duskyish.

(1348) *Dr. neglecta.*

Syn. Prinia neglecta, Jerdon. Madr. Journ. XIII, pt. II, 130.
Dr. sylvatica of Mednapur apud Blyth, J. A. S. XVI, note to p. 459

Inhabits Central India. Specimen procured near Mednapur differs from *Dr. sylvatica* in its more rufescent tinge throughout, the wingfeathers being margined with dull rufous; and the flanks are largely and deeply tinged with brown, extending up the sides of the breast.

(1349) *Dr.* ——— *?* Inhabits Java. *A.* Specimen presented by the Batavian Society (1845). is very like *Dr. sylvatica*, but smaller, with more conspicuously whitish lores and throat. Vide J. A. S. XVI, 459.

(1350) *Dr. Jerdoni*, Blyth, J. A. S. XVI, 459. Inhabits S. India.

(1351) *Dr. inornata.*

Syn. Prinia inornata, Sykes. P. Z. S. 1832, p. 89.

Inhabits Hindustan generally; S. India; Ceylon. This Ceylon race is darker above, especially on the crown, the lores and throat conspicuously whitish, as in Dr. robusta.

(1352) *Dr. Franklinii.*

Syn. Prinia Franklinii, Blyth. J. A. S. XIII, 376.
Pr macroura, Franklin, P. Z. S. 1831, p. 118.
Pr. fusca, Hodgson, P. Z. S. 1845, p. 29.
Sylvia longicaudata (?), Tickell, J. A. S. II. 576.

Inhabits Bengal; Nepal; Arakan.

(1353) *Dr. Buchanani*, Blyth, J. A. S. XIII, 376.

Syn. Prinia rufifrons, Franklin (nec Ruppell).
Pr. brunnifrons, Hodgson, An. Mag. N. H. 1845, p. 29.
Sylvia longicauda, var. A (?) Latham.

Inhabits Nepal; Upper Bengal; S. India.

(1354) *Dr. lepida*, Blyth, J. A. S. XIII, 376; XVI, 460. Inhabits margins of sand-deposits of rivers in Bengal: also Sindh.

Genus PRINIA, Horsfield.

(1355) *Pr. Hodgsonii*, Blyth, J. A. S. XIII, 376.

Syn. Pr. gracilis apud Jerdon (nec Franklin, nec Malurus gracilis, Ruppell).

Inhabits Nepal; S. India.

(1356) *Pr. gracilis*, Franklin, P. Z. S. 1831, p. 119. Inhabits Central India.

(1357) *Pr. rufescens*, Blyth, J. A. S. XVI, 456. Inhabits Arakan.

(1358) *Pr. socialis*, Sykes, P. Z. S. 1832, p. 89.

Syn. Foodkey Warbler, Latham

Inhabits S. India.

(1359) *Pr. Stewarti*, Blyth, J. A. S. XVI, 455.

Syn. Sylvia kalaphutki, B. Ham. MS.
Flaxen Warbler, var A., Latham.

Inhabits Upper Provinces of Bengal Presidency.

(1360) *Pr. flaviventris.*

Syn. Orthotomus flaviventris, Ad. Delessert.

Inhabits Nilgiris? Bengal Sundarbuns; Tenasserim; Malacca.

Genus NEORNIS, Hodgson.

(1361) *N. flavolivacea*, Hodgson, J. A. S. XIV, 590 (the young).

Syn. Drymoica brevicaudata, Blyth J. A. S. XVI, 459 (the adult).

Inhabits Nepal; Darjiling.

Genus ORTHOTOMUS, Horsfield.

(1362) *O. longicauda.*

Syn. Motacilla longicauda et M. sutoria, Gmelin.
Sylvia guzuratta, Latham.
S. ruficapilla, Hutton, J. A. S.
Orthotomus Bennettii, et O. lingoo, Sykes.
O. sphenurus, Swainson, 2¼ Cent.
O. sutoria and O. patia, Hodgson, P. Z. S. 1845, p. 29.

Tuntuni, Beng. Inhabits India generally; Ceylon; Burmese countries; Malayan peninsula.

(1363) *O. edela*, Temminck.

Syn. Edela ruficeps, Lesson.
Motacilla sepium apud Raffles.

Kuchichi, Malay. Inhabits Malayan peninsula; Sumatra.

(1364) *O. cineraceus*, Blyth, J. A. S. XIV, 589. Inhabits Malayan peninsula.

Genus HORIETES, Hodgson.

(1365) *H. brunnifrons*, Hodgson, J. A. S. XIV, 585.

Syn. H. schistilatus, Hodgson, J. A. S. 1845, p. 30.
Nivicola schistilata, Hodgson, J. A. S. XIV, 586.

Inhabits S. E. Himalaya, near the snow region.

Genus CISTICOLA, Lesson.

(1366) *C. cursitans* (Jerdon's *Ill. Ind. Orn.*, pl. 6).

Syn. Prinia cursitans, Franklin.

Inhabits India generally. Not satisfactorily distinct from B. schœnicola.

(1367) *C. omalura*, Blyth, J. A. S. XVIII, Inhabits Ceylon.

Genus PELLORNIUM, Swainson.

(1368) *P. ruficeps*, Swainson.

Syn. P. olivaceum, Jerdon.
Cinclidia punctata, Gould.
Megalurus ruficeps, Sykes.

Inhabits Nepal; S. India; Tenasserim provinces.

Genus TURDIROSTRIS, A. Hay.

(1369) *T. superciliaris*, A. Hay, *Madr. Journ.* XIII, pt. 2, 193. Inhabits Malayan peninsula.

Genus POMATORHINUS, Horsfield.

(1370) *P. hypoleucos*, Blyth, J. A. S. XIV. 599.

Syn. Orthorhinus hypoleucos, Blyth the young), J. A. S. XIII, 371.

Inhabits Arakan.

(1371) *P erythrogenys*, Vigors (Gould's 'Century.' pl. 55). Inhabits Himalaya.

(1372) *P. schisticeps*, Hodgson, *As. Res.* XIX, pt. 1, p. 181. Inhabits S. E. Himalaya; Sylhet; Tippera; Arakan.

(1373) *P. leucogaster*, Gould, P. Z. S. 1837, p. 137.

Syn. P. olivaceus, Blyth, J. A. S. XVI, 451.
P. montanus of Assam apud Horsfield, P. Z. S. 1839, p. 166.

Inhabits Deyra Doon; Nepal; Assam; Tenasserim provinces.

(1374) *P. melanurus*, Blyth, J. A. S. XVI, 451. Inhabits Ceylon.

(1375) *P. Horsfieldi*, Sykes, P. Z. S. 1832, p. 89. Inhabits Peninsula of India.

(1376) *P Phayrei*, Blyth J. A. S. XVI, 452. Inhabits Arakan.

(1377) *P. ferruginosus*, Blyth, J. A. S. XIV, 597. Inhabits Sikim.

(1378) *P. ruficollis*, Hodgson, *As. Res.* XIX, pt. 1, 182. Inhabits S. E. Himalaya.

(1379) *P. montanus*, Horsfield (*Zool. Res. in Java*, pl.). *Bokkrek*, Java. Inhabits Java.

Genus XIPHORHAMPHUS, Blyth.

(1380) *X. superciliaris*, Blyth, J. A. S. XII, 947.

Syn. Xiphorhynchus superciliaris, ibid, J. A. S. XI 175.

Inhabits Sikim.

Genus TURDINUS, Blyth.

(1381) *T. macrodactylus*, J. A. S. XIII, 382.

Syn. Malacopteron macrodactylum, Strickland.
Brachypteryx albogularis, Hartland.

Tana, Malay. Inhabits Malayan peninsula.

Genus TRICHASTOMA, Blyth.

(1382) *Tr. Abbotti.*

Syn. Malacocincla Abbotti, Blyth, J. A. S. XIV, 601.

Inhabits Arakan.

(1383) *Tr. olivaceum.*

Syn. Megalopteron olivaceum, Strickland, Ann. Mag. N. H. 1847, p. 132.

Tr. Abbotti, var? Inhabits Malayan peninsula.

(1384) *Tr. bicolor.*

Syn. Brachypteryx bicolor, Lesson.
Malacopteron ferruginosum, Blyth, J. A. S. XIII, 383.

Inhabits Malayan peninsula; Sumatra.

(1385) *Tr. rostratum*, Blyth, J. A. S. XI, 795. Inhabits Malayan peninsula.

Genus MALACOPTERON, Eyton.

(1386) *M. majus*, Blyth, J. A. S. XVI, 461. Inhabits Malayan peninsula.

(1387) *M. magnum*, Eyton, P. Z. S. 1849, p. 103. Inhabits Malayan peninsula.

Genus ALCIPPE, Blyth.

(1388) *A. albogularis.*

Syn. Setaria albogularis, Blyth, J. A. S. XIII, 385.

Inhabits Malayan peninsula.

(1389) *A. affinis* (J.A. S. XIII, 384.)

Syn. Trichastoma affine, Blyth, J. A. S. XI. 795.

Inhabits Malayan peninsula.

(1390) *A. cinerea*, Eyton.

Syn. Malacopteron cinereum, Eyton, P. Z. S. 1839, p. 103; J. A. S. XIII, 384.

Inhabits Malayan peninsula.

(1391) *A. Phayrei*, Blyth, J. A. S. XIV, 601. Inhabits Arakan.

(1392) *A. nipalensis.*

Syn. Siva nipalensis, Hodgson, Ind. Rev. 1838, p. 80.

Inhabits S. E. Himalaya; Arakan.

(1393) *A. sepiaria.*

Syn. Brachypterix sepiaria, Horsfield, Lin. Tr. XIII, 156.

Chichohan, Jav. Inhabits Java.

(1394) *A. poiocephala.*

Syn. Timalia poiocephala, Jerdon, Madr. Journ. XIII, 169.

Inhabits S. India.

(1395) *A. atriceps.*

Syn. Brachypteryx atriceps, Jerdon, Madr. Journ. X, 250.

Inhabits S. India.

(1396) *A.* (?) ***striata.***

Syn. Timalia striata, Blyth, J. A. S. XI, 783.

Inhabits Malayan peninsula.

Genus MACRONOUS, Jardine and Selby.

(1397) *M. ptilosus*, J. and S. *(Ill. Orn.* pl. 150).

Syn. Timalia trichorros, Temminck,

Burong taal-uban, Malay. Inhabits Malayan peninsula.

Genus MIXORNIS, Hodgson.

(1398) *M. gularis* (*Horsf. Zool. Res. in Java*, pl.).

Syn. Timalia gularis, Horsfield.
Prinia pileata, Blyth, J. A. S. XI, 204.

Burong Puding, Malay. Inhabits Tenasserim provinces; Malayan peninsula; Java.

(1399) *M. chloris*, Hodgson, J. A. S. XI, 794,

Syn. M. ruficeps, Hodgson, P. Z. S. 1845. p. 23.
Motacilla rubicapilla (?), Tickell, J. A. S. II, 576.

Inhabits Sub-himalayan region; Central India? Tenasserim provinces.

Genus TIMALIA, Horsfield.

(1400) *T. pileata*, Horsfield (*Zool. Res. in Java*, pl.). *Dawit*, or *Gogo-stile*, Jav. Inhabits Bengal; Nepal; Assam; Arakan; Java.

(1401) *T. nigricollis*, Temminck.

Syn. T. erythronotus, Blyth, J. A. S. XI, 793.
Brachypteryx nigrogularis, Eyton.

Burong Tanah, Malay. Inhabits Malayan peninsula.

(1402) *T. pectoralis*, Blyth, J. A. S. XI, 793.

Syn. Malacopteron squamatum, Eyton.

Pampang, Malay. Inhabits Malayan peninsula.

(1403) *T. erythroptera*, Blyth, J. A. S. XI, 794.

Syn. T. pyrrhophæa, Hartlaub.
Brachypteryx acutirostris, Eyton.

Inhabits Malayan peninsula.

Genus CHRYSOMMA, Hodgson.

(1404) *Chr. sinense* (Jardine and Selby, *Ill. Orn.* pl. 119).

Syn. Parus sinensis, also Gotah Finch, and Emberiza calfat, Var. A, Latham.
Timalia hypoleuca, Franklin.
T. Horsfieldi, Jardine and Selby.
Pyctoris rufifrons, Hodgson, P. Z. S. 1845, p. 24.
Timalia bicolor, Lafresnaye.

Gulchasm; also *Shukar Dumri*, H. ? (Jerdon). Inhabits India generally; China ?

Genus STACHYRIS, Hodgson.

(1405) *St. nigriceps*, Hodgson, J. A. S. XIII, 378; P. Z. S. 1845, p. 22. Inhabits S. E. Himalaya.

(1406) *St. pyrrhops*, Hodgson, J. A. S. XIII, 379; P. Z. S. 1845, p. 23 (there spelt *pyrops*). Inhabits Nepal.

(1407) *St. ruficeps*, Blyth, J. A. S. XVI, 452. Inhabits Sikim.

(1408) *St. chrysæa*, Hodgson, J. A. S. XIII, 379; P. Z. S. 1845, p. 23. Inhabits S. E. Himalaya; Arakan.

Fam. LANIADÆ.

Genus GAMPSORHYNCHUS, Blyth.

(1409) *G. rufulus*, Blyth, J. A. S. XIII, 370. Inhabits Terai region of the S.E. Himalaya, Arakan, &c.

Genus THAMNOCATAPHUS, Tickell.

(1410) *Th. picatus*, Tickell, J. A. S. XVIII, Inhabits Darjiling.

Genus LANIUS, L.

(1411) *L. lahtora* (Hardwicke's *Ill. Ind. Zool*).

Syn. Collurio lahtora, Sykes.
Lanius excubitor, var C., Latham.
L. burra, Gray, Hardw, Ill. Ind. Zool.

Dudia lahtora, ('Milky Shrike'), H. Inhabits India generally (nec Lower Bengal).

(1412) *L. schach, L.*

Syn. L. bentet, Horsfield.

Burong Papa, or Terip api, Malay.; *Bentet*, Java. Inhabits China; Philippines; Java.

(1413) *L. erythronotus* (Gould's Century, pl. 12, f. 2).

Syn. Collurio erythronotus, Vigors.

Inhabits N. W. Himalaya.

(1414) *L. caniceps*, Blyth J. A. S. XV, 302.

Syn. C. erythronotus of S. India, Auct.

Inhabits Indian peninsula; Sindh; Upper Bengal.

(1415) *L. nigriceps.*

Syn. Collurio nigriceps, Franklin.
Lanius nasutus, Scopoli.
L. antiguanus, Latham.
L. tricolor, Hodgson, Ind. Rev. 1837.
Indian Shrike, Latham.

Inhabits Bengal; Kutak; Nepal; Assam; Arakan.

(1416) *L. tephronotus.*

Syn. Collurio tephronotus, Vigors, P. Z. S. 1831, p. 43.
Lanius nipalensis, Hodgson, Ind. Rev. 1837, p. 445.
Grey-backed Shrike, Latham.

Inhabits Bengal; Nepal; Assam; Arakan.

(1417) *L. superciliosus*, L. (Vaill. *Ois. d' Afr.* pl. 66, f. 2.)

Syn. L. collurioides, Lesson.

Bengal variety—

L. cristatus, L.
L. phœnicurus, Pallas.
L. rutilus, var A, and L. superciliosus, var A, Latham.
L. melanotis, Valenciennes.
L. ferrugiceps, Hodgson, Ind. Rev. 1837. p. 446.

Sindh variety.

L. arenarius, Blyth, J. A. S. XV, 304.

Philippine variety?

L. lucionensis, Kátkáti. Beng.

Inhabits all S. E. Asia and its islands, except on elevated land.

(1418) *L. tigrinus*, Drapiez, *Dict. Class. d' Hist. Nat.*

Syn. L. magnirostris, Lesson, in Belanger's Voyage.
L. strigatus, Eyton, P. Z. S. 1839, p. 103.

Serara, Malay. Inhabits Malay countries.

(1419) *L. Hardwickii*, Vigors (Gould's 'Century,' pl. 12, f. 1).

Syn. Collurio Hardwickii, Vigors.
Bay-backed Shrike, Latham.

Pichanuk, H. Inhabits India generally (nec Bengal alluvium).

(1420) *L. hypoleucos*, Blyth, J. A. S. XVII, 249. Inhabits Tenasserim provinces.

Genus TEPHRODORNIS, Swainson.

(1421) *T. sylvicola*, Jerdon, *Madr. Journ.* X, 236. *Phari latora*, H. Inhabits S. India.

(1422) *T. pelvica.*

Syn. Tenthaca pelvica, Hodgson, Ind. Rev. 1837, p. 447.

Inhabits Nepal; Arakan.

(1423) *T. gularis.* (Tem. *Pl. Col.* 256. f. 1.)

Syn. L. virgatus, Temminck.
Lanius gularis, Raffles.

Baron Baron, Malay. Inhabits Malay countries.

(1424) *T. pondiceriana.* (Hardw. *Ill. Ind. Zool.*)

Syn. Muscicapa pondiceriana, Gmelin.
M. philippensis of India, Latham.
Lanius keroula, Gray.
L. muscipetoides, Franklin.
L. griseus, Tickell, J. A. S II, 573.
L. sordidus, Lesson.
T. superciliosus, Swainson.
Tenthaca leucurus, Hodgson, Ind. Rev. 1837, p. 447.

Inhabits India generally.

(1425) *T. affinis*, Blyth, J. A. S. XVI, 473. Inhabits Ceylon.

(1426) *T. grisola*, Blyth, J. A. S. XII, 180. Inhabits Penang; Java; Arakan; very rare in Lower Bengal.

Genus HEMIPUS, Hodgson.

(1427) *H. obscurus* (Horsfield's *Zool. Res. in Java.* pl.).

Syn. Muscicapa obscura, Horsfield.
M. hirundinaceus, Reinhardt.
Tephrodornis hirundinaceus, Swainson.

Inhabits Malay countries; Tenasserim.

(1428) *H. picata.*

Syn. Muscicapa picata, Sykes.
M. tyrannides, Tickell, J. A. S. II, 574.
M. hyrundinacea, apud Jerdon, Catal.
M. variegata (?), Linnæus.

Inhabits Arakan; Central and S India; Ceylon.

(1429) *H. capitalis.*

Syn. Muscicapa? capitalis, McClelland, P. Z. S. 1839, p. 159.
H. piceicolor, Hodgson, P. Z. S. 1845, p. 33.

Inhabits Himalaya; Assam.

Genus XANTHOPYGIA, Blyth.

(1430) *X. leucophrys*, Blyth, J. A. S. XVI, 123.

Syn. Muscicapa xanthopygia, A. Hay, Madr. Journ. XI, 162 (the female).

Inhabits Malayan peninsula.

(1431) *X. narcissina* (Tem., *Pl. Col.* 577, f. 1).

Syn. Muscicapa narcissina, Temminck.
Z. carysophrys, Blyth, J. A. S. XVI, 124.

Inhabits China; Japan.

Fam. BRACHYURIDÆ.

Genus PITTA, Vieillot.

(1432) *P. cærulea* (Tem. *Pl. Col.* 217).

Syn. Myiothera cærulea, Raffles.
Pitta gigas, Temminck.

Inhabits Malayan peninsula: Sumatra.

(1433) *P. nipalensis.*

Syn. Paludicola nipalensis, Hodgson, J. A. S. VI, 103.
Pitta nuchalis, Blyth, J. A. S. XI, 188.

Inhabits Himalaya; Arakan.

(1434) *P. cucullata*, Hartlaub (*Ann. Mag. N. H.* XIII, pl. 20.)

Syn. P. nigricollis, Blyth, J A. S. XII, 960.
P. rodogaster, Hodgson, J. A. S. XII, 961 (the young).

Inhabits Nepal; Assam; Malayan peninsula.

(1435) *P. cyanoptera*, Temminck (*Pl. Col.* 218).

Syn. P. malaccensis apud Blyth. J. A. S. XII, 960.

Inhabits Arakan; Tenasserim provinces; Malayan peninsula.

(1436) *P. triostegus* (Gould's 'Century,' pl. 23.)

Syn. Turdus triostegus, Sparrman.
T. malaccensis, Scopoli.
P. supercilliaris et abdominalis, Wagler.
P. bengalensis, Stephens.
P. brachyura of India, auctorum.

Inhabits India generally, from the sub-Himalayan region to Ceylon inclusive: never on the eastern side of the Bay of Bengal.

(1437) *P. erythrogastra*, Tem. (*Pl. Col*, 212.) Inhabits Philippines.

(1438) *P. granatina*, Tem. (*Pl. Col.* 506.)

Syn. P. coccinea, Eyton, P. Z. S. 1839, p. 104.

Inhabits Malayan peninsula.

(1439) *P. cyanea*, Blyth, J. A. S. XII, 1008; XVI, 153. Inhabits Arakan; Tenasserim provinces.

(1440) *P. cyanura* (*Pl. Enl.* 355).

Syn. Corvus cyanurus, Gmelin.
Myiothera affinis, Raffles.

Sintar, Sum.: *Punglor*, Jav. Inhabits Malayan peninsula; Sumatra.

Genus HYDROBATA, Vieillot.

(1441) *H. asiatica* (Gould's 'Century,' p. 24).

Syn. Cinclus asiaticus, Swainson.
C. Pallasii apud Gould.

Inhabits Himalaya.

Genus TROGLODYTES, Cuvier.

(1442) *Tr. nipalensis*, Hodgson, J. A. S. XIV, 589.

Syn. Tr. subhemalayanus, Hodgson, Gray.

Inhabits N. W. Himalaya; Nepal.

(1443) *Tr. punctatus*, J. A. S. XIV, 589.

Inhabits Sikim.

Genus EUPETES, Temminck.

(1444) *Eu. macrocercus*, Tem. (*Pl. Col.* 516). Inhabits Malayan peninsula.

Genus ENICURUS, Temminck.

(1445) *E. ruficapillus*, Tem. (*Pl. Col.*). Inhabits Java.

(1446) *E. maculatus*, Vigors, (Gould's 'Century,' pl. 27).

Syn. E. fuliginosus, Hodgson (the young).

Inhabits Himalaya.

(1447) *E. schistaceus*, Hodgson, *As. Res.* XIX, 191. Inhabits S. E. Himalaya; Tenasserim provinces.

(1448) *E. immaculatus*, Hodgson, *As. Res.* XIX, 190, J. A. S. XVI, 157. Inhabits Arakan. Rare in Nepal.

(1449) *E. frontalis*, Blyth, J. A. S. XVI. 156. Inhabits Malayan peninsula.

(1450) *E. scouleri*, Vigors (Gould's 'Century,' pl. 28). Inhabits Himalaya; rare to the N. W.

Fam. MERULIDÆ.

Subfam. MERULINÆ.

Genus MYIOPHONUS, Temminck.

(1451) *M. Temminckii*, Vigors (Gould's 'Century,' pl. 21).

Syn. M. nitidus, Gray.

Inhabits Himalaya; Assam; Arakan.

(1452) *M. Horsfieldi*. Vigors (Gould's 'Century,' pl. 20). Inhabits Nilgiris (nec Himalaya).

Genus TURDUS, L.

Subgenus ZOOTHERA, Vigors.

(1453) *Z. monticola*, Vigors (Gould's 'Century,' pl. 22). Inhabits Himalaya.

(1454) *Z. marginata*, Blyth, J. A. S. XVI, 141. Inhabits Arakan.

Subgenus OREOCINCLA, Gould.

(1455) *O. nilgiriensis*, Blyth, J. A. S. XVI, 181. Inhabits Nilgiris.

(1456) *O. mollissima*, Blyth, J. A. S. XI, 188; XVI, 141

Syn. O. rostrata, Hodgson, Ann. Mag. N. H. 1845, f. 326.

Inhabits Himalaya.

(1457) *O. dauma* (Gould's *B. E.* pl.).

Syn. Turdus dauma, Latham.
T. Whitei, Eyton.
T. doratus?
O. parvirostris, Gould, P. Z. S. 1837, p 136.

Inhabits Himalaya, Nilgiris: migrating to the plains in winter. Rare in Europe.

(1458) *O. spiloptera*, Blyth, J. A. S. XVI, 142. Inhabits Ceylon.

Subgenus TURDUS.

(1459) *T. viscivorus*, L. (*Pl. Enl.* 439; Gould's *B. E.* pl. 77).

Syn. T. major, Brisson.

Inhabits Europe; N. W. Himalaya.

(1460) *T. Naumanni* (?), Temminck (Gould's *B. E.* pl. 9).

Syn. T. dubius, Naumann.

Inhabits E. Europe; N. Asia; very rare in the Himalaya.

(1461) *T. atrogularis*, Natterer (Gould's *B. E.* pl. 75).

Syn. T. Bechsteini, Naumann.
T. dubius, Bechstein.

Inhabits N. Asia; Himalaya; Tippera.

(1462) *T. ruficollis*, Pallas.

Syn. (Perhaps a variety of Galerida cristata of which some specimens are partially rufous-tailed).

Inhabits N. Asia; Himalaya.

(1463) *T. javanicus* (?), Horsfield, *Lin. Tr.* XIII, 184.

Syn. T. concolor, (?) Temminck (Pl. Col.)
T. rufulus, Drapiez, Dict. Class.
T. modestus, Eyton, P. Z. S. 1839, p. 103.

Inhabits Arakan ; Malayan peninsula ; Java ?

Subgenus MERULA.

(1464) *M. vulgaris*, Ray, Leach (Gould's *B. E.* pl. 72).

Syn. Turdus merula, L.

Inhabits Europe ; N. Africa ; Madeira ; W. Asia ; Afghanistan ; China (Chusan).

(1465) *M. boulboul* (Gould's 'Century,' pl. 14).

Syn. Lanius boulboul et Turdus persicus (?), Latham.
T. pæcilopterus, Vigors.

Inhabits Himalaya.

(1466) *M. simillima.*

Syn. Turdus simillimus, Jerdon, Madr. Journ., X, 253.

Inhabits Nilgris.

(1467) *M. nigropileus.*

Syn. Turdus nigropileus, de la Fresnaye ; Ad. Delessert Voyage dans l'Inde.

Inhabits S. India.

(1468) *M. albocincta* (Royle's *Ill. Him. Bot.* pl. 8. f. 3).

Syn. Turdus albocinctus et T. albicollis, Royle.
T. collaris, Sorel.

Inhabits Himalaya.

(1469) *M. castanea*, Gould P. Z. S. 1835, p. 185. Inhabits Himalaya.

(1470) *M. Wardii* (Jerdon's *Ill. Ind. Orn.* pl. 8).

Syn. Zoothera melanoleuca. Hartlaub.
Oreocincla ? micropus, Hodgson (female).

Inhabits Himalaya ; S. India.

Subgenus GEOCICHLA, Kuhl.

(1471) *G. unicolor.*

Syn. Turdus unicolor, Tickell, Gould.

Inhabits Himalaya.

(1472) *G. dissimilis*, Blyth, J. A. S. XVI, 144.

Syn. Calcutta Thrush, Latham.

Inhabits Bengal (during cold season.)

(1473) *G. citrina* (Tem. *Pl. Col.* 445).

Syn. Turdus citrinus, Latham.
T. Macei, Vieillot.
T. lividus, Tickell, J. A. S. II, 577.
T. rubeculus apud Horsfield, P. Z. S. 1839, p. 161.

Inhabits Bengal ; Napal ; Assam ; Arakan ; S. India.

(1474) *G. cyanotus* (J. and S., *Ill. Orn.*., 1st series, pl. 46).

Syn. Turdus cyanotus, Jardine and Selby.

Inhabits Indian peninsula.

(1475) *G. innotata*, Blyth, J. A. S. XVI, 146. Inhabits Malayan peninsula ; Nicobars.

Subgenus PETROCINCLA, Vigors.

(1476) *P. erythrogastra* (Gould's 'Century,' pl. 13 ; J. and S. *Ill. Orn*, 1st series, pl. 129).

Syn. Turdus erythrogaster, Vigors.
Petrocincla rufiventris, Jardine and Selby.
Petrocossyphus ferrugineoventris, Lesson.

Inhabits Himalaya.

(1477) *P. cyaneus* (*Pl. Enl.* 250 ; Edwards, pl. 18).

Syn. Turdus cyaneus, L.
T. solitarius, Gmelin.
Merula cærulea, Brisson.
P. longirostris, Blyth, J. A. S. XVI,150.

Inhabits Europe ; N. Africa ; W. Asia ; Kashmir ; Punjab ; Sindh. The Indian variety *P. pandoo* (the male), and *P. maal* (the female), Sykes : *Turdus solitarius*, var. *A*, Latham. is merely somewhat deeper-coloured, the females especially, which are somewhat differently marked on the under-parts. The bill also is generally smaller. Inhabits Hindustan ; S. India.

(1478) *P. affinis*, Blyth, J. A. S. XII, 177. Inhabits Sikim ; Butan ; Assam ; Sylhet ; Tippera ; Arakan ; Tenasserim.

(1479) *P. manillensis* (*Pl. Enl.* 636).

Syn. Turdus manillensis, Gmelin.
T. olivaceus (?), Boddaert.

Inhabits Philippines ; China.

Subgenus MONTICOLA, Brehm.

(1480) *M. cinclorhyncha* (Gould's 'Century, pl. 19).

Syn. Petrocincla cinclorhyncha, Vigors.
Petrophila cyanocephala, Swainson.
Black-collared Thrush, var. A, Latham.

Inhabits Hilly parts of India generally, keeping to the forests : very rare in Lower Bengal in the seasons of passage.

Genus LUSCINIA, (Antiq.) L. (1735), G. R. Gray.

(1481) *L. philomela*, Bonap (*Pl. Enl.* 615, f. 2).

Syn. Motacilla luscinia, L.
Sylvia luscinia, Lath. Tem. (nec S. philomela, Tem.)

Bulbul hosta, H. : *Bulbul-i-hazar dastan*, Pers. Inhabits Europe ; N. Africa ; W. Asia ; common in Persia, but only known as a cage bird in Afghanistan.

Subfam. SAXICOLINÆ.

Genus THAMNOBIA, Swainson.

(1482) *Th. cambaiensis.*

Syn. Sylvia cambaiensis, Latham.
Saxicoloides erythrurus, Lesson (the female).

Inhabits Upper and Central India.

(1483) *Th. fulicata* (*Pl. Enl.* 185, f. 1).

Syn. Motacilla fulicata, L.
Ænanthe ptygmatura, Vieillot.
Th. leucoptera, Swainson.
Rusty-vented Thrush, and the female.—Sylvia fulicata, var. a, Latham.

Kulchuri, H. (Jerdon). Inhabits S. India; Ceylon; Philippines?

Genus KITTACINCLA, Gould.

(1484) *K. macrourus* (Vaillant, pl. 114).

Syn. Turdus macrourus, Gmelin.
T. tricolor, Vieillot.
Gryllivora longicauda, Swainson.

Shama, H.; *Abbeka*, H. (Jerdon): *Larwa*, Jav. Inhabits India generally (nec Lower Bengal); Ceylon; Burmese and Malay countries.

Genus COPSYCHUS, Wagler.

(1485) *C. mindanensis*.

Syn. Turdus mindanensis, Gmelin.
Lanius musicus, Raffles (nec Turdus amœnus, Horsfield).
Gryllivora magnirostra et Gr. rosea, Swainson (vide J. A. S. XVI, 139).

Choche, Malay; *Moorai*, or *Moorai Kichou*, Sum. Inhabits Malay countries.

(1486) *C. saularis* (Edwards, pl. 181).

Syn. Gracula saularis, L.
Gryllivora intermedia, Swainson.
Dahila docilis, Hodgson, As. Res. XIX, 189.

Dayal, B.; *Dayyur* or *Deyr*, H. (Jerdon): *Polichia*, Cingh: *Thabeitgyee*, Arakan. Inhabits Bengal; Nepal; India generally; Arakan; Tenasserim. The Head and back of female invariably ashy.

Var. Gr. brevirostra (?), Swainson.

Inhabits Ceylon. The Head and back of shining black, nearly as in the male.

Genus NOTODELA (?), Lesson.

(1487) *N.* (?) *leucura*, J. A. S. XVI, 138.

Syn. Muscisylvia leucura, Hodgson, P. Z. S. 1845, p. 27.

Inhabits Masuri; Nepal.

Genus GRANDALA, Hodgson.

(1488) *Gr. cœlicolor*, Hodgson, J. A. S. XII, 447. Inhabits Simla; Nepal: near snowy region.

Genus SAXICOLA, Bechstein (*Jerka*, Sindh).

(1489) *S. opistholeuca*, Strickland.

Syn. S. leucura apud Blyth, J. A. S. XVI, 137.

Inhabits Upper Hindustan; Sindh.

(1490) *S. picata*, Blyth, J. A. S. XVI, 131. Inhabits Upper Hindustan; Sindh.

(1491) *S. leucomela* (*Pl. Col.* 257, f. 3).

Syn. Muscicapa leucomela et M. melanoleuca, Stephens.

Inhabits S. Europe; N. Africa; W. Asia; Upper Hindustan; Sindh.

(1492) *S. atrogularis*, Blyth, J. A. S. XVI, 130-1.) Inhabits Upper-Hindustan; Sindh.

(1493) *S. œnanthe* (*Pl. Enl.* 554).

Syn. Motacilla ænanthe, L.

Inhabits Europe; W. Asia; Upper Hindustan.

Genus CYANECULA, Brehm.

(1494) *C. suecica* (*Pl. Enl.* 361, f. 2, and 610, f. 1, 2, 3).

Syn. Motacilla suecica, L.
Sylvia cæruligula, Pallas.
S. sperata, var. A, Latham (the female).
Blue-necked Warbler, Latham.

Husaini Pidda, H.: *Dumbuk*, Kabul. Inhabits N. Europe; India generally: very abundant in Lower Bengal.

Genus RUTICILLA, Brehm.

(1495) *R. frontalis* (Gould's *Century*, pl. 26. f. 2).

Syn. Phœnicura frontalis, Vigors.

Inhabits Himalaya generally.

(1496) *R. erythrogastra*.

Syn. Sylvia erythrogastra, Guldenstadt.
Muscicapa aurorea, Pallas.
Phœnicura Reevesii, Gray.

Inhabits N. and M. Asia, from the Caucasus to Japan; Nepal; Assam.

(1497) *R. phœnicurus* (*Pl. Enl.* 351, f. 2).

Syn. Motacilla phœnicura, L.
Phœnicura ruticilla, Swainson.
R. tythys of Afghanistan, apud Hutton, J. A. S. XV, 780.

Inhabits Europe; W. Asia; and variety in Afghanistan and Sindh.

(1498) *R. leucoptera*, Blyth, J. A. S. XII, 962; XVI, 134. Inhabits Malayan peninsula: Java.

(1499) *R. indica*, Blyth (Jardine and Selby, *Ill. Orn.* pl. 86, f. 3).

Syn. Phœnicura atrata apud Jardine and Selby.

Thirt bira (i. e. 'Shaker'). H. (Jerdon). Inhabits India generally.

(1500) *R. cæruleocephala* (Gould's *Century*, pl. 26, f. 2).

Syn. Phœnicura cæruleocephala, Vigors.

Inhabits Himalaya.

(1501) *R. fuliginosa*.

Syn. Phœnicura fuliginosa, Vigors, P. Z. S. 1831, p. 35.
Ph. plumbea, Gould, P. Z. S. 1835, p. 185.

Inhabits Himalaya.

(1502) *R. leucocephala* (Gould's *Century*. pl. 26, f. 2).

Syn. Phœnicura leucocephala, Vigors.
Sylvia erythrogastra, var. *a*, Latham.

Inhabits Himalaya.

Genus CALLIOPE, Gould.

(1503) *C. pectoralis*, Gould (*Icones Avium*). Inhabits Himalaya.

(1504) *C. camtschatkensis* (Lath. *Supp.*, pl. in frontispiece).

Syn. Sylvia camtschatkensis, Gmelin.
Motacilla calliope, Pallas.
Calliope Lathami, Gould.

Gangula, Nepal. Inhabits Asia. Common in Lower Bengal during the cold season; rare in C. India.

(1505) *C. cyana*.

Syn. Larvivora cyana, et L. brunnea (?), Hodgson, J. A. S. VI, 102.
Phœnicura superciliaris, Jerdon, Madr. Journ. XIII, 170.

Inhabits Himalaya chiefly: rare in Nilgiris: very rare and accidental in Lower Bengal during the seasons of passage.

Genus TARSIGER, Hodgson.

(1506) *T. chrysæus*, Hodgson, *Ann. Mag. N. H.* 1845, p. 198. Inhabits S. E. Himalaya.

Genus PRATINCOLA, Koch.

(1507) *Pr. caprata* (*Pl. Enl.* 235, f. 1. 2).

Syn. Motacilla caprata, L.
M. luctuosis, var. *A*, Latham.
M. sylvatica (?), Tickell, J. A. S. II, 575.
Saxicola fruticola, Horsfield.
S. bicolor et S. erythropygia, Sykes.

Pidah, or *Kala Pidah*, H.; *Lay khya*, Arakan; *Dechu*, Jav. Inhabits India generally (nec Lower Bengal); Arakan; Java.

(1508) *Pr. rubicola* (*Pl. Enl.* 678, f. 1).

Syn. Motacilla rubicola, L.

Inhabits Europe; N. Africa.

(1509) *Pr. indica*, Blyth J. A. S. XVI, 129.

Syn. P. rubicola of India, auctorum.

Inhabits India generally.

(1510) *Pr. leucura*, Blyth, J. A. S. XVI, 474. Inhabits Sindh.

(1511) *Pr. ferrea*, Hodgson, J. A. S. XVI, 129. Inhabits Himalaya generally.

Genus IANTHIA, Blyth.

(1512) *I. hyperythra*, Blyth, J. A. S. XVI, 132. Inhabits Sikim.

(1513) *I. rufilatus*, J. A. S. XVI, 132.

Syn. Nemura rufilatus, and the female—N. cyanura, Hodgson, P. Z. S. 1845, p. 27.
Erythaca Tytlerii (?), Jameson, Trans, Wern. Soc. (not described).
Motacilla cyanura (?), Pallas, the female.

Inhabits Himalaya generally; more numerous to the N. W.?

Genus ERYTHACA, (Antiq.) Cuv., G. R. Gray.

(1514) *E. flavolivacea*.

Syn. Ianthia flavolivacea, (Hodgson), J. A. S. XVI, 133. 774.
Nemura flavolivacea, Hodgson, P. Z. S. 1845, p. 27.

Inhabits Sikim.

(1515) *E. rubecula* (*Pl. Enl.* 361, f. 1).

Syn. Motacilla rubecula, L.

Inhabits Europe; W. Asia (Trebizond).

Genus ERYTHROSTERNA, Bonap.

(1516) *E. leucura* (vide J. A. S. XVI, 474).

Syn. Muscicapa leucura, Gmelin.
M. parva of India, auctorum.
Saxicola rubeculoides, Sykes.
Synornis joulainus, Hodgson, P. Z. S. 1845, p. 27.
White tailed Red breast, and the young—probably Maculate Flycatcher, Latham.

Turra, H. Inhabits India generally; rarer to the S.: extremely common in L. Bengal.

(1517) *E. acornaus*, (Hodgson).

Syn. Muscicapula acornaus of Nepal, J. A. S. XVI, 127.

Inhabits Himalaya.

(1518) *E. pusilla*, Blyth, J. A. S. XVIII.

Syn. Muscicapula acornaus of Central India, apud Blyth, J. A. S. XVI, 127.
Muscicapa poonensis apud Blyth, J. A. S. XI, 458.

Inhabits Central India.

Genus SIPHIA, Hodgson.

(1519) *S. strophiata*, Hodgson, *Ind. Rev.* 1837, p. 651. Inhabits Himalaya.

(1520) *S. superciliaris*.

Syn. Dimorpha superciliaris, Blyth, J. A. S. XI, 190 (altered to Muscicapula hyperythra, J. A. S. 885, and again by an oversight to M rubecula, J. A. S. XII, 940).
D. (?) rubrocyanea, Hodgson, P. Z. S. 1845, p. 26.

Inhabits S. E. Himalaya.

(1521) *S. (?) tricolor*.

Syn. Digenea tricolor, Hodgson, P. Z. S. 1845, p. 46; J. A. S. XVI, 126.

Inhabits Himalaya.

(1522) *S. (?) leucomelanura*.

Syn. Digenea leucomelanura, Hodgson, P. Z. S. 1845, p. 26; J. A. S. 1845, XVI, 126.

Inhabits S. E. Himalaya.

Genus ANTHIPES, Blyth.

(1523) *A. moniliger*.

Syn. Dimorpha? moniliger, Hodgson, P. Z. S. 1845, p. 26.
Niltava McGregoriæ, fœm (?), apud Hodgson, Ind. Rev. 1837, p. 650.
A. gularis, Blyth, J. A. S. XVI, 122.

Inhabits S. E. Himalaya; Arakan.

Genus MUSCICAPULA, Blyth.

(1524) *M. melanoleuca*, vide J. A. S. XVI, 137.

Syn. Muscicapa maculata apud Tickell, J. A. S. II, 574.

Inhabits S. E. Himalaya; C. India; Arakan; Tenasserim provinces; Java.

(1525) *M. superciliaris* (Jardine's *Contrib. Orn.* 1848, pl.).

Syn. Muscicapa superciliaris, Jerdon, Madr. Journ. XI, 16.
Dimorpha albogularis, Blyth, J. A. S. XI, 190.
Muscicapa hemileucura, Hodgson, G. R. Gray.
Lucknow Flycatcher and Azure Warbler, Latham.

Inhabits Himalaya chiefly; C. and S. India.

(1526) *M. sapphira* (Tickell) Blyth, J. A. S. XII, 939; XVI, 473. (Jerdon's *Ill. Ind. Orn.* pl. 32). Inhabits Sikim.

Genus CYORNIS, Blyth.

(1527) *C. unicolor*, Blyth, J. A. S. XII, 1067; XVI, 128. Inhabits Sikim.

(1528) *C. rubeculoides* (Gould's 'Century,' pl, 25).

Syn. Phœnicura rubeculoides, Vigors.
Niltava brevipes, Hodgson, Ind. Rev. 1837, p. 651.
Muscicapa rubecula, Swainson (the female).
Ætherial Warbler, Latham (and the female agrees with the supposed female of his Blue Indian Warbler).

Inhabits Himalaya; visiting the plains in the cold season, when not rare, in the vicinity of Calcutta: Arakan; Tenasserim.

(1529) *C. banyumas* (Horsfield's *Zool. Res. in Java*, pl.).

Syn. Muscicapa banyumas, Horsfield.
M. cantatrix, Temminck.

Inhabits Java: very rare in Nilgiris.

(1530) *C. elegans.*

Syn. Muscicapa elegans, Tem. (apud Strickland).
M. hyacintha apud Tickell, J. A. S. II, 574.
C. Tickelliæ, Blyth, J. A. S. XII, 941.
Blue Indian Warbler? Latham (vide J. A. S. XVI, 128).

Inhabits Central (and W?) India.

(1531) *C.* ? (Allied to *Muscicapa pallipes*, Jerdon) *Madr. Journ.* XI, 15. Inhabits Sikim.

Genus OCHROMELA, Blyth.

(1532) *Ochr. nigrorufa*. J. A. S. XVI, 129.

Syn. Saxicola nigrorufa, Jerdon, Madr. Journ. X, p. 266.
Muscicapa rufula, la Fresnaye.

Inhabits summit of Nilgiris.

Genus NILTAVA, Hodgson. (*Niltouw*, Nepal).

(1533) *N. grandis.*

Syn. Chaitaris grandis Blyth, J. A. S. XI, 189.
Bainopus irenoides, Hodgson, G. R. Gray.

Inhabits Sikim.

(1534) *N. sundara*, Hodgson, *Ind. Rev.* 1837, p. 650. Inhabits Himalaya; rare to the N. W.

(1535) *N. McGregoriæ.*

Syn. Phœnicura McGregoriæ, Burton, P. Z. S, 1835, f. 152.
N. fuligiventer, Hodgson, Ind. Rev. 1837, p. 650 (the male only).
Dimorpha auricularis, Hodgson, J. A. S XII, 240.
Leiothrix signata, McClelland, P. Z. S, 1839, p. 168. } The female.

Inhabits Himalaya; Assam.

Genus CYANOPTILA, Blyth.

(1536) *C. cyanomelanura*, J. A. S. XVI, 125 (*Pl. Col.*).

Syn. Muscicapa cynomelanura, Temminck.

Inhabits Java.

Genus STOPAROLA, Blyth.

(1537) *St. melanops* (Gould's 'Century,' pl. 6).

Syn. Muscicapa melanops, Vigors.
M. lapis, Lesson, Rev. Zool. &c. 1839, p. 104.
M. thalassina, Swainson (the female).
Verditer Flycatcher, Latham.

Nil Kutkutea, Beng. Inhabits India generally; visiting the plains in the cold season.

(1538) *St.*———? (Vide J. A. S. XVI, 125). Inhabits Java.

(1539) *St. indigo.*

Syn. Muscicapa indigo, Horsfield.

Inhabits Java.

(1540) *St. albicaudata*, Jerdon (*Ill. Ind. Orn.* pl. 14).

Syn. Muscicapa albicaudata, Jerdon, Madr. Journ, XI, 16.

Inhabits Nilgiris.

Genus MUSCICAPA, L.

Subgenus BUTALIS, Boie.

(1541) *B. terricolor*, Hodgson, J. A. S. XVI, 120. Inhabits Nepal.

Subgenus HEMICHELEDON, Hodgson.

(1542) *H. latirostris.*

Syn. Muscicapa latirostris, Raffles, Swainson, M. poonensis, Sykes.

Zukki, H. (Jerdon). Inhabits India generally; common in Ceylon; rare in L. Bengal: Malayan peninsula; Sumatra.

(1543) *H. fuliginosa*, Hodgson, P. Z. S. 1845, p. 31, J. A. S, XVI, 119. Inhabits Himalaya.

(1544) *H. ferruginea*, Hodgson, P. Z. S. 1845, p. 32. Inhabits S. E. Himalaya.

Genus ACANTHIZA, Vigors and Horsfield.

(1545) *A.*——*?* Inhabits Java?

BRACHYPTERYX series.

Genus SYLVANIA, Blyth.

(1546) *S. phœnicuroides*, J. A. S. XVI, 135.

Syn. Brachypterus phœnicuroides, Hodgson, Gray's Catal.

Inhabits Himalaya.

Genus CALLENE, Blyth.

(1547) *C. frontalis*, Blyth J. A. S. XII, 1010. pl.), *ibid.* XVI, 136. Inhabits Sikim.

Genus BRACHYPTERYX, Horsfield.

(1548) *Br. major.*

Syn. Phœnicura major, Jerdon, Madr. Journ. XIII, 170.

Inhabits Nilgiris.

(1549) *Br. montana*, Horsfield (*Zool. Res. in Java*, pl.). Inhabits Java.

(1550) *Br. cruralis.*

Syn. Calliope (?) cruralis, Blyth, J. A. S. XII, 933; XVI, 136.

Inhabits Sikim.

(1551) *Br.* (?) *nigrocapitata*, Eyton, P. Z. S. 1839, p. 137. Inhabits Malayan peninsula.

Genus TESIA, Hodgson.

(1552) *T. cyaniventer*, Hodgson, J. A. S. VI, 101.

Syn. T. auriceps, Hodgson, J. A. S. XVI, 137, 474.
Saxicola? olivea, McClelland, P. Z. S. 1839, 161.

Inhabits Nepal; Sikim; Assam.

(1553) *T. castaneo-coronata.*

Syn. Sylvia castaneo-coronata, Burton, P. Z. S. 1835, p. 152.
T. flaviventer, Hodgson, J. A. S. VI, 102.

Inhabits Himalaya.

Genus PNOEPYGA, Hodgson.

(1554) *Pn. squamata* (Gould's *Icones Avium*).

Syn. Microura squamata, Gould.
Tesia rufiventer, T. albiventer, and T. concolor, Hodgson (varieties of colouring.

Inhabits Nepal; Sikim.

(1555) *Pn. pusilla.*

Syn. T. pusilla, Hodgson, J. A. S. XIV, 588.
T. squamata, small variety?

Inhabits Nepal.

(1556) *Pn. caudata.*

Syn Tesia caudata, Blyth, J. A. S. XIV. 588.

Inhabits Sikim.

Genus ARUNDINAX, Blyth.

(1557) *A. olivaceus*, Blyth, J. A. S. XIV, 595.

Syn. Phragmaticola olivacea, Blyth, M. S. Jerdon, Madr. Journ. XIII, pt. II, p. 129.

Inhabits Bengal; Arakan; S. India.

Genus ACROCEPHALUS, Naum.

(1558) *Acr. brunnescens*, J. A. S. XV, 288.

Syn. Acrobates brunnescens, Jerdon, Madr. Journ. X, 269.
Acroceph. arundinaceus v. turdoides of India, auctorum.

Inhabits India generally; Arakan.

(1559) *Acr. montanus.*

Syn. Sylvia montana, Horsfield, Lin. Tr. XIII, 156.

Inhabits India generally; Java.

Genus LOCUSTELLA, (Ray) Gould.

(1560) *L. rubescens*, Blyth, J. A. S. XIV, 582. Inhabits Lower Bengal (in the cold season).

Genus PSEUDOLUSCINIA (?), Sasi.

(1561) *Ps. luteoventris.*

Syn. Tribura luteoventris, Hodgson, P. Z. S. 1845, p. 30; J. A. S. XVI, 583.

Inhabits Kachar region of Nepal.

Genus DUMETICOLA. Blyth.

(1562) *D. thoracica*, Blyth, J. A. S. XIV, 584.

Syn. Salicaria affinis, Hodgson, G. R. Gray.

Inhabits Nepal.

Genus PHYLLOPNEUSTE, Meyer.

(1563) *Ph. rama.*

Syn. Sylvia rama, Sykes, P. Z. S. 1832, p. 89; J. A. S. XVI, 440.

Inhabits India generally.

(1564) *Ph. indicus*, Blyth, J. A. S. XIV, 593. Inhabits Nepal; S. India; China (Chusan).

(1565) *Ph. occipitalis*, Jerdon, J. A. S. XIV, 593. Inhabits S. India.

Subgenus ABRORNIS, Hodgson.

(1566) *Abr. pulcher*, Hodgson J. A. S. XVI, 592. Inhabits Nepal; Sikim.

(1567) *Abr. cantator.*

Syn. Motacilla cantator, Tickell, J. A. S. II, 576; XVI, 440.
Culicipeta schisticeps, Hodgson, apud G. R. Gray.

Inhabits Nepal; C. India; rare in Lower Bengal.

(1568) *Abr. schisticeps*, Hodgson, J. A. S. XIV, 592.

Syn. Phyllopneuste xanthoschistos, Hodgson, G. R. Gray.

Inhabits Himalaya generally; Arakan.

(1569) *Abr. poliogenys*, Blyth, J. A. S. XVI, 441. Inhabits Sikim.

Subgenus CULICIPETA, Blyth.

(1570) *C. Burkii*, J. A. S. XII, 968.

Syn. Sylvia Burkii, Burton, P. Z. S. 1835, p. 153.
Cryptolopha auricapilla, Swainson, 2nd Centen.
Muscicapa bilineata, Lesson, Rev. Zool. par la Soc. Cuv. 1839, p. 104.

Inhabits India generally; rare to the south.

Subgenus REGULOIDES, Blyth.

(1571) *R. trochiloides*.

Syn. Acanthiza trochiloides, Sundevall.
Phyllopneuste reguloides, Blyth, J. A. S. XI, 191; XII, 963.

Inhabits Himalaya; migrating southward in cold season.

(1572) *R. modestus* (Gould's *B. E.* pl.) J. A. S. XIV, 963.

Syn. Regulus modestus, Gould.
R. inornatus, Blyth, J. A. S. XI, 19— (abraded plumage).
Phyllopneuste nitida, G. R. Gray.

Inhabits N. India, common in L. Bengal: very rare in Europe.

(1573) *R. chloronotus*, Hodgson, G. R. Gray. Inhabits Himalaya.

Subgenus PHYLLOSCOPUS, Boie.

(1574) *Ph. nitidus*, Blyth, J. A. S. XII, 965.

Syn. Muscicapa nitida (?) Latham, Franklin.
Sylvia hippolais apud Jerdon, Madr. Journ. XI, 6.
Hippolais Swainsoni, G. R. Gray.

Inhabits India generally; Ceylon.

(1575) *Ph. trochilus* (*Pl. Enl.* 651, f. 1).

Syn. Motacilla trochilus, L.

Inhabits Europe; N. Africa: W. Asia; W. India (apud Gould); Japan.

(1576) *Ph. tristis*, Blyth, A. J. S. XII, 966.

Syn. "Sylvia trochilus?" apud Jerdon, Madr. Journ. XI, 6.

Inhabits India generally.

(1577) *Ph. montanus*, Blyth, J. A. S. XVIII. Inhabits Himalaya.

(1578) *P. viridanus*, Blyth, J. A. S, XII. 967. Inhabits India generally; Arakan; very common in Lower Bengal.

(1579) *Ph. affinis*, J. A. S. XVI, 442.

Syn. Motacilla affinis, Tickell, J. A. S. II, 576.

Inhabits Bengal (common).

(1580) *Ph. lugubris*, Blyth, J. A. S. XII, 968. Inhabits India generally: common in Lower Bengal.

(1581) *Ph. javanicus?*

Syn. Sylvia javanica (?), Horsfield, Lin. Tr. XIII, 156.
Ph. magnirostris, Blyth, J. A. S. XII, 966.

Opior Opior, Java. Inhabits Nepal; Bengal; Arakan; Java?

(1582) *Ph. brunneus*, Blyth, J. A. S. XIV, 591 (described from a small specimen).

Syn. Ph. fuscatus, var., Blyth, J. A. S. XVI, 443-4.

Inhabits Bengal: common in Arakan.

(1583) *Ph. fuscatus*, Blyth, J. A. S. XI, 113; XII, 965. Inhabits Bengal; Arakan.

Genus REGULUS, (Antiq.) Cuvier.

(1584) *R. ignicapillus*, Temminck. Inhabits Europe and Asia N. W. Himalaya?

(1585) *R. cristatus*, Ray (*Pl. Enl.* 651, f. 3).

Syn. Motacilla regulus, L.
R. auricapillus, Selby.
R. flavicapillus, Naum.

Inhabits Europe and Asia: N. W. Himalaya.

Subfam. SYLVIANÆ (frugivorous Warblers).

Genus SYLVIA, Latham (*Phularia*, H., *i. e.* 'Flower pecker').

(1586) *S. Jerdoni*.

Syn. Curruca Jerdoni, Blyth, J. A. S. XVI, 439.
Philomela orphea apud Jerdon, Madr. Journ. X, 267.

Inhabits S. India.

(1587) *S. affinis*.

Syn. Curruca affinis, Blyth, J. A. S. XIV, note to p. 564.

Inhabits S. India; Ceylon.

(1588) *S. curruca* (*Pl. Enl.* 380, f. 3).

Syn. Motacilla curruca, M. sylviella, et M. dumetorum, Gmelin.
Curruca garrula, Brisson.

Inhabits Europe; Asia; Africa: India generally (nec Lower Bengal below the tideway).

Fam. CERTHIADÆ.

Subfam. CERTHINÆ.

Genus CERTHIA, L.

(1589) *C. nipalensis*, Hodgson (Blyth, *Mon. Indian Certhiadæ*).

Syn. C. himalayana apud Blyth, J. A. S. XIV, 581.

Inhabits Nepal.

(1590) *C. discolor*, Blyth, J. A. S. XIV, 580. Inhabits Sikim.

(1591) *C. himalayana*, Vigors, P. Z. S. 1831, p. 174.

Syn. C. asiatica, Swainson, 2½ Cent.

Inhabits Deyra Doon.

Subfam. SITTINÆ.

Genus TICHODROMA, Illiger.

(1592) *T. muraria* (*Pl. Enl.* 372.)

Syn. Certhia muraria, L.
T. phœnicoptera, Temminck.
T. europæa, Stephens.

Inhabits S. Europe; W. Asia; Afghanistan; Himalaya.

Genus SITTA, L.

(1593) *S. formosa*, Blyth (J. A. S. XII, 938, 1007). Inhabits Sikim.

(1594) *S. cinnamoventris*, Blyth, J. A. S. XI, 459. Inhabits Himalaya.

(1595) *S. castaneoventris*, Franklin (J. and S., *Ill. Orn.*, 1st series, pl. 165). Inhabits Hill regions of India.

(1596) *S. himalayana*, Jardine and Selby (*Ill. Orn.* 1st series, pl. 164).

Syn. S. nipalensis, Hodgson, J. A. S. V, 779.

Subgenus DENDROPHILA, Swainson.

(1597) *D. frontalis* (Swainson's *Zool. Ill.*, 1st series, pl. 2).

Syn. Sitta frontalis, Horsfield.
S. velata, Temminck.
S. corallina, Hodgson, J. A. S. V, 779.

Inhabits India, Burmah, and Malay countries.

Fam. GRAUCALIDÆ.

Genus GRAUCALUS, Cuvier.

(1598) *Gr. Macei*, Lesson.

Syn. Gr. papuensis of India, auctorum.
Gr. nipalensis, Hodgson, Ind. Rev. 1837, p. 327.
Ceblepyris javensis (?), Horsfield, vide J. A. S. XV, 306.

Kepodang-sungu, Jav. Inhabits India generally; Ceylon; Arakan; Tenasserim.

Genus CAMPEPHAGA, Vieillot.

(1599) *C. fimbriata* apud Strickland (*Pl. C.* 247, 250).

Syn. Ceblepyris fimbriatus, Temminck.
Lanius silens, Tickell, J. A. S. II, 573.
Volvocivora melaschistos, Hodgson, Ind. Rev. 1837, 328.
Graucalus maculosus, McClelland, P. Z. S. 1839, p. 159.
Ceblepyris lugubris, Sundevall.
Blue-grey Thrush, Latham.

Inhabits India generally; commoner to the N., and breeding in the Himalaya: Java?

(1600) *C. melanoptera*, Blyth, J. A. S. XV, 307. Inhabits Arakan, where common.

(1601) *C. Sykesi*, Strickland, *Ann. Mag. N. H.* 1844, p. 36.

Syn. Ceblepyris fimbriatus apud Jerdon, Catal.
C. canus, Sykes,—the young?
Eastern Thrush, Latham.

Inhabits India generally; Ceylon: nec Himalaya.

(1602) *C. cærulescens*.

Syn. Ceblepyris cærulescens, Blyth, J. A. S. XI, 463; XV, 308.

Inhabits Luçon.

Genus LALAGE, Boie.

(1603) *L. orientalis* (*Pl. Enl.* 273, f. 2).

Syn. Lanius orientalis, Gmelin.
Turdus striga, Raffles.
Sylvia leucophæa, Vieillot nec Latham.

Kras, Malay; *Lenjettan*, Jav. Inhabits Malayan peninsula and Archipelago.

Fam. — —?

Genus PERICROCOTUS, Boie.

(1604) *P. speciosus* (Gould's Century, pl. 7).

Syn. Turdus speciosus, Latham.
Muscipeta princeps, Vigors and Gould.

Nget-meng-thu, i. e. 'Prince bird,' Arakan. Inhabits Himalaya; C. India: rare in S. India and in L. Bengal: Assam, Sylhet, Arakan, Tenasserim, Malayan peninsula (Penang).

(1605) *P. flammeus* (Swainson's *Zool. Ill.* 2nd series, pl. 52; Jerdon's *Ill. Ind. Orn.* pl. 11).

Syn. Muscicapa flammea, Forster, Pennant's Ind. Zool.
M. subflava, Vieillot.
Phœnicornis elegans, McClelland, P. Z. S. 1839, p. 156.
August Flycatcher, Latham (but the preceding species also referred to).

Phari Bulal Chasa, H. (Jerdon); Inhabits S. India: Ceylon. Assam? (vide J. A. S. XV, 309).

(1606) *P. brevirostris* (Gould's 'Century,' pl. 8).

Syn. Muscipeta brevirostris, Vigors and Gould.
Phœnicornis miniatus apud Swainson, Class. Birds.

Inhabits Himalaya; Assam; Sylhet; Arakan: rare in C. and S. India.

(1607) *P. igneus*, Blyth, J. A. S. XV, 309.

Syn. Malayan P. flammeus, Auctorum.

Uwis, or *Semuttan*, Java. Inhabits Malay countries.

(1608) *P. solaris*, Blyth, J. A. S. XV, 310. Inhabits Sikim.

(1609) *P. roseus.*

Syn. Muscicapa rosea, Vieillot.
Phœnicornis affinis, McClelland, P. Z. S. 1839, p. 157.

Nget-meng-tha-mee (*i.e.* 'Princess-bird'), Arakan. Inhabits India generally; Arakan.

(1610) *P. peregrinus* (Gould's 'Century.' pl. 9).

Syn. Parus peregrinus et Motacilla cinnamomea, L.
P. coccineus et malabaricus, Gmelin.

Bulal Chusm, H. (Jerdon). Inhabits India generally; Ceylon; Arakan.

(1611) *P.* (?) *erythropygius* (Latham's *Gen. Hist.* Vol. VI, p. 178, pl. 98); Jardine's *Contrib. Orn.*, pl. 1).

Syn. Muscicapa erythropygia, Jerdon, Madr. Journ. XI, 17.
Turdus speciosus, var. β. and Cawnpore Flycatcher, Latham.

Inhabits Hindustan (nec L. Bengal).

Fam. AMPELIDÆ.

Genus COCHOA, Hodgson (*Cocho*, Nepal).

(1612) *C. purpurea*, Hodgson, J. A. S. V, 359 (J. A. S. No. 139, pl.). Inhabits Nepal; Sikim.

Fam. PITTIDÆ.

Subfam. EURYLAIMINÆ.

Genus EURYLAIMUS, Horsfield.

Subgenus CORYDON, Lesson.

(1613) *C. sumatranus* (*Pl. Col.* 297).

Syn. Eurylaimus sumatranus, Raffles.
Eu. corydon, Temminck.
Eu. Temminckii, Lesson.
Eurylaimus? Hay, J. A. S. X, 575.

Kungquait, Malay. Inhabits Tenasserim provinces; Malayan peninsula; Sumatra.

Subgenus EURYLAIMUS.

(1614) *Eu. javanicus*, Horsfield, (*Pl. Col.* 130, 131; *Zool. Res. in Java*, pl.)

Syn. Eu. Horsfieldi, Temminck.
Tamplana Lilin, Malay.

Inhabits Arakan; Tenasserim; Malayan peninsula and Archipelago.

(1615) *Eu. ochromalus*, Raffles (*Pl. Col.* 261).

Syn. Eu. cucullatus, Temminck.
Tamplana Qilin, Malay.

Inhabits Tenasserim provinces; Malayan peninsula and Archipelago.

(1616) *C. nasutus* (*Pl. Col.* 154).

Syn. Todus nasutus, Latham.
T. macrorhynchus, Gmelin.

Ujun and *Tudak Whogan*, Malay; *Palano*, or *Tampalano*, Sum. Inhabits Tenasserim provinces; Malayan peninsula and Archipelago.

(1617) *C. affinis*, Blyth, J. A. S. XV, 312. Inhabits Arakan.

Subgenus PSARISOMUS, Swainson.

(1618) *Ps. Dalhousiæ* (Gould's *Icones Avium*; Royle's *Ill. Him. Bot.* pl. 7).

Syn. Eurylaimus Dalhousiæ, Jameson.
Eu. psittacinus, Muller.
Raya sericeogula, Hodgson, J. A. S. VIII, 36.

Inhabits Himalaya; Assam; Sylhet; Arakan.

Subgenus SERILOPHUS, Swainson.

(1619) *S. lunatus* (*Trans. Zool. Soc.*, pl. 25).

Syn. Eurylaimus lunatus, Gould.
S. lunulatus, Swainson.

Inhabits Tenasserim provinces.

(1620) *S. rubropygia*, J. A. S. XV, 311.

Syn. Raya rubropygia, Hodgson, J. A. S. VIII, 36.
Eu. lunatus apud Horsfield, P. Z. S. 1839, p. 156.

Inhabits S. E. Himalaya; Assam; Sylhet; Arakan.

Subfam. PIPRINÆ.

Genus CALYPTOMENA, Raffles.

(1621) *C. viridis*, Raffles. (*Pl. Col.* 316; Horsfield's *Zool. Res. in Java*, pl.)

Syn. C. Rafflesii et C. caudacuta (the young), Swainson.

Sehoo, *Pachat*, *Sampo Penang*, Malay. Inhabits Malayan peninsula; Sumatra.

Fam. HIRUNDINIDÆ.

Genus HIRUNDO, L.

Chatok, H.; *Mo-tswai-nghet*, or *Pgan-hlwa*, Arakan; *Layang Layang*, Malay.

(1622) *H. filifera*, Stephens.

Syn. H. ruficeps (?), Lichtenstein.
H. filicaudata, Franklin, P. Z. S. 1831, p. 115.
H. indica et H. erythrocephala (?), Gmelin.

Inhabits C. India chiefly; rare in S. India; Deyra Doon; Katak.

(1623) *H. rustica*, L. (*Pl. Enl.* 543, f. 1).

Syn. H. gutturalis, Scopoli.
H. javanica, Sparrman.
H. panayana, Latham.
H. jewan, Sykes, P. Z. S. 1832, p. 83.

Inhabits Europe, Asia, and Africa; visiting India during the cold seasoa.

(1624) *H. domicola*, Jerdon, *Madr. Journ.* XIII, 173.

Syn. H. javanica apud Latham and Shaw.
Bungalow Swallow of residents in the Nilgiris.

Inhabits Malay countries; Nilgiris.

(1625) *H. daurica*, L.

Syn. H. alpestris, Pallas.
H. erythropygia, Sykes, P. Z. S. 1832, p. 83.
H. nipalensis, Hodgson, J. A. S. V, 780.

Inhabits E. Asia: common during the winter months in India, China, and Malasia.

(1626) *H. hyperythra*, Blyth, J. A. S. XVIII; *Mon. Ind. Hirundinidæ*. Inhabits Ceylon (resident).

(1627) *H. urbica*, L. (*Pl. Enl.* 542, f. 2). Inhabits Europe; N. Africa; rare in India.

(1628) *H. rupestris*, Scopoli (Gould's *B. E.* pl. 56).

Syn. H. montana, Gmelin.
H. rupicola, Hodgson, J. A. S. V, 781.
H. inornata, Jerdon, Madr. Journ. XIII, 173.

Inhabits S. Europe; N. Africa; W. Asia; Himalaya; Nilgiris.

1629. *H. concolor*, Sykes, P. Z. S. 1832, p. 83. Inhabits C. India.

1630) *H. riparia*, L. (*Pl. Enl.* 543, f. 2). Inhabits Northern regions; Africa; N. India (banks of Sutlej); C. India (rare).

(1631) *H. sinensis*, Hardwicke's *Ill. Ind. Zool.*,

Syn. H. brevicaudata, McClelland, P. Z. S. 1839, p. 156.

Inhabits river banks of all India; Burmah, and China (?).

Fam. ARTAMIDÆ.

Genus ARTAMUS, Vieillot.

(1632) *A. fuscus*, Vieillot (*Mem. Mus.* Tom. VI, fig.).

Syn. Oecypterus rufiventer, Valenciennes.
A. leucorhynchos, (L.) apud McClelland P. Z. S. 1839, p. 158, et Jerdon, Catal.
Murasiny Chatterer and Brown-coloured Swallow, var. A. Latham.

Tal-chatok Beng. Inhabits India generally; Assam; Arakan.

Fam. DICRURIDÆ.

Genus DICRURUS, Vieillot (*Chibya*, Nepal; *Chayon* or *Chagon*, Malay).

Subgenus CHIBIA, Hodgson.

(1633) *Ch. hottentota*.

Syn. Corvus hottentotus, L.
Edolius barbatus, Gray.
E. crishna, Gould, P. Z. S. 1836, p. 5.
Criniger splendens, Tickell, J. A. S. II, 514.
Chibia casia, Hodgson, Ind. Rev. 1837, p. 324.
Krishna Crow, Latham.

Kesh-raj, B.; *Kesya*, Nepal. Inhabits Bengal; Nepal; Assam; C India; rare in the peninsula of India (vide *Madr. Journ.* XIII, pt. 2. 121.

Subgenus CHAPTIA, Hodgson.

(1634) *Ch. ænea* (Vaill. *Ois. d' Afr.* 176).

Syn. Dicrurus æneus, Vieillot.
D. æratus, Stephens.
Ch. muscipetoides, Hodgson, Ind. Rev. 1837, p. 327.

Butchanga, Beng.; *Chaptya* (i. e. 'flat-billed'), Nepal. Inhabits Nepal; Bengal: Assam.

(1635) *Ch. malayensis*, A. Hay, J. A. S. XV, 294. Inhabits Malayan peninsula.

Subgenus BHRINGA, Hodgson.

(1636) *Bh. remifer*, (*Pl. Col.* 178).

Syn. Edolius remifer, Temminck.
E. rangonensis apud Horsfield, P. Z. S. 1839, p. 325.
Bh. tectirostris, Hodgson, Ind. Rev. 1837, p. 325.

Nghet-dan; Arakan. Inhabits Himalaya; Assam.

Subgenus EDOLIUS, Cuvier.

(1637) *E. paradiseus*.

Syn. Cuculus paradiseus, L.

Bherm or *Bhring raj*, H.; *Kate-ongal*, Mahr.; *Kalgia*, Nepal; *Nghet-dan*, Arakan; *Barong Saweh*, and *Chawi*, Malayan. Inhabits India and Malasia.

Var. A. Syn. Chibia malabaroides, Hodgson, Ind. Rev. 1837, p. 325.
Lanius malabaricus as figured by Latham and Shaw (but not L. malabaricus as described by Latham from Sonnerat).
E. grandis apud Blyth, J. A. S. XI, 170; Ann. Mag. N. H. XIV, 46.

Inhabits Nepal; Tippera; Tenasserim provinces.

Var. B. Syn. E, grandis, Gould, P. Z. S. 1836, p. 5.
E. dentirostris and E. orissæ (?), Jerdon, Madr. Journ. XIII, pt. 2, p. 121.
Dicrurus platurus, Vieillot, apud G. R. Gray.

Inhabits India; Bengal Sundarbuns; Assam; Arakan; Tenasserim provinces.

Var. C. Syn. Cuculus paradiseus, L.
E. rangonensis, Gould, P. Z. S. 1836, p. 5.
E. intermedius, Lesson, apud G. R. Gray.
E. cristatellus, Blyth, J. A. S. XI, 171.

Inhabits Malay countries.

Subgenus DICRURUS, Vieillot.

(1638) *D. edoliformis*, Blyth, J. A. S. XV, 297. Inhabits Ceylon.

(1639) *D. viridescens*, Gould (vide J. A. S. XI, 173, and 802, figs. 10 and 11). Inhabits Burmah.

(1640) *D. balicassius* (*Pl. Enl.* 603).

Syn. Corvus balicassius, L.
Oriolus furcatus, Gmelin.
Bhuchanga annectans, Hodgson, Ind. Rev. 1837, p. 326.
Dicrurus affinis, Blyth, J. A. S. XI, 147.
Corvus afer, Licht., and
C. assimilis, Bechstein, apud G. R. Gray.

Inhabits Malay countries; Nepal.

(1641) *D. macrocercus*, Vieillot (*As. Res.* XVIII, pt. 2. pl.).

Syn. Muscicapa biloba, Lichtenstein.
D. indicus, Stephens, Hodgson.
Bhuchanga albirictus, Hodgson, Ind. Rev. 1837, p. 326.
Edolius forficatus, Horsfield, in Lin. Tr. XIII, 144 (apud Strickland).
E. longus, Vaill., apud Horsfield.

Finga, Beng.; *Kalsa*, or *Bajunga*, sometimes also *Kotical*, H. (Jerdon); *Gyga-mgee-tshwai*, Arakan; *Sri Ganting*, Jav. Inhabits India generally; Arakan; Java?

(1642) *D. longicaudatus*, A. Hay described in *Ann. Mag. N. H.* 1844, p. 461; Jerdon, *Madr. Journ.* XIII, pt. 2, p. 121; J. A. S. XV, 298.

Syn. D. macrocercus apud Jerdon, Catal.
D. cinereaceus apud Gray, Hodg. Catal.

Nil Finga, and *Dhouh*, Beng. Inhabits India generally; Ceylon.

(1643) *D. interedius*, Blyth, J. A. S. XV, 298. Inhabits Tenasserim provinces; Penang.

(1644) *D. caerulescens* (Edwards, pl. 56), vide *Ann. Mag. N. H.* 1844, p. 47.

Syn. Lanius caerulescens, L.
L. fingah, Shaw.

Phari Bajunga H. (Jerdon). Inhabits India generally; not common in L. Bengal.

(1645) *D. leucopygialis*, Blyth, J. A. S. XV, 298. Inhabits Ceylon.

(1646) *D. cinereaceus*.

Syn. Edolius cinereaceus, Horsfield, Lin. Tr. XIII, 145.
D. leucopæus (?), Vieillot.
D. ceylonensis (?), Stephens.

Chenta, Jav. Inhabits Malay countries.

Fam. TCHITREADÆ.

Genus TCHITREA, Lesson.

(1647) *Tch. paradisi* (Vaill., *Ois. d' Afr.*, pl. 44, 45, 46; Jerdon's *Ill. Ind. Orn.* pl. 7).

Syn. Muscicapa paradisi, L.
M. indica, Stephens. } the rufous
M. castanea, Temminck. } plumage.
M. mutata of India, Latham.
Muscipeta leucogaster, Swainson, Nat. Libr., Muscicapidæ.

Shah Bulbul, and *Hosseini Bulbul*, H.; *Kaddehoora*, Cingh; (the white bird;) and *Sultana Bulbul*, H.; *Ginihoora*, Cingh.; (the chesnut bird;) *Tonka Peegeelee-pitta* (*i. e.* 'long-tailed Bulbul'), Telugu; *Walkordalatee*, Tamul. Inhabits India generally; Bengal; Deyra Doon.

(1648) *Tch. affinis*, A. Hay, J. A. S. XV, 292; XVII, 1179.

Syn. Malayan Tch. paradisi, Auctorum.
M. castanea (?), Temminck.

Ahtap, and *Mira Jabone*, Malayan. Inhabits Malay countries; Tenasserim; Arakan; Sikim; Nepal?

(1649) *Tch. atrocaudata* (?), Eyton, vide J. A. S. XV, 298.

Syn. Muscipeta atriceps, Blyth, J. A. S. XI, 203, 790.

Inhabits Malayan peninsula.

Genus MYIAGRA, Swainson.

(1650) *M. caerulea* (Vaill. *Ois. d'Afr.*, 158).

Syn. Muscicapa caerulea, Vieillot.
M. occipitalis, Vigors.
M. caeruleocephala, Sykes (the female).
Azure-headed Flycatcher, Latham.

Kala-mata Kutkutia, B. Inhabits India generally; Burmese and Malay countries; Philippines.

Genus PHILENTOMA, Eyton.

(1651) *Ph. velatum* (*Pl. Col.*).

Syn. Muscicapa velata, Temminck.
M. pectoralis, A. Hay, Madr. Journ. XIII, pt. 2. p. 161, Strickland, Ann. Mag. N. H. XIX, (1847), p. 131.

Inhabits Malayan peninsula and Archipelago.

(1652) *Ph. pyrrhopteron* (*Pl. Col.* 596, f. 2).

Syn. Muscicapa pyrrhoptera, Temminck.
Muscipeta plumosa, Blyth J. A. S. XI, 79.
Ph. castaneum, Eyton, Ann. M. N. H. XVI, (1845), p. 229

Inhabits Malayan peninsula and Archipelago.

Genus CRYPTOLOPHA, Swainson.

(1653) *Cr. cinereocapilla* (Swainson's *Zool. Ill.* pl. 13; *Nat. Libr.* Vol. on Flycatchers, pl. 23).

Syn. Muscicapa cinereocapilla, Vieillot.
Platyrhynchus ceylonensis et
Cr. poiocephala, Swainson.
Muscicapa nitida, var. A, Latham.

Inhabits India generally; Assam; Arakan; Tenasserim.

Genus RHIPIDURA, Vigors and Horsfield.

(1654) ***Rh. hypoxantha***, Blyth, J. A. S. XII, 935.

Syn. Chelidorhynx chrysoschistos, Hodgson, P. Z. S. 1845, p. 32.

Inhabits Nepal; Sikim.

Genus LEUCOCERCA, Swainson.

(1655) *L. fuscoventris*, Franklin, P. Z. S. 1831, p. 117.

Syn. Muscicapa sannio, Sundevall.
M. (Muscylva) albogularis (?), Lesson, the young?
Broad-tailed Flycatcher, Latham.

Chok Doyal, Beng. Inhabits L. Bengal; C. India.

(1656) *L. albofrontata* (Jerdon's *Ill. Ind. Orn.* pl. 2). *Rhipidura albofrontata*, Franklin, P. Z. S. 1831, p. 117. Inhabits India generally (nec alluvium of L. Bengal.)

(1657) *L. pectoralis*, Jerdon. J. A. S. XII, 953; Jerdon's *Ill. Ind. Orn.*, Art. *Rh. albofrontata*. Inhabits Nilgiris.

(1658) *L. javanica*.

Syn. Muscicapa javanica, Sparrman.
Platyrhynchus perspicillatus, Vieillot.

Murai-Kandang, Sum.; *Sikattan*, Jav. Inhabits Malay countries.

Fam. PYCNONOTIDÆ.

Genus HYPSIPETES, Vigors. (*Bulbul*, H.: *Boot Boot*, Arakan).

(1659) *H. olivacea*, Jardine and Selby, *Ill. Orn.* 2nd series (figured erroneously as *H. ganeesa*, Sykes, in 1st series, pl. 168).

Syn. Ixocincla olivacea, Bl., described J. A. S. XIV, 575.

Inhabits Mauritius.

(1660) *H. psaroides*, Vigors (Gould's 'Century,' pl. 10). *Ban Bukra* ('Jungle Goat,' from voice), Masuri (Hutton). Inhabits Himalaya; Assam; Arakan.

(1661) *H. nilgiriensis*, Jerdon, *Madr. Journ.* X, 245. Inhabits Nilgiris; Ceylon.

(1662) *H. concolor*, Blyth, J. A. S. XVIII, Inhabits Tenasserim provinces.

(1663) *H. McClellandii*, Horsfield, P. Z. S. 1839, p. 159. Inhabits Himalaya; Assam; Arakan.

(1664) *H. malaccensis*, Blyth, J. A. S. XIV, 574. *Chtap*, Malay. Inhabits Malayan peninsula.

(1665) *H. virescens*, Blyth, J. A. S. XV, 51.

Syn. Ixocincla virescens, Blyth, J. A. S. XIV, 579.

Inhabits Nicobars.

Genus IOLE, Blyth.

(1666) *I. olivacea*, Blyth, J. A. S. XIII, 386; XIV, 573. Inhabits Malay countries.

(1667) *I. virescens*, Blyth, J. A. S. XIV, 573. Inhabits Arakan.

Genus HEMIXOS, Hodgson.

(1668) H. *flavala*, Hodgson, J. A. S. XIV. 572. Inhabits Himalaya; Assam; Arakan; Tenasserim.

(1669) *H. icterica*.

Syn. Criniger? ictericus, Strickland, An. Mag. N. H. 1844, p. 411.
Turdus indicus (?), Gmelin, apud Jerdon.

Inhabits S. India; Ceylon.

Genus CRINIGER, Temminck.

(1670) *Cr. striatus*.

Syn. Trichophorus striatus, Blyth J. A. S. XI, 184.
Alcurus striatus, Hodgson, J. A. S. XII, 985.

Inhabits Himalaya.

(1671) *Cr. flaveolus*.

Syn. Trichophorus flaveolus, Gould, P. Z. S. 1836, p. 6.

Inhabits Himalaya; Arakan.

(1672) *Cr. gularis*.

Syn. Turdus gularis, Horsfield, Lin. Tr. XIII, 150.
Ixos phaiocephalus, Hartlaub.
Trichophorus caniceps, Lafresnaye.
Pycnonotus rufocaudatus, Eyton, Ann. Mag. N. H. 1845, p. 228.

Marba-rimba, Malay; *Bres*, Jav. Inhabits Malay countries.

(1673) *Cr. ochrocephalus*.

Syn. Turdus ochrocephalus, Gmelin.
Trichophorus crispiceps, Blyth, J. A. S. XI, 204.

Baron Baron (same as No. 883), Malay; *Chuchakrawa*, Jav. Inhabits Malay countries.

Genus PYCNONOTUS, Kuhl.

(1674) *P. jocosus*.

Syn. Lanius jocosus, L.
L. emeria, Shaw.
Gracula cristata, Scopoli.
Sitta chinensis, Osbeck, apud G. R. Gray.

Karra Bulbul, *Sepayi Bulbul*, Beng. Inhabits India generally; Arakan; variety (?) in the Tenasserim provinces and Penang.

(1675) *P. bengalensis*, Blyth, J. A. S. XVI, 567.

Syn. P. cafer of India, Auctorum.

Kala Bulbul, Beng. Inhabits Sub-Himalayan region; Assam; Bengal; Mednapur District.

(1676) *P. hæmorrhous*.

Syn. Turdus hæmorrhous, Gmelin.
Hæmatornis pusillus et pseudocafer, Blyth, J. A. S. X, 841.
H. cafer apud Jerdon, Catal.

Inhabits Hindustan generally; S. India; Ceylon; Arakan.

(1677) *P. nigropileus*, Blyth, J. A. S. XVI, 472. Inhabits Tenasserim provinces.

(1678) *P. leucotis*.

Syn. Ixos leucotis, Gould, P. Z. S. 1836, p. 6.

Bhooroo, Sindh. Inhabits Sindh.

(1679) *P. leucogenys*, (Hardw. *Ill. Ind. Zool.*)

Syn. Brachypus leucogenys, Gray.
Ixos plumigerus, Lafresnaye.
Hæmatornis cristatus, Burn.

Inhabits Himalaya; Kashmir.

(1680) *P. xantholaimus* Jerdon (*Ill. Ind. Orn.* pl. 35), J. A. S. XIV, 568. Inhabits E. Ghats of peninsular India.

(1681) *P. goiavier* (Sonn. *Voy.* t. 28.)

Syn. Muscicapa goiavier, Scopoli.
M. psidii, Gmelin.
Turdus analis, Horsfield.

Beribba, Malay; *Chuchack*, Jav. Inhabits Malay countries.

(1682) *P. flavescens*, Blyth, J. A. S. XIV, 568. Inhabits Arakan.

(1683) *P. flavirictus*, Strickland, *Ann. Mag. N. H.* 1844, p. 413.

Syn. Trichophorus virescens, Tem., apud Jerdon. Catal.
Ixos virescens, Tem., apud Tickell, J. A. S. II, 571.
Criniger Tickelli, Blyth, J. A. S. XIV, 571.

Inhabits Peninsula of India; Ceylon; Mednapur jungles, and W. border of the Gangetic delta.

(1684) *P. plumosus*, Blyth, J. A. S. XIV, 567. Inhabits Malayan peninsula.

(1685) *P. brunneus*, Blyth, J. A. S. XIV, 568. *Merlia*, Malay. Inhabits Malayan peninsula.

(1686) *P. Finlaysoni*, Strickland, *Ann. Mag.* N. H. 1844, p. 411. Inhabits Burmese countries. Common in Arakan, Tenasserim, &c.

(1687) *P. sinensis* (Eydoux and Gervais, *Voy. de la Favorite*, pl 14).

Syn. Muscicapa sinensis, Gmelin.
Turdus occipitalis, Temminck.

Inhabits China; Philippines.

(1688) *P. melanocephalus* (Hardw. *Ill. Ind. Zool*).

Syn. Brachypus melanocephalus, Gray.
Br. plumifer (?), Gould, P. Z. S. 1837, p. 137.
Vanga flaviventris, Tickell, J. A. S. II, 537.

Inhabits Himalaya; C. India; Asám, Sylhet, Tippera, Arakan, Tenasserim provinces.

(1689) *P. atricapillus* (Levaillant, *Ois. d' Afr.*, pl. 140; much too dully coloured).

Syn. Ægithina atricapilla, Vieillot—nec P. atricapillus, (Vieillot), apud Lord A. Hay, described J. A. S. XIV, 569.
Rubigula aberrans, Blyth, J. A. S. XV, 287; XVI, 472.

Inhabits Ceylon.

(1690) *P. gularis* (Jerdon's *Ill. Ind. Orn.*, pl. 37).

Syn. Brachypus gularis, Gould, P. Z. S. 1835, p. 186.
Br. rubineus, Jerdon, Madr. Journ. X, 246.

Inhabits S. India.

(1691) *P.* (?) *cyaniventris*, Blyth, J. A. S. XI, 792.

Syn. Ixodia (afterwards changed to Ixidia) cyaniventris, Blyth, J. A. S. XIV, 578.
Malacopteron aureum, Eyton, Ann. Mag. N. H. 1845, p. 228.
Turdus No. 6, Raffles, Lin. Tr. XIII, 311.

Inhabits Malayan peninsula; Sumatra.

Genus MICROTORSUS, Eyton (*Macrocelis* ? Swainson).

(1692) *M. melanoleucos*, Eyton, P. Z. S. 139, p. 102.

Syn. Brachypodius tristis, Blyth, J. A. S. XIV, 576,—the young.

Labau, and *Mirba Tando*, Malay. Inhabits Malayan peninsula.

Genus BRACHYPODIUS, Blyth.

(1693) *Br. cinereoventris*, Blyth, J. A. S. XIV, 576. Inhabits Tippera.

(1694) *Br. poiocephalus*, Jerdon (*Ill. Ind. Orn.* pl. 31)); *Madr. Journ.* X, 246. Inhabits S. India.

Genus SETORNIS (?), Lesson.

(1695) *S.* (?) *criniger*.

Syn. Brachypus (?) criniger, A. Hay, J. A. S. XIV, 577.

Inhabits Malayan peninsula.

Subfam. PHYLLORNINÆ.

Genus PHYLLORNIS, Boie (*Hariwa*, Beng.)

(1696) *Ph. Hardwickii* (Ad. Delessert, *Voy. dans. l'Inde*, pt. 2, pl. 7).

Syn. Chloropsis Hardwickii, Jardine and Selby, Monag.
Chl. curvirostris, Swainson, 2½ Centen. .
Chl. cyanopterus, Hodgson.
Chl. chrysogaster, McClelland, P. Z. S. 1839, p. 167.
Chl. auriventris, Guérin.

Boing-dan-thay, Arakan. Inhabits Himalaya; Assam; Sylhet; Arakan.

(1697) *Ph. aurifrons* (Jardine and Selby, *Orn. Ill.* pl. 5).

Syn. Chloropsis aurifrons, Jardine and Selby, Monog.
Chl. malabaricus, ibid. (tab. cit.)

Subz Harica, Nepal; *Nget-tsin*, Arakan. Inhabits S. India; Himalaya; Assam; Sylhet; Arakan.

(1698) *Ph. malabaricus*.

Syn. Turdus malabaricus, Gmelin, No. 125.
Chloropsis aurifrons apud Jerdon, Catal.

Inhabits Indian peninsula; Ceylon?

(1699) *Ph. Jerdoni*, Blyth, J. A. S. XIV, 566 Jerdon's *Ill. Ind. Orn.* pl. 43).

Syn. Chloropsis gamsorhynchus (mispelt cæsmarhynchos, v. casmarhynchus apud Gray, Griffith's Transl. An. Kingd. VI, 391), apud Tickell, J. A. S. II, 577.
Chl. cochinchinensis apud Jerdon, Catal.
Blue chinned Thrush, Latham.

(1700) *Ph. cochinchinensis* (*Pl. Cl.* 414, f. 2, apud Strickland).

Syn. Turdus cochinchinensis, Lath., Gm., the adult; and
T. malabaricus apud Latham—the young.
Chloropsis malabaricus apud Eyton, P. Z. S. 1836, p. 102; and Blyth, J. A. S. XII, 967, (nec form).
Philemon nigricollis (?), Vieillot.
Meliphaga javensis, Horsfield.
Phyllornis moluccensis, Gray.

Nget-tsin (same as No. 1283), Arakan; *Chuchakija*, Jav. Inhabits Burmese and Malay countries generally; Arakan.

(1701) *Ph. Sonneratii* (Jardine and Selby, *Orn. Ill.* pl. 100).

Syn. Chloropsis Sonneratii, Jardine and Selby.
Phyllornis Mulleri, Temminck.
Chl. gampsorhynchus, Jardine and Selby. } young.
Chl. zosterops, Vigors. } young.
Turdus viridis, Horsfield. } young.

Daon, or *Dawoan*, Malay. Inhabits Malay countries generally.

(1702) *Ph. cyanopogon*, Temminck, (*Pl. Col.* 512, f. 1).

Syn. Chloropsis mysticalis, Swainson, 2¼ Centen.; the young; described as that of and was referred erroneously to Ph. malabaricus, J. A. S. XII, 957.

Inhabits Malay countries generally.

Genus IORA, Horsfield.

(1703) *I. innotata*, Blyth, J. A. S. XVI, 472. Inhabits Arakan.

(1704) *I. zeylanica* (Brown's *Ill.*; pl. 15, 32; Lev. *Ois. d' Afr.*, pl. 141).

Syn. Motacilla zeylanica, cingalensis, et melanitera, Gmelin.
Fringilla multicolor, Latham.
Iora melaceps, Swainson.

Show Bhugah, or *Show Bheegee*, H. (Jerdon). Inhabits S. India; Ceylon; Deyra Doon (?).

(1705) *I. typhia* (Edwards, pl. 79).

Syn. Motacilla typhia, L.
Ficedula bengalensis, Brisson.

Fatikja, and *Toufik*, Beng. Inhabits Bengal; Nepal; Assam; Arakan; Tenasserim provinces; Malayan peninsula. The exceedingly common *Iora typhia* of Bengal very rarely exhibits any black about the cap and back at any season of the year; and those of the whole eastern side of the Bay of Bengal appear to be similiar: but occasionally specimens are met with, which have assumed less or more of this colouring, and which are perhaps hybrids, like those between *Coracias indica* and *C. affinis*, *Treron phœnicoptera* and *Tr. Jerdoni*, and a few other analogously affined races).

(1706) *I. scapularis*, Horsfield (*Zool. Res. in Java*, pl. —the female), J. A. S. XIII, 381.

Durong Capas, Malay; *Cheetoo*, Jav. Inhabits Malay countries.

Genus IRENA, Horsfield.

(1707) *I. puella* (Horsfield's *Zool. Res. in Java*, pl.).

Syn. Coracias puella, Latham.

Nget-pya-zah, Arakan; *Quayang*, and *Biang Kapoor*, Malay; *Bressi*, Jav. Inhabits C. and S. India; Assam; Burmah; Malay countries. *Malayan race* with lower tail-coverts reaching nearly to end of tail.

Fam. MELIPHAGIDÆ.

Subfam. ORIOLINÆ.

Genus ORIOLUS, L. (*Huldikaka*, Beng.)

(1708) *O. Traillii* (Gould's 'Century,' pl. 35; J. and S., *Orn. Ind.*, *2nd* series, pl. 26).

Syn. Pastor Traillii, Vigors.

Inhabits Himalaya; Assam; Burmah (Arakan, Tenasserim).

(1709) *O. melanocephalus*, L.

Syn. O. maderaspatanus, Franklin. } the young.
O. McCoshii, Tickell, J. A. S. II, 577. } the young.
O. Hodgsonii (?), Swainson.

Bania-bhou, Beng.; *Nghet-wa*, Arakan. Inhabits Bengal; Kutak; C India; Nepal; Assam; Arakan; Tenasserim;—distinct race in Ceylon, and Malabar (?).

(1710) *O. larvatus*, Lichtenstein (Lev., *Ois. d' Afr*, pl. 261, 262).

Syn. O. radiatus (?), Gmelin.
O. condonguar, Temminck.
O. capensis, Swainson.
O. monachus (Gm.), apud Wagler.
O. chloris, Cuvier.

Inhabits S. Africa.

(1711) *O. xanthonotus*, Horsfield (*Zool. Res. in Java*, pl. ; *Pl. Col.* 214).

Syn. O. leucogaster, Reinwardt.
O. castanopterus, Blyth, J. A. S. XI, 795 (the young).

Sepong Rayate, Malay. Inhabits Malay countries.

(1712) *O. chinensis*, L.

Syn. O. cochinchinensis, Brisson.
O. acrorhynchos, Vigors, P. Z. S. 1831, p. 97.

Inhabits China.

(1713) *O. macrourus*, Blyth, J. A. S. XV, 46. Inhabits Nicobar Islands.

(1714) *O. indicus*, Brisson (Jerdon's *Ill. Ind. Orn.*, pl. 15).

Syn. O. chinensis et cochinchinensis of India, Auctorum.
O. coronatus (?), Swainson, vel hippocrepis (?), Wagler.
Le Loriot des Indes, Buffon.

Inhabits Peninsular India; rare in Bengal; common in Burmese and Malay countries; also China.

(1715) *O. tenuirostris*, Blyth, J. A. S. XV, 48. Inhabits ——————?

(1716) *O. kundoo*, Sykes (the young).

Syn. O. galbula apud Franklin and Sykes (the adult).
O. aureus, Jerdon's Catal.
O. galbuloides, Gould.

Peebeck, H. (Jerdon). Inhabits Hindustan generally; nec L. Bengal.

(1717) *O. galbula*, L. (*Pl. Enl.* 26).

Syn. Coracias oriolus, Scopoli.

Inhabits Europe; W. Asia; N. Africa.

(1718) *O. viridis* (Gould's B. A. Vol. IV, pl. 13).

Syn. Gracula viridis and Coracias sagittata, Latham.
O. variegatus, Vieillot.
Mimeta viridis, King.
M. meruloides, Vigors and Horsfield.

Inhabits N. S. Wales.

Genus SPHECOTHERES, Vieillot.

(1719) *Sph. viridis*, Vieillot (Gould's B. A. Vol. IV, pl. 15).

Syn. Sph. virescens, Jardine and Selby.
Sph. australis et canicollis, Swainson.
Turdus maxillaris (?,) Latham.

Inhabits Australia.

Subfam. MELIPHAGINÆ.

Genus ENTOMYZA, Swainson.

(1720) *E. cyanotis* (Gould's B. A. Vol. IV, pl. 68).

Syn. Gracula cyanotis, Turdus cyaneus, et Merops cyanops, Latham.

Inhabits N. S. Wales.

Genus ZOSTEROPS, Vigors and Horsfield.

(1721) *Z. palpebrosus* (*Pl. Col.* 292, f. 3).

Syn. Sylvia palpebrosa, Temminck.
S. annulosa, var. a, Swainson.
Z. maderaspatana (v. madagascariensis of India), auctorum (vide J. A. S. XIV, 562).

Inhabits India generally (nec L. Bengal), from the Himalaya to Ceylon; Assam; Arakan; Tenasserim provinces; Nicobar Islands.

Fam. NECTARINIIDÆ.

Shakar-Khora (i. e. 'Sugar-sucker;') H.; *Mor-chang*, Beng.; *Tutika*, Cingh.; *Pan-bweng-tsot* (*i. e.* 'Flower-pecker'), Arakan.

Genus ARACHNOTHERA, Temminck.

(1722) *A. magna*.

Syn. Cinnyris magna, Hodgson, Ind. Rev. 1837, p. 272; J. A. S. XII, 951.
A. inornata of Assam apud Horsfield P. Z. S. 1839, p. 167; vide J. A. S. XII, 981.

Inhabits Nepal; Sikim; Assam; Sylhet; Arakan.

(1723) *A. flavigaster*.

Syn. Anthreptes flavigaster, Eyton, P. Z. S. 1839, p. 105, J. A. S XIV, 557.

Chechap Rimba, or *Kolechap Pangone*, Malay. Inhabits Malayan peninsula.

(1724) *A. chrysogenys*, Temminck, (*Pl. Col.* 338, f. 1); J. A. S. XII. 981; XV, 43.

Syn. Certhia longirostra apud Raffles, Lin. Tr. XIII. 299, (nec Latham).

Siap jantung, Malay. Inhabits Malayan peninsula; Sumatra.

(1725) *A. inornata*, Temminck (*Pl. Col.* 84).

Syn. Cinnyris affinis, Horsfield, Lin. Tr. XIII, 66.

Chess, Jav. Inhabits Java.

(1726) *A. modesta*.

Syn. Anthreptes? modesta, Eyton, P. Z. S. 1839, p. 105.
Ar. latirostris, Blyth, J. A. S. XII, 982.

Chichap Nio, Malay. Inhabits Malayan peninsula.

(1727) *A. robusta*, Muller (*Zool. Ind. Arch.*, t. 2, f. 1); described J. A. S. XV, 43, No. 6. Inhabits Sumatra.

(1728) *A. longirostra* (Griffith's *Transl. An. Kingd.* VII, 391, pl.)

Syn. Certhia longirostra, Latham (nec Raffles).

Prit Andun, Jav. Inhabits Java.

(1729) *A. affinis*, Blyth, J. A. S. XV, 43.

Syn. A. inornata apud Blyth, J. A. S. XII 982.
Cinnyris longirostris, Jerdon, Madr. Journ. XIII, 172.

Inhabits Arakan; Tenasserim provinces; Malayan peninsula; very rare in S. India.

Genus NECTARINIA, Illiger.

(*A.* With elongated middle tail-feather in the males).

(1730) *N. goalpariensis* (Royle's *Ill. Him. Bot.*, pl. 7), J. A. S. XII, 969.

Syn. Certhia goalpariensis, Latham.
Cinnyris Vigorsii (the male), and C. concolor (the female), Sykes, P. Z. S. 1832, pp. 98, 99.
C. miles, Hodgson, Ind. Rev. 1837, p. 273.
C. labecula, McClelland, P. Z. S. 1839, p. 167.
N. seheriæ, Tickell, J. A. S. II, 577.
N. Lathami, Jardine, Nat. Libr.

Inhabits Sub-Himalaya region; C. and S. India; Assam; Sylhet; Arakan; Tenasserim provinces.

(1731) *N. siparaja* (*Pl. Col.* 126, f. 3).

Syn. Certhia siparaja, Raffles, Lin. Tr. XIII, 299.
N. mysticalis, Temminck.

Sipa Raja, Malay. Inhabits Malayan peninsula and archipelago.

(1732) *N. Gouldiæ* (Gould's 'Century,' pl. 56), J. A. S. XII, 974.

Syn. Cinnyris Gouldiæ, Vigors, P. Z. S. 1831, p. 44.

Inhabits Sikim; Sylhet; Arakan.

(1733) *N. ignicauda* (*Nat. Libr., Nectariniidæ*, pl. 29); J. A. S. XII, 972.

Syn. Cinnyris ignicauda, Hodgson, Ind. Rev. 1837, p. 972.
C. rubricaudata, Blyth, mentioned J. A. S. XI, 192.
N. phœnicura, Jardine, Nat. Libr.

Inhabits Nepal; Assam; Sylhet.

(1734) *N. nipalensis* (*Nat. Libr., Nectariniidæ*, pl. 27); J. A. S. XII, 974.

Syn. Cinnyris nipalensis, Hodgson, Ind. Rev. 1837, p. 273.

Inhabits S. E. Himalaya.

(1735) *N. Horsfieldi*, Blyth, J. A. S. 975. Inhabits N. W. Himalaya.

(1736) *N. saturata* (*Nat. Libr., Nectariniidæ*, pl. 29): J. A. S. XII, 976.

Syn. Cinnyris saturata, Hodgson, Ind. Rev. 1837, p. 273.
C. assamensis, McClelland, P. Z. S. 1839, p. 167.
C. Hodgsonis, Jardine, Nat. Libr.

Inhabits S. E. Himalaya; Assam.

(1737) *N. lotenia* (*Nat. Libr., Nectariniidæ*, pl. 23—not good).

Syn. Certhia lotenia, L.
C. polita, Latham.
C. purpurata, Shaw.

Inhabits S. India; Ceylon.

(1738) *N. asiatica* (*Nat. Libr., Nectariniidæ*, pl. 24); J. A. S. XII, 978.

Syn. Certhia asiatica, L.
C. mahrattensis, C. chrysoptera, C. cirrhata, et C. currucaria, Latham.
C. saccharina, Shaw.
Cinnyris orientalis, Franklin, P. Z. S. 1831, p. 122.
C. epauletta et C. strigula, Hodgson, Ind Rev. 1837, p. 272.
C. cyaneus, Encl., Method.

Inhabits India generally; Arakan; Sindh.

(1739) *N. malaccensis* (Swainson's *Zool. Ill.*, 1st series, pl. 121).

Syn. Certhia malaccensis, Scopoli.
C. lepida, Latham.
N. javanica, Horsfield.

Prit-gantil, Jav. Inhabits Burmese and Malay countries (Arakan, Tenasserim).

(1740) *N. simplex*, Muller (*Zool. Ind. Arch.*, t. 8, f. 4).

Syn. N. frontalis, Blyth, J. A. S. XIV, 558.

Inhabits Malayan peninsula; Sumatra.

(1741) *N. phœnicotis*, Temminck (*Pl. Col.* 108, f. 1; 338, f. 2); J. A. S. XII, 979. Inhabits Burmese and Malay countries (Tippera, Arakan, Tenasserim).

(1742) *N. hypogrammica*, Muller (*Zool. Ind. Arch.* t. 8, f. 3).

Syn. N. nuchalis, Blyth, J. A. S. XII, 980, and the female termed Anthreptes macularia, J. A. S. XI, 107.

Inhabits Malayan peninsula; Sumatra; Borneo.

(1743) *N. solaris*, Temminck (*Pl. Col.* 347, f. 3). Inhabits Moluccas.

(1744) *N. pectoralis*, Horsfield (*Pl. Col.* 138).

Syn. N. eximia, Temminck.
Certhia philippensis olivacea, Brisson.

Sri-ganti, Jav. Inhabits Malayan peninsula and archipelago; Nicobar Islands.

(1745) *N. flammaxillaris*, Blyth, J. A. S. XIV, 557.

Syn. N. jugularis apud Blyth J. A. S. XII, 979.

Inhabits Arakan; Tenasserim.

(1746) *N. zeylonica* (*Nat. Libr., Nectariniidæ*, pl. 20,—not good).

Syn. Certhia zeylonica, L.
Cinnyris sola, Vieillot.
C. lepida apud Sykes (female.)

Inhabits Bengal: S. India; Ceylon.

(1747) *N. minima* (*Nat. Libr., Nectaraniidæ*, frontispiece.)

Syn. Cinnyris minima, Sykes, P. Z. S. 1832, p. 98.

Inhabits S. India.

(1748) *N. Hasseltii*, Temminck (*Pl. Col.* 376, f. 3).

Syn. N. Phayrei, Blyth, J. A. S. XI, 1008.
Certhia speeta, var., Raffles.
C. braziliana, Shaw.

Inhabits Burmese and Malay countries (Arakan, Tenasserim).

Genus DICÆUM, Cuvier.

(1749) *D. cruentatum* (Edwards, pl. 81).

Syn. Certhia cruentata, L. (nec apud Horsfield, Lin. Tr. XIII, 168, which = D. rubrocanum, (Tem.), Vaill.Ois. d' Afr. pl. 136).
C. coccinea, Scopoli.
C. erythronotus, Latham.

Inhabits Bengal; Assam; Arakan: Tenasserim; Malayan peninsula.

(1750) *D. trigonostigma* (Sonnerat, *Voy. aux Indes*, pl. 117.)

Syn. Certhia trigonostigma, Scopoli.
C. cantillans, Latham.
D. croceoventre, Vigors.

Beong Nalow, Malay. Inhabits Arakan, Tenasserim; Malayan peninsula; Sumatra.

(1751) *D. chrysorrhœum*, Temminck (*Pl. Col.* 478).

Syn. D. chrysochlorum, Blyth, J. A. S. XI, 1009.

Inhabits Arakan; Tenasserim; Malacca.

(1752) *D. concolor*, Jerdon (*Ill. Ind. Orn.*, pl. 89). Inhabits Nilgiris; Malabar.

(1753) *D. minimum*.

Syn. Nectarinia minima, Tickell, J. A. S. II, 577.
Certhia erythrorhyncha, Latham (founded on the drawing of a young specimen, with colour of bill exaggerated).
D. Tickelliæ, Blyth, J. A. S. XII, 983.
Myzanthe inornata, Hodgson, Gray's Catal.

Inhabits India generally; Ceylon; Arakan. Common in L. Bengal.

Genus MYZANTHE, Hodgson.

(1754) *M. ignipectus*, Hodgson, J. A. S. XII, 983. Inhabits Nepal; Sikim; Butan.

Genus PRIONOCHILUS, Strickland.

(1755) *Pr. thoracicus* (*Pl. Col.* 600, f. 1), J. A. S. XIV, 559.

Syn. Pipra thoracica, Temminck.
P. maculata (?), Temminck (female or young?).

Inhabits Malayan peninsula.

(1756) *Pr. percussus* (*Pl. Col.* 394, f. 2), J. A. S. XIV, 559.

Syn. Pipra percussa, Temminck.
Dicæum ignicapillum, Eyton, P. Z. S. 1839, p. 105.

Nalloo, or *Nalow*, Malayan. Inhabits Malayan peninsula; Sumatra.

Genus PIPRISOMA, Blyth (*Smicrornis*?, Gould).

(1757) *P. agile*, J. A. S. XIII, 314.

Syn. Fringilla agilis, Tickell, J, A S. II, 578.
Pipra squalida, Burton, P. Z. S. 1836, p. 113.
Parisoma (?) vireoides, Jerdon, Madr. Journ. XI, 9.

Inhabits C. India; Himalaya? (Deyra Doon?)

Order IV. GEMITORES.

Fam. COLUMBIDÆ.

Subfam. TRERONINÆ.

Genus TRERON, Vieillot. (*Hurrial*, H.; *Hurtel*, Beng.; *N'goo*, Arakan; *Battagoya*, Cingh.; *Poonai*, Sum.)

Subgenus TORIA, Hodgson.

(1758) *T. aromatica* (*Pl. Enl.* 163).

Syn. Columba aromatica, C. curvirostris, and (the female)
C. tannensis, Gmelin.
Poonai ubar, Sum. (Raffles).

Inhabits Eastern Archipelago.

(1759) Var. *T. nipalensis*, Hodgson, *As. Res.* XIX, 164; J. A. S. XIV, 847. *T'horia* (*i. e.*, 'beaked'), Nepal; *Krocha*, Malay. Inhabits Nepal; Assam; Arakan; Tenasserim provinces; Malayan peninsula; rare in L. Bengal.

(1760) *T. Capellei* (*Pl. Col.* 143).

Syn. Columba Capellei, Temminck.
Vinago giganteus, Vigors, Zool. App. to Lady Raffles's Biog. of Sir St. Raffles, p. 674.
Tr. magnirostris, Strickland, Ann. Mag. N. H. 1844, p. 115.

Inhabits Malayan peninsula; Sumatra.

Subgenus TRERON, Vieillot.

(1761) *Tr. viridifrons*, Blyth, J. A. S. XIV, 849. Inhabits Tenasserim provinces.

(1762) *Tr. phœnicoptera* (Gould's 'Century,' pl. 18; but the feet should have been coloured brilliant yellow); J. A. S. XIV, 849.

Syn. Col. phœnicoptera, Latham.
C. militaris, Temminck.
C. Hardwickii, Gray.

Inhabits Bengal, Assam, Sylhet, Nepal, and all Upper India, southward to C. India, where mingled much with the next race.

(1763) *Tr. chlorigaster*, Blyth, J. A. S. XII, 167; XIV, 850.

Syn. Tr. Jerdoni, Strickland, Ann. Mag. N. H. 1844, p. 167.
Tr. phœnicoptera v. militaris of S. India, Auctorum.

Inhabits Peninsula of India; rare in L. Bengal.

(1764) *Tr. bicincta* (Jerdon's *Ill. Ind. Orn.* pl. 21); J. A. S. XIV, 851.

Syn. Vinago bicincta (the male). and V. unicolor (the female), Jerdon, Madr. Journ. XII, 13, 14.
V. vernans, var., Lesson's Traité.

Inhabits India generally; Ceylon, Nepal, Assam, Sylhet, Arakan, Tenasserim.

(1765) *Tr. viridis* (*Pl. Enl.* 138; J. A. S. XIV, 851.

Syn. Columba viridis, Scopoli.
C. vernans, Gmelin.
C. purpurea, Latham.

Pouye, Malay. Inhabits Malayan peninsula and Archipelago.

(1766) *Tr. chloroptera*, Blyth, J. A. S. XIV, 852. Inhabits Nicobar Islands.

(1767) *Tr. malabarica* (*Nat. Libr. Columbidæ*, pl. 1); Jerdon's *Ill. Ind. Orn.*, Art. *Tr. bicincta*; J. A. S. XIV, 852.

Syn. Vinago aromatica (the male), and V. affinis (the female), Jerdon, Madr. Journ. XII, 13.
Columba pompadora? Gmelin (founded on Brown's 'Illustrations,' pl. 19, 20).

Inhabits S. India; Ceylon? rare in L. Bengal; common in Assam, Sylhet, Arakan, and Tenasserim.

(1768) *Tr. olax* (*Pl. Col.* 241).

Syn. Columba olax, Temminck.

Sembooan, Malay. Inhabits Malay countries.

Subgenus SPHENOCERCUS, G. R. Gray.

(1769) *Sph. cantillans* (Gould's 'Century,' pl. 57).

Syn. Vinago cantillans, Blyth, J. A. S. XII, 166 (cage variety).
V. sphenura, Vigors, P. Z. S. 1841, p. 173
Columba aromatica, var. *A*, Latham (cage variety).

Kokla, or *Kokhela*, H. Inhabits Himalaya.

(1770) *Sph. apicauda*.

Syn. Treron apicauda, Hodgson, Gray's Catal; J. A. S. XIV. 854.

Inhabits S. E. Himalaya; Assam.

(1771) *Sph. oxyura* (*Pl. Col.* 240).

Syn. Columba oxyura, Temminck.
Sphenurus semitorquatus, Swainson.

Inhabits Malay conntries.

Genus PTILINOPUS, Swainson.

(1772) *Pt. melanocephalus* (*Pl. Enl.* 214).

Syn. Columba melanocephala, Pennant.

Jowan Bondol, Jav. Inhabits Java.

(1773) *Pt. jambu* (Tem. *Pigeons*, *t.* 27, 28).

Syn. Columba jambu, Gmelin.

Paonag Gadang, Malay; *Poonai Jambu*, Sum. Inhabits Malayan peninsula; Sumatra.

(1774) *Pt. purpuratus* (Temminck, *Pigeons*, *t.* 24); vide J. A. S. XII, 178 (*bis*).

Syn. Columba purpurata, Latham.
C. Forsteri, Desmarest.
C. kurukuru, Bonnaterre.

Inhabits Ladrones, &c.

(1775) *Pt.* ? Inhabits Navigators' Islands.

Genus CARPOPHAGA, Selby. (*Dukul*, or *Dunkul*, H.)

(1776) *C. sylvatica*; vide J. A. S. XIV, 856.

Syn. Columba sylvatica, Tickell, J. A. S. II, 581.
Carp. ænea of India, Auctorum.

Dunkul, H.; *Soona Kubutra*, Uria; *Pyoonmadee*, Arakan; *Pagam*, Sumatra. Inhabits C. and S. India; Assam; Sylhet; Arakan; Tenasserim; Malayan peninsula; Sumatra; Java? Variety in Nicobar Islands.

(1777) *C. pusilla*, Blyth, J. A. S. XVIII, Inhabits Nilgiris.

(1778) *C. perspicillata* (*Pl. Col.* 246).

Syn. Columba perspicillata, Temminck.

Inhabits Java; Moluccas.

(1779) *C. insignis*, vide J. A. S. XIV, 855.

Syn. Ducula insignis, Hodgson, As. Res. XVIII, 162.
C. cuprea, Jerdon Madr. Journ. XII. p. 12 (subsequently referred to Col. badia, Raffles, ibid. XIII, 164).

Inhabits S. E. Himalaya; Assam; Arakan; Nilgiris.

(1780) *C. bicolor* (Sonn. *Voy. t.* 103).

Syn. Columba bicolor, Scopoli.
C. alba, Gmelin.
C. littoralis, Temminck.

Barung dara lahut, Jav. Inhabits Malayan peninsula and Archipelago; Nicobar Islands.

Subfam. COLUMBINÆ.

Subgenus ALSOCOMUS, Tickell.

(1781) *A. Hodgsonii*.

Syn. Columba Hodgsonii, Vigors, P. Z. S. 1839, p. 16.
C. nipalensis, Hodgson, J. A. S, V, 122; XIV, 867.

Inhabits Himalaya.

(1782) *A. puniceus*, Tickell, J. A. S, XI, 462; XII, 867, 878. Inhabits C. India; Assam; Arakan; Tenasserim.

(1783) *P. torquatus* (*Pl. Enl.* 316).

Syn. Columba palumbus, L.

Inhabits Europe: variety in N. W. Himalaya.

(1784) *P. pulchricollis*.

Syn. Columba pulchricollis, Hodgson, vide J. A. S, XIV, 866.

Inhabits S. E. Himalaya.

(1785) *P. Elphinstonei* (Jerdon's *Ill. Ind. Orn.*, pl. 48).

Syn. Ptilinopus Elphinstonei, Sykes, P. Z. S. 1832, p. 149.

Inhabits Nilgiris.

Subgenus COLUMBA (as restricted).

(1786) *C. livia*, Brisson (*Pl. Enl.* 510). *Jalalaya*, H.; *Parwi*, Mahr.; *Gola* of the dealers. Inhabits Europe; and variety in C. and S. Asia.

(1787) *C leuconota*, Vigors (Gould's 'Century,' pl. 59), J. A. S. XIV, 864. Inhabits Himalaya, near snow region.

Genus MACROPYGIA, Swainson.

(1788) *M. Reinwardtii* (*Pl. Col.* 248).

Syn. Columba Reinwardtii, Temminck.

Inhabits Moluccas, &c.

(1789) *M. rufipennis*, Blyth, J. A. S. XV, 871. Inhabits Nicobar Islands.

(1790) *M. amboinensis*.

Syn. Columba amboinensis, L.

Derkuku-sopa, Jav. Inhabits Tenasserim provinces; Java; Moluccas.

(1791) *M. leptogrammica* (*Pl. Col.* 248); J. A. S. XIV, 869.

Syn. Columba leptogrammica, Temminck.
Coccyzura tusalia, Hodgson, J. A. S. XIII, 936.

Inhabits S. E. Himalaya.

Genus GEOPELIA, Swainson.

(1792) *G. albiventris*, Blyth (*Report on Australian Vertebrata in Mus. As. Soc.*)

Syn. Columba Maugei (?), Temminck.

Inhabits Timor.

(1793) *G. striata* (Temminck, *Pigeons*, *t.* 47).

Syn. Columba striata et C. sinica, L.
C. malaccensis, Gmelin.
C. fowat, Bonnaterre.
C. bantamensis, Sparrman.

Katitiran, Sum.; *Berkutut*, Jav. Inhabits Malayan peninsula and archipelago.

Genus TURTUR, Selby. *G'hugu*, Beng.; *Fachta*, H.; *Cobeya*, Cingh.; *Gya*, Arakan; *Palam, or Terkuku*, Mal., Sum.; *Puter*, Jav.

(1794) *T. risoria* (Temminck, *Pigeons*, *t.* 44); vide J. A. S. XIV, 870.

Syn. Columba risoria, L.
T. erythrophrys, Swainson, apud Strickland.

Dhor Factah, H.; *Kalhak, Kahalak, Kahalaki*, or *Paur Ghughu*, Beng. Inhabits N. Africa; S. E. Europe?; S. Asia.

(1795) *T. bitorquatus* (Temminck, *Pigeons*, *t.* 47).

Syn. Columba bitorquata, Temminck.

Puter-genui, Jav. Inhabits Java; Moluccas; Timor.

(1796) *T. humilis* (*Pl. Col.* 258, 259).

Syn. Columba humilis, Temminck.
C. risoria (minor), Franklin—the female.
Asiatic Pigeon, Latham.

Seroti Fachtah, H.; *Golabi* (or 'rose-coloured'), *Tamakhuri* (or 'copper cup'), and *Itkuiya* (or 'brick coloured'), *Ghughu*, Beng.; *Gyo-lengbya*, Arakan. Inhabits India generally; Arakan.

(1797) *T. chinensis* (Sonnerat's *Voy. aux Indes*, *t.* 102); vide J. A. S. XIV, 875.

Syn. Columba chinensis, Scopoli.
C. risoria, var B, Latham.

Inhabits China.

(1798) *T. suratensis* (Temminck, *Pigeons*, *t.* 43); J. A. S. XIV, 874.

Syn. Columba suratensis, Latham.
C. tigrina, Temminck.
C. turtur, L., var., figured in Griffiths' Trans. Ann. Kingd., VIII, 290.

Chitla, Upper Provinces; *Chitroka Fachtah*, H.; *Chañral Ghughu*, or *Telia Ghughu*, B; *Kangskiri*, Bhagulpur; *Cobeya*, Cingh.; *Laybiouk*, Arakan. Inhabits India generally, Burmese and Malay countries.

(1799) *T. orientalis* (*Pl. Col.* 550); J. A. S. XIV, 875.

Syn. Columba orientalis, Latham.
C. meena, Sykes, P. Z. S. 1832, p. 149.
C. gelastis, Temminck.
C. agricola, Tickell, J. A. S. II, 581.
C. ferrago, Eversmann.
C. turtur, var., Raffles?

Balam, or *Terkuku*, Sum., Raffles; *Kulla Fachtah*, H.; *Sun Ghughu*, Beng.; *H'hulga*, Mahratta; *Gyo-pein-doo-ma*, Arakan. Inhabits India generally; Burmah; E. Malasia; N. Asia in summer.

(1800) *T. senegalensis* (Temminck, *Pigeons*, *t.* 45); J. A. S. XIV, 873.

Syn Columba senegalensis, L.
C. cambaiensis, Gmelin.
C. maculicollis, Wagler.

Tortru Fachtah, H. Inhabits India generally (nec alluvium of L. Bengal); W. Asia; Turkey; N. Africa.

Genus CHALCOPHAPS, Gould.

(1801) *Ch. indicus* (Edwards, pl. 14); J. A. S. XIV, 859.

Syn. Columba indica, L.
C. pileata, Scopoli.
C. javanica (?), cyanocephala, et albicapilla, Gmelin.
C. cyanopileata, et griseocapilla, Bonnaterre.
C. superciliaris, Wagler.

Ram Ghughu and *Rhaj Ghughu*, Beng.; *Nil Cobaya*, or *Nillo Cobaya* (*i. e.* 'blue dove') Cingh.; *Gyo-ngyo*, Arakan; *Takoat*, and *Poona*

Tanna, Malay; *Limoo-an*, Sum.; *Delimu*, or *Glimukan*, Jav. Inhabits India; Burmese and Malay countries.

Subfam. GOURINÆ.

Genus CALÆNAS, G. R. Gray.

(1802) *C. nicobarica* (Edwards, pl. 339; *Pl. Enl.* 491).

Syn. Columba nicobarica, L.
C. gallus, Wagler.

Inhabits Andaman and Nicobar Islands; Mergui archipelago; Malayan peninsula.

Order RASORES.

Fam. MEGAPODIIDÆ.

Genus MEGAPODIUS, Quoy and Gaymard.

(1803) *M. nicobariensis*, Blyth, J. A. S. XV, 52, 372. Inhabits Nicobar Islands.

Fam. PHASIANIDÆ.

Subfam. PAVONINÆ.

Genus PAVO, L.

(1804) *P. cristatus*, L. (*Pl. Enl.* 433, 434).

Syn. P. assamensis. McClelland, Ind. Rev. 1838, p. 513.

Mayura, *B.*; *Maur*, H.; *Mra*, or *Marak*, Sum. (Raffles). Inhabits India generally; Assam; Chittagong; Burmah? Sumatra.

(1805) *P. muticus*, L. Vieillot, (*Gal. des Ois.*, *t.* 202).

Syn. P. spiciferus, Vieillot.
P. Aldrovandi, Wilson.
P. javanicus, Horsfield.
P. japonensis, Brisson.

Oo-doung, Arakan; *Pegu Mayura*, B.; *Merak*, Java. Inhabits Burmese and Malay countries; northward to Arakan.

Genus MELEAGRIS, L.

(1806) *M. gallopavo*, L. (Wilson's *Am. Orn.*, Bonap. *Cont.* p. 9).

Syn. M. sylvestris, Vieillot.
Gallopavo sylvestris, Catesby.

Peru, B., H. Inhabits N. America. *A.* Indian domestic variety, male.

Subfam. POLYPLECTRONINÆ.

Genus CERIORNIS, Swainson.

(1807) *C. melanocephala* (Gould's '*Century*,' pl. 63, 64, 65).

Syn. Satyra melanocephala et Phasianus nipalensis, Gray.
Tragopan Hastingsii, Vigors.

Jewar, *Jewari*, Simla. Inhabits N. W. Himalaya.

(1808) *C. satyra* (Gould's '*Century*,' pl. 62).

Syn. Meleagris satyra, L.
Satyra Lathami et Pennantii, Gray.
S. cornuta, G. R. Gray.

Dafia, Beng. (Bhotea?) Inhabits S. E. Himalaya (Nipal, Sikim).

(1809) *C. Temminckii* (Hardwicke's *Ill. Ind. Zool*).

Syn. Satyra Temminckii, Gray.

Inhabits China.

Genus ITHAGINIS, Wagler.

(1810) *I. cruentus* (Hardwicke's *Ill. Ind. Zool.* Tem. *Pl. Col.* 332).

Syn. Phasianus cruentus, Wagler.
Ph. Gardnerii, Hardwicke (female).

Inhabits Nepal.

Genus GALLOPERDIX, Blyth. (Spur-fowl of sportsmen.)

(1811) *G. zeylonensis* (Pennant's *Ind. Zool.* pl. 7).

Syn. Tetrao zeylonensis, Gmelin.
T. bicalcaratus, Pennant.

Aban or *Saban Cuccula*, Cingh. Inhabits Ceylon.

(1812) *G. lunulosa* (Hardwicke's *Ill. Ind. Zool.*; Delessert, *Voy. aux. Indes*, pl. 10; Jerdon, *Ill. Ind. Orn.*, pl. 42, the female).

Syn. Perdix lunulosa, Valenciennes.
P. et Plectrophorus Hardwickii, Gray.
Francolinus nivosus Delessert.

Jitta Kodi. Telugu. Inhabits Rajmahl; C. W.; and S. India.

(1813) *G. spadiceus* (Hardwicke's *Ill. Ind. Zool.*, the female).

Syn. Tetrao spadiceus, Gmelin.
T. madagascariensis. Scopoli.
Polyplectron Northiæ, Gray (the female).

Inhabits C. and S. India.

Genus POLYPLECTRON, Temminck.

(1814) *P. chinquis*, Temminck (*Pl. Col.* 539), apud G. R. Gray.

Syn. P. albo-ocellatum, Cuvier.
P. lineatum, Gray, the female.
Pavo tibetanus, L.
Peacock Pheasant from China (?), Edward's, pl. 67, 69.

Doung-kula, Arakan: *Mo-nuwur*, and *Day-o-da-huk*. Inhabits Assam, Sylhet, Arakan, Tenasserim.

(1815) *P. bicalcaratum* (Hardwicke's *Ill. Ind. Zool*).

Syn. Pavo bicalcaratus, L.
P. malaccensis, Scopoli.
P. Hardwickii Gray.

Kuaow Charman, Malay, Sum. Inhabits Malayan peninsula; Sumatra.

Genus ARGUS, Temminck.

(1816) *A. giganteus*, Temminck (Vieillot, *Gal. des Ois.*, *t.* 203; Jardine and Selby, *Ill. Orn.*, *n. s.*, pl. 6).

Syn. Phasianus argus, L.
A. pavoninus, Vieillot.
Malay Peacock, Latham.

Kuaow, Malay; Sum. Inhabits Malayan peninsula; Sumatra. (Nec Sylhet, as stated by Hardwicke, *MS.* in Brit. Mus.)

Subfam. PHASIANINÆ.

Genus GALLUS, L. (apud G. R. Gray). *Murgh*, female *Murghi*, H.: *Ayam*, Malay.

(1817) *G. ferrugineus.*

Syn. Tetrao ferrugineus, Gmelin.
G. bankiva, Temminck.
Phasianus gallus, L.,—Domestic varieties (among which are G. giganteus, morio, crispus, ecaudatus, pumilus, plumipes, cristatus, pentadactylus, pusillus, lanatus, &c.).
Hackled Partridge, Latham—the hen.

Ban Murgh, or *Jungli Murgh*, H.; *Ban Kokra*, of Santals; *Ayam utan*, Malay; *Brooga*, Sum.; *Bengkiwo*, or *Bekikko*, Java. Inhabits Jungly districts of all N. India, from valleys of sub-Himalayan region southward to the Vindhyian range and the N. Circars; Assam: Burmese and Malay countries: Turkestan? (Vide J. A. S. VIII, 1007). A. Indian race, with white ear-lappet in living specimens (vide *Ann. Mag. N. H.* XX, 389). B. Pale sub-Himalayan race (vide *Ann. M. N. H.*, XX, 289). C. Deep-coloured Malayan race. D. Domestic varieties.

(1818) *G. Stanleyi*, Gray, (Hardwicke's *Ill. Ind. Zool.*,—the hen).

Syn. G. Lafayettei, Lesson.
G. lineatus, Blyth, mentioned J. A. S. XVI, 387.

Welle Cuccula, Cingh. Inhabits Ceylon.

(1819) *G. Sonneratii*, Tem. (*Pl. Col.* 232, 233).

Syn. Phasianus gallus apud Sonnerat.
Ph. indicus, Leach.

Jungli Murgh, S. India. Inhabits peninsula of India.

Genus EUPLOCOMUS, Temminck.

(1820 *Eu. ignitus* (Macartney's *Emb. to China*, pl. 13).

Syn. Phasianus ignitus, Shaw.
Gallus Macartneyi, Temminck.
Ph. rufus, Raffles (the female).

Jugang, Sum. Inhabits Malayan peninsula; Sumatra.

(1821) *Eu. nycthemerus* (*Pl. Enl.* 123, 124).

Syn. Phasianus nycthemerus, L.
Nycthemerus argentatus, Swainson.

Inhabits China.

(1822) *Eu. lineatus* (Belanger, *Voy. Ind. Orient., Zool.*, *pl.* 8, 9).

Syn. Phasianus lineatus, Latham.
Ph. Reynaudii, Lesson.
Ph. fasciatus, McClelland, Calc. Journ. N. H. II, 146.

Yeet, Arakan. Inhabits Burmese countries. (Arakan, Tenasserim. Pegu).

(1823) *Eu. Horsfieldi* (Gray's *Ill. Gen. Birds*, pl.).

Syn. Gallophasis Horsfieldi, G. R. Gray.

Mut'hura; *Purple Pheasant* of Europeans. Inhabits Assam; Sylhet.

(1824) *Eu. melanotus*, Blyth, (noticed J. A. S. XVII, 694). *Kalij Pheasant* of Darjiling. Inhabits Sikim.

(1825) *Eu. albocristatus*, (Gould's '*Century*,' pl. 66, 67).

Syn. Phasianus albocristatus, Vigors.
Ph. Hamiltonii, Gray (Hardw. Ill. Ind. Zool.)

Kalij of Simla, Masuri, &c.; also *Murgh-Kalij*, and *Kukera*. Inhabits N. W. Himalaya.

(1826) *Eu. erythropthalmos* (Hardw. *Ill. Ind. Zool.*—the female).

Syn. Phasianus erythropthalmos, Raffles.
Ph. purpureus, Gray (the female).

Pagar, Malay; *Mira Mata*, Sum. Inhabits Malayan peninsula; Sumatra.

Genus PHASIANUS, L.

Subgenus PUCRASIA, G. R. Gray.

(1827) *P. macrolopha* (Gould's '*Century*,' pl. 69, 70).

Syn. Satyra macrolopha, Lesson.
Ph. pucrasia, Vigors, J. E. Gray.
Ph. pucrasse, Gray.
Tragopan Duvaucelei, Temminck.

Plas, *Pukras*, *Koklas*. Inhabits N. W. Himalaya (rare in Nepal).

Subgenus PHASIANUS, as restricted.

(1828) *Ph. Wallichii* (Gould's '*Century*,' pl. 68).

Syn. Lophophorus Wallichii. Hardwicke.
Phasianus Stacei, Vigors.

Chir, or *Cheor*, *Banchil*, *Herril*. Inhabits N. W. Himalaya.

(1829) *Ph. torquatus*, Gmelin (Hardw. *Ill. Ind. Zool*).

Syn. Ph. albotorquatus, Bonnaterre.

Inhabits China.

(1830) *Ph. colchicus*, L. (*Pl. Enl.* 121, 122). *Kurgkuol*, Pushtu. Inhabits W. Asia (Abundant—though somewhat different from the European bird—on the Elburz Chain, N. of Persia). Now common in Europe.

Subgenus THAUMALEA, Wagler.

(1831) *Th. Amherstiæ* (G. R. Gray, *Ill. Gen. Birds*, pl. 125).

Syn. Phasianus Amherstiæ, Leadbeater.

Inhabits bordering regions of China and Tibet.

Genus LOPHOPHORUS, Temminck.

(1832) *L. impeyanus* (Gould's '*Century*,' pl. 60, 61).

Syn. Phasianus Impeyanus, Latham.
Ph. curvirostris, Shaw.
Lophophorus rufulgens, Temminck.

Monal, or *Ghur Monal*; *Murgh i zari* ('Golden Fowl'); *Murgh Muhshor*: male, *Ratkap*; female, *Monali*. Inhabits Himalya generally: Kaffiristan (Burnes).

Subfam. TETRAONINÆ.

Genus TETRAOGALLUS, Gray.

(1833) *T. himalayensis*, G. R. Gray (Hardw. *Ill. Ind. Zool.*; Jardine and Selby, *Orn. Ill.* pl. 141, nec pl. 76, nec G. R. Gray, *Ill. Gen. Birds*). These have since been united by Mr. G. R. Gray; but of some dozens of specimens from Afghanistan eastward to Sikim, all were quite similar, and corresponded neither with the Persian species (*T. caucasica*, v. *Nigelli*), nor with the Altai species (*T. altaica*) as described, nor very decidedly with the figure published by Messrs. Mitchell and G. R. Gray, which should represent a fourth species.

Syn. T. Nigelli of Himalaya, Auctorum.

Inhabits Himalaya; Hindu Kosh; Afghanistan.

Genus LERVA, Hodgson.

(1834) *L. nivicola*, Hodgson.

Syn. Perdix lerva, Hodgson, P. Z. S. 1833, p. 107.

Quoir Monal. *Snow Partridge* of sportsmen. Inhabits Snow-region of Himalaya.

Subfam. PTEROCLINÆ.

Genus PTEROCLES, Temminck. (*Bur-titur*, H. *Whistling Grouse*, or *Rock Pigeons* of sportsmen in India.)

(1835) *Pt. arenarius* (*Pl. Col.* 52, 53).

Syn. Tetrao arenarius, Pallas.
Perdix aragonica, Latham.
Bonasa pyrenaica, Brisson.

Buklit, H.; *Khyrgut*, or *Sya-rim*; also *Tutuk* (expressive of cry), and *Bovra Kurra* ('black breast'), Afghanistan. *Sand Grouse* of sportsmen. Inhabits desert regions of Asia, S. Europe, and N. Africa.

(1836) *Pt. fasciatus* (Jerdon's *Ill. Ind. Orn.*, pl. 10, 36).

Syn. Tringa fasciata, Scopoli.
Tetrao indicus, Gmelin.
Perdix indica, Latham.
Œnas indicus et bicinctus, Vieillot.
Pterocles quadricinctus, Temminck.

Hundsgri, H.; *Polunkar*, Telugu; *Kelkudari* (Rock Partridge), Tamul. *Painted Grouse* of sportsmen. Inhabits Hindustan generally.

(1837) *Pt. alchata* (*Pl. Enl.* 105, 106).

Syn. Tetrao alchata, L.
T. caudacutus, Gmelin.
T. chata, Pallas.
Œnas cata, Vieillot.
Pt. caspius, Menetries.

Inhabits Middle Asia; Afghanistan; Syria; Spain; N. Africa.

(1838) *Pt. exustus*, Temminck (*Pl. Col.* 354, 360).

Syn. Pt. senegalensis, Lichtenstein.

Bur Tetur and *Kumar Tetur*, H.; *Buttator*, Sindh; *Sassinia*, Afghanistan. Inhabits Hindustan; M. and W. Asia; S. Europe; N. Africa.

Subfam. PERDICINÆ.

Titr or *Tetur* (root of *Tetrao*), H.; *Kha*, Arakan.

A. Guinea-fowl.

Genus NUMIDA, L.

(1839) *N. meleagris*, L.

Syn. N. galeata, Pallas.

Inhabits Africa. The domestic adults are typically coloured.

Genus FRANCOLINUS, Brisson, Stephens.

Div. 1. With stouter bills.

(1840) *Fr. pintadeus*.

Syn. Tetrao pintadeus, Scopoli.
T. madagascariensis, Gmelin, (nec Scopoli).

Pintado Partridge, Mauritius. Inhabits Mauritius.

(1841) *Fr. sinensis*.

Syn. Tetrao sinensis, Osbeck.
T. perlatus, Gmelin.
Perdix Phayrei, Blyth, mentioned J. A. S. XII, 1011.

Inhabits Indo-China; China.

Div. 2. With less robust bills.

(1842) *Fr. vulgaris*, Stephens (*Pl. Enl.* 147, 148).

Syn. Tetrao francolinus, L.

Kala Tetur, H.; *Mushki Tetur*, Urdu: *Durraz* (Burnes). *Black Partridge* of sportsmen. Inhabits N. India; Afghanistan; Persia; Syria; Cyprus; Sicily.

(1843) *Fr. pictus*, (Jardine and Selby, *Orn. Ill.* pl. 50).

Syn. Perdix picta, Jardine and Selby.
P. Hepburnii, Gray, Hardw. Ill. Ind. Zool.

Painted Partridge of sportsmen. Inhabits peninsula of India, where replacing Fr. vulgaris.

D. Rock Partridges.

Genus CACCABIS, Boie.

(1844) *C. chukar* (Gould's '*Century*', pl. 71).

Syn. Perdix chukar, Gray.
Chacura pugnax, Hodgson, Madr. Journ. 1337, p. 305.

Chukor, H. (from voice); *Kulk*, or *Zirk*, Pushtu. Inhabits Himalaya; Afghanistan.

E. Ordinary Partridges.

Genus PERDIX, Brisson.

(1845) *P. gularis*, Tem. (Hardw. *Ill. Ind. Zool*). *Jungli Titr*, H. *Wood Partridge*, and *Bengal Chikor* of sportsmen. Inhabits Banks of Ganges.

(1846) *P. pondiceriana* (*Pl. Col.* 213; Hardw. *Ill. Ind. Zool*).

SYN. Tetrao pondicerianus, Gmelin.
Perdix orientalis, Gray.

Gora Titur, H. *Grey, Common*, or *Scavenger Partridge* of sportsmen. Inhabits India generally; Ceylon, never on the E. side of the Bay of Bengal.

Genus RHIZOTHERA, G. R. Gray.

(1847) *Rh. curvirostris* (Hardw. *Ill. Ind. Zool.* —the female).

SYN. Tetrao curvirostris, Raffles.
Perdix longirostris, Temminck.

Janting, Sum. Inhabits Malayan peninsula; Sumatra.

F. Wood Partridges.

Genus ARBORICOLA, Hodgson.

(1848) *A. torqueola* (*Pl. Col.* 462, 463; Hardw. *Ill. Ind. Zool.*—male.

SYN. Perdix torqueola, Valenciennes.
P. megapodia, Temminck.
P. olivacea, Gray.

Peura, *Ban Tetra*, N. W. Himalaya. *Green* or *Hill Partridge* of sportsmen. Inhabits Himalaya.

(1849) *A. rufogularis*, Blyth, J. A. S XVIII, Inhabits Sikim at a lower altitude than the preceding race.

(1850) *A. atrogularis*, Blyth, J. A. S. XVIII, Inhabits Hill regions of Assam, Sylhet, and Arakan.

(1851) *A.* (?) *Charltoni*.

SYN. Perdix Charltoni, Eyton, Ann. Mag. N. H. XVI, 230.

Inhabits Penang.

Genus ROLLULUS, Bonnaterre.

(1852) *R.* (?) *ocellatus* (Hardw. *Ill. Ind. Zool.*)

SYN. Tetrao ocellatus, Raffles. Lin. Tr. XIII, 322.
Perdix oculea, Temminck.

Troong, Sum. Inhabits Tenasserim provinces; Malayan peninsula; Sumatra.

(1853) *R. cristatus* (*Pl. Col.* 350, 351).

SYN. Columba cristata, Gmelin.
Phasianus roulroul, Scopoli.
Perdix coronata, Lathaм.
Tetrao porphyrio, Shaw.
T. viridis, Gmelin—female.

Soal, *Bestum*, Malay; *Bentol*, Sum. Inhabits Tenasserim provinces; Malayan peninsula; Sumatra.

(1854) *R. niger* (Belanger's *Voyage*, *t.* 7, male,—Hardw. *Ill. Ind. Zool.*,—female).

SYN. Cryptonyx niger, Vigors, Zool. Journ. IV. 349. } Male.
C. Dussumieri, Lesson. }
C. ferrugineus, Leadbeater, Lin. Tr. XVI. 349. } Female.
Perdix æruginosa, Eyton, P. Z. S 1839, p. 106. }

Hole, Malay. Inhabits Malayan peninsula; Sumatra.

G. Dwarf Partridges.

Genus PERDICULA, Hodgson. *Bush Quails* of Sportsmen.

(1855) *P. asiatica* (*Trans. Zool. Soc.* II, pl 3, —not good).

SYN. Coturnix pentah, Sykes.
Perdix asiatica et cambaiensis (?), Latham.

Lowa, H. *Common Bush Quail* of sportsmen: *Rock Quail*, S. India. Inhabits India generally.

(1856) *P. argoondah* (*Trans. Zool. Soc.* II, pl. 2,—not good).

SYN. Coturnix argoondah, Sykes.
Perdix rubiginosa (?), Valenciennes.

Geerza, H. *Forest Quail*. Inhabits S. India.

I. Quails. *Battair*, H.

Genus COTURNIX, Mœrrhing.

Subgenus COTURNIX, Gould.

(1857) *C. communis*, Bonnaterre (*Pl. Enl.* 170).

SYN. Tetrao coturnix, L.
C. major, Brisson.
C. dactylisonans, Temminck.
C. europæus, Swainson.
C. vulgaris, Jardine.

Ghaghus, H. (Jerdon). *Common Quail* of sportsmen. Inhabits Europe, Asia, Africa: common in India (nec Malasia).

(1858) *C. coromandelica* (*Pl. Col.* 35.)

SYN. Tetrao coromandelicus, Gmelin.
C. textilis, Temminck.

Rain Quail of sportsmen. Inhabits India generally.

(1859) *C. chinensis* (Gould's *B. A.* Vol. V, 92).

SYN. Tetrao chinensis, L.
T. manillensis, Gmelin.
Coturnix philippensis, Brisson.
O. excalfatoria, Temminck.
C. flavipes, Blyth, J. A. S. XI, 808,—the female.

Pikau, Malay; *Chaun-chan*, China; *Painted Quail* of sportsmen. Inhabits S. E. Asia and its islands; Australia. Common in the Malay countries; less so in Bengal; rare in S. India; Ceylon.

(1860) *C. (?) erythrorhyncha*, Sykes, (*Zool. Trans.* Vol. II, pl. 1). *Kokui Loosa*, H. (Jerdon). *Red-billed* or *Black Quail* of Nilgiris. Inhabits Nilgiris; Malabar.

Fam. TINAMIDÆ (?)

Subfam. TURNICINÆ.

Genus TURNIX, Bonnaterre. *Button Quails* of sportsmen.

(1861) *T. ocellatus* (Sonn. *Voy. t.* 23).

Syn. Oriolus ocellatus, Scopoli,
Tetrao luzoniensis, Gmelin.
Hemipodius thoracicus, Temminck.
H. atrogularis, Eyton, (the female), and H. taigoor apud Eyton (the female), P. Z. S. 1839, p. 107.
H. pugnax (?), Temminck (Pl. Col. 60, 2), apud G. R. Gray, Brit. Mus. Catal., and Strickland, Ann. Mag. N. H. XX, 135.

Pochio, Malay; *Puyu*, Sum.; *Drigul*, male, *Tomma*, female, Java. Inhabits Himalaya (Almorah, Nepal, Sikim); Burmese and Malay countries; Philippines. *N. B.* Himalayan, Burmese and Malayan examples are perfectly similar.

Rufous variety from S. India and Ceylon *Zool. Trans.* Vol. II, pl. 4).

Syn. Hemipodius taigoor, Sykes,—the male, and H. pugnax apud Sykes and Jerdon,—the female.

Small pale variety common in L. Bengal. *T. bengalensis*, Blyth). *Salni gundru*, Muttra.

(1862) *T. Dussumieri* (*Pl. Col.* 454, f. 2).

Syn. Hemipodius Dussumieri, Temminck.
H. maculosus (?) Temminck, apud G. R. Gray, Brit. Mus. Catal.
T. tanki, Buch. Hamilton, described J. A. S. XII, 181, (bis).

Bustard Quail of sportsmen. Inhabits India generally; Arakan.

(1863) *T. Sykesi*, A. Smith, *Zool. Africa*, art. *T. lipurana*.

Syn. Ortygis Dussumieri apud Jerdon, Catal., and J. A. S, XI, 804.

Chimnaj? H. (Muttra); *Tattu Buttera*, Sindh. Inhabits India generally: (L. Bengal?); Sindh.

Order V. CURSORES.

Fam. CASUARIDÆ.

Genus CASUARIUS, L.

(1864) *C. galeatus*, Vieillot (*Pl. Enl.* 313; *Menagerie du Museum*, pl.).

Syn. Struthio casuarius, L.
C. emu, Latham.

Inhabits Moluccas.

Genus DROMAIUS, Vieillot.

(1865) *Dr. novæ Hollandiæ* (Gould's B. A. Vol. VI, pl. 1).

Syn. Casuarius novæ hollandiæ, Latham.
Dr. ater, Vieillot.
Dromicus australis, Swainson.
Dr. emu, Stephens.

Inhabits Australia.

Fam. STRUTHIONIDÆ.

Genus STRUTHIO, L.

(1866) *Str. camelus*, L. (*Pl. Enl.* 547; *Menagerie du Museum*, pl.). *Shutur-murgh* ('Camel-fowl'), H. Inhabits Africa; Arabia?

Order VI. GRALLATORES.

Tribe PRESSIROSTRES.

Fam. OTIDÆ.

Genus OTIS, L.

Subgenus HOUBARA, Bonap.

(1867) *H. Macqueenii* (Hardwicke's *Ill. Ind. Zool.*), J. A. S. XVI, 786.

Syn. Otis Macqueenii, Gray.

Tilaor, H.; *Dugdaur*, Pushtu, *Hurriana Floriken* of sportsmen. Inhabits C. and W. deserts of India; Afghanistan.

Subgenus EUPODOTIS, Lesson.

(1868) *Eu. Edwardii* (Hardwicke's *Ill. Ind. Zool.*; Gould's *Century*, pl. 72).

Syn. O. Edwardii, Gray.
O. nigriceps, Vigors.
O. luconiensis, Vieillot (apud G. R. Gray).

Tokdar, H. Inhabits Hindustan; Luzon?

Subgenus. SYPHEOTIDES, Lesson.

(1869) *S. bengalensis* (Gould's *Century*, pl. 73, 74, 75).

Syn. Otis bengalensis, Gmelin.
O. himalayana, Vigors.
O. deliciosa, Gray.

Charj, or *Ablak Charj*, H. *Floriken* of N. India. Inhabits Bengal, Assam, Nipal; N. India generally.

(1870) *S. auritus* (Jardine and Selby, *Orn. Ill.* pl. 40, 92; Jerdon's *Ill. Ind. Orn.*, pl. 33).

Syn. Otis aurita, Latham.
O. fulva, Sykes, male in non-breeding dress.
O. atriceps, Gray.
O. indica, Shaw.

Charj, H. (S. India); *Tun-mor*, Mahr.; *Kunnoul*, Can. *Floriken* of S. India: *Likh* of Bengal. Inhabits India generally.

INCERTÆ SEDIS.

Fam. GLAREOLIDÆ.

Genus GLAREOLA, Brisson.

(1871) *Gl. orientalis*, Leach (apud G. R. Gray, *Lin. Tr.* XIII, pl. 132; pl. ; Gould's B. A. Vol. VI, pl. 23;—figures and descriptions bad, if the species be correctly assigned).

Syn. Gl. pratincola vel torquata of India, auctorum.

Inhabits India, Burmese and Malay countries.

(1872) *Gl. luctea*, Temminck (*Pl. Col.* 399; Griffiths' *Trans. An. Kingd.*, VIII, 543, pl.—very bad).

Syn. Gl. orientalis apud Jerdon, Madr. Journ. XII, 215.

Utteran, Sindh. Inhabits India generally (very abundant).

Fam. CHARADRIADÆ.

Subfam. CURSORIINÆ.

Genus CURSORIUS, Latham.

(1873) *C. coromandelicus.*

Syn. Charadrius coromandelicus, Gmelin.
Cursorius asiaticus, Latham.
C. frenatus. Illiger.
Tachydromus orientalis, Swainson.

Nukri, H. Inhabits India generally (nec Lower Bengal).

Genus MACROTARSIUS, Blyth.

(1874) *M. bitorquatus*, Jerdon, Blyth, J. A. S. XVII, 254. Inhabits E. Ghâts of peninsular India.

Subfam. ESACINÆ.

Genus ESACUS, Lesson.

(1875) *E. recurvirostris.*

Syn. Œdicnemus recurvirostris, Cuvier.
Carvanica grisea, Hodgson, J. A. S. V, 796.

Kawanak, H.: *Tuloor*, Sindh. *Bastard Floriken* of sportsmen. Inhabits India generally; Ceylon; Sindh; Arakan.

Genus ŒDICNEMUS, Cuvier.

(1876) *Œd. crepitans* (*Pl. Enl.* 919).

Syn. Charadrius œdicnemus, L.

Bursiri, or *Lámbi*, H.; *Khurma*, Beng.; *Gadang Kapala*, Sum. (Raffles). *Bastard Floriken* of some. Inhabits Europe, Asia, Africa. Very common in parts of India.

Subfam. VANELLINÆ.

Titi, Beng.

Genus HOPLOPTERUS, Bonaparte.

(1877) *H. ventralis* (Hardw. *Ill. Ind. Zool.*)

Syn. Charadrius ventralis, Wagler.
Ch. Duvaucelei, Lesson.

Nghet Taloing, Arakan. Inhabits India generally (on sand-flats). Common in Arakan.

Genus SARCIOPHORUS, Strickland.

(1878) *S. bilobus* (*Pl. Enl.* 880).

Syn. Charadrius bilobus, Gmelin.

Zirdi, H. Inhabits India generally on arable land.

Genus LOBIVANELLUS, Strickland.

(1879) *L. goensis* (Gould's *Century*, pl. 78).

Syn. Parra goensis, Gmelin.
Charadrius atrogularis, Wagler.

Tititui (expressive of cry), H.; *Titori*, Sindh. *Kibullo*, Cingh.; *Teeteedoo*, Arakan. Inhabits India generally and Malay countries (very abundant).

(1880) *L. cinereus.*

Syn. Pluvianus cinereus, Blyth, J. A. S. XI, 587.

Inhabits Bengal not uncommon in cold season.

(1881) *L. leucurus* (Denon's Egypt, *Zool.*, pl. 6, f. 2).

Syn. Charadrius leucurus, Lichtenstein.

Chizi, Kabul. Inhabits Middle Asia; N. Africa. Very rare in India.

Genus VANELLUS, L.

(1882) *V. cristatus*, Meyer (*Pl. Enl.* 242).

Syn. Tringa vanellus, L.
V. gavia, Leach.

Alatye, or *Mekhdao*, Kabul. Inhabits Europe and Asia; N. Africa (in winter): Upper India; never in S. India, or L. Bengal.

Subfam. CHARADRINÆ.

Genus SQUATAROLA, Cuvier.

(1883) *Sq. helvetica* (*Pl. Enl.* 854, 858).

Syn. Tringa helvetica, Gmelin.
Tr. squatarola, L.
Charadrius hypomelas Pallas.
Vanellus griseus, Brisson.
V. melanogaster, Bechstein.

Bara Batan, B.; *Chibugan*, Java. This is of nearly general distribution. Europe, Asia, Africa, Australia, N. America. Not rare in L. Bengal.

Genus CHARADRIUS, L.

(1884) *Ch. pluvialis*, L. (*Pl. Enl.* 904). Inhabits Europe; W. Asia; N. Africa.

(1885) *Ch. virginicus*, Bechstein (Wilson's *Am. Orn.* pl. 59, f. 5).

Syn. Ch. pluvialis apud Wilson, also Horsfield, and Jerdon. Catal.
Ch. pluvialis, var., Raffles.
Ch. marmoratus, Temminck.
Ch. pectoralis, Vieillot.
Ch. xanthocheilus (?), Wagler (Gould's B. A. Vol. VI, pl. 13).

Chota Batan, B.; *Berkay*, Malay; *Cheruling*, Sum.; *Trull*, Jav. Inhabits S. E. Asia and its islands; Australia?; N. and S. America. Very common in India.

Subgenus EUDROMIAS, Boie.

(1886) *Eu. morinellus* (*Pl. Enl.* 832).

Syn. Charadrius morinellus, L.

Inhabits Europe; W. Asia.

Subgenus HIATICULA, G. R. Gray.

(1887) *H. Geoffroyi*, vide J. A. S. XII, 180.

Syn. Charadrius Geoffroyi, Wagler.
H. rufinus, Blyth, Ann. Mag. N. H. 1843.

Inhabits India generally; not common; Java.

(1888) *H. Leschenaultii* (?), vide, J. A. S. H, 181.

Syn. Charadrius Leschenaultii (?), Lesson.
Ch. cirripedesmos, Wagler, apud Sundevall.
Ch. rufinellus, Blyth, Ann. Mag. N. H. 1833.

Inhabits India generally; extremely common L. Bengal.

(1889) *H. cantiana.*

Syn. Charadrius cantianus, Latham.
Ch. alexandrinus, Hasselquist.
Ch. littoralis, Bechstein.
Ch. albifrons, Meyer.

Inhabits Europe; Asia; N. Africa.

(1890) *H. philippina* (Sonnerat, *Voy. aux Indes*, pl. 46).

Syn. Charadrius philippinus, Scopoli.
Ch. dubius, Gmelin.
Ch. curonicus, Beseke.
Ch. minor, Meyer,
Ch. fluviatilis, Bechst.
Ch. intermedius, Menetries.
Ch. hiaticuloides, Franklin.
Ch. zonatus, Swainson.
Ch. hiaticula apud Pallas.
Ch. hiaticula. var. (?), Raffles.

Zirria, H.; *Tilla Chusmuk*, Kabul; *Bui*, Sum. Inhabits Asia; Africa; rare in N. W. Europe. Extremely common in India.

(1891) *H. pusilla.*

Syn. Charadrius pusillus, Horsfield.
Ch. minor ? Wagler, apud Jerdon, Catal.

Inhabits India and Malay countries. Rare in India.

(1892) *H. nigrifrons* (Gould's *B. A.* Vol. VI, pl. 20).

Syn. Charadrius nigrifrons, Cuvier.
Ch. melanops, Vieillot.
Ch. russatus, Jerdon. Catal.

Inhabits Australia (between 28° and 37°, S. lat.). Extremely rare in India.

Fam. CHIONIDÆ.

Genus HÆMATOPUS, L.

(1893) *H. ostralegus*, L. (*Pl. Enl.* 939). *Duriya Guzpoun* (i. e. 'Sea Longshanks' or *Himantopus*); H.; *Tetawuk*, Kabul. Inhabits Europe; Asia; N. Africa. Adult, in summer dress (bill 4 in. long). From Arakan.

Fam. RECURVIROSTRIDÆ.

Genus HIMANTOPUS, Brisson. *Lal Theng* ('Red-shank'), Beng.; *Guz-poun*, ('Yard-leg'), H.; *Chaha Bara*, Muttra; *Gusling*, Sindh: *Gagang-bayem*, Jav.

(1894) *H. candidus*, Bonnaterre (*Pl. Enl.* 878).

Syn. Charadrius himantopus, L.
Ch. autumnalis, Hasselquist.
H. vulgaris et H. rufipes, Bechstein.
H. albicollis, Vieillot.
H. atropterus, Meyer.
H. melanopterus, Temminck.
H. asiaticus, Lesson.

Inhabits Europe, Asia, Africa. Very common in India.

(1895) *H. intermedius*, Blyth, J. A. S. XVIII, p. . Inhabits India where much less common than H. candidus, and Malay countries.

Genus RECURVIROSTRA, L.

(1896) *R. avocetta*, L. (*Pl. Enl.* 353). Inhabits Europe, Asia, Africa. Not rare in Lower Bengal.

Fam. SCOLOPACIDÆ,

Kada-khoncha ('Clay-pecker'), B.; *Kutra*, H.; *Yeng-yan*, Arakan; *Trinil*, Jav.; *Chanchali*, Kabul.

Genus IBIDORHYNCHUS, Vigors.

(1897) *I. Struthersii*, Vigors (Gould's *Century*, pl. 79).

Syn. Erolia (red-billed) Hodgson, J. A. S. IV, 459.

Inhabits Himalaya.

Genus TOTANUS, Ray, Bechstein.

(1898) *T. glottis* (Gould's *Century*, pl. 75; *B. A.* Vol. VI, pl. 36;—winter plumage).

Syn. Scolopax glottis, L.
Sc. canescens, Gmelin.
Totanus chloropus, Meyer.
T. fistulans, Bechstein.
T. glottoides, Vigors.
Limosa grisea, Brisson.
L. totanus et L. glottis, Pallas.
Glottis natans, Koch.
Gl. Vigorsii, G. R. Gray.

Timtimma, H.; *Benonchung*, Jav. Inhabits Old World generally; Australia. Very common in India.

(1899) *T. stagnatilis*, Bechstein (Gould's *B. E.* pl. 314; *B. A.* Vol. VI, pl. 37; *Century*, pl. 76;—winter plumage).

Syn. Scolopax totanus, L.
T. Horsfieldi, Sykes.
T. Lathami, Gray (Hardw. Ill. Ind. Zool).
T. tenuirostris, Horsfield.

Chota Timtimma, H.; *Kiyo*, Java; *Kurruh-i-abi*, Kabul. Inhabits Old World generally; Australia. Very common in India.

(1900) *T. fuscus* (*Pl. Enl.* 875).

Syn. Scolopax fusca, L.
Sc. nigra et Tringa atra, Gmelin.
Sc. curonica, Beseke.
Limosa fusca, Brisson.
T. natans et T. maculatus, Bechstein.

Butan, H. Inhabits Europe and Asia. Common in India.

(1901) *T. calidris* (*Pl. Enl.* 845).

Syn. Scolopax calidris, L.
Tringa gambetta, Gmelin.
Tot. variegatus, Bruunich.
T. striatus et T. nævius, Brisson.

Chota Butan, H. Inhabits Europe and Asia. Very common in India.

Genus ACTITIS, Illiger.

(1902) *Act. glareola.*

Syn. Tringa glareola, Gmelin.
Totanus affinis, Horsfield.

Ola-Watua, Cingh.; *Kodidi*, Malay. Inhabits Europe and Asia. Extremely common in India.

(1903) *Act. ochropus* (*Pl. Enl.* 843).

Syn. Tringa ochropus, L.
Tonatus leucurus, Gray (Hardw. Ill. Ind. Zool.)

Tita. Sindh. Inhabits Europe and Asia. Rare in N. Africa. Common in India.

(1904) *Act. hipoleucos* (*Pl. Enl.* 850).

Syn. Tringa hipoleuca, L.

Tiha, and *Musda*, Sindh.; *Trinil batu*, Java. Inhabits Europe and Asia. Extremely common in L. Bengal.

Genus TEREKIA, Bonaparte.

(1905) *T. cinerea* (Gould's B. E. pl. 807; B. A. Vol. VI, pl. 34).

Syn. Scolopax cinerea, Gmelin.
Sc. terek, Latham.
Sc. sumatrana, Raffles.
Limosa recurvirostra, Pallas.
Fedoa terekensis, Stephens.
Tonatus javanicus, Horsfield.
Xenus cinereus, Kaup.

Kuning kaki, Sum.; *Bedaran*, or *Choweyan*, Jav. Inhabits Asia and its archipelago; rare in Europe and in Australia. Common in India.

Genus LIMOSA, Brisson.

(1906) *L. lapponica* (*Pl. Enl.* 900).

Syn. Scolopax lapponica, L.
Sc. leucophæa, Latham.
L. rufa, Brisson.
L. ferruginea, Pallas.
Totanus gregarius, Bechstein.

Inhabits Europe; Africa; never (?) India.

(1907) *L. ægocephala* (Gould's B. A. Vol. VI, pl. 28).

Syn. Scolopax ægocephala et Sc. limosa, L.
Sc. belgica, Gmelin.
Sc. melanura, Leisler.
L. leucophæa, Jerdon.
L. melanuroides, Gould.

Chaha, and *Jángral*, H.; *Susling*, Sindh; *Biru Lahut*, Jav. Inhabits Europe, Asia and its islands, and N. Australia. Very common in India.

N. B. Individuals of the same flock of this species vary excessively in size, and are frequently small as the pair represented by Mr. Gould. The bill varies in length from 2¾ to 4¼ in., and the closed wing from 7 to 8⅛ in.

Genus NUMENIUS, L.

(1908) *N. arquata*, L. (*Pl. Enl.* 818). *Sáda Kastachura* ('*White* Curve-bill,' as opposed to Ps. crepitans, Beng.; *Goar*, or *Goungh*, H.; *Terok*, Sum. Inhabits Europe, Asia, Africa. Common in India.

(1909) *N. phæopus* L. (*Pl. Enl.* 842).

Syn. Phæopus vulgaris, Flemming.

Chota Goungh, H.; *Gajahan*, Java. Inhabits Europe, Asia, Africa. Common on the sea-coasts of India, rare inland.

Genus TRINGA, L.

(1910) *Tr. canutus*, L. (*Pl. Enl.* 365, 366; Gould's B. E. pl. 324).

Syn. Tr. cinerea, Brunnich.
Tr islandica, nævia, grisea, et australis, Gmelin.
Tr. glareola, Pallas.
Tr. ferruginea, Meyer.
Tr. rufa, Wilson (Am. Orn. pl. 57, f. 2, 5).

Inhabits Europe, Africa, N. Asia. Very rare in India.

(1911) *Tr. subarquata*, Gmelin (*Pl. Enl.* 851; Gould, *B. E.* pl. 328; *B. A.*, Vol. VI, pl. 32).

Syn. Tringa ferruginea, Brunnich.
Tr. islandica, Retzius.
Tr. falcinella, Pallas.
Tr. chinensis, Gray.
Scolopax africana et pygmæa, Gmelin.
Sc. caffra, Forster.
Numenius pygmæus, Latham.
Erolia varia, Vieillot.
Falcinellus Cuvieri, Bonap.

Mayatan. Jav. Inhabits Europe, Asia, Africa, Australia. N. America. Very common in India.

(1912) *Tr. cinclus*, L. (*Pl. Enl.* 852; Gould, *B. E.* pl. 329).

Syn. Tringa alpina, L.
Tr. ruficollis et Scolopax pusilla, Gmelin.
Sc. salina, Pallas.
Numenius variabilis, Bechstein.

Inhabits Northern hemisphere. Not common in L. Bengal, nor in S. India.

(1913) *Tr. platyrhyncha* (Gould's *B. E.* pl. 331).

Syn. Tr. eloroides, Vieillot.
Limicola pygmæa, Kaup.

Inhabits Asia; rare in Europe: tolerably common in India.

(1914) *Tr. minuta*, Leisler (Gould, *B. E.* pl. 332).

Syn. Tr. pusilla, Meyer and Wolff.
Tr. cinclus Pallas, apud G. R. Gray.
Tr. damacensis, Horsfield.
Tr. pusilla ? apud Jerdon, Catal.

Chota Pun-loha, H. (Jerdon). Inhabits Europe and Asia. Very common in India.

(1915) *Tr. Temminckii*, Leisler (Gould. *B. E.* pl. 333).

Syn. Tr. pusilla, Bechstein.

Inhabits Europe and Asia. Common in India.

Genus EURINORHYNCHUS, Nilsson.

(1916) *Eu. pygmæus* (G. R. Gray, *Ill. Gen. Birds*, pl. 152, f. 1).

Syn. Platalea pygmæa, L.
Eu. griseus, Nilsson.
Eu. orientalis, Blyth, Ann. Mag. N. H. 1843.

Inhabits Europe and Asia. Extremely rare. ost numerous on the eastern coast of the Bay Bengal, a few mingled in flocks of No. 1911 -16).

Genus CALIDRIS, Illiger.

(1917) *C. arenaria* (Gould, *B. E.* pl. 335).

Syn. Charadrius calidris, L
Ch. rubidus, Gmelin.
Arenaria grisea, Bechstein.
A. vulgaris, Leisler
Tringa tridactyla, Pallas.
C. tringoides, Vieillot.

Inhabits Sea-coasts of Northern hemisphere. ery rare (?) in India.

Genus PHILOMACHUS, Mœrrhing.

(1918) *Ph. pugnax* (*Pl. Enl.* 300, 305, 306, 44; Gould *B. E.* pl. 328).

Syn. Tringa pugnax. L.
Tr. variegata, Brunnich.
Tr. equestris et grenovicensis, Latham.
Tr. rufescens, Bechstein.
Tr. littorea, Gmelin.
Limosa Hardwickii,—male } Hardw. Ill. Ind.
Totanus indicus,—female } Zool.

Gehwala, H.; *Chouchili*, Sindh. Inhabits Europe and Asia. Common in India in winter dress; onstantly leaving L. Bengal before the ruff of he male is put forth; though specimens with growing ruffs have been obtained at Rajmahl.

Genus STREPSILAS, Illiger.

(1919) *Str. interpres* (*Pl. Enl.* 856; Gould's *B. A.* Vol. VI, pl. 39).

Syn. Tringa interpres, L.
Str. collaris, Temminck.

This is if universal distribution, on all sea-oasts; rare inland.

Genus PHALAROPUS, Brisson.

(1920) *Ph. fulicarius* (Edwards, pl. 142).

Syn. Tringa fulicaria, L.
Ph. platyrhynchus, Temminck.
Ph. rufus. Bechstein.

Inhabits Northern regions. Exceedingly rare in India.

Genus MACRORHAMPHUS, Leach.

(1921) *M. semipalmatus*, Jerdon, Blyth, J. A. S. XVII, 252. Inhabits India, rare (?), or more probably confined to sea-coasts.

Genus SCOLOPAX, L.

(1922) *Sc. rusticola*, L. (*Pl. Enl.* 885).

Syn. Sc. indicus, Hodgson, J. A. S. VI, 490.

Inhabits Europe and Asia. Common in the Himalaya, and Nilgiris during the cold season. Very rare in L. Bengal, and in Ceylon.

Genus GALLINAGO, Ray, Stephens.

(1923) *G. nemoricola*, Hodgson (Jerdon's *Ill. Ind. Orn.* pl. 9), J. A. S. VI, 490. *Wood-Snipe*, Himalaya: *Solitary Snipe*, Nilgiris. Inhabits Himalaya; C. India; Nilgiris.

(1924) *G. solitaria*, Hodgson, J. A. S. VI, 491.

Syn. Sc. nemoricola, var.?

Inhabits Himalaya.

(1925) *G. stenura*.

Syn. Scolopax stenura, Temminck.
Sc. gallinago apud Raffles and Horsfield.
Sc. heterura et biclavus. Hodgson.

Kas Watua, Cingh.; *Boorkat Gadung*, Malay; *Sekadidi*, Sum.; *Burchet*. Jav. Inhabits India and Malay countries. Common in India.

(1926) *G. scolopacinus*, Bonaparte (*Pl. Enl.* 883).

Syn. Scolopax gallinago, L
G. uniclavus, Hodgson, J. A. S. VI 492.

Bharka, or *Bhuruk*, H. Inhabits Old World generally (nec Malay countries?)

(1927) *G. gallinula* (*Pl. Enl.* 884).

Syn. Scolopax gallinula, L,
Sc. minima, Ray.

Inhabits Old World generally (nec Malay countries?). Common in India.

Genus RHYNCHEA, Cuvier.

(1928) *Rh. bengalensis* (Hardw. *Ill. Ind. Zool*).

Syn. Scolopax bengalensis, L.
Sc. capensis, Gmelin, apud Raffles.
Rh. orientalis, Horsfield.
Rh. varia, Temminck.
Rh. capensis apud Gray.

Raja Kas Watua, Cingh.; *Pengung*, Jav. Inhabits India and Malay countries. Common in India.

Fam. PALAMEDEIDÆ.

Subfam. PARRINÆ.

Piho, H.

Genus METOPIDIUS, Wagler.

(1929) *M. indicus* (*Vieillot, Gal. des. Ois.* pl. 264; Hardw, *Ill. Ind. Zool.*)

Syn. Parra indica, Latham.
P. cuprea, Vahl.
P. melanochloris, Vieillot.
P. ænea, Cuvier.
P. superciliosa, Horsfield.
P. atrata, Tickell. J. A. S. II, 582. } Young.
Gallinula viridis, Gmelin. }

Dal-pipi, Beng; *Pichisan*, Java. Inhabits S. E. Asia and its islands. Very common in India.

Genus HYDROPHASIANUS, Wagler.

(1930) *H. chirurgus* (Gould's *Century*, pl. 77, Hardw. *Ill. Ind. Zool.*)

Syn Tringa chirurgus, Scopoli (Sonn. Voy. aux Indes, pl. 45,—non-breeding plumage).
Parra sinensis et lazoniensis, Gmelin.

Dal-kukra, H,; *Bhepi*, or *Bhenpi*, Beng. Inhabits India; China; Philippines. Common.

Fam. GRUIDÆ.

Genus GRUS, Mœrrhing.

(1931) *Gr. antigone* (Edwards, pl. 45; *Pl. Enl.* 865).

Syn. Ardea autigone, L.
Grus torquatus, Vieillot.
Gr. orientalis (?), Pallas.

Saras, or *Surhuns*, H.; *Gyo-gya*, Arakan. Inhabits India generally, rare to the southward.

(1932) *Gr. cinerea*, Bechstein (*Pl. Enl.* 769; Gould's *B. E.* pl. 270).

Syn. Ardea grus, L.
Grus vulgaris, Pallas.

Kulung, H.; *Kunj*, Persian. Inhabits Europe; Asia; N. Africa. Common in India.

Subgenus ANTHROPOIDES, Vigors.

(1933) *Anthr. virgo* (*Pl. Enl.* 241; Edwards, pl. 134.)

Syn. Ardea virgo, L.
Grus numidica, Brisson.

Karkarra, H.; also *Kurrounch* (Jerdon); *Kurkoncha*, Can.; *Shukdurruk*, Kabul. (All imitative of cry.) Inhabits Asia and Africa. Rare in S. Europe. Common in S. India.

Tribe CULTRIROSTRES.

Fam. ARDEADÆ.

Subfam. TANTALINÆ.

Genus FALCINELLUS. Ray, Bechstein.

(1934) *F. igneus* (Gould's *B. A.* Vol. VI, pl. 47).

Syn. Tantalus falcinellus, L.
T. igneus et viridis, Gmelin.
Ibis sacra, Temminck.

Kowari, H.; *Kala Kustechora*, B.; *Buzak*, Kabul. *Black Curlew* of sportsmen. Inhabits Old World generally; Australia. Common in India.

Genus GERONTICUS, Wagler.

(1935) *G. papillosus* (*Pl. Col.* 340).

Syn. Ibis papillosa, Temminck.

Buza or *Kala Buza*, H.; *Karunkul*, C. India. *King Curlew* of sportsmen. Inhabits India generally (nec L. Bengal).

Genus THRESKIORNIS, G. R. Gray.

(1936) *Thr. melanocephalus*, (Jardine and Selby, *Orn. Ill.*, pl. 120).

Syn. Tantalus melanocephalus, L.,—the young.
Ibis Macei et I. leucon (apud G. R. Gray), Temminck.
I. bengala, Cuvier.
I. religiosa apud Sykes.

Munda, H.; *Safed Buza* of some: *Sada Kastechora* (*i. e.* 'White Curlew') of some, B.; *Kula-gouk*, Arakan. *White Curlew* of sportsmen. Inhabits India generally; scarce in Arakan.

Genus TANTALUS, L.

(1937) *T. leucocephalus*, Gmelin (Pennant's *Ind. Zool.* pl. 11).

Syn. T. gangeticus, Shaw.
T. indicus, Cuvier.

Dokh, H.; *Jaunghal*, in Hindustan (Jerdon); *Kat Sarunga*, H., B.; *Lamjang*, and *Lumduk*, Sindh. Inhabits India generally; Ceylon; Assam; Arakan.

(1938) *T. lacteus*, Temminck (*Pl. Col.* 352).

Syn. T. ibis, var., and the young—
T. cinereus, Raffles, Lin. Tr. XIII, 327.

Inhabits Malay countries.

Genus PLATALEA, L.

(1939) *Pl. leucorodia*, L. (*Pl. Enl.* 405).

Chammach Buza (*i. e*, 'Spoon Ibis'), H.; *Chimta*, B. Inhabits Europe and Asia. Common in India.

Genus ANASTOMUS, Bonnaterre.

(1940) *A. oscitans*, (*Pl. Enl.* 932; Sonnerat, *Voy. aux Indes*, pl. 122).

Syn. Ardea oscitans, Boddaert.
A. ponticeriana et coromandelica, Gmelin.
An. typus, Temminck.
A. albus et cinereus, Vieillot.
Mycteria asiatica (?), Latham.

Gungla or *Gunglu*, H. (Jerdon); also *Ghongal*, H.; *Samuk-khol*, B.; *Tont'h Bhunga* (Tickell); *Kha-yoo-tsoot*, Arakan. Inhabits India generally. Common.

INCERTÆ SEDIS.

Genus DROMAS, Payk.

(1941) *D. ardeola*, Payk. (*Pl. Col.* 362; Salt, 'Travels in Abyssinia,' pl. 31).

Syn. Erodia amphilensis, Stanley.
Ammoptila charadroides? apud Jerdon, Catal.

Inhabits Sea-coast of S. India and Ceylon; also of E. Africa.

Subfam. CICONINÆ.

Genus MYCTERIA, L.

(1942) *M. australis*, Shaw (Gould's *B. A.* Vol. VI, pl. 51).

Syn. Ardea oscitans, Latham.
Ciconia leucoptera, Wagler.

Bunarus, and *Lohajung*, H.; *Ram Salik*, B. Inhabits India generally, Malay countries, and Australia.

Genus CICONIA, L.

(1943) *C. alba*, Belon (*Pl. Enl.* 866).

Syn. Ardea ciconia, L.

Lag-lag, or *Ujli*; also *Haji Lag-lag*, H. (Jerdon); *Dhek*, Muttra. Inhabits Europe; Asia; N. Africa; India generally; very common in parts of Bengal, during the cold season.

(1944) *C. nigra*, L. (*Pl. Enl.* 399).

Syn. Ardea nigra, L.
A. chrysopelargus, Lichtenstein.
A. fusca, Brisson,—the young.
White-bellied Jabiru, Latham.

Súrmai, H. (Jerdon). Inhabits Europe; Asia; N. Africa: common in N. India; very rare in L. Bengal.

(1945) *C. leucocephala* (*Pl. Enl.* 906).

SYN. Ardea leucocephala, Gmelin.
C. umbellata, Wagler.

Manikjor, H., B.; *Khyee-kheng-tswop*, Arakan; *Sandang-lawe*, Java. Inhabits India generally; Burmese and Malay countries. Common.

Genus LEPTOPTILOS, Lesson.

(1946) *L. argala* (*Pl. Enl.* 300).

SYN. Ardea argala, L.
A. dubia, Gmelin.
Ciconia mirabou, Temminck.
C. nudifrons, Jerdon, Catal.,—young.
Argala migratoria, Hodgson, Ind. Rev. 1838, p. 563.

Hargila, B.; *Dusta*, H. (Jerdon); *Chaniari Dhauk*, H. (Hodgson); *Garar*, Muttra. 'Adjutant' of Europeans. Inhabits N. Asia? Visiting India during the rains, when common in L. Bengal.

(1947) *L. javanica* (*Pt. Col.* 312).

SYN. Ciconia javanica, Horsfield.
C. capillata, Temminck.
C. calva, Jerdon, Catal.
C. nudifrons, and the young—C. cristata, McClelland, Ind. Rev. 1838, pl. 512.
Argala immigratoria, Hodgson, ibid., p. 563.
Ardea dubia of Sumatra, apud Raffles.

Madanchur, B.; *Chinjara*, H. (Jerdon); *Tontsap* and *Nghet-gyee*, Arakan; *Bangou Sula*, *Burong Kambing*, and *Burong Gaja* of Malays (Raffles); *Bangu*, Java. Inhabits India and Malay countries; never frequenting towns, like L. argala.

Subfam ARDEINÆ.

Genus ARDEA, L. *Bog*, or *Bogla*, H.; *Barado*, Sindh; *Nga-heet* and *Nghet-nga-nwa*, Arakan.

(1948) *A. goliath*, Ruppell (Atlas pl. , the adult).

SYN. A. typhon (?), Temminck (Pl. Col. 475)?
A. nobilis, Blyth, Ann. Mag. N. H. XIII, 175,—young bird.

Inhabits Bengal (in cold season); Nepal: also Africa. Several specimens of this immense heron have been procured in the vicinity of Calcutta, but all hitherto in the plumage of the first year.

(1949) *A. sumatrana*, Raffles Gould's B. A. Vol. VI, pl. 54,—the second plumage.

SYN. A. fusca, Blyth, Ann. Mag. N. H. XIII, 176.
A. rectirostris, Gould.

San Barado, Sindh. Inhabits Sindh; Sikim (tarai?); Assam; Arakan; Sumatra; Australia.

(1950) *A. cinerea*, L. (*Pl. Enl.* 755, 787).

SYN. A. major, L.
A. bruh (?), Jacquemont, Atlas, pl.

Kabud, H. (Jerdon). *Sada Kánk*, and *Anjun*, B.; *Saa*, Sindh; *Changa Awu*, Jav. Inhabits Europe; Asia; Africa. Common in India.

(1951) *A. purpurea*, L. (*Pl. Enl.* 783).

SYN. A. caspica, purpurata, rubiginosa (?), et botaurus aut rufa, Gmelin.
A. variegata, Scopoli.
A. monticola, LaPey.

Nari, H. (Jerdon); *Lál Kank*, B.; *Khyonhyoing*, Arakan; *Changa-ulu*, Java. Inhabits Europe, Asia, Africa.

Subgenus HERODIAS, Boie.

Koka, Cingh.; *Kantal*, Jav.; *Ooker*, and *Kumole*, Kabul; *Byoing Phyoo*, Arakan.

(1952) *H. alba* (*Pl. Enl.* 886; Goulds B. A. Vol. VI, pl. 56).

SYN. Ardea alba, L.
A. egretta, Temminck.
A. nivea, Lesson.
A. modesta, Gray.
A. flavirostris et melanorhynchos, Wagler.
A. torra, Buchanan Hamilton and Franklin.
A. syrmatophorus, Gould.

Mallang Bagla, *Turra Bagla*, and *Patoka Bagla*, H. (Jerdon); *Dhar Bagla*, B.; *Bacho Barado*, Sindh. Inhabits S. E. Europe; Africa; Asia and its islands; Australia. Common in India.

(1953) *H. intermedia* (Gould's B. A. Vol. VI. pl. 57).

SYN. Ardea intermedia, Wagler, Isis, 1829.
A. egrettoides, Temminck.
A. flavirostris, Bonnaterre, nec Wagler.
A. putea, Buchanan Hamilton.
A. nigrirostris, Gray,
H. plumifera, Gould.

Inhabits as last. The most abundant species of Egret in the Malay countries. Common also in India.

(1954) *H. garzetta* (*Pl. Enl.* 901).

SYN. Ardea garzetta, L.
A. xanthodactyla et A. nivea, Gmelin.
A. orientalis, Gray.
A. melanopus, Wagler, } Variety.
A. nigripes, Temminck, }
H. immaculata (?), Gould.

Kirchia (or *Kilchia*) *Bagla*, H. (Jerdon). Inhabits as last. Very common in India. Australia?

(1955) *H. bubulcus* (*Pl. Enl.* 910: Denon's Egypt, *Zool.* t. 1, pl. 8, f. 1).

SYN. Ardea bubulcus, Savigny.
A. lucida, Raffinesque.
A. æquinoctialis, Montagu.
A. coromandelensis, Stephens.
A. bicolor and A. ruficapilla, Vieillot.
A. russata, Temminck.
A. affinis, Horsfield.
A. coromandelica, Lichtenstein.
A. Veranii, Roux.
A. leucocephala, Cuvier.
A. caboga, Franklin.
A. ibis, Hasselquist.

Durrea and *Surkhia Bogla*, H.; *Gai Bagla*, B.; *Sudu Koka*, Cingh.; *Kantal Chilik*, Jav. Inhabits as last, associating much with cattle. Nec Australia?

(1956) *H. asha*.

SYN. Ardea asha, Sykes.
Herodias pannosa (?), Gould (B. A. Vol. VI, pl. 59).

Kala Bugla, H. (Jerdon). Inhabits Peninsula of India; Sindh. Nec (?) L. Bengal. Australia?

(1957) *H. jugularis* (Gould's B. A. Vol. VI, pl. 60).

Syn. Ardea jugularis, Forster.
A. cærulea, var., Latham.
A. matook, Vieillot.
Demigretta concolor, Blyth. J. A.S. XV, 372.
H. Greyi,—Gray (Gould's B. A Vol. VI, pl. 61),—permanent white variety.

Inhabits Arakan; Nicobar Islands; N. Zealand; Africa (Senegal)?

Subgenus BUTORIDES, Blyth.

(1958) *B. javanica.*

Syn. Ardea javanica, Horsfield.

Kancha Bagla, H.; *Kuno Bag*, B.; *Puchong*, Malay; *Upi upian*, Jav. Inhabits India and Malay countries. Common.

Subgenus ARDEOLA, Boie.

(1959) *A. leucoptera* (Hardw. *Ill. Ind. Zool*).

Syn. A. leucoptera, Boddaert,
A. Grayi, Sykes—breeding dress,
A. malaccensis, Gmelin—non-breeding dress.

Undki Bogli. H. (Jerdon); *Kuro Bog*, B.; *Kana koka*, Cingh. Inhabits India generally; Burmese countries; Malayan peninsula. Exceedingly common.

Subgenus NYCTICORAX, Brisson, Stephens.

(1960) *N. griseus* (*Pl. Enl.* 758).

Syn. Ardea nycticorax et grisea, L.
N. europæus, Stephens.

Wok (from voice), and *Batchka*, Beng., H.; *Gadri*, Sindh; *Leng-wet*, Arakan; *Guwo*, Jav. Inhabits Europe; Asia; Africa. Common in India.

Subgenus TIGRISOMA, Swainson.

(1961) *T. melanolopha.*

Syn. Ardea melanolopha. Raffles, Lin. Tr. XIII, 316.

Inhabits Ceylon; Arakan; Malayan peninsula; Sumatra.

Subgenus BOTAURUS, Brisson, Stephens.

(1962) *B. stellaris* (*Pl. Enl.* 789).

Syn. Ardea stellaris, L.

Nir goung, H. Inhabits Europe; Asia; Africa. Common in Bengal.

Subgenus ARDETTA, G. R. Gray.

(1963) *A. flavicollis* (Jerdon's *Ill. Ind. Orn.* pl. 16; Gould's *B. A.* Vol. VI, pl. 65,—not good, if the Australian be truly identical with the Indian species.

Syn. Ardea flavicollis, Latham.
A. nigra, Vieillot.
A. picta, Raffles,—the young figured in Hardwicke's Ill. Ind. Zool.

Kala and *Nol Bogla*, B.; *Tototan* or *Tomtomman*. Jav. Inhabits India generally: not common, nor rare in L. Bengal: Ceylon; Tippera; Arakan; Tenasserim; Malayan peninsula; Sumatra; China; Australia.

(1964) *A. cinnamomea* (Hardw. *Ill. Ind. Zool*).

Syn. Ardea cinnamomea, Gmelin.

Lal Bogla, H.; *Nati*, *korawaka*, Cingh.; *Ayam-Ayaman*, Jav. Inhabits India and Malay countries. Common.

(1965) *A. sinensis* (young figured as No. 1651, Hardw. *Ill. Ind. Zool.*,—not good).

Syn. Ardea sinensis, Gmelin.
A. lepida et A. nebulosa, Horsfield.

Bambangan, Jav. Inhabits India generally; Ceylon; Arakan; Jav; China. Generally observed on high reeds.

(1966) *A. minuta* (*Pl. Enl.* 323).

Syn. Ardea minuta, L.
A. danubialis et soloniensis, Gmelin.

Inhabits Europe, Africa, C. Asia; Nepal.

Tribe MACRODACTYLI.

Fam. RALLIDÆ.

Genus PORPHYRIO, Brisson.

(1967) *P. poliocephalus*, Latham. *Kaim*, or *Kayem*, Beng.: *Keima*, H.; *Kogh*, Sindh. Inhabits India generally; Arakan; Tenasserim. Replaced in the Malayan peninsula and archipelago by *P. smaragdinus*, Temminck, v. *indicus*, Horsfield; *Tedone* of the Malays; *Pellung*, Jav.

Genus GALLICREX, Blyth.

(1968) *G. cristatus.*

Syn. Gallinula cristata, Latham.
G. plumbea, Vieillot.
G. lugubris (male), and G. gularis (female), Horsfield.
Rallus rufescens apud Jerdon, Madr. Journ. XII, 205 (female).
Fulica cinerea, Gmelin,

Kora, or *Kongra*, Beng.; *Bontod*, and *Bureng*, Jav. Inhabits India generally, and Malay countries. Common in Bengal.

Genus PORZANA, Vieillot.

(1969) *P. phœnicura* (*Pl. Enl.* 896; Horsfield, *Zool. Res. in Java*, pl.).

Syn. Rallus phœnicurus, Pennant.
Gallinula javanica, Horsfield.
G. erythrina, Bechstein.
Fulica chinensis, Boddaert.

Daouk, or *Dehuk*, Beng.; *Dawuk*, H. (Jerdon); *Korawaka*, Cingh.; *Kurai*, Sindh; *Kaloo-gwet*, Arakan; *Roa-Roa*, Malay; *Sri-bomba*, Jav. Inhabits S. E. Asia and its archipelago. Extremely common.

(1970) *P. akool.*

Syn. Gallinula akool, Sykes (nec Jerdon).
G. modesta, Swainson 2½ Cent., p. 348.

Inhabits India generally. Rare in L. Bengal.

(1971) *P. maruetta* (*Pl. Enl.* 751).

Syn. Rallus porzana, L.
R. maruetta, Brisson.

Khairi, Beng. (generic); *Teerteeruk*, Kabul. Inhabits Europe, Asia, and Africa. Common in India.

(1972) *P. pygmæa* (J. and S., *Ill. Orn.*, pl. 15).

Syn. Crex pygmæa, Naumann
Gallinula Baillonii, Vieillot.

Inhabits Europe, Asia, and N. Africa. Very common in India.

(1973) *P. quadristrigata*.

Syn. Rallus quadristrigatus, Horsfield.
Gallinula superciliosa, Temminck.
G. leucosoma, Swainson, 2½ Cent, p. 348.

Inhabits Malay countries.

(1974) *P. fusca* (*Pl. Enl.* 773; *Pl. Col.* 387).

Syn. Rallus fuscus, L.
Gallinula rubiginosa, Tem.

Inhabits S. E. Asia and its islands. Common in India.

(1975) *P. fasciata* (*Pl. Col.* 417), J. A. S. XI, 797.

Syn. Rallus fasciatus, Raffles.
Gallinula euryzona, Tem.
Rallus ruficeps, Cuv.

Sintar, Malay (generic). Inhabits Malayan peninsula and archipelago.

(1976) *P. ceylonica* (Brown's *Ill.*, pl. 37.)

Syn. Rallus ceylonicus, Gmelin.

Inhabits Peninsular India; Ceylon.

Genus ORTYGOMETRA, Ray.

(1977) *O. crex* (*Pl. Enl.* 750).

Syn. Gallinula crex, L.
Crex pratensis, Bechstein.

Inhabits Europe and W. Asia: common in Afghanistan.

(1978) *R. striatus*, L.

Syn. R. gularis, Horsfield.

Ayam-aym, Sum.; *Tikussan*, Jav. Inhabits S. E. Asia and its islands. Common in India.

(1979) *R. indicus*, Blyth, J. A. S. XVII, p.

Syn. R. aquaticus of Indian auctorum.

Inhabits India generally. Common.

Genus. GALLINULA, Brisson.

(1980) *G. chloropus* (*Pl. Enl.* 877).

Syn. Fulica chloropus et F. fusca, L.
G. parvifrons, Blyth.
G. akool apud Jerdon, Catal.

Pan Paira, *Dahuk Paira*, B.; *Kushkul*, Cabul. Inhabits Europe, Asia, and N. Africa. Common in India.

Genus FULICA, L.

(1981) *F. atra*, L. (*Pl. Enl.* 197).

Syn. F. aterrima, L.
F. æthiops et F. leucoryx, Sparrman.
F. pullata et atrata, Pallas.

Dasri, or *Dasarni*. H.; *Kushkul*, Cabul; *Ari*, Sindh. Inhabits Europe, Asia, and N. Africa. Common in India.

Order VIII. NATATORES.

Tribe LONGIPENNES.

Fam. LARIDÆ.

Subfam. LARINÆ.

Genus CATARRACTA, Brunnich.

(1982) *C. cephus*, Brunnich (Gould's *B. E.* pl. 442).

Syn. Lestris parasiticus, Swainson.
L. crepidatus, Temminck
L. Buffonii, Boie.

Inhabits Northern seas.

Genus LARUS, L. *Gang Chil* (*i. e.* 'Ganges Kite,' B.): *Badkhor*, Cabul.

(1983) *L. fuscus*, L. (Gould, *B. E.*, pl. 431).

Syn. L. flavipes, Meyer.
L. argentatus apud Montagu.

Inhabits Atlantic; Mediterranean; Red Sea; Indian Ocean; C. G. Hope; N. Zealand. Cabul (Burnes).

(1984) *L. icthyaetus*, Pallas (Ruppell, *Atlas*, pl. 17).

Syn. L. kroikocephalus, Jameson, J. A. S. VIII, 242.
Icthyaetus Pallasi, Kaup.

Inhabits Asia; Indian Ocean; common in Bay of Bengal.

(1985) *L. ridibundus*, L. (*Pl. Enl.* 960, 970; Gould, B. E. pl. 425).

Syn. L. cinerarius et L. erythropus, Gmelin.
L. atricilla et L. nævia, Pallas.
L. canescens, Bechstein.
L. capistratus, Temminck.
Sterna obscura, Latham.

Inhabits Europe; Asia; N. Africa: much less common in L. Bengal than L. fuscus.

(1986) *L. brunnicephalus*, Jerdon, *Madr. Journ.* XIII, 225.

Syn. L. ridibundus, var., Sundevall.

Inhabits India generally. Common.

Subfamily. STERNINÆ.

Gáng Chil, B; *Tikári*, H.

Div. 1. Skimmers.

Genus RHYNCHOPS, L.

(1987) *Rh. albicollis*, Swainson (Gray's *Ill. Gen. Birds*, pl. 180). Inhabits India generally.

Div. 2. Marsh Terns.

Genus SYLOCHELIDON, Brehm.

(1988) *S. caspius* (Savigny, *Ois. d'Ægypt*, pl. 9, f. 1; Gould's B. A. Vol. VII, pl. 22).

Syn. Sterna caspia, Latham.
S. strenuus, Gould.
Thalassites, Catal., No. 405, Jerdon.

Inhabits India generally (nec L. Bengal), and the warmer regions of the Old World; Australia; rare in N. W. Europe.

Genus GELOCHELIDON, Brehm.

(1989) *G. anglicus* (Wilson's *Am. Orn.* pl. 72, f. 6).

Syn. Sterna anglica, Montagu.
St. aranea, Wilson (apud Audubon, Selby, and de Kay).
St. risoria et St. meridionalis, Brehm.
St. nilotica, Gmelin.
St. affinis, Horsfield (nec Ruppell).

Inhabits warmer regions of the Old World, extending also to America. Common in India.

Genus HYDROCHELIDON, Boie.

(1990) *H. indica.*

Syn. Viralva indica, Stephens.
Sterna hybrida, Pallas.
St. leucopareia, Natterer,
St. grisea, Horsfield,
St. cantiaca (?) apud Raffles.
St. similis, Gray (Hardw. Ill. Ind. Zool.)

Samar Saut ?, Sum.; *Puter-lahut*, Jav. Inhabits Europe; Asia; Africa; Malay countries: rare in N. W. Europe: very common in India. *N. B. H. fluviatilis*, (Gould's *B. A.* Vol. VII, pl. 31,) of Australia, would seem to differ only in having the entire throat white when in summer dress.

(1991) *H. nigra* (*Pl. Enl.* 333).

Syn. Sterna nigra, nævia, et L. hybrida (?), L. St. fissipes, Pallas. St. leucoptera, Temminck. } apud G. R. Gray.

Inhabits S. Europe; Africa; W. Asia. Rare in N. and C. Europe.

Genus THALASSEUS, Boie.

(1992) *Th. bengalensis* (Gould's B. A. Vol. VII, pl. 25).

Syn. Sterna bengalensis, Lesson,
St. media (?), Horsfield.
Th. Torressi, Gould
Sterna, Jerdon's Catal., No. 402.

Toyang kacher (?), Java. Inhabits Indian and Malayan seas; N. Australia.

Genus STERNA, L.

Subgenus SEENA, Blyth.

(1993) *Seena aurantia* (Hardw. *Ill. Ind. Zool.*

Syn. Sterna seena, Sykes.
St. aurantia, et St. brevirostris, Gray.

Inhabits India generally. Common along the rivers.

Subgenus STERNA.

(1994) *St. paradisea*, Brunnich (Vieillot, *Gal. des Ois.*, pl. 290).

Syn. St. Dougalli, Montagu.

Inhabits Europe; Asia; Africa; America; coasts of India.

(1995) *St. hirundo*, L. (*Pl. Enl.* 987).

Syn. St. fluviatilis, Naumann.

Inhabits Europe; Asia; Africa; Nilgiris; Ceylon.

(1996) *St. javanica*, Horsfield (Hardw. *Ill Ind. Zool*).

Syn. St. melanogaster, Temminck.
St. acuticauda, Gray.

Inhabits India and Malay countries. Common along the rivers.

Subgenus STERNULA, Boie.

(1997) *St. minuta* (*Pl. Enl.* 996; Wilson's *Am. Orn.* pl. 60, f. 2).

Syn. Sterna minuta, L.
St. sumatrana (?), Raffles.
St. sinensis (?), Gmelin,—young.

Toyang, Jav. Inhabits Northern hemisphere: represented in S. America and in Australia by closely allied species. Common on W. coast of India.

Div. 4. Oceanic Terns.

Genus ONYCHOPRION, Wagler.

(1998) *On. melanauchen* (Gould's *B. A.* Vol. VII, pl. 28).

Syn. Sterna melanauchen, Temminck.
St. minuta, Horsfield (apud G. R. Gray).

Inhabits Indian Ocean; Malayan seas: N. Australia. Breeds numerously on Nicobar Islands.

(1999) *On. anasthætus* (Sonnerat, *Voy. a la Nouv. Guinée*, pl. 84).

Syn. Sterna anasthætus, Scopoli.
St. panayana, Latham (nec apud Gould? B. A. Vol. VII, pl 33).
St. infuscata, Lichtenstein (from E. Indies).
St. antarctica, Mus de Paris, Lesson (Calcutta).

Inhabits Indian Ocean; Bay of Bengal; Malayan Seas.

Genus ANOUS, Leach.

(2000) *A. stolidus* (Gould's *B. A.* Vol. VII, pl. 34).

Syn. Sterna stolida, L,
A. niger, Stephens.
Gaira fusca, Brisson.
St. philippina (?), Latham.

Chamar, Malay (generic). This is of very general distribution, over the temperate and warmer parts of the ocean. Common in the Indian seas.

(2001) *A. tenuirostris* (Gould's *B. A.* Vol. VII, pl. 36).

Syn. Sterna tenuirostris, Temminck.
A. leucocapillus, Gould.

Inhabits coasts of Africa; Indian Ocean; Australian seas.

Fam. PROCELLARIDÆ.

Genus DIOMEDEA, L.

(2002) *D. exulans*, L. (Gould's *B. A.* Vol. VII, pl. 38).

Syn. Plautus albatrus, Klein.

Inhabits S. Ocean.

(2003) *D. melanophrys*, Temminck (Gould's *A.* Vol. VII, pl. 43). Inhabits S. Ocean.

(2004) *D. chlororhynchos*, Latham (Gould's *A.* Vol. VII, pl. 42).

Syn. D. chrysostoma, Forster.

Inhabits S. Ocean.

(2005) *D. fuliginosa*, Gmelin (Gould, *B. A.* ol. VII, pl. 44).

Syn. D. palpebrata, Forster.
D. antarctica, Banks.
D. fusca, Audubon.

Inhabits Southern Ocean.

Genus PROCELLARIA, L.

(2006) *Pr. gigantea*, Gmelin (Gould's *B. A.* ol. VII, pl. 45). Inhabits Southern Ocean.

(2007) *Pr. glacialoides*, A. Smith (Gould's *B. A.* Vol. VII, pl. 48).

Syn. Pr. tenuirostris, Audubon.

Inhabits S. Ocean.

(2008) *Pr. Cookii*, G. R. Gray (Gould's *B. A.* Vol. VII, pl. 51).

Syn. Pr. velox, Solander, MS.
Pr. leucoptera, Gould.

Inhabits Southern Ocean.

(2009) *Pr. turtur*, Solander (Gould's *B. A.* Vol. VII, pl. 54). Inhabits S. Ocean.

Genus PRION, Lacepede.

(2010) *Pr. vittatus* (Gould's *B. A.* Vol. VII, pl. 55).

Syn. Procellaria vittata, Forster.
Pr. Forsteri, Latham.

Inhabits Southern Ocean.

Genus PELICANOIDES, Lacepede.

(2011) *P. urinatrix*, (Gould's *B. A.* Vol. VII, pl. 60).

Syn. Procellaria urinatrix, Latham.
Pr. tridactyla, Forster.
Puffinaria Garnottii, Lesson.

Inhabits S. Ocean: Bay of Bengal (apud Sundevall).

Genus PUFFINUS, Brisson.

(2012) *P. major*, Faber (*Pl. Enl.* 962; A. Smith, *S. Afr. Zool.*, Aves, pl. 56).

Syn. Procellaria puffinus, L.
Pr. grisea, Gmelin.
P. fuliginosus, Strickland.
P. cinereus, A. Smith.

Inhabits Atlantic; Mediterranean; S. Ocean.

Genus THALASSIDROMA, Vigors.

(2013) *Th. oceanica*, Kuhl (Gould's *B. A.* Vol. VII, pl. 65).

Syn. Th. Wilsonii, Bonaparte.
Procellaria pelagica, apud Wilson.

Inhabits N. and S. Oceans.

Tribe TOTIPALMATI.

Fam. PELICANIDÆ.

Genus PHAETON, L.

(2014) *Ph. æthereus*, L. (the young; Gould's *B. A.* Vol. VII, pl. 73).

Syn. Ph. phœnicurus, Gmelin (the adult).

Inhabits Bay of Bengal; Indian Ocean; S. Seas, &c.

(2015) *Ph. candidus* (*Pl. Enl.* 369; Edwards, pl. 149, f. 2).

Syn. Lepturus candidus, Brisson.
Ph. melanorhynchos, Gmelin (the young).

Inhabits Bay of Bengal; Indian Ocean; S. Seas, &c.

Genus SULA, Brisson.

(2016) *S. fiber* (Gould's *B. A.* Vol. VII, pl. 78).

Syn. Pelicanus fiber et P. sula, L.
S. australis, Stephens.
S. braziliensis, Spix.

Inhabits Tropical Seas. Common in Bay of Bengal.

(2017) *S. piscator* (Gould's *B. A.* Vol. VII, pl. 79).

Syn. Pelicanus piscator, L.
S. candida, Stephens.
S. erythrorhyncha, Brandt.
S. rubripes, Gould.

Inhabits Tropical Seas. Common in Bay of Bengal, &c.

Genus PELICANUS, L.

(2018) *P. onocrotalus*, L. (Edwards, pl. 93).

Syn. P. roseus, Eversmann, } G.R. Gray.
Onocrotalus phœnix, Lesson, }

Inhabits S. Europe; W. Asia; Africa. *A.* stuffed head and neck, copious pendent crest 5 in. long, and with the rest of the feathers very unlike those of either Indian Pelican.

(2019) *P. javanicus*, Horsfield (Stephens, in Shaw's Zoology, XIII, 109, pl. 12).

Syn. P. onocrotalus of India, auctorum (also of Pallas?).
P. crispus (?), Bruch.

Hawasil, and *Gaganbher*, H.; *Gara Polo*, Beng. (generic); *Lampipi*, Malay; *Bukhul*, Java. Inhabits S. E. Asia and its islands. Common in India.

(2020) *P. philippensis*, Gmelin (*Pl. Enl.* 965).

Syn. P. roseus et P. manillensis, Gmelin.

Won-bo, Arakan; *Walang kadda*, Jav. Inhabits S. E. Asia and its islands. More common in L. Bengal than the preceding species.

Genus GRACULUS, L.

(2021) *Gr. carbo*, L. (*Pl. Enl.* 927).

Syn. Carbo cormoranus, Meyer.
C. albiventris, Tickell, J. A. S. XI, 463,—the young.

Gho-ghur, H.; *Khambo*, Sindh. Inhabits Northern hemisphere. Not common in most parts of India and never in L. Bengal. Most numerous towards the Himalaya.

(2022) *Gr. sinensis* (*Atlas* to Macartney's Embassy to *China*, pl.).

Syn. Pelicanus sinensis, Shaw.
Phalacrocorax fuscicollis, Stephens.
Ph. leucotis, Blyth.
Carbo leucogaster, Meyer.
C. nudigula, Brandt.

Inhabits Asia, chiefly to the eastward. In India, commonest towards the Himalaya, rare in the peninsula, and never seen in L. Bengal.

(2023) *Gr. Linnæi*, G. R. Gray (*Pl. Col.* 322).

Syn. Pelicanus graculus, L., apud G. R. Gray (nec apud Temminck).
P. leucogaster, Vieillot.
Carbo cristatus, Temminck.

Inhabits Europe; Africa to C. G. Hope.

(2024) *Gr. pygmæus* (Hardw. *Ill. Ind. Zool.*).

Syn. Pelicanus pygmæus, Pallas.
Carbo javanicus, Horsfield.
C. melanognathus, Brandt.
Phalacrocorax niger, Vieillot.
Halieus africanus apud Sundevall.

Jograbki, *Pan-koul*, H.; *Pan-Kowa* (i. e. 'Water Crow'), *Pan-Kowri*, and *Pan-kouti*, B.; *Kaben*, Sindh; *Tong-gyee*, Arakan; *Pechuch*, Jav. Inhabits Asia and its archipelago. Extremely common throughout India.

Genus PLOTUS, L.

(2025) *Pl. melanogaster*, Gmelin.

Syn. Pl. Vaillantii of India, auctorum.

Banwa, and *Pan Dubbi*, H.; *Goyar*, B.; *Teng-gyee*, Arakan; *Dandang Ayer*, Sum. Inhabits S. E. Asia and its archipelago. Common throughout India.

Tribe LAMELLIROSTRES.

Fam. ANATIDÆ.

Hans (root of *Anser*, &c.), H.

Subfam. PHŒNICOPTERINÆ.

Genus PHŒNICOPTERUS, L.

([illegible] Pallas.

Syn. [illegible] Temminck.

Bog-hans ('Heron Goose'), H.; *Kaan T'hunti*, B. Inhabits warmer regions of the old continent. Common in parts of India. It is the smaller Indian Flamingo.

Subfam. ANSERINÆ.

Div. 1. Swans.

Genus CYGNUS, L.

(2027) *C. olor* (*Pl. Enl.* 913).

Syn. Anas olor, L.
C. sibilus, Pallas.
C. mansuetus, Ray.
C. gibbus, Bechstein.

Inhabits N. Asia and of E. Europe, chiefly.

(2028) *C. atrata* (Gould's B. A. Vol. VII, pl. 6).

Syn. Anas atrata, Latham.
A. plutonia, Shaw.
Anas novæ hollandiæ, Bonnaterre.

Inhabits Australia.

Div. 2. Ordinary Geese.

Raj Hans, H.

Genus ANSER, Brisson.

(2029) *A. cygnoides*, (*Pl. Enl.* 347).

Syn. Anas cygnoides, L.

Inhabits China, where domesticated. Unknown in the wild state. The domestic Geese of India are a hybrid race between this and the next species.

(2030) *A. cinereus*, Meyer (Gould's *B. E.* pl. 347,—very bad; Yarrell's *Br. Birds*, III, 53).

Syn. Anas anser, L.
Anser ferus, Gesner.
A. vulgaris, Pallas.
A. palustris, Fleming.

Inhabits Northern hemisphere. Common in India; somewhat rare in W. Europe.

(2031) *A. brachyrhynchus*, Baillion (Yarrell's *Br. Birds*, III, 64).

Syn. A. phœnicopus, Bartlett.
A. brevirostris, Thienem.
A. rufescens (?), Brehm.

Inhabits N. hemisphere. Punjab.

Subgenus BERNICLA, Stephens.

(2032) *B. indica* (Gould's *Century*, pl. 80.

Syn Anas indica, Gmelin.
Anser undulatus, Brandt.

Inhabits India generally, common in the cold season.

Div. 3. Perching Geese.

Genus DENDROCYGNA, Swainson. *Silli* H.; *Saral*, B.

(2033) *D. major*, Jerdon (*Ill. Ind. Orn.*, pl. 23). Inhabits India generally; Not rare in L. Bengal.

(2034) *D. arcuata* (Horsfield, *Zool. Res. in Java*, pl.

Syn. Anas arcuata, Cuvier.
A. javanica, Horsfield.
Marecca awsuree, Sykes.

Butunth, Sindh; *Tseet-tsa-lee*, Arakan; *Bilibi*, Sum.; *Meliris*, Jav. Inhabits India and Malay countries. Extremely common. *N. B.* The Australian species referred to this by Mr. Gould (*B. A.* Vol. VII, pl. 14), is obviously distinct and new.

Genus SARCIDIORNIS, Eyton.

(2035) *S. melanotus* (*Pl. Enl.* 937; Pennant's *Ind. Zool.*, pl. 11).

Syn. Anser melanotus, Pennant.

Nukta, H.; *Tau-bai*, Arakan. Inhabits India and Burmah. Not common in L. Bengal.

(2036) *S.* (?) *leucoptera*, Blyth, J. A. S. XVIII. Inhabits Burmah; Tenasserim provinces.

Genus NETTAPUS, Brandt.

(2037) *N. coromandelianus* (*Pl. Enl.* 949, 950; Hardw. *Ill. Ind. Zool*).

Syn. Anas coromandeliana, Gmelin.
Berniela girra, Gray.
Dendrocygna affinis, Jerdon—winter dress.

Girja and *Girri*, H.; *Ghangerel*, B.; *Karagat*, Arakan. Inhabits India and Malay countries. Extremely common.

Div. 4. Shieldrakes.

Genus CASARCA, Bonap.

(2038) *C. rutila* (Gould's B. E. pl. 358).

Syn. Anas rutila, Pallas.
A. casarca, L.
A. rubra, Gmelin.

Surkhab and *Chukwa*, male, *Chukwi*, female, H. Inhabits Asia generally; N. Africa: rare in Europe: common in India.

Genus TADORNA, Leach.

(2039) *T. vulpanser*, Fleming (*Pl. Enl.* 53; Gould's B. E. pl. 357).

Syn. Anas tadorna, L.
A. cornuta, Gmelin.
T. familiaris, Boie.
T. Bellonii, Stephens.

Mekez (male), *Alikaz* (female), Cabul; *Shah Murghabi*, *Ali-jur gub*, and *Niraji*, Sindh. Inhabits Europe; Asia; N. Africa. Not common in L. Bengal; more so on the Indus.

Subfam. ANATINÆ.

Hans, H.; *Bigri*, B.

Genus ANAS, L.

Subgenus SPATULA, Boie.

(2040) *Sp. clypeata* (*Pl. Enl.* 971, 972).

Syn. Anas clypeata, L.
A. rubens, Gmelin.
A. mexicana, Latham.
A. platalea, Vieillot.

Tridari, H.: *Alipat*, and *Kachuk Mal*, Sindh. Inhabits Europe; Asia; Africa; N. America. Common in India.

Subgenus ANAS.

(2041) *A. boschas*, L (*Pl Enl.* 776, 777).

Syn. A. fera, Brisson.
A. domestica et A. aduncа, L. } Varieties.
A. curvirostra, Pallas.
A. purpureo-viridis, Schinz,
A. Breweri, Audubon.

Subz-gurdan ('green-neck'), Persian; *Niroji*, Sindh. Inhabits N. Hemisphere: in India, confined to the Upper Provinces; never L. Bengal, nor S. India.

(2042) *A. pœcilorhyncha*, Pennant (*Ind. Zool.* pl. 13; Hardw. *Ill. Ind. Zool*). Inhabits India generally (not migratory); Burmah; not very common in L. Bengal.

(2043) A. (?) *caryophyllacea*, Latham (Jerdon's *Ill. Ind. Orn.*, pl. 34; G. R. Gray, *Ill. Gen. Birds*, pl. ,—bill and feet coloured erroneously).

Syn. A. erythrocephala, Bonnaterre.

Inhabits India generally; Burmah. Not common in L. Bengal.

Subgenus DAFILA, Leach.

(2044) *D. acuta* (*Pl. Enl.* 954; Gould's B. E. pl. 365).

Syn. Anas acuta, L.
A. caudacuta, Ray.
A. longicauda, Brisson.
A. tsitzihoa, Vieillot.

Kokarali, Sindh; *Sink-dum*, (*i. e.* 'Pin-tail'), Cabul. Inhabits N. Hemisphere. Extremely common throughout India.

Subgenus CHAULELASMUS, G. R. Gray.

(2045) *Ch. streperus Pl. Enl.* 958).

Syn. Anas strepera, L.
A. platyrhynchus, Ray.
A. kekuscha, Gmelin.
Chauliodus capensis, Swainson.

Sya-dum, Cabul. Inhabits N. Hemisphere; S. Africa. Rather common in India.

Subgenus MARECA, Stephens.

(2046) *M. penelope* (*Pl. Enl.* 825: Gould's B. E. pl. 366).

Syn. Anas penelope, L.
A. fistularis, Brisson.

Chea Nepal. Inhabits Europe; Asia; N. Africa. Moderately common in India.

Subgenus QUERQUERDULA, Stephens.

(2047) *Qu.* (?) *glocitans*.

Syn. Anas glocitans, Pallas (nec Gmelin).
A. picta, Steller.
A. torquata, Mess.
A. formosa, Georgi.
A. baikal, Bonnaterre.

Inhabits N. E. Asia. Extremely rare in L. Bengal.

(2048) *Qu. crecca* (*Pl. Enl.* 947).

Syn. Anas crecca, L.

Tulsia Bigri, *B.*; *Juruku*, or *Churuku*, Cabul. Inhabits Europe; Asia; N. Africa. Common in India.

(2049) *Qu. circia* (*Pl. Enl.* 946).

Syn. Anas querquerdula et A. circia, L.

Inhabits Europe; Asia; N. Africa. Extremely common in India.

Subfam. FULIGULINÆ.

Ghotye, Kabul.

Genus FULIGULA, Stephens.

Subgenus BRANTA, Boie.

(2050) *Br. rufina* (*Pl. Enl.* 928).

Syn. Anas rufina, Pallas.
A. erythrocephala et A. cinerea, Gmelin—young.
Callichen ruficeps, Brehm.

Nul Gulnar, Cabul. Inhabits Europe; and Asia; rare in W. Europe. Not rare in L. Bengal, in December and January.

Subgenus FULIGULA.

(2051) *F. ferina* (*Pl. Enl.* 803).

Syn. Anas ferina, L.
A. rufa, Gmelin.
A. ruficollis, Scopoli.

Lal Muriya, B. Inhabits N. hemisphere. Moderately common in L. Bengal.

(2052) *F. marila* (*Pl. Enl.* 1002).

Syn. Anas marila, L.
A. frænata, Sparrman.
A. subterranea, Scopoli.

Inhabits N. Hemisphere; Nepal.

(2053) *F. cristata*, *Ray* (*Pl. Enl.* 1001, 1007).

Syn. Anas fuligula, L.
A. colymbis, Pallas.
A. scandiaca, Gmelin.
A. latirostris, Brunnich.
A. notata, Boddaert.

Dubaru, B.; *Ablak*, Cabul. Inhabits N. Hemisphere. Moderately common in India.

(2054) *F. nyroca* (*Pl. Enl.* 1000).

Syn. Anas nyroca, Guldenstadt.
A. peregrina et A. africana, Gm.
A. Gmelini, Latham.
A. glaucion, Pallas.

Lal Bigri, B. Inhabits Europe; Asia; N. Africa. Tolerably common in India: exceedingly so in some seasons.

Subfam. MERGINÆ.

Genus MERGUS, L.

(2055) *M. castor*, *L.* (*Pl. Enl.* 951).

Syn. M. merganser, L.
M. Raii, Stephens.
M. orientalis, Gould, P. Z. S. 1845, p. 2.

Khoruk, Cabul. Inhabits N. Hemisphere. Very rare in India, except towards the Himalaya.

Fam. PODICIPIDÆ.

Genus PODICEPS, L.

(2056) *P. cristatus* (*Pl. Enl.* 400, 941, 944).

Syn. Colymbus cristatus, L.
C. cornutus, Brisson.
C. urinator, Scopoli.

Inhabits Old and New continents; Australia?

(2057) *P. philippensis*, Gm. (*Pl. Enl.* 905, 945).

Syn. Colymbus minor, et C. hebridicus. Gmelin.
C. fluviatilis, Brisson.

Durbari, B.; *Puudub*, Bhagulpore. Inhabits Old continent. Very common in India.

APPENDIX, No. 1.

Genus PSITTACUS, subgenus CHRYSOTIS, p. 2.

(2058) *Chr. leucocephalus*, No. 8 (A).

Genus LORICULUS, p, 9.

(2059) *L. asiaticus*, No. 46 (A).

Psittacus philippensis and Psittacula rubrifrons, refer to a nearly allied species.

Genus CORIPHILUS, p. 13.

(2060) *C. notatus*, No. 90 (A).

Genus HALCYON, p. 46.

(2061) *H. amauropterus*, *Pearson*, J. A. S. X. 635. Inhabits L. Bengal (Sundarbans especially); Arakan; Tenasserim provinces; very abundant along the eastern coast of the Bay of Bengal, not yet observed on the western. Not rare in the vincinity of Calcutta.

Genus PICUS, p. 62.

(2062) *P. atratus*, *Blyth*, *J. A. S.* XVIII, p. Inhabits Tenasserim Provinces.

LEIOTHRICANÆ? p. 99.

Genus MUSCITREA, Blyth.

(2063) *M. cinerea*, *Blyth*, *J. A. S.* XVI, 122. Inhabits Arakan.

(2064) BISCUITS.

Skibstvebak, Dan.	Biscotto, Galetta, It.
Scheepsbeschuit, Dut.	Biscoito, Port.
Biscuit, Fr.	Bort, Saucher, Rus.
Zweibach, Ger.	Bizcocho, Galletta, Sp.
Biscoot, Hind.	Faulkner.

Biscuit, from the two Latin words bis coctus, twice baked, is an unfermented bread, which, if properly prepared, can be kept a great length of time, and hence its use as a common form of bread at sea. That supplied to the Royal Navy,

om England, is now all made by machinery, but n India, and in England, ordinarily, it is made y hand. The good quality of biscuits depends n the thorough kneading of the dough, and its ubsequent division into portions of equal size nd thickness.—*Tomlinson.*

(2065) BISHOPS WEED. ANETHUM SOWA.

Omum, TAM. | Ajowan, HIND.
Ajooma, DUK. | Aymaudum, CAN.

Bishops weed seed. Sison Ammi, Lin.—*Ainslie's Mat. Med. p.* 269. These well known arminative seeds yield by distillation a very useful oil which is given medicinally, as a stomachic. The distilled water is used as a carminative in every nursery of Madras under the name of Omum Water.

(2066) BISMUTH. Mr. Piddington, the Mineralogical Curator of the Bengal Asiatic Society's Museum, mentions in his reports, that he found bismuth in one of the ores sent him from the antimony mines near Maulmein; and it is found in connection with silver in Burmah.—*Mason.* Bismuth is a metal that was unknown to the ancients. It was referred to by Agricola in his work on mining in 1829, and was subsequently described by Stahl and Dufay. The minerals in which this metal constitutes the principal ingredient are comparatively few in number; and of these only two species are of any importance in a commercial point of view, namely, the native bismuth, and its sulphurets. These minerals are all of them soluble in strong nitric acid, the solution yielding a white precipitate on being dropped into water. They are known and described by mineralogists under the following names:—*Native* or *Octahedral Bismuth, Bismuth-Ochre, Prismatic Bismuth-Glance, Needle-Ore* or *Acicular Bismuth Glance* called by Phillips *Plumbo-Cupriferous Sulphuret of Bismuth, Tellur-bismuth,* formerly known by the name of *Molybdan Silver.—Engl. Cyc, p.* 481.

(2067) BISON, the name of a genus of Ruminant Animals belonging to the family *Bovidæ.* The genus *Bison* comprehends two living species, one of them European, now become very scarce and verging towards extinction; the other American, and, notwithstanding the advances of man, still multitudinous.—*Engl. Cyc. page* 482.

(2068) BIT-LABAN, BIT NOBEN.

Sunchul. GUZ. | Kala-nemek, Sochul, HIND.

A medicinal salt prepared by melting together for about 6 or 7 hours, in an earthen pot, an impure muriate of soda, called *samur,* and emblic myrobolans (*Hind. Guz.* Aoonla, Anvelcutty), in the proportion of fifty-six ounces of the muriate, to twenty ounces of the dried myrobolans. It is met with in most Indian bazars, and is used by native practitioners as a tonic in dyspepsia and gout, as a stimulant in chronic rheumatism, &c.—*Faulkner.*

(2069) BITTERS.—*Pure Bitters.* In all parts of the world bitter substances appear to be regarded by the common people as febrifuges. The beautiful Menyanthes trifoliata and the Tormentil are as popular, in northern regions, as the Chiretta and its various substitutes in tropical countries of the East. Such remedies were in great repute in regular practice before the discovery of Quinine. Although, however, they act as tonics and improvers of digestion, and are admirable adjuvants of the true antiperiodics, it is doubtful whether they possess any strictly antiperiodic virtues of themselves. In this respect they bear very much the same relation to true febrifuges, as salicine does to quinine. Most of them will be found enumerated under their respective heads, and it is only necessary to mention here that of the *Mucilaginous Bitters,* the chief is the Goluncha, and two others are the Baobab, and Cetraria. *Aromatic Bitters* were formerly in high repute, but have latterly fallen into disuse as febrifuges. India does not appear to be particularly rich in them, and it is a curious fact connected with them that the species of Galipia yielding Angustura bark, is more esteemed by the natives of the Cinchona countries than the true bark. Dr. Hancock gave very strong evidence in its favor. *Bitters containing Alkaloids or Tannin* are a class containing all the most important antiperiodics, and the most valuable of them all is quinine. No Indian tree comes so near the Cinchonas in its botanical affinities as the Hymenodictyon excelsum. As one of its chief habitats is the pestilential jungles of Goomsoor, this would be an exemplification, if its virtues were found to be really considerable, of a favourite notion with some, that along with the bane, nature always supplies the antidote. *Astringent Bitters* and substances containing much tannin, have long been used in Europe as febrifuges.—*Ind. Ann. Med, Sci. for April.* 1856, p. 381.

(2070) BITUMEN, ASPHALTUM, MINERAL PITCH.

Jodenlym, DUT. | Nift-i-roomie, PERS.
Judenpech, GER. | Asphalto, PORT.
Nift-roomie, HIND. | Asfalt, RUS.
Isfalto, IT. | Asfalto, SP.
Asphaltum, LAT. | FAULKNER.

Bitumen itself is a Latin word used by Tacitus, Pliny, and other Roman writers. A considerable number of combustible mineral substances, as Naptha, Petroleum, Maltha, or Sea-wax, are sometimes arranged under the head of Bitumens; but their properties vary greatly in some respects, as, for example, with regard to solidity, fluidity, and colour. The term Bitumen is however usually applied to two varieties, namely, *Asphaltum* already described and Elastic Bitumen. This is sometimes called Fossil Caoutchouc, and is a rare mineral product, which has hitherto been found in three places only; 1st, in the Odin mine, near Castleton in Derbyshire, in a Secondary Limestone, accompanied by asphaltum, calcareous spar, fluor, blende, galena, and pyrites; 2nd,

in a coal-mine of Montrelais, a few leagues from Angers in France, it occurs among quartz and calcareous crystals, in the veins of grit of the Coal Formation; 3rd, in a coal-mine near South Bury in Massachussets, United States.—*Eng. Cyc. p.* 494.

(2071) BIXA. This is a genus of plants belonging to the natural order *Flacourtiaceæ*. It produces the substance called Arnotto. The only species of any general interest in the genus is the *Bixa orellana*, a native of the Malayan Archipelago, but now extremely common in the W Indies, where it is cultivated in rich moist soil by the sides of rivers.—*Eng. Cyc. page* 495.

(2072) BIXA ORELLANA, Willd.

Kistee, DUK, Latkan, HIND. and BEN. Thee-dew, BURM.	Kuppa Manhala, CAN, Mungi natie marum & Sapprah marum,	TAM.

This plant forms a small tree with deep-green shining heart-shaped leaves, and clusters of purplish flowers, which are succeeded by capsules of a heart-shaped form, covered with stiffish bristles, and opening into two valves which contain, attached to their middle, a number of seeds covered with a soft, sticky, vermilion-coloured rind. It is the latter which furnishes the arnotto of commerce already described under its proper head. According to Feé, this substance is obtained by heaping up the seeds in water for several weeks or months, and afterwards pressing them, when the colouring matter separates and is afterwards precipitated in the water. Or the pulp is separated by washing and maceration, and the colouring matter precipitated by the aid of an acid, and caught upon fine sieves. Independently of the use of arnotto for staining cheese and butter, the Indians paint their persons with it, and thus, it is said, destroy the subcutaneous vermin with which they are infested. It acts as a purgative taken internally; but its reputed powers as an antidote to the poison of the cassava are imaginary.—*Eng. Cyc. page* 495. Dr. Roxburgh remarked that this plant appears to be a native of India, but in the indigenous plant, the flowers are white and the immature capsule, green; while in the plants from West Indian seed the flowers are rose coloured, and the immature seed vessel red: and the Eastern plants do not furnish so much nor so good a colour.—*Roxburgh*. Dr. McClelland mentions that *Bixa orellana* (*Thee-dew*), or *Arnotto*, is cultivated all over Pegu for the red and yellow dyeing properties of its capsule. This is found in all the bazars, and in those of Bengal under the name of *Lat-kan*. It is a favorite dye with the Burmese, and might become a production of some importance.—*McClelland*. It is this species of Bixa which is now so largely grown for its dye. Some account of this has already been given under its proper head, Arnotto, which is used to impart a bright orange colour to silk goods and to give a deeper shade to simple yellows. The dry hard paste is also found to be the best of all ingredients for imparting a golden tint to cheese and butter. The Spanish Americans mix it with their chocolate, to which it gives a beautiful rich hue. The dye is usually prepared by macerating the pods in boiling water for a week or longer. When they begin to ferment, the seeds ought to be strongly stirred and bruised with wooden pestles to promote the separation of the red skins. This process is repeated several times, till the seeds are left white. The liquor, passed through close cane sieves, pretty thick, of a deep red color, and a very bad smell, is received into coppers. In boiling, it throws up its coloring matter to the surface in the form of scum, which is taken off, saved in large pans, and afterwards boiled down to a due consistence, and then made up, when soft, into balls or cakes of two or three pounds weight. The imports into Great Britain of Arnotto for home consumption are from 200,000 to 300,000 lbs. per annum. The plant is grown in Dacca and other parts of India in the Malay Peninsula and the Eastern Archipelago. At the Hawaiian Islands, Tongataboo, Rio Janeiro, Peru and Zanzibar, the Arnotto is now an indigenous shrub which rises to the height of seven or eight feet, producing oblong heavy pods, somewhat resembling those of a chesnut. Within this there are generally thirty or forty irregularly formed seeds, which are enveloped in a pulp of a bright red colour, and a fragrant smell.—*Simmond's Commercial Products, p.* 448.

(2073) BOEHMERIA, a genus of plants belonging to the natural order *Urticaceæ*. The species were formerly comprehended under the genus *Urtica*. One of the species *Boehmeria nivea*, formerly *Urtica nivea*, is the Rheea of Assam, which yields fibres of remarkable fineness and tenacity. It appears from the investigations of Dr. Falconer, that the plant which yields the celebrated grass-cloth of China is identical with the Assam plant. Several specimens of these fibres manufactured into light articles of dress were exhibited in the Indian collection at the Great Exhibtion of 1851.

(2074) BOEHMERIA FRUTESCENS (*Urticeæ*). POOAH FIBRE. 'Pooah' by the Parbuttias; 'Kienki' by the Lepchas; and 'Yenki' by the Limboos. The plant grows to the height of six or eight feet, and varies in the thickness of the stem from the size of a quill to that of the thumb. The leaf is serrated, of a dark green colour above, silvery white below, not hairy or stinging; and has a reddish pedicle of about three inches long. The seed forms in small currant-like clusters along the top of the plant, and on alternate sides about an inch apart. Two small leaves spring from the stem at the centre of and above each cluster of seed. Dr. Falconer recognized the "Pooah" as the "*Boehmeria frutescens*" of

botanists, common at lower elevations on the Himalayas from Gurhwal to the Sikkim hills, ranges to Burrampooter. In the outer hills of Gurhwal and Kumaon it is called 'Poee,' and the tough fibre is used there for making nets. In Darjeeling, *B. frutescens* goes by a similar name, 'Pooah,' and the fibre is used for similar purposes. It was first described by Thunberg, who distinguishes it from the textile species, *Boehmeria* (or *Urtica*) *nivea*, which grows there in abundance." The 'Pooah' is not cultivated but grows wild and abundantly in the valleys throughout the mountains of Eastern Nipal and Sikkim, at the foot of the Hills skirting the Tarai to the elevation of 1000 or 1200 feet; and within the mountains up to 3000 feet. It is considered a hill plant, and not suited to the plains or found in them. It does not grow in the forest, but is chiefly found in open clear places, and in some situations overruns the abandoned fields of the Hill people within the elevations which suit it. It sheds its leaves in the winter, throws them out in April and May, and flowers and seeds in August and September. The exact period altering of necessity with the elevation. "When used as a fibrous material, it is cut down for use when the seed is formed; this is the case with the common Flax, in Europe. At this time the bark is most easily removed and the produce is best. After the seed is ripe it is not fit for use, at least it is deteriorated. As soon as the plant is cut, the bark or skin is removed. This is very easily done. It is then dried in the sun for a few days; when quite dry it is boiled with wood-ashes for four or five hours; when cold, it is beaten with a mallet on a flat stone until it becomes rather pulpy, and all the woody portion of the bark has disappeared; then it is well washed in pure spring water and spread out to dry. After exposure for a day or two to a bright sun it is ready for use. When the finest description of fibre is wanted, the stuff, after being boiled and beaten, is daubed over with wet clay, and spread out to dry. When thoroughly dry the clay is rubbed and beaten out; the fibre is then ready for spinning into thread, which is done with the common distaff. The 'Pooah' is principally used for fishing nets, for which it is admirably adapted on account of its great strength of fibre and its extraordinary power of long resisting the effects of water. It is also used for making game-bags, twine, and ropes. It is considered well adapted for making cloth, but is not much used in this way." Captain Thompson, to whom the specimens of Pooah fibre were sent, says that, "when properly dressed, it is quite equal to the best Europe Flax, and will produce better sailcloth than any other substance he has seen in India. Dr. Campbell's communication shows that mud is used in the preparation, which clogs it too much, and Mr. W. Rownee mentions that if potash were used in the preparation (which is invariably done with Russian Hemp and Flax) instead of clay or mud, the colour would be improved, the substance rendered easy to dress, and not liable to so much waste in manufacturing." Sergeant Crutcher thought that this fibre might be supplied for four rupees a maund, when large quantities were prepared. Captain Thompson thought that it would be worth twelve rupees a maund in Calcutta.—*Royle, p.* 368.

(2075) BOEHMERIA GOGLADO. This nettle is common in Gurhwal and near Simla, and probably abounds in fibre. *Royle, p.* 372.

(2076) BOEHMERIA MACROSTACHYA, is common in Gurhwal and near Simla. It probably abounds in fibre.—*Royle, p.* 372.

(2077) BOEHMERIA NIVEA, GAUDICHAUD. *Urtica nivea*, Lin. CHINA GRASS.

Chu or Tchou ma, CHIN.	Kunkhoora and kunkoora, in RUNGPORE.
Tejo karao, JAPANESE.	Rheea, in ASSAM.
Caloee, SUMATRA.	Pan, in SHAW.
Ramee, MALAY.	Rheea grass, ENGLISH.
Inan, in BONOA.	Goun, BURM
Gambe, in East CELEBES.	

The *Boehmeria nivea* is a herbaceous plant, with broad ovate leaves which are downy and white beneath, hence its specific name. It bears no sting.—*Eng. Cyc. p.* 528. This species of Boehmeria is the most famous among these nettles for its fibres, it being now satisfactorily ascertained that the well known *China grass* of commerce, the China-flax, or Dom Rheea or Ramee fibre, is the product of this plant, the Boehmeria (formerly Urtica) nivea. The caloee or Ramee fibre, the Urtica tenacissima of Roxburgh, and the Bon Rheea or Jungle Rheea, will perhaps be found other species. And the plants called B. candicans and B. utilis by Mr. Weber of Java, are supposed identical with B. nivea. Of all the Nettle Tribe, this plant is the most famous for its fibre. Dr. Royle considers it to be one of the most valuable products of India, as its strength far exceeds the best hemp, while its fineness rivals superior kinds of flax, and as four to five crops of fibre can be obtained from the same plants within the year, if any machine could be invented for facilitating the separation of the fibre, from the woody part of the stalks, the Rheea would speedily undersell all the other fibres. It is carefully cultivated by some nations, the Chinese and the Assamese, but it grows spontaneously in the islands of the Eastern Archipelago, along the base of the hills from Cochin-China to the Yellow River, and from Chusan to the farthest west that researches have extended, also in Japan, the Celebes, in Borneo and in Siam; it is indigenous all over the Malayan Peninsula: it grows freely at Singapore though not planted or cultivated to any extent. It grows also in Burmah, Assam and Rungapore; in all which the people make use of it as a cordage material, and know it by the various names

given above. The fibres can be had at Ningpo, for about 6 dollars a picul of 133 lbs., but in England they have fetched the high prices of £60, £80 and even £120 a ton. These high prices have prevented this fibre from coming into general use for the manufactures of England, but it has also been impossible to use it for fine purposes owing to the occasional occurrence of a small black, almost invisible spot. The lowest price at which the Rheea fibre of Assam is procurable, is 6 annas a seer or about £42 a ton; but Capt. Dalton considers it might be reduced to £28 a ton, if easier means of preparing it could be discovered. Notwithstanding these various localities, it is satisfactory to know that the manufacturers in England, Messrs. Sangster and Marshall of Leeds, have reported the fibres from China and from Assam to be identical for all practical purposes. In England, of late years, China-grass has attracted considerable attention, and no less than three prize medals were given, at the Exhibition of 1851, for finely prepared specimens of this fibre. On one of these, that of Messrs. Wright & Co., the Jury reported that the process of preparation consists, essentially, in a very ingenious arrangement for boiling the stems in an alkaline solution, after they have been previously steeped for twenty-four hours in water of a temperature of 90°. The fibre is then thoroughly washed with pure water, and finally subjected to the action of a current of high pressure steam till nearly dry. The Rheea grows with such readiness that, if left alone, the plant would soon produce a complete jungle; though thriving anywhere, it springs up most luxuriantly in the shade, where there is much moisture, growing to the height of eight or ten feet, when its shoots flower. It can then be cut down, and other shoots spring up, which are also soon fit to cut, and so on successively for nearly any period, yielding generally four or five cuttings in the year. In Burmah, the name "Goon," is applied to this plant, the term *Betya* being given to another nettle the U. heterophylla. In Sumatra it is known as "Caloee," but the Malays call it "Ramee." In Assam, Rungpore and Dinagepoor, it is grown in the districts, along the foot of the hills, and is cut down four or five times during the year, thus yielding a series of crops. The aggregate produce of an acre of ground is about twelve maunds, and there, the expense seems to be about 15 Rs. a maund. The different crops vary in strength and fineness. In the cultivation of this plant manure is useful; moisture is essential for quick growth, as well as shade and protection from storms, to allow it to grow to the height of eight feet, from which a six feet fibre may be extracted. In China, where the finest fibre is produced, it is cultivated with considerable care; it may be grown from seed, but more quickly by parting the roots, as it throws up numerous shoots which, when cut down, are succeeded by fresh ones, so that three several crops are obtained in the season. There are however two modes of cultivating and clearing it, the Chinese method and the Indo Chinese. In the former, the plant when grown for the first time in a new site, is raised from seeds, but the roots of the seedling plants give off new shoots, by which they may be propagated; but the plan adopted with mulberry trees of placing down layers, is a quick mode. The first crop may be gathered in six weeks or two months, and every six weeks thereafter. When the stems are cut, they are split longitudinally, the bark is removed and the inner fibre which then come into view are removed and softened in boiling water. For its Commercial relations, *see* CHINA GRASS.—*Royle, Fib. Plants*.

(2078) BOEHMERIA SALICIFOLIA, a stinging nettle, common near Simla and in Gurhwal, and probably abounds in fibre.—*Royle*, *p.* 377.

(2079) BOEHMERIA UTILIS. Syn. Bon or Bun Rheea, Wild or Jungle Rheea; Leepeah, Nepa. There is no proof that the *Bon* or *Bun Rheea* that is, Jungle Rheea, is the Dom Rheea or China Nettle in a wild state, but considerable probability that it is a distinct species, possessed of many of the same properties as the Ramee or Rheea Nettle. Indeed, Major Hannay, who has chiefly brought it into notice, says of Bon or Jungle Rheea (*Boehmeriæ* species) that it is a Jungle plant, common in the Assam forests, and thriving best in the vicinity of water or of running streams. When unmolested it grows to a tree, but, by proper management, any quantity of young shoots can be obtained; and as the divided roots afford numerous shoots, the plant can be propagated by slips as well as by the seed. Its cultivation for its fibre might be carried on as with the willow in Europe. By the Chinese in Assam it is said to be exported into Southern from Northern China. It is cultivated largely by the Hill tribes, north-west of Yeunan, and by the Singpoos and Dhoanncas of the northeastern frontier of India, to a small extent only for a coarse cloth, but chiefly for nets. The Nepaulese recognize it as the *Leepeeah* of Nepaul. ('Journ. Agri-Hortic. Soc.,' vii, p. 222.) This fibre is well adapted for rope-making. It is about five feet in length, brown in colour, strong, and flexible. Capt. W. Thompson, of the house of Messrs. Thompson, rope-makers, of Calcutta, says of it: "It is all that can be desired either for canvas or lines, and only requires to be known to be generally used for such purposes." It was the kind which was made into a five inch rope by Messrs. Huddart along with the Dom Rheea or China-grass, and broke with a weight of about nine tons, or precisely 21,025 lb. Since then, it has been made up into ropes of various sizes, which have been carefully tested, and found in every case greatly to exceed in tenacity those made of Russian Hemp of the same size.

has also been made up into lines and cords, some of them almost fine enough for fishing lines: in all which it displays its fitness for all such purposes, from the union of strength and flexibility. There is no doubt that it would command a market as soon as its good qualities become known. It would be desirable to ascertain whether, by pressing it between grooved rollers, or something of that kind, it could not be sent in a still cleaner state, and command a still higher price. It was valued at £35 a ton.—*Royle Fib. Pl. p.* 363.

(2080) BOERHAAVIA DIANDRIA. BOERHAAVIA DIFFUSA, Lin.

Its edible part.

Mookooruttay keeray, TAM.	Spreading Hogweed.
Tikrie ke baujee, DUK.	Smadika, SANS.
Attika mameddee, TEL.	Gadhapoorna, BENG.

Its root.

Mookaruttay vayr, TAM.	Attica mammedie vayroo, TEL.
Tikrie ki jurr, DUK.	Sinadika, SANS.

Horsfield says that in Java the *Boerhaavia diandria* is deemed emetic.—*O'Sh. p.* 512. The root of the spreading Hogweed Boerhaavia diffusa, Lin, the Native Practitioners reckon amongst their laxative medicines, and prescribe it in powder. The small round leaves, which grow at the joints of the stalks of the plant, are eaten by the Natives. In Cyngalese the plant is called Jan Lopes. It appears to be the Taludama of the Hort. Mal.—*Ain's Mat. Med. p.* 90.

(2081) BOERHAAVIA PROCUMBENS.

Mookoorootay-keeray, TAM.

A procumbent weed, with small red flowers, used by the natives with other leaves as greens.

(2082) BOERHAAVIA TUBEROSA, of Persia —

Mookaratty Vayr, TAM.	Attica mamedie varysoo, TEL.
Tikrie ke jur, DUK.	Sindika and Punarnava, SANS.

Spreading hogweed, East Indies.

Root said to be emetic, and purgative deemed laxative, and given by the natives in powder, a tea spoonful twice daily. It is single, oblong, hard within, bark soft and thin, of a dusky colour outside, slightly bitter, and somewhat nauseous taste.

(2083) BLACK. The commonly known substances which are so named, are Ivory Black and Smoke Black. Smoke Black is in colour black, with a bluish tint, of great lightness, adheres to the fingers, retaining a little of the oil of pitch, odour disagreeable, slightly empyreumatic; tasteless after calcination. Smoke black is prepared by the combustion of different resinous bodies, especially of pitch. This substance is burned in large pans under a dome or chimney, within which cloths are suspended to which the soot becomes attached. This species of carbon is employed only in the arts, in the manufacture of printer's ink, of blacking for shoes, &c.—*O'Shaughnessy, page* 618.

(2084) BLACKBURNIA MONODELPHA, Roxb. A large erect timber tree, a native of the mountainous parts of the Northern Circars. The wood is white, close grained and durable, and employed by the natives for a variety of purposes. It flowers at the beginning of the hot season.—*Rox. Vol.* I. *p.* 415.

(2085) BLACKING.

Noir (de cordonnier), FR.	Nero-da-ugner-le-scarpe, IT.
Schuhschwarze, GER.	Negro-de-zapatos, SP.

This article is prepared chiefly of oil, vinegar, galls, and green-copperas; and used in the blacking of boots, shoes, harness, hoods, &c. Each manufacturer has his own recipe, in which the principal ingredients are oil, vinegar and ivory black or some other sort of blacking matter.—*Toml.*

(2086) BLACK LEAD, CARBURET OF IRON, GRAPHITE, PLUMBAGO.

Potloot, DUT.	Miniera di piombo, Piombaggine, Corezolo, IT.
Mine de plomb noir. Plomb-de-mine, Potelot, FR.	Plumbago, LAT.
Pottloth, Reissbley, GER.	Piedra mineral de plomo SP. *Faulkner.*

A mineral of a dark steel-gray colour, and a metallic lustre; it is soft, has a greasy feel, and leaves a dark coloured line when drawn along paper. It is used in the manufacture of pencils, for making crucibles, in compositions for protecting iron from rusting, and for diminishing friction in machinery. The best Plumbago was that procured near Borrowdale in Cumberland. —*Faulkner.* It has also been largely worked in America. Ceylon produces it, also Travancore and Vizianagrum. See PLUMBAGO. Black Lead, occurs in veins, and in kidney shaped lumps, in gneiss mica slate and their subordinate rocks, but that at Borrowdale occurs in transition slate.—*Toml.*

(2087) BLACK LEAD PENCILS.

Potlootpennen, DUT.	Lapis-negro, PORT.
Crayonsnoirs. FR.	Karanaschu, RUS.
Bleystifte, GER.	Lapiz-negro, SP.
Lapis-nero, IT.	Surme-ka-kalm, HIND.

Are formed of black-lead, encircled with cedar and other woods. They are imported into India from the United Kingdom —*Faulkner.*

(2088) BLACK PEPPER.

Filfil-uswod, ARAB.	Maricha, JAV.
Micha, BALI.	Piper-nigrum, LAT.
Hootseaou, CHIN.	Lada, MAL.
Gamniris, CYNG.	Sahan, PALEMBANG.
Peper, DUT.	Fiffil-i-Seeah, PERS.
Poivre, FR.	Pimenta, PORT.
Schwarzen pfeffer, GER.	Maricha, SANS.
Kala-mirch, Gool-mirch, HIND.	Pimienta, SP.
Pepenero, IT.	Mellaghoo, TAM.
	Mirialoo, TEL.

A well known small dark berry or fruit, having an aromatic, pungent, hot taste; used as condiment in seasoning, &c. The best is that of Malabar, which is largely imported into Bombay and re-exported to England, France, the Persian and Arabian Gulfs, and Calcutta. Pepper is also produced in Siam, Malacca, Sumatra, and oth

islands of the Indian Archipelago. See PEPPER. —*Faulkner.*

(2089) BLACKWOOD.

Seesum, Guz. & Hind.

The timber of different species of *Diospyros* and probably of *Dalbergia*, which grow in various parts of the East Indies. It is brought to Bombay from the Malabar Coast, and is largely used in the manufacture of household furniture. —*Faulkner.* Every locality has a wood, which is known by this name, Holtzappfel mentions that East Indian Blackwood is from the *Dalbergia latifolia*, called Blackwood tree by the English and Sit Sal by the natives of India, on the Malabar coast, where it grows to an immense size. The wood of the trunk and large branches is extensively used for making furniture; it is heavy, sinking in water, close grained, of a greenish black colour, with lighter coloured veins running in various directions, and takes a fine polish.—*Holt*

(2090) BLANKET.

Cumblee, Guz. & Hind.

A soft loosely woven woollen stuff, used as a bed covering. The blankets manufactured in India, are of a coarse description, and are only used by the lower orders of the natives. English blankets being in general request, are largely imported. At the Madras Exhibition of 1851, were exposed, manufactured at Hoonsoor in Mysore. Blankets from half bred merino wool, half bred butt wool, warp woof mundium wool, common country wool, mundium wool.

(2091) BLEACHING.—Bleaching is practised in all parts of India; and some places, which are also seats of the cotton manufacture, are famous for bleaching, such as Dacca and Baroche. This has been ascribed to the excellency of the water in the neighbourhood of these places. A very good account has been given by Mr. Taylor, late of Dacca, of the process of bleaching at that place. This is particularly interesting, as including what are called modern discoveries. Fine muslins are merely steeped in water, other cloths are first washed. But all, of whatever texture they may be, are next immersed for some hours in an alkaline ley composed of soap and of "sajie muttee," that is, impure carbonate of soda. They are then spread over the grass, and occasionally sprinkled with water, and when half dried are removed to the boiling-house in order to be steamed. This is effected by twisting the cloths into the form of loose bundles and placing them upon a broad clay platform, which is on a level with, and surrounds, the neck of a boiler sunk into the ground. They are then arranged in circular layers, one above the other, around a bamboo tube, which is kept upright by means of transverse supporters projecting from it, the whole forming a conical pile that rises to a height of five or six feet above the boiler. The fire is kindled in the excavation below, and as the ebullition of the water proceeds, the steam diffuses itself through the mass of the cloths above, swelling by its high temperature the threads of the latter. The operation of steaming is commenced in the evening, and continued all night till the following morning. The cloths are then removed from the boiler, steeped in alkaline ley, and spread on the grass as on the preceding day, and again steamed at night. These alternate processes of *bucking* and *crofting*, as they are technically called, during the day, and of steaming at night, are repeated for ten or twelve days, until the cloths are perfectly bleached. After the last steaming, they are steeped in clear filtered water acidulated with lime-juice, in the proportion, generally, of one large lime to each piece of cloth. Lime-juice has long been used in bleaching in all parts of India, and Tavernier describes Baroche as famous as a bleaching station, on account of its extensive meadows and the large quantity of lemons reared there. Mixed fabrics of cotton and Muga silk are steeped in water mixed with lime-juice and coarse sugar, which latter article is said to have the effect of brightening the natural colour of the silk.—*Royle, Arts &c. of India, page* 481.

(2092) BLENDE. SULPHURET OF ZINC. A term applied to the native sulphuret of zinc, from which the pure metal is obtained. —*Faulkner.*

(2093) BLETTING. All ripe fruits after they have been kept for some time begin to decompose, and the spots formed on the fruit during this process have been called by Professor Lindley 'Blets.' During the whole time of the growth of the fruits of plants various important chemical changes go on in their tissues, especially whilst ripening. These changes have been examined with great care by Berard.—*Eng. Cyc. p.* 507.

(2094) BLIGHIA, a genus of plants named after Captain William Bligh, R. N., master of the Bounty in the celebrated mutiny, belongs to the natural order *Sapindaceæ*. It has a 5-parted calyx, 5 petals, a very short style, 3 stigmas, and a solitary seed with a very large arillus. Only one species of this genus has been described, the *Blighia sapida*, Akee-Tree. It is a native of Guinea, from whence it has been introduced into the East and West Indies and South America. It is a tree attaining a height of 30 or 40 feet. It has pubescent leaves, with three or four pairs of ovate lanceolate veined leaflets. The fruit of this tree is a berry of a reddish or yellowish colour, about the size of a hen's egg. The aril of the seed is pulpy, and of a grateful subacid flavour, and is eaten in Africa and the West Indies. This tree does not produce flowers in Britain. It may however be easily cultivated. It grows well in a mixture of loam and peat.

Cuttings will strike in sand under a hand-glass. They should not be deprived of any of their leaves.—*Eng. Cyc. p.* 508. The fruit, has the size and shape of a pear, of a red colour, and is much esteemed in Guinea and the West Indies. Wood, light and useless.

(2095) BLISTERING FLIES. There are several kinds of fly which when applied to the skin cause great irritation, inflammation, and blistering. These symptoms are occasioned by an acrid principle called *Cantharidin*, contained in these insects. The ancients chiefly employed two species of *Mylabris*, one of which, the *Mylabris cichorii*, (vern. *telini* HIND.) has been used for ages, and is so at present by the European and native physicians of India and China. The *Cantharis vesicatoria*, or Spanish blistering fly, is the species officinal in the British Pharmacopœiæ. Its colour is bright shining green or bluish, length about ⅝ of an inch, breadth ⅛th to ⅓rd of an inch. It occurs in the South of Europe generally, especially in Italy and Spain, and is found occasionally in England. The blistering flies of India are chiefly the Mylabris or Meloe cichorii the Cantharis gigas, and the Cantharis violacea. The *Meloe*, or *Mylabris cichorii* (Telini, *Hind.*) is common in the neighbourhood of Dacca, in the Hydrabad country, in Kurnool, and numerous other localities. Dr. Hunter has published a good account of this article in the 5th vol. of the *Transactions of the Asiatic Society*, p. 216. The insect is about an inch long, and ⅓rd broad; the elytra or wing coverts are marked with six cross stripes of deep blue and russet brown. The *Buprestis* of ancient writers is met with in the bazars under the name of the golden fly (*sonamukki.*) The *Cantharis violacea* is often mixed with specimens of *Meloe* in the bazars. The Telini fly, if procured before the mites have commenced its destruction, yields on an average one-third more of cantharidin than the *Spanish fly* of the European shops. The blue fly is of uncertain strength; the Buprestis, in all the specimens obtained, was quite inert.—A species of Meloe called the *M. trianthema*, from its being usually found on the plant named *Trianthema decandra* (biscopra, *Hind*) is described by Dr. Fleming. A tincture, acetous tincture, plaster, and ointment of the Meloe cichorii are described in the Bengal Pharmacopœia. Some prejudice exists against the article on account of its alleged excessive severity of action. This is solely owing to the presence of a greater quantity of *cantharidin* than that contained in the common fly. Diluting the tincture, and adding to the proportion of lard and wax in the plaster and ointment, perfectly assimilate the action of the indigenous and the imported insects. —*O'Shaughnessy, page* 684. At the Madras Exhibition of 1855, specimens of the Indian Blistering beetles, *Mylabris pustulata*, and *punctum* were exhibited by Monsieur Le Docteur Collas of Pondicherry. These were accompanied with a full and interesting report on their blistering properties printed in the "*Moniteur Officiel*" of 2d March 1855. The larger species is *Mylabris pustulata*, and the smaller is *Mylabris punctum*—Both insects are found in lare quantities at certain seasons all over Southern India. On account of Dr. Collas' careful researches into the natural history of these beetles, as well as his interesting report, and successful experiments with this therapeutic agent, the Jury awarded him a 2d Class Medal.

(2096) BLOCK. A block is a pulley or sheave revolving on a fixed axis or pin, within a chamber or mortace, cut out of a solid piece of elm, ash, or other tough wood which is called a shell. Blocks are employed as a mechanical power under a great variety of circumstances, but are chiefly employed in the rigging of ships, and, according to their shapes and purposes to which they an applicable, receive various names, as *dead-eyes*; *snatch block*; *long tackle block*; *clue garnet block*; *shoulder block*, *spring block*, &c. In England, they are now almost all made by machinery, and the best are those which have the chamber cut across the grain of the wood.—*Toml.*

(2097) BLOODSTONE, HELIOTROPE, ORIENTAL JASPER.

Radawar, GUZ. HIND. *Faulkner.*

Bloodstone, also called *Heliotrope*, is of deep green colour and is a jaspery variety of quartz. It has obtained its name from being spotted with red so as to resemble drops of blood. In addition to silica it contains oxide of iron and clay, which are mechanically introduced, and in this way the red spots are produced. In the royal collection at Paris there is a bust of Christ in this stone, so managed that the red spots represent drops of blood. (Dana, *Mineralogy.*)—*Engl. Cyc. page* 522. It is used for seals, rings, brooches, &c. Localities, India, Siberia, Iceland, &c. It is brought to Bombay from different parts of the Guzerat, &c, and is re-exported largely to England. Its price has lately been very greatly reduced.—*Madras Museum.*

(2098) BLOWPIPE. An instrument of various forms for directing a small jet of air laterally into the flame of a candle or lamp, whereby a portion of the flame is formed into a long slender cone, in the direction of the jet; the heat of which is most intense at the point where the reddish white and bluish portions of the flame meet. In this way common flame is converted into a species of furnace, capable of fusing or raising to a high degree of temperature, any substance minute enough to be involved by the flame.—*Toml.*

(2099) BLUBBER.

Thraan, DUT.	Salo worwannoe, Worwan,
Thran Fischtran, GER.	RUS.
Olio-di-pesce, IT.	Grassa, Aceite-de-pescado,
Oleum piscium. LAT.	SP. *Faulkner.*

The fat of whales and other large sea animals,

of which train oil is made. The blubber is the *Adeps* of the animal, which lies under the skin, and over the muscular flesh; it is about six inches thick in some parts, and from 2 to 3 feet in others —*Faulkner.*

(2100) BLUE CLOTH, is largely made in Southern India, and at Pondicherry there is a manufacture of much interest.

(2101) BLUE STONE, COPPERAS, BLUE VITRIOL, CYPRIAN VITRIOL, ROMAN VITRIOL, SULPHATE OF COPPER,

Zungbar, ARAB.	Virtriuolo blo. IT.
Palmanicum, CYNO.	Cupri-Sulphas, Cuprum Vitriolatum, Vitroleum ceruleum, LAT.
Sulphate de cuivre. FR.	
Schwefelsaures kupfer, GER.	Tutthanjana. SANS.
Moortooth. GUZ.	Caparosa, SP.
Moortooth, Leela, or Neela-tootiah, HIND.	Toorishoo, TAM.
	Toorishie, TEL.

Is of an elegant sapphire blue colour, hard, compact, and semi-transparent; when perfectly crystallised, of a flattish, rhombodial, decahedral figure; its taste is extremely nauseous, styptic, and acrid. It is used for various purposes in the arts, and also in medicine.—*Ure.* It is a product of Pegu, from which place it is brought to India, and is procurable in all bazars.—*Faulkner.*

(2102) BLUMEA GRANDIS. One of the most abundant weeds throughout the Tenasserim Provinces, is a species of Blumea, that grows six or eight feet high with leaves like mullen, which, when bruised, emit a strong odour of camphor. Many years ago, the Tavoyers informed Mr. Mason that they were in the habit of making an impure camphor from the weed by a very simple process; but Mr. O'Riley of Amherst, was the first to make a good article from it, and to bring it to public notice. He made more than a hundred pounds, and the specimens which he sent to Calcutta were reported "in its refined form, to be identical in all its properties with Chinese camphor." The plant is so abundant, that these Provinces might supply half the world with camphor. Wherever the trees are cut down, this weed springs up, and often to the exclusion of almost every thing else; so that an old clearing looks like a field under cultivation. Mr. O'Riley sent flowering specimens of the plant to Dr. M'Clelland for identification, who forwarded them to Dr. Voigt of Serampore, and subsequently reported, "Dr. Voigt states that it belongs to De Candolle's genus Blumea, and is, so far as he can see, a new species." It is without doubt the same plant as that which appeared in Wallich's Catalogue a quarter of a century ago, as *Conyza grandis*, and which De Candolle subsequently described as *Blumea grandis*. Wallich's specimens were from Tavoy, without flowers, and DeCandolle describes the leaf as nine inches long with the petiole, by three wide, ("*cum petiolo 9 poll. longa, 3 poll. lata,*) serrated, and bearing on the petiole five or six remote linear acute lobes, ("*petiolo lobulos 5—6 distantes lineares aculos gerentibus,*) which corresponds very accurately with some specimens of our camphor plant, but it does not correspond to any other species of Blumea in the Provinces with which Mr. Mason is acquainted.—*Mason.*

(2103) BOALEE, BENG. The jaw-bone of this fish is used in carding cotton for the Dacca muslins, as a substitute for the heckle and hand-cards —*Royle, p.* 225.

(2104) BOATS. All the common arts and manufactures of Bengal are carried on at Dacca, but in none of them do the Dacca workmen show superior skill, than in that of boat building. For their work in this art, they have been celebrated since the reign of Jehangire, when the *Nowarrah* was established here for the protection of the lower districts of Bengal, against the incursions of the Mughs of Arrakan. Dacca, it may be mentioned, has also acquired a local name or reputation for a few minor manufactures, such as those of violins, paper, and *shola* hats.—*Dr. Taylor.* The Teesta river in the Terai, at Leelpigoree is navigated by canoes, thirty to forty feet long, some being rudely cut out of a solid log of Sal, while others are built, the planks, of which there are but few, being sewed together, or clamped with iron, and the seams caulked with the fibres of the root of the Dhak (*Butea frondosa*), and afterwards smeared with the gluten of *Diospyros embryopteris.* The bed of the river is here three-quarters of a mile across, of which the stream does not occupy one-third; its banks are sand-cliffs, fourteen feet in height. A few small fish and water-snakes swarm in the pools.—*Hooker Him. Jour. Vol.* I. *page* 392. In the Eastern Archipelago, the Generic name for a boat or vessel, large or small, is Prau, a word almost naturalised in the European languages. It belongs equally to the Malay and Javanese languages, and from these has been very widely spread to others, extending as a synonym to the principal Philippine tongues. The usual name for a canoe or skiff, both in Malay and Javanese, is Sampan. The large vessels which the natives of the Archipelago used in war and trade were called by them Jung, which is the word corrupted junk, that Europeans applied to the large vessels of the Chinese, of which the proper name is wang-kang. For a square-rigged vessel or ship, the natives have borrowed the word Kapal from the Telugu or Telinga. Names vary with the forms of vessels, and the uses to which they are put; and these again differ with nations or tribes so as to be innumerable.—*Crawfurd Dict. page* 55. The boats in use along the coasts of the peninsula of India, well illustrate the readiness with which sea-faring people adapt their materials to the requirements of their respective localities, and I may notice here the rapid sailing boats of Bombay and the vicinity

of Cannanore, and the Catamaran and Masulah boat of the Coromandel coast.

(2105) BLUMENBACHIA *Loasaceæ*. BLUMENBACHIA INSIGNIS.—These are small plants with white flowers, the species are ornamental and may be sown in borders, the stem has the stinging properties of the nettle.

(2106) BOJIDAN. This is the root of a small plant brought from Delhi to Ajmere; esteemed as heating, and used to strengthen, and as an aphrodisiac: one seer costs two Rupees.—*Gen. Med. Top. p.* 130.

(2107) BOKHARA CLOVER. Melilotus arborea, is nearly allied to M. leucantha. Bokhara clover grows so freely as to afford five or six cuttings in the season of green herbage, from which, it is said, strong fibre can be obtained.—*Royle, p.* 298.

(2108) BOLBOPHYLLUM. FRAGRANT BOLBOPHYLLUM. Perhaps the most highly valued of the orchid order among the Burmese and Karens, is the sweet-scented bolbophyllum, which Karen youths wear in the lobes of the ear, and maidens in their hair. It abounds in almost every part of the jungles, throwing down delicate straw coloured racemes over the rough gray bark of old lagerstrœmias—emblems of childhood in the arms of age.—*Mason.*

(2109) BOLBOPHYLLUM CAREYANUM. CAREY-BOLBOPHYLLUM. This is a very common orchid in the vicinity of Maulmain, easily recognized by a long leaf at the apex of a false bulb, and by its small purplish flower.—*Mason.*

(2110) BOLE ARMENIAN.

Hejr, or Teen-armenie, ARAB.	Gurnkatta, SANS.
Ghil-armenie, DUK. HIN. PERS.	Simie kavikullo, TAM.
Bole de armenie, FR.	Simie kavi rai, TEL. *Faulkner.*

Bole is an earthy mineral forming one of the hydrous silicates of alumina. It occurs in masses in Armenia, Saxony, Italy, France, Ireland, Scotland, South America, and various parts of India. Bole found in the island of Lemnos is called Lemnian earth. Armenian Bole is of a fine bright red, is much used as a tooth powder; and is in use in India, amongst native pratitioners, as an astringent. A coarse red bole, calcined and levigated, is sold in Germany as a pigment, under the name of Berlin and English red. Cakes made of these earths called *tanam poo*, are used by the Javanese when they wish to become thin.—*Tomi.* The red boles are largely employed by fraudulent dealers to colour articles of food &c. It has of late years been detected as an ingredient employed in England to adulterate Anchovy Paste, Potted Shrimps, Potted Herrings, Yarmouth bloaters, Ham, Westphalian Ham; Potted beef Hamburgh Beef, Tomato sauce, Essence of Lobsters, and Essence of Shrimps. It is an unclean practice, injurious to health, and in some cases even dangerous to life. This soft, yellowish red, unctuous earth, consisting of alumina, silica, magnesia, and oxide of iron, is brought from the Persian Gulf, but it also occurs of fine quality in the Rajmahl hills, where it is termed *Geru mittee*. At the Madras Exhibition of 1855, samples of *Armenian Bole* were exhibited from Mysore, Bellary and other localities, and were deemed worthy of notice, as being articles of the Indian Materia Medica in general estimation. They are also employed in Native painting and gilding. Reduced to very fine powder it is used as an absorbent application sprinkled over ulcers or other raw surfaces. In many countries, Bengal and South America especially, this and other unctuous earths are eaten freely by pregnant women to allay the craving for food so common in that state. In times of scarcity it has been used by both sexes as a mechanical substitute for proper food.—*O'Shaughnessy, page* 693.

(2111) BOLETUS DESTRUCTOR, is one of the many species of *Fungi*, the ravages of which are too well known under the name of Dry Rot. Their destructive qualities are not, however, caused by the fructification or the part which we commonly consider the fungus itself, but by the ramifications through the substance of the wood of what botanists call the Thallus and gardeners the spawn of such plants, which is in effect their stem and root in a mixed state. Other species of *Fungi* produce dry rot.—*Engl. Cyc. p.* 652.

(2112) BOLETUS IGNIARIUS, when dried and sliced, furnishes the German Tinder, or Amadou, a leathery substance sold in the tobacconist's shops, as "Amadou."—*Engl. Cyc. p.* 552.

(2113) BOL KA GOND, BIJA BOL. This is the name given in Ajmere to a dark reddish yellow opaque gum resin like myrrh (appears to be true myrrh) imported via Bombay. The natives there have a curious idea regarding this gum, that by eating it or even rubbing it in the teeth, they will become loose and fall out: it is considered a warm medicine, is given to children in enlarged abdomen, mixed with musabbur(aloes) as a deobstruent; and is also used in making native ink: one seer costs eleven annas.—*Gen. Med. Top. p.* 129.

(2114) BOLO CHAPTIS, (Buch.) CORVINUS, (McClell.), BOLA. This is a species of Indian whiting that furnishes isinglass and which Mr. O'Riley sent up to Calcutta from Amherst. Dr. M'Clelland wrote that "it belongs to the genus corvinus, closely allied to *C. niger*, but of monstrous dimensions compared with the European species." This is the fish, the jawbone of which is described as "Boalee."—*Mason.*

(2115) BOMARIA, AMARYLLIDACEÆ. The colour of these parterre flowers are red and yellow, spotted, pink, &c.—*Riddell.*

(2116) BOMBACEÆ, a group of plants con-

sidered by some a distinct natural order, by others as a mere section of *Sterculiaceæ*. They are usually large trees, with broad deep-green leaves, and flowers of considerable size. This group contains some of the most majestic and beautiful trees that are known, but nothing of much medical or economical importance is furnished by them. Their wood is light and spongy; the long cottony substance found within their fruit, and which has gained for some of them the name of Cotton-trees, is too short in the staple and has too little cohesion between its fibres, to be manufactured into linen; and the slightly acid or mucilaginous qualities that occur in the group are altogether inferior to those of many *Malvaceæ*. The Baobab tree, *Adansonia*, is one of them. It is remarkable for the excessive thickness of its trunk as compared with its height, and this is a character of common occurrence. Several American species spread enormously near the ground, forming huge buttresses with the angles of their trunks. This is especially the case with the genus *Eriodendron*, which is moreover often defended by very large conical prickles, which do not fall off till they are exfoliated by the gradual distension of the trunk. Among these plants is a singular instance of a flower resembling the paw of some animal.—*Eng. Cyc. page* 553.

(2117) BOMBAX CEIBA. This large "cotton" tree, in South America and the West Indies, is used for canoes.—*Riddell.* It is common at Canton, and the fleshy petals of the flowers are sometimes prepared as food.—*Williams' Middle Kingdom, p.* 284.

(2118) BOMBAX INSIGNE is a native of the Birman Empire, and is remarkable for its large red and very showy flowers.—*Eng. Cyc. page* 554.

(2119) BOMBAX MALABARICUM, De Candolle. *B. heptaphyllum*, Lin.

Boorooga wood, Eng.	Ruckta simal, Hind.
Buruga kurra, Tel.	Mull Elava marum, Tam.
Saur, Duk.	

A large tree, trunk armed with prickles, leaves deciduous in the cold season; flowers in February and March, large, of a bright red colour and vase shaped, which in the morning contains a limpid sweet fluid, drunk by the natives; the wood is white, soft, and of little use. This large stately tree is of handsome appearance when in leaf. Its wood is spongy and of little value. The Bombaceæ and their allied species are more remarkable for their noble aspect than utility: they are, however, not devoid of interest; the seeds of many are enveloped in long wool, like that of the true cotton, but this has been but little manufactured from the slight cohesion existing between the fibres: used in stuffing cushions, pillows &c. The *B. malabaricum*, D. C. (*Bombax heptaphyllum*, L.) the *Ruckta-simal* of Bengal, yields a gum resin called *Moocherus*, and its roots constitute the *safed mooslie* of the bazars. The *Moocherus* occurs in knotty, opaque, dark brown pieces, often with internal cavities. Few remedies are more extensively employed by the natives than their white and black *mooslie*. Blume says that the bark of the root is emetic, and the statement is repeated by Rumphius, but is contrary to Dr. O'Shaughnessy's repeated trials. The white *moosli* is a small brittle root, which in the dry state contains sixty per hundred of gum, fifteen of starch, with traces of resin, the remainder being woody fibre. The powdered root forms a thick mucilage with cold water, and answers admirably as a nutritious demulcent for convalescent persons.—*O'Shaughnessy.*

(2120) BOMBAX PENTANDRUM, Lin. Syn. Eriodendron anfractuosum.

Silk Cotton. Eng.	Elavnai pungee, Tam.
Khattan, Hind.	Elavnu marum, Tam.

This produces a light wood, employed by the toy makers. It is likewise used for making rafts.—*Ain's. Mat. Med. p.* 208.—Dr. McClelland mentions that in the Tenasserim Provinces, *Bombax pentandrum*, *B. heterophyllum* and *Cochlospermum gossypium*, all afford a soft down, which is attached to the seeds and which the Burmese collect for stuffing pillows. At the Madras Exhibition of 1857, a very powerful bast was exhibited by Mr. Jaffrey, from the *B. pentandrum*.

(2121) BOMBAY BOXES are principally ladies' work-boxes of elegant workmanship. The outside is of ivory, curiously inlaid; the internal part of sandal wood.

(2122) BOMBAZINE. A fabric of worsted and silk, the warp being of silk and the weft or shoot of worsted.—*Toml.*

(2123) BOMBYCIDÆ, a family of Insects of the order *Lepidoptera*, belonging to the section *Lepidoptera nocturna* of Latreille, or Moths. The principal characteristics of this family are—their possessing only rudimentary maxilla, remarkably small palpi, and bipectinated antennæ. One of the most interesting of the family is the *Bombyx Mori*, well known as the moth to which the silkworm turns. This species which was originally from China is of a white or cream colour, with a brown fascia and two or more waved lines of a deeper colour crossing the upper wings. In Britain the eggs of this moth hatch early in May: the caterpillar or silkworm is at first of a dark colour, but soon becomes light, and in its tints much resembles the perfect insect, a circumstance common in caterpillars. Its proper food is the mulberry, though it will likewise eat the lettuce and some few other plants: on the latter, however, it does not thrive equally well, and the silk yielded is of a poor quality. The silkworm is about eight weeks in arriving at maturity, during which period it changes its skin four or five times. When about to cast its skin it ceases to eat, raises the fore part of the body slightly and remains in per-

fect repose. In this state it is necessary that it should continue for some little time, in order that the new skin, which is at this time forming, may become sufficiently mature to enable the caterpillar to burst through the old one. This operation, which is apparently one of considerable difficulty, is performed thus :—the fore part of the old skin is burst : the silkworm then by continually writhing its body (but not moving from the spot) contrives to thrust the skin back to the tail, and ultimately to disengage itself altogether ; this last part of the operation, however, is the most difficult, since it is no uncommon occurrence for them to die from not being able to disengage the last segment of the body from the old skin. When full grown the silkworm commences spinning its web in some convenient spot, and as it does not change the position of the hinder portion of its body much, but continues drawing its thread from various points and attaching it to others, it follows that after a time its body becomes in great measure inclosed by the thread. The work is then continued from one thread to another, the silkworm moving its head and spinning in a zigzag way, bending the fore part of the body back to spin in all directions within reach, and shifting the body only to cover with silk the part which was beneath it. As the silkworm spins its web by thus bending the fore part of the body back, and moves the hinder part of the body in such a way only as to enable it to reach the farther back with the fore part, it follows that it incloses itself in a cocoon much shorter than its own body, for soon after the beginning the whole is continued with the body in a bent position. From the foregoing account, it appears that with the most simple instinctive principles all the ends necessary are gained. If the silkworm were gifted with a desire for shifting its position much at the beginning of the work, it could never inclose itself in a cocoon; but by its mode of proceeding, as above explained, it incloses itself in a cocoon which only consumes as much silk as is necessary to hold the chrysalis. During the time of spinning the cocoon the silkworm decreases in length very considerably, and after it is completed, it is not half its original length ; at this time it becomes quite torpid, soon changes its skin, and appears in the form of a chrysalis. The time required to complete the cocoon is about five days. In the chrysalis state the animal remains from a fortnight to three weeks; it then bursts its case and comes forth in the imago state, the mouth having previously dissolved a portion of the cocoon by means of a fluid which it ejects. The moth is short-lived; the female, in many instances, dies almost immediately after she has laid her eggs ; the male survives her but a short time. The silkworms, which are most extensively reared for the purpose of producing silk, are liable to many diseases, and none have been mor destructive than that called muscardine. This disease attacks the caterpillar when about to enter the chrysalis state. It is always attended with the development within the body of a minute fungus closely resembling our common mould. It is probable the fungus only attacks those worms which are predisposed to disease, but in certain seasons this fungus has been so extensively developed as to lead to the supposition that it produces the disease itself. It is very certain that, when this fungus is prevailing and its spores are introduced into the body of the silkworm, it becomes rapidly diseased and dies. The fungus spreads internally before the death of the worm and afterwards it shoots forth from the surface of the skin. The chrysalis and moth will have the disease if inoculated with the fungus, but it only occurs spontaneously in the caterpillar.—*Engl. Cyc. page* 558.

(2124) BOMBYX ATLAS. Eastward of the City of Canton on a range of hills called Lofau shan, there are butterflies of large size and night moths of immense size and brilliant coloring, which are captured for transmission to the Chinese court and for sale. One of these insects (Bombyx atlas) "measures about nine inches across, the ground colour is a rich and varied orange brown, and in the centre of each wing there is a triangular transparent spot," resembling a piece of mica.—*Williams' Middle Kingdom, page* 273.

(2125) BONDUC NUT OIL. GUILANDINA BONDUCELLA.

Calichi kai yennai, TAM.

The oil of this common seed is mentioned by Ainslie, as being considered useful in convulsions and palsy. The seeds themselves are believed to possess tonic virtues. Used solely as a medicine.

(2126) BONDUC NUT.

Kuteulega, HIND.

The seeds of Guilandina bonducella, irregularly round, grey ; the almond is white, very hard, and intensely bitter; gets a blood red colour from nitric acid.—*Med. Top. of Ajmere.*

(2127) BONES.

Huddee, GUZ. HIND. | Yellumboo, TAM.
Istukhan, PERS. | Yemmookulloo, TEL.

The bones of cattle and other animals are extensively used in the arts, in forming handles for knives, walking sticks, inlaying, and various other purposes. They are occasionally exportde from Bombay to England (*Faulkner*), and the bones of animals are, thus, converted into various useful articles of commerce. Small boxes, lanterns, paper knives, buttons, and many small articles of dress, are made in China from horn and bones.—*Morrison, page* 197. Subjected to destructive distillation, in large retorts, amongst the other products which pass over is a peculiar oil,

which is collected and afterwards employed to feed the lamps burning in small close chambers, the sides of which thus become covered with LAMP BLACK. The mass remaining in the retorts consists of the earthy and saline portions of the bone, blackened by the carbon of the animal matter, in which state it is called ivory black, bone black, and animal charcoal. This substance has a remarkable attraction for organic colouring matter, and is largely used for removing the colouring matter from syrup, in the refining of sugar, and in the purification of many other organic liquors. By exposing ivory black to an open fire, the carbon is driven off, and the bones are nearly blanched These are reduced to powder, which is used for making the cupels of the assayer, also as a polishing powder for plate and other articles, and also by the manufacturers of phosphorus for making lucifer matches—*Toml.*

(2128) BON RHEEA, OR BUN RHEEA, OR JUNGLE RHEEA, the Leepeeah of Nepaul, is supposed by some to be the Dom Rheea or China Nettle in an uncultivated or wild state. But of this there is no proof, and it is more than probable that it is a distinct species of Boehmeria, possessed of many of the same properties as theRamee or Rheea Nettle. It grows very common, in all the Assam province, but it is cultivated largely by the Hill Tribes, on the West of Yeunan and to a small extent by the Singpoos and Dhoanneas of the North Eastern frontier of India, to be fabricated into a coarse cloth, but chiefly for nets. A five inch rope of Rheea fibre and one of Bon Rheea each broke within a few pounds of each other, but after sustaining a weight of more than nine tons weight, and it is reported to be all that can be desired for either canvas or lines, and only requires to be known to be generally used for that purpose. The Bon Rheea thrives best in the vicinity of water or of running streams: when unmolested it grows into a tree, but by proper management of it, any quantity of young shoots can be obtained, and as the divided roots of the plant afford numerous shoots, it can be propagated by slips as well as by the seed. This fibre is about five feet in length, brown in colour, strong and flexible.—*Royle, Fib. Plants.* See No. 2079

(2129) BON SURAT, the commercial name given to the fibres of the Urtica crenulata, Orchor Putta, which see. *Royle*, p. 366.

(2130) BOODUNK.—MENTHA [illegible]LEGIUM. —Penny royal.—Cultivated the same as thyme.

(2131) BOOKS.

Chopdee, GUZ.	Poosthakum, TAM.
Kitab, HIND. & PERS.	Poosthakooloo, TEL.

A general term applied to blank, printed, lithographed, or manuscript books.

(2132) BOON, REED OR SHOVE, the woodlike part of the flax plant. It is surrounded by the tough fibres called bast or harl and covered by cuticle, all cemented together by gummy and azotized compounds.—*Royle, p.* 199, *p.* 315.

(2133) BOORAGA the name of the gum, and wood obtained from *Bombax malabaricum*. It is a pure gum.

(2134) BOOR-COLE. Grows to great perfection; the leaves are curled. The tops should be cut off when two feet high; the sprouts being the only part fit for use. It is cultivated in the same way as cabbages, and may be had all the year round.

(2135) BOOREE. The pollen of the plant called Typha elephantina *(putera)* a native of Sinde: it is inflammable like that of Lycopodium, and used as a substitute for it in Europe. It is collected in Sinde.—*Royle, p.* 35.

(2136) BOORUNK KALA.—OCYMUM BASILICUM.—Sweet Basil. Grows common in native gardens; the seeds are used medicinally, an infusion being considered very cooling.

(2137) BOOTA.—This is the head of the Zea mays, which is grown at the commencement of the rains and sown in beds or in the common fields; it requires little care; the heads are either boiled or roasted before being eaten. The ground should be well manured before the seed is sown.

(2138) BORAEE.—Borago officinalis, is used as a pot herb; the young shoots and leaves as salad, requires treatment similar to Angelica. This succeeds at Madras, but flowers rather too early to be of much use; it is suitable for the flower garden, but is a native of England.

(2139) BORAGO ZEYLANICA. CEYLON BORAGE.

Balatti-kulpa, HIND.

Is cultivated in some gardens at Ajmere as a flower.—*Genl. Med. Top. p.* 180.

(2140) BORASSUS FLABELLIFORMIS, SYNONIMS; *The tree* is named,

Tar ka jhar, HIND.	Lontar, MALAY.
Tati chettoo, TEL.	Rontal, JAVANESE.
Panci marum, TAM.	Palmyra Tree, ENG.

The wood is called,

Palmyra and Porcupine wood, ENG.	Tar ke jhar kee Lakree, HIND.
Tatti chettoo kurra, TEL.	Panai marum kuttai, TAM.

The palm wine or *toddy* is known as

Pannang khulloo, TAM.	Tatie khulloo, TEL.
Tarie, DUK.	Palmyra Toddy, ENG.

The sugar is,

Pannay vellum, TAM.	Jaggary of Palmyra Toddy, ENG.
Tarka goor, DUK.	
Tatie bellum, TEL.	

The edible part is called,

Pannang kalung, TAM.	Young Palmyra Plant, ENG.
Geunghool, DUK.	
Tatigudda, TEL.	Tala, SANS.

The fibres of the palmyra leaf are called,

Thatee nara, TEL.	Panai nar, TAM.

Its fruit is the

Palmyra Fruit, ENG.	Tatie pundoo, TEL.
Pannam pollum, TAM.	Boea Iontar, MAL.
Tar phul, DUK.	Tata, SANS.

The Palmyra tree, the Borassus flabelliformis of Linnæus, is a tree only inferior in usefulness to Eastern nations to the date tree and cocoanut palm. By a glance at one of the maps in Berghaus' or Johnston's physical Atlas, showing the distribution of this plant, it will be seen, commencing in the north-eastern parts of Arabia in about 20° north latitude and 54° East longitude, extending through the Indian ocean, and the southern parts of Hindustan and ending in about 20° north and 93° east in the Bay of Bengal, the extent of the distribution being about 5,160 Geographical miles. Its favourite soil is a low sandy plain, and immense groves of it occur on the Malabar Coast, from Cape Comorin to Calicut, but the northern part of Ceylon, and from Tinnevelly to Madras, are the great palmyra regions, though the trees are found skirting the Bay south to Singapore and in all the islands of the Archipelago.—*Seeman.* In the Tenasserim provinces, also, it is the most generally diffused of all the palms. It attains a height of seventy feet; the circumference of its single trunk, at the bottom, is about 5½ feet and at the top 2½ feet. A Tamul Poem entitled Tála Vilásam enumerates 801 different purposes to which the Palmyra may be applied. The trees have to attain a considerable age before they are fit for timber; when a hundred years old, they are excellent, but their wood becomes harder and blacker by age, and the blacker and harder it is, it is the better. Almost every part of this tree is made use of; the leaves are used in thatching: the leaf stalks yield a coarse fibre useful for many purposes. The "olay," (*Tamul*) are the leaves cut into uniform strips upon which the natives write with iron styles. Before the introduction of paper, its leaf was the writing material of all the nations of the East, and still continues to be so of some of them. —*Crawfurd, page* 221. The Jaggery, obtained from it, is extensively used in the manufacture of sugar at Vizianagram and Rajahmundry, and is obtained from the wine of this Palm known as Toddy. This wine can be made a source of extensive drunkenness and dissipation at Madras, and is so among the lower class of Mahomedans, during the months of January, February and March, being the time it is drawn; the sweet pulp called Panavuttoo contained in the husk surrounding the seeds, is sold in the bazars, at 2 pice per ounce and is very pleasant to the taste. Ainslie says, that its fresh tasted gelatinous pulp is cooling and by no means unpalatable, and is called by the Tamools Noonghoo நுங்கு.—*Ainslie.* Indeed the Palmyra fruits form an article much prized by the people of India, and are eaten raw or roasted. These pulps are also made into a preserve, Punatoo, by squeezing them with water into a pulp, and sold in *mats* at 3 to 6 shillings each. Punatoo is much used as food in Jaffna, plain or mixed with gruel obtained from the pounded kelingoo farina, and made into soups puffs, cakes &c. The young Palmyra plants from the germinated seeds, when they are but a few inches high, are reckoned amongst the pot vegetables of the Natives of India, as well as of the Cyngalese; they are usually boiled, and eaten with a little of the kernel of the Cocoanut.—*Ainslie.* These young roots and shoots of the germinated seeds, when dried and ground into a kind of flour, are used as an article of diet. In Jaffna this Palm is looked upon with great reverence. The natives who can afford it, at the birth of a daughter, plant a certain number of trees, according to their circumstances, which become her dowry at marriage. Its wood is one of the porcupine woods of commerce; and the old black wood of the palmrya, is, next to that of Casuarina, the strongest tried; one specimen bore upwards of 700 lbs. and 5 of them gave an average of 648, though some were very bad. Mr. Rohde remarks that it is the strongst wood he tried, retaining for a length of time the position it assumed when loaded, without increase of deflexion: iron nails soon rust in this wood. He procured it of excellent quality in the Circars, the thickness of rafter when trimmed up rarely exceeds 2 inches four feet from the ground and one inch at twenty or twenty-four feet from it. Trees tapped for toddy do not, he believes, form wood. The large carpenter beetle, strange to say, appears to have particular delight in boring this hard wood, the *Cumboo* however is still more attractive to him. Though this wood has great stiffness and strength to resist cross strain and tension, it has none to resist rending which it does very readily—small canoes are formed of this tree, two of which lashed to a couple of spars form the usual mode of crossing lakes and rivers in the Circars—the root forms the head of the canoe, the smaller end is either elevated out of water by the form, or some of the pith is left for six inches at that end. As this decays, a lump of clay supplies its place. Formerly sea going vessels were planked with this wood, but the iron fastenings were soon destroyed. Boats planked with it are still common on the Godavery, being built probably where sawyers are not procurable. The peculiar structure of the wood of the Palms deserves attention, it appears to consist of a series of hard stiff longitudinal fibres not interlaced or twisted but crossed at considerable intervals at various angles by similar fibres which proceed from the soft heart of the tree, to the outer part, probably to the leaf stem—a radial section of Palmyra rafter shews this, the interstices are filled up with pith the proportion of which increases with the distance from the outer part.—*Rohde.* The wood is much used in house-building, for rafters, joists, and reapers. In England for veneers and inlaying. It is

exported in large quantities from Ceylon, where it is used for rafters, pillars, and posts of native houses. In the sandy parts of Jaffna in Ceylon, a hollow palmyra is inserted to form a well. The dark outside wood of very old trees, is used to some extent in Europe for umbrella handles, walking canes, paper rulers, fancy boxes, wafer stamps and other articles. The timber of the female tree is the hardest and best, and that of the male trees is never used, unless the tree be very old. It is too heavy to make ships of. At certain seasons of the year, thousands are employed in felling and dressing it. Each tree has from twenty-five to forty fresh green leaves upon it at a time, of which the natives cut off twelve or fifteen annually to be employed as thatch, fences, manure, mats, and mat baskets, bags, irrigation baskets, winnows, hats, caps, fans, umbrellas &c.; books and olays, tatakoo or puttays, for writing on.

(2141) BORASSUS. WILD PALMYRA. The Tenasserim Provinces yield an indigenous palm, which the natives call the wild palmyra. It has the fruit of the palmyra, but the leaf differs from it sufficiently to constitute it another species.—*Mason.*

(2142) BORAX. TINCAL.

Buruk, ARAB.	Kuddiakhar, Tunkunkhar, GUZ. HIND.
Piger, BALI.	Piger, JAV.
Kuddiakhar, BENG.	Patterie, Piger, MAL,
Lansipuscara. CYNG.	Chaularaya, NEP.
Sohaga, DUK.	Tunkar, PERS.
Boras, DUT.	Tunkanna, SANS.
Borate al calinule de soude, FR.	Velligarum, Vengarum, TAM.
Borax, GER. LAT. PORT.	Bi-borate of soda. ENG.

Borax, Biboras Sodæ, is chiefly procured from a lake near Thibet. The edges and shallows of the lake are covered with a stratum of Borax, which is dug up in considerable masses. In its rough state it is called *Tincal*, and is brought in the form of a brownish grey, impure, amorphous salt, or in detached crystals, less than an inch in length, and of the form of compressed hexahedral prisms. Sometimes it is brought partially refined; but when pure, is in colourless crystalline masses. Crude Borax is often covered with an oily or greasy matter, to prevent it from efflorescing. Its uses in the arts are considerable, being a very active flux. It occurs in dense crystalline masses, sometimes mixed with cha[illegible] totally soluble in warm water, solution [illegible] not effervesce with acids; but it turns turmeric paper brown. Its other localities are said to be Persia, China, South America, Europe. *Tincal* or crude borax, (*Hind. Guz.* Tunkunkhar), is in pale greenish pieces, covered with an earthy coating, and feels greasy to the touch. It is sometimes distinguished in the Indian bazars, but is more frequently sold under the general denomination of (borax) *Kuddiakhar*. Borax is imported into Bombay from Calcutta. Sohaga is brought to the Bengal bazars from Thibet, via Assam; and in the East Indies it is employed, in the moist way, as a solvent for Gum Lac. It is much used by the Tamool goldsmith, Tinkers ரசம் ஊற் (Cannar, Tam.) and Tinmen தகரவேலைக்காரர் (Tagaravelecarer, Tam), to facilitate the fusion of their metals. With it and lime juice, the Hindoos of the sect of Vishnoo prepare their red திருநாமம், Tiroochoornum, with which they mark their foreheads perpendicularly.—*Ains Mat. Med. p.* 144. Borax is readily purified by simple solution and crystallization. Borax is sometimes adulterated with alum and common salt; but Ammonia gives a white precipitate (alumina), if the former, and nitrate of silver, a white precipitate, if the latter, be present.—*Beng. Phar. p.* 364.

(2143) BOS INDICUS, the Zebu, has the following specific characters:—Forehead convex; withers with a more or less large fleshy hump; dewlap deep, waved; the upper part of the rump shelving very much. Amongst scientific writers this animal has had many designations. It is the *Bos Indicus* of Linnæus, the *Bos domesticus* of Hodgson, the *Bos Taurus Indicus* of Fisher, *Bos Zebu* of J. Brookes, *Bos Taurus Zebu* of Wagner. Varieties or particular breeds have also obtained a number of distinct appellations,—Little Indian Buffalo, Indian Bull, Great Indian Ox, Gun Bullock, sacred Bull, Madras Ox, Madhu Givi Oxen, Seringapatam Oxen, Two-humped Zebu, Hornless Zebu, Bucharian Ox, Nepaul Ox, and Javanese Cow. The domesticated zebus vary much in their size and the direction of their horns, but are generally distinguished by a fatty elevated hump below the neck and over the withers. The horns of some are short and suberect (Indian Ox), in others comparatively long and pointed backwards, with an inclination to curve inwards, as in the more common breeds (Zebu). The ears of some are of ordinary size and position (Zebu); in others pendulous. (Indian Ox.) The dewlap is more or less developed, in some very largely. Their colour varies from a light ashy-gray to a milk-white, and their size from the stature of an ordinary bull to that of a large mastiff. The limbs of all are deerlike and elegant. Mr. Bennett says, "they are spread over the whole of Southern Asia, the islands of the Indian Archipelago, and the eastern coast of Africa, from Abyssinia to the Cape of Good Hope." In many parts of India the Zebu is placed under the saddle or harnessed to a carriage, and travels at an easy rate. It must have lost much of its fleetness, if the more ancient writers are to be credited; for they speak of 50 or 60 miles a day as its usual pace, whilst the moderns only allow it 20 or 30 miles. The beef is not bad, but is neither so sweet nor so good as that of the common Ox, the hump always excepted, which when well cooked is very delicate. The Hindoos

venerate the Zebus and hold their slaughter to be a sin, though they do not object to work them. There are however some particularly sanctified Zebus, who lead an easy life, wandering about the villages at their will, and taking their pleasure and their food where they list, if not provided by the contributions of the devout. In most parts of India, they may be seen every day wandering at large in the streets eating rice, grain, and flour and vegetables from the stalls in the bazar; and the utmost a native does when he sees them plundering his goods too much, is to urge them by gestures and shouts to be off. I have never once seen them struck. The superstitious regard for these animals extends even to their excretions, or, as they are termed, the five products of the cow. The cow-dung is collected and dried and used for cooking food, even where wood is in abundance. Mr. Bennett, in his work on the 'Gardens and Menagerie of the Zoological Society,' has expressed an opinion that the Zebu is but a variety of the common Ox, but Mr. Vasey observes that the number of the vertebræ and the period of gestation both differ from that of the Ox.—*Engl. Cyc. p.* 620, 621.

(2144) BOS BUBALUS, THE BUFFALO. Forehead convex, rounded; horns large, flattened at the base, black on the plane of the face, bent down and recurved at the tips; ears quite half the length of the head, slightly ciliated; fur rough, irregular, bristly, often very far apart, on the face before the eyes two-rowed. This animal is the *Bos Bubalus* of Brisson; the *Bos Bubalis* of Linnæus; Buffle, French; and Büffel, German. A variety was called by Shaw *Bos Aruee*, which is the *Bubalus Arna* of Hodgson. Mr. B. H. Hodgson, who has by his labours thrown so much light upon Indian Zoology, says of the Indian Buffaloes: "The Bhainsa, or Tame Buffalo, is universal in India. The Arna, or Wild Buffalo, inhabits the margin rather than the interior of primæval forests. They never ascend the mountains, and adhere like the rhinoceros to the most swampy sites of the district they inhabit. There is no animal upon which ages of domesticity have made so small an impression as upon the Buffalo, the tame being still most clearly referrible to the wild ones at present frequenting all the great swampy jungles of India. In the wilderness as in the cow-house there is a marked distinction between the long (*macrocerus*) and curved-horned (*spirocerus*) baffaloes. The Arna ruts in autumn, gestating ten months and produces one or two young in summer. It lives in large herds, but in the season of love the most lusty males lead off and appropriate several females, with which they form small herds for the time. The Wild Buffalo is fully one-third larger than the largest tame breeds, measuring 10½ feet from snout to vent, and 6 or 6½ feet high at the shoulders, and is of such power and vigour as by his charge frequently to prostrate a well-sized elephant. It is remarkable for the uniform shortness of the tail, which does not extend lower than the hock; for the tufts which cover the forehead and knees; and, lastly, for the great size of its horns. They are uniformly in high condition, so unlike the leanness and angularity of the Domestic Buffalo, even at its best." The Buffalo has been introduced into Italy, where it is made very useful as a beast of burden, its great strength giving it an advantage over horses and ordinary oxen, in the marshy and swampy districts where the roads are frequently two or three feet deep with mud. A singular fact with regard to them is, that they thrive best in those districts which are most infected with malaria. The Manilla Buffalo is also a variety of this species.—*Engl. Cyc*: *page* 622. Crawfurd, speaking of it in the Archipelago, says, it is the same useful, powerful, ugly, sluggish and unwieldy animal which exists in all the warm countries of Asia, and which was introduced into Greece, Egypt, and Southern Italy in the middle ages. It is only, however, within ten or twelve degrees of the equator that it is found of great size, strength, and vigour. Compared with that of the Malayan countries, the buffalo of Southern Italy is certainly an inferior animal, and that of Northern India even a puny one. The buffalo is the principal beast of draught and burden throughout the Archipelago and Philippines, the ox being chiefly reserved for the tillage of dry upland grounds. The buffalo is larger and more powerful than the ox, but much slower and with less capacity of enduring toil. The flesh of this semi-aquatic animal is coarse, and its milk poor in quality compared with that of the cow. Its courage is indomitable, and united to its great strength, makes it an overmatch for the royal tiger. It has a repugnance to strangers, but with its friends is thoroughly docile. I have seen a boy of ten years of age part two enraged bulls with a switch, mount that which was his own by one of its horns, and ride home on it. The domestic buffalo is very scantily covered with hair, the colour of the skin appearing through it. It is either black or white, without any other variety, the black in nine cases out of ten predominating, and being considered, perhaps without much foundation, preferable to the white. Wherever the buffalo is found in the domestic state, it is also found in the wild one; and this makes it exceedingly difficult to determine whether this animal be a native of the Archipelago, or a domesticated stranger. Naturalists, I know, not on what ground, have come to the latter conclusion, and the natives of the country would seem to entertain the same opinion, for they call all buffalos found in the forest by an epithet which implies this, and which in Malay is jalang, meaning "stray" or "vagabond." The names given to

the animal, however, afford no warranty for this conclusion. With one exception, they are native, and not traceable to any foreign tongue. The Malay name is Kârbo, or Kárbau, and this with very slight variations extends over, at least, ten different languages of the Archipelago and Philippines. It is not, however, the only native name, for in the Sunda of Java we have the word munding, and in the Bugis and Macassar of Celebes, tedung. The only foreign name is the Sanscrit Maisa, restricted to the polite language of Java. That the domestic buffalo, however, has often escaped from servitude and become wild, is certain. This, for example, is probably the only source of the wild buffalo of the Philippines, for the buffalo of these islands was the only domesticated beast of burden in them before the arrival of the Spaniards. It seems then to have been confined to Luzon, although it has since spread to the other large islands; and invariably, it is known by the Malay name Karbo only, even the Spaniards themselves having adopted it, although at the same time expressing the inconsistent opinion that the buffalo was introduced into the Philippines from China. It is easy to see how readily it might have been introduced by the nearest Malays, those of Borneo; for even in native craft the voyage from Brunai to Manilla, in the proper season, is performed in seven days.—*Crawfurd Dic. p.* 73.

(2145) BOS FRONTALIS. The Gayal. There are three species which Professor Lundevall regards as subvarieties of a variety of the common bull. *Bos frontalis*, the Gayal. It is the *Bos frontalis* of Lambert, the *Bos Gayeus* of Colebrooke; Gavaya, *Sans*; Gavai or Gayal, *Hind*; Gobay goru, *Beng.*; Gaujangali, *Pers.*; Methana Mountaineers (Cucis, &c.) east of Silhet; Shial, Mountaineers (Cucis) east of Chatgaon; J'hongnua, Mugs; Nunec, Birmas; Gauvera, Ceylon. It is nearly of the size and shape of the English bull. It has short horns, which are distant at their base, and rise in a gentle curve directly out and up: a transverse section near the base is ovate, the thick end of the section being on the inside. The front is broad, and crowned with a tuft of lighter coloured long curved hair. The dewlap is deep and pendant. It has no mane nor hump, but a considerable elevation over the withers. The tail is short, the body covered with a tolerable coat of straight dark-brown hair; on the belly it is lighter coloured; and the legs and face are sometimes white. (Roxburgh.) Dr. Buchanan states that the cry of the Gayal has no resemblance to the grunt of the Indian Ox; but a good deal resembles that of the buffalo. It is a kind of lowing, but shriller and not near so loud as that of the European Ox. To this the Gayal, in Dr. Buchanan's opinion, approaches much nearer than it does to the buffalo. Mr. Macrae states that the Gayal is found wild in the range of mountains that form the eastern boundary of the provinces of Aracan, Chittagong, Tippera, and Silhet. The Cucis, or Lunetas, a race of people inhabiting the hills immediately to the eastward of Chittagong, have herds of them in a domesticated state. The animal is called Gabay in the Hindoo 'Sastra,' but seems however to be little known beyond the limits of its native mountains, except to the inhabitants of the provinces above mentioned. The same author informs us that the Gayal is of a dull, heavy appearance; but at the same time of a form that indicates much strength and activity, like that of the wild buffalo. Its disposition is gentle; even in the wild state on its native hills it is not considered dangerous, never standing the approach of man, much less sustaining his attack. The Cucis hunt the wild ones for the sake of their flesh. The Gayal is a forest animal, and prefers the tender shoots and leaves of shrubs to grass; it never wallows in mud like the buffalo. It is domesticated by the Cucis, but does not undergo any labour. The cow goes 11 (?) months with young, gives but little milk, and does not yield it long; but that little is remarkably rich, almost equalling cream, which it resembles in colour; the Cucis however do not make any use of the milk, but rear the Gayals entirely for their flesh and skins, of which last, or rather their hides, they form their shields. These domesticated herds roam at large in the forests near their village during the day, but return of their own accord at evening, being early taught to do this by being fed when young every night with salt, of which those animals are very fond. The Hindoos, in the province of Chittagong, will not kill this Gayal (their Gabay), which they hold in equal veneration with the cow, but they hunt and kill another Gayal (As'l Gayal or Seloi) as they do the wild buffalo.—*Engl. Cyc. page* 624. Mr. Bird proved that the Gayal will breed with the common Indian bull. He brought a domesticated female Gayal from Chittagong to Dacca directed a common bull (of the breed Deswali, a Zebu of the common kind found in the middle districts of Bengal), which the female received upon being blinded with a cloth thrown over her eyes. The offspring was a cow resembling mostly the Gayal mother; and from that cow, impregnated by a bull of the same common breed, another cow was produced, which also had grown up, and was in calf by a common bull when Mr. Bird wrote his account. (Asiatic Researches, vol. viii.)—*Engl. Cyc. page* 625.

(2146) BOS GAURUS, the Gour or Gaur. Hind hoof only half the size of the front hoof. Colour brown; legs white. This is the *Bos Gour*, Traile; *Bos Gaurus*, Col. Smith; *Bos aculeatus*, Cuvier. "Dr. Traill gives the dimensions of one not fully grown, which measured from tip of nose to end of tail 11 feet 11¾ inches; from the hoof to the withers 5 feet 11¾ inches; and from the withers to the sternum 3

feet 6 inches. The limbs have more of the form of the deer than any other of the bovine genus." The Gour, according to Captain Rogers, occurs in several mountainous parts of Central India, but is chiefly found in Myn Pat or Mine Paut, a high insulated mountain with a tabular summit in the province of Sergojah, in South Bahar. "This table-land is about 36 miles in length by 24 or 25 miles in medial breadth, and rises above the neighbouring plains probably 2000 feet. The sides of the mountain slope with considerable steepness, and are furrowed by streams that water narrow valleys, the verdant banks of which are the favourite haunts of Gours. On being disturbed they retreat into the thick jungles of saul-trees which cover the sides of the whole range.—*Eng. Cyc. page* 626.

(2147) BOS BANTING, the Banting, or Sumatran Ox.—Colour black, distinct large spot on rump, and legs white. This is the *Bos Banting* of Sir Stamford Raffles, *Bos leucoprymnus* of Quoy and Gaimard, *Bos Sondaicus* of Muller. It is a native of Java, Borneo, and Bali. There is a stuffed specimen and skeleton in the British Museum. Vasey in his 'Ox-Tribe,' has given a figure, and observes that it "bears some resemblance to the Gour, but in the skeleton of the Gour the sacrum consists of 5 vertebræ and the tail of 19, while in the skeleton of the Banting the sacrum consists of but 4 vertebræ and the tail of 18."—*Eng. Cyc. p*, 627. Ox (Bos). Exclusive of the buffalo, which is doubtful, two species of the ox are found in the wild state. One of these, called by the Malays, saladang, is sufficiently well ascertained to exist in the forests of the Malay Peninsula, although not as yet described by naturalists. The other is the Bos sondaicus, or Sunda ox, which exists in Java, the Peninsula, and Borneo, but, singularly enough, not in Sumatra, or in Celebes, or any island of the Philippine Archipelago, It is a large, massive, and powerful animal, of a light brown colour, with the hips and legs of the male of a clear white. It is the same species which is found in the forests of Pegu, up at least as far as Martaban.—*Crawfurd Dict. page* 316.

(2148) BOS GRUNNIENS. There is but one species, Poephagus grunniens *Bos grunniens*, the yak, or sarlyk. It is black: the back and tail often white. It is the *Bos grunniens* of Linnæus; *Bos Poephagus* of Colonel H. Smith. It has also been called the Grunting Ox, the Grunting Bull, Svora-Goy, and Bubul. There are several varieties called the Noble Yak, the Plough Yak, the Ghainorik, and Wild Yak. The following notices of the Yak are given in the Catalogue of the British Museum: "The Yaks dislike the warmth of summer, and hide themselves in the shade and water; they swim well; both sexes grunt like a pig. The calves are covered with rough black curled hair, like a curled haired dog. When of three months old they obtain the long hair on the body and tail. They willingly live with the common cows, and breed with them. The long white hairs of the tail are dyed red to form the tufts of hair on the caps of the Chinese. (Pallas, 'Act. Acad. Petrop.' 1777,250.)—*Eng. Cyc. page* 627. "The Yaks used for the plough are ugly and short-legged, and hold their heads very low. The beautiful long silky hair hanging from below the belly is almost if not entirely wanting in them, no less than the bushy tail, which their avaricious owners commonly cut off as an article of trade. They are guided by the nose. (Hoffmeister, 'Travels in Ceylon,' &c. 441.) The Yak-Ox used for riding is an infinitely handsome animal. It has a stately hump, a rich silky hanging tail nearly reaching the ground, twisted horns, a noble bearing, and an erect head (p. 441). They are very shy, and kick with their hind feet, turning their head round perpetually, as if about to gore their riders. Hooker writing of this animal says, "our broad-footed Yak-Ox is the beast with the thick silky white fringe under the body, and the bushy tail, both of which sweep the ground.... As the steepness increased, these poor animals began to moan, or rather grunt, in the most melancholy manner, and this unearthly music gradually rose to such a violent rattle, that driven rather by its irksome sound than by the discomfort of our saddleless seat, we dismounted at the end of the first half-hour (p. 443.)" The Yak, or Chauri Gau, inhabits all the loftiest plateaus of high Asia, between the Altai and the Himalaya, the Belur Tag, and the Peling Mountains, and is found tame as well as wild. It cannot live on the south side of the Himalaya beyond the immediate vicinity of the snow, where the tribes of Cachars on the juxtanivean regions of the Sub-Himalayas rear large herds of it, and cross-breed with the common-ox. They rut in winter, and produce young in autumn. Cæcum simple, not sacked, nor banded, four inches long; ribs 14 or 15 pairs; true dorsal ridge confined to the withers; dewlap none. (Hodgson.)—*Eng. Cyc. p.* 638.

(2149) BOSWELLIA, a genus of balsamic plants belonging to the natural order Amyridaceæ. One of the species is believed by Colebrook to be the Λιβανος of Theophrastus, and the *Thurea virga* of the Romans. ('Asiatic Researches,' vol. ix.) *Engl: Cyc. page* 582. It appears that the gum-resin called olibanum is the frankincense that was used by the ancients in their religious ceremonies. Linnæus was of opinion that it was yielded by the Lycian juniper; but that plant is a native of the south of France as well as of the Levant, and the botanists of that country deny that any such substance is produced by their juniper. The Greeks obtained their frankincense from Arabia. The Arabians call olibanum both Luban and

Cundur; but as benzoin is most used at the present day for religious purposes, the Mohammedan writers of India on Materia Medica apply only the term Cundur to olibanum. This Cundur has been ascertained by Messrs. Colebrook, Hunter, and Roxburgh to be yielded by *Boswellia thurifera* or *Boswellia serrata*. It is a large timber-tree found in the mountainous parts of India, yielding a most fragrant resin from wounds made in the bark. Its leaves are pinnate, and consist of about ten pairs of hairy serrated oblong leaflets, each of which is from an inch to an inch and a half in length. The flowers are pale pink, small, and numerous. The calyx is 5-lobed, the corolla of 5-dowry petals, the disk a fleshy crenelled cup, and the stamens 10, alternately shorter. The fruit is a 3-sided, 3-valved, 3-celled capsule, containing a single-winged pendulous seed in each cell. From this, Roxburgh distinguishes as a different species *Boswellia glabra*, a plant also yielding a resin which is used for incense and as pitch in some parts of India. It differs from the last in having no hairs on its leaves, in its leaflets being often toothless, and in its flowers being panicled. A substance analogous to olibanum, and used in a similar way in various parts of the world, is procured from several different trees, such as, in America, the *Croton niteus* (Schwartz), *C. thurifer* (Kunth), *C. adipatus* (Kunth): in Columbia. *Bailleria nervifolia* (Kunth) yields the American frankincense; the *Amyris* (*Icica Tacamahaca*, Kunth) *ambrosiaca* (Linn), yields also the resin coumier, likewise called American frankincense. *Lætia apetale* (Jacq.) also yields a substance similar to frankincense. *Olibanum* occurs in commerce of two kinds, the Arabian and East Indian. The former kind is now seldom met with, and its origin is a subject of doubt; the latter is obtained from the tree above described, and to it we limit our remarks. There are two varieties or degrees of fineness of it, the best called 'olibanum electrum,' or 'in granis,' sometimes called 'thus mannæ' or 'thus masculum': the other is termed 'olibanum commune,' or 'in sortis,' also fœmineum.' The first occurs in pieces varying from the size of a hazel-nut to that of a walnut, or larger, which are roundish or irregular in shape, of a light yellowish colour, varying to red or brown in some pieces, opaque or semi transparent, the outside often covered with a white powder, and upon being pounded the whole becomes a white powder. It is very friable, and breaks with a dull, sometimes even, sometimes splintery fracture. The second sort is generally in larger pieces, mostly of a dirty-gray or fawn-colour, and intermingled with pieces of wood and other impurities.—*Engl*: *Cyc*: *page* 583.

(2150) BOSWELLIA GLABRA.

Salaee, HIND. | Moræda, TAM.

A small tree; leaves pinnate, deciduous; flowers terminal, small, white with a red nectary, anthers yellow; yields the gum salai.

(2151) BOSWELLIA THURIFERA, Colebrooke, *As. Res.* xi. 317. xi. 158. Roxb. *Fl. Ind.* 383. Pereira, *Medical Gazette*, xx. 676.

Gunda barosa, Avul Kundoor, VERN. | Koonder Zuchir, ARAB.
Looban, DUK. | Dup-salaee, HIND.

A tree with leaves pinnate as the last; grows on the hills of the Deccan. It is a native of the mountainous tracts of Central India, and very common in the Shahabad country. Dr. Hooker remarks, when speaking of this plant, we continued to ascend from Belcuppee in Behar to the height of 1360 feet, where I came upon a small forest of the Indian Olibanum (*Boswellia thurifera*), conspicuous from its pale bark, and spreading curved branches, leafy at their tips; its general appearance is a good deal like that of the mountain ash. The gum, celebrated throughout the East, was flowing abundantly from the trunk, very fragrant and transparent.—*Hooker Him. Jour. p.* 29. The *Salai, salar, Boswellia thurifera*, remarks Dr. Irvine, tree, is plentiful in the Ajmeer hills: the gunda birosa is the prepared gum resin of this tree, and is similar in appearance and qualities to Venice turpentine. It is brought from Mewar, Harowtee and the Shekhawattee hills: and is considered stimulating: an oil is distilled from it, said to cure gonorrhœa. It is used also in ointments: much used in painting and by the lakheries one maund costs twelve rupees.—*Med. Top. of Ajmeer*: From the Shahabad country, Dr. O'Shaughnessy obtained fine specimens of the resinous products there called *sale gond or sale lassa*. At Chandalgur it is termed *gunda biroza*, and in the dry state *sukha biroza*. Dr. Hamilton however thought the English Olibanum to be the produce of an Amyris, partly because he could not find that the sale resin was used as incense by the Hindoos. The B. glabra and B. thurifera both furnish the Male frankincense of Dioscorides. Olibanum. The resin olibanum occurs in reddish or pale yellow tears, oval, oblong, and obtuse, sometimes in dense, opaque, brittle masses. The gunda barosa of the bazars is soft, ductile, opaque, greenish and white. The odour is balsamic and resinous, especially while the resin is burning; the flavour balsamic, and rather bitter, The powder, citron yellow. It is frequently adulterated by dammer, sandarach, and other cheaper resins; when chewed the hard variety softens, and dissolves partially in the saliva, which it renders white and emulsive. —*O'Shaughnessy*.

(2152) BOTANY BAY HE OAK. The wood of this tree is used in making Brush backs for veneers and in the manufacture of Tunbridge ware.

(2153) BOTANY BAY KINO. This is the produce of Eucalyptus resinifera; it is opaque,

dark brown; fracture shining and smooth; watery solution blackens the salts of iron strongly, and precipitates solution of gelatine.

(2154) BOTTLES.

Bouteilles, Fr.	Bottiglie, Fiaschi, It.
Boütteillen, Ger.	Bululki, Rus.
Batlee, Guz. Hind.	Bottellas, Sp.

These are glass or stone-ware vessels of various shapes and sizes, for holding liquids *Faulkner*.—A bottle manufactory was once established in the vicinity of Madras, but it has long been discontinued.

(2155) BOTRYCHIUM VIRGINICUM.—This large succulent fern grows plentifully in the Raklang Pass in the Sikkim Himalayas; it is boiled and eaten, both there and in New Zealand. Indeed ferns are more commonly used for food than is generally supposed. In Calcutta, the Hindoos boil the young tops of a *Polypodium* with their shrimp curries; and both in Sikkim and Nepal the watery tubers of an *Aspidium* are abundantly eaten. So also the pulp of one tree-fern affords food, but only in times of scarcity, as does that of another species in New Zealand (*Cyathea medullaris*): the pith of all is composed of a coarse sago, that is to say, of cellular tissue with starch granules.—*Hooker Him. Jour. p.* 292.

(2156) BOWRINGIA, a very curious and interesting genus of fern was found at Pomrang in the Khasia Hills, which is only known to occur elsewhere at Hong-kong in China, and has been called *Bowringia*, after the eminent Dr. Bowring. —*Hooker Him. Jour. Vol.* II, *page* 313.

(2157) BOZAH, is the Dukhanie and Hindoostanie name of a fermented liquor, obtained from Natchenny, Eleusine (Cynosurus) coracana, and somewhat resembling country beer. It is chiefly used in the higher provinces of India (*Anislie's Mat. Med. p.* 262); but the materials used in brewing or fermenting it vary in different places. The Sorghum vulgare is occasionally used, as also the bark of the margosa tree, and it is occasionally made more intoxicating by the use of drugs.

(2158) BOX WOOD.

Palm-hout, Dut.	Buchsbaum, Ger.
Buis, Fr.	Busso, Bosso, Bossolo, It.

This is a valuable wood of a yellowish colour, close grained, very hard, and heavy, it cuts better than any other wood, and is susceptible of a very fine polish. It is chiefly used by engravers, turners, mathematical, and musical instrument makers, and also in the manufacture of combs, knife-handles, button-moulds, &c. Localities, South of Europe, and West of Asia.—*Faulkner*. A new species of Box-wood has lately, however, been introduced into Britain from the Himalayas; it is the *Buxus emarginatus* of Dr. Wallich. This is found of considerable size and thickness, and the wood appears as good and compact as that of the boxwood in use in Europe.—*Royle, Illust. Himal. Bot. p.* 327. On actual comparison the Himalayan box-wood is found to be softer than the common kinds, but is like them in other respects, and woodcuts have been engraved upon the wood of the Himalayan Buxus emarginatus. The Karens sometimes furnished Mr. Mason with specimens of a wood that can scarcely be distinguished from the box-wood of Europe, but he had never seen the tree, though Mr. Mason has named it a Murraya. Wallich found *Nauclea cordifolia* on the banks of the Irrawaddy, which has "wood coloured like that of the box tree, but much lighter, and at the same time very close grained." It may possibly be the same tree, although the Tenasserim wood is not light; or it may be a Tavoy tree, which he says has "a strong tough wood, in grain like box."—*Mason*.

(2159) BRACELETS. The manufacture of Shell Bracelets is one of the indigenous arts of Bengal, in which the caste of Sankhari at Dacca excel. The *chanks* of which they are made are large univalve shells (several species of turbinella) from six to seven inches long, and of a pure white color. They are imported into Calcutta from Ramnad in Southern India, and from the Maldive Islands. At Dacca they are used for beetling fine Muslins, but principally for making the large massive bracelets which are worn by Hindoo women. They are sawn into semi-circular pieces, and these are rivetted and cemented to form the bracelets, some of which are elaborately carved, and inlaid with a composition of lac and a red pigment. A pair of bracelets of this description frequently costs as high as 80 Rupees. Of the thick pieces of the shells, beads are made to form the necklaces, which the Bengal Sepoys wear.

(2160) BRAGANTIA, a genus of plants belonging to the natural order *Aristolochiaceæ*. One of the species, *Braguntia tomentosa*, is said by Dr. Horsfield to be intensely bitter, and to be used as a medicine in Java.—*Engl. Cyc. page* 648.

(2161) BRAN.

Busa, Guz. Hind.	Towroo, Tam. Tel.

The thin skins of corn, chiefly of rice and wheat, separated from the grain. Its chief use is for feeding pigs, poultry, &c.

(2162) BRANDY.

Brandewyn, Dut.	Vinum adustum, Lat.
Eau de vie, Brandevin, Fr.	Aguardente, Port.
Brantewein, Ger.	Wino, Rus.
Brandy, Vern.	Agtardiente, Sp.
Aquarzente, It.	

A spirituous product obtained by distilling wine. Its qualities vary with the kind of wine employed. It is imported into India from France and England.

(2163) BRASS.

Missing, Messing. Geelkoper, Dut.	Ottone, It.
Cuivre jaune, Laiton, Fr.	Orichalcum, Auricalcum, Lat.
Messing, Ger.	Selenoi-mjed, Rus.
Peetul, Guz. Hind.	Laton, Azofar, Sp.

Brass is an alloy of copper and zinc. The term is generally applied to the yellow alloy of copper, with about half its weight of zinc, in which case it is called by Engineers *yellow brass*: but copper alloyed with about one-ninth its weight of tin is the metal of brass ordnance or gun metal. Similar alloys used for the *brasses* or bearings of machinery are called *hard* brass, and when employed for statues or medals they are called Bronze.—*Toml.* Brass is extensively used in India for the manufacture of cooking and other domestic utensils, and is in greater request than copper among the natives. It is imported into Bombay from England (*Faulk.*) but is largely manufactured in many parts of the country. An excellent specimen of *casting in brass* and bronzing was exhibited at the Madras Exhibition of 1855 by Mr. Rohde, a description of which is thus given by the Exhibitor. "The casting is in loam, 5 days are allowed for pickling (in tamarind leaf and water), scraping, filing, chasing, drilling, turning the cup and lastly annealing. The finished articles are then boiled in *sowdoo* (or wood ashes) and water, to free them from all grease, then set up and kept moist by dabbing with corrosive sublimate 1 oz. dissolved in *slightly* diluted vinegar 1 pint, till the desired tints are obtained, which may take ¼ hour or 20 minutes, they are then plunged and well rinsed in clean water *without friction* and dried in sawdust. Blacklead moistened with spirits of turpentine is then applied with a brush as in blacking a stone: when polished, the article is heated a little above what the hand can bear and lacquered with shell-lac varnish. The only nicety required is in getting the articles perfectly free from all grease, even finger marks, and in checking the bronzing at a proper period; if carried too far, it will scale off, if not far enough or irregularly, the color after rinsing will be varied. If the annealing has been irregular, the same will appear."—*M. E. of* 1855.

(2164) BRASS CAMPHIRE.—Borneo Camphor, Camphor of Baras, Malay Camphor. Bruss-capoor, Guz. & Hind.

The product of a tree (*Dryobalanops camphora*), confined to Sumatra, Borneo, and the Malayan Peninsula. It is found only in small quantities, in concrete masses, in the fissures of the wood. It is more fragrant, and less biting and pungent than the common camphor, and is held in much higher repute. It is imported into Bombay from China.—*Faulkner.*

(2165) BRASS LEAF, or *tinsel*, is manufactured by the Chinese to an enormous extent for making the *kin hwá* or 'golden flowers,' used in worship. It is exported to India, in boxes estimated to hold 50 catties.—*Morrison, page* 143. Also *tin-foil* to a small amount. *Bones* and *horns* are manufactured into buttons, opium-boxes, hair-pins, &c., some of which are exported. Bamboos, fishing-rods, and canes, form articles of commerce under the designation of *whangees*; the former are procured for umbrella handles, the latter sell according to taste or fashion. The same may be said of the great assortment of articles comprised under the head of *curiosities*, more or less of which are purchased by every trader visiting the country. Vases, pots, jars, cups, images, boxes, plates, screens, statuettes, &c., made of copper, iron, bronze, porcelain, stone, wood, clay, or lacquered ware, of almost every shape, size, and degree of workmanship, constitute the articles sent abroad under this designation.—*William's Middle Kingdom, Vol.* II. *page* 400.

(2166) BRASSICA, a genus of cruciferous plants, comprehending among other species the Cabbage, Cauliflower, Broccoli, Borecole, Rape, Turnip, Colza, and the like. It is distinguished from other cruciferous genera by the following characters:—Its seeds contain an embryo, the radicle of which is embraced in the concavity of the folded cotyledons. Its pod is long, slender, and many-seeded. The seeds are spherical. The calyx is equal at the base, and slightly spreading; the petals are undivided; the stamens entire.—*Eng. Cyc. page* 665. This tribe contains several very important alimentary species, viz. the *Brassica oleracea*, cabbage, and the red-leaved variety of that species; also the *B. campestris* and *rapa* (rape), *B. napus*, turnip, and the variety *oleifera*, cultivated for its oil, which is consumed to an immense amount in France for illuminations.—*O'Shaughnessy, page* 188.

(2167) BRASSICA CHINENSIS. Shanghae oil is obtained from this.—*Simmonds Comm. Product, p.* 511.

(2168) BRASSICA NAPUS, the Rape, Colza, or Coleseed, has the lower leaves lyrate, dentate, glabrous; upper leaves oblong, somewhat narrowed below, with a dilated cordate semi-amplexicaul base. It is difficult to find any character by which to distinguish this plant from Brassica campestris. In fact some botanists regard Brassica napus as nothing more than a variety of Brassica *campestris*.—*Eng. Cyc. page* 666.

(2169) BRASSICA OLERACEA, Cabbage. One of the most highly esteemed vegetables of European gardens is the cabbage.

(2170) BRASSICA RAPA, Turnips. Turnips are occasionally grown in the Tenasserim Provinces; but they do not reward the cultivator so well as cabbages.—*Mason.*

(2171) BRAZIL WOOD, Queen's Wood.—

Brasilienhout. Dut.	Legno del Brasile, Verzino It.
Bois de bresil Fr.	Pao Brasil Pao de Rainha, Port.
Brasilien-holz, Ger.	
Madera del Bresil, Sp.	

A wood employed for various purposes by

abinet makers in England, but its principal use s in dyeing red. It is procured in many parts f the Western Hemisphere, from one or two spe- ies of Cæsalpinia, West Indian and South Ameri- an trees, but, within the last fifteen years, from he *Gam Wood* imported from Africa. The true Brazil Wood is supposed to be the Bahia nitida, hich yields a finer and more permanent colour han any other.—*Tomlinson. Faulk.*

(2172) BREAD, may be leavened, or unlea- ened or unfermented. Where leaven is not used, ubstances are employed in imitation of yeast, rom which carbonic acid is disengaged, in making he bread, distending the dough and rendering it esicular and light: in the other, flour, water, ith perhaps the addition of salt, are alone em- loyed. In the former process, the substances mployed are the yeast of Europe, and the Palm ines or toddies of Eastern and Southern Asia. The substitutes for these are Sesqui—carbonate of Ammonia; carbonate of soda and hydrochloric cid; or carbonate of soda and tartaric acid: but y far the best of these substitutes is the carbo- ate of ammonia.

Wheaten Bread.—The species of bread in ommon use in a country depends partly on he taste of the inhabitants, but more in the ort of grain suitable for its soil. The Chinese se little bread and that little is generally of heat-flour. Cakes of wheat-flour, prepared on he girdle, is a common article of diet amongst he races of northern and central India: Further outh, on the table lands of the Peninsula, the atives of India use cakes made of the flour of he Indian Corn, the Zea mays; amongst the Mil- ets, bread is made of the great millet, the Sor- hum vulgare; also of the spiked millet, the Pen- illaria spicata; and the very poor of the people se the hard Raggy, the Eleusine corocana, in he form of cakes. Barley is occasionally used n the westward. Along the Sea-bord, however, f all Southern Asia, and eastward into China, oiled rice is the great article of diet, and it is nly made, with unfermented *palm wine*, into he cakes, familiarly known as Hoppers. The uperiority of wheat to all other farinaceous lants, in the manufacture of bread, is so very reat, that wherever this grain is easily and suc- essfully cultivated, wheaten bread is used, to he nearly total exclusion of most others. The ssential constituents of wheat flour are starch, lso called farina or fecula, glutin, and a little ugar and albumen. *Wheaten Bread* is occa- ionally adulterated with alum, which is added o whiten the flour, and to enable it to retain a arger quantity of water. Salt is also employed n the adulteration of wheaten bread, for the ame purposes as alum, to whiten the flour and nable it to hold more water, and carbonate of nagnesia has the same effect.—*Hassel.*

Indian corn bread, is rather less nutritious han that made from wheat, but is more fattening, in consequence of the greater quantity of oil contained in it.

Rice flour is scarcely ever made into fer- mented bread, although it is said to be oc- casionally mixed with wheat flour, for that purpose.

Bread of wood. In Sweden and Norway, saw-dust is sometimes converted into bread, for which purpose beech, or some wood that does not contain turpentine, is repeatedly ma- cerated and boiled in water, to remove solu- ble matters, and is then reduced to powder, heated several times in an oven, and ground: in this state it is said to have the smell and taste of corn-flour. It has a yellowish colour, and ferments on the addition of leaven; the sour leaven of corn-flour answering best for the purpose. When well baked, it makes a uni- form and spongy bread. By boiling wood-flour in water, a thick nutritious jelly is formed, like that made with wheat starch.—*Tomlinson.* In Eastern and Southern Asia, the ordinary *Wood Bread*, the well known Sago, is made from the starch granules contained in the pith of several species of palms. It is largely used as an article of diet, alike for the robust labourer as for the in- valid, and is extensively exported for the use of the sick, and the nursery.

(2173) BREAD-FRUIT TRIBE. This tribe of plants belongs to the natural family *Artocarpeæ*. Among the Artocarpeæ, we find the Bread- fruit, Fig, and Mulberry, genera of extensive distribution, numerous in species, growing to a great size, many of them of the greatest uti- lity to mankind, and probably much more important than is generally supposed; if we look to them as sources of material for paper- making, since the bark of some of the species is already applied to this purpose in some countries. The true Bread-fruit tree, the *Artocarpus incisa*, so famous for affording the chief article of food to the inhabitants of the South Sea Islands, and for which an expedition was sent by George III, under the celebrated Bligh, to introduce it into the West Indies, has bark which is useful to the people from its fibrous qualities: stripped, beat- en and prepared, it makes a kind of cloth, with which the South Sea Islanders clothe themselves. At Taiti, clothing made of it, and worn chiefly by the common people, was more common than that made with the Paper Mulberry, though in- ferior to it in softness and whiteness. Some of the East Indian species of Artocarpus, as the *Jak* tree, the *Kantal*, or *A. integrifolius*, and the *Dephal* or *A. Lakoocha*, and others, are probably possessed of similar properties; they are very abundant in Southern Asia, grow to a great size, and are frequently cut down on account of their wood. There were sent to the London Exhibi- tion of 1851, bark and bark *cloth*, which may all be produced by species of Artocarpus, as one of them was said to be the bark of the *Trap tree*, a

species of *Artocarpus*, which furnishes the Gutta used as birdlime. The fibre of the bark is used for fishing lines, cordage, and nets at Singapore. Another, *Chowat Kurnat*, similar to the above, was from Baram River. The *Glam* tree bark, from Borneo, furnishes a paper-like bark much used in caulking the seams of vessels. And the *Kumut* or bark cloth worn by the Kayans when mourning for the dead was also from the River Baram.—*Royle Fib. Pl.* p. 340.

(2174) BREAD STUFFS OF COMMERCE. The grain crops, edible roots, and farinaceous plants forming the Bread Stuffs of Commerce, from which man derives his principal sustenance, consist of the nutritious cereal grains, the tuberous rooted plants and the trees yielding farina. They are very widely diffused, and necessarily occupy the main attention of the cultivator; their products forming the most important staples of domestic and foreign commerce. The cereal grasses and roots, cultivated in temperate regions, such as wheat, barley, oats, rye, and the potato, are well known; but the Bread stuffs generally may be most conveniently arranged under three heads. Firstly—the Grain crops and legumes, which comprises the European cultivated grasses, wheat, barley, oats, &c.; and the tropical ones of rice, maize, millet, Guinea corn, &c. Secondly—Palms and other trees yielding farina, including the sago palms, plantain and banana, and the bread fruit tree. And Thirdly—the edible Root crops and Starch producing plants, which are a somewhat extensive class, the chief of which, however, are the common potato, yams, cocos or eddoes, sweet potatoes, the bitter and sweet cassava or manioc, the arrowroot and other plants yielding starch in more or less purity. The Bread stuffs, as they are popularly termed, particularly wheat and wheat flour, maize, and rice, form very important articles of commerce, and enter largely into cultivation in various countries for home consumption and export, and Russia, India, and the United States, carry on a very considerable trade in grain with other countries. The annual imports into England of breadstuffs for food, taking the average of the four years ending with 1852, amounted to,

	Tons.
Corn and grain, 8,085,903 quarters, at 60 lb. the bushel,	173,270
Flour and meal,	207,180
Rice,	40,817
Potatoes,	42,440
Sago, arrowroot, &c,	5,000
Total	468,707

Some portion of this quantity is doubtless consumed in the arts—as starch for stiffening linens, &c., and for other purposes not coming under the term of food, but there has been purposely left out in the calculation about 30,000 to 40,000 quarters of rice in the husk annually imported. With a rapidly increasing population in all parts of the civilized world, the production of bread is obviously the first object to be sought after, alike by the statesman and the peasant. An immense amount would be realised in every country, by the single saving of a bushel to an acre, in the quantity of seed ordinarily sown, and, the same result would follow if an additional bushel could be produced in the annual average yield of the wheat crop. From the best statistical accounts that can be obtained, the wheat annually produced in the United Kingdom of

England, Scotland, Ireland, is,	111,681,320 bushsel.
In France it is	198,660,000 ,,
United States	100,503,899 ,,

The amount of seed ordinarily sown to the acre in France is from two to three bushels. The return of crop for the seed sown is represented as in the best districts averaging 6·25 for one; in the least productive 5·40 for one. Those curious to know the calculations which have been made in some other countries in regard to this matter, will find the following information of use.

COUNTRIES.		Increase for seed sown.
Spain, Denmark, Prussia, France—best lands,		6 for one.
Portugal, Tuscany, Ireland		10 ,,
Plains of Lucca, Bologna,		15 ,,
Piedmont—Plains of Marengo,		4 to five.
Roman States - Pontiae marshes, Kingdom of Naples - best districts		20 ,,
Roman States and Kingdom of Naples - Ordinary lands. Scotland, Poland,		8 ,,
Malta the best lands,		38 to 64 ,,
,, Ordinary lands,		22, 25, 30 ,,
NORTHERN EUROPE.		
Sweden and Norway. Russia, Province of Tambof	1838	4.50 for one.
Russia, a good harvest,	1819	5 ,,
——— provinces north of 50 deg. latitude,	1821	3 ,,
England,	1830	9 ,,
Holland,	1828	7.50 ,,
Belgium,	1828	11 ,,
Bavaria	1827	7 to 8 ,,
Austria,	1812	7.05 ,,
Hungary,	1812	4 ,,
Switzerland, lands of an inferior quality,	1825	3 ,,
Of a good quality, 8; of the best quality,		12 ,,

(Statistique des Cereales de la France par Moreau de Jonnes.)—*Simmonds, p* 217.

(2175) BRICK.

Eent, Hind, Guz. Chengkul. Tam. Eetagarai, Tel.

A building material known since a very early period of the world's history, formed of tempered clay, and hardened either by exposure to the sun's rays or to the heat of a furnace, the former being called sun-dried bricks and the latter burnt bricks. They are also employed to make the metal of roads in countries where stone does not occur. The various argillaceous earths used in brick making are generally mixed with some other substance, being for the most part unfit to be used alone. Some are almost pure clay or alumina, and are strong and exceedingly plastic, but cannot be dried without splitting: others,

being light and sandy clays or loams are too loose to be made into bricks without the admixture of lime as a flux, to bind the materials. Others again, are natural compounds of alumina and silica, and, if free from lime, magnesia or metallic oxides, these are exceedingly valuable clays being from their infusible nature well adapted for making fire clays, for lining furnaces, for making crucibles, glass-house pots, &c. Fire clay is found in many places in India, and Dr. Hunter and the Madras Mint make firebricks equal to any imported and at less than half the cost. Bricks are still made in India by hand moulds, but in Britain they are now almost all made by machinery.

(2176) BRIEDELIA SPINOSA, Roxb. p. 735.; *Euphorbiaceæ*, Roxb. c. 171.

Kora man, TEL.	Moolloo vengay marum, TAM.

This is a large tree, a native of the Circars and Bengal. The qualities of its wood not known, though the tree is not uncommon and attains a considerable size in the Alpine jungles. It is a tree with a pretty large trunk, branches armed with strong thorns, leaves alternate, bifarious; flowers small, of a greenish yellow; berry small and globular; bark a strong astringent, and said to be vermifuge for cattle.—*O'Shaughnessy, page* 552.

(2177) BRINJAL. EGG PLANT.

Kattrikai. TAM.	Bodingan. SUMATRAN.
Byngun, DUK.	Brinzal, ENG.
Vunkaia, TEL.	Solanum melongena, LIN.
Trong, MALAY.	
Nila Barudena, HORT. M.	Vartaka, SANS.

The plant which produces this very excellent pot vegetable, is called in Europe "The Egg plant" it is of the class Pentandria and order Monogynia. There is a fine variety, large and long shaped, called by the Tamools kodivelung Kattrikai.—*Ainslie.*

(2178) BRINJAL. Var. Solanum melongena.

Kaliana kattrikai, TAM.	Kodikaloo vankaia, TEL.
Burree Byngun, DUK.	Deergavartaka, SANS.

This is a variety of the Brinjal, and is eaten by the common people.—*Ainslie p.* 240.

(2179) BRINJAL, prickly stemmed. Solanum insanum. Lin.

Mollu kattrikai, TAM.	Moluka kaia, TEL.
Dorla, DUK.	

This is a small, inferior sort of Brinjal, which takes its Tamool name from the circumstance of its stems being covered with prickles. It would appear to be the Seh unda of the Hortus Malabaricus.—*Ainslie, page* 241. For culinary purposes, the vegetable egg, or brinjal, is one of the best vegetables in India. Several varieties are extensively cultivated and eaten by all classes. It is a large round-shaped fruit, both purple and white; another is white, thin and long; a smaller species again is pear-shaped, red and purple striped; and there is one seldom exceeding the size of an egg. They are all dressed alike and used both in curries and other native dishes, and are much on the tables of Europeans. Their propagation is by seed, at the commencement of the rains. The young plants are placed at about eighteen inches apart and require watering every third or fourth day; they are sold from one to three pice a seer.

(2180) BRISTLES.

Borstels, DUT.	Setæ. LAT.
Soies, FR.	Szczeciny, POL.
Borsten, GER.	Schtschetina, RUS.
Setole, IT.	Cerdas, Setas, SP.

The strong glossy hairs growing on the back of the hog and the wild boar. They are extensively used by brushmakers, shoemakers, saddlers. &c. Russia is the great mart for bristles. —*Faulkner.*

(2181) BROCADE. Luppa. HIND. GUZ.

A fabric composed of satin, striped or purfled with gold or silver. It is now chiefly manufactured in different parts of India—Surat, Benares and Ahmedabad principally, and is almost exclusively used in the making of wedding, and state dresses for native princes and noblemen.

(2182) BRODIÆA. *Liliaceæ* —These bulbs with lilac, blue and white flowers may be grown like other lilies in a rich loam and are increased by off-sets of the roots.

(2183) BROMELIACEÆ. THE PINE-APPLE TRIBE. The Bromel worts, or the Pine apple tribe is a natural order of Endogens consisting of dry herbaceous plants, remarkable for their hardness and dryness of foliage. The flowers of most are pretty, and some of them, remarkably handsome and sweet scented; but, except in the genus "*Ananassa*" the fruit is in no case of any value: the order contains 23 genera and 130 species.—*Eng. Cyc. p.* 669. The Pine-apple, or Ananas, one of this tribe of plants, is an object of the most careful culture in Europe, on account of its pleasantly sweet and aromatic fruit. Its long and rigid leaves, which are thorny at the edges and point, abound in a quantity of fine white fibres, which are, in some countries, woven into the finest fabrics, netted, or twisted into lines for fishing and into ropes possessed of considerable strength. These are said not to be injured by constant immersion in water—a property which the natives increase by tanning them. The Pine-apple (*Ananassa sativa*, formerly Bromelia ananas), being a native of the moist forests of South America, from the level of the sea to elevations of about 1800 feet, requires, for its successful culture as a fruit, a warm and moist climate; but, like others of the family, the species are capable of existing in a warm, dry air. The Pine-apple is said to have been introduced into India by the Portuguese, in the year 1594. It has, in some parts, become so naturalised, as to appear indigenous. Capt. Turner, in his journey to Teshooloomboo, mentions it as very abundant at

the foot of the Himalayas. It flourishes in Assam, and forms thickets near Rangoon, producing, also, according to the accounts of different visitors, very juicy, well-flavoured fruit. Dr. Wallich, in the year 1836, presented to the Agricultural Society, a bag made on the Khasia Hills, of Pine-apple fibre, having purchased it for a trifle at Cheraponjee. He mentions the enormous quantity of Pines grown on that range, and that the plant appears as if it were quite a natural production. Dr. Helfer describes the Pine-apple as so abundant in the Tenasserim provinces as to be sold in Amherst Town in the months of June and July at the rate of one rupee for a boat-load. It chiefly abounds in low grounds, though it is also to be found in the hills amongst the Karens. The natives know it only by the American name, which they transform into *Nannah thi*—'thi' designating fruit. They do not seem to be acquainted with the beautiful fibre yielded by the leaves. The Pine-apple is described as growing in great abundance in the Philippine Islands, but as producing only a small, rather dry fruit. But we require some precise information to enable us to judge whether this is actually the plant escaped from cultivation. M. Perrotet considers it a distinct species, and has named it *Bromelia pigna*, from the Spanish name *Pigna* or *Pina*, signifying a cone. There, this wild plant is valued on account of the fine hair-like fibres which are separated from out of the leaves. Of these fibres, the celebrated pine-apple cloth of the Philippines, sometime called "batiste d'ananas," and resembling the finest muslin-like fabric, is woven. This is embroidered by the nuns of the convents in Manilla, with great skill and taste. Some beautiful specimens of these, under the name of Pina muslin, were to be seen in the Exhibition of 1851. This is sometimes called grass-cloth, but erroneously. With a magnifier the fibres may be seen to be very numerous and fine, but not twisted at all, as in grass-cloth or the finest muslins and cambrics. Mr. Bennet, in his 'Wanderings,' observes that one of the coarser fibres may be subdivided into threads of such fineness as to be barely perceptible, yet sufficiently strong for any purpose. Mr. Bennet mentions visiting a plantation near Singapore, made by a Chinaman, for the preparation of the fibres of the ananas or wild pine-apple, which are exported to China, being used there "in the manufacture of linens." The Chinese said he got 1½ rupees the catty, for the fibre. The leaves recently gathered—and the largest are preferred—are laid upon a board and the epidermis is removed with a broad knife. Upon its removal from the upper surface of the leaf, the long and beautiful fibres were seen lying upon the lower and denser epidermis, running in a longitudinal direction; the fasciculi of fibres were then readily detached by the hand on being raised with the broad knife. The separation of the fibre of the ananas is practised in other places besides the Philippine Islands. The Singapore Committee forwarded specimens (*Tali nanas*) from Malacca, as well as some of three different qualities prepared at Singapore, and a portion as ready for weaving, that is, with the ends gummed, or joined together by some adhesive substance; thus forming the "invisible knots" of an old author. Specimens were also sent from Java and the island of Celebes. Dr. Roxburgh does not appear to have paid much attention to the separation of the ananas fibre; but in the year 1839, Miss Davy sent specimens of a thread prepared from the wild pine-apple plant of Assam, of various degrees of fineness, observing that the thread must be prepared when the leaves are green, as nothing can be done with them in a dry state. Miss Davy subsequently sent specimens of cloth manufactured from this thread to the Agricultural Society of Calcutta, observing that she had had much difficulty in getting it woven, as the principal manufacturers in Dacca positively refused to undertake making it into cloth. A weaver in the jungles near Dacca, afterwards undertook to do so, and wove the cloth which was sent. Of this, Miss Davy had some embroidered in silver, - a style of work in which the natives of that part of the country excel. The specimens of the fibre were shown by Mr. E. Solly to spinners in this country, but who did not consider it could be substituted for flax in the manufacture of textile fabrics. A patent was, however, taken out by Mr. Zincke, for the manufacture of thread from this fibre, because, when bleached, it could be spun in the same way as flax. The process of bleaching, by destroying the adhesion between the bundles of fibres, renders it much finer; and hence enables it to be extended between the rolls in the process of spinning. He considers that, from its beautiful silky lustre, combined with considerable strength, it is well adapted to form a substitute for linen. Pine-apple fibres (*anasa nara*), and the tow or oakum from them, were also sent to the London Exhibition of 1851, from Madras and from Travancore, showing that the art of separating these fibres is extensively diffused. Dr. Hunter received some very fine, strong, and silky fibres from Porto Novo, prepared by Mr. Lima. Besides the fibre, some twine and cord made with it was also sent from Madras and from the Eastward. Mr. Bennett says, that at Singapore, from the cost of labour, the pine-apple fibre could not be prepared under thirty-eight or forty dollars the pecul; but in Penang, or other places where labour is cheap, and women and children could be employed upon it, the expense would hardly exceed ten dollars per pecul. In the experiments which Dr. Royle made with these various fibres, a certain quantity of those prepared at Madras bore 260 lb., while a similar quantity from Singapore bore 350 lb. be-

fore they broke ; but of New Zealand flax the same proportions bore only 260 lb. In a report from the Arsenal of Fort William, dated June 3d, 1853, the results are given of some experiments made by Conductor Wilkins on several kinds of rope manufactured by Messrs. W. H. Horton and Co., of Calcutta ; and among these there is one of Pine-apple fibre, of three inches and a quarter in circumference. The Government proof is that a rope of this size should bear a weight of 42 cwt., but it bore no less than 15 cwt. more, that is, it broke with a weight of 57 cwt. ('Journ. of Agric. Soc. of India,' vol. viii, p. 182); proving incontestably that Pine-apple possesses strength for cordage, as well as fineness for textile fabrics.—*Royle Fib. Pl. p.* 37.

(2184) BRONZE, GUN METAL.

Stuck-goed, DUT.	Metallum tormentorum, LAT.
Stuckgut, GER.	Metal de Canones, SP.
Bronzo, IT.	

It is used for casting statues, cannons, bells, frames, stands for argand lamps, ornaments, &c. Bronze is an alloy of copper and tin, the quantity of tin employed varying according to the effect desired to be produced. Analysis has shown that ancient weapons and tools contained 8 to 15 per cent of tin ; medals from 8 to 12 per cent tin, with 2 parts zinc added to each 100, for improving the bronze colour. The modern alloys of copper and tin have led to the production of a variety of metals bearing different names, as *Soft Gun metal, Brass ordnance* metal, with 8 to 12 per cent tin, the various *Bell metals* and the Chinese gongs with 20 per cent of tin : and *speculum metal*, of 126·4 of copper to 58·9 of tin.—*Tomlinson.*

(2185) BROOM GRASS. Aristida setacea, Lin.

Todapum, TAM.	Cheempirie Kutta, TEL.
Jaroo, DUK.	

This article in the more southern parts of the Peninsula is called Vullakamar Brooms are also made of the சீப்பு, Eerkoo, the midrif of the cocoanut leaf.—*Ains. Mat. Med. p.* 145.

(2186) BROOMS.

Balais, FR.	Scope, IT.
Besen, GER.	Metlu, RUS.
Jaroo. HIND.	Escobas, SP.
Torapum, TAM.	

Are well known articles, formed of various materials, and used for sweeping floors, walls, ceilings, &c. They get the name of broom, because first made in Europe from the small branches of the plant of that name. In India, they are made of the strong grasses which abound. That in Southern India, is the Torapum pilloo, the broom grass, above described.

(2187) BROUSSONETIA, a genus of plants belonging to the natural order *Urticaceæ* and sub-order *Moreæ*. There is but one species Broussonetia *papyrifera*.

(2188) BROUSSONETIA PAPYRIFERA. (Gluga, Javanese.) The Paper Mulberry, formerly Morus, now *Broussonetia papyrifera*, is a tree which has long been famous for its fibrous bark, as this is made into a kind of cloth as well as into paper. It is a native of the isles of the Southern Ocean, as well as of China and of Japan. In Taiti, or Otaheite, and other islands, they make cloth of its bark ; and it is said that the finest and whitest cloth and mantles worn by the principal people at Otaheite and in the Sandwich Islands is made of the bark of this tree, and this when dyed red takes a good colour. It is called *Kilia* on the west coast of Celebes. It is from the inner bark of this plant that the Japanese and the Chinese manufacture a kind of paper. It forms a small tree with soft brittle woolly branches, and large hairy rough leaves, either heart-shaped and undivided, or cut into deep irregular lobes. Some of the individuals are sterile, others fruitful. The flowers of the sterile trees grow in catkins, which fall soon after their anthers have all shed their pollen ; these catkins are composed of little greenish-purple membranous calyxes, each seated in the axil of a hairy bract and containing four elastic stamens. The flowers of the fruitful trees are collected into round green heads, and consist of a calyx like that of the sterile tree, with a small simple pistil occupying its centre, and having a long downy stigma. The heads gradually push forth little oblong greenish bodies ; these are the ripening fruits, which at maturity have a bright scarlet colour, and are of a pulpy consistence, with a sweetish insipid taste. Sir James Smith gives the following abridgment of Kæmpfer's account of the preparation of paper from its bark by the Japanese :—"For this purpose the branches of the present year, after the leaves are fallen, in December, are chosen, and being cut into pieces about a yard long are boiled till the bark shrinks and is easily separable from the wood, which is then thrown away. The bark being dried is preserved till it is wanted. In order to make paper it is soaked for three or four hours in water, after which the external skin and the green internal coat are scraped off ; at the same time the stronger and firmer pieces are selected, the produce of the youngest shoots being of an inferior quality. If any very old portions present themselves they are, on the other hand, rejected as too coarse. All knotty parts and everything which might impair the beauty of the paper are also removed. The chosen bark is boiled in a lixivium till its downy fibres can be separated by a touch of the finger. The pulp so produced is then agitated in water till it resembles tufts of tow. If not sufficiently boiled the paper will be coarse though strong ; if too much, it will indeed be white, but deficient in strength and solidity. Upon the various degrees and modes of washing the pulp much also depends as to the quality and beauty

of the paper. Mucilage obtained from boiling rice, or from a root called *Oreni* (Kæmpf., 474), one of the mallow tribe, is afterwards added to the pulp. The paper is finished much after the European mode, except that stalks of rushes are used instead of brass wires."—*Eng. Cyc. page* 671. Dr. Royle remarks that the manufacture of paper from this bark was long since accurately described by Kæmpfer, as seen by him in Japan, where they are said to cultivate this plant much as osiers are cultivated in Europe; the young shoots being cut down in December, after the leaves have fallen. These are then cut into good long pieces, and are boiled until the separation of the bark displays the naked wood, from which it is then easily separable with the aid of a longitudinal incision. In order to make paper, dried bark is soaked for a few hours in water, after which the outer cuticle and the internal green layer are scraped off. The stronger and firmer pieces are separated from the youngest shoots, which are of inferior quality. The selected bark is boiled in a ley of wood-ashes till the fibres can be separated by a touch of the finger. The pulp so produced is then agitated in water till it resembles tufts of tow. If not sufficiently washed the paper will be coarse, but strong; if too much boiled it will be weaker, but white. It is then beaten on a table, with batons of hard wood, into a pulp. Mucilage obtained from boiled rice, or from a plant called *oreni*, is added to the pulp. These three are stirred with a clean reed till reduced into a homogeneous liquor, and when of a due consistence are ready for conversion into sheets of paper. This process is interesting, from its resemblance to that adopted with the Nepal Paper plant, showing the probable introduction of the art from China Specimens of Paper Mulberry cloth, or rather paper used for the purposes of cloth, and made from the bark of the Paper Mulberry, as well as paper made from the same bark, were sent to the Exhibition of 1851 from Singapore. Mr. Williams says, the alburnum is carefully separated from the bark, and beaten to a pulp, and when mixed with rice sizing, is formed into sheets by moulds. The largest portion of the paper used in Japan is manufactured from this substance, but the Chinese usually employ bamboo and cotton; some of it is very fine and silky. The fibrous properties of this plant are interesting not only on its own account but also because it is allied to the Mulberries, the genus (*Morus*) numerous in species, and abounding in individuals, many of which are cultivated on account of their fruit, but still more for their leaves as food for the silkworm. It is probable that most of the species of the genus Morus have bark of a sufficiently fibrous nature. But few, if any, seem to be turned to this useful account. Yet the bark of the White Mulberry seems from very early times to have been made into paper in China; for Marco Polo informs us that "the Grand Khan causes the bark to be stripped from those Mulberry trees, the leaves of which are used for feeding silk-worms, and takes from it that thin rind which lies between the coarse bark and the wood of the tree. This being steeped, and afterwards pounded in a mortar until reduced to a pulp, is made into paper, resembling that which is made from cotton." This fact directs attention to the bush cultivation of the Mulberry in Bengal, for feeding silk-worms. This culture consists in planting cuttings of the Mulberry, which, as they grow, are cut down about four times in the year, in order to produce young leaves for the successive broods of silk-worms. The countless number of shoots which are thus thrown away, or used as fuel, would probably, under the agency of the dhenkee, yield good half-stuff for the paper-maker. Mr. Henley, indeed, informs us that, before leaving India, he had produced very satisfactory specimens of half-stuff from the bark of these rejected stems. The bark separates when the cut stems are steeped in water, and when pounded up, the greater part of the mucilaginous matter passes off, leaving a mass, having much of the good qualities of linen rag half-stuff. *Royle Fib. Pl. p.* 341. In China, the leaf of the common mulberry is the principal object of its culture, but the fruit is eaten, and the wood burned for lampblack used in making ink.—*Williams' Middle Kingdom, p.* 281.

(2189) BROWALLIA, SCROPHULARIACEÆ. These are handsome plants, blue and white flowers, easily cultivated from seed in any good soil. The white is an upright, and the blue a spreading, plant; both having a pretty and delicate appearance.—*Riddell.*

(2190) BROWN HEMP, is the commercial name given in Bombay to the fibres of the Hibiscus cannabinus. It is the Ambaree or Mesta pat of Bengal and the Palungoo of Madras, and is also known as Indian Hemp. See AMBAREE.

(2191) BRUCEA ANTIDYSENTERICA, is considered by the Wooginoos of Abyssinia a most valuable remedy in dysentery, and severe cases of diarrhœa. The false angustura bark was long supposed to be the produce of this Brucea, and its active principle was accordingly named *Brucine.* It is now however established that the false angustura bark is that of the strychnos nux-vomica, the *Kuchila* tree of Bengal.—*O'Shaughnessy, page* 226.

(2192) BRUCEA SUMATRANA, Roxb. Fl-Ind. i. 449. This is a native of Sumatra, the Moluccas, Cochin China, and China, but has been successfully grown in the Botanic Garden of Calcutta. In one year the plants were about four feet high, with a straight ligneous stem, and few branches; they then began to flower in May, and continued to blossom and ripen their seed all the year.—*O'Shaughnessy, page* 226. *Brucea Sum-*

atrana has serrated leaflets villous beneath, the racemes usually compound, the petals longer than the calyx. The leaves are intensely bitter, and possess the same medicinal properties as the Brucea antidysenterica (Christison, *Dispensatory*; Don, *Gardener's Dictionary*.)—*Engl. Cyc. p.* 671.

(2193) BRUMADUNDOO OR COOROO-KOO OIL. ARGEMONE MEXICANA.

Brumadundoo yennai, TAM.	Oil of Prickly Poppy, or.
Brumadundie Noona, TEL.	Jamaica yellow thistle,
Faringie datura ka tel, HIND.	ENG.

This pale yellow, limpid oil, may be obtained in large quantities from the round corrugated seeds of the prickly poppy, which was originally introduced from Mexico in ballast, but now flourishes luxuriantly in all parts of India. It was noticed under the head of Argemone mexicana. It is sometimes expressed by the natives and used in lamps, but is doubtless adapted to other and more important uses. In North Arcot it costs from Rs. 1-14-0 to Rs. 2-1-0 per maund.—*Madras Exhibition of* 1855. See ARGEMONE MEXICANA.

(2194) BRUNSVIGIA TOXICARIA. Amaryllis disticha, *Linn.* A native of the Cape of Good Hope. The viscid juice of the bulbs is a powerful poison, and used by the Bushmen on their arrows.—*O'Shaughnessy, page* 656.

(2195) BRUSHES.

Brosses, FR.	Schtschetki, RUS.
Bursten, GER.	Brozas. Cepillos, Escobillas, SP.
Setole, Spazzole, IT.	Broosh, VERN.
Escovas, PORT.	

Brushes are made of hairs, hog's bristles, strips of whale-bone, vegetable filaments of palms &c. fastened together in a handle, or in holes drilled for the purpose in a stock of wood, bone, ivory &c. and are of various shapes with various names, according to the purpose for which they are contrived. The smallest kind is the hair brush, used in water colour drawing. Bristles however are the chief of the articles employed in their manufacture, and on the average of the three years ending 1842, the average imports to England of bristles amounted to 1,772,196 lbs. a year, but in 1845 to 2,412,267 lbs.—*Toml.*

(2196) BRYONIA. SPEC.

Chukan pullum, TAM.	Gotoomba, SANS.
Boodama pundoo, TEL.	

The Bryonia, of which this is the fruit, grows in the woods; it is of an inferior order, and is only eaten by the common people.—*Ainslie, page* 223.

(2197) BRYONIA ALBA, same as B. dioica in properties.—*O'Shaughnessy, page* 347.

(2198) BRYONIA CALLOSA.

Boddama Kaia, TEL.

The bitter seeds are given in worm cases, and yield also a fixed oil used in lamps.—*O'Shaughnessy, page* 348. It is called.

Toomuttikai yennai, TAM. | Boddama kaia noona, TEL.

And is used in some parts of the country, where the fruit abounds. It is extracted by boiling in water, and is procurable only in very small quantities.—*Madras Exhibition of* 1857.

(2199) BRYONIA COCCINIA.

Covay-kai, TAM.

The fruit when green is used in making chatney; it is common everywhere in hedges and gardens, where it is a troublesome weed.—*Jaffrey.*

(2200) BRYONIA DIOICA. Αμπελος λευκη, Βρυωμα, Diosc. Root large, white, long, fleshy. Root acrid and purgative, produces also violent vomiting. It was formerly a very popular remedy in Europe, but is now banished from the Pharmacopœiæ.—*O'Shaughnessy, p.* 347.

(2201) BRYONIA EPIGÆA. Rottl.

Kolung kovay kalung, TAM. | Rawkus Gudda, HIND.

This valuable bitter root resembles that of the colombo plant (*O'Sh. p.* 347): it is mucilaginous and tonic, stomachic and aperient; and natives employ it in the latter stages of dysentery; they also give it internally for old venereal affections and chronic rheumatism: it is for the most part prescribed in powder (which is of a very pale yellow color) in doses of a pagoda weight in the course of the four and twenty hours, and is continued for eight or ten days together: this quantity generally produces one or two loose motions. The root when dried very much resembles in taste the Columbo root, to which it also approaches in medicinal qualities. The following is Dr. Rottler's own botanical description of the Bryonia epigæa:—The stalk sulcate, smooth. The leaves somewhat fleshy, cordate, trilobate, dentate, rough, the lateral lobes subbilobate. The flowers in a raceme—male flowers, five, small, female flower single pedunculate, proceeding from the same axilla as the male flowers.—*Ainslie's Mat. Med. p.* 301.

(2202) BRYONIA GRANDIS.

The Plant,

Jivaka, Vimba, Patuparni, SANS.	Telkatcha, HIND.
Koondorie, DUK.	Covay, TAM.

The juice of the leaves is used as an application to obstinate ulcers produced by the bites of animals (*Ainslie, vol.* ii. *p.* 436.)—*O'Shaughnessy, page* 348.

The Leaves,

Covay keeray, TAM.	Donda koora, TEL.
Kundorie ke baujee, DUK.	Bimb, SANS.

The Fruit,

Covay kai, TAM.	Donda kaia, TEL.
Kundorie ka phul, DUK.	Bimb, SANS.

The fruit கசகசக்காய் when unripe is rank-

ed amongst the Kaïs கறி or garden stuffs of the natives of India. In that state it has a slightly acid but not unpleasant taste. When ripe it is considered as a fruit (pullum) பழம், and it is then sweetish but insipid; it is smooth, oblong, and about an inch and a half long.—*Ainslie, page* 139.

(2203) BRYONIA ROSTRATA. Rottl.

Appacovay, TAM.

Leaf of the beaked bryony.—*Ainslie's Mat. Med. p.* 259. This is a native of Tranquebar. The root is prescribed in India as an astringent and emollient poultice in cases of piles. (*Ainslie.*)—*O'Shaughnessy, page* 347.

(2204) BRYONIA SCABRA, Lin. Ainslie

Ahilaykum, SANS.	Musmusa, DUK.
Mosumooskei keeray, TAM.	Noodosa koora. TEL.
Musmusa ka baujee, DUK.	Ahilayka, SANS.

The shoots and leaves are aperient: the fruit slightly bitter also.—*O'Sh. p.* 348.

(2205) BRYOPHYLLUM CALYCINUM. This curious flowered plant with a leaf like the house-leek was introduced into India by Lady Clive, from the Moluccas, and has been so naturalized on the Tenasserim Coast, that it may be sometimes seen growing around old pagodas like a wild plant.—*Mason.*

(2206) BUCHANANIA LATIFOLIA.—BROAD-LEAVED BUCHANANIA.

Moreda, TAM.	Theet-sai, BURMESE.
Pujal, HIND.	

This is a jungle tree, flowering after the rains. It is common in the Kotah jungles. Both the *Buchanania latifolia* and *B. angustifolia*, are found in Tenasserim. The former is plentiful, both in the Pegu and Tounghoo districts, and the latter is only seen about Rangoon. They both yield valuable oil-seeds of the sweet or fatty class.—*McClelland.* A very fine oil might be expressed from the seed. The Buchanania latifolia is very handsome; flowers fragrant, and the wood hard and durable. It bears fruit about the size of a small cherry, in long bunches, colour of a darkish purple: the kernels, or seeds, which are covered with a double shell, after being prepared by the natives, are sold in the bazars of India four or five pounds for a rupee: they possess the flavor of almonds, and are used as such by the native confectioners, the fruit is agreeable, and the seed, called Chironji *Hind*, Chaurapuppoo *Tam.*, has a very pleasant rich flavour. The method of preparing them by the Bheels is this: the fruit when ripe in May is gathered, then soaked in water to soften the outer pulp, when it is washed and rubbed off by the hands: the little nut is then dried in the sun, and afterwards broken between a common chuckee or stone hand-mill, such as is used for grinding wheat: the kernels are then sifted and winnowed. This kernel of the Buchanania latifolia is much used in native confectionary, being brought to Madras from Cuddapah, &c. The oily kernel is roasted and eaten by the Brahmins with milk, and is considered a great delicacy.—*Madras Exhibition. Irvine. Eng. Cyc.*

(2207) BUCKLANDIA is a magnificent tree and one of the most beautiful evergreens of Sikkim. One seen by Dr. Hooker had a trunk twenty-one feet seven inches in girth, at five feet from the ground, and was unbranched for forty feet. Ferns and the beautiful air-plant *Cœlogyne Wallichii* grew on its branches, with other orchids, while *Clematis* and *Stauntonia* climbed the trunk. Such great names (Buckland, Staunton, and Wallich) thus brought before the traveller's notice, never failed to excite lively and pleasing emotions: it is the ignorant and unfeeling alone who can ridicule the association of the names of travellers and naturalists with those of animals and plants. This superb tree is a great desideratum in English gardens; Dr. Hooker believes it would thrive in the warm west of England. Its wood is brown, and not valuable as timber, but the thick, bright, glossy, evergreen foliage is particularly handsome, and so is the form of the crown. It is also interesting in a physiological point of view, from the woody fibre being studded with those curious microscopic discs so characteristic of pines, and which when occurring on fossil wood are considered conclusive as to the natural family to which such woods belong. Geologists should bear in mind that not only does the whole natural order to which *Bucklandia* belongs, possess this character, but also various species of *Magnoliaceæ* found in India, Australia, Borneo, and South America.—*Hooker Him. Jour. Vol.* II *page* 185.

(2208) BUCKWHEAT. POLYGONUM. Buckwheat belongs to the temperate and arctic climates, and is cultivated in Northern Europe, Asia, and America for the farinaceous albumen of its seeds, which, when properly cooked, affords a delicious article of food to a large portion of the human race. It also serves as excellent fodder to milch cows, and the straw, when cut green and converted into hay, and the ripened seeds, are food for cattle, poultry, and swine. It is raised most abundantly in Central Asia and the Himalaya. In the latter country the different varieties are grown at various elevations, between 4,000 and 12,000 feet. The common variety grown in Europe is the *Polygonum fagopyrum*, and *P. emarginatum* is grown in China and the East. In Britain the produce varies from 2 to 4 quarters per acre. The quantity of seed sown is 5 to 8 pecks the acre. It is believed to be a native of Central Asia, as it is supposed to have been first brought to Europe in the early part of the twelfth century, at the time of the crusades for the recovery of Syria from the dominion of the Saracens; while others contend that it was introduced into Spain

by the Moors, four hundred years before. The cultivation of buckwheat, in one or other of its species, is principally confined to Great Britain, France, Switzerland, Italy, Netherlands, Germany, Sweden, Russia, China Tartary, Japan, Algeria, Canada, and the middle and northern portions of the United States. In America from 30 to 45 bushels per acre may be considered as an average yield in favourable seasons and situations, but 60 or more bushels are not unfrequently produced. According to the census returns of 1840, the annual quantity raised in the United States was 7,291,743 bushels; of 1850, 8,950,916 bushels. The average annual imports of buckwheat into Britain have not exceeded 1,000 quarters, until 1852, when they reached 8,085 quarters. A small quantity of the meal is also annually imported.—*Simonds, p.* 259.

(2209) BUDRANJA BOYA. A species of Melissa, a small plant found about Ajmeer, where it is considered heating, and is used to cleanse the blood: one seer for two rupees.—*Gen. Med. Top. p.* 130.

(2210) BUFO SCABRA. The common Bengal and Java toad, abounded in the marshes, in the Lachen Valley, adjoining Thibet. This is a remarkable instance of wide geographical distribution for a Batrachian, which is common at the level of the sea under the tropics.—*Hooker Him. Jour. Vol.* II. *page* 96.

(2211) BUFF.

Buffle, Fr. | Cuojo di Bufalo, It.
Buffel, Buffelhaute, Ger. |

A sort of leather prepared from the skins of buffaloes, elks, oxen, and other like animals, dressed with oil, after the manner of chamois leather. It is used in making gloves, sword belts, &c. It is manufactured in India.

(2212) BUGS. A tallow candle kept in bed, is said to drive away bugs, which are very troublesome in the East, as also in the hills, and Cashmere.—*Honig. p.* 343.

(2213) BUHRSTONE, is a quartzose rock containing cellules. It is as hard and as firm as a quartz crystal, and owes its peculiar value to this quality, and the cellules, which give it a very rough surface. Stones for grinding wheat and other kinds of grain are formed of this rock, and those which are most valued have the cavities about equal in space to the solid part. The best stones for this purpose come from France, and are obtained from the Paris basin and adjoining districts When used for grinding, the stones are cut into wedge shaped parallelopipeds, which are called panes. These are bound together by iron-hoops into millstones. The Paris Buhrstone is a Tertiary Formation. A Bhurstone is obtained in Ohio in America, which is in part a true sandstone, and contains fossils. It also contains lime, and Mr. Dana suggests that the removal of the lime by solution may have given it its cellular character. It overlies the Coal Formation, and has an open cellular structure where quarried for millstones. The quartz rock of Washington in the United States is in some parts cellular, and makes good millstones. Buhrstone also occurs in Georgia near the Carolina line, and in Arkansas near the Cove of Wichitta (Dana, *Manual of Mineralogy.*)—*Eng. Cyc. page* 681.

(2214) BUKUM, Cæsalpinia sappan. q: v: Narrow-leafed Brasiletto. This is a common shrub in most parts of India; the seed is used for colouring milk, and the wood as a red dye.

(2215) BULBS. Those imported into India, for flowering plants do not succeed well in general; this is owing in a great degree to their being disturbed; the best plan to adopt is to prepare a good piece of ground somewhat raised, to throw off the heavy rains and to plant each variety by itself in rows, keeping them clear of weeds. Every season, when they begin to grow, stir up the soil and add a little well decayed horse manure. One thing is perfectly evident regarding this species of plants in India, that the more nursing they receive the weaker they become, they seem to relish neglect, under which they flourish in the greatest beauty. If wanted to be grown in pots, the soil should be three parts sand and one vegetable mould and decayed manure. When the bloom appears, a watering of liquid manure once or twice a week will aid them greatly. After the leaves are decayed, put them in a dry situation till another season; when they begin to show signs of growth: let a slight watering for some time be given to enable them to form new roots, then take out one inch of soil, and put in the same quantity of decayed horse manure mixed with a little sand, after which water freely, till the flowers are past when they should be *gradually dried.*—*Riddell.*

(2216) BULLAR, Eng.

Sem ke pattay, Hind. | Mutche cotte, Tam.

This is a variety of the Lablab vulgaris. It is a shrubby plant, bearing a small bean, sown in June and ripe in October; it is boiled plain and eaten, or put into curries; the natives also give it to cattle.

(2217) BULRUSHES (*Typhaceæ*).

Pun, Booree, Sindeh.

Bulrushes, so conspicuous in the marshes of Europe, extend also to similar situations in most parts of India. The leaves are in some parts of Europe employed in making mats and winter coverings for plants, as well as for stuffing chairs, the leaves of *putera* and *reree* (or *Typha elephantina* and *T. angustifolia*) are employed in making mats in North-West India. Dr. Stocks informed Dr. Royle that in Sindh the former is called *pun*, and its leaves employed for making mats and baskets. The pollen, like that of Lycopo-

dium, is inflammable, and used as a substitute for it in Europe. It is also collected in Sindh, and there called *booree.—Royle Fib. Pl. p.* 85. Bulrushes in Europe are used for putting between the staves of barrels, also for chair bottoms and matting.

(2218) BUNBURBUTTEE, HIND.—Phaseolus lunatus.—Duffin Bean. Sown in rows the same as other beans, but with a much greater space between; they require very strong sticks for support, and are ready in about six months. No very particular care is necessary.

(2219) BUNKA THADA.

Bunka thadah, TEL. | Bahtra, HIND.

A wood which was sent to the Great Exhibition.

(2220) BUN-OCHRA, "Urena lobata."

Wet-khyœ-pa-nai, BURMESE.

A weed, common in most parts of India, abounds in a strong fibre, which is a tolerably fine substitute for flax. The Urena lobata abounds along the coast of Province Amherst; and affords a valuable hemp.

(2221) BUNT. SMUT BALLS OR PEPPER BRAND, (Uredo caries, Dec; Uredo fœtida, Bauer.) The fungus which occasions this well known and much dreaded disease, has hitherto been met with only in the grains of wheat, when its presence is readily recognised by the peculiarly disgusting odour of the infected car. When this disease prevails, it greatly deteriorates the value of the sample; and from imparting its disgusting odour to the flour it makes it less fit for bread.—*Russell.*

(2222) BUOYS.

Bouees, FR. | Gavitelli, IT.
Ankerboyen, GER. | Boyas, SP.

IN naval language, the term buoy signifies any floating body employed to point out the situation of anything under water, as a ship's anchor, a shoal, a sand-bank or the course a ship should take entering a harbour: they receive various names.

(2223) BURGUNDY PITCH. PIX BURGUNDICA. This is a product probably of the Abies excelsa; it is of light yellow colour, often adulterated with dammer or gunda barosa.

(2224) BURI, OR BULI. The name of a Philippine palm, probably the Corypha gebanga of botanists, and the Gabang of the Malays and Javanese. The Philippine islanders make much use of the several parts of this palm. From the leaves they make mats, from the sap both sugar and a distilled spirit, from the pith a sago, and from the seeds rosaries, while the spines boiled in water yield a thread from which a coarse cloth is woven, called Sagoron.—*Crawfurd Dic. p.* 77.

(2225) BURSUNGA. This drug is the leaves of the Bergera Konigii.

(2226) BURNET, POTERIUM SANGUISORBIA This plant is raised from seeds sown annually; it is used in salads, but is of little value as a vegetable.

(2227) BURRIE TOOVAR.—CAJANUS INDICUS, CYTISUS CAJAN. PIGEON PEA.—Large Dhal.

Toor dhal, HIND. | Thovary purpoo, TAM.

This is sown in fields at the commencement of the rains in June and sometimes much later; it is ripe in December. The seeds are sometimes ground into flower or split like dry peas: for the latter they are an excellent substitute. There are several varieties, which sell from 30 to 40 seers for the rupee.

(2228) BUSTARD. OTIS TARDA.

Neel naray. TAM. | Beetmiakie, CAN.
Junglie ka-boot, HIND. | Cowdun, also Jerz, PERS.
Beetmiaka, TEL.

Various species of this genus of buds are to be met with in many parts of India, but the *O. tarda* is more rarely seen in the lower and southern tracts of the Peninsula, than in the more northern regions. In Mysore, which, from its great elevation, is much colder than other countries of the same latitude, the Bustard is still common.—*Ainslie's Mat. Med. p.* 296. Bustard is the English name of a bird belonging to the genus Otis. The species are land birds whose proper position in the ornithological system has caused some embarrassment to Zoologists.—*Eng. Cyc. p.* 697. The Bustards live generally in open countries, preferring plains or wide-spreading extensive downs dotted with low bushes and underwood-localities which give them an opportunity of descrying their enemy from afar.—*Eng. Cyc. page* 697. They are found in Europe, Asia, and Africa; but not in America. The *Otis tarda*, the great Bustard, is the *Otis* and *Avis tarda* of Belon and others; Ostarde Houtarde, Outarde, Bistarde of the French; Starda and Starda commune of the Italians; Der Grosse Trappe, Trapp, Trappgans, and Ackentrapp of the Germans; Abutarda (*Avis tarda*) of the Spaniards; and Gustard of the old Scotch. The *Otis nigriceps* is a native of Asia. The specimen from which the figure in Mr. Gould's magnificent work ('Century of Birds from the Himalaya mountains') was taken, was brought from the highlands of the Himalaya, but it is by no means confined to that locality. Colonel Sykes observed it in the wide and open country of the Mahrattas, where it lives in large flocks, and where it is considered one of the greatest delicacies as an article of food. It is indeed so abundant in the Deccan, that Colonel Sykes records, in the 'Proceedings of the Zoological Society,' that one gentleman shot nearly a thousand. The male has the body above pale bay, lightly undulated with rufous-brown; neck, a few spots on the wings, and belly, white; the head, which

is crested, the outer wing-coverts, the quills, and the large mark on the breast, black; irides deep-brown; bill and feet yellowish. Length, inclusive of tail, 56½ inches; tail, 13⅝ inches. The female resembles the male in plumage, but is only 41½ inches including the tail, which is 10½ inches. The eggs, of which Colonel Sykes found only one in a hole in the earth on the open plain and that considerably advanced in the process of incubation, were in shape a perfect oval, and in colour a brown-olive, with obscure blotches of darker brown-olive. Length 3 4/10 inches, diameter 2 7/10 inches.—*Engl. Cyc. page* 701.

(2229) BUTANEE, Hind. Pisum sativum.

Common Pea, ENG. | Puttanee, TAM.

The native country pea is sown after the rains in drills, and varies in price according to the quality; when green they are tolerable as a vegetable, but are best in soup. Procurable in December and January.

(2230) BUTEA, a genus of plants belonging to the natural order *Leguminosæ*, named after John, Earl of Bute, a great patron of botanists. The species are natives of the East Indies. They are unarmed trees, with pinnately trifoliate leaves, with racemes of deep scarlet flowers.—*Eng. Cyc. page* 703. The flowers of the *Butea frondosa* and *B. superba*, may be had in greater quantity in Pegu than any part of the east. They are called in the Bengal bazars *Palasphool* and afford a bright yellow colour. The Burmese are fully acquainted with the value of this dye, and the article is found in all the bazars.—*McClelland.*

(2231) BUTEA FRONDOSA, LEGUMINOSÆ, Roxb. c. 21.

Porasum marum, TAM. | Palas, SANS.
Moduga chettu, TEL. | Dhak, HIND.
Pouk, BURM. | Thorus mara, CAN.
Pulasa, also kinaka, BENG.

A native of the mountains of India and a common shrub on the village lands, thriving well in many parts of the country. The fields of Plassey took its name from this tree. It is common in some parts of Ajmeer and very common in Boondee and Kotah.—*Genl Med Top. p.* 203. This species of butea is very abundant in Province Amherst where it is a magnificent tree. The Pwo Karens plant it in their sacred groves, where the deep rich orange blossoms seen under a tropic sun in the dry season, enveloping their almost leafless trunks and branches, give the copse the appearance of a burning jungle. The Burman books describe the Himalaya forest, as shining with the flowers of the butea "like a flame of fire."—*Mason. Butea frondosa* is a tree of very general occurrence throughout the province of Pegu, but more especially about Tounghoo, where it cannot escape notice from its bright orange flowers, which illuminate the forests in all that part of the country during the months of February and March. In Burmah, the *Butea frondosa* (Pouk-pin, *Burm.*) is plentiful, but the timber is crooked and only fit for ornamental work. Wood, dark-brown.—*McClelland. Butea frondosa* has pubescent branches, roundish obtuse or emarginate leaflets, velvety beneath; the corolla four times the length of the calyx; the calycine teeth rather acute. It is a native of mountainous districts in Hindustan. *Butea frondosa* when abundantly in flower presents a gorgeous sight. In mass the inflorescence resembles sheets of flame, and individually the flowers are eminently beautiful, the bright orange-red petals contrasting brilliantly against the jet-black velvety calyx.—*Hooker's Him. Jour. p.* 52. "The lac insects are frequently found upon the smaller branches of the tree, but whether the natural juices of its bark contribute to improve their red colouring matter has not been determined." (G. Don.)—*Engl. Cyc. page* 703. The shrub yields firewood, and its bark and roots fibrous matter, which is used as cordage or beaten into oakum for caulking boats, This fibre has considerable strength, and is of great use to the natives for agricultural and domestic purposes though unimportant in commerce.

Its seed,

Porasum verci, TAM. | Porasum seed, ENG.
Moduga vittiloo, TEL. | Palashaw, SANS.

is contained within the very flat, oval, chesnut coloured legume of the plant, and is a medicine held in high estimation by the Tamool practitioners as an anthelmintic, both in cases of Tapeworm and ascarides. Dr. Roxburgh, in his excellent account of the plant, informs us that from fissures and wounds made in the bark of the tree, a beautiful red juice issues, that soon hardens into a ruby coloured, brittle, astringent gum, which he thinks might prove a valuable medicine. In Dukhanie the Porasum tree is called Plas papara. It is the Plaso of the Hortus Malabaricus in which we are told that its fruit powdered, is anthelmintic, and the Dhak of the mahomedans of upper India.—*Ains. Mat. Med. p.* 108.

Its flowers,

Porasum flowers. ENG, | Plaspapare ke phool, also
Porasum poo, TAM. | Tesoo and keesoo, DUK.
| Palasha, SANS.

either by themselves, or in conjunction with those of the sorrowful Nyctanthes, are used by the dyers, in dyeing a beautiful bright yellow. With the juice of the fresh Porasum flowers diluted with alum water and rendered clear by depuration, Dr. Roxburgh prepared a soft extract which he tells us proved a brighter water colour than any gamboge he had met with.—*Ains. Mat. Med. page* 193. *Butea frondosa*, called the Bastard Teak, flowers in March, and the flowers are of a beautiful deep red, shaded with orange, and downy; they are used to dye with: as the juice of the common flowers, which in this species are two inches long, gives

to water a bright yellow colour similar to gamboge. This property is also possessed by the dried petals. Its large flowers *teesoo* and *keesoo* yield a beautiful dye, which is likely to come into extensive use. The கரட்டு பூசுமரம்? அல்லது பூவரசமரம் Koat mookee marum or Poorasee marum is a tree held in high estimation by the natives. The wood, which is said to be elastic and durable, is much esteemed by carpenters, for its toughness, and by many it is preferred for gunpowder charcoal. A red juice, which flows from this tree when evaporated is found to consist principally of tannin, and is brought into the market under the name of East Indian Kino. it is a ruby colored gum, which exudes from incisions into the bark: it abounds in astringent matter, but has been found difficult to apply in tanning leather. Its coloring matter is powerful and permanent; some specimens analysed by Professor Solly, after the impurities had been separated, yielded 72½ per cent. of tannin—*Simmonds, p.* 507. This gum is one of the most valuable articles of the class to which it belongs. It appears to be one of the most useful kinds of gum, and might be supplied to any extent from the province of Pegu.—*McClelland.* The exudation of the Butea tree, or pulas kino, when exported to England a few years ago, was recognized "as being the gummi rubrum astringens" of the old druggists. M. Guibourt of Paris, to whom some of it had been sent, states his opinion in his work on drugs, that it is the original "kino which had entirely disappeared from commerce, and was once so much valued, as to be sold for nearly a guinea a pound." Amherst Province can furnish almost any quantity of the article, the tree which produces it being one of the most common denizens of its forests.—*Mason.* The true *Palass goond*, or Bengal kino, is of brittle texture and ruby-red colour, freely soluble in the mouth, inodorous, of excessively astringent taste, soluble in water, the solution being of a deep red colour, partially soluble in alcohol, giving a pale tincture, the salts of iron blacken all the solutions. This juice is obtained by incisions in the bark; it is at first very fluid and red, then becomes paler and hardens. Its extraction takes place during the hot season. In the Dublin Pharmacopœia this exudation is described as a variety of Kino. The true Kino however proceeds from a different source, but in chemical properties and medicinal effects both are identical. The Palass Kino is extremely rich in tannic and gallic acid, and contains moreover arabine and ulmine; from this composition, as might be expected, it exercises the most powerful astringent effects. In two or three grain doses it is an excellent remedy in many forms of chronic diarrhœa; as an external astringent application it is quite unrivalled. The flowers of this tree give a fine yellow dye.—*O'Shaughnessy, page* 296. Dr. Forbes Royle says of the *Butea frondosa*, that it yields by incisions made in its bark an astringent gum, which was at one time supposed to be the genuine Kino of commerce. It is no doubt possessed of similar properties, is frequently used as such in India, and useful like it in Diarrhœas and advanced stages of Dysentery. It is also used in the art of tanning. It has been occasionally sent to Britain as Kino, and Dr. Pereira found it in an old drug firm marked *Gummi-rubrum astringens.* Its Sanskrit name is *Kin-suka.* It is commonly known in India as *Kini ke gond*, and also by the name *Kumrkus.* Its chemical characteristics are very like those of the Kino of Pterocarpus. It is very carelessly collected, and therefore often contains impurities. It is remarkable for containing a beautiful red colouring matter, difficult of separation. Analysed by Mr. E. Solly, a portion in the crude state yielded about 50 per cent. of Tannin; but when purified by simple solution in water, so as to separate the impurities, 100 parts contained 73·26 parts of Tannin, 5·05 of difficultly-soluble Extractive, and 21·67 of Gum, with Gallic acid and other soluble substances. The colour and properties of Tannin vary with the exposure and season of collection.—(*v. Roxburgh, Fl, Ind.* iii. *p.* 245, and *Pro. R. Asiatic Soc. May* 1838.)

(2232) BUTEA PARVIFLORA.—A scandent shrub, flowers small and white,

(2233) BUTEA SUPERBA. CREEPING BUTEA. Tiga madega, TEL.

This is an immense creeper with flowers resembling the Butea frondosa. It has glabrous branches; roundish ovate obtuse leaflets, velvety beneath; the corolla four times the length of the calyx; calyx-teeth acute. It grows on the mountains of Coromandel, and is not uncommon in the provinces of Tavoy and Mergui. It resembles the last species, but is larger in all its parts. It yields the same kind of juice. There are two other species described.—*Eng. Cyc. page* 703.

(2234) BUTEES. BATIS. Butees is sold in the Lahore Bazar and is called Atees also; both of them seem to be the Aconitum heterophyllum. —*Honigberger, page* 241.

(2235) BUTTER.

Smor. DAN.	Burro, IT.
Boter, DUT.	Masslo korowe, RUS.
Beuerre, FR.	Manteiga, PORT.
Butter, GER.	Butyrum LAT.
Muska. Mucken. GUZ. HIND.	Manteca, SP.

Faulkner.

An oily compound forming one of the components of milk, the others being curd or caseine, a species of sugar, and certain salts. The lighter matters suspended in milk separate in the form of cream, which can be separated by churning into butter and butter milk. The yield of cream is increased by dropping into the milk a

small piece of zinc. Butter is naturally of a yellow colour, which is deepened when the cows feed in rich pastures, but it is often artificially heightened by arnotto.—*Toml.*

(2236) BUTTERS, VEGETABLE, the name given to the concrete oil of certain vegetables, from its resemblance to the butter obtained from the milk of animals, and from being employed for similar purposes. The term is also occasionally, but improperly, applied to some vegetable products which are entirely of a waxy nature, such as the wax of Myrica cerifera. The name is likewise bestowed in Siberia on certain algæ, species of the genus Nostoe, such as N. pruniforme. The most important Vegetable Butters are produced by the Bassia butyracea and other species of Bassia and certain palms, such as the Cocos butyracea and the Elais guineensis; the former of which is of great utility to the inhabitants of Brazil, where it grows naturally, and to the negroes of St. Domingo, where it is cultivated: while the latter is very serviceable to the natives of Guinea.—*Eng. Cyc. page* 704. The generally known solid oils or vegetable butters are as follows: *Butter of Cacao*, from Theobroma cacao; 1000 parts of the seed yield 300 parts of a concrete oil or butter, of a most agreeable flavour. *Butter of Cinnamon*, from Cinnamomum verum or zeylanicum. By strong decoction, the fruit yields a concrete oil, called Cinnamon wax, used for candles, and which exhales while burning a most delicious odour. *Butter of Nutmeg* from Myristica moschata; This is brought from the Moluccas, of two kinds, and is obtained by bruising the Nutmegs into a paste which is compressed in bags between hot metallic plates. *Butter of Cocoa-nut* from Cocos nucifera; which yields a concrete oil, but perhaps expensive. *Cocoanut oil*, prepared by rasping the pulp of fresh ripe cocoa-nut, adding a little hot water, squeezing and boiling the milky juice until the water has evaporated, and filtering through paper, produces an oil which separates into two portions, the one fluid and limpid, the other a solid concrete substance of a pure white color, which in the shade remains unliquidated at all temperatures. It may possibly be found that the process of manufacture affects the out-turn of the solid product. *Butter of Palm oil* from Elais guineensis, a native of Africa and America. The concrete Palm oil is much esteemed in Europe for unguents and has been lately recommended for culinary purposes. A new export from the Western Coast of Africa, has been large quantities of Solid Palm oil, of the consistence of hard butter. *Shea Butter* from Bassia Parkii, or Pentadesmis butyracea. *Galam Butter* or Ghee, from Bassia butyracea, Fulwa or Phulwara, *Hind*, a native of Nepal and Almora in Northern India; produces an excellent butter. Bassia latifolia, *Vern: Tam.* Illoopai Yennai; *Tel.* Ippa noona; *Hind.* Mahwa ka tel. The oil of this Bassia separates into two portions, one on the surface, fluid, and of a pistacio green color: the other of a brownish green, and almost solid. Bassia longifolia, *Vern: Tam.* Illeepai Yennai, *Tel.* Ippa noona, *Hind.* Mohe ka tel. Of three samples of the Illoopoo Oil, one separated into two portions; the upper, fluid, of a pale oil green, in color; and the lower, greenish white and of the consistence of ghee. Another specimen of the oil of this Bassia separated into three portions, the uppermost a golden yellow and fluid, the middle yellowish white, solid, and floating in the upper; and the lowest solid, and brown in color. A third sample in the Madras Exhibition was of the consistence of ordinary ghee and was sent as a material fit for the lubrication of Railway Carriages, and another beautiful specimen, almost solid, from Tanjore was of a light golden yellow colour. *Chinese Vegetable Butter* from Stillingia sebifera produces the butter and oil so much in use in China: the number of these trees in the province of Chekiang is immense. *Indian Vegetable Butter*, Piney Butter, or Doopada solid oil, from the Vateria indica; Piney Marum, Tamil, grows on the Western Coast and in Canara. It is white or yellowish white, of the consistence of hard salt butter, and in the shade remains always solid. It can be procured in quantities in southern India. It is used for lamps principally, but is very suitable for soaps and candles. It is prepared by cleaning the seeds; then roasting and grinding them into a mass. To 5 seers of seed, add 12 seers of water, and boil until the oil rises to the surface. Remove the oil, stir the contents of the vessel, and allow it to stand until the following day, when more oil will be observed on the surface, which may be collected and the process repeated. *African Butter* from Pentadesmis butyracea in Sierra Leone. *Japan Wax* from Rhus succedaneum. *Almond Butter. Gamboge Butter*: this is a product of the Garcinia pictoria, Rox: it is called Muckke Tylum, *Tam.* Arasana Ghoorghy yenni, *Can.* It grows abundantly in Mysore and Western Coast jungles. *Cocum Butter*, Garcinia purpurea? This is one of the two species of Garcinia, G. pictoria and G. purpurea, the seeds of which produce solid oil, the former the Gamboge butter and the latter the Cocum butter: the Gamboge butters are solid and of a deep leek green color. The G. pictoria grows abundantly in certain parts of Mysore and the Western Jungles. The oil is procured by pounding the seed in a stone mortar and boiling the mass until the Butter or oil rises to the surface: 2½ measures of seed yield one seer of butter, and it is sold at the rate of Annas 1-4 per seer of Rupees 24, in the Nuggur division of Mysore, and is used as a lamp oil and as ghee. *Sterculia fœtida oil, Vern: Tam.* Coodiray yennai or Coodira pusjun yennai. This oil is thick at all seasons of the year, and is obtainable probably in large quantities in the

forests on the Nulla Mulla and Yella Mulla range, *Butter of Laurel*—Laurus nobilis, *Simmonds, p.* 510. Solid Oils are obtained from the Dipterocarpi, in the Indian Archipelago. *Simmonds, p.* 511. Solid Oil of the Horse eyes and Cacoons of Jamaica, Fevillea scandens, is white and hard. *Simmonds, p.* 511. *Kawan Solid Oil* is procured from a species of Bassia from Singapore or Java *Sim: p.* 511. *Mijo* or Japan Butter, from Dolichos soja, Japan· *Sim. p.* 512. Solid Oil from Myristica (Virola) sebifera, of British Guiana. *Sim. p.* 512. Solid Oil from the Demerara Butter tree, Pekea (?) Bassia buttyrosa, *Sim. p.* 512. Solid Oil from the Demerara butter tree, Saouari, Pekea tuberculosa, *Sim. p.* 512, *Vegetable Wax* from Shanghae, *Sim. p.* 540. *Myrtle Wax* from Cape of Good Hope, *Sim. p.* 540 and 541. Solid Oil of Bombay, *Sim. p.* 521, from Salvadora persica or Vernonia anthelmintica, *Sim. p.* 521. *Carap* or Carab Vegetable Butter, from Carapa guianensis, a large tree in Trinidad, and British Guiana, *Sim. p.* 519. *Butter* of the Great Macaw Tree, from Acrcomia fusiformis, *Ibid. Broonga Malagum* Oil, or ointment, from Masulipatam, separates into three portions, the uppermost, fluid, resembling brown sherry, the middle, of the consistence of ghee, and brownish yellow; and the lowest almost solid and of a hair brown color. *Mooragana* or Mooroogana Butter or solid oil of Canara, is a solid oil used for medicinal purposes and as an ointment for the wounds of cattle, injured by tigers. It is said to be produced from a forest tree growing in the Canara Jungles. The specimens are dark brown and quite solid and this product merits the best consideration. A very excellent sample of this solid oil was in the Madras Exhibition of 1857 from Mangalore. It is the most solid of the solid oils. *Odul* or Adul oil of Travancore is separated into two portions; the upper, fluid, of the colour of golden sherry; the lower, reddish white, of the consistence of ordinary hard salt butter. *Shacotty oil* of Canara is used for cutaneous eruptions. The specimen of this oil in the Museum separated into two portions; the upper, yellowish and fluid, and the lower brownish red and of the consistence of hard ghee. *Hibavania oil*, Canarese; under this name, there was exhibited at the Madras Exhibition of 1857, a solid oil from the Sampajoy district by Pedro Probhoo, of a clove brown colour, a small phial priced at Rupees 4½ *Camujay* tree oil: a small bottle, priced Rupees 2¼ from the same district, by the same exhibitor, was a dark gelatinous mass, of the consistence of blanc mange. Oil of Hydnocarpus inebrians, the *Thortay oil* of Canara, is a very valuable vegetable solid oil, used for sores. This oil is solid and of the consistence of ordinary hard salt butter. Terminalia Bellerica, *Vern. Tam.* Thaneeka or Tannekae yennay. The oil from the Terminalia bellerica separates into two portions —the one fluid, of a pale oil green color, and the other white, floccular, and of the consistence of ghee. *Nobis.*

(2237) BUTTERFLIES. Azemu Samdong; In the Lachen valley, the caterpillar of the swallow-tail butterfly (*Papilio machaon*), was common, feeding on umbelliferous plants, as in England; and a *Sphynx* (like *S. euphorbiæ*) was devouring the euphorbias; the English *Cynthia cardui* (painted-lady butterfly) was common, as were "sulphurs," "marbles," *Pontia* (whites,) "blues," and *Thecla*, of British aspect but foreign species. Amongst these, tropical forms were rare, except one fine black swallow-tail. —*Hooker, Vol.* II. *p.* 65.

(2238) BUTTONS.

Boutons, Fr.	Bottoni, It.
Knopfe, Ger.	Botoens, Port.
Buttoun, Guz.	Pogowizu, Rus.
Goondee, Hind.	Botones, Sp.

Buttons are made from metal, shell, horn, bone, palm seeds, fruits, woods, glass, wire, mother of pearl: jet, precious stones: linen, velvet; satin, florentine, and embroidered stuff of all kinds. Birmingham is the great seat of this manufacture. Those of metal are often gilt, and fine grains of gold, and sometimes 2½ grains, are made to cover 144 one inch buttons: so great is the divisibility of that precious metal.—*Toml.*

(2239) BUXUS, the genus of plants whose species afford the valuable hard wood called Box. Of the two European species *B. sempervirens* and *B. Balearica*, the former, or common Box, forms a large evergreen bush or small tree, common all over the south of Europe from Spain to Constantinople, and reaching even so far as the north of Persia.—*Eng. Cyc. p.* 704.

(2240) BUXUS EMARGINATUS. This is a new species of Box-wood lately introduced into Britain from the Himalayas; it is the *Buxus emarginatus*, of Dr. Wallich: this is found of considerable size and thickness, and the wood appears as good and compact as that of the box wood in use in Europe.—*Royle, Illust. Himl. Bot. p.* 327. On actual comparison the Himalayan box-wood is found to be softer than the common kinds, but is like them in other respects, and wood cuts have been engraved upon the wood of Himalayan Buxus emarginatus.—*Eng. Cyc.*

(2241) BUYO. The name given in the Philippine Islands to the betel pepper, the sirih of the Malays, and Piper betel of botanists.—*Crawfurd Dictionary, page* 78.

(2242) BYSSUS, the name of a long, delicate, lustrous, and silky fasciculus of filaments, by which some of the conchiferous mollusks (the *Mytilacea*, Mussels, and *Malleacea*, Hammer Oysters, for example) are moored to submarine rocks, &c. This is not, as some authors have stated, a secretion spun by the animal, but, according to De Blainville, an assemblage of muscular fibres dried up in one part of their extent, still

contractile and in a living state at their origin, a condition which they enjoyed throughout their whole length at the period of their attachment. The tendinous foot of *Byssoarca* and *Tridacna* seems to be a step towards the organisation of a true byssus. In the great *Pinna* of the Mediterranean this substance is well and largely developed, and its situation is in a fleshy sac or sheath at the base of the foot, which is attached towards the middle of the abdominal mass of the animal. In Italy the byssus is manufactured into various articles; and there are few museums without a glove or a stocking woven out of this substance. In the great Exhibition of 1851 a large number of articles were exhibited manufactured from this substance, as well as specimens of the silk for making up.—*Eng. Cyc. p.* 707.

(2243) BYTTNERIACEÆ, *Byttneriads*, the Byttneria Tribe, a group of plants by some botanists considered a distinct natural order, by others reduced to a section of Sterculiaceæ. They belong to Lindley's Malval alliance of Exogens, and are readily known by their petals being bagged at the base, their stamens partly sterile and petaloid, and their fruit covered with hooked spiny hairs. From Sterculiaceæ proper they differ by the presence of petals, and their stamens not being united into a column; from Malvaceæ by their 2-celled anthers and bagged petals; and from *Lasiopetaleæ* by their calyx not being coloured like a corolla, and their petals not rudimentary. The species are chiefly inhabitants of tropical countries. They partake of the mucilaginous inert properties of *Malvaceæ*. Their bark often yields a tough fibre fit for manufacture into cordage; and one species, *Theobroma Cacao*, (Theobroma), produces the seeds from which the buttery and somewhat bitter substance called cocoa is obtained, and which forms the basis of chocolate. The fruit of *Guazuma ulmifolia* is eaten by the Brazilians. Many of the species yield fibres which might be manufactured into cordage, as *Microlæna spectabilis* and *Abroma augustum*. In Madagascar the bark of *Dombeya spectabilis* is made into ropes.—*Eng. Cyc. page* 708. In its more extended relations, the natural family of *Byttneriaceæ*, includes such genera as *Bombax*, *Sterculia*, *Abroma*, *Guazuma*, &c., and like that of the Mallow-worts, inhabits hot parts of the globe chiefly, and also like it contains a number of plants remarkable for abounding in mucilage and in fibrous bark. Of these some are employed for cordage in different parts of the world, and of them a few, as *Abroma augusta*, might probably be grown with greater profit, and yield a better product, than some of those which are now in cultivation. Thus the species of Bombax, which are remarkable for their gigantic stature and their splendid inflorescence, are also so on account of their capsules, which, on bursting, display a flocculent substance, often mistaken by travellers for cotton, and the tree is hence called *Cotton tree*. But as this substance is more silky than cotton, it has been distinguished by the name of *Silk Cotton*. It differs also in not spinning like cotton. Some difficulty, therefore, is experienced in making use of this very abundant cotton-like produce; but Mr. Williams, of Jubbulpore, has succeeded in spinning and weaving some of it so as to form a very good coverlet. It might be easily made use of for stuffing pillows, muffs, or coverlets, for wadding, or for conversion into half-stuff for paper-makers, perhaps for making gun-cotton. In the 'Trans. of the Agri-Hortic. Soc.,' iii, p. 274, there is a report from the Society of Arts on two pieces of cloth made from the Simool or Silk Cotton tree; and it is observed that, from the shortness of the staple of the down, and its elasticity, it could not be spun by cotton-spinning machinery. Several of this family abound in mucilage, thus a Guazuma is employed in South America in clarifying sugar; as a Kydia is in India. A species of Sterculia yields a tragacanth-like gum on the west coast of Africa, as another does in India. Several species of this genus are remarkable for the tenacity of the fibre of their bark, which is employed for cordage, as *Myrodia longiflora* in Guiana, and *Chorisia crispifolia* in Brazil, *Dombeya umbellata* in the Isle of Bourbon, and *Sterculia Ivira* in the West Indies. *Helicteres Isora* may be similarly employed in India. *Sterculia guttata* is a tree, a native of Malabar, which was first made known by Capt. Dickenson, in the year 1802. The bark of the younger parts of the tree abounds with very strong, white, flaxen fibres, of which the inhabitants of Wynaad manufacture a kind of coarse cloth. It is not usual to make use of the bark until the tenth year, when its size will be equal to that of most forest trees. The tree is felled, the branches lopped off, and the trunk cut into pieces, of six feet long, a perpendicular incision made in each piece, the bark opened, and taken off whole, chopped, washed, and dried in the sun. By these means, and without any further process, it is fit for the purposes of clothing. *Sterculia villosa*, called *Oadal* in Assam, is another tree of this genus, which is a native of the mountainous countries to the eastward of Bengal. Trunk straight. The bark is smooth, but fibrous. Bags are made of it. Its fibres are made into cords by the natives of the eastern frontier of Bengal, to bind wild elephants with. Of a coil of *Oadal* rope, Major Jenkins gave the following notice in the year 1847: "The *Oadal tree* is very common, and the rope is made most readily; the bark, or rather all the layers, can be stripped off from the bottom to the top of the tree with the greatest facility, and fine pliable ropes may be made from the inner layers of bark, whilst the outer yield coarse ropes. The rope is very strong and very lasting—wet doing it little injury." *Oadhal* is a creeper in Kemaon, with fine, strong fibres; and *Microlæna spectabilis* is a

tree found at the foot of the Himalayas, which yields fibres fit for rope-making. *Guazuma ulmifolia* is a South American tree, which was introduced into India, and largely cultivated at one time in the Madras Presidency under the name of Bastard Cedar, as fodder for cattle. The fibres of its straight, luxuriant, young branches were submitted to trial by Dr. Roxburgh. *Abroma augusta*, the *Woollet-comul* or *Ullat-kumul* of Bengal, and which Dr. Roxburgh at one time called Perennial Indian Hemp or Flax, is a native of various parts of India, growing luxuriantly in gardens even as far as 30° N. lat., and extending eastward to the Philippine Isles. It grows to a small tree, but may be caltivated as an annual; flowers profusely during the rainy season, and ripens its seed in the cold weather. It particularly attracted Dr. Roxburgh's attention; as the bark abounds with strong white fibres, which make a very good substitute for Hemp, affording good common cordage. The plant grows so quickly, as to yield two, three, or even four crops of cuttings, annually, fit for peeling; hence it may be advantageously cultivated, and is deserving of more than common attention on account of the beauty, fineness, and strength of its fibres. Dr. Roxburgh ventured to prognosticate as large a yearly produce as can be obtained from an acre of Danchee, Jute, Sunn, Hemp, or Flax; as it is a perennial, large, shrubby plant, in every respect easier to cultivate and to prepare the fibres than Sunn, and the produce much greater. Indeed, in an experimental culture, he obtained from three cuttings 271 lb. of clean fibre, which he states was three times greater than the average produce of Sunn. To separate the bark from the shoots, maceration in stagnant water, from four to eight days, answers well during the warmer parts of the year, while three times as much is scarce sufficient during the cold season, indeed the process is scarcely practicable then; besides, the fibres are greatly weakened by prolonged maceration. The fibres being naturally very white and clean, they do not require to be cleaned. Dr. Roxburgh states that, in its native state, without being dressed in any way, it is about one tenth part stronger than Sunn, and in that state much more durable in water. A cord of its fibre bore 74 lb., when Sunn broke with 68 lb. (*v.* p. 269.)—*Royle Fib. Pl. p.* 265.

(2244) BYTTNERIA HERBACEA.

Aree-keeray, Tam.

A very common little herbaceous plant with red and yellow flowers, used mixed with others, as greens.

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(2245) CABBAGE. Brassica oleracea. Nothing is more astonishing than the wide difference existing betwixt the cultivated varieties of cabbage, and the original stock which is an uninviting weed on the shores of Britain, with wavy green leaves, and yellow flowers like the common mustard. This vegetable is raised from seeds, and cuttings; requires a free open rich soil and plenty of water; the surface of the ground round the plants should be repeatedly howed to keep it open and free of weeds. The varieties which seem to grow best at Madras, are the Early York, Vanack, Nonpareil, Carters matchless, Red, Globe Savoy, Brussels sprouts, and Knole-Cole. The seeds of cabbage, should be sown some time before the commencement of N. E. Monsoon at Madras, in a well prepared bed, not too rich.—*Jaffrey*. Writing on the culture of this vegetable in the Dekhan, Dr. Riddell remarks that the drum-head, sugar-loaf, and savoy, and all the others require similar care and attention. Sow the seed in the latter end of May in boxes, or baskets, shaded at first from the sun, and kept continually moist. The advantage of sowing thus early, is that the plants are strong by the time the rains set in, and the leaves do not offer to the small fly which settles upon them to lay its eggs, the nourishment necessary for the young caterpillar when hatched. The plants, when about three inches high, should be pricked out about two inches apart, into other boxes, and lightly covered over with dry thorns to prevent sparrows and other small birds from eating them. When large enough to be transplanted into nursery beds, use the same precaution with regard to thorns; and lastly, place them where they are to remain, in rows about eighteen inches apart, either on the top of the ridge, or in the hollow—the former method in the rains is to be preferred. The soil should be light and rich. In the cold season, the precaution of sowing the seed in boxes is unnecessary, as they grow very well in small beds sown broad-cast, and watered at first by the hand, after which, when removed, they thrive extremely well. If the seed is sown so late as January, a stock of plants may be raised, which come but to a small size, and if kept in the beds and sheltered from hot winds may be transplanted in the rains. They produce good sprouts for eating when other vegetables are scarce; as also the stalks of the old cabbages, of which, if towards the end of the rains the shoots be carefully stripped off, they may be planted, and a succession of cabbages be procured by this means. I have known this

plan adopted for years: in fact, in my own garden, particularly the red cabbage, I have cultivated in this way for many seasons. You cannot be too careful in examining your young plants twice or thrice a day in the early part of the season, and having all the caterpillars picked off or destroyed. Sugar loaf cabbage and knole-cole are particularly infested with them. I found that sprinkling the young plants, after watering, with a little black pepper, caused the small green caterpillar to leave the plant immediately. Slugs and caterpillars have a great aversion to pounded turmeric.

(2246) CABLE. Amar, TEL.

In Southern Asia some cables for ships are made of Coir or Cayar, the requisite quantity being laid out at full length along the beach or other convenient spot: they are made up in strands, and twisted in a very simple machine; viz. a strong wooden frame, in a strong board across which three or four pins are placed and turned like the screws of a carpenter's bench, by as many men; the further end of the cable is fixed to a large revolving pin, which is turned round in a similar manner. As the strands are twisted, the horse in which this is fixed is drawn nearer to the other. It is evident that cable strands thus laid are very unequally strained: the outer lines being tight while the inner ones are slack. By laying the strand and twisting it as each yarn leaves its separate reel, a strand is formed of which each yarn bears its due proportion of the strain. Huddart's patent rope was laid on this principle, the necessary apparatus for winding off the yarn might be readily made. Cables for the Shakespear bridges are formed of the country rattan. In the Red Sea those formed of the coating of the branches of the date tree are used; and the same material with a proportion of fibre of the Kaldera bush, the *Pandanus odoratissimus*, is used by fishermen in forming drag ropes for their nets at Oopada.--*Mr. Rhode's M.S.S.*

(2247) CABOOSE.

Wooleve meen, TAM. | Eesheegay duntie, TEL.
Nuddie ka Shaikra, DUK.

This fish is common at Madras.—*Ains. Mat. Med. p.* 155.

(2248) CACALIA COCCINEA. This flowering plant will grow in any soil, and is mostly found in waste places, the species are numerous and found in all parts of the globe.

(2249) CACALIA KLEINIA.

Lisan ul saur, ARAB. | Gao Zuban, PERS.

The leaves resemble the tongue of the buffalo, and the stalks are prickly and covered with white spots. While fresh the leaves have a strong smell like hemlock, they are given in decoction in rheumatism, syphilis, and lepra, indeed in the class of cases in which sarsaparilla is usually employed by European practitioners. In Bombay they seem to be highly esteemed (*see* Bombay Committee's report in the Journal of the Medical and Physical Society of Calcutta.) The article is common in the bazars, and deserving extensive trial.—*O'Shaughnessy, page* 420. Honigberger (p. 246) states that Cacalia Kleinia is much used in Hindustan, both by Mahomedan hakims and Hindoo practitioners, and but very little by English physicians. Besides the leaves, which resemble the ox-tongue in form, there is a water distilled from them, kept for use.

(2250) CACALIA SONCHIFOLIA. SYN. Emilia sonchifolia, D. C.

Shudimudi, BENG. | Palla camudie, MALAY.
Udiram panum. SANS.

A decoction of this plant is deemed anti-febrile on the Malabar coast.—*O'Shaughnessy, page* 420.

(2251) CACAO OR COCOA. The chocolate nuts or seeds, termed cacao, are the fruit of species of *Theobroma*, an evergreen tree, native of the Western Continent of America, but one of them now naturalised in India. That commonly grown is *T. cacao;* but Lindley enumerates two other species, *T. bicolor*, a native of New Granada; and *T. guianensis*, with yellow flowers, a native of Guiana. The chocolate plant is sparingly cultivated in India. It is unknown as an object of cultivation in every part of the Asiatic Archipelago except the Philippines, and of late the northern peninsula of Celebes. In most of the Philippines it is cultivated, but only for home use, and the quality produced is inferior to that of Guayaquil and other parts of America. That of the island of Cebu is the best, being worth from 15 to 20 per cent. more than the produce of the other islands.—*Crawfurd Dicty. page* 78. The seeds being nourishing and agreeable to most people, are kept in the majority of houses in America, as a part of the provisions of the family. By pressure they yield a fatty oil, called butter of cacao. They also contain a crystalline principle analagous to caffeine, called theobromine. The common cacao of the shops consists generally of the roasted beans, and sometimes of the roasted integuments of the beans, ground to powder. The consumption of cacao in the United Kingdom of Great Britain and Ireland is about three millions of pounds annually, yielding a revenue of £15,500. Few tropical products are more valuable or more useful as food to man than cacao, and were it more generally employed, so that the berries should not be more than two, three, or, at most, six months old, from the time of gathering (for, if kept longer, they lose their nutritive properties), even a smaller quantity than that usually taken in a cup would suffice; in fact, cacao cannot be *too* new. The cacao beans lie in a fruit somewhat like a cucumber, about five inches long and three-and-a-

half inches thick, which contains from twenty to thirty beans, arranged in five regular rows with partitions between, and which are surrounded with a rose-colored spongy substance, like that of water melons. There are fruits, however, so large as to contain from forty to fifty beans. Those grown in the West India islands, as well as Berbice and Demerara, are much smaller, and have only from six to fifteen; their development being less perfect than other parts of South America. After the maturation of the fruit, when their green colour has changed to a dark yellow, they are plucked, opened, their beans cleared of the marrowy substance, and spread out to dry in the air. In the West Indies they are immediately packed up for the market when they are dried; but in Caracas they are subjected to a species of slight fermentation, by putting them into tubs or chests, covering them with boards or stones, and turning them over every morning to equalize the operation. They emit a good deal of moisture, and lose the natural bitterness and acrimony of their taste by this process, as well as some of their weight. Instead of wooden tubs, pits or trenches dug in the ground are sometimes had recourse to for curing the beans; an operation called earthing. They are, lastly, exposed to the sun and dried. According to Lampadius, the kernels of the West India cacao beans contain in 100 parts, besides water, 53·1 of fat or oil, 16·7 of an albuminous brown matter, which contains all the aroma of the bean; 10·91 of starch, 7½ of gum or mucilage, 0·9 of ligunine, and 2.01 of a reddish dye-stuff, somewhat akin to the pigment of cochineal. The husks form 12 per cent. of the weight of the beans. The fatty matter is of the consistence of tallow, white, of a mild agreeable taste, and not apt to turn rancid by keeping. It melts only at 112 degrees Fahr., and should, therefore, make tolerable candles. It is obtained by exposing the beans to strong pressure in canvas bags, after they have been steamed or soaked in boiling water for some time. From five to six ounces of butter may be thus obtained from a pound of cacao. It has a reddish tinge when first expressed, but it becomes white by boiling with water. The beans, being freed from all spoiled and mouldy portions, are to be gently roasted over a fire in an iron cylinder, with holes in its ends for allowing the vapors to escape, the apparatus being similar to a coffee-roaster. When the aroma begins to be well developed, the roasting is known to be finished, and the beans must be turned out, cooled, and freed by fanning and sifting from their husks. The kernels are then to be converted into a paste, either by trituration in a mortar heated to 130 degrees Fahr., or by a powerful mill.—*Ure's Dictionary of Arts and Manufactures.* The cacao tree resembles the English dwarf apple tree both in body and branches, but the leaf, which is of a dark green, is considerably broader and larger. The nuts are of the color and about the size of an almond, and hang eighteen to thirty together by a slender stringy film, enclosed in a pod. A ripe pod is of a beautiful yellow, intermixed with crimson streaks; when dried, it shrivels up and changes to a deep brown; the juice squeezed from the mucilaginous pulp contained in the husks of these nuts appears like cream, and has a very grateful taste of a cordial quality. The nuts have a light pleasant smell, and an unctuous, bitterish, roughish (not ungrateful) taste. Those of Nicaragua and Caracas are the most agreeable and are the largest; those of the French Antilles, and our own West India islands, are the most unctuous. The Mexicans, in preparing the chocolate paste, add some long pepper, a little annatto, and lastly vanilla; some add cinnamon, cloves and anise, and those who love perfumes, musk and ambergris. The finest American cacao is said to be that of Soconusco, but the principal imports are from Caracas and Guayaquil, which is of a very good quality. The province of Barcelona, adjoining Caracas exports annually from 200,000 to 300,000 cwt. The banks of the Magdalena, in the vicinity of Santa Martha and Carthagena, are famed for the excellant cacao they produce. "This tree," says Bonnycastle (Spanish America vol. 1, p. 257), "is indigenous, seldom exceeds the diameter of seven inches, and is extremely beautiful when laden with its fruit, which are disposed on short stalks over the stem and round the great branches, resembling citrons, from their yellow colour, and warty appearance. The leaves are attenuate, stalked, drooping, about a foot long and three inches broad, elliptic, oblong, pointed, slightly wavy, entire, and very smooth on both sides; with one mid-rib and many transverse ones, connected by innumerable veins. The petals of the flowers are yellow, the calyx of a light rose-color, and the flowers themselves are small and placed on tufts on the sides of the branches, with single footstalks, about an inch long. Its fruit is red, or a mixture of red and yellow, and about three inches in diameter, with a fleshy rind half-an-inch thick; the pulp is whitish and of the consistence of butter, containing the seed; these seeds are generally twenty-five in number in each fruit, and when first gathered are of a flesh colour, and form a nice preserve if taken just before they are ripe. Each tree yields about two or three pounds of fruit annually, and comes to maturity the third year after planting from the seed; it also bears leaves, flowers, or fruit all the year round, the usual seasons for gathering being June and December. The excellence of the Magdalena chocolate may be attributed to the moist nature of the soil, as the plant never thrives where the ground is hard and dry, or cannot be irrigated." *Mode of cultivation in the Colombian Republics*—Plantations of cacao were speedily mul-

tiplied in Colombia, and the soil so admirably seconded the labors of the planter, that in the produce abundance was united to excellence. The cacao of this quarter ranks next to that of Soconusco. It is well known that the best commercial recommendation of cacao is that of coming from Caracas. But even in these provinces the quality varies. The cacao of Orituco is superior to that of other places, and a quantity of equal bulk weighs twenty per cent. more The cacao of the coast comes next, and obtains a preference over that of the interior. The plantations of cacao are all to the north of the chain of mountains which coast the sea, and in the interior country. The former extend from Cumana to the mouth of the Tocaygo; the latter are situate in the vallies of Tuy, Orituco, Ocumare, Cura, Marrin, Tare, Santa Theresa, Santa Lucia, Zuapira, Santa Philippo, Barquisimeto, Valencia, Guige and Cariaco. All kinds of soil are not equally adapted to the culture of cacao, still less are all exposures; but an analysis of the soil destined to this culture never furnishes indications on which reliance can be placed. No regard should be had to color or composition; it is only requisite that it should be friable to a certain depth, which is ascertained by the size of the trees with which it is covered; this sign determines the land proper for cacao. A suitable situation is not so easily found. It should be exposed as little as possible to the north, and be on the borders of a river, which may communicate moisture to the soil in dry seasons, and receive its drainings in times of rain. A preference is particularly to be given to land which can receive from the river the benefits of irrigation without being exposed to injury from its overflow. After having chosen the land, it should be cleared of all trees, shrubs, and other plants. This operation is performed in various ways. It is customary in Colombia to commence felling the trees immediately after the rains, that is, about the month of November; the wood, after being cut, is left to dry, then collected in heaps and burnt. As soon as the new plantation is cleared, it is crossed with small ditches, in directions according to the declivity of the soil. These serve to drain the stagnant waters, to carry off the rains, and to irrigate or water the soil whenever necessary. The *alignement* is then laid out, in which the cacao trees are to be arranged. They are planted in triangles or squares. In either case, there is always in the centre an alley, bordered by cacao trees, and running from east to west. When they are planted in squares, this alley is crossed by another running from north to south. The cacao plants should be placed at fifteen or sixteen feet (French measure) from each other, in good soil; and about thirteen or fourteen feet in soil of inferior quality. This is almost the only tree in nature to which the enlivening beams of the sun are obnoxious. It requires to be sheltered from their ardour; and the mode of combining this protection with the principles of fertility, forms a very essential part of the skill which its cultivation demands. The cacao tree is mingled with other trees, which guard it from the rays of the sun, without depriving it of the benefit of their heat. The *Erythrina* and the banana are employed for this purpose. The latter, by the rapidity of its growth, and the magnitude of its leaves, protect it for the first year. The erythrina endures at least as long as the cacao; it is not every soil, however, that agrees with it. It perishes after a while in sandy and clayey ground, but it flourishes in such as combine those two ingredients. In one range of cacao trees, a banana is placed between two cacaos, and an erythrina between the two following. In the other range a banana is placed between each cacao tree, and no erythrinas, so that the latter are at the distance of two alleys. The banana and the erythrina are first planted, and when a shelter from the sun is thus provided, the hole for the cacao is made, around which are planted four stalks of the yucca plant, at the distance of two feet from each other. At the end of two months the cacao is planted. The smaller the plant is, the better. There are, nevertheless, soils subject to worms where the small plants do not thrive; but, excepting in this particular, the small plants are preferable, because the large require more labor for their transportation and planting; many of them die, and those which survive bud and shoot forth, but are never of any value. The cacao plant should not exceed thirty-six inches in size when transplanted; if larger, it succeeds with difficulty. The nurseries of cacao demand an excellent soil, well prepared, where the water does not remain. They should be well sheltered from the sun. Small knolls of earth are formed, in each of which are put two seeds of cacao, in such a manner that they are parallel with the level of the ground. During the first twenty days the seeds are covered with two layers of banana or other leaves. If necessary, the ground is watered: but the water is not suffered to remain. The most suitable time for sowing is in November. Where there is not a facility for watering, the planting of the cacao should take place in the rainy season; but when the former is practicable, it is best to plant in dry weather and assist nature by irrigation, since it is then in the power of the cultivator to give the exact quality of moisture necessary. But, in all cases, care should be taken that the plants are not wet in the interval between their being taken out of the ground and replanted. When the bananas grow old, they should be carefully felled, lest the cacaos should be injured by their accidental fall. They are totally removed as soon as the erythrina yields sufficient shade; this operation gives more air to the trees of the plantation, and encourages

their growth. Until the cacao attains four feet in height, it is trimmed to the stem. If it shoots forth several branches, they are reduced to three, at equal distances; and, in proportion as the plant increases, the leaves which appear on the three branches are stripped off. If they bend much, and incline towards the earth, they are tied in bunches, so that the tree may not remain crooked. The branches, which are trimmed, are cut at the distance of two fingers from the tree. The suckers which spring from the tree are also removed, as they only live at its expense.

Harvest of the cacao.—The tree yields two principal crops in a year, one about St John's day, the other towards the end of December. The cacao however ripens and is gathered during the whole year. But in all seasons the planters of the Central American republics make it a point, so far as possible, to collect their crops only at the decline of the moon; because experience proves that this precaution renders the cacao more solid, and less liable to spoil. To collect the fruit, those negroes and Indians are employed who have the sharpest sight, that only the ripe fruit may be gathered. The most robust and active are chosen to carry it to the places where the beans are to be shaken out, and this is left to the aged and maimed to do. The operation is performed on a floor well swept, and covered with green leaves, on which they place the cacao. Some open the pod, and others strike out the beans with a small piece of wood, which must not be sharp, lest it should injure them. The good and bad beans must not be mingled together. There are four sorts of cacao in every crop; the ripe and in good condition, the green but sound, the worm-eaten, and the rotten. The first quality is best, the second is not bad; but the two others should be rejected. As soon as that which is not fully ripe begins to show specks, it must be separated. As to the pods which are not perfectly ripe, they should remain in heaps during three days under green banana leaves, that they may ripen before they are hulled. When the cacao is stored, great care is necessary not to leave amongst it pieces of the pod or leaves, or any other extraneous particles. This care must be repeated every time that it is removed from the store, or replaced in it. The cacao must always be exposed to the sun on the fourth day after it has been gathered, and this exposure should be daily repeated until it is perfectly dry. When that is the case, the beans burst on being squeezed, their shell resounds when struck, and they no longer become heated when placed in heaps; the latter is the best proof that the moisture injurious to their preservation is dissipated. If the cacao is not sufficiently exposed to the sun, it becomes mouldy; if too much, it withers, and easily pulverises; in either case it soon rots. When the quantity of cacao gathered is considerable, it is placed in the sunshine by a hundred quintals at a time, unless the cultivator has a sufficient number of persons employed to expose a greater quantity. This operation is indispensable, to prevent it from becoming mouldy. If the rains prevent this exposure to the sun, it is necessary, as soon as it is sufficiently cleaned or purified, to spread it in apartments, galleries, or halls, with which the plantation must be provided; this operation cannot be delayed without danger of losing the crop. It is to be wished that stoves were employed to dry the Cacao when the sun fails, but this expedient, so simple and important, is generally unknown. It is almost universally believed that the most essential precautions for preserving the cacao consists in gathering it at the decline of the moon, I believe that they may more seriously calculate on the care of depositing it in apartments so hermetically closed that the air cannot penetrate; it would be advisable to make these apartments of wood, for the more perfect exclusion of moisture. The floor should be elevated two feet; under the floor a pan of coals is placed, covered with a funnel, the point of which enters into the heap of cacao and then diffuses the vapor. In the apartment which contains the cacao, some persons place bottles of vinegar, slightly stopped with paper, to prevent the formation of worms. The beans which begin to show specks, may be preserved from entire corruption by a slight application of brine. This occasions a small degree of fermentation, which is sufficient to destroy the worms, and to preserve the cacao during a considerable time from new attacks. Why is not this preservative also employed after the cacao is dried, and when placed in the store, where it awaits the purchaser? At St. Philip they make use of smoke to preserve the cacao; it is also ascertained that fine salt, thrown in small quantities on the cacao, protects it from worms. Much has been done for the cacao when it has been cleared of all green or dead beans, and extraneous substances; when it has received no bruise or injury in the operation of drying, and when it has been subsequently kept in a place that is dry and not exposed to the air; yet, even with all these precautions, cacao of the best quality is seldom found marketable at the end of a year. These circumstances sufficiently prove that the culture of cacao requires attention more than science, vigilance rather than genius, and assiduity in preference to theory. Choice of ground, distribution and draining of the waters, and position of the trees destined to shade the cacao, are almost the only points which require more than common intelligence. Less expense is also required for an establishment of this kind than for any other of equal revenue. One able hand is sufficient for the preservation and harvest of a thousand plants, each of which should yield at

least one pound of cacao, in ground of moderate quality, and a pound and a half in the best soil. By an averaged calculation of twenty ounces to each plant, the thousand plants must produce twelve hundred and fifty pounds, which, at the ordinary price of 31s. 6d. per cwt., would produce about £17 10s. per annum for each laborer. The expences of the plantation, including those of utensils, machines, and buildings, are also less considerable for cacao than for any other produce. The delay of the first crop, and the accidents peculiar to cacao, can alone diminish the number of planters attached to its culture, and induce a preference to other commodities. The cacao plant is not in a state of prolific produce till the eighth year in the interior, and the ninth in plantations on the coast. Yet, by a singularity which situation alone can explain, the crops of cacao commence in the ninth year in the valley of Goapa, and at the east of the mouth of the Tuy. In the vicinity of the line, and on the banks of Rio-Negro, the plantations are in full produce on the fourth, or at most the fifth year. The cacao tree continues productive to the age of fifty years on the coast, and thirty years in the interior of the country. The cultivation of cacao will be most situable to the less wealthy individual, as it demands so little labor and outlay. Baron Humboldt observes, in alluding to Spanish America, that cacao plantations are occupied by persons of humble condition, who prepare for themselves and their children a slow but certain fortune; a single laborer is sufficient to aid them in their plantations, and 30,000 trees, once established, assure competence for a generation and a half. *Cultivation in the West India Islands*—The only English colonies where this nutritious and wholesome substance is now cultivated to any extent, are Trinidad, St. Lucia, Grenada, and St. Vincent. There are few, perhaps no agricultural or horticultural pursuits, so delightful (observes Mr. Joseph, in his "History of Trinidad,") as that of the cultivation of the cacao. It is planted in rows, intersecting each other at right angles, at the distance of from twelve to fifteen feet, according to the nature of the soil. The tree is not suffered to grow higher than about fifteen feet, and its broad rich foliage, the hues of which vary from a light green to a dark red, loaded with yellow and dark red pods, which contain the chocolate bean, are beautiful objects; these alleys are shaded by rows of magnificent trees, called *Bois Immortel* by the French and English, by the Spaniards the Madre de Cacao. It is the *Erythrina umbrosa* or *arborea* of Linnæus. Like the Bignonia or Pouie, this tree, at particular seasons, throws off its foliage and is covered with blossoms; those of the Erythrina are of a brilliant red color, justifying its Greek appellation. In this state they are literally dazzling to behold —no object in the vegetable world looks more striking than the alleys of a Cacao walk shaded

by a forest above them of the Bois Immortel. Mr. W. Purdie, Government Botanist of Trinidad, observes as follows. My attention has been lately directed to the average produce per tree, which will, I hope, throw some light on its cultivation. From fifteen cacao trees, at St. Ann's, I have this year gathered 115 lbs. of cacoa (dried), and at present there is at least 50 lbs. more ripe on the same trees. This gives 165 lbs. of cacao from fifteen trees, or 11 lbs. per tree. These cannot be considered fine trees; on the contrary, they are what would be considered ordinary ones; therefore the average in this case is fair, and differs materially from selecting the produce of fifteen trees from a large plantation, and giving the average return of what might be obtained from cacao cultivation. Last year these trees did not average more than 2 lbs. per tree, and I attribute the increase of crop to the thinning out of both the cacao and shade trees. In a former letter to the cacao-planters of Trinidad, I recommended twenty-four to thirty feet from tree to tree as the proper distance; but so as to meet the feelings of those who, unfortunately for themselves, consider every cacao tree cut down a sacrifice, I propose that the trees be thinned out to twenty-four feet, and that, at intervals of twenty rows at most, avenues of fifty feet in both directions should be left. After this, it will be better seen what may be necessary to be done to each individual tree; neither should the shade trees be forgotten; as a general rule, they are prejudicially thick. At twenty-four feet apart there would be seventy-five trees per acre, 250 per quarree. This, at 11 lbs. per tree, gives 2,750 lbs. of dried cacao per quarree, at 5 dollars per 100 lbs., gives 137 dollars 50 cents gross; deducting 80 dollars per quarree expenses, leaves 57 dollars 50 cents net profit. Thus an estate of 120 acres, or 36 quarrees, would contain 9,000 trees, 11 lbs. per tree will give 33,000 lbs. of cacao, at 5 dollars gives 4,350 dollars gross per annum; deducting 80 dollars per quarree (a much more liberal sum than is at present laid out), leaves a net balance of 1,950 dollars, or 16 dollars 25 cents per acre. Now this, it must be remembered, would be the produce from 9,000 trees, and from an estate containing only 36 quarrees of land (which cannot be considered a large one); what, then, might be expected from estates containing 40,000 trees? A very important economy might also be made in the curing of the cacao, by which much time would be saved, and consequently expense, by adopting the same method as is used in Jamaica for drying coffee, namely, floorings of cement, or, as they are called, barbecues. At convenient distances in the centre of these floorings (which are inclined planes) a slightly-raised circular ridge is formed with cement, leaving an aperture at the lower side to allow the escape of any water that may have lodged in them.

The cacao is easily brought together in the these places in the event of rain, and at night covered with portable wooden frames, which are readily removed by two men. In this way the cacao would be dried in a fifth of the time much more effectually, and of a brighter colour. The beverage generally called *cacao* is merely the berries of *Theobroma Cacao*, pounded and drank either with water or milk, or with both. *Chocolate* (of which I shall speak by and bye) is a compound drink, and is manufactured chiefly from the kernels of this plant, whose natural habitat would seem to be Guayaquil, in South America, though it flourishes in great perfection in the West Indies. It grows also spontaneously and luxuriantly on the banks of the Magdalena, in South America; but the fruit of those trees that are found in the district of Carthagena is preferred to all others, probably from a superior mode of cultivation. Sir R. Schomburgh, in his expedition into the interior of British Guiana, found the country abounding in cacao, "which the Indians were most anxious to secure, as the pulpy arillus surrounding the seed has an agreeable vinous taste." Singular to say, however, they appeared perfectly ignorant of the qualities of the seed, which possesses the most delightful aroma. Sir Robert adds, they evinced the greatest astonishment when they beheld him and Mr. Goodall collecting these seeds and using them as chocolate, which was the most delicious they had ever tasted. These indigenous cacao trees were met with in innumerable quantities on the 5th of June, 1843, and the following day; and thus inexhaustible stores of a highly-prized luxury are here reaped solely by the wild hog, the agouti, monkeys, and the rats of the interior.—(*Simmonds's Col. Mag. Vol.* I., *p.* 41.) The height of the cacao shrub is generally from eighteen to twenty feet; the leaf is between four and six inches long, and its breadth three or four, very smooth, and terminating in a point like that of the orange tree, but differing from it in color; of a dull green, without gloss, and not so thickly set upon the branches. The blossom is first white, then reddish and contains the rudiments of the kernels or berries. When fully developed, the pericarp or seed-vessel is a pod, which grows not only from the branches, but the stem of the tree, and is from six to seven inches in length, and shaped like a cucumber. Its color is green when growing, like that of the leaf; but when ripe, is yellow, smooth, clear and thin. When arrived at its full growth, and before it is ripe, it is gathered and eaten like any other fruit, the taste being subacid. If allowed to ripen, the kernels become hard; and, when taken out of the seed-vessel, are preserved in skins, or, more frequently, laid on the vijahua leaves, and placed in the air to dry. When fully dry, they are put in leathern bags, and sent to market: this is the Spanish mode of taking in the crop. A somewhat different method is followed in Trinidad and Jamaica (in the latter island it can scarcely be said to be cultivated now); but it differs in no essential degree from the principle of gradual exsiccation, and protection from moisture. *Chocolate*, properly so called, and so prized both in the Spanish continent and in the West Indies, never reaches Great Britain except as a contraband article, being, like nearly all colonial manufactured articles, prohibited by the Custom-house laws. What is generally drank under that name is simply the cacao boiled in milk, gruel, or even water, and is as much like the Spanish or West India chocolate as vinegar is to Burgundy. It is, without any exception, of all domestic drinks the most alimentary; and the Spaniards esteem it so necessary to the health and support of the body, that it is considered the severest punishment to withhold it, even from criminals; nay, to be unable to procure chocolate, is deemed the greatest misfortune in life! Yet, notwithstanding this estimation in which it is held, the quantity made in the neighbourhood of Carthagena is insufficient for the demands of the population, and is so highly priced that none is exported but as presents! The manner in which the Spaniards first manufactured this veritable Theobroma—this food for gods (from *Theos*, God, and *broma*, food)—was very simple. They employed the cacao, maize, Indian corn (*Zea Mays*), and raw cane-juice, and coloured it with arnatto, which they called *achiotti* or *rocou*, but which was known in Europe at that time by the name of *Terra Orellana*. These four substances were levigated between two stones, and afterwards, in certain proportions, mixed together in one mass, which mass was subsequently divided into little cakes, and used as required, both in the solid and fluid form. The Indians used one pound of the wasted nuts, half a pound of sugar, and half a pound of ground corn (maize) each and then added rose-water to make it palatable. This the Mexicans called chocolate, from two words in their language, signifying the noise made by the instruments used to mill and prepare it in the water. Chocolate, as used in Mexico, is thus prepared:—The kernels are roasted in an iron pot pierced with holes; they are then pounded in a mortar, and afterwards ground between two stones, generally of marble, till it is brought to a paste, to which sugar is added, according to the taste of the manufacturer. From time to time, as the paste assumes consistency, they add long pepper, arnatto, and lastly, vanilla. Some manufacturers vary these ingredients, and substitute cinnamon, cloves, or aniseed, and sometimes musk and ambergris—the two latter on account of their aphrodisiac qualities. The following is the formula given by a late writer:—To six pounds of the nut add three-and-a-half pounds of sugar, seven pods of vanilla, one-and-a-half pounds of corn meal (maize ground), half-

a-pound of cinnamon, six cloves, one drachm of capsicums (bird pepper), and as much of the rocou or arnatto as is sufficient to color it, together with ambergris or musk, to enforce (as he says) the flavor, but in reality to stimulate the system. There is another chocolate made of filberts and almonds, but this is not considered genuine. In old Spain it is somewhat differently made: two or three kinds of flowers, also the pods of campeche, almonds, and hazel-nuts, being mixed up with it, while the paste is worked with orange-water. With regard to the manner in which chocolate is prepared in England nothing need be said, as it is too well known to require description. That which has appeared to Mr. Simmonds the best is "*Fry's Chocolate*" which requires only to be rubbed up with a little boiling water, and scalded milk added to it with sugar according to the taste of the drinker; there is a flavour, however, in this chocolate sometimes of *suet*, which is probably added to give it a richness which the cacao employed may not possess of itself. In the West Indies they rarely add anything to cacao but arnatto (sometimes a little fresh butter), though it is often scented and sweetened, and sold in little rolls at five-pence and ten-pence each, currency. It is always boiled with milk, which, though very indigestible when boiled and taken alone, seems to lose this quality when taken with chocolate. Chocolate thus made is much drank, when cold, in the middle of the day, and is considered, both by the negroes and the old settlers, as a most nutritive and salutary beverage. The signs by which *good chocolate* or cacao is known are these:—It should dissolve entirely in water, and be without sediment; it should be oily, and yet melt in the mouth; and if genuine, and carefully prepared, should deposit no grits or grounds. That made in the West Indies, and in some parts of Cuba, is dark: but that manufactured in Jamaica is of a bright brick colour, owing to the greater quantity of arnatto which is used in the preparation, and which, he thinks, gives it a richer and more agreeable flavor. In an economical point of view, chocolate is a very important article of diet, as it may be literally termed meat and drink; and were the half starved artisans, over-wrought factory children, and ricketty millinery girls, of Britain induced to drink it instead of the innutritious beverage called "tea," its nutritive qualities would soon develop themselves in their improved looks and more robust constitutions. The price too, is in its favour, cacao being eight-pence per pound; while the cheapest black tea, such as even the Chinese beggar would despise, drank by milliners, washer-women, and the poorer classes in the metropolis, is three shillings a pound, or three hundred and fifty per cent. dearer, while it is decidedly injurious to health. The heads of the naval and military medical departments in England have been so impressed with the wholesomeness and

superior nutriment of cacao, that they have judiciously directed that it shall be served out twice or thrice a week to regiments of the line, and daily to the seamen on broad Her Majesty's ships, and this wise regulation has evinced its salutary effects in the improved health and condition of the men. Indeed, this has been most satisfactorily established in Jamaica among the troops; and the same may be asserted of the seamen in men of war on the coast. It is also certain that those who indulge in excesses find their vigor more speedily restored by the alternate use of chocolate and coffee than by any other ingesta; and pigs, goats, and horses, which are fed even on the spoiled berries, are observed to become very speedily fat, and in good condition. But cacao has not only the property of rapidly restoring the invalid to health, strength and condition, but a very inconsiderable quantity of it will sustain life for a long period. The South American Indians perform extraordinary journeys, subsisting, during these prolonged travels, on an incredibly small quantity of chocolate—so small, indeed, as to render the accounts of travellers upon the subject almost marvellous. In this respect it resembles coffee, which also possesses the estimable property of sustaining the powers of life, while it modifies and restrains the passion of hunger. It is a curious fact, and how far this condition may be connected with its powers of sustenance is worthy of inquiry, that chocolate recently boiled, if the operation be performed in a tin pan, is highly electrical; and this property may be frequently manifested by repeating the process. The mode of cultivating the cacao is given at some length by Edwards; it is that of the Spaniards, a process strictly followed in Trinidad, where, of all the West India islands, it constitutes a considerable item of exports. It is thus described:—"A spot of level land being chosen—preference is always given to a deep black mould, sheltered by a hedge or thicket, so as to be screened by the wind, especially the north, and cleared of all weeds and stumps of trees—a number of holes are dug, at ten or twelve feet distance from each other, each hole being about a foot in length, and six or eight inches deep. A very important matter is the selection of the seeds for planting, and this is done in the following manner: the finest and largest pods of the cacao are selected when full ripe, and the grains taken out and placed in a vessel of water. Those which swim are rejected; those chosen are washed clean from the pulp, skinned, and then replaced in the water till they begin to sprout; Banana (*Musa paradisiaca*), or some other large leaves, those of the sea-side grape (*Coccoloba uvifera*), for instance, are then taken, and each hole is lined with one of them, leaving, however, the sides of the leaves some inches above ground; after which the mould is rubbed in gently till the hole is filled; three nuts are then selected for

each hole, and they are set triangularly in the earth, by making a small opening with the finger about two inches deep, into which the nuts are put, with that end downwards from which the sprout issues." They are then covered lightly with mould, the leaf folded over, and a small stone placed on the top, to prevent its opening; in eight or ten days the young shoots appear above the ground; the leaves are then opened to give them light and air, and a shelter from the sun, either in the shape of plantain or banana leaves, is not forgotten; but the cocoa-nut and other species of palm, on account of their fibrous structure and great durability, are always preferred. This artificial shelter is continued for five or six months. But, as a further security to the young plants, for they are very delicate, other trees or shrubs are planted to the south-west of the plants, that they may grow up with and shelter them, for young cacao will grow and flourish only in the shade. For this purpose the coral bean-tree (*Erythrina corallodendrum*) is chosen. Mr. Simmonds presumes there are other trees and plants equally eligible for this purpose, and more useful; but his experience does not enable him to speak positively upon the subject. Should the three seeds placed in each hole spring up, it is thought necessary, when the plants are fifteen or twenty inches high, to cut one of them down. The two others, if they devaricate, are sometimes suffered to remain, but it does not always happen that even *one* of the three springs above the earth; consequently this additional labor is not invariably requisite. On the fourth or fifth year the tree begins to bear, and attains perfection by the eighth, continuing to produce two crops of fruit per annum, yielding at each crop from 10 lbs. to 20 lbs, according to the nature of the soil. It will continue bearing for twenty years; but, as it is a delicate plant, it suffers from drought, and is liable to blight. In these respects, however, it does not differ from many other plants, which are even more subject to disease, though not half so valuable. Besides, a proper system of irrigation, such as could be had recourse to in many parts of Jamaica, would obviate and prevent these evils. Cacao is cultivated in the highlands as well as on the coasts of the north-eastern peninsula of the large and rich island of Celebes, which has, within the last year or two, been thrown open to foreign trade. The plantations of it are even now considerable, and this branch of Industry only requires not to be impeded by any obstacles in order to be still further extended. It forms a large ingredient in the local trade, and furnishes many petty traders with their daily bread, not to speak of the landowners, for whom the cultivation of the cacao affords the only subsistence. The preparation of the product differs from that adopted in the West Indies, but we have not been able to ascertain the practice. We may reckon that 1,200 to 2,000 piculs of 133 lbs. are yearly produced; the prices vary much, being from 50 to 75 florins per picul.—("Journal of the Indian Archipelago," vol. ii., p. 829.) Bourbon now produces 15,000 to 20,000 kilogrammes of cacao annually. Cacao is grown to a small extent in some of the settlements of Western Africa, but as yet only a few puncheons have been exported, all the produce being required for local consumption. The following figures give the imports and consumption of cacao into the United Kingdom in the last five years:—

	Imports. lbs.	Consumption. lbs.
1848 . .	6,442,986 . .	
1849 . .	7,769,234 . .	3,233,135
1850 . .	4,478,252 . .	3,103,926
1851 . .	6,773,960 . .	3,024,338
1852 . .	6,268,525 . .	3,382,944

The home consumption is very steady at about 3,000,000 lbs., yielding to the revenue £15,000 to £16,000 for duty. The produce of British colonies pays 1d. per lb. duty, that from foreign countries 2d; cocoa husks and shells half these amounts; when manufactured into chocolate or cocoa paste the duty is 2d. per lb. from British possessions, and 6d from other parts. The quantity imported in this form is to the extent of about 14,000 lbs. weight.

(2252) CACTACEÆ, OR CACTEÆ, Indian Figs the Cactus Tribe, a natural order of Exogenous plants.—*Engl. Cyc. page* 707. It is on species of the *Cactaceæ* that the cochineal insect feeds. Of these, the *Opuntia tuna* seems the most employed in Peru; *O. Hernandezii*, is the most celebrated in Mexico: and *O. cochenillifera*, the native province of which is somewhat doubtful.—*Engl. Cyc. p.* 710. The Cactus plants are a very small division of a large family, and rank amongst botanical curiosities; natives of the tropics, they grow in brick and lime rubbish with a little well decayed manure and vegetable mould.—*Riddell.*

(2253) CADABA INDICA, *Capparideæ.*—The Indian Cadaba is a straggling shrub, its flowers in terminal racemes, of a dingy white, nearly throughout the year, very common about Mussulman burial grounds.—*Riddell.*

(2254) CADJANS.

Jowlee. GUZ. HIND.	Cobaray yakoo, TEL.
Tenary Elle, TAM.	

Cadjans are the dried leaves of the cocoanut Palm; they are largely used as a thatch, which resists the rain better than tiles: but roofs made of them should be relaid before the commencement of the rainy season: 149,500 were imported into Bombay in the year 1850-51.

(2255) CÆSALPINEÆ, OR CÆSALPINIADS, *Brown.* The Cæsalpineæ abound in tropical and

warm parts of the world; a few, as Cercis siliquastrum, spread into more northern latitudes. Some are highly ornamental. The wood of many is red-coloured and astringent. Hymenæa courbaril yields a resin, the *Gum Anime* of the shops. The leaves and fruit of some are purgative, as of the Cassia Sennas and of the Tamarind. Calyx 5-toothed or bilabiate, deciduous or withering on the plant. Corol irregular, imbricated, subpapilionaceous, or nearly regular, spreading, of 5 petals, which are free, inserted into the bottom of the calyx. Stamens 10, or fewer from abortion, often unequal, perigynous, or inserted with the petals, usually free, sometimes united. Ovary free, placenta unilateral. Seeds without albumen. Embryo straight. Leaves alternate stipulate, impari or abruptly pinnate, sometimes single.—*Royle.*

(2256) CÆSALPINIA, a genus of plants belonging to the above, or according to others, to the tribe *Cassieæ*, of the natural order *Leguminosæ*, and especially distinguished by the lowermost of its sepals being arched, the uppermost of its stalked petals being the shortest, its stamens all perfect with shaggy bases, and the fruit a compressed bivalved pod. The species are trees or shrubs, found both in the East and West Indies, with showy yellow flowers, abruptly pinnated leaves, and stems which are usually more or less prickly. The Brazil-Wood of commerce is said to be furnished by two of its species. Fée considers the sappan wood of the East Indies (*Cæsalpinia sappan*) to be one of the Brazil-Woods of the merchants. Upon the whole it appears that we have no good testimony as to what the tree is that yields it; but it is probable that it is the produce of many species, and possibly of more than one genus, for De Candolle and Sprengel doubt whether the *Cæsalpinia echinata* is not rather a *Guilandina*. The best Brazil-Wood is said to come from Pernambuco, where it is called Pao da Rainha or Queen's Wood, on account of its being a royal monopoly. The Bukkum or Sappan wood of commerce is yielded by *C. Sappan*. A substance known in the markets under the name of Dividivi or Libidibi, lately become important on account of the tannin it contains, is the fruit or pods of *C. coriaria*. They are not used in medicine, but in dyeing and tanning.—*Engl. Cyc. page* 711.

(2257) CÆSALPINIA BONDUCCELLA, Syn. Guilandina Bonduccella. *Vern.* Kutkulega—Kutkaranga. Akulmookt of Avicenna. A climbing plant and a native of the East and West Indies; seeds a powerful tonic, and very valuable febrifuge. The kernels are very bitter; reduced to powder and mixed with black pepper they are used in 3 to 6 gr. doses in ague with the best results; powdered small with castor oil they are applied externally in hydrocele. The seeds yield oil, starch, sugar, and resin. Mr. Piddington published an analysis in the Trans. Medical and Physical Society of Calcutta, in which these principles were described. Nitric acid reddens the nut, and subsequently gives it a yellow colour. The root is deemed in Amboyna to be a good tonic.—*O'Sh. p.* 311. The powder is tonic and febrifuge, and given in ague with decided benefit. Dose, six to twenty grains three times daily.—*Beng. Phar. p.* 405. It grows in hedges near gardens at Ajmeer, where the nuts and leaves are used as febrifuges by the natives. *Bonduc nut oil*, Calichi kai yennai, Tam. is the oil of its common seed and is mentioned by Ainslie, as being considered useful in convulsions and palsy. The seeds themselves are believed to possess tonic virtues and are used solely as a medicine. *Bonduc nuts*, are irregularly round, and grey; the almond is white, very hard, and intensely bitter; and gets a blood red colour from nitric acid.—*Med. Top. of Ajmere.*

(2258) CÆSALPINIA CORIARIA. The "Cæsalpina coriaria," is a plant of South American origin, belonging to the natural order "Cæsalpineæ." It appears to have been introduced some 12 or 15 years ago, into the Botanical gardens at Calcutta. From thence, seeds or young plants were sent to Madras and cultivated in the Horticultural Gardens. It is now grown at several stations in the Madras Presidency, Bangalore, Hoonsoor and Guntoor. The seed pods have been extensively used for tanning leather, and for this purpose are considered superior to all the Indian astringents. Leather tanned in this way is considered equal to that of the best of Europe manufacture. (Vide Juror's Report, Madras Exhibition 1855, article, "Tanning materials.")—*Indian Annals* No. VII. page 120. Dr. Cornish met with a specimen of the plant in an officer's garden at Secunderabad. It was a large and handsome tree about 20 feet high, with very wide and spreading branches. A large quantity of seed pods ripened in the year 1855; probably more than a hundredweight fell in the course of the year. A good sized tree in the West Indies is said to produce about 80lbs. annually. The soil and climate of the Deccan appear to be well suited for the growth of this tree, and as the pods are likely to be in demand for "tanning material," it might be cultivated on a large scale with every prospect of success. Jacquin describes the Cæsalpinia coriaria as a handsome branching tree, of about fifteen feet in stature, covered with a dark spotted bark. Its leaves are doubly pinnate, and the leaflets of twelve pair without a terminal one; they are oblong, obtuse, smooth, very entire. The flowers are disposed in spikes issuing from the extremities of the branches; they are small, yellowish and slightly fragrant. To these succeed oblong compressed somewhat obtuse pods curved laterally, the inner side being concave and the other convex. The seeds rarely exceed three or four in each pod, and are

of a brownish color. It is to the curved pod of this leguminous shrub that the commercial term of Divi Divi, or Libi-Libi, is given. The average produce of pods from a full grown tree has been estimated at 100lbs. weight, one-fourth of which consists of seeds or refuse, leaving about 75lbs. of marketable matter. Dr. Cornish observes, that the "divi divi" pods are of a dark brown color externally, when ripe, transversely wrinkled and curled, from 1 to 2 inches long, and ¾ of an inch wide. The outer skin of the pods is very thin, and peels off easily if the pods are ripe. Underneath it, and separated from the seeds by a layer of woody fibre, is a considerable thickness of astringent matter of a light yellow color. Each pod contains from 2 to 4 seeds in separate compartments. The astringent matter in the walls of the pod, he found, on examination, is almost pure tannin. An excellent tannin, slightly darker in color than that manufactured from galls, may be prepared by the other process. About 60 or 65 per cent, of the whole pod, (excluding seeds) consists of impure tannin. The remainder being made up of woody fibre, starch, and gum. The powder of the pods is of a light yellow color, taste purely astringent, and strongly resembling tannin, as met with in commerce. At an interval of six feet apart, an acre of ground will contain 1210 trees, yielding an average of 810 cwts., and 30 pounds of divi-divi, or above 20½ tons of marketable matter, worth, at only £5 per ton, £200. Should the interval between the trees be extended two feet more, we shall still have 680 to the acre, the produce of which would not improbably be increased by the increased space given for the extention of the branches. The ground in which this tree admits of being cultivated is that which is least adapted to the staple products of tropical agriculture; guinea grass may be profitably raised beneath its shade, and as with the exception of the three years which precede the commencement of its bearing, there is hardly any deduction to be made from its returns, it promises to be among the most valuable objects of a planter's attention. Divi-divi resembles a dried pea-shuck curled up filled with yellow powder, and a few dark brown seeds. Its tannin differs materially from that of nutgalls. The quantity of mucilage it contains precludes it from the use of dyers, but the experiments of Mr. Rootsey of Bristol show the pods to contain 50 per cent of tannin, and it is largely used by curriers. It appears also from trials made that one part of Divi-Divi is sufficient for tanning as much leather as four parts of Bark and the process occupies only one third of the time. The selling price ranges from £8 to £13 per ton. The imports into the United Kingdom in 1844, were 3,900 tons; in 1845 and 1846, about 1,400 tons each year; during the subsequent three years the imports were merely nominal, but in 1850 a renewed demand seems to have sprung up, for 2,770 tons were imported into Liverpool, and a few tons into London.—*Simmonds Comm. Products, p.* 503. The seed pods of this tree being known to contain a large per centage of astringent matter, induced Dr. Cornish to give it a trial in Fever. The ætherial extract is not completely soluble in water, but the re-actions of the soluble portion, prove its indentity with tannin. Dr. Cornish has given the divi divi powder to nearly 100 patients suffering from Intermittent Fever in its various forms, and on the whole with considerable success. The dose of the powder pods commonly used was from 40 to 60 grains three times a day. He began cautiously with 10 grains, but found that doses below 30 grains rarely produced any effect in controlling the febrile paroxysms. As was the case with powdered galls, constipation of the bowels, as a result of treatment, was very uncommon. No inconvenience resulted from the use of large doses of this astringent. In two cases out of 94, it had to be omitted on account of gastric irritation, and diarrhœa existing. The astringent matter appears to have been rapidly absorbed into the circulation.—*Dr. Cornish in Indian Annals No.* VII, *page* 121.

(2259) CÆSALPINIA PANICULATA, A magnificent climber festooning the trees with its dark glossy foliage and gorgeous racemes of orange blossoms.—*Hooker's Him. Jour. p.* 25.

(2260) CÆSALPINIA SAPPAN. *Leguminosæ*, Roxb. c. 16. The Sappan tree.

Patonga, Sans, Bukum, Puttungay, Hind.	Isiapangum, Vuttunghy, Tam.

This tree is a native of Siam and Amboyna. It grows in the Kotah jungles. It is found in the immediate vicinity of Prome, growing in the small hills of the place, but except near Thoungzai, in the northern part of the Rangoon district, where it is also seen in small quantity, Dr. McClelland has not found it in the interior of the province or in the larger forests, so that it is perhaps scarcely entitled to a place amongst the natural productions of Pegu.—*McClelland.* It is cultivated in Palghaut for the purpose of dyeing the straw used in mat making (Wight); from its high price for this purpose, it is not used for carpentry. It grows to a larger size in China than India. The Sappan-Wood, *sapan* of Bengal commerce, constitutes an article of very important trade to Calcutta: the wood, *bukum*, is solid, heavy, hard, compact, whitish while recent, but reddening on exposure to the air. It is tasteless and inodorous, communicates a fine red colour to water, and the alkalies remove more colouring matter when water ceases to act. Alcohol forms a deep red tincture. Like logwood, the sapan is considerably astringent, and contains a principle if not identical with, at least much resembling, *hæmatin*. The extract may be substituted for that of logwood. Paper dyed with the tincture is a good test

for alkalies, being turned to a reddish-violet colour.—*O'Shaughnessy, page* 310. An extract of Sappan Wood is a useful astringent, (containing much gallic and tannic acid,) and a good substitute for the logwood of the British Pharmacopeiæ. The dose is five to ten grains twice or thrice daily in chonic dysenteries chiefly. It is seldom given alone, but usually with quinine, gentian or chiretta. It should not be given with the preparations of iron.—*Beng. Phar. p.* 295. A decoction of Sappan is a perfect indigenous substitute for the decoction of Hæmatoxylon of the Edinburgh Pharmacopeia.—*Beng. Phar. p.* 280. The Sappan Wood is an article of considerable commerce in the East. It is the bukkum wood of India, and is procured in Mergui, Bengal, the Tenasserim Provinces, Malabar and Ceylon. In 1842 as much as78,000 cwts.were shipped from Ceylon, but the export from thence has decreased. This island, however, ships dyewoods annually to the amount of £2,000. A large quantity is exported from Siam and the Philippine Islands; as much as 200,000 piculs annually from the former and 23,000 piculs from Manila. 3,524 piculs were shipped from Singapore in 1851, and 4,074 piculs in 1852. The picul is about one cwt and a quarter. Sappan wood yields a yellowish color, like that of Brazil wood (C. brasiliensis), but it does not afford of dye matter so much in quantity or so good in quality. The shipments from Ceylon were: in 1842, 77,694 cwt; in 1843, 1,692; in 1844, 2,592; in 1845, 2,854. I have no detailed returns at hand, but in 1837, 23,695 piculs of sappan wood, and 2,266 piculs of roots of ditto were shipped, and in the first six months of 1843, 22,326 piculs were exported from Manila. A large portion of this comes to Europe, but some goes to China, to United States, Singapore. &c. 15,500 piculs were shipped from Manila in 1845, 5,250 ditto in 1845, and 1,210 tons in 1850. About 3,000 piculs of sappan wood and the same quantity of other dye-stuffs are annually imported into Shanghae. The price of straight Sappan wood at Shanghae in July 1853, was thirty dollars per picul. In Calcutta, in June 1853, 4,000 piculs of the root of Manila Sappan wood sold freely at about 7s. 6d. per factory maund; Siam ditto 6s. 15 tons were imported into Liverpool in 1849, and 120 tons in 1850, from Calcutta. The imports of Sappan wood into the United Kingdom in 1850, amounted to 3,670 tons, worth £8 to £12 the ton, and this continued the price in January 1853.—*Simmonds.*

(2261) CÆSALPINIA SEPIARIA. Chilloor: Kilgutch, Hind.

A scandent strong armed shrub; flowers yellow, generally used to fence round fields. Kilgutch, grows in one hedge at Ajmeer, and forms a splendid impenetrable hedge, covered, with bright green leaves and large yellow spikes of flowers.—*Gen. Med. Top. p.* 192.

(2262) CAJANUS INDICUS.

Tovaray. Tam.	Toor also Ukhur, Mahr.
Toovar, Duk	Shukhool, Pers.
Kandaloo, Tel.	Doll or Pigeon pea.
Dhol. Hind.	Citysus Cajan, Lin.
Toovaray, Can.	Adaki, Sans.

This excellent pulse is the produce of a plant of the class Diadelphia and order Decandria, and makes a pudding little inferior to that made of pease—*Ainslie.* The doll bean is raised to a small extent in Tenasserim, but the doll sold in market is principally imported.—*Mason.*

(2263) CAJANUS INDICUS. Cytisus Cajan. *Variety.*

Malay Towaray. Tam.	Ghirie Adaki, Sans.
Burry Toovur. Duk	Hill Doll.
Konda Kandaloo. Tel.	

This differs from the Tovaray துவரை in being larger, and somewhat darker in colour; it is a very valuable pulse.—*Ainslie, p.* 281.

(2264) CAJAPUTI, L. Cajuputi Oleum, E. Cajeput, D. Oleum e foliis distillatum, L. Volatile Oil of the Leaves of Melaleuca Cajaputi, *Maton and Rorb.* (*M. minor*, Sm.) L. E. *Polyadelphia Icosandria*, Linn. Cayaputi Oil, or Oil of Cajeput.

Kayaputty-ka-teil, Hind.	Kayapooti-tailam, Tam.
Kayaputteih. Mal.	

Cajuputti Oil, pronounced *Kayapootee* (meaning *Arbor alba*) in the East, appears to have been known only since the time of Rumphius, who describes two trees, 1. *Arbor alba major*, H. A, ii. t. 16. 2. *Arbor alba minor*, H. A. ii. t. 17. f. 1. In 1798, Mr. Smith, of the Calcutta Botanic Garden, was sent to the Molucca Islands to obtain the true sort of Cayaputi plant. He obtained several, which were introduced into the above Garden, and have since been distributed all over India, and it is curious that this species, though a native of Molucca, is able to stand the cold of N. W. India, probably owing to the thickness of its bark. Mr. S. having also sent specimens to England they were ascertained by Dr. Maton to be those of the second kind, and named *Melaleuca cajaputi* in the London Pharm. For 1809, a name which Dr. J. E. Smith afterwards unnecessarily changed to *M. minor.* The other species obtained by Mr. Smith in 1798, which the Malays also call Cayaputi, (In Murray, App. Medicam, we have it named *Caieput* s. *Kaiuput Oleum,*) is the *Melaleuca leucadendron*, of which the leaves are larger, more falcate, 3-nerved, and smooth, but possess little or no fragrance, and are not known to yield any of this celebrated Volatile Oil. The *Melaleuca cajuputi*, according to Mr. Mason, is an elegant little tree, with birch-like bark and produces cajuput-oil. It is indigenous in the Karen forests of the southern provinces of Tenasserim but he has not observed it north of the valley of Palouk river, in latitude about 13°. Simmonds remarks that the leaf of this *Melaleuca*

minor yields, by distillation, the volatile oil of cajeputy, well known as a powerful sudorific, and a useful external application in chronic rheumatism. It is an evergreen shrub, with white flowers like a myrtle, native of Eastern Asia principally flourishing on the sea coasts of the Moluccas and other Indian Islands. Two sacks full of the leaves yield scarcely three drachms of the oil, which is limpid, pellucid, and of a green color. Cajeput is a corruption of the Malay words kayuputih, literally "white wood," from the colour of the bark of the Melaleuca cajeputi of botanists. It most abounds in the island of Boeroe in the Molucca Sea, where the essential oil is obtained by the distillation of the leaves.—*Crawfurd's Dictionary, page* 79. Dr. Royle mentions that *Melaleuca cajuputi*, Roxb. (fig. 64), forms a small tree with an erect but crooked stem covered with thick, rather soft, light-coloured bark; branches scattered, with slender twigs which droop like those of the Weeping Willow. Leaves alternate, lanceolate, acute, slightly falcate, 3 to 5 nerved, while young silky, and diffusing a powerful odour when bruised. Spikes terminal and from the extreme axils, downy as well as the calyx and branchlets, while in flower there is only a scaly conic bud at the apex, which soon advances into a leafy branchlet. Bracts solitary, 3 flowered. Calyx urceolate, (fig. 64, 3,) limb 5 parted. Petals 5, white, scentless. Stamens from 30 to 40, in five bundles; filaments 3 or 4 times longer than petals. Anthers incumbent with a yellow gland at the apex. Style long Stigma obscurely 3-lobed. Ovary ovate, and like the capsule 3-celled, (f. 64, 2 and 1,) many seeded, lower half united with, but the capsule is enclosed within the thickened tube of the calyx. Seeds angularly wedge shaped. A native of the Molucca Islands, especially of Boeroe, Manipe and of the S. of Borneo. It is called *Daun. kitajil*, but also Cajuputi. The leaves are collected on a warm dry day in autumn, and placed in dry sacks, in which they nevertheless become heated and moist. They are then cut in pieces, macerated in water for a night and then distilled. Two sackfuls of the leaves yield only about 3 drachms of the oil. This is clear and limpid, of a light green colour, very volatile, diffusing a powerful odour, having a warm aromatic taste, something resembling that of Camphor, followed by a sense of coolness. Sp. Gr. 0·914 to 0·927; soluble in Alcohol. It boils at 343°. When distilled with water, a light and colourless oil first comes over, and then a green-coloured and denser oil, which, with less odour, is more acrid. Comp. C_{10} H_9 O=77. Some adulterations are occasionally practised with this oil, especially at the time when it reached a high price, chiefly with the oils of Rosemary and of Camphor; but it is now commonly met with in a pure state, and without any admixture of Copper. *Action. Uses.* Diffusible Stimulant, Antispasmodic; externally in Rheumatism. Surprise was excited in India when Cayaputi Oil was stated to be a cure for Cholera, as Oil of Peppermint is as useful. Dose *M.* iij—v. given on lump of sugar.

(2265) CALABAR SKINS.

Petitgris, Fr.	Bjelka, Rus.
Grauwerk, Ger.	Gris pequeno, Sp.
Vaor, Vajo, It.	

Are the Siberian squirrel skins, of various colours, used in making muffs, tippets, &c.—*Faulk.*

(2266) CALABASH. Cucurbita lagenaria, Lin.

Anapa kaya, Tel.	Hurrea kuddoo, Hind.
Chooraykai, Tam.	Laboo Ambon, Malay.

Is of two kinds the long or Ceylon and the round: they are good vegetables when young and are useful when dry as vessels.—*Rhode, M.S.S.*

(2267) CALADIUM COSTATUM. The root of the Berar (*Caladium costatum*) is eaten by the natives of the Pedir cost (Achin), after being well washed —*Simmonds' Comm. Product, p.* 377.

(2268) CALADIUM CUCULATUM. In China, several species of the Aroideæ are cultivated for food, among which the Caladium cuculatum, Arum esculentum and indicum, are the most common. The tuberous roots of the Sagittaria sinensis also contain much farinaceous matter and are esteemed for their food; the taste resembles that of the preceding and all grow in marshy lands. The roots of these plants and of the water chesnut are manufactured into a powder resembling arrowroot, much in request among the people.

(2269) CALADIUM ESCULENTUM. Ventenat. The vegetable.

Saymboo keeray, Tam.	Chama koora, Tel.
Urvi ke baujee, Duk.	Chamaka, Sans.

The root.

Saymboo kalung, Tam,	Tallas, Javanese.
Urvi gudda, Duk.	Bete. Ternatese.
Chama gudda, Tel.	Kelady, Malay.
Urvee, Hind.	Chamaka, Sans.

This is a valuable root which appears to be generally cultivated in eastern countries. It is shaped somewhat like a yam and when well boiled and afterwards roasted is not inferior to it in taste. It is the common food of the inhabitants of Travancore, where there is a superior variety of it, with broad, purple colored leaves. The Worriahs in the Ganjam Circars (where it grows large), call it Cutchoo, the Malays of the Eastern islands hold it in high estimation. Niebhur in his "Travels in Arabia" says, it is produced in abundance in marshy situations in this country as well as in Egypt. He speaks of it under the name of Arum esculentum. Rumphius, speaking of this esculent root at Amboyna, says, "Nutrimentum est "catholicum in orientalibus hisce insulis et tan- "quam utilissima regionis censetur planta eodem

" modo, quo ab antiquis jam fuit temporibus in " Ægypto, licet ibi haberetur cibus rusticorum, " ac forte per saracenos ejus usus innotuit Occi- " dentalibus Africæ et Europæ partibus, ita ut " haud inepte Æthiopum panis vocari posset." Vide Rumphius, tom. v. page 316.—*Ainslie.* Mr. Jaffrey says that Caladium esculentum, *Saim-may-keeray*, is cultivated for its arrow shaped leaves, which are used as greens both in the East and West Indies; called by the French *Chou de Bresie*, and by the Germans *Essbare Arum.* Also that the roots are sometimes eaten though not considered wholesome.

(2270) CALAMANDER WOOD.

Calamander marum, Tam. | Koulmidvies, Ceylon. Also Kalu mederige.

Is scarce even in Ceylon whence it has been occasionally brought by private individuals: it is probably the most beautiful of all fancy woods—*McCulloch.* The figure is between that of rose wood and zebra wood; the colour of the ground is usually a rich hazel brown described as chocolate brown with black stripes. It is a hard wood and turns well: it is considered to be a variety of ebony. Mr. Laizor says, there are three varieties of Coromandel, the *Calamander* or *Coromandel*, which is the darkest and most commonly imported into England; the *Calemberri*, which is lighter coloured and striped; and the *Omander*, the ground of which is as light as English yew, but of a redder cast, with a few slight veins, and marks of darker tints. It grows between the clefts of rocks, thus rendering it difficult to extract the roots which are the most beautiful parts of the tree —Mr. Rhode (M.S.S.) has met with variegated ebony of rich lustre in logs of ebony cut in the Northern Circar hills: but whether this is owing to the wood being young or whether the wood is from a distinct tree he does not know, but there seems no doubt that very many trees yield an ebony. *Rhode* M.S.S. This beautiful fancy wood as obtained from Ceylon, is exceedingly hard, and finely veined, with different shades of black and brown. It is very scarce and dear. This very beautiful wood is called by the Natives Kuloumidvie. Thumberg was inclined to believe that this was the true Ebony, but Koenig afterwards discovered that to be a different tree.—*Ain's. Mat. Med. p.* 211.

(2271) CALAMBUCO. The name of one of the best timber-trees of the Philippine Islands, the wood of which is largely employed by the natives in the fabrication of domestic utensils and agricultural implements.—*Crawfurd Dic. p. 79.*

(2272) CALAMINA PREPARATA, Zinci Carbonas impurum præparatum. Prepared Calamine.—Burn *Calamine* with a red heat, triturate and reduce to a very fine powder, as directed for Chalk. By the process of roasting, some of the Carbonic acid and water are expelled, and a portion of Oxide of Zinc is formed. The mass being subjected to elutriation, it is often, like Chalk, prepared in little conical masses. It usually contains many impurities, as Oxide of Iron and other metals, and is adulterated with Sulph. Baryta, Carb. Lime, &c. Much of the Calamine of commerce has been shown by Dr. R. D. Thomson and Mr. Murdoch to contain no Zinc, but to be Sulph. Baryta coloured with Armenian Bole. *Uses.* A dessicant powder for excoriations in children.—*Royle.*

(2273) CALAMPELIS. Bignoniaceæ,—C. Scabra.—This plant is of much beauty, well adapted for training on trellis-work, the orange coloured flowers being very showy; any light loamy soil suits it.—*Riddell.*

(2274) CALAMUS. A genus of palm trees, indigenous to Asia, and abounding in the islands of the Indian Archipelago, as well as in the Malayan peninsula. Martius enumerates fifty-two species, but the total number is not known. All the species are spreading shrubs or small trees, erect or often climbing to a considerable height. They furnish the "Dragons-Blood," "Malacca-Canes," and "Ratans of Commerce."—*Seeman.* Although a genuine palm, yet from the slender stems and its general habit, it has more the look of some tall grass, and has been considered as one of the links in the chain of organisation which connect the Grasses with the Palms. The species are principally found in the hotter parts of the East Indies, where they grow in the forests, climbing over trees and bushes to a greater extent than any other known plants. The stem of *Calamus verus* is described as being 100 feet long, that of *C. oblongus* 300 to 400 feet, of *C. rudentum* upwards of 500 feet, and of *C. extensus* as much as 600 feet; Rumphius even states that one kind attains the extraordinary length of 1200 feet (vol. v. 100). It is closely covered over by the tubular bases of the leaves, through which it is drawn by the cane-gatherers when green; afterwards it is dried in the sun, and then is ready for the market. These canes are extensively used for the sake of the hard flinty coating of their stems, which are readily split into strips, from which the bottoms of chairs and similar articles are manufactured. It is not possible to say from what particular species the canes of the shops are obtained, it being probable that many are gathered indiscriminately; *C. rotang* has however been said to furnish the stouter, and *C. Scipionum* the slenderer sorts. The flesh that surrounds the seeds of this genus is a delicate article of food; limpid water flows from the stems when cut through; and the young shoots of some of them, while still tender, are roasted or boiled, chopped small, and, being fried with pepper and gravy, are said to furnish a very delicate dish. Several species are copiously

described in Rumphius 'Herbarium Amboinense,' (vol. v.) under the name of Palmijuncus. Dragon's Blood or Djurnang, is the produce of a species of Calamus. Those which chiefly yield it are the *C. petræus* (Lour.) *C. rudentum* (Lour.), *C. verus* (Lour.), and *C. draco* (Willd.), of which the last three were by Linnæus reckoned mere varieties of the *C. rotang* (Linn.) They are natives only of Hindustan, Cochin China, and the Moluccas. The ripe fruits are covered with a reddish-brown dry resinous substance, which is the Dragon's Blood. In this state they are collected, and allowed to remain in rice-mills till the resin drops off. The resin is afterwards melted, either by the natural warmth of the air or by artificial heat, and then moulded into the different forms in which it occurs in commerce. Another mode of obtaining it is as follows:—The ripe fruits are shaken in bags, and the resin so obtained is formed into pieces about the size of a bean, which are then wrapped up in leaves; this kind is much prised in the East Indies. A second sort is procured by throwing together the fruits after they have been treated in the foregoing manner, melting them in the sun or with a slow fire, and collecting what exudes, which is then formed into small four-cornered cakes. A third sort is obtained from what remains after the two foregoing processes, being run out and formed into round cakes, which contain hard portions of the fruit. According to other accounts, the finest sort is procured by exposing the fruits to the vapour of boiling water, and scraping off the soft resin as it exudes.—*Eng. Cyc. page* 713. As before observed, the species of *Calamus*, yielding the different kinds of Cane, have little of the appearance of Palms, are usually remarkable for their weak and trailing stems, which often extend to a great length, and ascend the loftiest trees. It is these long stems, which, when divested of their sheathing leaves, form the canes of commerce—some so much admired as sticks; others for their flexibility, conjoined with tenacity. These, when their smooth and shining dense outsides are separated in strips, are universally employed for *caning* the bottoms of chairs, of couches, and for other articles. Some are occasionally twisted into ropes, in the localities where they are indigenous: but they are more generally employed, as sticks, and for mat-making and cane work, as their great strength admits of such narrow strips being employed, as to allow of large spaces being left, and thus enables strength to be combined with lightness and free ventilation. The species of Calamus abound in the Islands of the Indian Archipelago, as well as in the Malayan Peninsula. A few species are found within the Madras territories, but in India they chiefly abound in the forests of the districts of Chittagong, Silhet, and Assam, whence they extend along the foot of the Himalayas as far north as the Deyra Doon, where a species is found which the late Mr. Griffith has named *C. Royleanus*, and applied the name of *C. Roxburghii* to the plant which Dr. Roxburgh called *C. Rotang* common in Bengal and on the Coromandel Coast. Both are called *bet*, and used for all the ordinary purposes of cane; as are *C. tenuis* of Assam, *gracilis*, *extensus*, and others. *C. Scipionum* of Loureiro, Mr. Griffith considered to be the species which yields the well-known Malacca Cane, but the plant does not appear about Malacca. He was, however, informed that the canes are imported from Siak, on the opposite coast of Sumatra. The extensive uses to which Canes are applied, both in their entire and split state, are well known. They are abundant in all the moist tropical parts of the East, both on the continent and in islands. In Java, the cane is cut into fine slips, which are platted into excellent mats, or made into strong, and at the same time, neat baskets. In Japan, all sorts of basket-work are made of split cane, and even cabinets with drawers. Cane is also platted or twisted into cordage, and slender fibres are made to answer the ordinary purposes of twine. It is stated that in China, as also in "Java and Sumatra, and indeed throughout the Eastern islands, vessels are furnished with cables formed of cane twisted or platted. This sort of cable was very extensively manufactured at Malacca." The species employed for this purpose is probably the *Calamus rudentum* of Loureiro, which this author describes as being twisted into ropes in these Eastern regions, and employed, among other things, for dragging great weights, and for binding untamed elephants. So Dampier says: "Here we made two new cables of rattans, each of them four inches about. Our captain bought the rattans, and hired a Chinese to work them, who was very expert in making such wooden cables. These cables I found serviceable enough after, in mooring the vessel with either of them; for when I carried out the anchor, the cable being thrown out after me, swam like cork in the sea, so that I could see when it was tight; which we cannot so well discern in our hemp cables, whose weight sinks them down—nor can we carry them out but by placing two or three boats at some distance asunder, to buoy up the cable, while the long boat rows out the anchor." The tow-ropes mentioned by Marco Polo as used by the Chinese for tracking their vessels on their numerous rivers and canals, seem also to have been made of cane—and not of bamboo, as sometimes stated—as they were split in their whole length of about thirty feet, and then twisted together into strong ropes some hundred feet in length. Mr. G. Bennett says, in his 'Wanderings,' ii, p. 121, that he "remarked some Chinese one morning near Macao, engaged in making some very durable ropes from rattan. The rattans were split longitudinally, soaked, and attached to a wheel, which one person was

keeping in motion, whilst another was binding the split rattans together, adding others to the length from a quantity he carried around his waist, until the required length of the rope was completed." Though apparently insignificant, Canes yet form a considerable article of commerce, inasmuch as in some years between four and five millions of them have been exported from the territories under the government of the East India Company. Though not employed for their fibres, yet, as connected with the different kinds of the genus Calamus, we may mention the different Canes which are imported. Most of them are produced by species of Calamus. The walking sticks called "Penang Lawyers" are the stems of a small Palm called *Licuala acutifida*. The Ground Rattan is distinguished by its straight head and straight and stiff character altogether, as well as by its pale colour; though some are at least an inch in diameter, and others not half that thickness. Some are distinguished by a hard, and others by a soft bark It is not known whether the slender are of the same species as the thicker kinds, growing in different situations, or from roots of different ages, but *Rhapis flabelliformis* is said to yield the Ground Rattan. The Malacca Cane is supposed to be produced by *Calamus Scipionum*, said to be imported from Siak, on the coast of Sumatra. Some of these are simply mottled or clouded, others of a brown colour, in consequence, it is said, of their having been smoked. The more slender specimens of these, with the longest internodes, are those most highly valued. The most common kind of Cane, that employed for caning chairs, &c., is known in commerce by the name of Rattan Cane. This must be yielded by a variety of the long trailing species which abound wherever the genus is found. The most northern one, *Calamus Royleanus*, no doubt yields the Rattans collected in the Deyra Doon, while *C. Roxburghii* doubtless yields those collected in more southern latitudes. But it is probable that a variety of species yield the thin Rattans of different localities, and some of which have already been mentioned. Another kind of Rattan is called Dragon Cane. This is thicker than the last, both light and dark coloured, with long internodes and a hard bark, less flexible than the common Rattans, but strong, springy, and much valued. A variety, with soft bark, is called Manilla Dragon Cane. Other kinds of Canes, imported from China, are known, one with stiff stems and large knots by the name of *Jambee*, and one as *Whanghee*. This has a pale, hard bark, and flexible stems, with internodes of about an inch and a half or two inches, and a number of little holes at the knots. Some, which are occasionally called Canes, are produced by species of Bambusa, Saccharum, and other grasses. *Calamus Draco*, a native of Sumatra and the Malay Islands, yields, as a natural secretion of its fruit, the best D'jurnang or Dragon's blood, which has been an article of commerce from the earliest times, and still continues in demand.—*Royle Fib. Pl.*

(2275) CALAMUS ARBORESCENS. An arboreous species of ratan common in the jungles. Griffith justly terms it "a very elegant palm."—*Mason.*

(2276) CALAMUS DRACO. Dragon's blood plant. The resin called Damoolukwain, *Hind.* A native of the Indian archipelago, also in the forests of Tenasserim: the natives call it "Red ratan," it produces a red exudation like dragon's blood.—*Mason.* It is little known in the Peninsula of India. The plants when young are elegant, and resemble small palm trees, after which they become scandent and overrun any neighbouring trees. The fruits are fleshly, red, astringent, and yield the resin called *Dragon's blood.* It is of much more importance in the arts than in medicine, being chiefly used as an ingredient in varnishes and paints. In commerce, it occurs in powder, grains, masses, drops the size of an olive, and in sticks enveloped in the leaf of the talipot palm.—*O'Shaughnessy, page* 642.

(2277) CALAMOSAGUS LACINIOSUS, RATAN SAGO PALM. The sago palm has not been discovered in the Tenasserim Provinces, but Griffith describes a palm from the Mergui Islands, which he named the ratan sago palm. "It appears," he says, "to be osculant, between calamus, sagus, and zalacca, having the habit of the former, the inflorescence of the second, and in some measure the seed of the last genus:" so that while it resembles a ratan, it has flowers like the sago palm.—*Mason.*

(2278) CALAMUS ROTANG. BEN BET, *Hind.*—This plant has been introduced from the Moluccas, and is the well known Rattan plant. It is called the marsh date, the leaves are used at Cuddapah for making ropes and mats: this may be the ground rattan, or *Calamus rotang* which grows abundantly in marshy ground, and bears leaves resembling those of the date.

(2279) CALAMUS RUDENTUM. MOTIE BET, *Hind.*—This is a larger species, and is found in some of the gardens of the Deccan.

(2280) CALAMUS VIMINALIS. RATTAN FRUIT.

Perupum pullum, TAM.	Betta pundoo, TEL.
Bete ka pull, DUK.	Vetra, SANS.

This fruit hardly deserves a place here, it grows in the woods and is eaten by the common people.—*Ainslie, p.* 231.

(2281) CALUMBA, COCCULUS PALMATUS, *Dec.* The Calumba Plant. *Diœcia Hexandria*, Linn. Calumba-root was first made known as a medicine by F. Redi about 1677. Semedus mentioned it before 1722 among medicines from

India. In works on Materia Medica in use in India, it occurs by the name of *Kalumb*. Dr. Berry first ascertained that it was the root of a plant (of which he figured the male) inhabiting the forests on the coast of Mozambique and Oibo in Eastern Africa, but where it is never cultivated. Sir W. Hooker in 1830 described and figured both male and female plants, from plants introduced by Capt. Owen into the Isle of France. Figs 39 and 40. Calumba-root is sometimes adulterated with American or False Calumba, of which the infusion becomes dark green with the Sesquichloride of Iron; also with Bryony-root, which is distinguished by a permanent bitterness of taste with acridity.

(2282) CALCAREOUS SPAR, crystallized native carbonate of lime, of which the primitive form, as it occurs in *Iceland spar*, is an obtuse rhomboid of 105° 5' and 74° 55' Its specific gravity is 2·72. The secondary forms are more numerous than those of any other substance. Bournon in his *Traite de Mineralogie* has described and figured 680 modifications of this mineral—*Tomlinson, page* 265. But under this term it is usual to include only those varieties of Carbonate of Lime which occur in distinct individual crystals of the rhombohedral system, the name never being used to denote Arragonite, or any crystals of carbonate of lime belonging to the prismatic system; nor is it usual to apply it to those more or less crystalline limestones of which marble is the purest variety, where each crystal is so embedded in the mass as to have lost all individuality. The following are the names of the more common varieties of Calcareous spar:—Iceland spar, Satin spar, Chalk, Rock Milk, Calcareous Tufa, Stalactites, Stalagmite, Limestone, Oolite, Pisolite, Argentine, Fontainbleau Limestone, white and clouded Marbles, Statuary Marble, compact Limestone, Stinkstone, Anthraconite, Plumbo Calcite, Mineral Agaric, &c.—*Eng. Cyc. page* 717. Calc. Spar is found in many parts of India, and the following article merits attention. Sir,—I have the honor to inform you that I have this day forwarded per banghy to you a specimen of limestone found at Sankerydroog 25 miles S. W. of Salem. It requires a much greater heat to burn it than the ordinary kinds of limestone and is generally burnt by the natives of this part in small circular kilns with a jungle shrub named ஆவாரஞ்செடி which burns with a great heat. When burnt it is much whiter than the general chunam and takes a most beautiful polish, and is therefore much used for the last coat of plaster in houses &c.giving the appearance of the whitest marble when polished. A great quantity is burnt in Sankerydroog and sent to Salem and other parts of this Collectorate for eating with betel, as betel eaters hold it in great esteem owing to its piquant flavor. I am sorry to say that my maistry was not successful in getting any stone at Curpor likely to answer for Lithography, but I intend visiting the spot myself next week in order to see if I can find any. (Sd.) C. Wilkieson, Lieut., A. Civ. Eng. 5th Division.

(2283) CALCEDONY.

Akeek, Guz. and Hind.

A species of agate of a uniform colour, generally of a milky white or pale yellow, often with an internal wavy structure. Localities, Faroe island, Iceland, Great Britain, Cambay, &c. This one of the inferior gems, is abundant in Cambay, and in the amygdaloid trap of the Dekhan. Calcedony, is so called from having been early found at Calchedon (sometimes incorrectly written chalcedon) in Bithynia opposite Constantinople. It is of a uniform colour, generally of a milky white or pale yellow, like turbid jelly, often with an internal wavy structure in the form of stalactites, and very generally with a peculiar mammillary surface. It is found in great abundance in the Faroe Islands, in Iceland, in Cornwall, and many places of Great Britain, as well as other countries; sometimes in large masses, from which cups and other vessels are formed. Pliny describes it as being found in the neighbourhood of Thebes in Egypt, and as brought to Rome from Carthage.

(2284) CALCEOLARIA. Scrophulariaceæ. These are both shrubby and herbaceous plants, they thrive best in a light rich loamy soil and may be cultivated both by seed and cuttings. The hybrids raised from this genus are very numerous and showy, the colours are chiefly purple, orange, yellow, and spotted.—*Riddell.*

(2285) CALCULUS CYSTICUS.

Koroshanum, Tam.	Gauzereh, Pers.
Gyroon, Duk.	Biliary Calculus of a Cow.
Hejrulbuckir, Arab.	Gorochana, Sans,

Koroshanum, or Korashaaum, is the Tamul name given to those biliary concretions occasionally found in the gall bladder of Cows or Bullocks in India. They are generally contained in a little bag, which holds two or three small ones, each about the size of a tamarind stone, or one large one, as big as a marble. They are of a bright yellow colour, and are considered by the Native practitioners as highly valuable in certain indispositions of young children, owing to their cordial and alexipharmic qualities. A piece about the bigness of a mustard seed, is commonly given for a dose to a babe of two months old, in conjunction with an infusion of ஓமம் Womum or சீரகம் Siragum. This substance is also used together with கடுக்காய் Kadukai and மாச்சக்காய் Machakai, in preparing a mixture for cleansing the inside of the mouths of new-born infants. The Vyteans prescribe a solution of it in warm ghee, to be poured up the nose in cases of nervous head-ache, and they administer it too, in தோஷம் Doshum, (Typhus Fever), made into a draught with women's milk.—*Ains. Mat. Med. page* 85.) *See* Bezoar.

(2286) CALDERA BUSH, Pandanus odoratissimus.

Mogali, Tel.

This valuable bush, or another species, furnishes material for the sugar bags of the Mauritius; the leaves also contain fibres that might be applied to many useful purposes: the droops from the stem are a mass of tolerably fine fibres: and with the ends beaten out are used by plasterers for brushes: the fibre is used for lines and cordage, and the plant itself makes good fences near the sea; but it soon becomes straggling. —*Rhode M.S.S*

(2287) CALAMBEG, or Calambao, sometimes called Aloes-wood, is the Agallochum of the ancients, and the Agila or Eagle wood of the moderns. It is produced in Siam and Silhet by Aquilaria Agallocha.—*Royle, Illustr. p.* 171.

(2288) CALENDERING, Mora, *Tel.* a term said to be corrupted from *cylindering*, and signifying the finishing process in Europe in the manufacture of cotton or linen goods, by which they are passed between *cylinders* or rollers, and made of a level and uniform surface. The starch used in calendering is made from flour, deprived of gluten by fermentation in water, in the proportion of a pound of flour to a gallon of water. The whole is passed through a sieve after fermentation, and this separates the bran. The flour is then boiled, and a small quantity of indigo added, to give it a blue colour, after which more water is added, according to the degree of stiffness to be given to the goods. This liquid is frequently thickened with porcelain clay, or calcined plaster of Paris, or both, in order to give an appearance of strength and thickness to the cloth. This all disappears as soon as the goods are washed; therefore, it merely makes them more attractive to the eye of the purchaser. The practice was originally deceptive; but it can scarcely be called so now that it is generally adopted, and is perfectly well known to the great majority of buyers.—*Tomlinson, page* 273. In India, an appearance similar to that produced by Calendering is given to goods particularly to such chintzes as were intended for the Persian market by beating them and then rubbing them on a board with a shell slightly waxed. The texture is no doubt injured by it. The coarse cloths formerly largely exported were beaten with a heavy block on a log of wood before being made up in bales.—*Rhode M.S.S.*

(2289) CALICO.

Kattun, Dan.	Chaelwarree, Pers.
Katoen, Dut.	Baweluika, Pol.
Coton, Toile de coton, Fr.	Pano de Algodao, Port.
Kattun, Ger.	Wuboika, Rus.
Tela bambagina, Tela di pinta, It.	Tela de Algodon, Sp.
	Cattun, Sw.

White or plain cotton cloth. The name is known to have been derived from Calicut on the Malabar Coast, whence it was first taken to Great Britain. It is now brought to India from England.—*Faulkner.*

(2290) CALICO-PRINTING. The art of producing a coloured pattern on cloth by the application of colouring substances appears to be of great antiquity. In India the art of calico-printing has been practised for ages, and it derives its English name from *Calicut*, a town on the Malabar Coast, where it was formerly carried on extensively. The large cotton chintz counterpanes, called *pallampoors*, which from an early period have been made in the East Indies, are prepared by placing on the cloth a pattern of wax, and dyeing the parts not so protected. Printed goods which half a century ago were sold for 2*s.* 3*d.* per yard, may now be had for 8*d.* or less; and a cotton print, sufficient for a complete dress, may be had for 3*s.* or 4*s.*, or less. It is stated by Mr. M'Culloch, as an example of the prodigious increase of calico-printing, that in 1829, before the abolition of the duty, 89,862,433 yards of all descriptions of printed goods were exported; whereas in 1841, there were exported of printed cottons alone, 329,241,892 yards, of the declared value of £7,772,735. The object of colico-printing is to apply one or more colours to particular parts of cloth, so as to represent a distinct pattern, and the beauty of a print depends on the elegance of the pattern, and the brilliancy and contrast of the colours. The processes employed are applicable to linen, silk, worsted, and mixed fabrics, although they are usually referred to cotton cloth, or calico. There are various methods of calico-printing, the simplest of which is block-printing by hand, in which the pattern or a portion thereof is engraved in relief, upon the face of a block of sycamore, holly, or pear-tree wood, backed with deal, and furnished with a strong handle of box-wood. A machine called the *Perrotine*, in honour of its inventor, M. Perrot of Rouen, is in use in France and Belgium as a substitute for hand-block printing. Copper-plate printing similar to that used in the production of engravings has also been applied to calico-printing. The invention of *cylinder* or *roller-printing*, is the greatest achievement that has been made in the art, producing results which are truly extraordinary: a length of calico equal to one mile can by this method be printed off with four different colours in one hour, and more accurately and with better effect than block printing by hand. Another method of calico-printing remains to be described, namely, *press-printing*, by which several colours can be printed at once. The cloth to be printed is wound upon a roller at one end of the machine, and the design, which is formed in a block of mixed metal about 2½ feet square, is supported with its face downwards in an iron frame, and can be raised or lowered at pleasure. The face of the block is divided into as many stripes,

ranging crossways with the table, as there are colours to be printed. The colours used in calico-printing are derived from all the three kingdoms of nature, but it seldom happens that solutions, infusions, or directions of these colours admit of being applied at once to the cloth without some previous preparation, either of the cloth itself, or of the colouring material. It is often necessary to apply some substance to the cloth which shall act as a bond of union between it and the colouring matter. The substance is usually a metallic salt, which has an affinity for the tissue of the cloth as well as for the colouring matter when in state of solution, forms with the latter an insoluble compound. Such a substance is called a *mordant*, (from the Latin *mordere*, to bite,) a term given by the French dyers under the idea that it exerted a corrosive action on the fibre, expanding the pores, and allowing the colour to be absorbed. The usual mordants are common alum and several salts of alumina, peroxide of tin, protoxide of tin, and oxide of chrome. These have an affinity for colouring matters, but many of their salts have also a considerable attraction for the tissue of the cloth, which withdraws them to a certain extent from their solutions. Mordants are useful for all those vegetable and animal colouring matters which are soluble in water, but have not a strong affinity for tissues. The action of the mordant is to withdraw them from solution, and to form with them, upon the cloth itself, certain compounds which are insoluble in water. Although the different methods of printing are numerous, and the combinations of colours and shades of colour almost infinite, yet each colour in a pattern must, in the present state of the art, be applied by one of six different *styles* of work. These are termed. 1, the Madder style; 2, Printing by steam; 3, the Padding style; 4, the Resist style; 5, the Discharge style; and 6, the China-Blue style. By the proper combination of two or more of these styles any pattern however complicated is produced. The processes actually required for finishing a piece of cloth are numerous, as for example, in producing a red stripe upon a white ground, the bleached cloth is submitted to nineteen operations, as follows:—1. Printing on mordant of red liquor, (a preparation of alumina,) thickened with flour, and dyeing; 2. Ageing for three days; 3. Dunging; 4. Wincing in cold water; 5. Washing at the dash-wheel; 6. Wincing in dung-substitute and size; 7. Wincing in cold water; 8. Dyeing in madder; 9. Wincing in cold water; 10. Washing at the dash-wheel; 11. Wincing in soap-water containing a salt of tin; 12. Washing at the dash-wheel; 13. Wincing in soap-water; 14. Wincing in a solution of bleaching-powder; 15. Washing at the dash-wheel; 16. Drying by the water extractor; 17. Folding; 18. Starching; 19. Drying by steam.—*Tomlinson, page* 282. The art of *Calico-printing* is one which was common to the Egyptians and Indians, and is still largely practised by the latter, and with a skill which in 1851, produced much to be admired even in the midst of the productions of the world, and after so many attempts have been made to improve an art certainly imported from the East. Pliny was acquainted with the wonderful art by which cloths, though immersed in a heated dyeing liquor of one uniform colour, come out tinged with different colours, and afterwards could not be discharged by washing. The people of India were found practising the art when first visited by Europeans. The mordaunts they apply both by pencils and by engraved blocks, though it has been said that the former method was the only one employed. Blocks are however used throughout India, but silk handkerchiefs, some exhibited by Mr. Warrington, to show the different stages of dyeing as practised in India, had the parts where the round spots were to be, tied up with thread so as not to be affected by the dye-liquors. The cloth-printers at Dacca stamp the figures, on cloth which is to be embroidered. The stamps are formed of small blocks of kantul (*artocarpus*) wood, with the figures carved in relief. The colouring matter is a red earth imported from Bombay, probably the so called "Indian earth" from the Persian Gulf. Though the art is now practised to much perfection in Britain the Indian patterns still retain their own particular beauties, and command a crowd of admirers. This is no doubt due in a great measure to the knowledge which they have of the effects of colours, and the proportion which they preserve between the ground and the pattern, by which a good effect is procured both at a distance and on a near inspection. *Printing in Gold and in Silver* is a branch of the art which has been carried to great perfection in India, as well upon thick calico as upon fine muslin. The size which is used is not mentioned, but in the Burmese territory the juice of a plant is used, which, no doubt, contains caoutchouc in a state of solution.—*Royle, Arts &c. of India, p.* 483. The well-known imitations of Bandana handkerchiefs, white figures formed on a ground of Turkey-red are by means of an aqueous solution of chlorine. This is made to flow down through the red cloth in certain points which are defined and circumscribed by the pressure of hollow lead types inserted into plates of lead contained in a hydraulic press. The press is furnished with a pair of pattern plates, one attached to the upper block of the press, and the other to the movable part of it. From twelve to fourteen pieces of cloth previously dyed in Turkey-red are stretched over each other as evenly as possible, and then rolled round a drum. A portion of the fourteen layers equal to the area of the plates being drawn through between them, the press is worked, and the plates are brought together with a force of upwards of

300 tons. The solution of chlorine is then allowed to flow into the hollows of the upper lead plate, whence it descends on the cloth and percolates through it, extracting the Turkey-red dye, the intense pressure preventing the bleaching liquor from spreading beyond the limits of the figures perforated in the plates. When a certain quantity of bleaching liquor has passed through, water is admitted in a similar manner to wash away the chlorine. The pressure is then removed, and another square of the fourteen layers is moved forward under the plates, and the process is repeated. When all the pieces have been discharged, they are winced in water, and further treated so as to improve the lustre both of the white and of the red.—*Tomlinson, page* 284.

(2291) CALLICARPA CANA (VERBENACEÆ). Aroosha Fibre of Chittagong. The family of plants to which the above belongs is not remarkable for any fibrous bark, but it is so from the great diversity of appearance in the plants placed in it, inasmuch as it includes the lowly Vervein and the lofty Teak. Mr. Sconce, when at Chittagong, had some of the fibres of this plant, which he says is there called Aroosha, prepared, first by cutting the stems, which grew three or four feet high, and then steeping. The inner bark was then easily stripped off. This was afterwards heckled, and a portion of the fibre spun into thread, but it does not appear of much value in a country where so many others abound. Capt. Thompson reports that a line made from the fibre forwarded from Chittagong, broke at once, without stretching, with only 127 lb.; though only the finest and largest of the material was made into this line. A line of Russian Hemp of the same size will sustain with ease 400 lb.; so that this fibre is much too weak for either sail-cloth or cordage. It however possesses all the free and kindly nature of flax, and even smells like Flax. It is easily worked, with little or no waste, and he thinks must have been prepared with vegetable oil."—*Royle, Fib. Pl. p.* 310.

(2292) CALLICARPA LANATA, Roxb. bitterish and rather aromatic.—*O'Sh. p.* 456.

(2293) CALLICHROA. *Compositæ.*—C. Platyglossa.—This is a border flower, yellow with a broad ray, requiring a good soil and should only be watered by the hand, it seldom exceeds a foot in height.—*Riddell.*

(2294) CALONYCTION ROXBURGHII. *Ipomæa grandiflora.*

Chandnee, Hind.

A large flowered species of ipomea whose snowy blossoms open at sunset and shut at daylight is sometimes seen carried over arbours and pandals on the Tenasserim Coast. It is

> ——"the white moon-flower, such as shows
> On Serendib's high crags to those
> Who near the isle at evening sail
> Scenting her clove trees in the gale."—*Mason.*

(2295) CALONYCTION SPECIOSUM. Another species with the same English name is occasionally seen in European gardens, in Tenasserim.—*Mason.*

(2296) CALOPHYLLUM (from καλός, beautiful, and φύλλον, leaf), a genus of plants belonging to the natural order Guttiferæ.—*Engl. Cyc. page* 723. In the Tenasserim Provinces, house carpenters often use the timber of a species of calophyllum, and this tree also furnishes spars. A species of Calophyllum, Poona marum, is a large tree common on the western Ghauts of Peninsular India. Its wood is much used in house and to same extent in ship building.—*McIvor.*

(2297) CALOPHYLLUM ANGUSTIFOLIUM is the Piney-Tree of Penang, yields a hard timber.—*Engl. Cyc. page* 728.

(2298) CALOPHYLLUM, CALABA.

Calaba Tree.

This is a native of Travancore, and produces true East India tacamahaca resin. This resin is rarely met with: it is yellow, translucent, adhesive, of acrid taste, and pleasant aromatic smell.—*O'Shaughnessy, page* 238. The Calaba-tree, has obovate or oblong, obtuse or emarginate leaves; hermaphrodite or male flowers; lateral very short racemes. This plant is a tree 60 feet in height, and is a native of the Caribbee Islands. It has white, sweet scented flowers, and a green fruit something like the cornelian cherry, which contains a white solid kernel. An oil is expressed from the seed for domestic uses and for burning in lamps. The timber is used for various purposes especially for staves and cask-headings. Lindley says that the commercial product known as "the true East Indian Tacamahaca is produced by the Calophyllum calaba." There are, however, several gums brought into the market under the name of Tacamahaca, of which formerly more was used than at the present day. The 'Tacamahaca seu Resina Tacamahaca' of the old Pharmacopœias appears to have been the produce of the *Elaphrium tomentosum* and *E. excelsum*, plants belonging to the natural order Amyrideæ. It is described as a resin of a brownish yellow colour, spotted with white, easily broken into pieces, which have a shining fracture, easily melting in the fire, and having a pleasant scent. Cullen says that it was not employed in his day "as an internal medicine; and as an external I cannot perceive its virtues." It was used for making plasters as a counter irritant, for which there are forms in the continental Pharmacopœias at the present day. There is however another form of Tacamahaca-in-Shells? It has got this name from being collected in little gourd-shells. This is the true East Indian Tacamahaca, which is collected from *C. Inophyllum* in the East Indian Islands and from *C. Tacamahaca* in Madagascar and the Mauritius. *C. Brasiliense* yields an acrid aromatic lemon-scented resin.—*Eng. Cyc. p.* 723.

(2299) CALOPHYLLUM INOPHYLLUM.

Guttiferæ, Icon. 77.

Alexandrian Laurel, ENG.	Ponna chettoo. TEL.
Pinnay marum, TAM.	Sultana champa, HIND.
Wooma mara, CAN.	

The beauty of the leaves has given name both to the genus and species—Calophyllum, *handsome leaf*, and Inophyllum, *fibre leaf*, "because the middle nerve of the leaf seems to ramify into a multitude of fibres;" while the flowers are in elegant white bunches, and very sweet scented. —*Mason*. Calophyllum *inophyllum* has oblong or obovate obtuse leaves, usually emarginate; round branches; loosely racemose flowers; racemes axillary, 1-flowered; usually opposite peduncles. This tree is a native of the East Indies, and often attains a height of 90 or 100 feet. It has large handsome leaves like those of a water-lily, snow-white fragrant flowers, and a fruit about the size of a walnut.—*Eng. Cyc. p* 723. The Alexandrian Laurel, grows to a considerable size on the Malabar Coast, but is a still larger tree on the island of Balambangam and along the shores of Banguey and Sampanmangio where it has got the names of Palo-Maria and Dancawn. *Ainslie*. It occurs in all parts of India, and is in flower and fruit most part of the year. The tree is worthy of attention, as it grows well in sandy tracts close to the sea, where few others thrive, it is rare at a distance from the Coast. In the alpine forests, it attains a great size and it is said furnishes the poon spars so valuable for shipping; so far as Dr. Wight can learn, there are two or three species of calophyllum used for the same purpose under the general name of poon.—*Wight*. It is a common plant in Malabar, where it yields fruit twice a year, in March and September, and frequently attains the age of 300 years. It is cultivated in Java for the sake of its shade and the fragrance of its flowers.—*Eng. Cyc*. It is also common in the Philippine islands, where the natives prepare oil from the fruit of it in the same manner as is done in Malabar.—*Ainslie*. Near the Burman monasteries, this fragrant flowered species of Calophyllum is occasionally seen in cultivation, and is a remarkably handsome tree.—*Mason*.

The flower.

Pinnay poo, TAM.	Ponna poo, TEL,
Surpunka phool, HIND.	Poonaga, SANS.

This fragrant and delightful white flower is the produce of this most beautiful tree. It is held in great veneration by the Hindoos who offer it at the shrines of both Sheva சிவன் and Vishnu விஷ்ணு.—*Ains. Mat. Med. p.* 159.

The oil.

Pinnacottay TAM.	Pinnay yennai, TAM.
Poon-seed Oil, ENG.	Pinnay noona, TEL.
Calophyllum inophyllum,	Surpun ka Tael, HIND.

The seeds or berries contain nearly 60 per cent. of a fragrant, fixed oil, which is used for burning as well as for medicinal purposes, being considered a cure for the itch. As commonly prepared, it has a dark green color. It is perfectly fluid at common temperatures, but begins to solidify when cooled below 50 degrees.—*Simmonds' Com. Products, p.* 5 3. It is the fresh seeds when shelled, and subjected to pressure which yield this dark green oil. Old seeds yield a higher colored and thicker product. In the year 1847-48, Galls. 3,871 of the oil, and cwt. 508 of the seeds, were shipped from Madras chiefly to Ceylon and the Straits. It has now ceased to be an article of export. In Tanjore 437 acres producing on an average 24⅝ collums per acre of seed are covered with this tree: this yields 267¼ maunds of oil at Rs 20-4 per maund. In Tinnevelly, it costs As. 4-8 and Trichinopoly As. 4 per seer. In Tanjore, it is used for lamps, and for caulking vessels, but it appears to be chiefly valuable as a medicine. It is seldom procurable in the bazar, but is expressed when required at the Madras Exhibition of 1855, excellent samples were shown by Mr. Kohlhoff, from Tinnevelly and Travancore, the Tanjore Local Committee, Cochin and Madras:—Also from Canara, under the name of "Honay," from Goa by the name of "Oleum unda," from Cochin called "Perun Poonak," and from Masulipatam. When the trunk of this tree is wounded it exudes a yellow viscid juice, which frequently hardens to the consistence of a gum.—*Eng. Cyc*. And according to Dr. O'Shaughnessy, the roots yield a resin, deemed the same as the Bourbon *Tacamahaca*. The balsam seems analogous to myrrh, and is useful in indolent ulcers—*O'Sh*. The bark and the exudation are used for medicinal purposes.—*Eng. Cyc. page* 723. The seeds are bitterish. In Java the tree is said to be diuretic.—*O'Sh*. This large tree is common on the Western Ghauts where the wood is much used in house, and to some extent in ship building. The wood is coarse grained, strong, durable and ornamental. Mr. Dalrymple tells us, that no tree is superior to this for knees and crooked timber.—*Ainslie*.

(2300) CALOPHYLLUM LONGIFOLIUM

Thar-rabee, BURM.

In Pegu this is found near towns, together with two other species of the same genus, which are of smaller growth. Its wood is red, and adapted to cabinet making. The *Calophyllum longifolium*, from its size, may be reckoned among the timber trees of the province. It affords an oil-seed, which would yield an oil probably similar to that of *C. inophyllum*, which is known in Madras as *Pinnacotay oil* (*vide* list of oil-seeds circulated for information by the Madras Government, November 1854.) This tree, together with *C. inophyllum* and *C. lanceolaria* is cultivated for the fragrance

of its flowers. The seeds are large and contain a considerable proportion of oily matter, which possesses much of the aroma of the flower.—*McClelland.*

(2301) CALOSANTHES INDICA, *Bignoniaceæ*, Icon. 1337. Pana woodachie marum, *Tam.* Said to be a very soft and juicy wood, of no value.

(2302) CALOTROPIS.

Arka and Akund, SANS.	Ashur. ARAB.
Ak, Mudar, and Muddar, HIND.	Yercum, TAM.
	Tamella Jilladdoo, TEL.

In the Southern, as in the Northern parts of India, there is met with in considerable quantities in all uncultivated, and encroaching even on cultivated grounds, two species *Asclepias* now *Calotropis gigantea*, and *C. Hamiltonii* (*Asclepiadeæ*) of a plant with broad, rather fleshy, glaucous-coloured leaves; and which, on being wounded, gives out a milky juice from every part. The former of these is called *Ak* and *Mudar* in Northern, and *Yercum* in Southern India. Its juice and the powdered bark of its roots, have long been employed as an alterative, by the natives of India, in leprosy and other cutaneous affections, and are no doubt possessed of active properties. Dr. Duncan obtained from it a principle which he called *Mudarine*. In Arabic authors on Materia Medica it is even supposed to have been known to the Greeks. It has long been famous for yielding a kind of Manna, which is called *Sukkur-al-ashur*, and *Ak* or *Mudar ke shukur* (sugar). ('Himal. Bot.,' p. 275.) Lately its milky juice has been collected by making incisions into the plant, and prepared as a substitute for Caoutchouc and Gutta Percha. (*v.* 'Journ. of the Agri-Hortic. Soc. of India,' viii, pp. 107 and 226.) Dr. Riddell calculated that ten average sized plants will yield as much juice as will make a pound of Gutta-Percha-like substance. This is evaporated in a shallow dish, either in the sun or in the shade; when dry, it may be worked up in hot water with a wooden kneader, as this process removes the acridity of the gum. It becomes immediately flexible in hot water, but is said to become hard in cold water, and is soluble in oil of turpentine, takes impressions, and will no doubt prove a valuable product, either alone or mixed, with other substances. It is however a conductor of electricity. Mr. Moncton, C. S., has proposed making use of the downy substance contained in the follicles of the Mudar: and, indeed, has had paper made of it, as well pure as when mixed with two fifths of the pulp of the Hemp (Sunn ?), such as the natives use for making paper. As the glossy and silky, but comparatively short fibre, is difficult to spin, a mixture of one fifth of cotton was made, in order to enable it to be worked. A good wearing cloth, which stands washing and takes a dye, was produced. It is, however, well suited for stuffing pillows or coverlets. Mr. Moncton calculated that its cost would be one rupee a maund. This silky down of the pods is used by the natives on the Madras side in making a soft, cotton-like thread. The Mudar, Mr. Moncton observes, grows all over India; it seems to thrive on soils that either reject or destroy everything else. It is difficult to conceive anything less productive than dry sand, and yet the Mudar thrives in it. Should its cotton be found useful, the waste lands of India could be covered with it, as it requires no *culture* and no *water*. It comes to maturity in a year, but is perennial; and when once planted or sown, would require no further care; and where thickly planted, might be made the means of reclaiming poor soils, as the leaves and some of the upper branches rot, while the root and stem remain. Col. Tremenheere, of the Engineers, has suggested that the Mudar should be used as a hedge to protect desert land brought under cultivation from the encroachment of drift sand. This would give a healthful impetus to the cultivation of the plant itself.—*Royle.* Writing of the Calotropis, Dr. Hooker says, the *mudar* plant was abundant here, but I found that its properties and nomenclature were far from settled points. On the banks of the Ganges, the larger, white flowered, subarboreous species prevailed; in the interior, and along my whole previous route, the small purple-flowered kind only was seen. Mr. Davis, of Rotas, was in the habit of using the medicine copiously, and vouched for the cure of eighty cases, chiefly of leprosy, by the *white mudar*, gathered on the Ganges, whilst the purple of Rotas and the neighbourhood was quite inert: Dr. Irvine, again, used the purple only, and found the white inert. The European and native doctors, who knew the two plants, all gave the preference to the *white*; except Dr. Irvine, whose experience over various parts of India is entitled to great weight.—*Hooker Him: Jour. Vol.* I. *page* 86. It is a plant yielding a very excellent fibre. Of this, some beautiful specimens were sent to the Exhibition of 1851, by Dr. Wight, who made experiments upon its great strength. The late Dr. Stocks enumerated it among the cordage plants of Sindh; and Capt. G. J. Hollings, Deputy-Commissioner of Leia, in the Punjab, has published an account of this fibre being used for fishing nets, and as cordage, at Dehra Ghazee Khan, on the Indus. The species, however, is not the same in all these places. *Calotropis gigantea* is that common in the Southern, and *C. Hamiltonii* in the Northern parts of India, and *C. procera* in Persia; the last extends even to Syria. The mode of separation of the fibre is tedious, and may for the present oppose some obstacles to the ready supply of this material. Capt. Hollings states that the sticks of the Mudar were cut about twelve or eighteen inches in length; the outer bark was then carefully peeled

off, and the fibre picked from the inner part of it. Several threads were then placed side by side, and twisted into a twine by rubbing them between the hands. No water is used (indeed it is injurious); everything is done by manipulation. In a subsequent paper, Capt. Hollings observes, that the best plan is to select the straightest branches, which are always the largest; to let them dry for at least twenty-four hours, before any attempt is made to separate the fibre. On the second or third day the sticks are slightly beaten, especially at the joints, which ensures the bark, with the fibre attached, being peeled off without breaking. The workmen then bite through the bark, about the centre of its length; they then hold the tissue of threads in one hand, and separate the bark with the other. He did not find that any of the ordinary methods of separating fibre were useful; but it is probable that some of the mechanical methods of separating Flax would be effectual with this fibre when in a dry state. Dr. Wight's specimens, which are of those of *C. gigantea*, he describes as being merely stripped off from the stalk, and slightly prepared, to remove the epidermis. He observes, that as it is a most common plant, it may become a valuable article of commerce, if a less costly mode of separating it can be devised, without injuring its quality. The colour, when fresh, is of a greenish-white. Dr. Wight, from his experiments, considered it the strongest fibre on the Madras side of India, where it is used for fishing lines. It bore 552 lb., when the Janapa or Sunn of Coimbatore bore 414 lb. A small cord, made of the specimens from the Punjab, examined by Captain Thompson, at Calcutta, bore 3 cwt., "without shewing symptoms of distress," and was therefore equal to the best cordage; but it seemed to him still better adapted for the purposes of Flax than of Hemp. Mr. Willis considered the fibre to possess extraordinary merit, which would be valued by spinners for use in their finer fabrics. So, when examined by practical men in Europe, it has been pronounced to be well calculated for supplying the place of good Flax, for making prime yarns. One gentleman observed that it twists all up at the end, and therefore could not be heckled. But this is probably owing to the mode of preparation; as the natives are described as twisting it between their hands. It was considered well worth £30, or rather £35 a ton. Capt. Thompson thought, in Calcutta, that it would be valued at from £30 to £40 per ton in England; perhaps more. Though the Mudar or Yercum fibre, from its fineness, seems well calculated to answer for many of the purposes of Flax; yet, from its strength, it is also well suited to supply the place of Hemp. In Royle's experiments, when Petersburgh Hemp bore 160 lb., and the Brown Hemp of Bombay and Jubbulpore Hemp bore 190 lb., the Yercum also bore 190 lb. Dr. Wight has given the following as the results of his experiments of the strength of Mudar fibre: —

Coir	224 lb.
Pooley Mungee (*Hibiscus cannabinus*)	290 ,,
Marool (*Sanseviera zeylanica*)	316 ,,
Cotton (*Gossypium herbaceum*)	346 ,,
Cutthalay nar (*Agave americana*)	362 ,,
Janapa (*Crotolaria juncea*), Sunn, hindee	407 ,,
Yercum (*Calotropis gigantea*)	552 ,,

In considering the varied useful properties of these plants, we cannot but be struck with the fact, of how wonderfully the Creator of all has furnished every part of the world with plants and animals suited to its diversified soils and climates. So that if the people residing near these barren places would make use of the natural riches within their reach, they have the means, by commercial interchange, of commanding comforts to which they are now strangers; and we might then apply literally the words of the Prophet: "The wilderness and the solitary place shall be glad for them; and the desert shall rejoice, and blossom as the rose." ('Isaiah,' xxxv, 1.)—*Royle Fib. Pl. p.* 306.

(2303) CALOTROPIS GIGANTEA. MUDAR.
Syn. Asclepias gigantea, *Linn.*

Madorius, RUMPH.	Jumakioos, GREEK.
Erich, RHEEDE.	Yerkum. TAM
Arka Akund. SANS.	Jilroo chettoo. TEL.
Ashur, ARAB.	Ak-ka jhar, Mudar, H.

This is a large shrub common in many parts of India, and cultivated in the Calcutta Botanic Garden.—*O'Shaughnessy, page* 453. Red Variety, Mudar, grows wild all over India. —*Riddle.* It will grow on barren sands, and it has been suggested to plant it as a barrier to drift sands. The late Dr. Duncan obtained from its juice a principle which he called Mudarine. It has long been famous for yielding a kind of Manna, which is called *Sakkur-al, ushur* also *Ak* or *Mudar ke shukker* and, lately, its milky juice has been collected, by making incisions into the plant, and prepared as a substitute for Caoutchouc and Gutta Percha. Dr. Riddell calculates that the average sized plants will yield as much juice as will make a pound of Gutta Percha-like substance. This is evaporated in a shallow dish either in the sun or in the shade; when dry, it may be worked up in hot water with a wooden kneader, as this process removes the acridity of the gum. It becomes immediately flexible in hot water, but is said to harden in cold water, and is soluble in oil of turpentine; takes impressions: is not, however, a non-conductor, like Gutta Percha, but will no doubt form a valuable product either alone or mixed with other substances.—*Royle Fib. Pl.* The milky juice is also said to be used for tanning.—*Simmonds.* The follicles, when ripe, contain a fine silky down which has been spun and converted into cloth.—*M. E. of* 1857. Latterly the silky cotton like substance, which fills its pods, has been wove into cloth,

with sufficient success to encourage further trials. The down-like substance has been made into paper, and is well suited for stuffing pillows.

Fibre of the Yercum.

Jillade nara, TEL. Aku HIND.	Yeroocum nar, TAM.

Rope or Coir.

Toondee coir, TAM. Galum Taroo, TEL.	Lamb-dore, HIND.

The soft, white fibre, though till lately unknown in England, has long been so to the Natives of India. The plant which furnishes it being one of the most common all over the country. Were a cheap and easy mode of separating the fibre from the bark discovered, it might become a valuable article of export on account of its great strength.—*Wight.* It is susceptible of being spun into the finest yarn for cambric. Of two ropes made of the fibre, a piece of one, about 7 feet long, sustained for some time 540 lbs. and broke with 552. This was found the strongest of the cordage fibres tried in the Coimbatore district, and would doubtless be much used if more were easily procurable, the shrub being most abundant.—*Wight.* The fibre is used everywhere in Asia to make fishing lines, being of extraordinary strength, and it is even considered better adapted for cloth than for cordage. The strength of the fibre exceeds that of all other vegetable substances, as the following experiments, of a three strand $\frac{3}{8}$ inch rope, will show.

	Weight sustained.
1 Coir (Cocos nucifera), ...	224 lbs.
2 Pooley Manjee (Hibiscus Cannabinus),	290
3 Marool (Sanseviera zeylanica), ...	316
4 Cotton (Gossypium Herbaceum), ...	346
5 Cutthalay nar (Agave Americana). ...	362
6 Junapum or Sunn (Crotolarea juncea)	407
7 Yercum nar (Calotropis gigantea), ...	552

Its fibre is valued at £30 to £35 a ton. The leaves warmed and moistened with oil are used by the Natives as a discutient —*Riddell.* In the Tenasserim Provinces, the mudar plant is propagated for its medicinal properties, which are said to be very numerous, and European practitioners recommend the juice of the plant in cases of leprosy above all other preparations. There, two varieties occur, one with a cream-coloured flower, and another with a black and purple tinge.—*Mason.* At the Madras Exhibition of 1855, among the manufactures from flax, hemp and their substitutes were a few novel and interesting fabrics, some of which have been made expressly for this Exhibition. The finest of these was Cambric made from the fibres of the Yercum or Calotropis gigantea exhibited by Mr. Underwood. This cambric was of very fine quality and suited for pocket handkerchiefs or collars. A prize was awarded in another class to the maker of a ladies' embroidered handkerchief manufactured from yercum fibre. These specimens were sent to the

Paris Exhibition. A very fine dressed and corded Flax from the fibres of the Calotropis gigantea was exhibited by Mr. F. Crampton, Madras, and by the Madras School of Industrial Arts. The Cuddapah Local Committee also contributed very clean white and strong fibres, thread and cloth from the same fibre.—*M. E. Juries Reports.* Dr. Honigberger (p. 247) states that the Calotropis gigantea grows profusely in all parts of the Punjab; and that in some countries it attains the size of a small tree. Amongst the ruins of the old city of Lahore, nearly the whole vegetation consists of Calotropis and Harmala Ruta. The charcoal made from this root was usually employed in the gunpowder manufactories of the Punjab. The native doctors use the leaves, the buds, the bark of the root as well as the milky juice of the Calotropis: the root is used in cancer. Dr. O'Shaughnessy, writing on the medicinal properties of this plant, states that the root, bark, and inspissated juice are used extensively for their emetic, diaphoretic, and purgative properties which have been known for many centuries to the Indian practitioners, and have of late attracted much notice from European physicians. The dried bark of the root is of a greyish yellow colour; heavy and very peculiar smell, acrid, nauseous. This principle was termed *mudarine* by its discoverer Dr. Duncan. The powdered bark of the root in doses of from $\frac{1}{2}$ a drachm to one drachm proves emetic after an interval of from 29 minutes to an hour, generally causing much nausea, and in about one case in every three inducing a cathartic operation. In doses of from 2 to 5 grs. taken every half hour, it proves nauseant, powerfully diaphoretic, and after several doses gently cathartic. On the whole this preparation may be deemed one of our best substitutes for ipecachuana, producing similar emetic and diaphoretic results; combined with opium it affords a good representative of the Dover's powder of the British Pharmacopœiæ. In dysentery it may be very safely substituted for ipecachuan in Mr. Twining's and other formulæ, about twice the quantity being used in each dose.—In India medicine the powdered root, bark, and the dried milk are used in small doses in a multitude of disorders, and enjoy high reputation as alteratives in the treatment of lepra, elephantiasis, secondary syphilis, and in several spasmodic diseases. The clinical experiments of Mr. Playfair, Dr. Duncan, and Dr. Royle, leave no doubt of the bark of the root being really efficacious in incipient leprosy, and in numerous diseases of the skin. Mr. Playfair's Essay occurs in the Transactions of the Med. Society of Calcutta. The results of Dr. Duncan's chemical experiments appear in the "Lancet" vol. 1829-30.—*O'Shaughnessy, pages 453 and 454.* The compound powder of this plant, is an excellent substitute for Dover's powder, but in preparing it, we require to substitute for ipecacu-

anna twice the quantity of the powdered mudar. When a supply of ipecacuanha is not obtainable, this drug will be found a moderately good substitute. Many practitioners attribute to the mudar specific utility in the treatment of several cutaneous diseases and leprosy.—*Beng. Phar. page* 405.

(2304) CALOTROPIS HAMILTONII, Wight. This is the most common species in the upper provinces of India, and obtains the same native names as the true mudar. By Dr. Royle's experiments and those of Dr. O'Shaughnessy, the bark of the root and the dried milk possess similar properties to those of the C. gigantea; iti s, however, far inferior as an emetic remedy. According to Dr. Wallich, this and C. gigantea are the same species.—*O'Shaughnessy, page* 454.

(2305) CALOTROPIS PROCERA, Persia and Arabia. *Syn.* Asclepias procera, *Hort. Kew.* Ascl. gigantea. *Bot. Rep.* Beid-el-sar. *Prosper Alp.* A shrub, much resembling C. gigantea, juice extremely acrid, used to remove hair from the skin, and as an external remedy in ringworm, and several other cutaneous diseases. A kind of manna named Shukr-ul-ashur is produced on this or some nearly allied species by the puncture of an insect called *Gattigul*, (Royle Illustr. p. 275.)—*O'Shaughnessy, page* 454.

(2306) CALPICARPUM ROXBURGHII. PERIWINCLE TREE. *Syn.* Cerbera fructicosa; this is a handsome shrub almost constantly covered with blossoms, that can scarcely be distinguished from the flowers of the rosy-periwincle, though of a different genus. It was first discovered in Burmah, and Roxburgh, who introduced it into the Botanical Garden of Calcutta, said in his description: "The flower is like those of *Vinca rosea*, but larger and faintly fragrant; it is in fact one of the most ornamental shrubs in the garden."—*Mason.*

(2307) CALYPTRANTHES CARYOPHYLLIFOLIA. Willd. Swartz. *Myrtaceæ.*

The tree.

Jamoon, HIND.	Nawel marum, TAM.
Nawel wood, ENG.	Neredie chettoo, TEL.

The fruit.

Nawel pullum, TAM.	Nuwel fruit, ENG.
Jamoon ka phull, DUK.	Kaka jemboo, SANS.
Neredie pundoo, TEL.	

These are large growing timber trees, the wood is light, and chiefly used for making grain measures. It is also made into carriage frames, cots &c.—*Ains. Mat. Med. p.* 206. The bark is astringent, and is used in a decoction by the natives for dysentery.—*Riddell.* The fruit when ripe, is of a very dark purple colour, and about the size of a large cherry. In taste it somewhat resembles the sloe, but is much sweeter.—*Ainslie, page* 229.

(2308) CALYPTRANTHES CARYOPHYLLIFOLIA. Variety.

Vullay nawel pullum, TAM.	Tella neredie pundoo, TEL.
Oojla jamooon ka pull, DUC.	Sweta jemboo, SANS.

This variety of the Nawel pullum fruit is nearly similar to it in natural qualities and has got its names from being of a different colour (white).—*Ainslie, page* 235.

(2309) CALYPTRANTHES JAMBOLANA.

Jamoon, HIND.	Turkolum, TAM.

This is a large and handsome tree, which flowers in February and March, and thrives in any good soil. The fruit of the best sort is as large as a common blue plum, which it resembles in appearance; it has a rough astringent flavour, and should be soaked in salt and water before it is eaten. The fresh stone if planted grows immediately.—*Riddell.*

(2310) CAMBESSEDEA OPPOSITIFOLIA. *Syn.* Mangifera Oppositifolia. Opposite-leaved mango. This indigenous tree of Tenasserim produces a fruit much like a plum. There are two varieties, one bearing an intensely sour fruit, and the other one as insipidly sweet.—*Mason.*

(2311) CAMBRIC.

Kameryksdoek, DUT.	Cambraja, IT.
Cambray Batiste, FR.	Cambraia, PORT.
Kammertuch, GER.	Cambrai, SP.

A fine linen fabric, first made at Cambray in French Flanders, whence it derives its name. It is now manufactured, of a superior quality, in England and Scotland.—*Faulkner.*

(2312) CAMELLIA, a genus of plants belonging to the natural order *Ternstromiaceæ*, and nearly related to the plants which yield the tea of the shops. All the species are natives of China and Japan, or of corresponding climates in the north of India, whence they have been introduced into Europe. *C. Japonica*, a species with broad shining leaves, and red flowers, is the original of the numerous beautiful varieties now so common in British gardens. The principal part of these have been raised by the skill of the Chinese or Japanese, and are remarkable not only for their gay colours, but for the great symmetry with which their petals are arranged, the flowers when seen in perfection resembling nothing so much as beautiful shell-work. The sorts that have been raised in England are in most instances inferior to the Chinese in symmetry, but they occasionally surpass them in richness of colour. They are multiplied by cuttings, grafts, and buds, and also by seeds, which the Waratah and some single sorts produce in plenty. The other species of *Camellia* in our gardens which deserve notice are, the *C. maliflora*, the Apple-Blossomed Camellia, which is probably a mere variety of the last; *C. Oleifera*, whose seeds yield a valuable oil in China; and *C. Reticulata*, which is by far the handsomest

of all. The leaves of this species are very remarkably netted, and the semi-double flowers, which are sometimes as much as six inches across, are of a deep rich rose-colour.—*Engl. Cyc. page* 728.

(2313) CAMELLIA JAPONICA. Its elegant flowers are as much admired by the people of China, its native country, as by florists abroad. The Chinese enumerate thirty or forty varieties, for each of which they have a separate name, many of these varieties are unknown out of China and Chinese gardeners are likewise ignorant of a large proportion of those found in Western conservatories. This elegant flower is cultivated solely for its beauty, but there are other species of Camellia raised for their seeds, the oil expressed from them being serviceable for many household and mechanical purposes. The Camellia bears the same name that the tea plant does, and the term "cha" is likewise employed, as tea is with ourselves, to designate any infusion.—*Williams' Middle Kingdom p.* 285.

(2314) CAMEL'S HAIR.

Poil de Chameau, Laine de chevron, Fr.	Pelo di Camello, It.
Kameel-haar, Ger.	Moo-i-Shutur, Pers.
Oont-ka-bal, Hind.	Peló o lana de Camello, Sp.

In England, Camel's hair is principally used in the manufacture of pencils for painting; and in the East it is woven into clothing, tents, ropes, &c.—*Faulkner.*

(2315) CAMELUS.

Gamal, Heb.	Cammello, It. & Sp.
Djemel, Arab.	Kameel, Ger.
Κάμηλος, Gr.	Chameau Fr.
Camelus, Lat.	Camel, Eng.

A genus of ruminant animals without horns. It includes two species, *Camelus Bactrianus*, the Camel, and *Camelus Arabicus*, the Dromedary. The existing peculiarities of form in this genus lead to the opinion that the Camels and the Llamas form the link between the *Ruminantia* and *Pachydermata.—Engl. Cyc. p.* 728. The two species of Camel were well known to Aristotle, who, in his 'Natural History' (ii. 1), mentions both the Arabian and the Bactrian, remarking that the latter has two humps, whereas the former has but one. The organisation of the Camels is wonderfully adapted to their habits and uses to man.—*Engl. Cyc. p.* 729.

(2316) CAMELUS BACTRIANUS (Linn.), the Mecheri, or Camel. It is the *C. Ditophus* of Walther, *C. Turcicus* of Alpinus, the Bactrian Camel of Pennant, Le Chameau of Buffon, and the Trampeltheir of Knorr. It has two humps on the back. Length about 10 feet. Hair shaggy, particularly under the throat. Colour generally dark-brown. Localities, Persia, Turkey, &c.—*Engl. Cyc. page* 732.

(2317) CAMELUS DROMEDARIUS (Linn.) the Sghinel, or Dromedary. It is the *C. Luk* of Eversmann, *C. vulgaris* of Forskal, *C. monotophus* of Walther, *C. Dromas* of Gesner, *C. minimus* of Klein, *C. vetus* of Frisch, the Arabian Camel of Pennant, and Le Dromedaire of Buffon. It has one hump, situated on the middle of the back. Length about 8 feet. Hair pale brown. Localties, Arabia, Africa, &c. Purchas (book vi., c. 1, 8. 9) says that of camels there are three kinds; the first called Huguin, of tall stature and able to carry a thousand pounds weight; the second less, having a double bunch, fit for carriage and to ride on, called Becheti, bred only in Asia; the third sort, called Raguahill, small, able to travel (for they are unfit for burdens) above an hundred miles in a day. The king of Timbuctoo can send messengers on such camels to Segelmesse or Dasha.—*Engl. Cyc. p.* 732. A fossil species, *C. Sivalensis*, of this genus was discovered by Dr. Falconer and Captain Cautley in the Tertiary deposits of the Sewalik Hills of Hindustan. The crania, jaws, and teeth of this species are to be seen in a fine state of preservation in the British Museum. It was nearly related to the existing species, but exceeded them by at least one-seventh in height.—*Engl. Cyc. page* 733.

(2318) CAMLET.

Kamelot, Dut.	Ciambellotto, It.
Camelot, Fr.	Kamlot, Rus.
Kamelot, Ger.	Camelote, Sp.

A light stuff, made of long wool hard spun, sometimes mixed in the loom with cotton or linen yarn.—*Faulkner.*

(2319) CAMOENS. The Cave of Camoens, where the Portuguese poet is supposed to have written a portion of his Lusaid, is a place of universal interest and resort at Macao. It is picturesquely situated upon the summit of a small hill, on the margin of the inner harbor. Large granite rocks are here gathered in a confused cluster, which form a natural cave, from the entrance of which there is a wide prospect of the surrounding country. The banians, the pagoda, and other oriental trees unite their foliage and form a grove in which the rocky cave is embowered. Surrounding it are grounds cultivated with trees, creeping vines and flowering shrubs, charmingly arranged by the borders of winding paths, and upon the sides of the hills. Artificial terraces, ingeniously disposed, invite the visitor to the enjoyment of the view or to rest beneath the shade. Above the cave rises a rotunda, from which there is an enchanting prospect, and a marble monument, with a bronze bust and an inscription here record the fortunes, the genius, and virtue of Camoens, the poet. Camoens' visit to Macao was during his banishment from Portugal, in consequence of his pertinacious courtship of a lady of rank, whose parents did not affect an alliance with the poet, who, although of a respectable family, was poor, and looked upon as an uncertain adventurer,

In 1551, he proceeded to Goa, in India, where he again involved himself in trouble by writing his "Absurdities of India," and was banished to the Moluccas, and in the course of his exile he resorted frequently to Macao, which was a favorite residence of the poet. The cave was his chosen spot of retirement, where, in its "sweet retired solitude," he meditated his great work, the Lusaid. Camoens returned to Portugal, but only to live in misery and die in an hospital.—*American expedition to Japan, page* 165.

(2320) CAMOMILE.

Ehdakl-mirzie, ARAB.	Camomilla, IT.
Baboone-ka phul, DUK.	Chamomilla, LAT.
Camomile, FR.	Babooneh-gow, PERS.
Romische hamiller, GER.	Manzanilla, SP.
Baboone-ka-phul, HIND.	Chamaindoo-poo, TAM.

A useful herb, a native of Europe and Persia, and grows plentifully in most parts of Great Britain. It is celebrated as a tonic and stimulant, an infusion of the flower heads being much used in domestic medicine.—*Faulkner.*

(2321) CAMPANULA. *Campanulaceæ.*—This genus of plants are cultivated for the flower garden. It includes the Canterbury-bell and Venus's looking glass, and is well known for its ornamental beauty and profusion of flowers. All the species grow freely in any soil and are propagated by seed and dividing the roots.—*Riddell.* The species of *Campanula* seldom succeed in Madras. They should be raised from seeds sown during the rains; the seed requires care, being very small.—*Jaffrey.*

(2322) CAMPANULA EDULIS, Chobs, Okab, is a hispid plant with a thick root, erect one-flowered stems, ovate-lanceolate crenate leaves; lobes of the calyx linear-lanceolate, equal in length to the corolla, which is hispid. It is a native of Arabia Felix. Its root is thick and sapid, and contains a considerable quantity of starch. It is on this account frequently eaten by children, as are the roots of many other species. —*Eng. Cyc. page* 733.

(2323) CAMPANULA LILIFOLIA (*Adenophora lilifolia*, Ledebore) has alternate leaves, the radicle ones petiolate, ovate-roundish, cordate toothed; the corolla campanulate, the style exerted. It is a native of Siberia, and of the east of Europe. Like many others of the genus it has an edible root, which is sometimes divided into several turnip-formed tubers. The flowers are numerous and sweet-scented. It is interesting from the fact that the leaves before blossoming are crowded together on the summit of the stem, so as to form a green rose-like body. But as the axis elongates, the leaves become afterwards scattered on the prolonged stem. The roots are eaten in China both raw and cooked. The other British species of this genus not described are *C. latifolia*, great Bell-Flower, common in the North; *C. Rapunculoides*, very rare; and *C. patula*, frequent in hedges and thickets. *Eng. Cyc. page.* 734.

(2324) CAMPHOR.

Kafoor, ARAB.	Kaafur, MALAY.
Kapur, BALI.	Kafoor, PERS.
Capooroo, CYNG.	Alcanfor, PORT.
Camphre, FR.	Kamfora, RUS.
Kampfer, GER.	Kapoor, SANS.
Kapoor, GUZ. & HIND.	Alcanfor, SP.
Canfora, IT.	Carpoorum, TAM & TEL.
Camphora, LAT.	

Camphor is a principle found in many plants, but only in two in any great abundance. Like several substances the produce of countries to the southward or eastward of India, Camphor was unknown to the ancients. (Hindoo Med. p. 93.) It was known to the Arabs, and called by them *Kaphoor*. The Camphor tree, Camphora Officinarum, *Nees v. Esenbeck*, (*Laurus Camphora*, Linn.) is an evergreen tree, grows to a considerable size, is straight below and branched. All parts emit a camphoraceous odour when bruised. Wood white, fragrant, much used in China for making trunks, boxes, &c. Branches somewhat lax, smooth, with a greenish bark. Leaves alternate, with long petioles, ovate-lanceolate, rather coriaceous, smooth, shining, and bright-green above, paler beneath, triple-nerved, with a sunken gland opening by a pore beneath, at the axils of the principal lateral veins. Leaf-buds scaly. Flowers small, hermaphrodite, smooth externally, in naked, axillary, and terminal corymbose panicles. Perianth 6-cleft, with a decidous limb. Fertile stamens 9, in 3 rows, the 3 inner supported at the base with 2 stipitate compressed glands. Anthers 4-celled, opening by as many ascending valves, the 3 interior looking outwards, the others opening inwards. Three sterile stamens subalternate with those of the second row, three others stipitate, each with an ovate head. Drupe situated in the truncate cup-like base of the perianth. It is a native of China principally near Chinchew in the province of Fokien; also of Formosa and Japan.—Nees von Esenb. 130. St. and Ch. 129. Mr. Williams states it is found in Kwangsi, Fuhkien, Formosa, and Cochin China, and affords both timber and gum for exportation and domestic use. The tree itself is large, and furnishes excellent planks, beams, and boards, for building vessels and making trunks and other articles, and the preparation of Camphor, sawing of the timber, and the construction of trunks, articles of furniture, and vessels in whole or in part, occupies great numbers of carpenters, shipwrights, and boat-builders.—*Williams' Middle Kingdom, Vol.* II. *page* 137. Camphor is diffused through all parts of the plant, and is separated from the root, trunk, and branches, which when cut into chips, are boiled in water and then sublimed into inverted straw cones contained within earthen capitals. It is thus obtained in the form of *Crude Camphor*, chiefly from

the province of Fokien and the opposite island of Formosa, but some of good quality is also procured from Japan. The Dutch exported from thence into Europe 310,520 lbs. in seven years. It is sometimes imported into Britain from Batavia. The ordinary Crude Camphor is in small greyish-coloured, slightly sparkling grains, which by aggregation form greyish crumbling cakes, with all the properties of purified Camphor. This is separated from impurities by being mixed with lime and sublimed in thin glass vessels, which being afterwards cracked, the Camphor is obtained in a concavo-convex cake about three inches thick with a hole in its middle. Camphor is solid, colourless, and translucent, with a crystalline texture, has a strong, penetrating, aromatic odour, and a bitter, rather pungent taste, followed by a sensation of coolness : though brittle, it is not, from its toughness, easily pulverized. Sp. Gr. ·98 to ·99 ; so that it floats on water, and, evaporating, produces a circulatory movement. From its volatility, it volatilizes at ordinary temperatures, and crystallizes on the inside of bottles.—*Royle.* Another kind of Camphor, the Camphor of Sumatra, is procured from the stem of a large tree, the *Dryobalanops Camphora*, Colebrook ; *D. aromatica*, Gaertner. It is a large forest tree, as far as is known, confined to a few parts of the islands of Sumatra and Borneo, but in these abundant. It is secreted in crystalline masses naturally into cavities of the wood. It supplies this camphor only after attaining a considerable age. In its young state it yields, however, by incision, a pale yellow liquid, called the liquid camphor of Borneo and Sumatra, which consists of resin and a volatile oil having a camphorated odor. An account of this tree, and of the mode of procuring the peculiar and high-priced camphor which it yields, is given by Dr. Junghuhn, who has travelled lately in Sumatra, and Prof. De Vriese, of Leyden, in the "Nederlandsch Kruidkundig Archief" for 1851. An abstract of the memoir, translated into English by Miss De Variese, is published in "Hooker's Journal of Botany" for February and March 1852:—The Dryobalanops is a gigantic tree, rising for fifty or even a hundred feet above those which compose the chief mass of the forests where they grow, just as the steeples of the churches appear above the roofs of the houses in a town. The trunks of the full-grown trees are from 7 to 10 feet in diameter at the very base, and from 5 to 8 feet higher up; they rise to the height of 100 or 130 feet, and their ample crown is from 50 to 70 feet in diameter. The tree has a limited range, being confined to the seaward slope of the mountains of south-western Sumatra, most abundant on the lower slopes and the outlying hills of the alluvial plain, and extending in latitude from 1 deg. 10m. to 2 deg. 20m. N., and perhaps further to the north. Camphor oil occurs in all the trees, and is most abundant in the younger branches and leaves. The solid camphor is found only on the trunks of older trees, especially in fissures of the wood, and in smaller quantity than is generally supposed. Colebrooke, and authors who have copied from him, assert that camphor is found in the heart of the tree in such a quantity as to fill a cavity of the thickness of a man's arm, and that a single tree yields about eleven pounds. The price of this camphor, which at Padang sells for about 340 dollars per hundred weight, suffices to show that the account is much exaggerated. The camphor occurs only in small fissures, from which the natives, having felled the trees and split up the wood, scrape it off with small splinters or with their nails. From the oldest and richest trees they rarely collect more than two ounces. After a long stay in the woods, frequently of three months, during which they may fell a hundred trees, a party of thirty persons rarely bring away more than 15 or 20 pounds of solid camphor, worth from 200 to 250 dollars. The variety and price of this costly substance are enhanced by a custom which has immemorially prevailed among the Battas, of delaying the burial of every person who during his life had a claim to the title of Rajah (of which each village has one) until some rice, sown on the day of his death, has sprung up, grown and borne fruit. The corpse, till then kept above ground among the living, is now, with these ears of rice, committed to the earth, like the grain six months before, and thus the hope is emblematically expressed that, as a new life arises from the seed, so another life shall begin for man after his death. During this time the corpse is kept in the house, enclosed in a coffin made of the hollowed trunk of a Durion, and the whole space between the coffin and the body is filled with pounded camphor, for the purchase of which the family of the deceased Rajah frequently impoverish themselves. The camphor oil is collected by incisions at the base of the trunk, from which the clear balsamic juice is very slowly discharged. In Sumatra the best camphor is obtained in a district called Barus, and all good camphor bears that local name, being known in Commerce as Brass Camphire, Borneo Camphor, Camphor of Baras, Malay Camphor, Bruss-capoor, *Guz.* and *Hind.* It appears that the tree is cut down to obtain the gum and that not in one tenth of the trees is it found. Barus camphor is getting scarce, as the tree must be destroyed before it is ascertained whether it is productive or not. About 800 piculs are annually sent to China. The proportion between Malay and Chinese camphor is as eighteen to one; the former is more fragrant and not so pungent as the latter. Nine hundred and eighty-three tubs of camphor were exported from Java in 1843 ; 625 bales were imported in 1843, the produce of the

Japanese empire, and 559 piculs exported from Canton in 1844. The price of unrefined camphor in the Liverpool market in July, 1853, was £4 to £4 10s. the cwt. There have been no imports there direct in the last two years.—*Simmonds.* Borneo camphor, as found in the wood of the Dryobalanops camphora, is in white crystalline fragments. Sp. G. 1.009. Its odour is not of so diffusable a nature, otherwise it closely resembles the camphor from the Camphora officinarum.—*Royle, page* 536. The wood of the camphor tree is good timber, suited for house and ship-building.—*Crawfurd Dictionary, page* 81. The liquid camphor of the same tree appears of the nature of Camphogen. Dr. A. T. Thomson, by passing a current of oxygen gas through it converted it into camphor.—*Royle.* The oil both in a fluid and solid state, is found in the body of the tree where the sap should be, but not in all trees. The liquid oil is abundant, and little appreciated, but the concrete bears a very high price, which depends wholly on its scarcity and the fancy of the Chinese and Japanese, who ascribe high medicinal virtues to it, which it probably possesses in no higher degree than the cheap article which they themselves obtain by the distillation of the wood of the Cinnamomum camphora, and which may be had in the same markets for about one hundredth part of the price. The Malay name is a slight corruption of the Sanscrit one, karpura. To distinguish it from the camphor of China and Japan, the wood Barus is annexed, being the name of the sea-port of the western coast of Sumatra, from which the article was principally exported from that island. From what Barbosa says, it is to be presumed that both the Malay and Chinese camphor were in use by the Hindus before the arrival of Europeans. The prices of the different sorts reduced to present Indian weights and moneys will be as they existed in Malabar and Calicut in the beginning of the sixteenth century, as follows: coarse camphor, in cakes (canfore grossa in pani), from 40 to 45 Spanish dollars, the picul of 133⅓ pounds, which is about double the present price at Singapore; camphor, to use internally, and for the eyes (canfora da mangiar, e per gl' occhi) 1360 dollars the picul, which is probably no more than 35 per cent. above existing prices in Singapore. There was also a sort used for anointing the idols (per ugner gl' idoli) at half the price of the last. These two must have been Malay camphor, while the first, from its low price, must have been Chinese or Japanese.—*Crawfurd Dict. page* 81. Another and new source of Camphor is the Blumea grandis, one of the most abundant weeds throughout the Tenasserim Provinces: It grows six or eight feet high with leaves like mullen, which, when bruised, emit a strong odour of camphor. Many years ago, the Tavoyers informed Mr. Mason that they were in the habit of making an impure camphor from the weed by a very simple process; but Mr. O'Riley of Amherst, was the first to make a good article from it, and to bring it to public notice. He made more than a hundred pounds, and the specimens which he sent to Calcutta were reported "in its refined form, to be identical in all its properties with Chinese camphor." The plant is so abundant, that these Provinces might supply half the world with camphor. Wherever the trees are cut down, this weed springs up, and often to the exclusion of almost every thing else: so that an old clearing looks like a field under cultivation. Mr. O'Riley sent flowering specimens of the plant to Dr. McClelland for identification, who forwarded them to Dr. Voigt of Serampore, and subsequently reported "Dr. Voigt states that it belongs to De Candolle's genus Blumea, and is, so far as he can see, a new species." It is without doubt the same plant as that which appeared in Wallich's Catalogue a quarter of a century ago, as *Conyza grandis*, and which De Candolle subsequently described as *Blumea grandis.* Wallich's specimens were from Tavoy, without flowers, and De Candolle describes the leaf as nine inches long with the petiole, by three wide, ("*cum petiolo* 9 *poll. longa*, 3 *poll. lata*") serrated, and bearing on the petiole five or six remote linear acute lobes, ("*petiolo lobulos* 5—6 *distantes lineares aculos gerentibus*") which corresponds very accurately with some specimens of this camphor plant, but it does not correspond to any other species of Blumea in the Provinces with which Mr. Mason is acquainted.—*Mason.* Camphor has been manufactured in Spain from several Labiatæ, and has been prepared artificially by passing a current of muriatic acid gas through turpentine; this last variety however has not been used in medicine. Camphor is not mentioned by the ancient writers; it was introduced into Europe about six centuries since, but it was previously known to the Arabs. The Camphor tree has been successfully cultivated in Europe, and Fée mentions one at Malmaison, over 20 feet high by 6 inches in diameter. There are several descriptions of the mode of obtaining Camphor from the *Camphora officinalis.* According to Ure, the wood is cut into small pieces and put, with plenty of water, into large iron boilers. which are covered with an earthen capital or dome, lined within with rice straw. As the water boils the camphor rises, with the steam, and attaches itself as a sublimate to the stalks, under the form of granulations of a grey color. In this state it is picked off the straw and packed up for exportation to Europe.—("Dictionary of Arts and Manufactures.") According to Tomlinson, the roots and wood of the tree are chopped up, and boiled with water in an iron vessel, to which an earthen head containing straw is adapted; and the camphor sublimes, and condenses upon the

straw. In China the chopped branches are boiled in water till the camphor begins to adhere to the stirrer: the liquor is then strained, and the camphor concretes on standing: it is afterwards mixed with a finely powdered earth and sublimed from one metallic vessel into another.—*Tom. p.* 288. Kæmpfer says that the Japanese camphor is made by a simple decoction of the wood and roots, but bears no proportion in value to that of Borneo. There is also an imitation of camphor in Japan, but every body can distinguish it from the genuine.—*Simmonds.* Two kinds of unrefined or crude amphor are known in commerce: 1. *Dutch* or *Japan camphor*, also called *tub-camphor*, from the circumstance of its being brought from Batavia (and reported to be the produce of Japan) in tubs, covered by matting, each surrounded by a second tub, secured on the outside by hoops of twisted cane. Each tub contains from 1 cwt. to 1¼ cwt. or more. It consists of pinkish grains, which by their mutual adhesion form lumps. It is of larger grain, clearer, and sublimes at a lower temperature than the second variety, which is known in commerce as, 2. *Ordinary crude camphor*, *China camphor*, and *Formosa camphor*. This is imported from Singapore, Bombay, &c., in square chests, lined with lead foil, and containing from 1¼ to 1½ cwt. It is chiefly produced in the island of Formosa, and is conveyed in junks to Canton, whence the foreign markets are supplied. It consists of dirty greyish grains. It varies in quality, but is sometimes as fine as the Dutch kind. Crude camphor very much resembles moist sugar before it is cleaned. It is refined, and converted into the beautiful well-known article sold in the shops, by sublimation. This process is carried on in spheroidal vessels, called *bomboloes* (Fig. 418.) They are made of thin flint glass, and weigh about 1lb. each, and measure about 12 inches across. Each vessel has a short neck. When filled with crude camphor, they are imbedded in a sand-bath, and heated to a temparature of from 250° to 280°, which is afterwards raised to between 300° and 400°. About 2 per cent. of quick-lime, and 2 parts bone-black, in fine powder, are added to the melted camphor and the heat raised, so as to boil the liquid. The vapour condenses in the upper part of the vessel. As the sublimation proceeds, the height of the sand around the vessel is diminished. The process is completed in about 48 hours. This operation requires considerable attention and experience. Dr. Ure says:—"If the temperature be raised too slowly, the neck of the bottle might be filled with camphor, before the heat had acquired the proper subliming pitch: and if too quickly, the whole contents might be exploded. If the operation be carried on languidly, and the heat of the upper part of the bottle be somewhat under the melting point of camphor, that is to say, a little under 350°, the condensed camphor would be snowy, and not sufficiently compact and transparent to be saleable. Occasionally, sudden alternations of temperature cause little jets to be thrown up out of the cake formed above, which soil it, and render its re-sublimation necessary." The vessels being removed from the sand-bath, the mouth is closed with tow, and in this hot state, water is sprinkled over them, and they crack. When quite cold, the cake of camphor, weighing about 11 lbs., is removed, and trimmed, by paring and scraping in the form of large hemispherical cakes, perforated in the middle. In this process the lime retains the impurities and a portion of the camphor: the latter is recovered by heating the mixture in an iron pot, with a head to it, and the product is refined by a second sublimation.—*Tomlinson, page* 287. Of this process Dr. O'Shaughnessy briefly says (p. 545) that to purify the camphor it is introduced into a subliming vessel with one-fiftieth its weight of quicklime, to retain some oil with which it is contaminated, and heat is gently applied by a sand bath. Two Kedgeree pots luted together answer perfectly, a very small aperture being left for the escape of air on the first application of heat. Camphor ($C_{10}H_8O$) is a white and semi-transparent solid, (sp. gr. 0.987,) of a crystalline fracture, a peculiarly fragrant odour, and a warm, pungent, and somewhat bitterish taste, accompanied by a sense of coldness on the tongue. It is soft and tough, but can be readily pulverised if moistened with a few drops of spirits of wine. It evaporates in the air at ordinary temperatures, and gradually sublimes in close vessels and attaches itself to the surfaces most exposed to the light. If a vessel exhausted of air, and containing a piece of camphor, be exposed to the direct rays of the sun, those crystals will be formed speedily. When small pieces of perfectly clean camphor are allowed to fall upon the surface of pure water, they rotate and move about with great rapidity, sometimes for several hours together; but if, while the camphor is rotating, the surface of the water be touched with any greasy substance, (a glass rod dipped in turpentine answers best,) all the floating particles quickly dart back, and are instantly deprived of all motion. See "Magazine of Popular Science 1837" on "The rotatory motion of camphor upon the surface of water." Raspings of cork, steeped in sulphuric ether, sublimated benzoic acid, potassium, and some other substances, also rotate and move about on the surface of water. The motions of the camphor are accelerated by placing the glass in vacuo. Camphor fuses at 347°, and boils at 400°, when it may be distilled without decomposition. The density of camphor-vapour is 5·27. Camphor is sparingly soluble in water; 1 part of camphor requiring about 1,000 parts

of water for solution. This aqueous solution is named *camphor julep*. It is very soluble in alcohol, ether, acetic acid, sulphuret of carbon, and some other substances, 100 parts of spirits of wine (specific gravity 0.806) dissolve 120 of camphor, forming the *camphorated spirit* of the Pharmacopœia. On adding water to this, nearly all the camphor is thrown down, in a minutely divided state. Considerable use is made of camphor in medicine, both as an internal and an external remedy; but it ought never to be taken internally without medical advice. A dose of two scruples appears to be sufficient to cause death.—*Tomlinson, page* 287. Camphor has been much used in all low fevers, about eight years ago, Dr. Barareh, a Military Surgeon, announced that he cured the bad intermittents of Wallachia with it, giving 1½ gr. pills every two hours for six or eight hours before the expected paroxysm. The advantages were—1. Relapses not so common as under Quinine; 2. Its use is not attended by any of the disagreeable effects of Quinine; 3. It is much cheaper. The action of Camphor is variously described Applied locally for a time to any delicate surface, it will act as an irritant. Its action when taken internally, is chiefly on the nervous system. In moderate doses it will exhilarate, and also allay nervous irritation, and produce quietude and placidity of feeling. Being absorbed into the system, in large doses, or in particular constitutions, the circulation may be affected. It afterwards passes off by the skin and bronchial membranes, but not by the urine; the pulse is increased in fulness, and diaphoresis produced, especially if the patient be covered over; consequent relief of febrile symptoms ensue. But other cases occur, in which sedative effects are perceived. In large doses it acts as a Narcotic, and might be poisonous. It is chiefly useful as a Calmative and Anodyne in various Nervous, especially Hysterical, affections, in doses of gr. v.—gr. x., and in some Nervous and Typhoid fevers. Camphor wood is considered valuable for the construction of chests and almirahs, as its powerful odour protects the contents from the ravages of white ants and other insects.—*O'Sh. page* 545.

(2325) CAMPHORA, a genus of plants belonging to the natural order *Lauraceæ*. This genus was constituted by Nees von Esenbeck for the *Laurus Camphorifera* of Kämpfer. the plant which yields the Camphor of commerce.—*Engl. Cyc. page* 735.

(2326) CAMPHORA GLANDULIFERA.—Sassafras of Nipal. This product was described in the Transactions of the Bengal Medical and Physical Society. The bark corresponds precisely in appearance, chemical properties, odour and stimulating effects, with the Sassafras bark (Laurus Sassafras) of European pharmacy. It is perhaps the bark of the Camphora glandulifera of Nipal.—*Royle, page* 324. *O'Shaughnessy, page* 545

(2327) CAMPHORA OFFICINALIS, the Camphor Laurel, is a tree with lax smooth branches; the leaves are bright-green and shiny above, paler beneath, and somewhat coriaceous, with a sunken gland at the axils of the principal veins, projecting at the upper side, opening by an oval pore beneath. This plant is a native of Japan and China, and is cultivated in most of the warmer parts of the world. The chief part of the Camphor of commerce is yielded by this tree, which is cultivated most extensively in the island of Formosa, from whence it is taken to Canton, which is the principal market for Camphor.—*Eng. Cyc. page* 735.

(2328) CAMPHOR-WOOD. The camphor-tree of Sumatra is the Dryobalanops camphora, of which the wood is hard, compact and brownish-coloured. The fragrant light coloured soft wood of which the trunks and boxes from China are made, is supposed to be that of the Camphor tree of Japan, Laurus Camphora, or Camphora officinalis. One or more of the tribe of Laurels yield the Sirevabali wood of Guiana, which is light, fragrant, and much used in the building of boats.—*Holt.* The Martaban Camphor-wood *Laurus* (Sassafras) is a very large tree, scattered sparsely throughout the Tenasserim provinces. Wallich wrote that it was very like *Laurus glandulifera*, which furnishes the sassafras, and camphor-wood of Nepaul. The Karens call it the "tree galanga," from its fragrance.—*Mason*

(2329) CAMWOOD. A red dye-wood of a very fine colour, obtained from Sierra Leone. It is chiefly used in turnery for knife-handles, and similar articles. Camwood, *Baphia nitida*, red sanders wood, barwood, and other dry woods are found in great quanties in many parts of Africa. In 1849, 216 tons were imported into Liverpool, from Sierra Leone, worth £ 20 to £25 per ton. The dyes of Africa are found to resist both acids and light, properties which no other dyes seem to possess in the same degree. About thirty miles east of Bassia Cove, in the republic of Liberia, is the commencement of a region of unknown extent, where scarcely any tree is seen except the camwood. This boundless forest of wealth, as yet untouched, is easily accessible from that settlement; roads can be opened to it with little expense, and the neighbouring kings would probably give their co-operation to a measure so vastly beneficial to themselves. It is impossible to ascertain the exact amount of export of these commodities to Europe and the United States, but it is very great, and employs a large amount of vessels. One Liverpool house imported 600 tons in a single year, worth £ 9,000. In 1841 upwards of 3,000 tons of dye woods were imported into Liverpool from

the western coast of Africa. Camwood is used as a mordaunt and for producing the bright red colour seen in English Bandana handkerchiefs. —*Simmonds' Commil. Product, p.* 445.

(2330) CANARA. At the Madras Exhibition of 1855, a very extensive collection of medicinal substances, illustrating the Native Pharmacopœia of Western India, was forwarded by the Local Committee of Canara. This collection, not limited to indigenous products, contained not a few articles imported from Arabia and elsewhere. Amongst the drugs were *gamboge, catechu, dikkamully* gum, *cubebs, colocynth, assafœtida, wood oil,* (dipterocarpus) *cocculus cordifolius, sphæranthus ?, plumbago zeylanica, acorus calamus, guilandina bondnc, argemone mexicana, cannabis indica, cyperus ?, fish oil, cocum butter,* and *sago.*— *Madras Ex. J. R.*

(2331) CANARIUM BENGALENSE. (*Roxb. Fl. Ind.* vol. iii. p 136.) According to Roxburgh, this is an immense forest tree, a native of Sylhet and the adjacent mountainous countries, and flowering in May and June. From fissures or wounds in the bark, a large quantity of very pure, clear, amber-coloured resin exudes, which soon becomes hard and brittle, and is not unlike copal; yet the natives set little or no value on it. In the Calcutta bazar it is only valued at from 2 to 3 Rs. for seven maunds of eighty pounds each. Roxburgh does not mention the native name of this resin.—*O'Shaughnessy, page* 285.

(2332) CANARIUM COMMUNE. (*Roxb. Fl. Ind.* vol. iii. p. 137.) A native of the continent of India, the Archipelago, and Isle of France, where it is called *Bois de colophane.* It was brought from the Moluccas to the Botanic Garden of Calcutta, but in Roxburgh's time did not thrive, owing to the coldness of the winter months. The bark yields an abundance of limpid oil with a pungent turpentine smell, congealing into a buttery camphoraceous mass, (*Lind. Fl. Med.* p. 170.) The writer adds, that it has the same properties as balsam of copaiba; and is said to yield East Indian elemi. —*O'Shaughnessy, page* 288.

(2333) CANARIUM GENICULATUM. This is a large and valuable timber tree found in the Pegu valley, but it is scarce. Wood, white colored, adapted to every purpose of house-building.—*McClelland.*

(2334) CANARY SEED. The produce of an annual grass cultivated in different parts of Great Britain, and used as food for singing birds.— *Faulkner.*

(2335) CANARY WOOD. A fancy wood of a golden yellow colour.—*Faulkner.*

(2336) CANAVALIA GLADIATA. *Dolichos gladiatus.* Sword Bean. The sword bean is planted to a small extent, and its young pods are used as a vegetable.—*Mason.*

(2337) CANAVALIA VIROSA. Wild sword bean. On the sea shore of the Tenasserim provinces, a wild species of sword bean is found growing in great profusion.—*Mason.*

(2338) CANCER, a genus of Short-Tailed *Crustacea,* the type of the family Canceridæ. Dr. Leach restricted the genus Cancer to the form of *Cancer Pagurus,* Linn., the large eatable Crab of English coasts, which was, when he defined the genus, the only species known. The genus *Cancer* of Linnæus included a large number of species, and the term Crab, which is a translation of it, is in common parlance applied to the great bulk of the Brachyurous Crustaceans. For the Blood-spotted Crab of the Asiatic seas (*Cancer maculatus.* Linn. &c.) and the Coralline Crab (*Cancer corallinus.* Fabr.), Dr. Leach instituted the genus *Carpilius,* characterised by the existence of a single tooth on the border of the carapace, and by the tridentated front; and, for the Eleven Toothed Crab (*Cancer* undecimdentatus, Fabr.) —*Engl. Cyc. page* 741. Ainslie gives the following vernacular names for C. pagurus. Kaddel Nundoo కడల్ నండు ⑥, *Tam.*, Dirya ka kekra, *Duk.*, Catan, *Malay*, Samoodrapoo Nundrakaya, *Tel.* —*Ains. Mat. Med. p.* 156.

(2339) CANDLES.

Kaarzen, DUT.	Candela, LAT.
Chandelle, FR.	Velas. PORT.
Lichter, Kerzen, GER.	Swjetschi, RUS.
Butty, GUZ. HIND.	Velas, SP.
Candelle, IT.	

Candles are manufactured from tallow, bleached bees-wax, spermaceti, the concrete part of cocoanut oil. A candle is a cylinder or slightly conical rod formed of solid fat, in the axis of which a bundle of parallel, twisted or woven fibres is enclosed. It is necessary to the due comprehension of some of the details of candle-making to enter briefly into the chemistry of fats and oils, substances of first-rate importance to the welfare of a country, the large proportion of carbon contained in them rendering them valuable sources of food and artificial light. Most fats and fixed oils, vegetable and animal, are mixtures of two, and generally three distinct compounds, each of which taken singly has all the properties of fats. The first of these substances, called *stearine,* (from στέαρ, tallow or suet,) is solid at common temperatures; it constitutes the solid fatty ingredient in mutton-tallow; the second is *oleine,* (from ἔλαιον, *oleum,* oil,) and is liquid at ordinary temperatures, and down to the temperature of freezing water: the third substance is named *margarine,* (from μαργάρον, a pearl,) on account of its mother-of-pearl lustre: it is solid at ordinary temperatures. All fats may therefore be regarded as mixtures of the fluid oleine with the solid stearine of margarine. If the solid be in larger proportion than the fluid, as in various kinds of tallow, it requires a greater degree of heat to melt it. If the fluid portion

prevails, as in the oils, the melting point is lowered. The chief material used in making candles is tallow. This substance is the concrete fat of oxen, deer, sheep, and other large quadrupeds, separated from the fibrous matter which accompanies it. There are two principal varieties of tallow, arranged according to their purity and consistence into *candle* and *soap tallow*. It is generally sufficiently pure for soap-making without previous preparation. Candles are also made in very great numbers from palm oil. This substance is obtained from the western coast of Africa, south of Fernando Po, from the fruit of the oil palm (*Elais guineensis.*) Such are the chief materials used in the manufacture of candles. Ordinary candles are made of tallow, and are either *dipped* or *moulded*. Mutton-suet with a proportion of ox-tallow is used for mould candles, which are required to be hard, and to have a glassy surface. Coarse tallow is used for *dips*. The wicks used for the best candles are cotton rovings imported from Turkey. Wax is not adapted for moulding, in consequence of the contraction which it undergoes in cooling, and the tenacity with which it adheres to the sides of the moulds, but candles are made of it in the following manner :—A set of wicks properly cut and twisted, and warmed at a stove, are attached to a ring of wood or metal, and suspended over a basin of melted wax, which is taken up by a large ladle and poured on the tops of the wicks, each wick being kept constantly twisted round its axis by the fingers ; the wax in running down adheres to the wicks, and completely covers them. This process is repeated at intervals until a sufficient thickness is attained. The candles are then rolled while hot with a flat surface of box-wood upon a smooth table of walnut-wood kept constantly wet ; this makes them truly cylindrical. This basting, twisting of the wicks and rolling, is sometimes repeated two or three times before the candles are finished, but a skiful workman will cover the wicks with the proper quantity of wax without taking them down. If a wax candle be broken across, the annular layers, like the yearly rings in wood, can be easily counted, and their number indicates the number of times the wax, has been poured over the wick. The large wax candles used in Roman Catholic churches are made by placing a wick upon a slab of wax bending this together and then rolling it. The long, thin, coiled wax tapers are made in the following manner :—the wick, which must be uniform, is wound round a drum, from which it is passed into the wax pan, at the bottom of which is fixed a guiding roller, and from thence through a drawing plate to a second drum. The drawing plate is of metal, and is similar to that used in wire-drawing : the holes in it correspond in size to the diameter of the taper, and the wick is passed through smaller and smaller holes until it is of the proper thickness. Rush-lights are made in the same manner as dip candles. *Tomlinson, page* 290. Wax candles of an inferior description have long been made in the town of Vizagapatam. Of late years the large importations of candles from Europe have caused the manufacture to deteriorate considerably. Wax candles are made in Goa and Malabar, whence they are sometimes imported into Bombay ; but English, French, and German candles are the kinds that are in general use in India. The usual price of the best Wax candles made at Vizagapatam, in 1838, was about 8 annas a pound, they are also made at Peddapore, at Berhampore and other parts, they are generally of very irregular shapes. It is a great improvement to place two thin instead of one thick wick in each, and the wicks should be plaited not twisted. Wax candles improve with age.—*Rhode M.S.S.*

(2340) CANDY (Sugar).

Kurree-shakur, Hind. Guz. | Nabhat, Pers.

A preparation of sugar made by melting and crystallising it several times. Sugar-candy is largely imported in tubs from China into Bombay.

(2341) CANES.

Nathur, Guz. | Bate, Hind.

Canes are the produce of the "Calamus" genus of palms. Their origin and the several varieties have been described at some length under the article "Calamus," which see. The species of Calamus are numerous in the Islands of the Indian Archipelago, as well as in the Malayan Peninsula. A few species are found within the Madras territories, but in India they chiefly abound in the forests of the districts of Chittagong, Silhet, and Assam, whence they extend along the foot of the Himalayas as far north as the Deyra Doon, where a species is found which the late Mr. Griffith has named *C. Royleanus*, and applied the name of *C. Roxburghii* to the plant which Dr. Roxburgh called *C. Rotang* common in Bengal and on the Coromandel Coast. Both are called *bet*, and used for all the ordinary purposes of cane ; as are *C. tenuis* of Assam, *C. gracilis*, *C. extensus*, and others. *C. Scipionum* of Loureiro, Mr. Griffith considered to be the species which yields the well-known Malacca Cane, but the plant does not appear about Malacca. He was, however, informed that the canes are imported from Siak, on the opposite coast of Sumatra. The stem of *Calamus verus* is described as being 100 feet long, that of *C. oblongus* 300 to 400 feet, of *C. rudentum* upwards of 500 feet, and of *C. extensus* as much as 600 feet ; Rumphius even states that one kind attains the extraordinary length of 1200 feet (vol. v. 100). It is not possible to say from what particular species the canes of the shops are gathered indiscriminately ; *C. rotang* has however been said to furnish the stouter, and *C. Scipionum* the slenderer sorts. Mr. Mason adds, that in the Tenasserim Provinces, cane

or ratan is used extensively by the natives instead of cordage. The stays of the masts in native boats are usually made of ratans, and they are split up into strings for the innumerable purposes to which cord and twine are usually applied. All that gives stability to bamboo houses, is the ratan which ties them together. There are numerous species indigenous in the forest, and the Karens have different names for seventeen species or varieties.—*Mason.* The Calamus rudentum of Loureiro is manufactured at Malacca into cables, and is employed for dragging great weights and binding wild elephants. See CALAMUS.

(2342) CANIS, a genus of Carnivorous *Mammalia*, of which the common dog may be regarded as the type. Under the Linnæan genus *Canis* are to be found the Dogs (*Canis familiaris*); the Wolves (*Canis Lupus*); the Hyænas (*Canis Hyæna*); the Foxes (*Canis Vulpes*), &c.; the Jackals (*Canis aureus*); the Mexican Wolf (*Canis Mexicanus*), Xoloitzcuintli of Hernandez; and *Canis Thous* of Surinam. M. Lesson in his 'Manuel' begins the second section of the Digitigrades with the genus *Canis*, and he adopts the following subdivisions:—1. Those genera which have the pupil of the eye round, including the Dogs properly so called, the Wolves, and the Jackals. 2. Those genera in which the pupil of the eye contracts vertically, the Foxes and the Zerdas. 3. The Dogs with Hyæna-like feet, the Hyæna-Dog. *Canis pictus*, Desm., *Hyæna picta*, Temm., *Lycaon*, Brookes. The genus *Canis* being mostly restricted at the present day to the animals of Lesson's first section, this article will be confined to the animals commonly called Dogs, Wolves, and Jackals. *Canis familiaris.* The specific description given by Linnæus is simply "Canis caudâ (sinistrosum) recurvatâ"—"dog with tail curled towards the left." Cuvier observes that the Domestic Dog is distinguished by its recurved tail, and that it varies infinitely besides in stature, form, colour, and the quality of the hair. It exhibits, he adds, "the most singular, the most complete, and the most useful conquest that man has made. The whole species is become our property; each individual is entirely devoted to his master, adopts his manners, distinguishes and defends his property, and remains attached to him even unto death; and all this springs not from mere necessity, nor from constraint, but simply from reconnaissance and a true friendship. The swiftness, the strength, and the highly developed power of smelling of the dog, have made him a powerful ally of man against the other animals, and were perhaps necessary to the establishment of society. It is the only animal that has followed man all over the earth." It is a question of considerable interest as to what was the parent-stock of the dog. Some zoologists are of opinion that the breed is derived from the Wolf; others that it is a familiraised Jackal; all agree that no trace of it is to be found in a primitive state of nature. That there were dogs or rather animals of the canine form in Europe long ago we have evidence from their remains, which we shall presently notice; and that there are wild dogs we know. India, for example, affords many of them, living in a state of complete independence, and without any indication of a wish to approach the dwellings of man. These dogs, though they have been accurately noticed by competent observers, do not throw much light on the question. They may have escaped from the dominion or half dominion of man, and have betaken themselves to a vagabond life. It becomes necessary however to examine into the state of these dogs, some of which are entirely wild and keep to the mountain and forest, whilst others hang about the villages, and though without owners give tokens of a more social disposition, and are tolerated as the scavengers of the place, which they clear of disgusting incumbrances, somewhat after the Portuguese fashion. Colonel Sykes thus describes the Deccan Dog, *Canis Dukhunensis*, Sykes, Kolsun of the Mahrattas, *Cuon Dukhunensis*:—"Red, paler underneath; tail bushy, pendulous; pupil rounded. This is the Wild Dog of the Deccan. Its head is compressed and elongated; its nose not very sharp, the eyes are oblique: the pupils round, irides light brown. The expression of the countenance that of a coarse ill-natured Persian Grayhound, without any resemblance to the Jackal, the Fox, or the Wolf, and in consequence essentially distinct from the *Canis Quao* or *Sumatrensis* of General Hardwicke. Ears long, erect, somewhat rounded at the top, without any replication of the tragus. Limbs remarkably large and strong in relation to the bulk of the animal, its size being intermediate between the Wolf and the Jackal. Neck long. Body elongated. Between the eyes and nose red brown: end of the tail blackish. From the tip of the nose to the insertion of the tail 33 inches in length: tail 8½ inches. Height of the shoulders 16½ inches." Colonel Sykes adds that none of the domesticated dogs of Dukhun are common to Europe. The first in strength and size is the Brinjaree Dog, somewhat resembling the Persian Grayhound but much more powerful. The Pariah Dog, he states, is referrible to M. Cuvier's second section. This is very numerous, not individual property, but breeds in the towns and villages unmolested. The Colonel remarks that the Turnspit Dog, long backed, with short crooked legs, is frequently found among the Pariahs. There is also a petted minute variety of the Pariah Dog, usually of a white colour, and with long silky hair, corresponding to a common Lapdog of Europe; this is taught to carry flambeaux and lanterns. The last variety noticed is the dog with hair so short as to appear naked like the *Canis Ægyptius.* It is known to Europeans by the name of the Poly-

gar Dog. ('Zool. Proc.,' part i.) In 1832 the skin of the Wild Dog of Nepaul was compared by Colonel Sykes with a specimen of the Kolsun of the Mahrattas above described, and he stated his impression to be that the animals are identical, differing only by the denser coat and more woolly feet of the Nepaul race, a difference readily accounted for by the greater cold of the elevated regions inhabited by it. Colonel Sykes is also of opinion that the Kolsun is identical with the Buansuah, an Indian Dog, described by Mr. B. H. Hodgson under the name of *Cuon primævus*. Specimens of these dogs are to be seen in the British Museum, in the Catalogue of which institution they are not only made specifically distinct, but are placed under the genus Cuon as distinct from *Canis*. Mr. Bell, in his 'History of British Quadrupeds,' discusses the question of origin. "In order," says Mr. Bell, "to come to any rational conclusion on this head, it will be necessary to ascertain to what type the animal approaches most nearly, after having for many successive generations existed in a wild state, removed from the influence of domestication and of association with mankind. Now we find that there are several different instances of the existence of dogs in such a state of wildness as to have lost even that common character of domestication, variety of colour and marking. Of these, two very remarkable ones are the Dhole of India and the Dingo of Australia: there is besides a half reclaimed race amongst the Indians of North America; and another also partially tamed in South America which deserve attention; and it is found that these races in different degrees, and in a greater degree as they are more wild, exhibit the lank and gaunt form, the lengthened limbs, the long and slender muzzle, and the great comparative strength which characterise the wolf; and that the tail of the Australian dog, which may be considered as the most remote from a state of domestication, assumes the slightly bushy form of that animal.—*Eng. Cyc. page* 742. The Esquimaux Dog (*Canis familiaris Borealis*), and the Hare-Indian or Mackenzie River Dog (*Canis familiaris Lagopus*), will occur as instances to those who have been familiar—and who is not?—with the histories of our northern expeditions and the Garden of the Zoological Society of London in the Regent's Park. In that menagerie the three dogs last named might at one time be seen side by side. The period, says Mr. Bell, "at which the domestication of the dog first took place is wholly lost in the mist of antiquity. The earliest mention of it in the sacred Scriptures occurs during the sojourn of the Israelites in Egypt—'But against Israel shall not a dog move his tongue.' It is again mentioned in the Mosaic law in a manner which would seem to show that they were the common scavengers of the Israelitish camp, as they are still in many of the cities of the East:—'Neither shall he eat any flesh that is torn of beasts in the field: ye shall cast it to the dogs.' A similar office seems to be repeatedly alluded to in the course of the Jewish history. The Shepherd's Dog, a variety which was most probably one of the first that civilised and settled man called in aid to preserve his flocks from beasts and birds of prey and the depredations of roving human tribes, is remarkable for the capacity of its cranium and its great sagacity. We give the gigantic Tibet Dog as a fine example of the Mastiffs. Dr. Wallich gave to Mr. Broderip the data which enabled the latter to write the following account:—"These noble animals are the watch-dogs of the table-land of the Himalaya Mountains, about Tibet. Their masters, the Bhoteas, to whom they are most strongly attached, are a singular race, of a ruddy copper-colour, indicating the bracing air which they breathe, rather short, but of an excellent disposition. Their clothing is adapted to the cold climate they inhabit, and consists of fur and woollen cloth. The men till the ground and keep sheep, and at certain seasons come down to trade, bringing borax, tincal, and musk, for sale. They sometimes penetrate as far as Calcutta. On these occasions the women remain at home with the dogs, and the encampment is watched by the latter, which have an almost irreconcileable aversion to Europeans, and in general fly ferociously at a white face. A warmer climate relaxes all their energies, and they dwindle even in the valley of Nepaul." Some specimens were taken to England by Dr. Wallich; they were placed in the Zoological Society's Garden in the Regent's Park, but died soon after their arrival. The Hon. Edward Gardner, British resident at the court of the Raja of Nepaul, never heard of any other instance of this variety being domesticated by Europeans. In all the varieties of the domestic dog the period of gestation is 63 days. The litter is generally numerous, often as many as eight or nine. The whelps are born blind, and do not see till nine days are fully expired: they sometimes see on the tenth, and sometimes not till the twelfth day. At the fourth month the teeth begin to change, and at two years the growth of the animal is considered complete. A dog is considered old at the expiration of five years, and the limits of his existence rarely exceed 20 years. It is confidently stated that in all the varieties, if a Dog has any white on any part of his tail, that colour will invariably be found at the tip. *Canis Lupus* (Linnæus), the Wolf. Lieutenant Colonel Hamilton Smith makes *Lupus* the first section of his first sub-genus *Chaon*, of the Diurnal *Canidæ*, or Canine group furnished with a round pupil of the eye. Several varieties or species of Wolf are met with in Asia. The Landgah, or Indian Wolf, is the *Canis pallipes* of Sykes, and the *Saccalius Indi-*

cus of Hodgson. It is an inhabitant of Nepaul. Of the Indian wolves, one, the Beriah, is described as being of a light fox-colour inclining to dun, not larger than a grayhound, slenderly made, but bony; the head and ears long, like those of a Jackal, and the tail long, but not very hairy; the other, which is smaller, Colonel Smith refers to his Lyciscan group. The last-named Zoologist refers the black Derboun of the mountains of Arabia and the south of Syria to the Wolf. *Canis aureus* (Linnæus), the Jackal, or Tschakkal, Chacal or Loup Doré of the French, Adive of Buffon. It is an inhabitant of India, other parts of Asia, and Africa. Cuvier says that Jackals are met with from India and the environs of the Caspian Sea to Guinea, but that it is not certain that they are all of the same species. The habits of the Jackal are gregarious hunting in packs, and the pests of the countries where they are found, and where they burrow in the earth. In their huntings the Jackals will frequently attack the larger quadrupeds, but the smaller animals and the poultry are their most frequent prey. The offensive odour of the Jackal has been given as one of the reasons against reducing it to a state of domestication. We do not see what advantage is to be derived from such a process, but if it were desirable that objection it seems would not hold. Colonel Sykes, who notices it as the Kholah of the Mahrattas and as being numerous in Dukhun (Deccan), had in his possession at the same time a very large wild male and a domesticated female. The odour of the wild animal was almost unbearable; that of the domesticated Jackal was scarcely perceptible.—*Engl. Cyc. p.* 757.

(2343) CANNA, a genus of plants belonging to the natural order *Marantaceæ*. There are several species of this genus, all of which are known by the name of Indian Shot. They are inhabitants of South America and of the East Indies.—*Engl. Cyc. p.* 758.

(2344) CANNA EDULIS has smooth leaves and stems coloured at the base, the roots tuberous and large, the middle segment of the corolla very short. This is one of the species of the order the rootstock of which is used for making arrowroot. Nearly all the species contain starch in the rootstock, which renders them fit to be used as food after being cooked. The starch is separated by tearing the rootstock in pieces and submitting it to the action of water. The water with the starch suspended is poured off from the ligneous portion of the rootstock, and the starch is afterwards allowed to subside.—*Engl. Cyc.p.* 758.

(2345) CANNA INDICA. Lin. The plant itself, is the Krishna tamara of the Telingas, and the Katu-bala of the Hortus Malabaricus.—*Ains. Mat. Med. p.* 142. Its Bead seed is,

Kull valei munnie, TAM.	Sabba jaya, HIND.
Ukkilbar ke munkeh, DUK.	Seelarumba, SANS.

Canna In dica has the inner limb of the corolla trifid, the segments lanceolate, acuminate, straight.—*Engl. Cyc. p.* 758. There are several varieties of this; the colours of the flowers scarlet, orange, red and yellow mixed, they blossom throughout the year and are cultivated by dividing the roots or by seed: the latter should be sown whilst fresh, or if otherwise they will require to be soaked for a few hours in water; a good common soil is all that is requisite.—*Riddell.* The seeds of most of the species are round, black, shining, hard, heavy, and about the sixteenth of an inch in diameter, resembling shot, for which they are sometimes used as a substitute. They are roasted and employed in infusion in the same manner as coffee. They yield also a purple dye.—*Engl. Cyc. p.* 758. With the round, hard, black seeds, contained in the hairy pericarpe of the Canna Indica the natives make necklaces and other ornaments. In the Tenasserim Provinces, both the red and yellow varieties of Indian shot are often seen in gardens, and the first is much cultivated by the Burmese for the seeds which they use for sacred beads.—*Mason.*

(2346) CANNABIS SATIVA, and its variety *C. indica.* The Hemp appears to be a plant of the Persian region, where it is subjected to great cold in winter, and to considerable heat in summer. It has thus been able to travel on one hand into Europe, and on the other into India; so that the varieties produced by climate have by some been thought to be distinct species, the European being called *C. sativa*, and the Indian *C. indica.* The name κανναβις, by which it was known to the Greeks, seems to be derived from the Arabic *kinnub*, the *canape* of the middle ages, Dutch *hinnup* and *kinnup*, German *hanf*, whence the English *hemp.* Herodotus mentions it as Scythian. Bieberstein met with it in Tauria and the Caucasian region. It is well known in Bokhara, Persia, and abundant in the Himalayas. Its resin seems to have been employed as an intoxicating substance in Asia and Egypt from very early times, and even in medicine in Europe in former times, as we find it notieed in Dale (*Pharmacologia*, i. 133) and Murray (*Apparat. Medicaminum*, iv. p 608—620), where it is arranged, as in this work, next to the Humulus. It has of late years been brought into European notice by Dr. O'Shaughnessy. The Indian plant has by some, been thought to be a species distinct from the European one; but, like Dr. Roxburgh and others, Dr. Royle was unable, when in India, to observe any difference between the plant of the plains and that of the hills of India, nor between these and the European plant. The Indian secretes a much larger proportion of resin than is observable in the European plant, but a difference is observed in this point in India between plants grown in the plains, and those of

the mountains, and also when grown thickly together. The natives plant them wide apart, to enable them to secrete their full powers. In Europe, the thick sowing, and moister, often dull, climate will prevent the due secretion of the peculiar principles of a plant of the Persian region. "The leaves are sometimes smoked in India, and occasionally added to tobacco, but are chiefly employed for making *bhang* and *subzee*, of which the intoxicating powers are so well known. But a peculiar substance is yielded by the plants on the hills, in the form of a glandular secretion, which is collected by the natives pressing the upper part of the young plant between the palms of their hands, and then scraping off the secretion which adheres. This is well known in India by the name of *churrus*, and is considered more intoxicating than any other preparation of the plant; which is so highly esteemed by many Asiatics, and serves them both for wine and opium: it has, in consequence, a variety of names applied to it in Arabic, some of which were translated to Dr. Royle as "grass of faqueers," "leaf of delusion," "increaser of pleasure," "exciter of desire," "cementer of friendship," &c. Linnæus was well acquainted with its "vis narcotica, phantastica, dementens," (anodyna et repellens). It is as likely as any other to have been the *Nepenthes* of Homer.—*Royle p.* 569. Dr. O'Shaughnessy remarks that in certain seasons and in warm countries a resinous juice exudes and concretes on the leaves, slender stems, and flowers. Separated and in masses, this juice constitutes the *Churrus* of Nipal and Hindostan, and to this, the type or basis of all the hemp preparations, are the powers of these drugs attributable. In Central India and the Saugor territory and in Nipal, *Churrus* is collected during the hot season in the following singular manner:—men clad in leathern dresses run through the hemp-fields brushing through the plant with all possible violence; the soft resin adheres to the leather, and is subsequently scraped off and kneaded into balls, which sell from five to six rupees the seer. A still finer kind, the *Momeea* or waxen *Churrus*, is collected by the hand in Nipal, and sells for nearly double the price of the ordinary kind. In Nipal, Dr. McKinnon informs us, that the leathern attire is dispensed with, and the resin is gathered on the skins of naked coolies. In Persia, it is stated by Mirza Abdul Russac, that the *Churrus* is prepared by pressing the resinous plant on coarse cloths, and then scraping it from these and melting it in a pot with a little warm water. He considers the *Churrus* of Herat as the best and most powerful of all the varieties of the drug. The dried Hemp plant which has flowered, and *from which the resin has not been removed*, is called *Ganjah*. It sells for twelve annas to one rupee the seer in the Calcutta bazars, and yields to alcohol twenty per 100 of resinous extract, composed of the resin (*Churrus*), and green colouring matter (*chlorophylle.*) Distilled with a large quantity of water, traces of essential oil pass over, and the distilled liquor has the powerful narcotic odour of the plant. The *Ganjah* is sold for smoking chiefly. The bundles of *Ganjah* are about two feet long and three inches in diameter, and contain twenty-four plants. The colour is dusky green—the odour agreeably narcotic—the whole plant resinous, and adhesive to the touch. According to Mr. McCann's notes, the *Ganjah* consumed in Bengal is chiefly brought from Mirzapur, and Gazeepur being extensively cultivated near Gwalior and in Tirhoot. The natives cut the plant when in flower, allow it to dry for three days, and then lay it in bundles averaging one seer weight, which are distributed to the licensed dealers. The best kinds are brought from Gwalior and Bhurtpore, and it is also cultivated, of good quality in a few gardens round Calcutta. In Jessore, we are informed, the drug is produced of excellent quality, and to a very considerable extent of cultivation. The larger leaves and capsules without stalks, are called "*Bang*, *Subzee*, or *Sidhee*." They are used for making an intoxicating drink, for smoking, and in the conserve or confection termed *Majoon*. *Bang* is cheaper than *Ganjah*, and though less powerful, is sold at such a low price that for one pice enough can be purchased to intoxicate an "habituated person." *Sidhee*, *Subjee*, and *Bang* (synonomous) are used with water as a drink, which is thus prepared:—About three tola weight (540 troy grains) are well washed with cold water, then rubbed to powder, mixed with black pepper, cucumber, and melon seeds, sugar, half a pint of milk, and an equal quantity of water. This is considered sufficient to intoxicate an habituated person. Half the quantity is enough for a novice. This composition is chiefly used by the Mahomedans of the better classes. The same quantity of *Sidhee* is washed and ground, mixed with black pepper, and a quart of cold water added. This is drank at one sitting. This is the favourite beverage of the Hindus who practice this vice, especially the Brijobassies and many of the Rajpootana soldiery. —*O'Shaughnessy, page* 582. It is from its possessing a remarkably tough kind of woody tissue capable of being manufactured into linen and cordage, that hemp is best known; and for its good qualities in this respect it is unrivalled among the many plants possessing similar properties. See HEMP.

(2347) CANNONS.

Kanonen, DUT.	Top, PERS.
Canons, FR.	Canhoes, PORT.
Kanonen, GER.	Puschki, RUS.
Top, HIND.	Canones, SP.
Cannoni, IT.	Kanon, SW.

Are long, hollow engines, for throwing iron, lead, or stone balls, by the force of gun-powder. —*Faulkner.*

(2348) CANTHARIDES, BLISTER BEETLE, SPANISH FLIES. *Latreille.* Class INSECTA. Order *Coleoptera.*

Cantharides, Mouches d'-espagne, FR.	Cantharis, LAT.
Spanische Fliegen, GER.	Hischpanskie muchi, RUS.
Canterelle, IT.	Cantaridas, SP.

The name *κανθαρις* was applied by the Greeks to a species of Coleopterous Insect which possessed the properties of the officinal Blistering Beetle, but it was distinguished by *yellow* transverse bands. This is the characteristic of species of Mylabris, one of which, *M. Fusseleni*, occurs in the south of Europe, and another, *M. Cichorii* (fig. 96,4), in Syria, and apparently throughout the East. In India it is called *telee* and *telee mukhee*, or the Oily Fly, no doubt from the oil-like exudation which the insects of this genus give out from the articulations of their legs when seized. Another species, *M. Trianthema*, is mentioned by Dr. Fleming, and the *Lytta gigas*, Fab. is found there as well as in Senegal. One is mentioned by the Arabs under the name of *zurareh*. It is not known when the officinal Blistering Fly came to be used, but it has had a variety of names. It was called *Meloe vesicatorius* by Linnæus, *Lytta vesicatoria* by Fabricius, and *Cantharis vesicatoria* by Geoffroy, and now by the Pharmacopœias. Geoffroy grouped the Vesicatory Beetles in a small tribe corresponding nearly with the Linnean genus Meloe, and distinguished it by the title Cantharideæ. This he divides into eleven genera, among which are *Cantharis*, *Mylabris*, and *Meloe*, all of which species have been employed as vesicatories. *Meloe majalis*, or May-worm, is a specimen of the genus.—*Royle.*

(2349) CANTHARIS VESICATORIA, is of an elongated, almost cylindrical form, from 6 to 10 lines in length by about 2 in breadth, the male somewhat smaller than the female. It is easily distinguished by its two beautiful elytra or wing-cases, which are long and flexible and of a shining golden green colour, and cover two thin brownish membranous wings. The head is large and sub-cordate, with a longitudinal furrow along the head and the thorax: this is not larger than the head, rather quadrate. Its thorax chiefly, but also the rest of the body covered with whitish gray hairs; antennæ black, long, simple filiform. The maxillæ support the jointed palpæ, of which the terminal joint is somewhat ovate. The legs are from 4 to 6 lines long, smooth, 5 joints to the first pair of the tarsi, and 4 only to the last, all violaceous. Single spine on leg and notch in tarsus. The last joint of tarsus with a pair of claws, each of which is bifid. Near the anus of the female are two articulated caudal appendages somewhat similar to palpi.—It abounds in the S. of France, Spain and Italy; and it has spread into Germany and the S. of Russia. It is found upon the Ash, Lilac and Privet especially, but also upon the Elder and Honeysuckle, more rarely on the Plum-tree, Rose, Willow, and Elm. M. Farines states, that the insects produced in warm places, and such as are exposed to the sun, are most energetic. Cantharides are stated not to live above eight or ten days. When alive, they exhale a strong, fœtid, and penetrating odour by which their presence is readily detected, and so offensive, that public walks sometimes become deserted until they have disappeared. They are usually caught early in the morning, when persons with covered hands and faces shake them off the trees, plunge them into vinegar, or expose them in sieves to the vapour of vinegar, and then dry them in the sun or in warmed apartments. They should be preserved in well stoppered bottles, as they are subject to be destroyed by other insects, introducing with them a little Alcohol, Petroleum, Camphor, Chloride of Lime (*Derheims*), or Pyroligneous acid (*M Farines*), as it is preferable to employ fresh, well-dried, and smooth, not dusty, insects. They long preserve their form and colour, also to some extent the disagreeable odour of the living insect, and have an acrid burning taste. The powder is of a greyish-brown colour, interspersed with shining particles, which are the fragments of the elytra, head and feet; and, though comparatively inert, these parts are very indestructible, and thus often serve to detect their presence in fatal cases. *Action. Uses.* Narcotic, Acrid Poison; Rubefacient and Irritant; Stimulant Diuretic; sometimes producing inflammation of the urinary organs; but useful in smaller doses in inducing a healthy state of the mucous membrane in chronic gonorrhœa, Leucorrhœa, &c. Best known and most extensively employed for raising Blisters when applied to the skin, in a space of from six to twelve hours sometimes accompanied with the disadvantage of producing painful strangury. The ancients chiefly employed two species of *Mylabris*, one of which, the *Mylabris cichorii*, (*vern.* telini, *Hind.*) has been used for ages, and is so at present by the European and native physicians of India and China. The blistering flies of India are chiefly the Mylabris or Melœ cichorii the Cantharis gigas, and the Cantharis violacea. The *Meloe* or *Mylabris cichorii* (Telini, *Hind.*) is common in the neighbourhood of Dacca, in the Hydrabad country, in Kurnool, and numerous other localities. Dr. Hunter has published a good account of this article in the 5th vol. of the *Transactions of the Asiatic Society*, p. 216. The insect is about an inch long, and $\frac{1}{3}$rd abroad; the elytra or wing coverts are marked with six cross stripes of deep blue and russet brown. The *Ruprestis* of ancient writers is met with in the bazars under the name of the golden fly (*sonamukki*.) The *Cantharis violacea* is often mixed with specimens of *Meloe* in the bazars. The Telini fly, if procured before the mites have commenced its destruction, yields on an average one-third more of cantharidin than

the *Spanish fly* of the European shops. The blue fly is of uncertain strength; the Buprestis, in all the specimens obtained, was quite inert.—A species of Meloe called the *M. trianthema*, from its being usually found on the plant named *Trianthema decandra* (biscopra, *Hind.*) is described by Dr. Fleming. A tincture, acetous tincture, plaster, and ointment of the Meloe cichorii are described in the Bengal Pharmacopœia. Some prejudice exists against the article on account of its alleged excessive severity of action. This is solely owing to the presence of a greater quantity of *Cantharidin* than that contained in the common fly. Diluting the tincture, and adding to the proportion of lard and wax in the plaster and ointment, perfectly assimilate the action of the indigenous and the imported insects.—*O'Shaughnessy, page* 684. At the Madras Exhibition of 1855, specimens of the Indian Blistering beetles, *Mylabris pustulata*, and *punctum* were exhibited by Monsieur Le Docteur Collas of Pondicherry. These were accompanied with a full and interesting report on their blistering properties printed in the "*Moniteur Officiel*" of 2d March 1855. The larger species is *Mylabris pustulata*, and the smaller is *Mylabris punctum*. Both insects are found in large quantities at certain seasons all over Southern India. On account of Dr. Collas' careful researches into the natural history of these beetles, as well as his interesting report, and successful experiments with this therapeutic agent, the Jury awarded him a 2d Class Medal.

(2350) CANTHIUM NITENS? *Rubiaceæ.*

Malay cauray, TAM.

The wood of this, like that of the succeeding, is unknown to me. The plant is described as a small tree. I only know it from the specimens which accompanied the name, but which were not accompanied with timber.—*Wight.*

(2351) CANTHIUM PARVIFLORUM.

Balusoo-kura, TAM.	Burra munga, HIND.
Naga valli, SANS.	Sengarary marum, TAM.
Nulla baloosoo, TEL.	Keernee, CAN.

A common thorny bush throughout India, especially on the Coromandel coast. Its wood is close grained, hard and suited for turning small objects. A decoction of the leaves or root is prescribed in India in dysentery, and is also given in worm cases. About three ounces, being given daily. The fruit and leaves are eaten.—*O'Shaughnessy, p.* 401.

(2352) CANVASS, SAIL CLOTH.

Zeildock, DUT.	Lona, PORT.
Toile a voile, FR.	Parusnoe polotno, Parusina, RUS.
Segeltuch, GER.	Lona, SP.
Canevazza, Lona, IT.	

Canvass is a woven frabic, made from the fibres of hemp. The word is said to be a corruption of the Latin name for hemp, *cannabis.* The Italians call it *canape.* A finer description of canvass, called *huck-aback*, is made from hemp for towels and common table-cloths. Canvass is manufactured at Pondicherry and at Cuddalore in the South Arcot district of a superior and of an inferior description, and sold in bolts containing 40 yards; the better quality is sold at from 20 to 25 Rupees, and the coarser at 8 to 15 Rupees a bolt. Canvass of excellent quality is manufactured in Travancore. European canvass though much dearer is generally preferred in India to the native material. Europe material selling at Rs. 24-5-6, per bolt, while the ordinary country can he had for Rs. 16. At the Madras Exhibition of 1855, Mr. Underwood exhibited fibres of the Agave Americana in a number of different stages of preparation, as in dressed fibre, plain and colored yarns, cloth, and damask, checked, colored, and striped canvas, imitation horse hair cloth and tabaret, all made from the same fibre. Dr. Riddell exhibited some good plain and penelope canvas, colored cloth, brushes, white and colored ladies' shoes made from the fibres of the Agave Americana. The canvas and ladies shoes were of excellent quality, and the cloth of brilliant colors—*M. E. J. R.* A coarse description of very hard brown canvas has been for some time produced in Bengal. At present in some parts of the Madras presidency, cotton canvas of very good quality is produced: two or more threads are placed together, sometimes the threads of the web are twisted either wet or dry. Native vessels have all their sails made of an inferior description obtained at the rate of 6 to 8 Rupees a maund of 25 lbs. in the northern parts of Madras Presidency. The better description would probably be more suitable than European canvas for sails which are only occasionally used. If well washed, to get rid of the dressing previous to use, it would be less liable to mildew, would be lighter and more easily handled; but the best could not be procured much under the price of ordinary English canvas.—*Rhode M.S.S.*

(2353) CAOUTCHOUC, ELASTIC GUM, INDIAN RUBBER.

Caoutchou, FR.	Boracha, PORT.
Federharz, GER.	Resina elastica, Ule, SP.

Caoutchouc. One source of this very remarkable substance (also called *elastic resin, elastic gum* or *India-rubber,*) is the syringe-tree of Cayenne and other parts of South America. For the first knowledge in Europe of the source of caoutchouc, we are indebted to some French academicians, who were sent out for the purpose of astronomical observation, in 1735. They discovered that it was the white milky juice of certain plants, found abundantly in Para, in the Brazils, in Quito, and since found in Asia. Of late years, considerable quantities have been brought from Java, Penang, Singapore, and Assam. The trees grow so abundantly in some

places, that hundreds of miles are covered with them. Caoutchouc oozes out as a vegetable milk from incisions made in the tree: it is collected chiefly in wet weather, when it flows most abundantly. The methods of inspissating and indurating it are still said to be kept secret, but this is unlikely: and it appears, that the juice thickens and hardens gradually on exposure to the air, and that, as soon as it becomes solid, it displays an extraordinary degree of flexibility and elasticity. Hence it is supposed that the natives make moulds of clay, or some substance that can be easily broken, and cover them with repeated layers of the juice, allowing each layer to dry before the next is applied. When the proper thickness is attained, the mould with its elastic covering is held over the smoke of a wood fire. The mould is then broken out, and the dried bottle forms the India-rubber of commerce. Mr. Solly, in a paper on the preparation of Caoutchouc, (*Trs. Asiatic Soc., London.*) adverts to the manner in which the sap is prepared for the market, by being laid on to some substance in successive layers, which are allowed to dry. That such is the case is evident on cutting a bottle of caoutchouc: the layers are distinctly visible, and they may even be separated if the mass be soaked in boiling water. It is evident that a great quantity of impurities must be deposited on the surface.—*Tomlinson, page* 297. Another of its sources was discovered in Assam in the beginning of this century and was fully brought into notice by Dr. Royle in 1836.—*Royle Prod. Res.* 76. The plant which yields it there, is the Ficus elastica which might no doubt be cultivated with advantage, and the banyan tribe generally yield a milky juice which, for many purposes to which caoutchouc is applied, might be rendered serviceable. Within a dozen years the true caoutchouc tree of Assam *Ficus elastica* has been introduced into the Tenasserim Provinces, and appears to grow as well as an indigenous plant.—*Mason.* In the Tenasserim Provinces, also, *Echites*, an indigenous creeper yields caoutchouc not at all inferior to that which is obtained from the elastic fig tree. The Agricultural and Horticultural Society, in reporting on a specimen sent them by Major Macfarquhar of Tavoy, observed: "With care in preparing, it would be equal to the best South American." I have never seen the plant in flower, but to judge from the fruit, it belongs to the dogbane tribe, and Echites group, for its seeds are comose above.—*Mason.* Caoutchouc is also procurable from the Nerium grandiflora, a beautiful climbing shrub often met with in gardens. In the *Asiatic Researches*, v. 167 is a description of a plant yielding caoutchouc, the "Urceola elastica" of Sumatra and Pulo Penang: From wounds in the bark of this plant a milky fluid oozes, which separates into an elastic coagulum and watery liquid of no use. This coagulum, after some months keeping, is described as having the properties of Indian rubber. Poisonous properties are attributed to the juice of this plant.—*Rhode M.S.S.* Caoutchouc is also yielded in abundance by *Vahea gummifera*, and Willoughbya edulis, genera of the natural order Apocynaceæ or Dogbanes; and is also produced from the Siphonia elastica. The milky juices of some trees of Malabar might be collected with the view of ascertaining the proportion of caoutchouc in them, and from the Loranthi which abound to an incredible extent in Malabar, a similar substance might readily be procured. Caoutchouc was not known in Europe until the commencement of the last century, and it continued for a long time in comparative obscurity. Few persons are probably aware of the comparatively late introduction of India-rubber into Britain. Dr. Priestly, in the preface of his work on Perspective, printed in 1770, says:—"Since this work was printed off, I have seen a substance [no name is given to it] excellently adapted to the purpose of wiping from paper the marks of a blacklead pencil. It must, therefore, be of singular use to those who practice drawing. It is sold by Mr. Nairne, Mathematical Instrument maker, opposite the Royal Exchange. He sells a cubical piece of about half an inch for three shillings; and he says it will last several years." It was first used for rubbing out the marks of black-lead pencils. Its use was then extended to the preparation of certain varnishes, which it rendered capable of resisting changes of temperature without cracking and scaling off. The facility with which two recently cut and perfectly clean surfaces of caoutchouc weld together, led to its use in the laboratory for the formation of short elastic tubes, which are used as connectors for a variety of apparatus in which separate pieces of glass tubing are thus joined together with flexible joints: they are prepared by wrapping a piece of sheet caoutchouc loosely over a glass tube or rod, and then cutting off the superfluous portion with a pair of scissors, on pressing the fresh cut edges together, they cohere so as to form a perfect tube. Caoutchouc is also used in the preparation of certain surgical instruments, which are required to be both supple and flexible. But the most important application of caoutchouc has been in waterproofing. In fact, caoutchouc is, as M. Dumas remarks, a very wonderful substance. The ordinary method of making waterproof cloth is exceedingly simple. The caoutchouc is dissolved in the oil distilled from gas-tar, and spread upon the surface of a piece of cloth, upon which a similiar piece is then extended. Both pieces are then passed between a couple of rollers. Hence the waterproof fabric consists of two pieces of cloth united by an interposed layer of caoutchouc. This cloth is so impervious to moisture that floating or hydrostatic beds are formed of it, and beds and

cushions are rendered elastic by inflating them. —*Tomlinson, page* 299.

(2354) CAPE ASTER. CINERARIA.

(2355) CAPE JESSAMINE. GARDENIA

(2356) CAPE OR BRAZIL GOOSEBERRY. PHYSALIS PERUVIANA.

(2357) CAPERS.

Kebbir, ARAB.	Capparis, LAT.
Kappers, DUT.	Kebbir, PERS.
Capres, FR.	Kaperszu. RUS
Cappern, GER.	Alcapparris, SP. *Faulkner.*

Capers, are the unexpanded flower-buds of the caper-tree, (*Capparis spinosa,*) a trailing shrub, growing in Italy and the South of France. Preserved in vinegar, these flower-buds constitute a well-known article of commerce, and of luxury at our tables. The cultivation of the tree for this purpose is confined to a comparatively narrow district in the south of France, namely, Cuges and Roquevaire, in the department of the Bouches-du-Rhone and Olioulles, in the department of Du Var. The gathering time is from June to August. As soon as the morning dew is off the trees, women, wearing a sort of flexible basket at their waists, collect the buds, at the rate of twenty-five or thirty pounds' weight in a day. The plantations are divided into compartments, each of which is visited every week during the season ; an experienced picker being able to tell the precise day when the buds will be in the best condition. A small and choice form of bud is called the *nonpareil* ; but if this be neglected for one day, it becomes a second-rate bud, called *capucine* : if not gathered then, it becomes on the third a *capote*. These three qualities are perfectly well known to merchants, and are more esteemed than buds gathered at random. But the less scrupulous cultivators are not only careless in this respect, but often allow the flower to ripen its fruit, which is a kidney-shaped seed, and which is sold with the commoner sort of capers. An inferior sort of caper is sold as *flat capers.—Tomlinson, page* 303. It will be seen that the quality depends exclusively upon the age at which they are gathered, the smallest and youngest being the dearest and most delicate, and the largest and oldest the coarsest and cheapest. On an average each plant of the caper-bush gives a pound of buds. The consumption of capers in Britain is inconsiderable, not amounting to more than about 60,000 lbs. a year. Several other species of *Capparis* possess stimulating properties. There is a plant found in the neighbourhood of Carthagena called Fruta de Buno, supposed to be a *Capparis,* the fruit of which is extremely poisonous. The order has 28 genera and about 840 species. Some of the American species of *Capparidaceæ* are very poisonous ; others act as vesicatories ; and a few are merely stimulant. To the latter class belongs the *Capparis spinosa* of the south of Europe.—*Eng. Cyc. p.* 765.

(2358) CAPILAPODI, *Tam.* (Produce of *Rottleria tinctoria.*) (Ainslie). A fine reddish brown light powder which the natives employ for dyeing a beautiful pale orange colour, it is the red dust shaken from the seed of the plant above named and is an export from Malabar, where the tree is called Corunga munjemaram.—*Rhode M.S.S.*

(2359) CAPILLAIRE, SYRUP OF. This Syrup, which is brought to India for sale from Bourbon, is prepared with leaves of the Adianthum, Capillus Veneris. I understand from Dr. Klein, that at the same island, the article is sometimes made with another species of Adianthum (Adianthum caudatum), this grows in Ceylon, amongst the Courtalum hills and in other parts of the Indian Peninsula. Both the plants just mentioned (which are of the class Cryptogamia and order of Filices), are natives of Cochin China, the first is also found at Amboyna and is called by Rumphius Micca Miccan Uttan. Vide Rumph. Sib. x. Tab. xxxiv.—*Ainslie's Mat. Med. p.* 297.

(2360) CAPOOR CUTCHERRY, is the root of a plant sent to India and Persia for medicinal purposes and for perfumery, and to preserve clothes from insects. It is about half an inch in diameter, and cut up when brought to market; it has a pungent bitterish taste, and slightly aromatic smell.—*Middle Kingd. Vol.* II, *p.* 400.

(2361) CAPPARIS ACUMINATA. This was found by Dr. Hooker in full flower along the road side, in the Soane valley.—*Hooker, Him. Jour. Vol* I. *p.* 38.

(2362) CAPPARIS APHYLLA, common wild Caper tree. Kurela, *Hind.* This is very common every where in Rajwarra, and often becomes a considerable tree, in the jungles; the flowers are red and very handsome: one species has yellow flowers.—*Genl. Med. Top. p.* 199. The fruit of the *C. aphylla* of India, is used as a pickle.—*O'Shaughnessy.*

(2363) CAPPARIS BREVISPINA. *Authoonday-kai,* Tam. The green fruit is used in making pickles. It is a scrambling shrub, common in hedges with a beautiful red fruit, the size of a small pear ; the stem armed with yellow thorns in pairs at the leaves.—*Jaffrey.*

(2364) CAPPARIS DIVARICATA. *Capparideæ,* Icon. 889. Toarattie marum, *Tam.* A small sized tree, wood only fit for fuel.—*Wight.*

(2365) CAPPARIS GRANDIS. *Capparideæ,* Icon. 21. Vellay toarattie marum, *Tam.* A small tree, but the wood is close grained and hard, too small for general use.—*Wight.*

(2366) CAPPARIS HORRIDA, Lin.

Catallikai also Atunday, TAM.	Aradoonda, TEL.
Ardunda, DUK.	Hoonkara, SANS.

The Natives eat this dressed in different ways. It is the produce of a tree of the class Polyandria and order Monogynia.—*Ainslie, p.* 238.

(2367) CAPPARIS SINAICA. The buds of the *Capparis Sinaica*, or Caper of Mount Sinai, are the *filfil-ul-jibbel*, or mountain pepper of the East.—*O'Shaughnessy.*

(2368) CAPPARIS SPINOSA, The caper plant, is well known through its young flower buds, which constitute the capers of the shops. —*O'Shaughnessy.*

(2369) CAPREÆ, a sub-tribe of the family *Bovidæ* amongst the Ruminant *Mammalia*, and equivalent to the sub-tribes *Boveæ*, *Antilopeæ*, *Strepsiceræ* and *Oveæ* according to Dr. Gray's arrangement of the *Mammalia* in the British Museum. The Capreæ include what are commonly known by the name of Goats. The classification of these animals has been the cause of much difference of opinion. Ray established three genera of Ruminants with bisulcated hoofs. 1. *Bovinum genus*—the Oxen. 2. *Ovinum genus*—the sheep. 3. *Caprinum genus*—the Goats; comprising the Common Goat, the Ibex, the Chamois, the Gazelles, &c. Mr. Hodgson, after remarking on the difficulty experienced by zoologists in the determination of distinctive marks adequate for the separation of the genera *Antilope*, *Capra*, and *Ovis* insists that, as he has shown, the character founded on the presumed absence of cavities in the cores of the horns connected with the frontal sinus is incorrect, and he conceives that the value of the characters, which are generally admitted by authors as distinguishing between the genera *Capra* and *Ovis* may be tested by a comparison of the wild race of either genus which belongs to the Himalaya. He then describes *Capra Jharal*, which is "clad in close short hair, and without the least vestige of a beard," as related to the Alpine *Ægagri* and to *Capra Jemlaica* and *Ovis Nahoor* (Hodgson), placing them both under the tribe *Capridæ* (H. Smith); and having completed the description of this wild goat and wild sheep, he exhibits the points of difference and of resemblance between the two. In describing the wild sheep, Mr. Hodgson observes that the horns are inserted high above the orbits on the crown of the forehead touching nearly at the base with their whole depth, and carrying the frontal bones very high up between them, the parietals being depressed in an equal degree. The goat's skull has, he states, the same form, but less strikingly developed; and he seems to think that this form of the skull would afford a just and general mark to separate *Ovis* and *Capra* from *Cervus* and *Antilope*, remarking that there is a gradation of characters in this respect among the Antilopes tending to the Capryne type in their general structure. Mr. Hodgson thus concludes; "The goat and sheep have in common, hair and wool; no beard; no suborbital sinuses; evanescent muzzle; no inguinal pore; horns in contact at the top of the head; knees and sternum callous; angular and transversely wrinkled horns; striated ears; two teats only in the females; horns in both sexes; and, lastly, incisors of precisely the same form. Of the various diagnostics then proposed by Colonel Hamilton Smith, it would seem that the following only can be perfectly relied on to separate *Ovis* from *Capra*:—slender limbs; longer pointed ears; chaffron arched; nares long and oblique; very voluminous horns, turned laterally with double flexures. I should add myself the strong and invariable distinction—males not odorous, as opposed to the males odorous of the genus *Capra*. But after all, there are no physical distinctions at all equivalent to the moral ones so finely and truly delineated by Buffon, and which, notwithstanding what Colonel H. Smith urges in favour of the courage and activity of sheep, will for ever continue to be recognised as the only essential diagnostics of the two genera."—The following is a synopsis of the genera of Capreæ.

A. Muffle Naked.

1. *Hemitragus.* Horns trigonal, compressed and knotted in front.
2. *Kemas.* Horns square, flat, and cross-ridged in front—*Eng. Cyc. p.* 767.

B. Muffle Hairy.

3. *Ægoceros.* Horns roundish, conical.
4. *Capra.* Horns square, flat, and nodose in front.
5. *Hircus.* Horns trigonal, compressed, sharp-edged and knotted in front.

Dr. Gray refers the Common Goat, which must be taken as the type of the family, to the last genus, of which it is the only species. Hircus *Ægagrus*, the Goat, is Αἴξ (ὁ καὶ ἡ, but generally used for the female), τράγος, χίμαρος (the male), ἔριφος (young male kid of three or four months.) It is the *Capra Hircus* of Linnæus; the *Capra caucasia*, H. Smith; *Ægoceros Capra*, Pallas, *Capra Ægagrus*, Gmelin. The varieties of this animal are very numerous; and many of these are regarded by writers on natural history as species. Fischer speaks of the *Ægagrus* as being, without doubt, the parent of our domestic Goat. Whilst upon this inquiry we must not omit the Jemlah Goat (*Capra Jemlaica*, of Hamilton Smith), which is said to inhabit the district of Jemlah, between the sources of the Sargew and the Sampoo; that is, says Colonel Smith, the most elevated range of Central Asia, forming the nucleus between the western and south-eastern branches of the Himalaya Mountains. This animal appears to be the same as the Jharal of the Nepaulese, *Capra Jharal* (*Hemitragus Jemlaicus*, Gray,) described by Mr. Hodgson ('Zool. Proc.', 1834), from a fine male specimen kept in his garden at Nepaul. He states that the Jharal is found wild in the Kachar region, in small flocks, or solitarily, and gives its character as bold, capricious, wanton, eminently scansorial, pugnacious, and easily tamed and acclimatised in foreign parts. He remarks that the Jharal has a close affinity, by the character of the horns to the Alpine *Ægagri*

and still more nearly, in other respects, to *Capra Jemlaica*. It differs, he observes, from the former by the less volume of the horns, by their smooth anterior edge, and by the absence of the beard; from the latter, by the horns being much less compressed, not turned inwards at the points, nor nodose. He adds, that the Jharal breeds with the Domestic Goat, and more nearly resembles the ordinary types of the tame races than any wild species yet discovered. During a visit to Rhenish Germany in the autumn of 1837, Mr. Ogilby learned from Professor Cretzschmar, the well known editor of the Mammalogical part of Dr. Ruppell's first 'Atlas,' the success of an experiment which the professor had been carrying on for some years in the neighbourhood of Frankfort-on-the-Main, to ascertain the possibility of procuring a cross between the Cashmere Goat and the Saxon Merino Sheep. With this intention Professor Cretzschmar had two or three years ago procured a large Cashmere buck, which was put into a stable with twelve Merino ewes. For two seasons however his hopes were disappointed, and it was not till the season of 1836 that the desired union took place. During the spring of that year the sheep very freely took the buck, and produced fine healthy lambs, which were, when Mr. Ogilby obtained his information, rather better than a year old. They were kept in a large stable with a number of pure Merinos, which is the usual mode of treating these valuable animals in that part of Germany, where the land is all under the plough, and there are neither sheep nor grazing farms; and so closely did they resemble the pure Saxon breed, that it was impossible to perceive any difference in their external characters. The species of the genera of *Capreæ* in the British Museum Catalogue are as follows;—*Hemitragus Jemlaicus*, the Jharal or Tehr. This animal inhabits the loftiest mountains of India. *Kemas Warryato*, the Warryato or Jungle kemas. It is a native of India, and has been called the Wild Sheep of Tenasserim. *Ægoceros Caucasia*, the Tur, or Zac. It inhabits the Caucasus, and is sometimes called the Caucasian Ibex. *Capra Himalayana*, the Sakeen or Skyn. It is also called the Himalaya Ibex. Dr. Gray observes that this is not probably distinct from *Ibex* (*Capra*) *Sibirica*. *Capra* (?) *lævicornis*, the Smooth-Horned Ibex. It is probably a hybrid. *Capra Nubiana*, the Beden or Jaela. It is an inhabitant of Egypt, Arabia, and Crete.—*Eng. Cyc. page* 772.

(2370) CAPRIFOLIUM SEMPERVIRENS. *Caprifoliaceæ*.—The Lonicera or Trumpet honeysuckle, named after Adam Loniceir, a German botanist. Common all over England. Grows in hedges, thickets, and clefts of rocks; flower yellow, or white with deep red streaks, and remarkable for its odour. Lonicera sempervirens, a native of North America, with flowers, scarlet outside and yellowish white within—very useful in covering walls; the perfume at night is unpleasant to some persons, being sickly. Lonicera chinensis is common in some gardens of the Deccan. Is propagated by slips and layers in any good garden soil.—*Riddell.*

(2371) CAPRIMULGUS, a genus of Birds belonging to the tribe *Insessores* and the family *Caprimulgidæ*.

(2372) CAPSELLA BURSA PASTORIS, Mullay muntha-kerray. *Tam.*—The shepherds purse, an English weed, common on the Neilgherries, used by the natives as a pot herb.—*Jaffrey.*

(2373) CAPSICUM.

Chillies, Eng	Moollaghai, Tam.
Mirchie, Lall Mirich, Duk. Hind. and Guz.	Lombok, Javan.
Meerapa kailoo Tel.	Chabe or Chabul, Malay.

Capsicum, a genus of plants belonging to the natural order *Solanaceæ*. The shell of the fruit is fleshy and coloured, and contains a pungent principle, which also exists in its seed in great activity. On this account both the fruit and seeds of different varieties or species of *Capsicum* are in request as a condiment, and either in the unprepared state or ground, when they are called Cayenne Pepper, form a conspicuous feature amongst the plants affording stimulating substances used by man. In Europe the *Capsicum* enters largely into the seasoning of food and the preparation of pickles, and in warmer countries it constitutes one of the first necessaries of life either green or ripe.—*Tomlin.* It is this plant, and not any of the genus Piper, which is the universal peppery condiment of all the inhabitants of the Asiatic islands in Eastern Asia; the latter, indeed, being little used, and mostly raised for exportation. Foreign species or varieties of Capsicum have been introduced into the Archipelago, and are named Chabe China, the Capsicum of China; and Chabe sabrang, the Capsicum of India, literally, of "the other side of the water."—*Crawfurd Dicty. p.* 82. There are now numerous varieties of chillies in India, many of which have been introduced. They are raised from seeds, that have been kept for one year, for if fresher, the crop is generally a failure. One species called "devil's pepper," introduced by Lord Harris, from Trinidad, is so intensely hot that the natives can hardly manage to use it. It is cultivated during the cold months. —*Jaffrey.* In the Tenasserim Provinces they have large quantities of Cayenne-pepper, or chillies, of which two or three species, enter into all the native dishes; not in the form of pepper, but the fruit, stewed or roasted, is eaten with the food. In India, the dried fruits of several species and varieties of Capsicum are the

Capsicum grossum (Bell pepper)
" annuum.
" frutescens. Goat "
" minimum (Bird's Eye.)

These, valued as a digestive condiment, are raised all over the country, the principal use of them being as condiments and to make Cayenne Pepper and Chilly vinegar. The several species of Capsicum are natives of South America, whence they have been introduced into the Old World, and become universally diffused, from the fondness of Asiatics for warm condiments. The Hindoos, though cultivating the Capsicum extensively, have no specific name for it, but call it *Red Pepper*. "Chilli, either simply or in composition, being the Mexican name for all the varieties and species of this genus" (*R. Brown*), indicates that the genus is American. Many varieties have no doubt been raised to the rank of species. The genus is distinguished by its berry-like but dry fruit. The fruit varies much in form, being round, oblong, cordate, or horned, and either scarlet or yellow, and more or less pungent in taste. The horn-shaped variety is most common, from 2—3 inches in length, and from ½—1 inch diameter at the base, and usually called Capsicums, and the plant C. annuum. One variety, called Cockspur pepper, has the fruit long and slender. Sometimes the fruit is globose or lobed; the variety is then called *C. baccatum*. When the fruit is small, elongated, and pointed, the variety is called Bird-Pepper, and botanically *C. minimum*. When the plants are allowed to grow beyond the year, they become shrubby, and form the variety called *C. frutescens*. Nees von E. 190. St. and Ch. 44. The berry or fruit of the Capsicum, in its dried state, when powdered, form Cayenne Pepper, but are often preserved in vinegar as a pickle, and the fluid likewise employed under the name of Chilly Vinegar. Rubefacient, Acrid Stimulant. Much used as a Condiment in hot countries. Sometimes used as a counter-irritant, with salt as a stimulant in Scarlatina maligna, as a gargle in relaxed sore throat, or in the form of Cayenne Lozenges. The fresh Capsicums used in Europe are principally obtained from the *Capsicum annuum*. This is a weedy plant found wild in South America and the West Indies but grown largely in Southern Asia. This species grows from one to two feet high, forming a dark green bush, with ovate or ovate-lanceolate leaves; its flowers are small and white; its fruit is extremely variable in size, colour, position, and even in quality. Red and yellow are the prevailing colours; the oblong-conical is the ordinary figure; and to hang in a drooping position is the most usual direction of the fruit. But round, ovate, and even depressed fruit is known, and many varieties constantly bear their fruit in an erect position. Most of them are too pungent for European palates; but the large Red Bullock's Heart and yellow Tomato Capsicums are mild enough to be sliced with salad. A much hotter species is the *C. fruticosum*, or frutescens, or Goat-Pepper, of the East Indies, which differs from the *C. annuum* in being a shrub and in its fruit being very small. There is also a kind cultivated by the Chinese, with black fruit; and botanists recognise many others, but they appear to be in many cases mere varieties of *C. annuum* or *C. fruticosum*.—*Eng. Cyc. page* 774.

(2374) CAPSICUM ANNUUM, *Vern.* Gachmirch, grows in South America, Mexico, East Indies, and called Chillee, capsicum, cayenne pepper, red pepper. Fruit of various forms, and either scarlet or yellow, in some scarcely pungent, in others intolerably hot.—Capsicum is of greater importance as a condiment than as a remedial agent. It possesses strong stimulating properties, and has been employed with success as a topical application to elongated uvula, and relaxation of the pendulous veil of the palate; made into a lozenge with sugar and tracacanth it is a favourite remedy for hoarseness with professional singers and public speakers. In putrid sore throat, whether symptomatic or strictly local, gargles of an infusion of red pepper are often very usefully employed. In native formulæ we meet this ingredient constantly, especially in the prescription for gout, dyspepsia, cholera, and ague. The practice is doubtless good, and derived from long experience of the beneficial effects of this stimulant on the native of the East. —*O'Shaughnessy, page* 467 and 8.

(2375) CAPSICUM FRUTESCENS, Willd. Cayenne pepper. Goat pepper. Bird pepper.

Mollaghai, TAM.	Merapakailoo, TEL.
Laal mircha, DUK.	Braha Maricha, SANS.
Laal mirch, HIND.	Lunka mirch, BENG.

This plant is so well known all over India as the large red pepper, that it is hardly neceesary to describe the method of culture, which merely consists in sowing the seed broad-cast, and when the plants are about six inches high, putting them either in rows or beds eighteen inches apart. The soil should be rich. They require watering, and being kept clear of weeds.—*O'Shaughnessy, page* 468.

(2376) CAPSICUM MINIMUM.

Oosee-moolakyai, TAM.

The East Indian bird pepper, generally cultivated for pickles: they are very hot: this plant is of a shrubby nature, yielding fruit for a series of years. The Caffree Chilley, *Capsicum grossum* of Botanists and the Nepaul Chilley, *C. Nepalense*, are varieties of *C. frutescens*.—*Jaffirey*.

(2377) CAPSICUM PURPUREUM and *C. minimum*, or Cayenne pepper. In Pegu, both species are cultivated in small quantity for domestic use.—*McClelland*.

(2378) CARABUS, a genus of Coleopterous Insects, of the family Carabidæ. This must not be confounded with the genus *Carabus* of Lin-

næus, which, according to many of the modern authors, is divided into several families, and each of those families contains numerous genera. The necessity for sub-dividing the group called *Carabus* by Linnæus will be seen when it is taken into consideration that there are probably now about 800 species discovered. —*Eng. Cyc. page* 774.

(2379) CARALLUMA ADSCENDENS. Cullee-moolayan, *Tam.* This curious looking fleshy plant with angular stems belonging to the natural order Asclepiadæ, is used by the natives in making pickles, and sometimes in chatney. —*Jaffrey.*

(2380) CARANA PALM, (Maurita Carana) its leaves are used as a thatch for houses.—*Seem.*

(2381) CARANX, a genus of Acanthopterygious Fishes, belonging to the family *Scomberidæ.* —*Engl. Cyc. page* 775.

(2382) CARBON is one of the elements which occurs pure in nature. In this state it is called *Diamond,* and forms one of the most precious gems. It is also found in a tolerably pure condition in *Graphite* called *Plumbago* or *Black-Lead.*) This substance contains from 90 to 96 per cent. of Carbon, with the rest iron. Carbon enters largely into the composition of Amber and also of mineral Caoutchouc and the various forms of Bitumen. It forms the distinguishing element of *Coal.—Eng. Cyc. page* 776.

(2383) CARBONATE OF LIME. This is a very abundant mineral in the Tenasserim Provinces and embraces several varieties. Stalactical Carbonate of Lime is one of these. All the limestone caves have stalactites hanging from their roofs; and stalagmites raised on their floors. The Siamese Karens often bring over bits of limestone of the shape of a shell, and when broken, a shell usually of the genus melania appears, that has been encrusted with carbonate of lime. Much of the alabaster of which ornaments are made is stalagmite; but all the alabaster images of that coast are made of marble: and not of compact gypsum, which they much resemble.—*Mason.*

(2384) CARBUNCLE.

Escarboukle, Fr.	Carbunculus, Lat.
Karfunkel, Ger,	Carbunculo, Sp.
Carbonchio, It.	

A precious stone once highly esteemed. A variety of garnet.

(2385) CARDAMOM.

Ebil, Heelbuya, Arab.	Kapol, Jav.
Ensal, Cyng.	Capulaga. also Powar, Malay.
Ellachi. Duk. Guz. and Hind.	Kakelah-seghar, Heil, Pers.
Cardamomen, Dut.	Cardamomus, Port.
Cardamomes. Fr.	Kardamomos, Sp
Kardamom, Ger.	Yaydersie, Tam.
Cardamomi, It.	Yaylakooloo, Tel.

Cardamoms are the production of various species of plants of the same tribe as the ginger, growing in India, Ceylon, and Java. Various species of *Alpiniæ, Amomum, Elettaria, and Renealmia,* appear to furnish the cardamoms of the shops, which consist of the oval, trivalvular capsules containing the seeds. These are used in medicine as aromatic tonics and carminatives; and in culinary purposes for curries, ketchups, soups, &c. Their active ingredient is a pungent volatile oil. The least dampness injures the finer sorts. About 687 cwts. of cardamoms, and 5,000 cwts. of bastard cardamoms, are annually exported from Siam. England imported about 300 tons in 1849. The price ranges from 1s. 6d. to 3s. the pound. The estimated value of the cardamoms and pepper shipped from Ceylon in the past few years was as follows:—1846, £2? 8; 1847, £246; 1848, £205; 1849, £454; 1850, £960; 1851, £771; 1852, £590. The following are some of the plants from which cardamoms are procured. 1. *Amomum cardamomum,* a plant of Eastern and Southern Asia, supplies the round cardamoms. It has pale brown flowers. The fruit varies in size from that of a black currant to a cherry. 2. *A. angustifolium* (Pereira), a plant having red blossoms, furnishes the large Madagascar cardamoms, and also supplies some of the seeds called "Grains of Paradise," which are, however, larger than those imported under that name. This species is found in Abyssinia, according to Mr. Chas. Johnston, author of "Travels in Abyssinia." The seeds are pale olive brown, devoid of the fiery peppery taste of the grains of paradise. 3. *A. maximum,* the great winged amomum produces the Java cardamoms of the London market, and is also grown extensively in Ceylon, the Malay islands, Nepaul, Sumatra, and other islands of the Eastern Archipelago. There were exported from Ceylon in 1842, 5,364lbs.; in 1843, 9,632lbs.; 1844, 7,280lbs.; and in 1845, 11,812lbs. The pods are large and long, and dark colored, approaching to black, the taste nauseous and disagreeable, not the least resembling that of the Malabar cardamoms. It is propagated by cuttings of the rhizoma. The plants yield in three years, and afterwards give an annual crop. They are not used in Britain but sent to the continent. 4. *Alpina Cardamomum.*—This is the source of the clustered cardamoms, and furnishes the best known sort. Its produce is in great request throughout India, fetching as much as £30 the candy of 600 lbs. About 192 candies are grown annually in Travancore, and the usual crop in Malabar is reckoned at 100 candies annually. It flourishes on the mountainous parts of the Malabar coast, and among the western mountains of Wynaad. The bulbous plants, which grow three or four feet high, are produced in the recesses of the mountains by felling trees, and afterwards burning them, for wherever the ashes fall in the openings

or fissures of the rocks, the plant naturally springs up. In the third year, the plants come to perfection, bearing abundantly for a year or two, and then die. In Soonda Balaghat, and other places where cardamoms are planted, they are much inferior to those grown in the wild state. It may be propagated by cuttings or divisions of the roots. Not more than one-hundredth part of the cardamoms raised in Malabar are used in the country. They are sent in large quantities to the ports on the Red Sea, and the Persian Gulf, up the Indus to Scinde, to Bengal and Bombay. The price of Malabar cardamoms at Madras, in June, 1853, was about £3 the maund of 25 lbs. They fetch in the Bombay market £4 10s. the maund of 40 lbs. Cardamoms form a universal ingredient in curries, pillaus, &c The seed capsules are gathered as they ripen, and when dried in the sun are fit for sale. They should be chosen full, plump, and difficult to be broken; of a bright yellow color, and piercing smell; with an acrid, bitterish, though not very unpleasant taste, and particular care should be taken that they are properly dried. 5. *Amomum Grana-Paradisi*, which is indigenous to the islands of Madagascar and Ceylon, yields an inferior sort of cardamoms, known by the names of grains of paradise, or Meleguetta pepper. These are worth in the English market only from 1s. 2d. to 1s. 4d. per pound, while the long and Malabar cardamoms fetch 2s. 8d. to 3s. 3d. the pound. This plant is a native of Guinea, and the western parts of Africa about Sierra Leone. Britain imported from thence in 1841, 7,911 pounds. The taste of these Guinea grains is aromatic and vehemently hot or peppery. They are imported in casks from Africa, and are principally used in veterinary medicine, and to give an artificial strength to spirits, wine, beer, &c. The average quantity on which duty was paid in the six years ending with 1840, was 16,000lbs. per annum. They are esteemed in Africa the most wholesome of species, and generally used by the natives to season their food. Dr. Pereira, from a careful examination and close inquiry, is of opinion that the *Amomum Grana-Paradisi* of Smith, and the *Amomum Melegueta* of Roscoe, are identical species. In the second volume of the "Pharmaceutical Journal," Dr. Pereira states that the term "grains of paradise," or Melegueta, has been applied to the produce of no less than six scitamineous plants. At the present time, and in this country, the term is exclusively given to the hot acrid seeds imported into England from the coast of Guinea, and frequently called Guinea grains; and by the Africans Guinea pepper. 6. ***Elettaria cardomomum***, Don. The fruit of this species constitutes the true, small, officinal Malabar cardamoms. It is an ovate, oblong, obtusely triangular capsule from three to ten lines along, rarely exceeding three lines in breadth, coriaceous, ribbed, greyish or brownish yellow. It contains many angular, blackish or reddish brown rugose seeds, which are white internally, have a pleasant aromatic odor, and a warm agreeable taste. 100 parts of the fruit yield 74 parts of seeds, and 26 parts of pericarpal coats.—*Simmonds, p.* 420. *Elettaria major*, is a perennial, native of Ceylon, which grows in shady situations in a rich mixed soil. The dried capsules are known in commerce as wild or Ceylon cardamoms, and are of less value in the market than those of Malabar (Elettaria Cardamomum, Maton). It is chiefly grown about the Kandyan district; and in the eight years ending with 1813, the average export was nine and a-half candies per annum. At the Madras Exhibition of 1855, the Elettaria Cardamomum, so much used for various kinds of food, was exhibited in fine order from Mysore, Coorg, Canara andTravancore, and seemed to be identical with Amomum Cardamomum. The seeds in taste resemble our carraways, and are used for seasoning various dishes. Ceylon cardamoms are now worth in the London market (Sept. 1853. 1s. to 1s. 3d. per lb; Malabar ditto 2s. 3d.to 3s.—*Simmonds' Comml. Product, p.* 421. The Karen forests of Tavoy, and Mergui abound with Cardamom plants; and while subject to the Burmese Government, the Karens were required to collect the seeds and pay them in as tribute; but they gather very few now, as they can employ their time more profitably; and when they did collect, they were in the practice of mixing a spurious kind of cardamom with the true, the produce of a plant belonging to the genus amomum, believed to have been *A. Cardamomum.*—*Mason.* Cardamoms are imported into Bombay from the Malabar Coast, and are re-exported to England, and the Arabian and Persian Gulfs.—*Faulkner.*

(2386) CARDAMOMS BASTARD.

Kurrocha, Guz. Hind.	Kapulaga, Bali. Jav.
Heel kilan, Pers	Mal.

Are much larger than the true Cardamom, more pungent, but less aromatic, with a strong camphoraceous taste. They are not much esteemed, and are only used by the poorer classes of natives as a substitute for real cardamoms. They are brought to Bombay from the Malabar Coast.—*Faulkner.*

(2387) CARDIOPTERIS. At Cachar, Cardiopteris covered the trees for upwards of sixty feet, like hops, with a mass of pale-green foliage, and dry white glistening seed-vessels. It is a remarkable plant of unknown affinity; see Brown and Bennett, "Flora Javæ:" it is found in the Assam valley and Chittagong.—*Hooker, Him. Jour. Vol.* II. *page* 334.

(2388) CARDIOSPERMUM HALICACABUM. Lin. *Sapindaceæ.*

Shibjool, Duk.	Smooth leaved heart pea.
Mooda-cottan, Tam.	Karavee, Sans.
Boodda-kanka-rakoo, Tel	

The heart pea or balloon vine; an annual

climbing plant, with an inflated membranous capsule, hence its name. The root of this twining plant, the leaves of which are broad, lanceolated, and sub-divided, is considered by the Native practitioners as aperient. It is mucilaginous, and in a very slight degree nauseous to the taste. The Vyteans prescribe it in decoction to carry off offending bile, and purify the intestinal canal. Rheede says the leaves are given in pulmonic complaints on the Malabar coast.—*Ains. Mat. Med. p.* 89. The heart-seed, which has an aperient root, is raised in great quantities by the natives of Tenasserim, but more as a vegetable than a medicine.—*Mason.*

(2389) CARDIUM, a genus of Bivalve *Mollusca* belonging to the Acephalous *Lamellibranchiata*. The shells belonging to this genus are very widely distributed, and many of them are remarkable for the elegance of their form and colouring. The species are about 200 in number. "We find," say the authors of the 'History of British Mollusca,' "the great assemblage of Cockles in the Indian Ocean."—*Eng. Cyc. p.* 777.

(2390) CARDIUM EDULE.

Fish cockle, ENG.	Seepee, DUK.—*Ains. Mat. Med. page* 155.
Muttie, TAM.	

(2391) CARDOLE, a thick black oily substance, obtained from the pericarp of "Anacardium occidentale" the cashew nut, was exhibited from Tanjore, at the Madras Exhibition of 1855, and by Lieutenant Hawkes. It is a powerful vesicating agent.

(2392) CAREX, a genus of plants belonging to the natural order Cyperaceæ, and the tribe Cariceæ.—*Eng. Cyc. page* 778.

(2393) CAREX ARENARIA grows on the sands of the sea-shore and is one of the plants which, in conjunction with the *Elymus*, *Arundo*, and *Psamma*, binds the loose sands, and forms them into solid embankments. Although most of the species are devoid of striking beauty, some of them when in flower are much admired on account of the elegant drooping of their panicles of golden-coloured flowers.—*Eng. Cyc. page* 778.

(2394) CAREX MOORCROFTII. Grass was very scarce in Thibet but a running wiry sedge (Carex Moorcroftii) binds the sand, like the *Carex arenaria* of the English coasts.—*Hooker Him. Jour. Vol.* II. *page* 155.

(2395) CAREYA ARBOREA, *Myrtaceæ*, Ill. 99.

Pailæ marum, TAM.	Cumbia, CAN.
Budada-nedi, TEL.	Kumba or Koomba, HIND.
Baubwai, BUR.	

A good sized tree, leaves deciduous in the cold season, bears an oblong fruit, size of an egg; has a very peculiar scent, no use is made of it.—*Riddell.* This is one of the most numerous trees throughout the Tenasserim province. The timber is large, and forms the chief material of which the carts of the country are made: wood, red: equivalent to mahogany.—*McClelland.* Furnishes a useful timber for house building. In some parts of India matchlocks are made from it.—*Mason.* In India the stringy bark of this tree is employed by the natives of the countries in the circars and along the foot of the Himalayas as a slow match for their match-lock guns.—*Royle Fib. p.* 301. The bark is very astringent, worthy of examination; Salsette jungle; Guzerat; Candesh; Malabar Hills and Parell Hills.

(2396) CAREYA SPHÆRICA, almost identical with the above Careya arborea, serves as cordage, and is used as slow match for guns in N. Circars. Hort. Garden 22.

(2397) CARICA, a genus of plants belonging to the natural order Papayaceæ. One of the species is,

(2398) CARICA PAPAYA, Lin.

Uruu khurbooza, HIND.	Bapai pundoo, TEL.
Thin baw, BURMESE.	Papa, MALAY.
Puppalie pullum, TAM.	Paupoy, MALEAL.
Puppaya, DUK.	

Carica Papaya, is a remarkable tree found in various parts of South America, with a simple unbranched erect trunk (*Eng. Cyc. page* 780), is generally found in villages throughout India and grows without much care. The fruit is generally gathered in a green state and dressed as curry, which, with rice, forms a very common repast.—*McClelland.* Carica papaya, *Puppiley-kai*, T., is used green by Mussulmen, and the lower class of natives as a vegetable. The fruit when ripe used as a dessert. Rumphius tells us that in the Eastern Island the Popaie fruit, sliced and dressed while green and white, is a pleasant table vegetable. Vide Rumphius, tom. 1. cap. xliv, page 148. —*Ainslie.* It contains in its centre dark colored seeds with taste like the water cress. In its unripe state the Popaie is made into tarts which are not easily distinguished from those made of apples. The fruit is formed by a large oblong pepo suspended upon the leafless part of the trunk, like the jack fruit; the surface when ripe is a pale, and rather dingy orange yellow, obscurely furrowed, and often rough, with little elevated points. A milky juice exudes on incision from the rind. It is deemed a powerful vermifuge in the Mauritius, and the power of the seeds (which taste like water-cress) is said to possess the like virtue. The milky juice very closely resembles white of egg in its chemical composition. It is alkaline, contains albumen in such quantities that it coagulates when heated to 170°, and it putrifies readily, evolving a very offensive odour. It is stated in several works of high authority that tough meat rubbed with this juice becomes very tender and fit for the table, without any injurious property being communicated to it. The flesh of animals fed on the

leaves and seeds is said also to be remarkably tender. It is even asserted that dead animals hung from the branches of the tree undergo this alteration. These ideas prevail also in Bengal, where the Mahomedan table servants frequently use the juice with the view of softening beef-steaks and old fowls. In numerous experiments which Dr. O'Shaughnessy instituted he could not trace any well marked discisive effect of this kind. Putrefaction appeared to him to be accelerated by contact with this as well as other albuminous fluids. Just before putrefaction commences, muscular fibre is doubtless less rigid than at any previous time. It is thus that we may possibly best explain the effect, if any, produced by the practice in question. As to the alleged efficacy of suspending meat from the tree, he is disposed to regard it as a mere popular delusion. The leaves are used by the negroes in washing linen, as a substitute for soap. He cannot speak from his own experience of the anthelmintic virtue of the juice. He has given it in doses of from 20 to 60 drops, without observing any marked effects.—*O'Shaughnessy, page* 352.

(2399) CARINARIA, the name of a genus of *Mollusca*, arranged by Cuvier under his fifth order of Gasteropods (Lamarck's *Heteropoda*) as the type of that order, and by De Blainville under the first family (*Nectopoda*) of his order *Nucleobranchiata*. The shells of this genus were formerly known to collectors under the names of Venus's Slipper and the Glass Nautilus: indeed one of the species is the *Argonauta vitreus* of Gmelin.—*Eng. Cyc. page* 782. *Carinaria* has never yet been taken in any other than warm latitudes. Three species, *C. vitrea*, *C. fragilis*, and *C. Mediterranea*, are recorded without reckoning Lamarck's *C. cymbium*.

(2400) CARISSA CARANDAS. Lin. *Apocynacea*.

Perin Claka pullum, TAM	Pedda kalivie pundoo, TEL.
Burray Karoonday, DUK.	Karamurda, SANS.
Karunda, HIND.	

The Wild Black Carandas. Bengal currants. Jasmine flowered Carissa., *Eng.* A large thorny bush, cultivated for the fruit at Ajmeer, but the plant grows abundantly wild in the Kotah jungles, and in March and April fills the air with the fragrance of its blossom. This plant forms beautiful and impassible hedges.—*Med. Top. page* 185. In some of the European gardens of Tenasserim this species of Carissa is cultivated for its berries, which taste when stewed like currants.—*Mason.* It grows wild in most parts of the Deccan, bearing a dark blue coloured berry when ripe, and sold in the bazar. There is also a cultivated sort in gardens. The fruit of the latter when ripe is sometimes eaten by Europeans, but in the green state is made into tarts, jellies, and pickles: the jelly is considered inferior to none made of other Indian fruits. The wild sort is gathered and sold by the natives for the same purpose. This species is a marked exception to the generally poisonous nature of the family, the acid fruits affording the well known and favourite caranda jelly of our tables.—*O'Shaughnessy, page* 444. This fruit is about the size of a large olive and when ripe is black and has a very pleasant taste somewhat like a damson.—*Ainslie, p.* 230.

(2401) CARISSA SPINARUM. Lin.

Sirroo Claka Pullum, TAM.	Boosaroocum, SUMATRAN
Chotay Karoonday, DUK.	Karavindie, SANS.
Chinnie Kalivie pundoo, T.	

This is a small, dark coloured, sweet, pleasant tasted berry: it grows in the woods, and is much esteemed by the natives: contains 4 small seeds. —*Ainslie, page* 232.

(2402) CARMINE.

Karmyn, DUT.	Carminio, IT.
Carmine, FR.	Carminium, LAT.
Karmin, GER.	

A beautiful pigment prepared from cochineal. It was discovered accidentally by a Franciscan monk of Pisa, who having formed an extract of cochineal with salt of tartar for the purpose of employing it as a medicine, obtained a fine red precipitate on the addition of an acid. Homberg, in 1656, published a method for preparing it. As the use of this substance in reviving the roses on the cheek of beauty, and concealing the attacks of time, became known, the costly pigment became much in request. The makers of it in some of the principal towns of Europe, succeeded in preparing different varieties of it of greater or less purity and lustre. Many of these processes, even to the present day, are kept secret; and although the chemistry of the art is well understood, yet there are certain details of manipulation, and an empirical knowledge of the effects of temperature, doubtless acquired after long experience and many failures, which confer on the carmines of some makers a greater lustre than on those of others. The use of carmine has of late years been extended to the manufacture of superfine red inks, of artificial flowers, and to silk dyeing. Carmine is the finest red colour which the painter possesses. It is chiefly used in miniature painting and in water colours. It is made in large quantities in Paris. Carmine is one of those colours called *lakes*, a term applied to certain colouring substances, which behave like acids and combine by precipitation with a white earthy basis, usually alumina. Carmine is the richest and purest portion of the colouring matter of cochineal isolated in the manner here alluded to. Various imitations of carmine are prepared for the use of those who exhibit rouge on their cheeks. The common rouge of the theatres is prepared by pounding benzoin, red sandal wood, Brazil wood and alum in brandy, The mixture is then boiled until three-fourths of the liquid has evaporated: a paint of an intense red colour remains, and this is applied to the face with a

piece of soft cotton. Vinegar is sometimes substituted for the brandy; but as both fluids injure the skin, the colouring matter is sometimes extracted from the dye-woods, and unguents formed therewith, by means of balm of Mecca, butter of cacao or spermaceti. If the colour be too intense it is mixed with chalk.—*Rouge dishes* are small saucers containing a layer of dry rouge. Those which are prepared in Portugal probably contain genuine carmine: clumsy imitations of these dishes are prepared in London. *Spanish wool* and *oriental wool* are also rouge vehicles. Wool is impregnated with the colour, and formed into cakes about the size of a crown-piece by the Spaniards, and somewhat larger by the Chinese: the latter is most esteemed, since it affords (in the language of a modern pharmacopist) "a most lovely and agreeable blush to the check." Beautifully painted and japanned *colour-boxes* are also imported from China. Each box contains 24 papers, and in each paper are 3 smaller ones, namely, a "lovely blushing red" for the cheeks, an "alabaster white" for the face and neck, and a "jet black" for the eyebrows. French carmine is superior to that of English manufacture, and the superiority is said to depend on the influence of light on its formation and precipitation; the clear sky of the south of France being more favourable for the process than the more hazy atmosphere of England.—*Tomlinson, page* 326.

(2403) CARNATIONS, DIANTHUS CARYOPHILLUS.—These plants succeed pretty well so long as they are kept young, but degenerate soon, if not propagated annually: this is done by pipings. The soil in which they are grown must be entirely free from vermin; they succeed well in fine river sand to which has been added to every third part one part of well decayed manure. This beautiful genus of plants embraces about 130 species and varieties, besides a host of florist's varieties.

(2404) CARNAUBA. The *Copernicia cerifera* is a native of Brazil, a farina is prepared from its trunk and by shaking the young leaves after being detached from the tree, each leaf yields about fifty grains of a whitish scaly powder, which is melted in pots over a fire. It is employed to adulterate bees wax and is imported into Britain for manufacturing Candles.—*Seeman.*

(2405) CARNELIAN. One of the inferior gems of a uniform white or flesh colour: largely exported from Japan and from the Gulf of Cambay. It is also abundant in the trap rocks of the Dekhan and beds of its rivers. Carnelian, so called because some kinds are of a flesh colour, (Carnis, Latin for flesh) is that variety of a uniform colour, which is of commonest occurrence. Carnelians are never figured or striped. The colours are shades of red and yellow, the deep clear red being the rarest and most valuable. The great supply of carnelians is from Japan, where they exist in vast quantities, and they are also exported from Bombay, being collected in the province of Guzerat; but the best, according to Neibuhr, come from the Gulf of Cambay. Many of the antique gems are engraved in carnelian, and it is now much used for seals.

(2406) CARPETS.

Galeem, Zoolee. ARAB.	Ghaleechah, PERS.
Tapyten, Vloer-tapyten, DUT.	Kowru. Kilimi, RUS.
Tapis. FR.	Alfombras, Alcatifas, Tapetes, SP.
Teppiche, GER.	Jamoocarum, TAM.
Sutrunjee, GUZ. HIND.	Jamcana, TEL.
Tappeti, IT.	

Persian and Turkey carpets are most esteemed, but those made in Axminster, Wilton, and Edinburgh, are believed to be very little, if any, inferior to those of Persia and Turkey. A variety of carpets are made in different parts of India, both of cotton and wool, and we now refer to these. Climate chiefly influences everything relating to the clothing or habitation of man. Among the latter, coverings for the floor, are necessarily included. In a cold, wet climate, it is hardly possible to use the floors of rooms without some kind of covering; and therefore we read in earlier times of the floors in Europe being covered with straw, rushes, hay, or heather. In warm countries, on the contrary, it is more the habit to sit in the open air under the shade of trees; and it is there desirable to have some covering over the sandy or dusty earth, either to sit or lie down upon. It is not surprising, therefore, that the invention of carpets should have originated in Eastern countries. Mats are the most agreeable in hot weather; and for these, India is famous, as well for their variety as for their fineness and pattern. Carpets, either of cotton, silk, or woollen, are employed in all Eastern countries, from the south of India to Turkey in Europe, for praying on, and for occasions of state. The carpets employed by the ancients are thought to have been of the nature of tapestry, and used for covering couches rather than floors. True carpets seem to have been first employed in Persia; and those called Turkish were probably originally of Persian manufacture, whence the manufacture might have been introduced into Turkey, and where, as well as in Egypt, the art is still practised. The Persians still remain unrivalled in the happy combination of colour and pattern for which their carpets have long been distinguished, whence the most varied hues and deepest tints are brought into close approximation, and, far from offending the eye, please by their striking, because harmonious contrasts. Though printed calicos of large size, and suitable patterns are sometimes used for covering the floors in India, yet the most common carpets employed there are those made of cotton, and *sutrunjees*, of different colours, usually blue and

white, in red or orange stripes, squares, or stars; some of large size, and well suited for halls and tents. They are thick and strong in texture, the two surfaces alike, smooth and without pile, and they are manufactured in different parts of India at Moorshedabad, Rungpore, Agra &c., and at many places in the Madras Presidency. Another kind of cotton carpet is that with a pile of cotton, and similar in appearance to a Turkey carpet, manufactured at Sasserim,—white, with a centre and border of blue, and they are made with every variety of coloured pattern, in the Hyderabad country. Silk is another material of which carpets are made in the East; and the pile being of silk, imparts both softness and richness to the surface, while the colours are clear and brilliant. They are beautiful as specimens of variety in pattern, brilliancy in colouring, as well as of pleasing harmony in the whole. Silk carpets, of small size, are made in Tanjore, Hyderabad, and Khyrpore. Woollen carpets, of large size, and of beautiful and well-coloured oriental patterns, are made at Mirzapore & Gorukpore, and many parts of Madras. The former is most famous in India for its carpets, which are frequently sold in Britain as Turkey carpets. The rugs from Ellore are universally admired for their general characteristics of oriental pattern and colouring; and these, as well as the large carpets from Mirzapore, all in the same style, seem well adapted for sale in Europe. At the Madras Exhibition of 1857, there was a large display of carpets and rugs, the manufacture having been brought to considerable perfection in several parts of Southern India. There were four distinct branches in these contributions; 1. The imitation Axminister or close nap woven carpet; 2. The short velvet pile or tapestry carpet and woollen rug; 3. The long velvet pile or imitation Turkey carpet; 4. The silk or velvet pile carpet. Of the *Axminister Carpet*, there were some very good specimens of close nap carpets from Warungul, the colors clear and bright, but a sameness in the patterns. The carpets were strong, soft, and very close in the weaving. The chief of the manufactures and the only one for which Warungal is famed is that of Persian Carpets, which are made of all sizes and of worsted, cotton, or even of silk. The weavers are all Mahomedans and are congregated principally at Mutwarrah, although there are a few looms within the Warungal fort. The weavers are drunken, turbulent, ignorant Mussulmans, possessing no capital, but dissipating in excess the little money they may procure on accomplishing a piece of work. Carpets chiefly of a small size, about two yards long and a little more than a yard in breadth, are made for the Hyderabad market, money being advanced to the Weavers by the dealers there. A worsted Carpet of this size and shape costs at Warungul from Rupees 2¼ to Rupees 2¼. A cotton Carpet is twice the price of a worsted. A silk one very highly priced.

A common trick among these weavers is to substitute hemp for worsted. Of the *Velvet Pile Carpets*, some large and creditable specimens were exhibited from Ellore and Tanjore. The former were closely woven, bright, and harmonious in color, and the patterns more varied than those from any other locality. Some of the rugs from Tanjore were also very tasteful. The long velvet pile or Turkey carpet was but poorly imitated at Bangalore and Trichinopoly. There was considerable variety and boldness in the patterns of these carpets, but the wool was dirty and coarsely dyed and the weaving loose. The carpets are cheap, but it was doubtful if they would wear well as the wool seemed to be easily pulled out.—*Madras Exhibition Juries Reports.* At Iyrempettah in Tanjore they make very handsome Carpets of silk. In Southern India, the cotton carpets used for tents are made at Cumbum, Rajahmundry, and other parts, the price being under one Rupee the square yard. They are generally in broad stripes of red and shades of blue. Small carpets of this description are produced in almost every district, and are used by sepoys and others for sleeping on: they are somewhat less in price in proportion than the larger ones. Carpets of a small description, woven with woollen in stripes on a stout cotton web, are made at about the same cost. Mr. Rohde has no doubt but that a fabric woven like striped cumbly in sufficient lengths would sell for carpeting in our colonies, as it could be sold at one fourth the price of English carpets and would be well suited to the colonists' wants. Silk carpets are made in Ramnad and at Tanjore—*Rhode M.S.S.* The best rugs and carpets are produced at Ellore, the better descriptions varying in price from 2½ to 4 or 5 Rupees a yard, they are of dyed wool upon a cotton web, the colours being arranged much in the same manner as a printer's composer sets up type, the colours are not so bright as those given in Europe. Commoner descriptions, of the size of small hearth rugs, are exported thence to England and Persia. Carpets of an inferior description are produced in Mysore, North Arcot Collectorate and other parts. Dr. Walker in the Asiatic Journal, No. 113, gives the following description of Carpet weaving at Hunumcoonda which is generally applicable. "The Carpet loom is nothing more than the common native loom placed vertically instead of horizontally. The waft is of thick strong cotton twist being arranged by no wafting mill but by one of the workmen going round and round two stakes fixed in the ground and dropping the thread at each as he passes, in the loom it is kept on the stretch by two strong billets of wood, the threads being attached by separate loops of cotton fixed to a bamboo, which is elevated or depressed at the will of the weaver. The worsted is held in the left hand and a crescent shaped knife in

the right, the fingers of both being left free. The inner thread of the waft is then seized, the worsted wound round the outer, crossed on itself, and the extremity drawn out by which it is made to descend in the form of an open figure of eight to be snipped by the curved knife. It is superfluous to say that this is the work of an instant. When the pattern is new or difficult, the order and position of the worsted threads is changed by a reader in a kind of rhyme. On a row being completed, the warp, in the shape of a cotton thread, dyed dark brown by the bark of the Swietenia febrifuga, is forced down by means of an iron toothed comb, in form something like an adze; the whole is completed by cutting the worsted to its proper length by large scissors held steadily against the waft. Infant labour is employed and preferred in Warungal Carpet weaving, it being averred that their more limber finger joints are best fitted for the finer parts of the work. Dried springs of Toolsee (Ocymum sanctum) and bunches of Lepidigathis indica are attached to the loom frames; the workmen say that these make their labour go on more cleverly. Twelve different worsteds are employed. The *blue* is produced from Indigo, the *yellow* and the *sulphur yellow*, from boiling the sulphur yellow in water impregnated with Carbonate of Soda, in which a little turmeric has been mixed, the deepest yellow is produced by dipping the same in potash ley. The *reds* are all produced by lac dye dissolved by tamarind juice with sulphate of alumina and potash as a mordant. The depth of colour depends in three cases upon the original black, brown, or white colour of the wool; in the fourth on the length of time the last description of wool was allowed to remain in the dye. The *greens* are produced by immersion in Indigo, and then, in pulas or turmeric, their degrees also depend on the original colour of the wool. Bengal Indigo is always preferred to the home manufactured by the worsted dyers. Cotton carpeting is also prepared in the same way as the woollen. As a general rule the lighter worsteds wear the longest. The red seems to render the wool brittle and I doubt not some destructive agent is employed in preparing the wool. If the weavers would be induced to wash the wools thoroughly with soap, both before and after dying the carpets, this would probably be far more desireable. Messrs. Watson Bell of Broad Street have lately imported into England the Ellore carpets, furnishing flax for the web which at an additional cost of about 8 annas a yard ensures a very superior article. By offering high rates for superior articles, they have done much to improve the manufacture. Contrary to Mr. Rhode's expectation, they find it best to purchase none of inferior quality, the charges, probably, precluding their profiting by the common but generally bulky articles. The duty on import into the United kingdom is 5 per cent.—*Rhode* M.*S.S*,

(2407) CARPINUS, a genus of plants belonging to the natural order Cupuliferæ.—*Engl. Cyc. p.* 786. *C. viminea* has taper-pointed leaves with simple or nearly simple serratures, and less deeply serrated lobes to the cupules. It is a large handsome tree with weeping branches, found on the mountains of Nepaul.—*Engl. Cyc. p.* 787.

(2408) CARPOBALSAMUM. An inferior quality of opobalsam, obtained from the fruit and twigs on the same tree (*Amyris Gileadensis*) that yields the superior quality.

(2409) CARPOPOGON PRURIENS of Roxburgh is closely allied to Mucuna pruriens and is now called *Mucuna pruritus*, or more properly *fabacea.*—*O'Shaughnessy, page* 297.

(2410) CARROT. DAUCUS CAROTA, Linn. The Carrot has long been cultivated in the East, where it is called *jugur* and *gajur*. The Arabs giva *istufleen* as its Greek name,—a corruption, no doubt, of the σταφυλινος of Dioscorides. The root of the cultivated Carrot is too well known from its fusiform shape, yellow colour, sweetish taste, and nutritious nature, to require description. It is officinal on account of its succulent nature, being favourable for making poultices, which are moderately stimulant. The seeds are larger but milder in consequence of being cultivated.—*Royle page* 425. As a vegetable it is so well known as to need little description. The two kinds in general use all over the Deccan are the red and yellow—(orange and lemon colour): they may be sown at the commencement of the rains, broad-cast, in beds of about six feet square, and should be thinned, leaving a space of six or eight inches at least between each root: this distance is sufficient for the first crop, but those that are sown later should have at least six inches space allowed between each root. If you wish to preserve your carrots until the commencement of the rains, in the months of March and April, cut off the green tops, and let the roots remain in the ground; this checks their growth, and by this means good carrots can be had until the middle of July. I found the yellow Cape to answer the best for preserving; the seed was not sown until January. They bear transplanting well, and may be sown with advantage in drills. The soil should be light and good: care must be taken, the same as in moving beet, not to break the root.—*Riddell.*

(2411) CARTHAMUS TINCTORIUS, Lin. Safflower, or Bastard saffron. Κυηκος, Hippocr.

Koosumbha, SANS.	Kooshumba chettoo, TEL.
Koosum, BENG.	
Sendoorkum, TAM.	Usfur, ARAB.
Koosum, HIND. DUK.	Kajeereh, BENGALIE.

Carthamus, is a genus of plants belonging to the natural order *Compositæ*. *C. tinctorius*, the safflower, is a pretty annual plant, found wild in

Egypt and the Levant. It has an erect cylindrical stem, branching near the summit, a foot or two high, and furnished with sharp-pointed, oval, sessile, somewhat spiny leaves.—*Engl. Cyc. p.* 787. The Carthamus has a smooth stem, of a colour approaching to white, and about 3 feet in height. The plant is propagated by seeds sown in drills at 1½ feet distance from each other. The young plants appear in about a month, and after the second month are hoed and thinned, each plant being left a foot from the other. The richer the land, the larger the proportion of colouring matter afforded by the flower. On the opening of the flowerets they are rapidly gathered without being allowed to expand fully. They are then dried in the shade with great care. It grows naturally in Egypt, and is cultivated largely in Spain and in many parts of the Levant, whence it is chiefly imported and from India. That of India, is cultivated especially in Behar and Dacca, and in the low country between the Ganges and Dullasery; and the produce of Paterghautta and Belispore situated in that locality, is considered, in the London Market, as the best that is exported from India. In 1787, all the Safflower raised in the District was consumed by the Dyers of Dacca, on account of its yellow dye. In 1800, 2,000 maunds of it were exported; and since that time, the quantity annually sent to Calcutta has gradually increased and is now little short of 6,000 maunds. The Dacca Safflower ranks next to that of China which is reputed to be of a superior quality. The Safflower is widely grown on the banks of the Irrawaddy, and may be occasionally seen on the banks of the Salwen. Its flowers furnish the best yellow dye in the country, and mixed with other ingredients they are used to dye red, and to give a variety of tints.—*Mason.* These flowers are used by the Dyers in dyeing pink and scarlet.—*Ains. Mat. Med. p.* 195. Safflower, according to Dr. McClelland, is cultivated to a small extent for its flowers, which yield a yellow dye. The dry flowers are found in the bazars of India and Bengal, in the latter under the name of *Koosum* It is used by the Burmese for dyeing cotton, and might be much more largely cultivated, as the climate seems favourable to its growth.—*McClelland.* According to the experiments of Dufour, Marchaco, and Dobereiner, the petals of the safflower contain in 100 parts moisture 6, dust 3, vegetable albumen 5, yellow colouring matter 24, extract and saline matter 5, resin 0.3, red colouring matter 5, (per 100) with wax, fibre, oxide of iron, &c. It contains a red colouring matter insoluble in water, and called carthamêine derived probably from the oxidation of a peculiar principle existing in the petals called *carthamine*, and by Dumas, *carthamous acid.* When a weak soda solution of carthamine is left in contact with oxygen, it first becomes yellow and then red, and on saturating this red liquor with citric acid, red carthamine is thrown down. When air is excluded the alkaline solution remains colourless. 'The affinity of carthamêine for cotton and silk is such, that when it is recently precipitated, those substances immediately combine with it, and become at first rose-coloured, and afterwards of a fine red, so that they may be thus dyed without the intervention of the mordant; the stuffs so dyed are rendered yellow by the alkalis, and the colour is to a certain extent restored by the acids. Carthamêine is never used in dyeing wool. When it is precipitated from concentrated solutions, it furnishes a liquid paint, which, evaporated upon saucers, leaves a residue of somewhat metallic, lustre, used as a pink dye-stuff, and which mixed with finely powdered talc and dried, constitutes common rouge. Safflower also contains a yellow substance soluble in water. When the infusion is evaporated it leaves an extract very soluble in water, precipitated by acids and soluble in alkalis. It is not reddened by oxidizing agents.—*Tomlinson, page* 333. The yellow principle is worthless as a dye. It is soluble in water, is removed by washing, and thrown away as the first step, in the preparation of the valuable red product. The red dye is an acid resinous substance of superb colour, insoluble in water and in acid solutions, little soluble in alcohol, and not at all in ether. It is dissolved freely by aqueous alkaline solutions, which it neutralizes. Its salts (carthamates) are crystallizable, and quite colourless; acids precipitate the carthamic acid from solutions of these salts. To obtain it on the large scale, after the separation of the yellow matter, the dried flowers are treated by a solution of carbonate of soda, and lemon juice added; the carthamic acid precipitate, is collected by subsidence, washed, and carefully dried at a gentle heat. The most lovely tints are imparted by this dye to silk and cotton; *rouge* is a mixture of the dry carthamic acid, and finely powdered talc. The *pink saucers* used for giving a flesh tint to silk are prepared from this dye with a small portion of soda. 8 oz. of the prepared petals, and 2 oz. carbonate of soda are acted on by 2 gallons of water. 4 lbs of prepared chalk are added, and the colour precipitated upon this by citric or tartaric acid. The Chinese card-rouge is a carthamate of soda, colourless when rubbed on, but by the salt being decomposed by the acetic acid secreted by the skin itself, the carthamic acid separates in the most perfect rosy tint, which can be imagined. The seeds are said to be purgative and emetic in moderate doses. It is certain, however, that paroquets feed on them with great avidity, and without experiencing any ill effect. They yield abundance of fixed oil.—*O'Shaughnessy, page* 411. A fixed oil is prepared from this plant, which is used, as an external application, in paralytic affections, and for bad ulcers; and small seeds are reckoned by the Vyteans amongst their laxative medicines.—*Ains. Mat.*

Med. page 118. It is cultivated in China, India, Egypt, America, Spain, and some of the warmer parts of Europe, and is indigenous to the whole of the Indian Archipelago. A large quantity is grown in and exported from Bali. The Chinese safflower is considered the best, and that from Bombay is least esteemed. The price of Safflower in the English market varies from £ 1 to £ 8 per ton, according to quality. The annual quantity imported into England is from 400 to 500 tons, ¼ths of which is sent from Calcutta, and about 150 tons is grown in the Dacca Collectorate.—*Simmonds, p.* 450. A pale brownish yellow oil is obtained from the seeds of Carthamus tinctorius, in Bombay ; the seeds contain about 28 per cent. of oil.—*Faulkner.*

(2412) CARVING.—The term Carving is, in the present day, applied to the cutting into particular shapes and patterns different materials, such as wood, horn, and ivory. Wood-carving the natives of India must have practised from very early times, for their idols, and for calico-printing, as they have long used wood-blocks for this purpose. They are fond of carving many of their ordinary utensils, as spinning-wheels &c ; but their skill is shown according to European taste, in the carving of the blackwood and Ebony furnitures of Bombay and Madras, especially in the elegance of the patterns of the backs of the chairs and sofas, in the side-boards and book-cases. Such furniture is well adapted for even the best English houses. Carvings in ivory in different parts of India, are much to be admired, whether for the size or the minuteness, for the elaborateness of detail or for the truth of representation. Among these the ivory carvings of Berhampore are conspicuous. A set of chessmen from there, at the Exhibition of 1851, carved from the drawings in Layard's "Nineveh," were excellent representations of what they could only have seen in the above work ; and showed that they are capable of doing new things when required ; their representations of an elephant and other animals, were so true to nature, that they might be considered the works of real artists. The carvings in the same material in the state chair from Travancore were greatly admired, and from the truth of representation on a minute scale, where an elephant is enclosed in the shell of a pea, from Calicut. Chouries, or fly-flappers, where the ivory, or sandal-wood, is cut into long hair-like threads, are also specimens of their mechanical skill. Their skill in wood-carving was conspicuously displayed in the elaborate details of the sandal-wood boxes from the Malabar Coast. The skill of the Indian carver is also conspicuously shown in the beauty of the figures and buildings in the pith like stems of the marsh-plant called shola (*Æschynomene aspera*). In the latter all the elaborate detail of the richly ornamented Hindoo architecture of the South of India is carefully brought out. For this work only two tools seem to be employed,—one a large and heavy knife and one with a fine sharp cutting edge. Besides these, cocoa-nut shells and gourds are carved and made into cups, vases, and snuff-boxes, also the kernel of the cocoa-nut variously cut, for making garlands for state occasions. The natives of India display great skill and neatness, as well as habitual taste, in their work (and other) boxes of ivory, horn, or porcupine-quill, ebony and sandal-wood, their fans and umbrellas, chouries, and khuskhus or other baskets, hookah-snakes, imitation fruits and flowers, toys, and puzzles. The skill is remarkable with which the unyielding substance of a hard thick shell is converted into necklaces for men and into bracelets for the women. "The manufacture of shell bracelets is one of the indigenous arts of Bengal, in which the caste of Sankari at Dacca excel. The *chanks* of which they are made are the large species of Turbinella, from six to seven inches long, and of a pure white colour. They are imported into Calcutta from Ramnad and South India, opposite to Ceylon, and from the Maldive Islands."—*Taylor.* With the Chinese, *Ivory* for carving comes to China principally from Cochin-china and Africa, via Bombay, and always finds a ready sale at Canton ; the largest and best tusks weigh from 16 to 25 pounds each, decreasing to five or six pounds. The cuttings and fragments also form an article of trade, as the workmen can employ the smallest pieces. *Bones* and *horns*, especially the long horns of buffaloes, are in China worked into handles, buttons, &c. Rhinoceros' horns are brought from Burmah and Sumatra, and from Africa through Bombay ; they are highly valued by the Chinese from a notion that cups made from them sweat whenever a poisonous mixture is poured into them. A perfect horn sometimes sells as high as $300, but those that come from Africa do not usually rate above $30 or $40 each. The principal use of these horns is in medicine and for amulets, for only one good cup can be carved from the end of each horn ; and consequently the parings and fragments are all preserved. The hard teeth of the walrus, lamantin, and other cetaceous animals, also form an article of import into China from the Pacific, under the designation of *seahorse*-teeth ; they weigh one or two pounds a piece, and the ivory is nearly as compact, though not so white, as that of the elephant. The delicate carving of Chinese workmen is well known, and has often been described ; many specimens of it are annually sent abroad. Few products of their skill are more remarkable than the balls, containing ten or twelve spheres cut out one within another. The manner of cutting them is simple. A piece of ivory or wood is first made perfectly globular, and then several conical holes are bored into it in such a manner that their apices all meet at the centre, which is usually hollowed out an inch or less after the

holes are bored. A long crooked tool is then inserted in one of the conical holes, so bent at the end and stoppered on the shaft that it cuts the ivory at the same distance from the surface when its edge is applied to the insides of the cone. By successively cutting a little on the insides of each conical hole, their incisures meet, and a sphericle is at last detached, which is now turned over and its faces one after another brought opposite the largest hole and firmly secured by wedges in the other holes, while its surfaces are smoothed and carved. When the central sphere is done, a similar knife, somewhat larger, is again introduced into the holes, and another sphere detached and smoothed in the same way, and then another, until the whole are completed, each being polished and carved before the next outer one is commenced. It has been supposed by some that these curious toys were made of hemispheres nicely luted together, and they have been boiled in oil for hours in order to separate them and solve the mystery of their construction. Fans and card-cases are carved of wood, ivory, and mother-of-pearl in alto-relievo, with an elaborateness which shows the great skill and patience of the workman, and at the same time his bad taste in drawing, the figures, houses, trees, and other objects being grouped in violation of all propriety and perspective. Beautiful ornaments are made by carving roots of plants, branches, gnarled knots, &c., into fantastic groups of birds or animals, the artist taking advantage of the natural form of his materials. Models of pagodas, boats, and houses are also entirely constructed of ivory, even to representing the ornamental roofs, the men working at the oar, and women looking from the balconies. Baskets of elegant shape are woven from ivory splinths; and the shopmen at Canton, exhibit a variety of seals, paper-knives, chessmen counters, combs, &c., exceeding in finish and delicacy the same kind of work found anywhere else in the world. The most elaborate coat of arms, or complicated cypher, will also be imitated by these skilful carvers. The national taste prefers this style of carving on plane surfaces; it is seen on the walls of houses and granite slabs of fences, the woodwork of boats and shops, and on articles of furniture. Some of it is pretty, but the disproportion and cramped position of the figures detracts from its beauty.—*Williams' Middle Kingdom, Vol.* II. *pages* 141 *and* 408.

(2413) CARYOCAR. This is the only genus of the natural order *Rhizoboluceæ* and its species deserve to be introduced into Southern Asia. One of the species yields the Butter Nuts of the London fruiterers' shops. One species is described by Aublet, under the name of *Pekea buttyrosa*, as a large tree with a trunk 80 feet high, and 3 feet in diameter. The berries are covered by a rind two or three lines thick, and consisting internally of a buttery yellowish substance, which melts between the fingers, and which is sometimes used in cooking instead of animal butter. Under the rind lies a stone covered all over with slender stings, which easily separate, and become very troublesome to those who open the stones; within is a kidney-shaped kernel covered with a brownish membrane, and very good to eat; it is commonly served at table. It is called Pekea by the blacks in the neighbourhood of Oyapoco in French Guyana, where it is much cultivated. The species that furnishes the Butter-Nuts of the London markets is much like this, but is called Tata-youba by the natives of Guyana, and differs in having no stings upon the surface of the stone of its fruits: this is the *Pekea tuberculosa* of Aublet; the *Caryocar tomentosum* of modern botanists. Another species, *Caryocar nuciferum*, bears what are called the Suwarrow, or more properly Saouari, Nuts of commerce. It has only three leaflets to each leaf, each with a toothed margin and a taper-pointed extremity; the flowers are very large, deep brown externally and rich crimson in the inside; the fruit is in form like an egg, covered with a thick rough brown rind, beneath which is a soft greenish buttery substance. The nut has a stinging surface, and contains a very excellent kernel, from which may be extracted an oil like that from sweet almonds. These plants might with advantage be introduced into India.—*Engl. Cyc. page* 790.

(2414) CARYODAPHNE DENSIFLORA, Blume, Java. *Kiteja.* A tree 60 to 80 feet high, leaves gratefully aromatic, used in infusion like tea against spasms of the bowels, and in puerperal convulsions.—*O'Shaughnessy, page* 547.

(2415) CARYOPHYLLUS AROMATICUS, *Linn.* (*Eugenia caryophyllata*) Clove. *Icosand. Monog.* Tribe *Myrteæ*, Linn.

Cramboo, TAM.	Chankee, MALAY.
Long, DUK and HIND	Lawangum, TEL.
Warrala, CING.	Karenful, ARAB.
Lavanga, SANS.	Mykek, PERS.—*O'Sh.*

The Clove-tree is an evergreen and, like other of the Myrtaceæ, elegant in appearance. It is like the Pimento. The wood is hard and covered with a smooth grey bark. The leaves opposite and decussate, ovate-lanceolate, tapering towards both ends, about 4 inches long, somewhat leathery, shining, and minutely dotted, diffusing a clove-like fragrance when bruised. Panicles short, trichotomously divided, jointed at every division. The calyx tube is cylindrical, of a dark purple colour, adhering to the ovary, divided into 4 ovate concave segments. Petals 4, overlapping each other and of a globular form when in bud, afterwards spreading, roundish, whitish and said to exhale a grateful odour. Within the calyx and at the top of the ovary is a quadrangular disk, surrounding but not embracing the base of the short obtuse style. Stamens in 4 bundles, filaments long, yellow. Ovary

nearly cylindrical, 2 celled, with many small ovules in each cell attached to the sides of the dissepiment. Fruit a large elliptical berry, containing a single seed, by the growth of which the second cell and numerous ovules have been obliterated. Embryo large, elliptical, dotted. Cotyledons unequal, sinuose, the larger one partly enveloping the smaller, including the superior radicle.—See the Bot. Mag. t. ii. 749, for a full description: Dict. des Sciences, Nat. for detailed dissection. It is a native of the Moluccas, but confined by the Dutch to Amboyna and Ternate. It has, however, been introduced into the Isle of France, India, the West Indies and Guyana.—*Royle.* The tree can scarcely be made to live in Bengal.—*O'Sh. pages* 334-36. Cloves, are the unexpanded flower-buds, and are picked by hand or with long reeds, and then quickly dried in the shade Cloves should be large, heavy, brittle, brown externally, red within, and when compressed or rasped allowing a volatile oil to exude. Their odour is aromatic, very sweet, taste aromatic, strong, hot, and acrid, almost to burning, slightly bitter. The best are obtained from the Moluccas. They have considerable weight. Their actual properties are extracted by water and by alcohol. The cloves are gathered in October, or in February. Each shrub gives from 2 to 4 lbs. of cloves, but in the arborescent state 20 lbs. have been produced. One clove tree is described, the trunk of which was eight feet in diameter, and which furnished annually 50 to 60 lbs. A pound of cloves contains about 5000 flowers. The ripe fruits dried before the sun, are also found in commerce, and are called clove berries, or *mother cloves.* Their properties are analogous to, but much feebler than cloves, and are still imported into China.—*Royle, p.* 797. It is impossible to ascertain when cloves were first introduced into Europe. The Chinese who visited the Molucca islands before their discovery by the English, disseminated this spice through India, whence it spread to Persia, Arabia, and Europe. After the Dutch conquest of the Moluccas they restricted the cultivation of the clove to the island of Amboyna and to Ternate. Nevertheless the plant was introduced by the French into the Mauritius and Bourbon, and by the English into Barbadoes and the Antilles, in all which localities it succeeds perfectly.—(*Fee.*) The clove plant resembles the coffee. It grows quickly, and bears while young. Its height seldom exceeds 18 feet, its trunk is straight, and sustains a large somewhat conical cyme, so tufted that it resists the efforts of the wind, and the tree is thus frequently destroyed by storms.—*O'Shaughnessy.* It is extremely handsome, and of luxuriant foliage, the whole tree and leaves are strongly Aromatic. The Clove tree is propagated by seed or layers, the plant thrives best in a strong compact soil of a clayey nature, and arrives at maturity eight or nine years after sowing. The seeds should be sown about six inches apart, in beds with plaintain leaves or mats suspended two or three feet from the ground to shelter the young plants from the sun, for if not protected from it when young, they droop and die. When the plants are five or six months old, they should be transplanted at a space of fifteen or sixteen feet asunder, and will bear about the sixth year.—*Riddell.* Cloves are universally employed as spice, and enter into some pharmaceutical preparations; the volatile oil is much used by perfumers, and dentists apply it to carious teeth to cauterize the exposed nerve. The *volatile oil* is very fluid, but thickens by age, clear, transparent, at first colourless, then amber-like or brown, heavier than water, entirely soluble in alcohol, reddened deeply by nitric acid, and producing oxalic acid; odour very powerful and agreeable, taste very hot, acrid, and burning. It is much adulterated, especially with pimento oil. The oil is obtained by distilling cloves from a saturated solution of common salt in water: the salt being added in order that the liquid should acquire a higher boiling point, viz. 224. —*O'Shaughnessy.* The resin, named caryophullin, is obtained in brilliant satiny crystals. —*Royle.*

(2416) CARYOTA URENS.

Evimpannah, TAM.	Bon khejur,
Bastard Sago Palm, ENG.	Burra flawan,
Bhynee, CAN.	Kittul, CING.
Jeroogoo, TEL.	Bherlee-mahar, also
Ramguoah,	Coondal panai marum. TAM.

The Caryota urens, is one of a genus of elegant palm trees frequent in woody mountains of the East Indies. Their trunks are ringed and often lofty, but they flower only once in the course of their existence. The C. Urens is a native of Ceylon, Malabar, Bengal, Assam and various other parts of India. It is a lofty palm, being more than forty feet high and the trunk is more than a foot in diameter. It ascends the mountains of Sikkim to the height of 5000 feet. —*Hooker, page* 143, *Vol.* 1. Dr. Roxburgh describes it as highly valuable to the natives of the country where it grows in plenty. During the hot season, a single tree will yield at the rate of one hundred pints of toddy or palm wine in the twenty-four hours.—*Royle.* Its spathes yield this toddy or palm wine, koondel panei khulloo, which is used in the Deccan as yeast for fermenting bread but is also used by the Natives of Ceylon, Canara and Malabar. It is converted into Sugar or Jaggery, Koondel panei vellum, *Tam.*, and into the spirit known as Bynee Arrack.—*Ainslie's Mat. Med. page* 265. The wood is extensively used under the name of Napiera in Ceylon for rafters which are exceedingly hard and durable.—*M. E.* The pith, or farinaceous part, is filled with starch granules equal to the best sago. The natives make it into bread, and boil it into thick gruel. According to Knox,

'the inside is nothing but pith. It yieldeth a sort of liquor, which they, the Cyngalese, call *Jelligee*: it is rarely sweet and pleasing to the palate, and as wholesome but no stronger than water." It "bears leaf like to that of a betel-nut tree, which is fastened to a skin as the betel-nut leaves are, only this skin is hard and stubborn, like a piece of board; the skin is all full of strings as strong as wire; they use them to make ropes withal."—*Royle.* Its leaves are very large, measuring eighteen or twenty feet in length, and from ten to twelve across; from their fibre, the "kittul fibre" of commerce, ropes of great strength, brushes, brooms, caps, and similar articles are manufactured; the kernel is used for buttons and beads: the woolly material found on the petioles is used for caulking ships as oakum.—*Seeman.* In a recent account of the 'Vegetable Products of Ceylon,' by Mr. Ondatjee, it is said that the *black fibre* from the leaf-stalks, manufactured into rope, of great strength and durability, is used for tying wild elephants. The Rodyahs, or outcasts among the Kandyans, make this rope generally with considerable skill, as it is both regular and compact.—*Royle.* At the Madras Exhibition of 1855, the nar of this, the Indian Sago palm, was exhibited from Cocanada, Nellore, Masulipatam and Travancore. It is much used by the natives for making fishing lines and bow-strings, is very strong and resists water for some time, but is liable to snap if suddenly bent or knotted. It resembles black horse hair and might be employed similarly.—*M. E. J. R.*

(2417) CARAGANA GERARDIANA, its common name 'Tartarian furze.'

(2418) CARAWAY SEED.

Carvi, Cumin des pres, Fr.	Carvi, It.
Keummel, Brodkummel, Ger.	

Carum Carui, Caraway plant. Caraway seeds have an aromatic smell, a warm pungent taste, and yield much essential oil. They are used in confectionary, for flavouring cheese, spirits, liqueurs; and in medicine. They are imported into Bombay from England and the Persian Gulf. The essential oil, which is much used in pharmacy, is of a yellow colour, sweet smell, and very hot taste: in Germany caraway seeds are used in bread. The essential oil is much used as an adjunct and solvent in the preparation of the resinous cathartic pills. The roots of the caraway plant are very agreeable, and are eaten in the north of Europe.—*O'Shaughnessy, page* 358.

(2419) CARUM NIGRUM. *Vern.* Zeera seeah. Brought into India from Kunawur, and used as a carminative. (*Royle.*)—*O'Shaughnessy, page* 358.

(2420) CASEARIA ELLIPTICA. Klaare marum, *Tam.* This is a large shrub rather than a tree, the wood therefore can be of little value except for ornamental purposes. It is smooth, fine grained and yellow coloured. The juice said to cure snake-bites.—*Wight.*

(2421) CASHEW NUT.

Hidgeillee, Badam, Beng.	Cajew, Guz. & Hin.
Catsjoenooten, Dut.	Acaju, It.
Noix d' acajou, Fr.	Nozes d'acaju: Port.
Akajunusse, Westindische Anakarden, Ger.	Nueces, d'acaju, Sp.

Cashew nuts have already been noticed at some length, when describing the *Anacardium occidentale*, the tree from which they are obtained. Cashew nuts are kidney shaped bodies, attached to the fruit of the tree which is found in the East and West Indies, and America. They are used as an article of food, and also as an ingredient in chocolate and are procurable in all Southern and Eastern Asia.

(2422) CASHEW APPLE OIL. Anacardium occidentale. This powerfully vesicating oil is obtained from the pericarp of the Cashew Apple. It has been long known to the Native Physicians, and much resembles in its properties the acrid oil obtained from the marking nut (Semecarpus Anacardium).—*M. E. J. Rep.*

(2423) CASHEW GUM. Anacardium occidentale. The trunk and branches of this tree yield, on being wounded during the ascent of the sap, a transparent gum similar in appearance to gum arabic, for which it is a good substitute. This gum is subastringent and being unpalatable to insects, is particularly adapted for use, where their depredations require to be guarded against.—*M. E. J. R.*

(2424) CASHEW NUT OIL. Anacardium occidentale.

Moondree cottay yennai, Tam.	Kajo ka tel, Hind.

The light, yellow, sweet tasted, and edible oil obtained from the *nut* of this tree, is in every respect equal, if not indeed superior, to either olive, or almond oil. It is very seldom prepared, the nuts being used as a table fruit.—*M. E. J. R.*

(2425) CASHMERE GOAT. Perhaps the most highly prized of any animal in the East is the goat of Cashmere, with the long silky hair of which are worked the world-famed Cashmere shawls. They thrive best on the grassy slopes of the Cashmere hills, but are also reared with success in Lahore and still further to the south.

(2426) CASHMERE, a beautiful fabric manufactured in the kingdom of Cashmere, from the fine wool growing about the roots of the hair of the Thibet goat. Cashmere shawls have a wide-spread fame, on account of their extreme softness, brilliancy, and elegance; and it has long been the aim of European nations to imitate, and if possible to equal them, applying to their manufacture the more speedy and elaborate methods which modern science has placed within reach. The oriental shawls are woven by an extremely slow process,

and are therefore very costly. The date of the manufacture is unknown, but these shawls have been celebrated ever since the British established themselves in India. As far as we can gather from the observations of various writers, the Thibetian wool, being imported from Thibet and Tartary into Cashmere, is first bleached to rid it of a greyish hue which naturally belongs to it, then spun into yarn by women, and dyed of various colours. The yarn is next given out to the weavers by a merchant, who perhaps enters largely into the shawl trade, and engages a number of shops in which men work for him; or else he supplies a certain number of overseers called Oostands with yarn, delivering to them at the same time instructions as to the quality, colour, patterns, &c. of the goods, and these men carry on the manufacture at their own houses, with the help of ordinary weavers. The Oostands receive six or eight *pice* a day for their wages, the common workman from one to four *pice*, the value of a *pice* being about three-half pence. Thus scantily are the shawl weavers of Cashmere rewarded, while the fabric they produce has often been sold in London at from 100*l.* to 400*l.* the shawl. But it is fair to state that the manufacture of a remarkably fine and elaborate shawl will sometimes occupy a shop for a whole year, two or three or perhaps four persons being constantly engaged on it. Plain shawls are simply woven with a long narrow and heavy shuttle, but variegated shawls are worked with wooden needles instead of a shuttle, there being a separate needle for each colour. In some of the richest shawls, scarcely a quarter of an inch is completed by three persons in one day. Sometimes, in order to hasten the process, a shawl is made in separate pieces at different looms, and the pieces are afterwards sewed together. This is done with great dexterity, so that it is not immediately detected. An overseer at each loom superintends the workmen, and if the pattern be new, he directs them as to the figures and colours, keeping before him a paper pattern of the device which is to be produced. The rough or inferior side of the shawl is uppermost on the frame, nevertheless the pattern is most accurately preserved by the workers, who sit on benches while so employed. The shawls are made both long and square, the former generally measuring 54 inches wide, and 126 long, the latter 63 to 72 inches square. They are exquisitely soft and warm, surpassing in these respects every other clothing material. In some parts of Asia these shawls are worn just as they come from the loom; but all those destined for India are carefully washed and packed near Lahore. The extent of the manufacture in Cashmere has been differently stated: some years ago there were said to be 16,000 looms in that kingdom; and if it be correct that about five shawls (including the inferior qualities) are made on an average at each loom during the year, this gives a total of 80,000 shawls as the annual produce of the kingdom. When Cashmere was tributary to Afghanistan, a considerable portion of the revenue was exacted in shawls instead of money. The beauty and value of Cashmere shawls has led to various imitations, which at length have proved successful, both in France and England. The government of the former country gave encouragement to a patriotic and zealous man, M. Janbert, who exposed himself to great risk and hardship, in bringing from the East in 1823, a flock of Thibet goats, part of which were successfully reared at St. Oven, near Paris. The climate suited them well, so that for several years the proprietor was enabled to sell a great number of male and female goats, which were called Cashmere goats. The Cashmere wool still imported from Thibet comes into Europe by way of Casan, on the eastern bank of the Volga. The mills for spinning it are very numerous in France where three principal descriptions of Cashmere shawls are manufactured, at Paris, Lyons, and Nismes. The Paris shawls are principally of the kind known as French Cashmere, in which, by the aid of the draw-loom and of the Jacquard, a surface appearance is given precisely similar to that of the oriental shawls. Both the warp and the weft are the yarn of pure Cashmere down: the figures and colours of the Indian shawls are faithfully copied, and the deception would be complete, did not the reverse side show the cut ends. What is called the Hindoo shawl, manufactured at Paris, has its warp in spun silk which reduces the price. These imitation shawls are executed by as many shuttles as there are colours employed, which are thrown across the warp according to the requirements of the pattern, and being in many cases introduced only at intervals, the yarn remains floating loose at the back of the piece, and is cut off afterwards. To contrive a method of weaving shawls that should be, like the eastern ones, both sides alike, was a difficult task, but was at last accomplished by Parisian ingenuity. In this case the yarns of the weft are not only equal in number to the colours of the pattern, but there are also as many little shuttles or pirns filled with these yarns as there are colours to be repeated in the breadth of the piece. Each of these small pirns or bobbins passes through only that portion of the flower in which the colour of its yarn is to appear and stops on the one side and the other of the cloth exactly at its limit: it then returns upon itself, after having crossed the thread of the adjoining shuttle. From this reciprocal interweaving of the various yarns of the shuttles, it happens that, although the weft is made up of a great number of different threads yet they form a continuous line in the whole breadth of the web, upon which the lay or batten acts in the usual manner. The great art consists in avoiding confusion of the shuttles,

and in not striking up the lay till all have done their part. A woman assisted by two girls is able to conduct the whole operation. But this close imitation of the oriental shawl is a very slow process, and therefore the shawls, must be necessarily costly. Lyons is famous for its Thibet shawls, the weft of which is yarn, with a mixture of spun silk. The shawls of Nismes are celebrated for their low price and the ingenuity with which spun silk, Thibet down, and cotton are all worked up together.—*Tomlinson, page* 337. The Cashmere Shawls are usually divided into three groups, the "Border Shawl;" the Rizayee or Shawl of the finest texture, and the ordinary Cashmere Shawl —*M. E. J. R.* Cashmere, and the next in quality Umritsir shawls, possess unequalled fineness, delicacy, and warmth. These shawls are brought to Bombay in large quantities direct from Cashmere,which are almost entirely exported to London. The trade is entirely in the hands of the natives.—*Faulkner.*

(2427) CASSAVA OR MANIOC. The shrub from which this substance is prepared is about six feet high, extensively grown for its farinaceous root: there are several species, nearly all natives of America, principally of Brazil, whence it derives one of its common names of Manihot or Mandioc. Two species of Manihot have been found indigenous in South Australia. The varieties commonly cultivated for their roots, are the sweet and the bitter. The Sweet cassava is the *Janiphi* (or *Jatropha,*) *Loeflingii*, of Kunth; the *Manihot Aipi*, of Pohl.—This species has a spindle-shaped root, brown externally, about six or seven ounces or more in weight, which contains amylaceous matter, without any bitterness, and is used as food, after being rasped and washed, so as to cleanse it from the fibrous matter, in the same manner as arrowroot is prepared. It is distinguished from the bitter cassava by a tough ligneous fibre, which runs through the heart of the tuber. Manihot starch is sometimes imported into Europe under the name of Brazilian arrowroot. The cassava is known in Peru as *yucca*. A dry mixed soil is best suited to its culture. So exhausting is this crop, that it cannot be raised more than two or three times successively on the same land. The roots arrive at maturity in eight or nine months after planting, but may be kept in the ground a much longer time without injury. Sweet cassava might be sliced, dried in the sun, and sent to Europe in that state. In dry weather the process succeeds remarkably well, and the dried slices keep for a considerable time. Dr. Shier ascertained that when these sliced and dried roots were first steeped and then boiled, they return to very nearly their original condition, and make an excellent substitute for the potato. The plant thrives on even the poorest soil; the mode of planting is simple. It consists in laying cuttings

CASSAVA OR MANIOC.

a foot long in square pits a foot deep, and covering them with mould, leaving the upper ends open. From two to four pieces may be placed in each square. The planting ought to be in the rainy season. The cuttings must be made from the full-grown stem. A humid soil causes the root to decay, a dry soil is therefore more adapted for its cultivation. As blossoms are occasionally plucked from potato plants, so the manihot or cassava is deprived of its buds to increase the size of its roots. The raw root of the bitter species, when taken out of the ground, is poisonous. If exposed, however to the sun for a short time, it is innocuous, and when boiled is quite wholesome. The starch of the root of the manioc is prepared in the following manner, as described by Dr. Ure:—"The roots are washed and reduced to a pulp by means of a rasp or grater. The pulp is put into coarse strong canvas bags, and thus submitted to the action of a powerful press, by which it parts with most of its noxious juice. As the active principle of this juice is volatile, it is easily dissipated by baking the squeezed cakes of pulp upon a plate of hot iron. The pulp thus dried concretes into lumps, which become hard and friable as they cool. They are then broken into pieces, and laid out in the sun to dry. In this state they are a wholesome nutriment. These cakes constitute the only provisions laid in by the natives, in their voyages upon the Amazon. Boiled in water, with a little beef or mutton, they form a kind of soup similar to that of rice. The cassava cakes sent to Europe are composed almost entirely of starch, along with a few fibres of the ligneous matter. It may be purified by diffusion in warm water, passing the milky mixture through a linen cloth, evaporating the straining liquid over the fire, with constant agitation. The starch, dissolved by the heat, thickens as the water evaporates, but on being stirred it becomes granulated, and must be finally dried in a proper stove. The Bitter cassava is the *Janipha Manihot*, of Kunth; the *Jatropha Manihot*, of Linnæus; and *Manihot utilissima*, Pohl.—This species has a knotty root, black externally, which is occasionally 30lbs. in weight. In the root there is much starchy matter deposited, usually along with a poisonous narcotic substance, which is said to be hydrocyanic acid. The juice of the plant, when distilled, affords as a first product a liquor which, in the dose of thirty drops, will cause the death of a man in six minutes. It is doubted whether this acid pre-exists in the plant; some suppose it to be generated after it is grated down into a pulp. It can be driven off by roasting, and then the starch is used in the form of cassava bread. It is principally from the starch of the bitter cassava that tapioca is prepared by elutriation and granulating on hot plates. This serves to agglutinate it into the form of concretions, constituting of the tapioca of commerce. This being starch very

nearly pure, is often prescribed by physicians as an aliment of easy digestion. A tolerably good imitation of it is made by beating, stirring, and drying potato starch in a similar way. The grated starch of the roots, floated in water, is spontaneously deposited, and when repeatedly washed and dried in the sun, forms cassava flour, called "Moussache" by the French. The juice of the bitter cassava, mixed with molasses and fermented, has been made into an intoxicating liquor, which is much relished by the negroes and Indians. The concentrated juice of the bitter cassava, under the name of cassareep, forms the basis of the West India dish, "pepper pot." One of its most remarkable properties is its highly antiseptic power, preserving meat that has been boiled in it for a much longer period than can be done by any other culinary process. Cassareep was originally an Indian preparation. The manioc or cassava is cultivated in America, on both sides of the equator, to about latitude 30 degrees north and south. Among the mountains of intertropical America, it reaches to an elevation of 3,200 feet. It is cultivated also in great abundance on the island of Zanzibar, and among the negro tribes of Eastern Africa to the Monomoesy, inclusive; on the west coast of Africa, in Congo and Guinea. It has also been introduced into Asia. The farina of the manioc is almost the only kind of meal used in Brazil, at least in the north, near the equator. An acre of manioc is said to yield as much nutriment as six acres of wheat. Meyen states, "It is not possible sufficiently to praise the beautiful manioc plant." The Indians find in this a compensation for the rice and other cerealia of the Old World. It has been carried from Brazil to the Mauritius and Madagascar. Tapioca is a preparation of Cassava and the following quantities of Brazilian arrowroot, or tapioca, were imported in the undermentioned years into Britain.

	Cwts.		Cwts.
1833	942	1838	462
1834	888	1839	402
1835	1,663	1840	983
1836	3,735	1841	1,870
1837	2,142	1843	2,325

The cassava root grows abundantly in most of the West India islands and tropical America; the trouble of planting is inconsiderable, and the profit arising from its manufacture, even by the common process of hand-grating, is immense. Enterprising colonial settlers should give this a fair trial, as well as encourage the present growers to increase their crops and improve the quality of the article, so as to render it suitable for the English market. The manufacture of starch will one of these days become a productive source of colonial wealth. Since Cassava was first grown in the West, its capabilities as a starch-producer have, to a certain extent, been known, and for that purpose it has been in limited use. Mr. James Glen, of Haagsbosch plantation, Demerara, erected machines on his plantation for grinding the root and preparing the starch of the bitter cassava, and shipped the article in considerable quantities to Europe, where it was sold at a price which puts the profit upon sugar cultivation completely to the blush. His agent in Glasgow writes, that any quantity (like that already shipped) can command a ready sale at 9d. per. lb. Its use is co-extensive, or nearly so, with that of sugar. A sample of a ton, prepared at Haagsbosch in 1841, was submitted for examination to Dr. Shier, at the colonial laboratory, Georgetown, who admitted it to be a beautiful specimen of starch, although it had undergone but *one* washing. The root from which it was made, was planted eight or nine months previously, upon an acre of soil, which had never undergone any preparation of ploughing, or been broken and turned up in any way. The plants were never weeded after they had begun to spring, nor were they tended or disturbed until they were ripe and pulled up. The expense of planting the acre was five dollars, and reaping this crop would, I suppose, amount to as much more, say £2 in all. The green cassava was never weighed, but the acre yielded fully a ton of starch—equal at 9d. per lb., to £84. The experimental researches of Dr. Shier have led him to believe that the green bitter cassava will give one-fifth its weight of starch. If this be the case the return per acre would, under favorable circumstances, when the land is properly worked, be enormous. On an estate of Essequibo, a short time ago, an acre of cassava, grown in fine permeable soil, was lifted and weighed; it yielded 25 tons of green cassava. Such a return as this per acre would enable tropical colonies to inundate Great Britain with food, and at a rate which would make flour to be considered a luxury. Dr. Shier is convinced that, in thoroughly drained land, where the roots can penetrate the soil, and where its permeability would permit of their indefinite expansion, a return of 25 tons an acre might uniformly be calculated upon. What a blessing, not only for those colonies, but for the world, would the introduction be of this cheap and nutritious substitute for the potato,—*Simmonds, page* 370.

(2428) CASSIA, a genus of plants belonging to the natural order *Leguminosæ*. It consists of a large number of species, chiefly inhabiting the tropical or temperate parts of the world, and including among them the plants that produce the Senna leaves so commonly employed as a purgative. The genus Cassia belongs to the sub-order Cæsalpinieæ of Leguminosæ. Cassia Fistula and other species are now referred by some, to *Cathartocarpus*. The leaflets of several different species of Cassia constitute the various kind of senna called Senna leaves. In addition to the leaflets, the leaf-stalk and pods are frequently present, especially in the Alexandrian Senna, which contains also the

leaves and pods of *Tephrosia Apollinea*, and the leaves, but rarely the follicles, of *Cynanchum arghel*, Delile (Cassia *oleæfolium*, Nectoux), a plant belonging to the natural order *Apocynaceæ*, which possesses deleterious properties. The leaves of this last named plant constitute two parts in ten of the Senna of Alexandria. The Tripoli Senna is free from it, as is likewise the Tinnevelly Senna, which is now the best and cheapest in the markets of Britain, and should always be preferred, as much of the griping tendency of common Senna is due to the presence of the Arghel leaves. The Senna Leaves met with in the continental markets or shops are frequently adulterated with the leaves and berries of the *Coriaria myrtifolia*, a very poisonous plant.—*Engl. Cyc. page* 793. When free from adulterations, Senna furnishes a most valuable purgative medicine; but when impure, its action is accompanied with nausea, griping, and other unpleasant symptoms. It is desirable therefore to free it from impurities before administering it or subjecting it to the action of water to form an infusion.—*Eng. Cyc. page* 794.

(2429) CASSIA ABSUS.

Chychm, Egypt. | Chusmuk, also chusmeeguh, Pers.
Kushmee zurk, also Hub-oos-soudan, Arab. | Chuksoo, Hind.
| Akakalis, Greek.

This shrub (described by Roxb. Fl. Ind. vol. ii.) is extremely common in the Deyra Dhoon and on the plains of northern India. It is a small biennial or triennial, covered with glutinous hairs, legumes six seeded, seeds black. M. Delile mentions this seed as the Chychm of the Egyptians, brought by the caravans from Darfour, the powdered seeds being used as an application in cases of chronic opthalmia. Mr. Royle informs us they are used for the same purposes in India, and are known by nearly the same name, Chaksoo being the Hindostanee, Chusmuk and Chusmeeguh the Persian, Kushmeezurk and Hub-ul-Soudan, Arabic. To this is also aded *Akakalis* as a Greek name.—*Royle, p.* 184. This term is well known in the bazars.—*O'Sh. p.* 309.

(2430) CASSIA ACUTIFOLIA, (Alexandrian senna.) Is found in Arabia Felix, Upper Egypt, Arabia, and Senaar, between the Nile and Red Sea. *Cassia acutifolia*, is a small under shrub, with ovate lanceolate sharp-pointed leaflets, yellow flowers in terminal erect racemes, and compressed velvety legumes an inch long and half an inch broad. It forms an important article in the commerce of the countries where it grows. It is chiefly sent to Alexandria for shipment, whence it has gained the name of Alexandrian senna among the drug-merchants. It is considered the most valuable of all the sennas.—*Eng. Cyc. page* 793. This species constitutes the bulk of the senna consumed for medical purposes in Europe. It is much adulterated with the leaves of Cynanchum arghel, Tephrosia Apollinea, and Coriaria myrtifolia.—*O'Shaughnessy, page* 306.

(2431) CASSIA ALATA. Winged Cassia. Senna alata. Roxb. Fl. Ind. ii. p. 349.

Dao murden, Hind. | Seema Avasee, Tel.
Dadrugna, Sans. | Broad leaved cassia, E.
Semie Aghatee, Tam. | Cassia Alata, Lin.
Velaitie Aghatie, Duk. | Dveepa gustia, Sans.

The fresh leaves bruised and mixed with lime juice are deemed a powerful specific in ring-worm. Dr. O'Shaughnessy had often tried them, and with decided advantage. Ainslie mentions (p. 109) that the fresh leaves, simply bruised and rubbed upon the eruption, are also found in many instances to remove it. The whole plant is used by the Tamuls as a remedy in venereal, in poisoned bites, and as a general tonic.—*O'Sh. p.* 308. This species bears a profusion of gaudy, yellow flowers, and is much cultivated by the natives of Tenasserim for its medicinal properties in diseases of the skin.—*Mason.* It is a stunted shrub, pretty only when in flower. An ointment prepared from its fresh leaves is almost a specific in ring-worm.—*Beng. Phar. page* 383.

(2432) CASSIA AURICULATA.

Tanghedoo, Tel. | Turwer, Hind.
Mayharie and Talopodo, Sans. | Avaray puttay, Tam.

One of the commonest shrubs in the Madras Presidency, grows abundantly in the sterile tracts: also in all parts of the Deccan. The bark is used for tanning, and the stems to make native tooth-brushes. This plant is of great importance to the tanner, its virtues are well known to the native Chuckler, who can obtain a large quantity of the bark at a low rate, and with it a soft and durable leather may be turned out. On the whole, it is perhaps the best of the indigenous astringents of southern India for this purpose. The powder of the dried seeds is introduced into the eye in extreme stages of opthalmia. The seeds are also used as tonics, in the form of electuary, the dose of which is a small tea-spoonful twice daily.—*Ainslie*, ii. *p.* 32. All parts of the plant have much astringency, and seem to possess no other property.—*O'Sh. p.* 309. Its wood is known as the Tangada wood, Tangada kurra, *Tel.* and its bark as Avaraiputtai, *Tam.*

(2433) CASSIA BARK. Laurus Cassia. Lin.

Lawanga puttay, Tam. | Darchinie, Duk.

Cassia Bark is the bark of Cinnamomum (Cassia, *Blume*) Aromaticum, *Nees v. Esenbeck*, (Laurus Cassia, *Linn*,) and of other species. Cassia is mentioned by early Greek writers; in the Bible by the name *Kiddah*, and is one kind of Cassia in Diosc, i. c, 12. It is translated Cassia in Exod. xxx. 24 (*v.* Kiddah, and Kinnamon, *Bibl. Cycl.* and *Antiq. of Hind. Med.* p. 84). There are several distinct sources of Cassia, though it is often described as produced by the *Laurus Cassia* of Linnæus, a plant, said to be of Ceylon and the Peninsula of India, but which it is diffi-

cult to determine. Dr. Wight has shown that no less than three species were included by Linnæus under one name: one plant is *Litsæa Zeylanica*, Dawalkurunda of the Cingalese; another, apparently *Cinnamomum sulphuratum* of Nees, is the *C. perpetuo-florens* of Burmann; and the third, the *Carua* of Rheede (Hort. Mal. i. 57), Dr. Wight considers to be the *Cinnamomum iners* of Nees. Herman's own plant of Cassia lignea, in the British Museum, is named *Walkurunda*, and is a true Cinnamomum. Cassia bark, called *Cassia lignea* (and by the Chinese *Kwei Pe*, or Cassia-skin), we learn from the Chinese Repository, ii. 455, is exported from China to all parts of the world, sewed up in mats, usually two or more rolls in each mat, and a pound in each roll. From China it is imported into Singapore, Calcutta, and Bombay. It is imported into Great Britain from all these places, and also from Manilla, as well as from Quilon and Madras, and is kept in all shops and sold as Cinnamon, this being distinguished by the name of *true* Cinnamon, and must be specially asked for by this name. *Chinese Cassia* or *Cinnamon*, as it is also called, is, according to Mr. Reeves, produced in the province of Kwangsi, whose principal city Kwei-ling derives its name from the forests of Cassia by which it is surrounded. It is also said to be produced in Cochin-China in the dry sandy districts lying north-west of the town of Faifoe, between 15° and 16° of N. lat., and imported into Canton, &c. to the extent of 250,000 lbs.; also, that it is preferred to the Cinnamon of Ceylon. Mr. Crawford (Embassy to Siam, p. 470) says that the epidermis is not freed from the bark, as it is in that of Ceylon, that the superior kinds are retained for consumption in China, and the inferior re-exported to Singapore, &c. and to Europe. Cassia, though it bears a considerable resemblance to Cinnamon, is usually in single quills, seldom more than double, from ¼ to ½ or even 1 inch in diameter. It is thicker, rougher, more dense, and breaks with a shorter fracture, and is of a darker red colour than Cinnamon, and its powder of a reddish-brown tint. Its taste is more pungent and stronger, but not so sweet and grateful as that of the *true* Cinnamon, and its odour less agreeable. That from China is now always stripped of its epidermis, and is probably produced by the plant described below under the name of *Cinnamomum aromaticum.—Royle, p.* 542.

(2434) CASSIA BERRIES, OR DALCHINIE BERRIES, are produced in the Nuggur districts of Mysore from the same plant as the Cassia buds. The berries are an article of trade in the Nuggur division of Mysore. (Signed) J. Kirkpatrick.—*Rohde, M.S.S.*

(2435) CASSIA BUDS. LAURUS CASSIA, Lin.

Sirnagapoo, TAM.	Kasielblamen, DUT.
Tejputka phul, HIND.	Nagkessur, GUZ.
Nagaychc aloo, TEL.	Flores de cassia, PORT.

Cassia Buds (called by the Chinese *Kwei-tsze*, or Cassia-seeds), were formerly officinal under the name of Flos Lauri Cassiæ. Cassia Buds are the dried flower buds (perianth and ovary) of the Cassia tree, the Cinnamomum aromaticum, and are mostly brought from China. They bear some resemblance to a clove, but are smaller, and when fresh have a rich cinnamon flavor.—*Simmonds.* They should be chosen round, fresh, and free from stalk and dirt. They have the flavor and pungency of cassia. The exports from Canton in 1844 were 21,500 lbs.; in 1850, 44,140 lbs., valued at 7,400 dollars. The average quantity of Cassia Buds imported into the United Kingdom, in each of the thirteen years ending with 1842, was 40,231 lbs.; the average quantity entered for home consumption in these years was 6,610 lbs., and the average annual amount of duty received was £312.—*Simmonds.* They are exported from Canton in considerable quantities, have some resemblance to cloves or to nails with round heads, or are cup-shaped when the perianth bud falls off. Those that are fresh and plump are preferred. They are imported into Britain chiefly for use in confectionary, forming one of the ingredients of many old receipts. From the Chinese Repository, the opinion of Mr. Reeves, of Nees, &c., it is more than probable that both *Cassia buds* and *Cassia lignea* are obtained from the same tree. The buds have the flavour and pungency of taste of Cassia, and yield an essential oil upon distillation. The *Cinnamomum aromaticum, Nees v. Esenb*, from which Cassia Bark and Cassia Buds are supposed to be obtained, is a tree of considerable size. Branches angular, twigs and petioles covered with down. Leaves often nearly opposite, though usually alternate, oblong-lanceolate, acute at each end, triple-nerved, or with three nerves which unite into a single nerve above the insertion of the leaf-stalk, and disappear towards the apex of the leaf; the nerves are, like the twigs, covered with broken (strigulose) downiness, with curved-veinlets on the under surface. Panicles narrow, silky.—This is the *C. Cassia* of Blume, introduced from China, and the *Laurus Cassia*, t. 3. of the brothers Nees, in their paper on the Cinnamon, also of Hort. Kewensis, ii. p. 427, and the Laurus Cinnamomum of Andrew's Repos. t. 595, often quoted 596. The leaves taste mucilaginous and Cinnamonic. Dr. Lindley says that as grown in stoves they are almost insipid, mucilaginous, and somewhat astringent. Dr. Royle received a specimen of this plant (named *Cinnamomum chinense*) from the Messrs. Loddiges, who informed him that it was imported by their house from China in 1790. This is probably the source of the various plants in hot-houses. The leaves taste mucilaginous, but also aromatic. Cassia, on the authority of Mr. Marshall, has been usually thought to be only the coarser kinds of the Cinnamon of Ceylon, or that separated from the larger branches or thick roots, and that, though intended for con-

sumption in Asia, has been imported into England and sold as *Cassia lignea.* But this, as has been observed, can have seldom taken place, for it cannot be traced among the exports of Ceylon, where, moreover, all Cinnamon, whether coarse or fine, pays an export duty of 3*s.* a pound, and the Cassia, even in England, is not worth more than 1*s.* a pound.—*Royle.* At the Madras Exhibition of 1855, Cassia Buds were exhibited from Mysore, Canara and Travancore. This spice is less known than it deserves to be, and is now exported pretty largely from the Western Coast.—*M. E. J. R.* With Cassia Buds the Vyteans and Mahomedan Physicians prepare a stomachic infusion which is a favorite remedy with them in many complains.—*Ainslie's Materia Medica, page* 8. Cassia Buds are produced by the same plant from which Cassia-lignea is obtained. They are of a dark brown colour, with the form not unlike that of a small nail. The flavour and taste resemble those of cinnamon. Cassia buds are brought to Bombay from China and the Malabar Coast, and are chiefly used in medicine. According to the English Cyclopædia, the unexpanded flowers, when they have attained about a fourth of their complete size, of a species of *Cinnamomum,* are collected and sold under this name. Much diversity of opinion exists respecting the particular species of plant which yields this article. Professor C. G. Nees von Esenbeck (who is perhaps the best authority) says it is chiefly *Cinnamomum aromaticum* (Nees) and partially *Cinnamomum dulce* (Nees), *Laurus dulcis* (Roxb.), *Cinnamomum Chinense* (Blum.); while Dr. Th. F. Ludwig Nees von Esenbeck ascribes it to *Laurus Tamala* (Hamilton, 'Linn. Trans.' xiii. p. 556, the *Laurus Cassia,* 'Hort. Beng.'), and Dierbach to the *Laurus Culeba* (Lour,), which last supposition is at variance with the statement of Louriero ('Flora Cochinensis', p. 310), respecting the action of the berries of that species. Cassia Buds have the appearance of nails with heads of different sizes and shapes, according to the period of growth when collected. But an artificial process is employed by the Chinese collector, of pressing the top against a flat hard body, by which the ovary or fruit is prevented falling out. Externally they are of a dark or grayish-brown; the fruit, which is within, is of a bright brown. The taste and odour resemble cinnamon. By distillation they yield a heavy yellowish-coloured oil. It was at one time supposed that an inferior sort, nearly devoid of taste, which is met with in commerce, was the genuine, which had been previously deprived of its oil; but Martius shewed that this was a spurious kind, which is distinguished from the true by having the upper part of the calyx marked by six slits or incisions. It is moreover not so sound as the true sort, and is furnished with a longer foot-stalk. It should be remembered that the term *Cassia* used here has no relation to the genus which yields the Sennas of commerce. The uses of Cassia Buds are the same as those of cinnamon and cloves.—*Eng. Cyc. page* 794.

(2436) CASSIA ELONGATA. Senna plant. *Syn.* C. lanceolata, Royle. *Off.* The leaves—the *Tinnevelly senna,* or Senna mekhi, of the bazars. This is a native of the interior of India, according to some authorities; others believe it to be only naturalized. *Cassia lanceolata* (of Forskal, Suna mukee of the Arabians) and Cassia ethiopica, furnish other kinds of Senna. The greater part of the produce of Cassia lanceolata finds its way to India through the Red Sea, Surat, Bombay, and Calcutta. In 1838-39, the Calcutta imports were 966 maunds at 6 Rs. per maund of 82 lbs. This species has been cultivated successfully by Mr. Hughes at Tinnevelly, and Dr. Royle at Seharunpore. The plants in these situations yield a drug quite equal in value to the best imported article. In the Calcutta Garden the plant does not thrive well.—*O'Shaughnessy, page* 306.

(2437) CASSIA FISTULA, Lin. Purging Cassia. This has been unfortunately named, as it is constantly confounded with the Cassia yielded by the family of Laurels, with which the present product has nothing to do. The plant is a native of India, where it is constantly employed in medicine by the natives, and thus became known to the Arabs. The tree has been introduced into the West Indies, whence Cassia pods are now imported, as well as from India and the north of America. It is one of the most showy of trees, having something of the foliage of the Ash, with the inflorescence of the Laburnum. Leaves from 12 to 18 inches long, with from 4 to 8 pair of opposite, ovate, rather pointed leaflets, smooth on both sides, of a light green colour, from 2 to 6 inches long and 1 to 3 broad. Stipules minute. Petioles round, without glands. Racemes 1 to 2 feet long, pendulous, without bracts. "The three lower filaments longer than the others, with oblong anthers opening by two lines in the face, the other 7 clavate, with pores at the small end." (Lindley.) Ovary slender, smooth, one-celled, with numerous seeds, and without any transverse separations. Legumes cylindrical, 1 to 2 feet long, smooth, somewhat obtuse, indehiscent, marked externally with 3 longitudinal bands, one being opposite to the two others, divided into a number of spurious cells by transverse partitions. Seed one in each cell, surrounded by a soft blackish-coloured pulp. On account of this peculiarity of the legume, this plant is sometimes but unnecessarily placed in a separate genus, *Cathartocarpus.* The pods being officinal on account of the pulp, those are to be chosen which are heavy, and in which seeds do not rattle. The pulp is of a blackish colour, viscid, with a rather mawkish sweet taste, and a slight sickly odour. To separate the pulp, wash it out from the bruised

pods with boiling water, strain and then evaporate to a proper consistence. Soubeiran states that four ounces of pod give one ounce of pulp. This, analysed by Vauquelin, yielded Sugar, Gum, Extractive, Vegetable Jelley, Gluten, Parenchyma, Water. M. Henry states that the Sugar possesses the nauseous taste peculiar to the pulp, and he has announced the presence of a principle having many of the properties of Tannin. *Action. Uses.* Laxative; in large doses, Purgative.—*Royle page* 355.

(2438) CASSIA FLORIDA. Flowery Cassia. Though not so handsome as either of the preceding species, the Flowery Cassia is extensively multiplied on the Tenasserim Coast. It is a slender, graceful tree, "every branch terminating in a large panicle of deep yellow blossoms;" and when several are clustered together, waving their radiant glories in the floods of a noon-tide sun, they look like illumined hills on the eve of a Burman Carnival.—*Mason.*

(2439) CASSIA PLANTS, namely Cassia Lanceolata, C. Obovata, and other species, (*C. Senna*, Linn.) producing the Senna-leaves. Senna has been distinctly known only since the time of the Arabs; but they refer to the legumes only, though the leaves have long been employed in the East. There is, however, great uncertainty respecting the species of Cassia which yield the different commercial varieties. This is owing partly to all the Senna countries not having been thoroughly explored, and partly to species having been formed from imperfect specimens and others from leaves collected out of different samples of the Sennas of commerce. The following species seem to be clearly distinct. Forskal's *C. lanceolata*, has been changed in consequence of the great confusion which has arisen from this name having been applied by so many authors to the sharp-leaved Senna, which is imported in such large quantities both from Arabia and Egypt, and to which he restricts it.

1. *Cassia Forskalii* (C. lanceolata, *Forsk.* and *Lindley* Fl. Med, p. 259). Leaflets in 4 or 5 pairs, never more; oblong and either acute or obtuse, not at all ovate or lanceolate, and perfectly free from downiness even when young; the petioles have *constantly* a small round brown gland a little above the base. The pods are erect, oblong, tapering to the base, obtuse, turgid, mucronate, rather falcate, especially when young, at which time they are sparingly covered with coarse scattered hairs. (Lindl. *l. c.*) Collected by Dr. S. Fischer in Palm-grounds in the valley of Fatmé, flowering at the end of February. Forskal describes this as being distinguished "glandula supra basin petioli." It was found by him at Surdud and about Mor. It is called *Suna* by the Arabs, and probably yields some of the Arabian Senna of commerce.

2. *Cassia lanceolata* (Fig. 59, taken from the Author's "Illustrations of Himalayan Botany," t. 37.) This is a bushy annual, of about 2 to 3 feet in height, extremely leafy, and of most luxuriant inflorescence in a cultivated state. The stems are erect, round, smooth, a little flexuose towards the apex. The leaves alternate, abruptly pinnate. The leaflets 5 to 8 pairs, with short petioles, ovato-acute in the lower and lanceolate-acute in the upper parts of the plant, "slightly mucronulate, smooth above, rather downy beneath (especially in young leaves), with the veins turning inwards and forming a flexuose intramarginal line; petioles without glands; stipules softly spinescent, semihastate, spreading, minute." Racemes axillary and terminal, erect, rather longer than the leaves. Ovary linear, downy, falcate, with a smooth recurved style. Legumes (3) pendulous, membranous, flat, only slightly protuberant over the seeds, oblong, sometimes elliptical, nearly straight, with the upper margin, a little curved, tapering abruptly towards the base, and rounded at the apex, of a brown colour, containing from 5 to 8 white rugose seeds (2). These are figured by Gærtner, ii. t. 146. It is probably the *Cassia medica* of Forsk. p. cxi., and agrees with his specimen of "Senna Meccæ Lohajæ inveniebatur foliis 5—7 jugis, lineari-lanceolatis," p. 85, of which Forskal states large quantities are yearly exported from the district of Abu-arisch to Jidda. The species includes,

a. Tinnevelly Senna, cultivated by Mr. Hughes in the south of India; also that cultivated by *Dr. Royle* at Saharunpore, *C. lanceolata*, Royle Him. Bot. t. 37, and by Dr. Wight near Madras. v. fig. 60, B. and spec. in Brit. Mus. It is the *Cassia officinalis* of Gært. and Roxburgh, Fl. Ind. ii. p. 346, which name ought to have been retained, or the above *C. medica*, Forsk. instead of *C. elongata* being coined, especially as this was formed from the leaves of a cultivated Indian Senna found in commercial samples. It is cultivated by Dr. Gibson, near Poona. Dr. Burns writes that he has found the lanceolate Senna wild near Kaira in Guzerat. His cultivated specimens, if picked, would form good Senna.

b. Cassia lanceolata of most authors. *C. acutifolia*, Hayne, ix. t. 41. Nees and Eberm. t. 345. St. and Church. Pl. 30, as C. Senna. These best represent the form of Alexandrian Senna (v, 60, A., a small leaf), and specimen in Brit. Mus. from Senaar.—*(Kotschy.)* It is found in the valleys of the desert to the south and east of Syene or Assouan, and collected for the trade to Cairo, forming 3-5ths, of Alexandrian Senna.

c. Cassia acutifolia, called of Delile, Esenbeck and Eberm, t. 346. (fig, 60, c.) The leaflets are narrower and more tapering towards the apex than the foregoing, as might be expected in a poorer soil and drier climate. Some of the In-

dian specimens in Dr. Rottler's Herbarium closely resemble this variety; also African specimens from Tajowra to the south of the straits of Bab-el-Mandeb. Dr. Royle is unable to distinguish these by any permanent characters, nor dried Senna-leaves cultivated at Saharunpore from good specimens of *Bombay Senna* (that is ordinary Indian Senna) imported into Britain from India; nor these from *Suna Mukki* sent him by Dr. Malcolmson from Aden, and which he states are "the produce of Africa, but in appearence exactly resemble the Arabian Suna. In the market both are sold as one kind, and bring the same price."

3. *Cassia ovata* of Merat, Dict. de Mat. Med. b. 613. *C. æthiopica*, Guibourt. Is probably a distinct species, as it is said to have a gland at the base of the petiole and another between each pair of leaflets. The leaflets are in 3 to 5 pairs, exactly oval acute, slightly pubescent below; the follicles are thin, pale yellow coloured, 1-3rd smaller than those of *C. obovata*. It is said to be found both in Nubia and Fezzan, and to furnish exclusively the Senna of Tripoli, Sené de Tripoli. It is extremely like a variety of *C. lanceolata*. The figure of C. Senna in Stevenson and Churchill, Med. Bot. t. 30, quoted by Dr. Pereira as representing this plant, is referred to by Dr. Lindley as a good representation of C. auctifolia of Delile. But Merat and De Lens say of it: "Nous ne le connaissons que par les feuilles et les fruits qu'on en voit dans la commerce." M. Guibourt calls it *C. æthiopica*; but instead of referring to *C. lanceolata* of Colladon, Pl. xv. f. e. as representing this species, he says that it is exactly represented by the Sene de Nubie of Nectoux, pl. 2.

4. Cassia obovata, *Colladon*, Hayne, ix. 42. Nees and Eberm. 347. Diffuse herbaceous plant. Leaves equally pinnate, glandless. Leaflets 4-6 pairs (somewhat villous, Roxb.) obovate, obtuse, but slightly mucronate, unequal at the base, the terminal pair more cuneate and larger. Stipules triangular, narrow, and tapering, rather stiff and spreading. Flowers yellow, in racemes. Bracts ovate, cordate, acuminate, concave, single-flowered. Legumes broad, membranous, smooth, lunate in shape, rounded at each end, with an elevated crest over each side on both valves, so as to form an interrupted ridge along the middle of each valve. Seeds 6 to 8, wedge-shaped, rugose as in C. lanceolata.—A native of Africa, from Senegal (*Fl. de Senegambie*) to the Nile; found in Fezzan by Dr. Oudney (*R. Brown*) in Egypt from Cairo to Assouan, Nubia; found in the Adel country near Sultalli (*Mission to Abyssinia*); Desert of Suez; Syria; dry parts of India, as Kaira (*Burns*); Guzerat, Dekkan (*Col. Sykes*), near Delhi, and Valley of Rungush, near Peshawar (*Falconer*); high dry uncultivated lands of Mysore (*Roxburgh. Wight*). It has been cultivated in Italy (*Sené d' Italie*), and forms 3-10th of Alexandrian Senna. This species is very distinct, in its obtuse obovate leaves and crested legumes, from the preceding acute-leaved species. *C. obtusa* Roxb. was probably described from young legumes, as the author, like Dr. Lindley, has compared good specimens from Mysore with others from Africa. The *obtusata* (fig. 60. H.) of Hayne does not seem to differ sufficiently from his *C. obovata* (fig, 60. G.) It is possible, however, that there are two very similar species in Africa. Mr. H. Grant, late of the India House, has favoured the author with a specimen in flower collected by him in February at Philæ, which has upon it *both* obovate (H.) leaflets and some which are ovate and acute (G.)! Lieut Wellsted's collection contains a specimen from the coast of Arabia, of which the leaflets are obtuse, elliptic, and hairy. The sennas of commerce may be arranged as follows.

1. *Tinnevelly Senna*, first cultivated in the district of that name. in 12° of N. lat. by the late Mr. Hughes, from seed probably obtained from Arabia or picked out of the *Suna Mukki*, as was done by Dr. Royle when he cultivated Senna at Saharunpore. (*v.* Himal. Bot. p. 186, t. 37, and Trans. Med. Soc. of Calcutta, v. p. 433.) Dr. Royle also grew Senna from Tinnevelly seed sent to him by Sir C. afterwards Lord Metcalfe; but he did not find the smallest difference between the two when grown in the same situation. The Tinnevelly Senna is well-grown and carefully picked; the leaflets are of a fine rather lively green colour; thin, but large, being from one to two inches in length, truly lanceolate. This kind is "highly esteemed in England, and is quickly displacing all the other sorts in Edinburgh, and many other cities in Britain." (Christison.) Dr. A. T. Thomson says of it, it is mild in operation, certain as a purgative, and operates without griping. It is now cultivated by Mr. Hughes' successor.

Saharunpore Senna, the same kind of Senna, cultivated at Saharunpore, differed only in the leaflets being smaller, as might be expected from the more northern latitude (30°). These Dr. Royle prescribed in the hospitals at Saharunpore, and found them effective as a purge, and operating without producing inconvenient nausea or griping. Mr. Twining, after trying them in forty-five cases in the General Hospital at Calcutta, says, in his report to the Medical Board: "From these trials, I am disposed to consider the Senna now under trial equal to the best I have ever seen."

Madras Senna. Senna is now imported also from Madras, the produce of that Presidency. In the four years 1852-53 to 1855-56, 1,715 cwt., value Rupees 17,487, were exported, having been previously imported into Madras from Tinnevelly, where it is cultivated by the natives, and is of the same nature as Mr. Hughes' Senna, though not so well grown nor so carefully picked. Dr.

Christison says of it, the leaflets are longer than those of Bombay Senna, and not so taper-pointed, but otherwise differ only in being better preserved, and being more active, are more esteemed. Dr. Searle, in a communication to the India House, says of this Senna, that "now furnished to the profession by the Madras Government is in my experience quite as good as the Alexandrian," "every leaf of the Indian being of the genuine spear-shaped species."

2. *Bombay* or Common Indian Senna, *Suna Mukki* of the natives, is first imported into Bombay from the Arabian Gulf:

316,728 lbs. in 1837-38. 570,426 lbs. in 1838-39.
Re-exported to Great Britain, 262,284 lbs. in 1838-39.

That this Senna forms a large, if not the largest porportion of what is consumed in England is not only evident from the above importation, but also from a comparison with the whole quantity of the other Sennas imported as given by Dr. Pereira.

	1838.	1839.
From East Indies	72,576 lbs.	110,409 lbs.
From other places	69,538 ,,	63,766 ,,

Some of this Senna is no doubt produced in Africa, as stated above by Mr. Malcolmson: a good deal of it in Arabia, probably by *Cassia lanceolata*, and some perhaps by *C. Forskalii*. The leaflets are thin, lanceolate, usually entire, about an inch or an inch and a half in length, narrower than either the Tinnevelly or Saharunpore Senna, probably from growing in a poorer soil and drier climate. They are of a pale green colour, often with dark brown-coloured leaflets intermixed, also some pods, and many leaf-stalks, with occasionally other impurities. The good specimens of this Senna are, however, of excellent quality, and its commercial and medical value would be much increased, if the finest leaflets were picked out. It is in constant use in hospital practice in India, and generally highly approved of. Dr. Royle prefers them for all purposes to the following kind as found in commerce.

3. *Alexandrian Senna* is an excellent kind, when the genuine lance-shaped leaflets have been picked out; but that commonly employed in England, is a mixed and very impure kind, being made up of the leaflets much broken of *C. lanceolata* and of *C. obovata*, with some pods and broken leaf-stalks, and also with leaves of other plants. It should be used only after having been carefully picked, as directed in the Edinburgh pharmacopeia. Picked Alexandrian Senna is of a pale green colour, with a faint smell. The leaflets are broad-lanceolate, the two sides unequal; they are thicker and shorter than the Indian Sennas. The lanceolate Senna of Upper Egypt, Nubia, and Senaar, yields two crops annually, the plants being cut down in spring and autumn, dried in the sun, when the leaves are stripped off, packed in bales, and sent to several *entrepots*, and finally to Boulac in the vicinity of Cairo. Of the lanceolate Senna *five* parts are here mixed with *three* parts of the leaflets of *C. obovata*, brought from other parts of Egypt and even from Syria, and also with the leaves (*two* parts) of *Cynanchum Argel*. This mixed Senna is that exported from Alexandria. On the Continent a further addition is made of the leaves of *Colutea arborescens* and of *Coriaria myrtifolia*. Dr. Pereira states that, "under the name of *heavy senna* he has met with *argel* leaves, which were sold at a higher price than ordinary senna," and Dr. Christison mentions, what indeed may often be seen, that is, Argel leaves left intermixed even in what is called Picked Alexandrian Senna. This Senna is often called "Senè de la Pálthe."

4. *Tripoli Senna*, is brought from Fezzan to Tripoli. This has the general appearance of Alexandrian Senna, but is less esteemed, though it is a more pure Senna, probably because the leaflets are more broken down, and all the leaf-stalks have not been removed. The leaflets are shorter and less pointed than in lanceolate Senna—indeed, more ovate; hence this Senna is said to be produced by *C. ovata* (C. æthiopica); but it also contains leaflets of *C. obovata*, which species was found in Fezzan by Dr. Oudney.

5. *Aleppo Senna* is now seldom imported into England. It consists of the leaflets of *C. obovata*, as do some other kinds, such as Italian Senna. Dr. Ainslie says that the *obovate* is the only kind of Senna met with in India, meaning the Peninsula of India; for it is not met with in the Bengal Presidency; nor according to Dr. Searle, is it used in that of Madras at the present day. It is less effective as a purgative, and apt to create nausea and griping. On the matter of the adulteration of this drug, Commercial Senna is prepared for use by picking out the leaflets, and rejecting the leaf-stalks, also extraneous matter, as dust, date-stones, &c., as well as the leaves of other plants. The legumes, however, possess the cathartic properties of the leaves to a considerable extent, and were alone used by the original Arabs; and there is no reason to believe that the stalks are inert. The most important adulterations are, however, the leaves of other plants. Those of the *Argel* (D.) may be distinguished by being lanceolate, equal on the two sides of the midrib, thick, leathery, and paler. They operate very dubiously as a cathartic, but occasion griping and protracted sickness. (C.) Those of *Tephrosia Apollinea* (F.) are obovate downy, and the veins proceed transversely from the midrib to each margin of the leaf without forming a marginal vein. The leaves of *Colutea arborescens*, or Bladder Senna, are ovate, but equal at the base. Those of *Coriaria myrtifolia* (E.) are astringent, usually broken down, and marked on each side of the midrib with a strong lateral nerve. As

the systematic adulteration of Senna in Egypt with the leaves of other plants is objectionable, and has been so noticed by the Pharmaceutical Society, the most efficient method of stopping it would be to purchase only the pure African and Arabian Sennas which come to us by Bombay, instead of (unless it has been picked) that which is called Alexandrian, from its place of export (v. P. J. ii. p. 63.) In India, a good substitute for Senna is afforded by *Rae Suna*, one of the COMPOSITÆ. The active principles of Senna are extracted both by rectified and by proof spirit, and both by cold and by hot water; but long boiling injures its properties as a medicine. A very useful set of experiments has been made by Mr. Deane (P. J. iv. 61), from which he finds that though the best result was obtained by macerating Senna in a weak spirit, yet that cold water extracts the soluble and active portions, nearly if not quite as well as hot water; and that picked Alexandrian Senna of the best quality is superior to all the others, from the quantity of extract it contains. Of the East Indian, that from Tinnevelly is best; and that the common East Indian is better than small Alexandrian. But it has not been proved that the purgative property is in proportion to this Extract. He found that Senna 7½ oz. troy were completely exhausted by Dil. Spirit (1 part Spirit to 5 of water) 20 fl. oz., and the product four times the strength of the Inf. Sennæ of the London pharmacopœia. In its use, it is a Purgative; safe and efficient, acting chiefly on the small intestines, and producing copious loose evacuations in doses of ½dr. to 2d. or with Bohea Tea (Paris) or with Coffee, as in the French *Café au Séné*.—*Royle p.* 362.

(2440) CASSIA LIGNEA.

Seleckeh, ARAB.
Kayu-manis, BALI.
Kwei Pie, CHINESE.
Mukalla, CYNG.
Moodercancel, Hout-Kassie, DUT.
Casse en bois, FR.
Kassien rinde, GER.
Tej, Dalchcenee, GUZ, & HIND.
Cassiglina, IT.
Cayu-manis, JAV.
Cassia Lignea, LAT.
Ilavanga, MALEAL.
Kayu-legi, MAL.
Singrowla, NEP.
Tej, PERS.
Cassia lenhosa, PORT.
Tuj, SANS.
Cassia lenosa, SP.
Lawanga putty, TAM.

In devoting a separate article to Cassia lignea, from that of Cassia bark or the Cassia of Malabar, I have been chiefly influenced to this by the knowledge that the Cassia lignea is derived from several species and even perhaps genera of plants, and from a desire to retain the commercial relations of this substance, a part, under the name it is usually known by in commerce. *Cinnamonum Cassia*, or *aromaticum*, the *Laurus cassia* of Linnæus, seems to be the chief source of the "Cassia Lignea" of commerce. It differs from the true cinnamon tree in many particulars. Its leaves are oblong-lanceolate; they have three ribs, which coalesce into one at the base; its young twigs are downy, and its leaves of the taste of cinnamon. Malabar cassia appears to be the produce of another species of *Cinnamomum* probably *C. eucalyptoides*, or *Malabathrum*. Dr. Wight, of the Madras Medical Service, in a report to the East India Company, expresses his belief that the Cassia producing plants extend to nearly every species of the genus. "A set of specimens (he observes) submitted for my examination, of the trees furnishing Cassia on the Malabar coast, presented no fewer than four distinct species; including among them the genuine cinnamon plant, the bark of the older trees of which, it would appear, are exported from the coast as cassia. Three or four more species are natives of Ceylon, exclusive of the cinnamon proper, all of which greatly resemble the cinnamon plant, and in the woods might easily be mistaken for it and peeled, though the produce would be inferior. Thus we have from Western India and Ceylon alone, probably not less than six plants producing cassia, add to this nearly twice as many more species of cinnamomum, the produce of the more eastern states of Asia, and the Islands of the Eastern Archipelago, all remarkable for their striking family likeness; all, I believe, endowed with aromatic properties, and probably the greater part, if not the whole, contributing something towards the general result, and we at once see the impossibility of awarding to any one individual species the credit of being the source whence the cassia lignea of commerce is derived, and equally the impropriety of applying to any one of them the comprehensive specific appellation of cassia, since all sorts of cinnamon like plants, yielding bark of a quality unfit to bear the designation of cinnamon in the market, are passed off as cassia." The Cassia tree, according to Mr. Crawfurd, is found in the more northern portion of the Indian isles, as in the Philippines, Majindanao, Sumatra, Borneo, and parts of Celebes. It is also grown on the western coast of Africa. The principal seat of its culture is, however, the Malabar coast and the provinces of Quantong and Kingse, in China. The famous Cassia of China is incomparably superior in perfume and flavor to any spice of its class. Its native place is supposed to be the interior provinces of China. The market price is said to be £5 per lb.—*Simmonds' Commercial Products, page* 393. The Malabar sort brought from Bombay is thicker, darker colored, and coarser than that from China, and is more subject to foul packing. A small quantity of Cassia is brought from Mauritius and Brazil, and a large amount from the Philippine Islands. Cassia bark fetches from 80s. to 105s. per cwt. in the London market, according to quality. The imports appear on the decline. In 1843 and 1844 Britain imported nearly two millions of pounds. The quantity imported and retained

in Britain for consumption in the past four years are shown in the following figures :—

	Imported. lbs.	Retained for consumption. lbs
1848	510,247	76,152
1849	472,693	83,500
1850	1,050,008	97,178
1851	267,582	82,467

The cheaper Indian barks, as well as the cinnamon of the East, seemed at one time to be fast driving out of the market the superior class cinnamon of Ceylon. In 1841 Java exported 400 cwts. of cinnamon; and the quantity of Cassia imported into the United Kingdom from India and the Philippine Islands, in the five years ending with 1844, was—

	lbs.
1840	329,310
1841	1,261,648
1842	1,312,804
1843	2,470,502
1844	1,278,413

40,000 lbs. were received from India in 1848; and 3,795 arrobas of cassia were exported from Manila in 1847. In 1852, 2,806 cwts. of cassia were received at Singapore from China, and 1,380 cwts. exported from that settlement to the Continent, against 903 cwts. shipped in the previous year. What the Ceylon spice-grower wants is an extended field of operation—a larger class of consumers to take off his cinnamon, and this can only be obtained by bringing it within the means of the great mass of cassia buyers. The Cassia tree grows naturally to the height of 50 or 60 feet, with large, spreading, horizontal branches. The peelers take off the two barks together, and separating the rough outer one, which is of no value, they lay the inner bark to dry, which rolls up and becomes the *Cassia lignea* of commerce. It resembles cinnamon in taste, smell and appearance. The best is imported from China, either direct from Canton, or through Singapore, in small tubes or quills, sometimes the thickness of the ordinary pipes of cinnamon and of the same length; but usually they are shorter and thicker, and the bark itself coarser. It is of a tolerably smooth surface and brownish color, with some cast of red, but much less so than cinnamon. The exports from China are said to be about five million pounds annually; price about 32s. per cwt. In 1850, 6,509 piculs of cassia lignea (nearly one million pounds, valued at 87,850 dollars, were shipped from the single port of Canton. Cassia bark is of a less fibrous texture, and more brittle, and it is also distinguished from cinnamon by a want of pungency, and by being of a mucilaginous or gelatinous quality.—*Simmonds.* Cassia lignea, analysed by Bucholz, yielded of Volatile Oil 0·8, Resin 4·0, Gummy Extrative 14·6, Bassorin with Ligneous fibre 64·3, water and loss 16·3=100. But as Sesquichloride of Iron and Gelatine both produce precipitates, that of the former of a dark-green colour (*p.*), it must also contain Tannin. Its active properties, dependent chiefly on the volatile oil, are taken up by spirit, and partially by water, as in the preparations.—*Action, Uses.* Aromatic Stimulant.—*Royle.*

(2441) CASSIA, MALABAR. Cassia has long been known to be a product of the forests of the Indian Peninsula. It is stated to have been a cause of jealousy between the Dutch and Portuguese that the latter sold some of the *Wild Cinnamon* growing in Cochin, &c. Buchanan, in his Travels in Mysore (ii. 336), mentions it as common on all the hills of the Malabar coast, also that Mr. Brown had planted it at Anjarakandy, as well as the Ceylon cinnamon (ii.545—6). He states that at Mangalore it was called *Dhal-China* (that is, Cinnamon), and exported to Muscat, Cutch, Scind and Bombay; also that the buds of the tree were called *Cabob-China*, and likewise exported to the same place. This export still continues, as it appears by the reports of the commerce of Madras and of Bombay that 107,856 lbs. of Cassia, were exported from Malabar and Canara, and that in 1844—45, there were imported into Bombay from Malabar and Canara, of Cassia, 52,686 lbs., and of Cassia Buds, 69,860 lbs. In the 4 years, 1852-3 to 1855-6, the exports from Madras ports amounted to cwt. 12,970, valued at Rupees 1,25,570. Some of these probably find their way into the English market. This plant Dr. Wight considers to be the famous *Carua* of Rheede, Hort. Mal. i. t. 57, referring it, doubtfully however, to *C. iners*. Reinwardt, a plant of Java and Penang, but which seems to be sufficiently distinguished by being devoid of the aromatic qualities of the Malabar plant. *Cinnamomum iners* is however, closely allied to another species, *C. eucalyptoides*, which is intermediate between *C. iners* & *C. nitidum* (Nees). Dr. Wight's drawing of the Malabar Cassia Plant sent to the India House (*v.* his Icones), appears to Dr. Royle to agree very closely with that of *C. eucalyptoides*, given by Nees and Ebern., in their Pflanz. Med., and which Nees v. Esenb. describes as Cinnamomum eucalyptoides of *Nees von Esenb.* Branches roundish, smooth; lower leaves ellipticoblong, upper ones subovate, acute at the base, subattenuate, obtuse at the apex-3-nerved, nearly veinless. Panicles sessile, subterminal and axillary. Flowers with silvery silkiness; segments of the perianth obovatocuneiform, deciduous from the middle—*Laurus Malabarathrica*, Roxb. Hort. Calc. p. 30. Wall Cat. n. 2583, B. "Sapor et odor foliorum fortis et acris caryophyllorum cum levi camphoræ tinctura." The berry not seen. The *Cinnamomum iners* of *Reinw.* is distinguished chiefly by the leaves being more lanceolate, 3-nerved, nearly veinless. Panicles pedunculate. Segments of the perianth deciduous below the apex. But both require

careful re-examination with good specimens, and comparison with the Malabar plant, before any one can determine whether this be identical with either or different from both. In the latter case, it ought to be called *Cinnamomum Caruæ*. The Chinese *Cinnamomum aromaticum* might, no doubt, be successfully cultivated where this thrives so well. Dr. Wight says, " a set of specimens (submitted officially to his examination) of the trees furnishing Cassia on the Malabar coast, presented no fewer than four distinct species, including among them the genuine Cinnamon plant, the bark of the older branches of which it would appear are exported from that coast as Cassia." And besides, he infers that all sorts of Cinnamon-like plants, yielding bark of a quality unfit to bear the designation of Cinnamon, are passed off as Cassia. Mr. Huxham, of Quilon, also states, that the former is coarser and thicker than the latter. Both are obtained from the same tree, the Cassia being the bark of the larger parts of the tree and the Cinnamon being peeled from the younger shoots and small branches. —*Royle, p.* 544.

(2442) CASSIA OBOVATA. Syn. *C. obtusa*, Wight and Arn. p. 288. *Senna obtusa*. Roxb. Fl. Ind. ii. p. 344. *C. Burmanni*. Wall. in Trans. Calc. Med Soc. vol. viii. p. 164. Wight in Mad. Journ. July 1837, p. 71. t. 4.—*O'Shaughnessy*. Aleppo Senna, has obovate very-blunt leaflets, and curved pods, with a very slight covering of down. The flowers are pale yellow. It is common in the same countries as the Cassia and mixed with it in commerce; it however chiefly constitutes the Aleppo Senna.—*Eng. Cyc. page* 793. It is indigenous in Mysore, Egypt, Suez, Nubia, and Central Africa. The leaves furnish the Aleppo and Italian drug. A nearly allied species, the *C. obtusa*, is common on the dry uncultivated lands of Mysore.—*O'Shaughnessy, page* 307.

(2443) CASSIA ORTUSIFOLIA. Chakowar, Jangli-powar. According to Dr. Irvine (*Gen. Med. Top. p.* 131.) the seed of this plant is used in medicine, the plant is scarce about Ajmeer, is prescribed to cleanse the blood, in an entire state: when the seeds are pounded and then swallowed, vomiting is produced, the leaves of the young plant are eaten as a vegetable, are also applied in itch cases. It is very common in the Dekhan: goats and sheep are fond of the seed, one seer of the seed costs one pice.—*Irvine.*

(2444) CASSIA OCCIDENTALIS. This is common in Bengal, small, very offensive, used in cutaneous maladies, and also aperient. Roxburgh gives it no native name.—*O'Shaughnessy, p.* 309. This small species of cassia Mr. Mason has occasionally noticed in Tenasserim, in native cultivation for medicinal uses. It was originally introduced into India from the West Indies. —*Mason.*

(2445) CASSIA OIL.

Tuj-ka-teil, Hind. | Koolfa-ka teil, Malabar.

Cassia bark yields a yellow volatile oil, called oil of cassia, the finer kind of which differs but little in its properties from that of cinnamon, for which it is generally substituted: it has a specific gravity of 1·071. The best is manufactured in China, where the wood, bark, leaves and oil are all in request. The Cassia oil is rated at 150 dollars per picul, and the trade in this article reaches about 250,000 dollars.—*Simmonds, page* 396. Cassia Oil, the Volatile Oil of Cassia-bark, obtained by distillation with water, is imported from Singapore, and is still probably all produced by the Chinese Cassia or Cinnamon, Cinnamomum aromaticum. When pure, it has a pale wine-yellow colour, which does not deepen with age. (*c.*) Sp. Gr. 1·095. It has in a remarkable degree the Cassia odour and taste. Cassia oil is imported into Bombay from China: and in Surat, the oil is expressed from both China and Malabar cassia. The latter kind, which is of a dirty brown colour, is chiefly exported to the Persian and Arabian Gulfs, Zanzibar, &c. under the name of *Koolfa-ka-teil.*—*Faulkner.*

(2446) CASSIA SOPHERA, Lin.

Poonaverie, Tam. | Sourna Mayharie, Sans.
Pydu tenghadoo, Tel.

The juice of the leaves as well as that of the fresh root of this species of Cassia is reckoned a sovereign external application in cases of ring worm, and is generally prescribed mixed with a certain portion of lime juice. The plant is the pomum Tagera of the Hort. Mal. and the Cambang cuning of the Malays.—*Ainslie.*

(2447) CASSIA SUMATRANA. Mayalee, *Burm.* Plentiful throughout the Hlaine, Pegu and Tounghoo Forests It is the Bombay Black wood.—*McClelland.*

(2448) CASSIA TORA. Fœtid Cassia.

Tukarieenie, Tam. | Prabunatha, Sans.
Kulkul, Arab. | Chackoonda, Hind.

Common all over the plains of India. In Tenasserim, the fœtid cassia is one of the most abundant weeds in the country. Its leaves are fœtid, mucilaginous, and gently aperient. They are much used for adulterating senna. The seeds ground with sour butter-milk are used with excellent effect in itchy eruptions, and the root rubbed to a pulp with lime juice has almost specific powers in the cure of ring worm. Like all the allied species of Cassia this seems to owe its virtues to its astringency alone.—*O'Shaughnessy, p.* 309.

(2449) CASSIS. A kind of black currant (*Ribes nigrum*), used in prepaing the liquor called *Ratafia.* It was once celebrated for its medicinal properties.—*Faulkner.*

(2450) CASSOWARY. This bird erroneously supposed to be a native of the Suhda Islands, is known to the inhabitants of these countries only as an imported stranger. The Malay name is Suwari, from which, most probably, the European one is taken. Most probably it will be found to be a native of Ceram and New Guinea only, and like the cockatoos, crown pigeons, and birds of Paradise, of the last island, made known to the inhabitants of the west through the Malay and Javanese, who have immemorially carried on a trade with the country of the Papuans.—*Crawfurd Dictionary, p.* 84.

(2451) CASSYTA FILIFORMIS. Lin.

Cotton elhay, TAM. | Cotton ka paat, DUK.

These are the leaves of a parasitical plant which appear to be the Acatsja Valli of the Hortus Malabaricus and is of the class Enneandria and order Monogynia. They are put into butter-milk, as seasoners, and are chiefly in use amongst the Brahmins in the southern parts of the Peninsula,—*Ainslie's Mat. Med. p.* 263.

(2452) CASTANEA INDICA of the eastern and northern Himalayan mountains, yields an edible nut called *Nikari.* (Royle p. 345.)—*O.Shaughnessy, p.* 607. *Castanea indica* (Theetkyha, *Burm.*) is a large tree, plentiful in the Rangoon, Pegu and Tounghoo districts; wood, red, equivalent to Mahogany.—*McClelland.* The chesnut, *Castanea indica,* Mason writes, "is a native of the hilly frontier of Bengal;" but the chesnut of this country, viz.

(2453) CASTANEA MARTABANICA, grows nearly down to the sea shore of Tenasserim There is an indigenous chesnut tree growing on the uplands which yields abundantly, and whose fruit is sold in the bazar, but they will not compare with the French chesnuts, nor even with the American chincapins.—*Mason.*

(2454) CASTANEA. CHINESE CHESNUTS. Fortune says that among these woods, he met with the chesnut for the first time in China. This discovery was of great importance, as he was most anxious to introduce this to the Himalayan mountains in India. Many attempts had been made to introduce it from Europe, but they had not succeeded. The seeds of such trees as sakes, chesnuts, tea, &c. retain their vitality for a very short time after they are gathered if they are not sown and allowed to vegetate. It is therefore useless to attempt to send these seeds in dry paper parcels or in hermetically sealed bottles from Europe to the North of India. The chesnuts which he had met with in the markets of China, although excellent for the desert were generally too old for vegetating; but when he discovered the locality where they grew, there was no longer any difficulty in procuring them quite fresh. There are two species cultivated on these hills. One is somewhat like the Spanish, and although probably a different variety, it produces fruit quite equal in quality, if not superior, to the Spanish chesnut. The other is a delicious little kind bearing fruit about the size and form of our common hazel-nut. Large quantities of both kinds were procured by him in the autumn, sown in Ward's cases, and sent on to India. Part were sent to Government and part to the Calcutta Agricultural and Horticultural Society. They vegetated freely during the voyage, and many hundreds of nice healthy young plants reached India in the most perfect condition. The chesnut may now be considered naturalized on the hills of India, and in a few years will no doubt make its appearance in the markets amongst other fruits.—*Fortune's Residence. Page.*

(2455) CASTING OF METALS. The natives generally prepare a model in wax which is embedded in moist clays, which, after being dried in the sun, is heated in the fire, the wax run out and the metal run in. A much better plan where accuracy is required, as in casting a brass nut or box for a large screw, is to cast the model in lead, and, having bedded it in clay, it may, when the mould is dry, be melted and run out and the metal run in. Wax models allow the moulds to shrink in drying and the thread of a screw box so formed, of course does not correspond. The best specimens of native casting Mr. Rohde has seen were a set of figures cast at Pettapore, about 30 years ago, for the Zemindar who had whole armies of such in bronze.—*Rhode M.S.S.*

(2456) CASTOR.

Joond-Bedushtur Ashbut-chegan, ARAB.	Joond bedushtar, PERS.
Beevergeil, DUT.	Costoreo, PORT.
Kastoreunt, Bibergeil, GER.	Baboowaja struga, RUS.
Castora, IT.	Castoreo, SP.
Castoreum, LAT.	Munace, TAM.
	Faulkner.

A peculiar concrete substance, analogous in its nature to musk, found in two pear shaped bags, situated beside two smaller follicles in the inguinal region of both sexes of the beaver. It is of a penetrating unpleasant odour, and a bitterish and somewhat acrid taste. Two kinds are known in commerce, one American, and the other Russian, which is exceedingly rare. Castor is used in medicine as a stimulant and antispasmodic. Writing scientifically, this is a concrete animal substances, formed in the preputial follicles of the beaver, *Castor fiber.* Both male and female beavers have sacs which contain this substance. In the male each sac is composed of an external or cellular coat, inclosing muscular fibres; within there is a vascular coat covering a scaly glandular membrane; externally this membrane is shining and silvery, internally scaly and glandular. The castor is contained in this bag; while fresh, it is liquid, yellow, and of strong colour. The beaver inhabits North America chiefly. Two kinds of castor are known in commerce, American and Rus-

sian. The American consists usually of two isolated sacs, wrinkled and connected by a ligament; the sacs are long and pear-shaped. Pereira states that the colour, and other external characters, are quite variable. The article called by the English druggists, "Hudson's Bay castor" is deemed the best kind now to be found. The *Russian* castor has become so dear and scarce that it is no longer available. *Castor* was once much relied on as an antispasmodic and a stimulant of the uterine system—dose dr. 2 in pills. A simple tincture and an ammoniated tincture are given in the British Pharmacopœiæ. In the present day it is seldom or never prescribed in any form.—*O'Shaughnessy, page* 619.

(2457) CASTOR OIL.

Chitta amadum, TEL. | Errundee-ka-tel, HIND.
Chitta manak ennay, TAM. |

Castor oil is expressed from the seeds of *Ricinus communis (Palma Christi)*, a plant with petale-palmate leaves, which is found native in Greece, Africa, the South of Spain, and the East Indies, and is cultivated in the two Indies, as well as in North and South America. In the temperate and northern parts of Europe, the plant is an herbaceous annual, of from three to eight feet high; in the more southern parts it becomes shrubby and even attains a height of twenty feet; while in India it is often arboraceous and thirty or forty feet high. The best oil is obtained by expression from the seeds without heat, and is hence called "cold drawn oil." A large quantity of oil may be produced by boiling the seeds, but it is less sweet and more apt to become rancid than that procured by expression. The *Palma Christi* grows continually for about four years, and is in constant bearing, ripening its rich clusters of beans in such profusion, that 100 bushels may be obtained annually from an acre, and their product of oil two gallons per bushel. There are several species, all of which yield oil of an equally good quality. A shrubby variety is common in South Australia, and other parts of New Holland. *Ricinus lividus* is a native of the Cape of Good Hope. It is a hardy plant, of the easiest culture, and will thrive in almost any soil, whether in the burning plains or the coldest part of the mountains. The seed should be planted in the tropics in September, singly, and at the distance of ten or twelve feet apart. They will bear the first season, and continue to yield for years. When the seed-pods become brown, they are in a fit state to pluck. It is often grown in the East intermixed with other crops. The primitive mode there of obtaining the oil is to separate the seeds from the husks, and bruise them by trying them up in a grass mat. In this state they are put into a boiler amongst water, and boiled until all the oil is separated, which floats at the top, and the refuse sinks to the bottom; it is then skimmed off, and put away for use. The purest oil is obtained, as before-mentioned, by crushing the seeds (which are sewed up in horse-hair bags), by the action of heavy iron beaters. The oil, as it oozes out, is caught in troughs, and conveyed to receivers, whence it is bottled for use. Castor oil is used for lamps in the East Indies, and the Chinese have some mode of depriving it of its medicinal properties, so as to render it suitable for culinary purposes. That which the people of Britain import from the East Indies comes from Bombay and Calcutta, and is obtained at a very low price. It is exceedingly pure, both in color and taste. In India there are two varieties of this plant cultivated, the one with large seeds, and the other with small seeds. That obtained from the large seeded variety is sometimes drawn cold, and its straw colored specimens are scarcely distinguishable in quality from the oil of the small seeded variety. It is however more usually extracted by heat and forms the common "Lamp oil" of the Bazar. In its *preparation*, the seeds having been partially roasted over a charcoal fire, both to coagulate the albumen and to liquify the oil, are then pounded and boiled in water until the oil rises to the surface. The roasting process, gives it a deeper red colour and an empyreumatic odour. The price of this oil varies in different parts of the country from Rs. 1-10-0 to Rs. 3-13-6 per maund of 25lbs. The average of nineteen large stations, in all parts of the Presidency for the Quarter ending 31st October 1854, was Rs. 2-8-6 per maund. The average exports of the last six years, Galls. 27,561 per annum. The small variety is employed to make the Castor oil used in medicine, in the usual way. The following is the process for making a fine kind of castor oil for domestic purposes. Take five seers of the small castor oil nuts, and soak them for one night in cold water. Next morning strain this water off, throw it away, and put the nuts into a second quantity of fresh water, and boil them in it, for two hours. After which, strain the water off, and throw it away as in the first instance the husk or outer covering being removed. The nuts are then to be dried in the sun, on a mat, for three days at the end of which time, they are to be well bruised in a mortar, add to the nuts, thus bruised, ten measures of water, and set them on the fire to boil, taking care to keep continually stirring the contents of the pot, until all the oil appears at the top when it is to be carefully strained off, and, after being allowed to cool, put into a bottle for use. The quantity of nuts mentioned in the above receipt ought to yield about one quart bottle full of oil. In place of the ten measures of plain water, the same quantity of Cocoanut water may be used: it is supposed to make the castor oil of a paler and finer colour.—*Rhode M.S.S.* Castor oil is largely imported into Bombay from Cutch and other ports in the Presidency, and is re-exported to England and France. The Palma Christi or

Castor-oil plant, is very extensively propagated by the Karens, who have two or three varieties. Until they were informed, however, by the missionaries, they were not at all aware of the medicinal properties of the plant; their object in planting the tree being, to obtain the seeds to mix with their dyes, and fix their colours. —*Mason.* In the West Indies the shrub grows about six feet high. The stalks are jointed, and the branches covered with leaves about eighteen inches in circumference, forming eight or ten sharp-pointed divisions, of a bluish green color, spreading out in different directions. The flowers contain yellow stamina; the seed is enclosed in a triangular husk, of a dark brown color, and covered with a light fur, of the same color as the husk. When the capsule is thoroughly ripened by the sun, it bursts, and expels the seeds, which are usually three in number. In Jamaica this plant is of such speedy growth, that in one year it arrives at maturity, and it has been known to attain to the height of twenty feet. A gallon of the seed yields by expression about two pounds of oil. The wholesale price in Liverpool, in October, 1853, was 3d. to 5d. per lb. It is exported from the East Indies in small tin cases, soldered together and packed in boxes, weighing about 2 cwt. each. In Ceylon castor oil is obtained from two varieties of the plant, the white and the red. The native mode of preparing the oil is by roasting the seed; this imparts an acridity to the oil, which is objectionable. By attending to the following directions, the oil may be prepared in the purest and best form. The modes of preparation are—1. By boiling water. 2. By expression. 3. Extraction by alcohol. In the first the seeds are slightly roasted to coagulate the albumen, cleaned of the integuments, bruised in a mortar, and the paste boiled in pure water. The oil which rises on the surface is removed, and treated with an additional quantity of fresh water: 10,000 parts of clean seed give by this process (in Jamaica) 3,250 of oil, of good quality, though amber-colored. 2. Expression is the simplest and most usually adopted process; the cleaned kernels are well bruised, place in cloth bags, and compressed in a powerful lever and screw press. A thick oil is obtained, which must be filtered through cloth and paper to separate the mucilage. In Bengal the manufacturers boil the oil water, which coagulates some albumen, and they subsequently filter through cloth, charcoal, and paper. 3. The extraction by alcohol is practised by some druggists. Each pound of paste is triturated with four pounds of alcohol, specific gravity 8.350, and the mixture subjected to pressure. The oil dissolved by the alcohol escapes very freely: one half is recovered by the distillation of the spirit, the residue of the distillation is boiled in a large quantity of water. The oil separates and is removed, and gently heated to expel any adherent moisture; then filtered at the temperature of 90 deg. Fahrenheit; 1,000 parts of the paste have by this process given 625 of colorless and exceedingly sweet oil. The cultivation of the *Palma christi*, and the manufacture of castor oil, is extensively carried on in some parts of the United States, and continues on the increase. A single firm at St. Louis has worked up 18,500 bushels of beans in four months, producing 17,750 gallons of oil, and it is stated that 800 barrels have been sold, at 50 dollars per barrel. The oil may be prepared for burning, for machinery, soap, &c., and is also convertible into stearine. It is more soluble in alcohol than lard-oil. American castor oil is imported for the most part from New York and New Orleans, but some comes from British possessions in North America. In the United States, according to the "American Dispensatory," the cleansed seeds are gently heated in a shallow iron reservoir, to render the oil liquid for easy expression, and then compressed in a powerful screw press, by which a whitish oily liquid is obtained which is boiled with water in clean iron boilers, and the impurities skimmed off as they rise to the surface. The water dissolves the mucilage and starch, and the heat coagulates the albumen, which forms a whitish layer between the oil and water. The clear oil is now removed, and boiled with a minute portion of water until aqueous vapors cease to arise: by this process an acrid volatile matter is got rid of. The oil is put into barrels, and in this way is sent into the market. American oil has the reputation of being adulterated with olive oil. Good seeds yield about 25 per cent. of oil. A large proportion of the drug consumed in the eastern section of the Union is derived by way of New Orleans from Illinois and the neighbouring States, where it is so abundant that it is sometimes used for burning in lamps, and in the East Indies, this is the common purpose to which it is put. In Jamaica the bruised seeds are boiled with water in an iron pot, and the liquid kept constantly stirred. The oil which separates swims on the top, mixed with a white froth, and is skimmed off. The skimmings are heated in a small iron pot, and strained through a cloth. When cold it is put in jars or bottles for use.

	Castor oil imported.	Retained.
	lbs.	lbs.
1826	263,382	453,072
1831	393,191	327,940
1836	981,585	809,559
1841	871,136	732,720
1846	1,477,168	—
1849	1,084,272	—
1850	3,495,632	—

The Eastern imports into Britain, of castor oil come chiefly from the East India Company's pos-

sessions, and were as follows, nearly all being retained for home consumption :—

	lbs.		lbs.
1830	490,558	1837	957,164
1831	343,373	1838	837,143
1832	257,386	1839	916,370
1833	316,779	1840	1,190,173
1834	685,457	1841	869,947
1835	1,107,115	1842	490,156
1836	972,552	1843	717,696

In 1841, 12,406 Indian maunds of castor oil were shipped from Calcutta alone, and 7,906 ditto in 1842. In 1842, 8 cases were shipped from Ceylon, 10 in 1843, 24 in 1844, and 14 in 1845. 1,439 barrels were shipped from New Orleans in 1847. The quantity brought down to that city from the interior was 1,394 barrels in 1848, and 1,337 barrels in 1849. Within the last year or two, an attempt has been made to introduce the cake obtained in expressing the seeds of the castor oil plant as a manure, which is deserving attention, both because it is in itself likely to prove a serviceable addition to the list of fertilizers which may be advantageously employed, and because it may lead to the use of similar substances, which are at present neglected, or thrown aside as refuse. The castor oil seed resembles in chemical composition the other oily seeds. It consists of a mixture of mucilaginous, albuminous, and oily matters; and the former two of these are indentical in constitution and general properties with the substances found in linseed and rape cake, while the oil is principally distinguished by its purgative properties. The cake obtained is in the form of ordinary oil-cake, but is at once distinguished from it by its color, and by the large fragments of the husk of the seeds which it contains. It is also much softer, and may easily be broken down with the hand. In an analysis of two samples of castor cake, stated to have been obtained by different processes; and, from the large quantity of oil, one of which must have been cold-drawn.

	Cold drawn. No. 1.	Hot drawn. No. 2.
Water	8.32	16.31
Oil	24.32	—
Nitrogen	3.05	3.35
Ash	7.22	4.95
The ash contains—		
Siliceous matters	1.96	—
Phosphates	3.36	2.27
Excess of phosphoric acid ...	0.64	—

To give a proper idea of the value of this substance as a manure, the average composition of rape cake, as deduced from the analyses contained in the Transactions of the Highland Society of Scotland is here given :—

Water	10.68
Oil	11.10
Nitrogen	4.63
Ash	7.79

The ash contains—

Siliceous matters	1.18
Phosphates	3 87
Excess of phosphoric acid	0.39

It will be at once seen that there is close general resemblance between these two substances, although there is no doubt that the castor cake is inferior to rape cake; still I believe that this inferiority is fully counterbalanced by the difference in price, which is such that, compared with rape cake, the castor cake is really a cheap manure. There is only one of its constituents which it contains in larger quantity, and that is the oil. No weight is, however, to be attached to the quantity of oil in a manure. In a substance to be used as food, it is of very high importance; but so far as we at present know, its value as manure is extremely problematical.—*Simmonds.*

(2458) CASUARIA POMANDRA. Burmese, Thabyaiywetkya. This is scarce, but found in the Pegu district. Timber strong and close-grained. Wood, white coloured, adapted for fancy work and cabinet making.—*McClelland.*

(2459) CASUARINA EQUISITIFOLIA. This tree was introduced into Southern Asia about 50 years ago, and is now well established, growing freely and ripening seed in great abundance. In general appearance, it much resembles the Larch Fir,—it grows in 10 years to the height of about30 feet. It generally grows very straight, and where the main shoot is broken or lopped off, throws out secondary shoots readily and these are usually straight and erect. It thrives best in sandy tracts along the Sea shore, and it would be desirable to plant it largely on the sand Hills, North and South of Madras where some numbers have already been grown. The wood is reddish in colour, in density and appearance it somewhat resembles Trincomallee. It bears a great strain, is well adapted for posts, and is said to bear submersion in water very well. The bark contains tannin, and a brown dye has lately been extracted from it by M. Jules L'Epine of Pondicherry. The manufacturer states that the Extract is fixed by a solution of Bichromate of Potass: with *Alum* as a mordant the Casuarina gives a reddish nankeen colour, with Iron a black colour, and if these mordants are mixed, the result is grey. The Casuarina dye becomes fixed by exposure to air without mordants, a nankeen red is obtained after 30 minutes exposure. At the end of an hour, M. Lepiné states that the colour is not affected by water, alkalies, solar light, or heat. The crystallised Extract and cloth dyed with the Casuarina were laid before the Jury of the Madras Exhibition, and the reddish brown colour of the cloth stood the test of washing well. Considering the discovery to be highly creditable to M. Lepiné, the Jury awarded him a 2d Class Medal.—*M. E. J. R.* On the whole, this tree well deserves extensive cultivation on the sandy

tracts, where it grows so readily. Hort. Garden, 13, Frith Col.—*M. E. J. R.*

(2460) CASUARINA MURICATA. *Myrticaceæ.* TINIAN PINE. BEEF WOOD. *Hind.* HURI. —This, from its general resemblance is commonly called the fir tree in India. It is grown in all parts of the Deccan. It has been introduced about twenty or twenty-five years, and grows to the height of forty feet. The small cones abound with seed, and should, if required, be gathered just before ripening. If placed in the sun, the seeds fall out, and may be planted immediately in baskets, boxes, or beds of good loam. This is the only species indigenous to the Tenasserim Coast, which is the one that has been diffused over Bengal, but the species introduced into England is the one common to the Indian Archipelago, and the South Sea Islands, called in the latter place ironwood. The wood is very hard and durable, and the Tahitians in their war-days chose it for the manufacture of their furniture, and ingeniously carved war-clubs; hence they term it the club-wood. They also fashioned valuable fishing hooks from its roots. This Casuarina in the Tenasserim Provinces is found inhabiting only the loose, sandy soil of the sea-board, and never inland. In general outline it resembles the pine, but it is of a more slender figure, and more elegant in appearance. It is there a remarkable tree, growing eighty feet high and spreading out without a leaf of covering; but its numerous fine knotted branchlets, mantled with brilliant green, and hanging in drooping bunches, or floating out lightly upon the breeze like long skeins of green silk, adorn it with the most graceful drapery; and make it one of the most desirable trees for embellishing a Tenasserim park.—*Mason.* This tree was introduced into Madras about 50 years ago, and is now well established, growing freely and ripening seed in great abundance. In general appearance, it much resembles the Larch Fir—it grows in 10 years to the height of about 30 feet. It generally grows very straight and where the main shoot is broken or lopped off, it throws out secondary shoots readily while usually grow straight and erect. It thrives best in sandy tracts along the sea shore, and it would be desirable to plant it largely on the sand Hills north and south of Madras where some numbers have already been grown. The wood is reddish in colour, in density and appearance it somewhat resembles Trincomallee wood. It bears a great strain, is well adapted for posts and said to bear submersion in water very well. On the whole this tree well deserves extensive cultivation on the sandy tracts where it grows speedily.

(2461) CATAPA. Ingudi badam. Almond of Terminalia Catappa.—*Ben. Phar.* 199.

(2462) CATHA, a genus of plants belonging to the natural order *Celastraceæ. C. edulis* is the Kat or Khat of the Arabs. "It would appear," says Dr. Lindley, "to be of a stimulating character. According to Forskahl the Arabs eat the green leaves with greediness, believing them to have the power of causing extreme watchfulness, so that a man may stand sentry all night long without drowsiness. They also regard it as an antidote to the plague, and assert that a person wearing a twig of it in his bosom may go among the infected with impunity; they even believe that the plague cannot appear in places where the tree is cultivated." ('Vegetable kingdom,' p. 587) At the same time Forskahl adds, "The taste of the leaves does not seem to indicate such virtues."

(2463) CATHARTOCARAUS. (from *καθαίρω*, to purge, and *κάρπος*, fruit), a genus of plants belonging to the natural order *Leguminosæ.*—*Engl. Cyc. p.* 797.

(2464) CATHARTOCARPUS FISTULA.

Khyar-chember, ARAB.	Dranguli, Toong-gooli JAV.
Sonali, BENG.	Cassiæ pulpa, LAT.
Cakay, CAN.	Mentus, MAL.
Ahilla, CYNG.	Khyar-i-Chember, PERS.
Amultas, DUK.	Cassia purgante, PORT.
Pykassie, DUT.	Suvarnuka, SANS.
Casse-fistulense, FR.	Konnemarm, Sarakonnemam, TAM.
Purgircassie, GER.	Rayla, TEL.
Gurmalla, GUZ, HIND.	
Polpa di cassia, IT.	

Cathartocarpus Fistula, the purging Cassia, or Pudding Pipe-Tree. This is by some included as a Cassia. It has leaves with 4-6 pairs of ovate rather acuminated glabrous leaflets; the petioles glandless; the racemes loose, bractless; the legumes cylindrical, rather obtuse, smooth. It is supposed to have been originally a native of tropical Africa, but is now extensively diffused over the globe, and is found abundantly in Hindustan, China, the East Indian Islands, the West Indies, and, South America. It is a tree from 30 to 40 feet high, with yellow flowers and long cylindrical black pods, from 9 inches to 2 feet in length. The valves of this pod are thin, hard, and brittle; and its cavity is divided by numerous thin brittle transverse dissepiments; the partitions thus formed have each a single hard flattened ovate seed, surrounded by a soft pulp. The pulp has a sweetish, flat, not unpleasant taste, and is separated by boiling the pod in water, straining the fluid, and then evaporating it to the consistence of a thick extract. This extract acts as a mild purgative on the system, and was long in great repute in Europe on that account. It is now however seldom used; and although admitted into the lists of Materia Medica of the British Pharmacopœias, is only placed there as entering into the composition of the Electarium Cassiæ and the Confectio Sennæ. The pulp, according to Henry, consists of 61 per cent. of sugar, 6.75 of gum, and 13.25 of tannin. It probably also contains Carthartine or an analogous principle.—*Engl. Cyc. page* 797. But according to Braconnet's analysis, 20 parts of the pulp consists of

sugar, 12.00, gum 1.35 astringent matter, glutten, and colouring matter in small quantities, and water 3.80. The cathartic properties are held to reside in the sugar. Several pharmaceutical preparations of cassia pulp occur in the Pharmacopœiæ of Europe. When long kept the cassia pods become dry, and rattle when shaken; these are found by experience to be destitute of purgative properties. The leaves of the tree are also purgative, the powdered seeds are aperient, in the dose of from four to six drachms. The pulp is a soft, gentle, and agreeable laxative, but requires to be taken in large doses, from four drachms to one ounce being at least required. Its most valuable use is as a base for purgative electuaries, containing more active ingredients.—*O'Shaughnessy, page* 305. "This tree," says Roxburgh, "is uncommonly beautiful when in flower, few surpassing it in the elegance of its numerous, long pendulous racemes of large, bright yellow flowers, intermixed with the young lively green foliage. It bears a striking resemblance to the laburnum. When in blossom, it is one of the most beautiful of the common jungle plants. On the Eastern side of the ghauts of the Peninsula of India, it is a small tree of great beauty when in flower, but too small to yield useful timber; in the Malabar forests, however, it attains sufficient size to adapt it for spars for native vessels. The wood which is close grained, is generally a heavy crooked timber well adapted for felloes of wheels, ploughs, &c.—*Rhode.* And is used for these purposes and for making tom-toms. According to Mr. Rhode it is one of the best for tanning but it is not in equal repute with the Chucklers with that of Cassia auriculata, the proportion of astringent extract being much smaller, and it is said to thicken the leather, but will probably be found to be well suited to the tanning of hides and butts.—*M. E.* According to Dr. Irvine, one seer of the fruit yields twenty tolas of the concrete pulp, which is sold in Ajmere at four seers for one rupee. He found the bark of the root of this tree to act as a very strong purge.—*Med. Top.*

(2465) CATHARTOCARPUS JAVANICUS, Horse-Cassia, has leaves with 12-15 pairs of ovate obtuse glabrous leaflets; glandless petioles; axillary racemes; nearly cylindrical, very long, and transversely torose legumes. It is a native of Java and the Moluccas. Its legumes are above two feet in length, and contain a black cathartic pulp, which is used as a horse-medicine in the East Indies. G. Don has described a species of *Cathartocarpus* (*C. conspicuus*), which is a native of Sierra-Leone, where the pods are called Monkey Drum-Sticks.—*Engl. Cyc. p.* 798.

(2466) CATHARTOCARPUS NODOSUS, Cassia nodosa. Knotted cassia. This species of cassia is remarkable for its large pink-colored flowers, and is seen tinting the Tavoy forests almost as beautifully as the calico tree does the steeps of the Apalachian Mountains. It is highly esteemed in Bengal, but Mr. Mason has not seen it cultivated in these Provinces except by Major Macfarquhar, and he mentioned his plants were sent him from the Botanical Garden near Calcutta.—*Mason.*

(2467) CATHARTOCARPUS ROXBURGHII. A highly ornamental tree, in form much resembling the weeping ash. It is at present only to be found in gardens, but the wood is hard and handsomely marked, and may hereafter prove a valuable addition to the timbers of India. Hort. Garden 28.

(2468) CAT-SKINS. The skins or furs of the domestic and wild cats. They are used for a variety of purposes, but chiefly for being dyed, and sold as false sable. The fur of the wild cat is more esteemed than that of the domestic cat. —*Faulkner.*

(2469) CATS EYES.

Chushm-maidah, Guz., Hind., Pers.

Cats-eye, a form of Chalcedony, of a greenish-gray colour, having a peculiar opalescence, or glaring internal reflections, like the eye of a cat: the effect is owing to filaments of asbestos. It comes from Ceylon and Malabar, and possesses considerable value as a gem. (Dana, Mineralogy.) —*Engl. Cyc. p.* 798. The cat's eye, is often seen set in rings, and is brought to Tenasserim from Burmah. Comstock says: "It is in great request as a gem, and bears a high price:" but those seen in Maulmain market are not much valued. A small one may be purchased for two rupees, and one of ordinary size for five; while ten rupees is the highest price given for the best.—*Mason.*

(2470) CATURUS SPECIFLORUS. Cattooseerageum. Vervonia Anthelmintica. —A shrub with dicœcious flower: *Linn. Roxb. Fl. Ind.* iii. p. 760.—*O'Shaughnessy, p.* 561.

(2471) CAULIFLOWER. Brassica oleracea var. An excellent vegetable, grows freely, but does not flower in Madras. In the Deccan, the seed should not be sown until the latter end of August, as it does not always head well: it requires the same care as the cabbage, and should be planted in a similar manner. Removing the plants occasionally prevents their quick growth, and Dr. Riddell thinks think if the roots, when taken up, were divided into halves, or quarters, before being put into the ground, that it would facilitate its going to head. The soil in which he [illegible] the finest heads grown was of a [illegible]cription, and the plants had little [illegible]iven to them. In England the market gardeners seldom water cauliflowers, and once in four days is amply sufficient in the Deccan: no injury will ac-

crue even if watered less frequently. The white brocoli is, he is sure, often taken for the cauliflower in this country, and he has seen heads large enough to be divided into two dishes, and then form a sufficiency to cover a dish in general use for vegetables. Brocoli, both red and white, should be cultivated in the same manner as cauliflower.—*Riddell.*

(2472) CAVIARE.

Caviar, Fr.	Caviarium, Lat.
Kaviar, Ger.	Ikra, Rus.
Caviario, It.	Caviario, Sp.

Caviare, a substance prepared in Russia consisting of the salted roes of large fish. The best, which is made from the roe of the sturgeon caught in the Wolga, in the neighbourhood of Astrachan, appears to consist entirely of the eggs: it is packed in small kegs, but the inferior sort is made into the form of dry cakes. It is highly esteemed in Russia, and also forms an article of considerable export; 30,000 barrels having been exported from Astrachan in a single season. The manufacture consists in separating the roe from its membranes, then washing in vinegar or white wine, and drying by spreading it out on a board in the air. Salt is then well rubbed in, and it is next put in a bag and the liquor pressed out. It is then packed in kegs for sale. During the three annual seasons of fasting in Russia, the consumption of caviare is very great, as it is also in Italy during the fasts of the church. It is eaten on bread, with oil and lemon juice or vinegar.—*Tomlinson, page* 354.

(2473) CAYENNE PEPPER, Guinea Pepper.

Filfill-achmar, Arab.	Peperone commune, It.
Tubia, Bali.	Lombok, Jav.
Meneshena, Can.	Lada-mira, Mal.
Gasmiris, Gyng.	Filfil-i-surkh. Pers.
Poivre d'Espagne, Fr.	Brahu-maricha, Sans.
Spanischer Pfeffer, Ger.	Mollaghai, Tam.
Lal-mirchee, Lal-mirchee, Guz, Hind.	Merapakaia, Tel.

Is a mixture of the powder of the dried pods of different species of capsicum. It is used in medicine, and also as a stimulating condiment. See Capsicum.

(2474) CATECHU, Gambier, Cutch, Terra Japonica.

Cutt, Can,	Catecu, It.
Cachou, Fr.	Gambir. Mal.
Katchu, Ger.	Catch, Port.
Cauth, Kuth, Cutch, Guz. Hind.	Sha-See, Burm.

The early history of Catechu is obscure, and though it was probably known to the Ancients, Persian works on Materia Medica in use in India do not quote any Arabic or Greek names for it. A great variety of astringent extracts are now known to be prepared from the wood, bark, and fruit of various plants. The Acacias, however, are most noted for the secretion of astringent principle in the wood, bark, and legumes of various species, which hence form articles of commerce, and are employed in tanning. But none are more valuable than the officinal species yielding Catechu. Catechu (called *Kut* or *Kutch* by the natives of the East and Cutch, and Terra and Japonica in commerce) is properly an extract prepared from the wood of the Acacia Catechu; but the term is now applied also to other extracts similar in appearance and properties. It should be confined to these, and the term Kino applied to astringent *natural* exudations. The mode of preparing Catechu, by cutting into chips the inner brown coloured wood, and making a decoction which is afterwards evaporated to a proper consistence, was first accurately described by Mr. Kerr, as practised in Behar; it is the same on the confines of Nepal, and in north-west India, on the Malabar coast, and also in Ava, from the same tree.—*Royle, p.* 350. When of good quality, Catechu is more powerful as an astringent than kino. Of all the astringent substances we know, catechu appears to contain the largest proportion of tannin, and Mr. Purkis found that one pound was equivalent to seven or eight of oak bark for tanning leather. A few years ago the terms catechu, terra japonica, and cutch were employed synonymously; they are now, however, for the most part used in trade somewhat distinctively, though not uniformly in the same sense. The manufacture of catechu from the *Acacia catechu* as practised in Canara and Behar, has been described by Mr. Kerr ("Med. Obs. and Inquiries," vol. v.), and Dr. Hamilton ("Journey through Mysore," &c., vol. iii.), while Professor Royle has explained the process followed in Northern India. According to the last-mentioned gentleman, "the kutt manufacturers move to different parts of the country in different seasons, erect temporary huts in the jungles, and selecting trees fit for their purpose, cut the inner wood into small chips. These they put into small earthen pots, which are arranged in a double row, along a fireplace built of mud; water is then poured in until the whole are covered; after a considerable portion has boiled away, the clear liquor is strained into one of the neighbouring pots, and a fresh supply of the material is put into the first, and the operation repeated until the extract in the general receiver is of sufficient consistence to be poured into clay moulds, which, in the Kheree Pass and Doon, where he has seen the process, are generally of a quadrangular form. This catechu is usually of a pale red color, and is considered there to be of the best quality. By the manufacturers it is conveyed to Saharunpore and Moradabad, whence it follows the course of commerce down the Ganges, and meets that from Nepaul, so that both may be exported from Calcutta."—*Simmonds, p.* 496. Next to timber, *catechu* or *Cutch* is undoubtedly one of the most important exports of the pro-

vince, and Pegu Cutch has obtained a reputation, which will always give it a preference in the market. *Acacia Catechu*, the tree from which it is procured, begins to appear about six miles to the north of Rangoon, and from thence it increases both in the number and size of the trees, until it constitutes the prevailing character of the forests to the north-east of Prome, where the trees are fifty to sixty feet high with a girth of seven or eight feet, and it is said to attain even a larger size in the Burmese territories lying north of the boundary. It is found plentifully in the northern part of the Tharawaddy district, but it is scarcely to be seen on the Tounghoo side of the hills. Thus it is entirely confined to the valley of the Irrawaddy. The manufacture of Cutch is scarcely known or practised below Meeaday, and that which finds its way into the market as Pegu Cutch probably comes chiefly from beyond the frontier. There is no reason why it should not be manufactured largely from the parallel of Henzadah upwards, as the tree from thence becomes inexhaustible, growing over rich rice plains in places of easy access.—*McClelland.* The catechu obtained from this tree in Pegu, fetches £4 to £5 more per ton than Gambier and other astringent extracts.—*Simm*: *page* 495. At the Madras Exhibition of 1855, catechu was seen in the form of 1. Circular flat Cakes from Travancore, covered on both sides with paddy husks. 2. Large flat Cakes from the Northern Division, varying in colour from Brick dust to dull yellow. 3. Round balls of a dark brown colour, the size of a small orange from Mangalore, where a large manufacture takes place. But these two sorts appeared identical or nearly so, varying only in shape.—*M.E.J.R.* Catechu is largely imported into Bombay from Singapore and China; two varieties are distinguished from the latter place, viz. *black* and *white* caucth.-*Faulkner.* Three chief varieties of catechu are described by Feé, and other eminent writers on pharmacy; viz. that of Bengal, Bombay, and the catechu in masses. *Bengal catechu* is in pieces of 3 to 4 ounces each, partially rounded, of dull red colour, covered with seeds on one side, fracture dull, undulated, and often marbled; taste astringent and subsequently sweet, powder grey; tannic acid 48.5 per 100. *Bombay catechu* is in pieces of 2 to 3 ounces, flattened and round, of brown colour, with seeds externally and internally, fracture shining, and rarely marbled; taste bitter, without any succeeding sweetness; powder brown grey; tannic acid 54.5 per 100. *Massive Catechu* is found in the bazars in pieces of 3 or 4 ounces, fragments of larger masses, reddish or blackish brown, uniform, shining, wrapped in large nerved leaves, fracture uniform, flavour very astringent, somewhat bitter, with an after sweetness; powder orange. Proportion of tannic acid very variable.—*O'Shaughnessy.* The best is of uniform liver brown colour; often adulterated with red clay; this is detected by incineration. Pure catechu leaves no more than 5 per 100 of earthy matter. According to Dr. Royle, Catechu is seen either in square or roundish pieces or balls, varying in colour, from a pale whitish or light reddish-brown to a dark brown colour; either earthy in texture, or lamellated, or presenting a smooth shining fracture. Some kinds are hence more friable than others; all are without smell; the taste is bitter, astringent, followed by a little sweetness. The pieces are generally of a darker colour externally than they are in the inside. Some of the kinds are covered with rice husks, others are enveloped in leaves, which Dr. Pereira has ascertained to be those of *Nauclea Brunonis*, a native of the Malayan peninsula. The *pale* variety is usually distinguished from the *dark* coloured, and said to be imported from Calcutta; but Dr. Royle obtained both kinds in the bazars there, the pale being imported from the Upper Provinces, and the dark from Pegu and Singapore. The dark-brown Catechus are obtained from Bombay; but both kinds may no doubt be prepared from the same tree, as a greater degree of, or longer continued heat, and greater exposure to light, is said to produce the dark colour. The dark are heavier, more dense in texture, and have a resinous fracture. The largest portion of good Catechu is taken up by water, especially when boiling, the infusion being of a light or reddish-brown colour, according to its strength: it reddens litmus, and is strongly astringent in taste. From forming a crude precipitate with a solution of Gelatine, Catechu is applicable to the tanning of leather, for which it is now much employed. Sir H. Davy, in analysing the Dark and Pale Catechu, or the Bombay and Bengal, as they were called, obtained from

	of Tannin	Extractive	Mucilage	insol. residuum.	
Dark Catechu	109	68	13	10	= 200
Pale do.	97	73	16	14	= 200

The Tannin of Catechu is very similar in properties to that obtained from Galls. The principle called Extractive by Sir H. Davy, has by others been called Resinoid matter, Resinous Tannin, and of late *Catechine* and *Catechuic acid.* This is most easily obtained by treating Gambier with cold water.—*Royle. p.* 351. When of good quality, catechu is a more powerful astringent than Kino. It appears to contain the largest proportion of Tannin of all the substances we know, and Mr. Purkis found that for tanning leather one pound was equivalent to seven or eight of oak bark.—*Sim.* Catechu is much used in medicine as an astringent and tonic, being usually given in combination with aromatic and earthy substances; the dose is 10 grains, repeated according to circumstances.—*O'Shaughnessy, p.* 302. Dr. Timmins, in his Report to the Madras Medical Board, mentions that he employed catechu in lieu of galls, in the treatment of 175 cases of Fever, and with equally

satisfactory results. Two cases only required quinine. The dose was the same as that of gall powder, given with infusion of chiretta.

(2475) CEDAR.

Ceder, Dut.	Cedrus, Lat.
Cedre, Fr.	Kedr, Rus.
Zeder, Ger.	Cedro, Sp.
Cedro, It.	

A name given to several distinct kinds of forest trees. The timber is resinous, has a fragrant odour, a rich yellowish-brown colour, and a bitter taste, owing to which it is not subject to worms —a circumstance which accounts for its great durability. The cedar of Lebanon so famous in Scripture, was in ancient times much employed in the construction of temples, and other religious buildings; in the formation of statues of the heathen deities, tablets, &c.—*Faulkner.* The cedar of Lebanon is usually called Pinus Cedrus, but sometimes Cedrus Libanus; the lofty Deodara, a native of the Himalayas, with fragrant and almost imperishable wood, and often called the Indian cedar, is sometimes referred to the genus Pinus, and sometimes to that of Cedrus or Larix, with the specific name of Deodara. Dr. Hooker is of opinion that the Deodar and the cedar of Lebanon are identical. The wood of several of the Conifera however is called cedar. The wood of Juniperus virginiana is called Red or Pencil Cedar, and that of J. bermudiana is called Bermuda Cedar. That of J. barbadensis, is called Barbadoes Cedar; while the Juniper of the North of Spain, and South of France, and of the Levant, is from J. oxycedrus: the White Cedar of North America, a less valuable wood than the red cedar, is yielded by Cupressus thyoides, and the cedar-wood of Japan, according to Thunberg, is a species of cypress. The name Cedar is thus applied to a number of woods in our different colonies, which are in no way related to the Conifera: thus the cedar of Guiana is the wood of Icica altissima. The white wood or white cedar of Jamaica is Bignonia leucoxylon, and the bastard cedar of India is Guazuma ulmifolia. In New South Wales again the term white cedar is applied to Melia Azaderach, and red cedar to that of Flindersia australis, as well as to the wood of the Toon tree, or Cedrela Toona.—*Holtz.* In China, a kind of Cedar probably a cypress, called nan mah, or southern wood, which resists time and insects, is considered peculiarly valuable and especially reserved for imperial use and buildings. —*Williams' Middle Kingdom, page* 275.

(2476) CEDRELA FEBRIFUGA (Soymida febrifuga?) has leaflets ovate-oblong, acuminated, quite entire. It is a native of Java. Its bark is said to have a bitter effect on some of the fevers of India than cinchona.—*Eng. Cyc. p.* 802.

(2477) CEDRELA TOONA, (*Toon*).

Tunna, Beng.	Toon marum, Tam.
Loodh, Sans.	Toona, Hind.
Thit-kado, Burm.	Tundu, Can.
Toon tree, Eng.	

Cedrela, a genus of plants, the type of the natnral order *Cedrelaceæ.* It has the following characters :—Calyx 5-toothed; petals adnate to the torus; stamens 5, distinct; capsule 5-celled; 5-valved; seeds numerous, on each side of the dissepiment ending in a wing.—*Engl. Cyc. page* 802. *Cedrela Toona,* the Toon Tree or Bastard Cedar, has lanceolate leaflets, acuminate, entire, pale glaucous beneath. It is a native of the East Indies, where it is called Toon. It has an erect trunk of great height and size, with smooth gray bark. The flowers are very numerous, small, white, fragrant, like honey. The seeds are numerous, imbricated, winged. This noble timber tree is common in Bengal; it flowers in February, and the seeds ripen in May and June. *Cedrela Toona* is found on the banks of streams in the Tounghoo district, but it is scarce.—*McClelland.* It grows in the ravines of the Concan, and is stated to be abundant, 25 miles North East of Trevandrum. It is found in the Mysore and Salem jungles in large quantities, also along the crest of the ghauts from Travancore to Goa. Wight No. 103, 126, Travancore. At the Tambur river, in East Nepal, the vegetation in some spots was exceedingly fine, and several large trees occurred: Dr. Hooker measured a Toon tree (*Cedrela*) thirty feet in girth at five feet above the ground.—*Hooker Him. Jour. p.* 193. It will be seen from this that it has a wide range throughout India and furnishes the name of a beautiful wood, common in the higher provinces, where it is made into furniture of all kinds, and is much admired for its close grain and beautiful colour, resembling, though lighter than and not so close grained as, Mahogany, to which it is deemed equivalent.—*Ains. Mat. Med. p.* 210. It is called Bastard Cedar from an aromatic resin exuding from it resembling the American Cedar. It is often sold in Madras under the general name of "Chittagong wood" and is the most valuable of the woods known by that commercial name. In Coimbatore it is a valuable timber tree of large size, and its reddish coloured wood is used for cabinet-making purposes. It or an allied species is known also in Coimbatore under the name of Wunjoolie marum; but as this is a very heavy and strong, hard wood, said to be admirably fitted for pestles and mortars and other purposes demanding great strength, but not for cabinet purposes, Dr. Wight suspects Roxburgh's toona and the Wunjoolie are different trees. A specimen of wood sent by General Cullen as of this tree showed the grain and polish remarkably well: it is however of a brighter colour, and apparently a denser quality than any met with in the market, inducing a doubt as to its being of the same species. The wood of this tree closely resembles the inferior kinds of mahogany, and is much used in India. The bark is powerfully astringent, but not bitter. The native physicians use it in conjunction with the powdered nut of the Cæsalpinia bonducella, an

intense bitter. M. Nees Von Essenbeck has published an account of some experiments on the bark, which indicated the existence of a resinous astringent matter, a brown astringent gum, and a gummy brown extractive matter, resembling *ulmine*. The bark was used in Java by Blume in epidemic fevers, diarrhæa, and other complaints. Horsfield gave it in dysentery, but only in the last stage, when inflammatory symptoms had disappeared.—*O'Shaughnessy, page* 249-250. Its flowers in conjunction with safflower (Koosumba) are used by the inhabitants of Mysore, for dyeing the beautiful red colour called there Gul-i-nari.—*Ains. Mat. Med. p.* 205. The species sent by General Cullen is said to be abundant in Travancore. It is very deserving of careful enquiry, as to locality, supply, &c. with a view to being brought into more extensive use in this Presidency. It is said to yield planks from 2 or 3 feet in diameter, and competent practical advisers think that it promises to be a good substitute for Mahogany.—*M. E. J. R.*

(2478) CELERY. APIUM GRAVEOLENS. The blanched stalks of this plant form one of the best salads, and the green leaves are used in soups, It succeeds well on the plains of India under the following treatment. Trenches should be dug 2 feet deep, and 15 inches broad, the earth taken out thrown up on each side; dig the bottom of the trench well, and put in 9 inches of decayed cow manure and leaves in equal parts, to which add 4 inches of the soil formerly taken out, with a little lime, mix well together and water, in two or three days, plant 9 inches apart. Seed should be sown early in the season, so as to ensure strong plants by the commencement of the rains; at the close of which begin to plant. *To blanch*, when the plants are one foot high they should be earthed up, with the earth on the side of the trenches to the height of 4 inches: the proper way to do this is to take a plant in the left hand, and put the soil round it with the other, taking care not to allow any to get into the heart and not to earth above it, a little lime is required to be dusted above the plants before commencing, it will prevent injury from worms; after the first earthing, the foliage ought never to be watered if possible; as it causes the plant to decay at the centre; the earthing up must be repeated as the plants grow.—*Jaffrey*. In the Dekhan, according to Dr. Riddell, Celery seed may be put down at the commencement of the rains, and, like other plants at that season, is better for being first sown in boxes or baskets, for the convenience of being removed under shelter, if the weather is bad. When the plants are about two inches high, they may be pricked out into other boxes or baskets, two inches apart, where they remain for the first four or five weeks, and then removed into beds or rows: to the latter he gives the preference at the early part of the season; after that put them into square beds of six feet, and about twelves inches apart. They then grow so close in the leaves that they protect each other's roots from the sun, and keep the beds moist, besides being very readily blanched, merely requiring a couple of half circular tiles to be put around the stem, tied with string or matting; then earth up the sides, which completes the business. In four or five days you may commence cutting, and by transplanting the off-shoots, have a succession the whole year round. The plant is very hardy, and goes to seed without any difficulty.—*Riddell.* Kurufs, *Arab.*, are the seeds of Apium graveolens, used in Indian medicine. Celeriac is a variety of celery, and is to be managed precisely in the same manner. It seldom grows above eight inches, and mostly spreads upon the ground. The root only of this is eaten: it forms rather a large white bulb, nearly the size of a parsnip and has an exceedingly fine flavour. The root of the celeriac is used for stews rather than eaten raw.

(2479) CELASTRACEÆ, *Spindle-Trees*, the Spindle-Wood Tribe, a natural order of Polypetalous Exogens, consisting of shrubs or trees principally found in temperate latitudes. The barks of *Celastrus scandens* and *Celastrus senegalensis* are said to be purgative and emetic, whilst the species of *Celastrus venenatus* are reported to inflict the most painful wounds. The fruits of *Elæodendron ruber* are eaten at the Cape of Good Hope. It has 24 genera and 260 species.—*Engl. Cyc. page* 803.

(2480) CELASTRUS PANICULATUS. C. nutans, Roxb. Malkungee. Staff Tree.

Vululuvy, TAM.

This is a native of the Circar mountains and Mysore; the deep scarlet colored oil obtained by expression from the seeds of this shrub is used in medicine: the seeds submitted to destructive distillation yield the oleum nigrum, an empyreumatic black oily fluid of the uses of which in medicine Mr. Malcolmson has given an interesting account in his excellent work on Beriberi and rheumatism. It is administered in doses of a few drops daily in emulsions, and seems to exercise a decidedly beneficial effect. A specimen of this liquid sent by Mr. Malcolmson to Dr. O'Shaughnessy, did not differ in any sensible degree from the empyreumatic products of the distillation of the common fixed oils, containing naptha and other carburets of hydrogen. Large quantities would doubtless yield paraffine and creosote.—*O'Shaughnessy, p.* 271. In Ajmere the seed is imported from Marwar, and Godwar, is there considered sudorific, and generally heating, and is swallowed whole in rheumatism. It is used in horse mesalihs.—*Genl. Med. Top. p.* 146.

(2481) CELOSIA ALBIDA, Lin. *Riddell.*

Pannay keeray, TAM.
Ghoorugoo koora, TEL.
Booroondie, SANS.—*Ainslie's Mat. Med. p.* 255.

(2482) CELOSIA ARGENTEA. WHITE COCK'S-COMB, SIRWARIE.

Sufaid Moorgh-kes, HIND.

Double variety cultivated. The single variety is very common in the rains in the cultivated fields, both white and pink, and cattle eat the plants, especially buffaloes.—*Genl. Med. Top. p.* 185.

(2483) CELOSIA ASIATICA, INDIAN CELOSIA.

Kookspuna, HIND.

A common weed in gardens.—*Genl. Med. Top. p.* 200.

(2484) CELOSIA CERUNA, DROOPING COCK'S-COMB. Cultivated as a flower.—*Genl. Med. Top. p.* 185.

(2485) CELOSIA CRISTATA, CRESTED COCK'S-COMB.

Lal and Peela Moorgh-kes, HIND.

Both white and yellow varieties are cultivated in gardens.—*Genl. Med. Top. p.* 185. This common annual is met with all over the world, is sometimes cultivated by the natives of Tenasserim. The Burman name signifies cock's comb, like the English.—*Mason.*

(2486) CELOSIA NODIFLORA,

Comatty keeray, TAM. | Kullianie, SANS.—*Agri. Ainslie, p.* 253.
Pendli pedda koora, TEL.

(2487) CELTIS ORIENTALIS (ULMACEÆ). Captain Reynolds, sent to the Agri-Hortic. Society a specimen of a primitive cloth made by the Garrows from the bark of a tree, whose leaves were enclosed in the parcel. He says "they make several such cloths of different colours from various barks, and though these manufactures would seem cheap enough, they are not usually at the expense or labour of even such rough clothing for themselves, preferring apparently to go naked; they import at least 100,000 mds. of Cotton, but to his knowledge do not weave a seer for themselves. The Garrows who come to the plains have generally some small ends of cloths; but these are bought from the Bengalees, apparently to attend the *hauts* (fairs) in, not as clothing to protect them from wind and weather." Dr. Falconer, to whom the specimens were referred, pronounced them to be those of *Celtis orientalis*, a tree which is pretty common all over India, and known under the name of Chakan in Bengal. The cloth is probably called "Yangfung" in Assam: Capt. Reynolds names it "Amfuk." Dr. Buchanan Hamilton says, the under bark of this tree, like that of the West India kind, consisting of numerous reticulated fibres, forms a kind of natural cloth, used by the Garrows for covering their nakedness. ('Lin. Trans.,' xvii, p. 209) He also describes it in his report on Assam as a kind of rug worn by the Garrows in the cold weather, and serving them as blanket by night. But the specimens of this, as well as of some others, are chiefly interesting as showing the probability of the existence of numerous plants, of which the useful properties still remain unknown—for the fibrous properties of this are not mentioned by Dr. Roxburgh; and of him, it is justly observed in th 'Journ. of the Agri-Hortic. Society,' vi, p. 18 "from this circumstance it may be inferred h was not aware of it, as he appears never to hav allowed an opportunity to pass of drawing atten tion to the useful properties of plants describe by him, but, on the contrary, to have ever bee desirous of rendering his botanical acquirement subservient to the dissemination of useful infor mation in connection with every department c the vegetable kingdom."—*Royle Fib. Pl. p.* 31

(2488) CEMENTS. At the Madras Exhibi tion of 1855, there were a good many contribu tions of Limes, Concretes, Septariæ, Dolomites Magnesite, Gypsum and other substances used i manufacturing Cements, and there seems to b an abundant supply of minerals of this class al over Southern India. The shell lime of Sooloor pett is too well known to require further notic except that it is far too pure a carbonate of lim to be used for out door plastering near the sea The Kunkurs or Nodular limes are more durabl though not so white. The Septariæ or Parker' cement stones, are very common in Southern In dia, though the beds are not extensive: they ac company the strata of blue and white Potters clay and kaolin that are so common in this Presi dency. The best hydraulic septariæ occur a Awady near Madras, Bangalore and Chingleput A very fine natural Hydraulic cement occurs o the banks of the Godavery and has been exten sively used in the construction of the Godaver and Kistna Anicuts. A very good Hydrauli Limestone occurs along with the blue slate o Cuddapah—and the Dolomites of the Cedc Districts and the Northern Circars make gooc cements. The magnesite of Salem, Bangalore and Vizianagram, would probably improve th qualities of some of the other Limestones in cer tain proportions, as it acquires great hardness o surface but is deficient in adhesiveness. Numer ous experiments have been tried with this mine ral which certainly possesses some good hydrau lic properties but has disappointed the expecta tions at first formed of its usefulness.—*M. Ex Jur. Reports.*

(2489) CENTAUREA ATROPURPUREA The sweet Sultan.

(2490) CENTAUREA. *Compositæ.* The vari ous species of this beautiful and elegant genus are easily grown from seed in any light loamy soil, they are of various heights from twelv inches to five feet, the seed may be sown in pots or small beds at the close of the rains, ther transplanted and they will blossom during th cold weather. The flowers are fragrant and o different shades of colour, purple, blue, yellow white, red, brown, &c.

(2491) CENTAUREA MOSCHATA. Musk Centaury. *Hind.* Sha-pusund. Cultivated as a flower.—*Gen. Med. Top. p.* 206.

(2492) CENTRANTHUS RUBER. *Valerianaceæ.*

Jallukree, HIND.

This is an ornamental annual, generally grown from European seed, the colours of the different species are red, blue and white, and thrive in any good garden soil. The Valerian grows wild in some of the upper parts of Bengal.—*Riddell.*

(2493) CEPHAELIS IPECACHUANA. The roots of this plant are the part used. It is a native of New Granada in Brazil. Three modifications or varieties of these invaluable roots are found in commerce and pharmacy, viz. 1. "*Grey*" *or annulated Ipecachuana.* 2. "*Grey-red*" *Ipecachuana.* 3. "*Starchy or whitish grey*" *Ipecachuana.*—*O'Shaughnessy, page* 379. The emetic effects of the root were known to the Brazilians from time immemorial, and it received from the Portuguese the name of 'rais d'oro,' or golden root. The father of the celebrated Helvetius was the first to establish its utility after numerous experiments performed in the hospitals of Paris, for which he was rewarded by Louis XIV. with a thousand *louis d'or.* The roots of the *Viola parviflora*, the *Psychotria emetica*, and several other plants, have been occasionally used to adulterate the ipecachuana. The plant is not cultivated in Brazil, and as it only flourishes in the large forests daily falling before the planters' axe, the root is rapidly becoming scarce, and proportionally high priced. —*O'Shaughnessy, page* 381. For Indian substitutes for ipecachuana, see CALOTROPIS, CRINUM, RANDIA, PÆDERIA &c. &c.—*O'Shaughnessy, page* 383.

(2494) CERASUS, a genus of plants belonging to the Amygdaleous division of the natural order *Rosaceæ*, and including the common cherry among its species. The species may be divided into the True Cherries, the Bird-Cherries, and the Cherry-Laurels.—*Eng. Cyc. page* 826. Voigt says there is a species of cerasus, or cherry "a native of Maulmain," but Mr. Mason has never happened to meet with it. He had however good authority for the statement and Griffith remarks that there is in the Tenasserim Provinces one species of the almond tribe, "which abounds in prussic acid."—*Mason.*

(2495) CERASUS CAPRONIANA. The Cherry tree. A native of Europe, the Himalayas, Caucasus, &c. In Cashmere it is called *Aloo baloo.* The kernel of this fruit contains the elements of hydrocyanic acid, and is accordingly much used for communicating its peculiar flavour to brandy and liqueurs. The fruit of *Cerasus Pudum* is used for the same purpose in the hills. The bark is called *pudmak*, and used in medicine by the native, as it is also in America. The liqueur called *Maraschino*, which is chiefly manufactured in Venice, Trieste, and Zara in Dalmatia, is prepared from a variety of cherry named the *Griot marasquin*; the fruit and seed are crushed together, one part to the hundred of honey added, and the whole mass subjected to fermentation; during this process it is distilled, and the product is rectified. To the rectified spirit sugar and water are added, in proportions guided by the taste of the manufacturer, and the resulting liqueur is stored for some months before use, to free it of empyreumatic flavour. —*O'Shaughnessy, p.* 323.

(2496) CERASUS JAPONICA, the Dwarf Almond. This is a native of Japan, and long known in English gardens as the Double Dwarf Almond, one of the most beautiful objects that appear in the month of March.—*Eng. Cyc. page* 827.

(2497) CERASUS LAUROCERASUS. (Cherry-laurel.) This is a native of Trebizond and Affghanistan, cultivated in Europe. The distilled water of the leaves is much used in Europe as a vehicle for opiates and other anodyne medicines. It is given in doses of from half an ounce to one ounce. Great care is essential in the observation of the exact formula given in the Pharmacopœia for this preparation, a deviation from which may render the distilled fluid a most dangerous poison.—*O'Shaughnessy, page* 324.

(2498) CERASUS PSEUDOCERASUS, the Chinese Cherry.—*Eng. Cyc. page* 827.

(2499) CERASUS SERRULATA, the Fine-Toothed Cherry. A native of China.—*Eng. Cyc. page* 287.

(2500) CERASUS VULGARIS, (*Prunus Cerasus*, Lin.) the common Cherry. Flowers appearing earlier than the leaves, which are light green and smooth underneath. Branches when young stiff and erect. Fruit roundish or heart-shaped, succulent, more or less firm, and sugary, It is found wild in the woods of Asia Minor, where it acquires a very large size. Dr. Royle considers the cherry to be wild in Cashmere.—*Eng. Cyc. page* 826.

(2501) CERATONIA SILIQUA, Lin.

Khirnoob Nubtee, ARAB.

Saint John's Bread (or Fruit of the Carab tree).—*Ains. Mat. Med. p.* 39. The Carab tree has been very successfully introduced at the Saharunpore gardens, and was to be distributed along the dry and sandy tracts of the North Western provinces. The pods sell in the bazar at ten rupees a seer, or five rupees a pound.—*Spry's Suggest, p.* 54.

(2502) CERBERA, a genus of plants belonging to the natural order *Apocynaceæ*, contains among other poisonous species that from which the Tanghin poison of Madagascar is procured. —*Eng. Cyc. p.* 829.

(2503) CERBERA AHORAI, properties as in C. Manghas—*O'Shaughnessy, p.* 447.

(2504) CERBERA FRUTICOSA. A large shrub, native of salt marshes, the fruit is a deadly poison.

(2505) CERBERA MANGHAS. A common plant in the East Indies, occurring in wet situations. The kernels are described by Lindley as emetic and puragative. Waiz states that the leaves are used in Java as an excellent substitute for senna. The milky sap is also said to be purgative; the properties of all parts of the plant deserve most attentive investigation.—*O'Shaughnessy, p.* 447. In many places in Tenasserim on the banks of tide-water streams, the most remarkable tree in sight is this species of cerbera, whose fruit is used very extensively by the Burmese to make an oil which they burn in their lamps, and use to annoint their heads; a use not mentioned in the books. The medicinal properties are unknown in Tenasserim, and Mr. Mason thinks their existence may be doubted. If correct, these Provinces might supply all India with senna; for the tree abounds from the mangrove swamps on the sea-shore, to the boundaries of tide-water on almost every stream, and any quantity of leaves may be obtained for the trouble of gathering.—*Mason. C. Manghas* is a native of Singapore and some of the adjacent islands. The seeds are emetic and poisonous, whilst the milky sap is purgative. The leaves and bark are used as a substitute for senna.—*Eng. Cyc. p.* 830.

(2506) CERBERA TANGHIN, the Tanghin is described as a tree with lanceolate alternate leaves. The kernel of the fruit must be a very powerful poison: it is not much larger than an almond, and yet is sufficient to destroy above twenty persons. Radama, the late king of Madagascar, abolished the use of it as an ordeal. The plant which yields the Tanghin has been called by Du Petit Thomas *Tanghinia venenifera.* Its nut filamentous and woody, albumen none, the kernel said to be a formidable poison; it was used in Madagascar for the trial by ordeal, but the practice is now discontinued.—*O'Shaughnessy, p.* 446.

(2507) CERBERA THEVETIA. A large shrub with leaves like the oleander, and bell-shaped yellow flowers; common, easily propagated by cuttings.—*Riddell.* Its milk poisonous, bark bitter and purgative, also said to be powerfully febrifuge, "two grains being affirmed to be equal to a common dose of cinchona." Perfectly naturalized in India, according to Royle.—*O'Shaughnessy, p.* 447.

(2508) CEREAL GRAINS. The cereal grains are those which are the object of a continuous culture for food. The seeds of all the Gramineæ, those of the darnel alone excepted, are capable by cultivation of becoming alimentary. The value of grains generally speaking is directly as the size of the caryopsis, and inversely as the thickness of the pericarp. When the grain abounds in perisperm it is heavy, when the envelope is thick the grain is, on the contrary, light, thus:—

100 seeds of wheat weighed,..		4,50. grs.
100	barley, ...	3,85.
100	rye, ...	2;60.
100	oats, ...	2,50.

The chemical composition of the grain influences materially the quality of the resulting bread. If the gluten be absent no fermentation takes place in the dough, if the gluten be in excess the bread is heavy and acid. Wheat flour may be considered the type of all that is suitable for alimentary purposes, and in the degree of deviation from this standard consists the inferiority of the other grains. Several diseases infest the cereal grains, generally altering the perisperm, sometimes destroying it altogether; all these maladies are produced by minute cryptogamic plants (mushrooms), of which the three following are the most frequent:—

1. *Caries,* (*uredo caries,*) attacks wheat, usually spares the pericarp, but changes the perisperm into a black fœtid powder. The component globules are devoid of pellicles. The disease is highly contagious.

2. *Carbon or smut,* (*Uredo segetum*) occurs under the epidermis, is composed of spherical globules, attacks all the cereal grains indiscriminately, and resembles black dust.

3. *Ergot or spur,* (*Sclerotium clavus*), is elongated in form, black externally, white and horny within, exceedingly deleterious in its properties, if long taken; in large doses acts specially on the womb.

But little is known as to the native country of the cereal grains. Michaud states that he has seen wheat growing wild on Mount Atlas. Sicily has, but on insufficient grounds, claimed the honour. Pallas saw wild wheat between the Don and the Volga, but in all these cases the production of a few scattered plants is fairly accounted for on the grounds of the seeds having been transported thither by birds, or with the stores of wandering merchants or commissariat trains. Feé inclines to the belief that the ocean now covers the primitive country of corn, and refers to the catastrophes which formed the Straits of Gibraltar, submerged the Atlantis of the ancient geographers, and caused America to spring from the waves, as proofs that we may easily account for our not discovering the native soil of the cereal grains. Without cultivation all the cereals degenerate, as is said to be the case with oats at the Cape of Good Hope.—*O'Sh.* The following are the Exports and Imports of Cereal grains of Madras.

Cereal grains exported from the Madras Territories by Sea

ARTICLES.	1852—53. Quantity.	1852—53. Value. Rs.	1853—54. Quantity.	1853—54. Value. Rs.	1854—55. Quantity.	1854—55. Value. Rs.	1855—56. Quantity.	1855—56. Value. Rs.	TOTAL. Quantity.	TOTAL. Value. Rs.	REMARKS, The names of the countries being arranged in order of the proportion in which the articles have been exported to them.
Grain.											
Anoomooloo, Tel; Mutcha Cuttay, Tamil; Lablab vulgaris,	Qrs. 349	2,235	.....	.....	Qrs. 605	5,475	Qrs. 119	1,456	Qrs. 1,073	9,166	Chiefly to Indian French Ports, and Ceylon.
Carumanooloo, Tel; Cara-munni, Tamil; Lobi, Hind.	,, 198	1,757	Qrs. 149	1,315	.....	.....	.....	.....	,, 347	3,072	Wholly to Ceylon.
Condooloo, Tel; Thovarai, Tamil; Cajanus Indicus,	,, 504	2,908	,, 374	3,988	Qrs. 2,304	19,673	Qrs. 173	1,848	,, 3,355	28,470	Chiefly to Indian French Ports, Pegue, Bengal, Bombay and Akyab.
Condooloo Conda, Tel; Malathovary, Tamil; Cajanus Indicus,	,, 409	2,806	.....	.....	.....	.....	.....	.....	,, 409	2,806	Do. do do. and Pegue.
Dholl, Hind; Condipuppoo, Tel; Thovarai-purpoo, Tam; Cajanus Indicus,	,, 1,618	15,694	Qrs. 1,663	12,369	Qrs. 798	7,112	Qrs. 805	8,241	,, 4,884	43,416	Do. to Ceylon, Mauritius, Pegue, and Indian French Ports.
Horse Gram, Colloo, Tam; Oolavaloo, Tel; Dolichos Uniflorus,	,, 6,493	29,954	,, 4,717	34,417	,, 4,014	30,191	,, 5,153	52,808	,, 20,377	1,47,070	Do. to do. Indian French Ports, Mauritius, New South Wales, Pegue, and Malacca Straits.
Menoomooloo, Tel; Ooddoolloo, Tel; Oollondoo, Tam: Moong, Moonash, Mash, Hind: Phaseolus mungo,	,, 1,327	10,567	,, 422	4,152	,, 296	3,897	.....	.....	,, 2,045	18,616	Do. to do. Pegue, Indian French Ports, and Mauritius.
Natcheny, Kavooroo, Tam; Ragaloo, Tel; Ragi, Hind; Elcusine Corocana,	,, 789	3,732	,, 1,537	7,655	,, 2,622	12,754	Qrs. 3,354	18,512	,, 8,302	42,653	Do. to do. Bombay, and Cutch.
Paddy; unhusked rice, Oryza sativa, Nelloo, Tam; Waddloo, Tel.	,, 45,045	2,22,408	,, 49,437	2,23,957	,, 46,681	2,37,811	,, 50,134	2,54,412	,, 1,91,147	9,38,588	Do. to do. Travancore, and Malacca Straits.
Pease,	,, 250	1,719	,, 725	6,941	,, 1,847	21,181	,, 1,641	18,762	,, 4,463	48,603	Do. to do. do. Mauritius, and Indian French Ports.
Pessaloo, Tel. Haree moong, Hind. Pucha payaroo, Tam; Green-gram, Phaseolus radiatus,	,, 5,001	32,303	,, 1,734	18,357	,, 2,003	22,304	,, 1,101	11,960	,, 9,839	84,924	Do. to do. Pegue, Bengal, Indian French Ports, Bombay, and Mauritius.
Rice, Oryza sativa,	,, 6,09,899	49,28,107	,, 6,25,104	59,25,118	,, 4,76,700	47,81,074	,, 6,01,962	54,94,631	23,13,665	2,11,28,930	Do. United Kigdom, Arabian and Persian Gulfs, Ceylon, France, Mauritius, Pegue, West Indies, Bombay, Cutch, Goa, Malacca Straits, Indian French Ports, Sinde, Travancore, China, and Bourbon.
Sanagaloo, Tel. Chick Pea, Bengal gram; Cadalei, Tam; Chenna, Hind; Cicer Arietinum,	,, 17,573	1,38,765	,, 37,284	3,89,604	,, 12,075	1,50,627	,, 5,263	60,479	,, 72,195	7,49,475	Do. to Mauritius, and Bourbon, Ceylon, Pegue, N. S. Wales, and Indian French Ports.
Wheat,	,, 7,221	62,723	,, 5,208	58,736	,, 5,710	75,389	,, 5,558	72,190	,, 19,697	2,69,032	Do to Ceylon, Mauritius, and Bourbon, Bombay, Indian French Ports, and United Kingdom.
Other sorts,	.....	12,822	.....	14,563	.....	12,209	.....	5,934	.....	45,528	Do United Kingdom, Pegue, Bombay, Bengal, Moulmein and [Indian French Ports.

Cereal grains imported into the Madras Territories by Sea.

Anoomooloo, Tel. Mutchay Cottay, Tam. Bullar, Hind. Lablab vulgaris,	.....	.....	.....	.....	.....	.....	Qrs. 1 48	1,810	Qrs. 148	1,810	Wholly from Moulmein.
Condooloo, Tel. Thovaray, Tam. Cajanus Indicus (bruised),	.....	.....	.....	.....	Qrs. 115	1,050	.....	.....	,, 115	1,050	Do. from Akyab.
Dholl, Cajanus Indicus,	Qrs. 365	4,770	Qrs. 924	12,007	,, 461	6,568	Qrs. 1,656	24,158	,, 3,406	47,503	Chiefly from Bengal, Bombay, and Concan.
Horse Gram, Dolichos uniflorus,	.....	.....	.....	.....	,, 77	1,063	Crs. 495	4,781	,, 572	5,844	Do. from Indian French Ports.
Menoomooloo, Telugu. Oolandoo, Tam. Phaseolus mungo.	.....	.....	Qrs. 167	2,479	,, 1,820	21,207	Qrs. 1,447	14,157	,, 2,434	37,843	Do. from Bombay, Concan, and Scinde.
Paddy, Oryza sativa,	Qrs. 7,428	34,522	,, 17,169	1,08,206	,, 24,240	1,66,185	,, 7,317	49,366	,, 56,154	3,60,281	[gal, and Bombay. Do from Akyab, Balasore, Pegue, Bassein, Khyook Phyoo, Ben-
Pease, not ascertained,	,, 1,561	17,756	,, 2,772	34,682	,, 7,250	89,120	,, 8,981	1,03,860	,, 20,567	2,45,418	Do. from Bengal, Pegue, Bombay, and Concan.
Pessaloo, Tel. Putchay Payroo, Tam. Phaseolus radiatus,	.....	.....	.....	.....	,, 183	1,708	,, 564	5,669	,, 747	7,377	Do. from Bombay, & Scinde.
Rice, Oryza sativa,	Qrs. 6,232	56,709	Qrs. 67,894	10,61,757	,, 94,033	17,21,245	,, 1,41,424	20,48,791	,, 3,09,583	48,88,502	[Indian French Ports, & Calcutta. Do. from Bombay, Pegue, Malacca Straits, Moulmein, Concan,
Sanagaloo, Tel. Caddalei, Tamil, Bengal Gram, Cicer arietinum	,, 785	7,979	,, 1,257	15,241	,, 2,577	34,541	,, 5,489	69,626	,, 10,108	1,27,387	Do. from Bengal, Pegue, and Khyook Phyoo.
Wheat,	,, 10,050	1,35,665	,, 12,144	1,73,213	,, 19,405	2,98,350	,, 7,400	1,14,680	,, 48,999	7,21,808	Do. from Bengal, Bombay, Concan, Guzerat, and Goa.
Grain of sorts,	.....	6,499	.....	7,965	.....	16,195	.....	5,310	.....	35,969	Do. from Bombay, Moulmein, and Indian French Ports.

Cervus Wallichii, the Bara Singa, or Morl, is an Indian species. It is also found in Persia, where it is called Maral, Gevezu, or Gookoohee. It is the *Cervus Pygargus* of Hardwicke; also Jesrael, or Tailless Deer, and Red Deer, of India.

Cervus affinis, the Saul-Forest stag, the Stroa or Tibetan stag of Hodgson, the Bara Singha of the Hindoos. The bones are as heavy and as large as those of the Wapiti.

Cervus Sika, the Sika, is of a dark-brown colour, and has rather slender horns. It is a native of Japan.

Panolia Eldii, the Sangnai, is an Indian species.

Rucervus Duvaucellii, the Bahrainga, is another Indian species. It is called the spotted Deer of the Sunderbunds, and Barara Singha by Hardwicke. It is the *Cervus Elaphoides* of Hodgson. It inhabits reedy marshes and the islands of great rivers, never entering the mountains or forests. The tail is short, with no caudal disc and no heavy mane.

Rusa Aristotelis, the Samboo. It is the *Cervus Hippelaphus* of Ogilby, *Cervus unicolor* of H. Smith, Cerf de Coromandel of Cuvier, *Cervus Bengalensis* of Schirz, Daim Noir de Bengale of Duvaucell, the Samboo-Deer of Bennett, *Cervus heterocerus* of Hodgson. The last author describes four varieties of this animal. They are natives of various parts of India, and inhabit great forests and the mountains above them. They are not gregarious, and rut and drop their horns in spring.

Rusa Dimorphe, the Spotted Rusa, Gerver or Gower. Their colour is red-brown. They are confined to the saul-forests in India.

Rusa Hippelaphus, the Mijangan Banjoe. It is the *Cervus Hippelaphus* of Cuvier; Cerf Noir du Bengale, ou Hippelaphe, of F. Cuvier; Cerf d'Eau, ou Mejanganbanjoe, of the Malays of Java, according to Duvaucell; Rusa, or Roussaitan (Black Stag), of the Javanese and Sumatrans; *Rusa Hippelaphus*, the Great Rusa, of Smith; *C. Mollucensis* of Quoy and Gaimard, *C.* (*Rusa*) *Timorensis* of Muller. The size and proportions of this animal are about those of the Common Stag, but its hair is rougher and harder, and when adult that of the upper part of the neck, of the cheeks, and of the throat is long, and forms a sort of beard and mane. In winter its colour is of a grayish-brown more or less deep; in summer it is of a brighter and more golden brown. The croup is a pale yellow, and the tail is brown terminated by rather long hair. It is a native of Bengal, Sumatra, and the islands of the Indian Archipelago.

Rusa equinus, the Samboe. It is the Rusa of Raffles; the Eland or Elk of the Dutch sportsmen. It inhabits Sumatra and Borneo. It is of a plain brown colour.

CERVIDÆ OR CERVINA.

Rusa Peronii, the smaller Rusa, is a native of Timor and Luboc, Bavian and Ternate.

Rusa Philippinus, the Philippine Rusa, is the *C. Marianus* of Cuvier; the Cerf de Philippines of Desmarest. It is a native of the Philippines.

Rusa lepida, the Sunderall Rusa, is a native of Java. It is scarcely as large as a roebuck.

Axis maculata, the Axis. It is the *Axis* of Pliny; *C. Axis* of Erxleben; *A. major* of Hodgson, also *A. medius* and *A. minor* of the same author; Cerf Cochon of Buffon; Spoted Axis or Chittra, Langna or Pada or Spotted Porcine Deer, Thou or Spotted Porcine *Axis*, *A. medius*, or Spotted Hog-Deer, or Thou Langna of the Tarai, of Hodgson. In size and general form it nearly resembles the common Fallow-Deer. The skin is at all times of a rich fawn-colour spotted with white. Height at the shoulder 2 feet 6 or 7 inches. The distribution of the spots varies in different individuals. The ground-colour changes to nearly black along the back; the under parts are snow-white. Flanks, sides, shoulders, hind quarters, and part of the neck spotted as above mentioned. There is a broad dusky spot on the forehead, and a line of the same colour extends along the middle of the nose. The male has no canine teeth, nor has the female any horns; she is generally less in size than the male, and resembles him much in colour, but may be distinguished, it is said, by a white longitudinal line on the flanks. The young resemble the parents. It is a native of India and the larger islands of the Indian Archipelago; very abundant in Bengal, and on the banks of the Ganges. The Axis haunts the thick jungles in the vicinity of water, and the British sportsmen hunt it under the name of the Spotted Deer. It feeds in the night; and is timid, indolent, and mild, excepting when the females have young, and then the male is bold and fierce. The Axis is easily domesticated, and in England has propagated freely in captivity. The species has been kept with success both in menageries and open parks, to both of which its form and colour make it an elegant ornament.

Axis pseudaxis, the Spotted Axis. It is the *C. pseudaxis* of Gervais. It differs from *A. maculata* in having a series of spots in place of an oblique streak on the haunches.

Hyelaphus porcinus, the Lugna Para, or Shgoriah. It is the *Cervus porcinus* of Sundevall; the *Cervus niger* of H. Smith; the Porcine Deer of Pennant; the Brown Porcine Axis of Hodgson; C. Hippelaphus, var. 3, of Cuvier. This species is easily known from the Axis by being lower on its legs, and having no distinct black dorsal streak, nor white streak on its haunches. The horns are generally short, with only short snags. They live in families, or small herds, on the plains of Hindustan. They are

found in Ceylon, Mr. Ogilby says they do not ascend mountains. The *Cervus Dodur* of Royle is probably a distinct species, *Cervus pumilis* of H. Smith is perhaps a variety.

Cervulus vaginalis, the Kijang or Muntjak. It is the *Cervus Muntjac* of Zimmerman : *Prox Muntjac* of Zimmerman ; *Prox Muntjac* of Sundevall ; *Cervus plicatus* of Forster ; the Ribbed-Faced Deer of Pennant ; the Chevreuil des Indes of Allamand. The height of the Muntjak at the shoulders is about 2 feet 2 inches ; head pointed ; eyes large, with lachrymal sinuses ; ears rather large ; tail short and flattened. In the living animal there are on the face two rough folds of the skin, considerably distended and elevated, about an inch and a half apart above, and following the direction of the prominent part of the forehead they unite below, so as to mark the face with the letter V. In the dried subject the folds are contracted, and three distinct ribs appear, which suggested to Pennant the name of Rib-Faced Deer. General colour reddish-brown above ; belly and front of the thighs pure white. The male has large canines in the upper jaw : the female has none, nor has she horns. Dr. Horsfield, who has given the best account of this animal, states that, in Java, the Muntjac selects for its retreat certain districts, to which it forms a peculiar attachment, and which it never voluntarily deserts. Many of these are known to have been the favourite resort of this animal for several generations. They consist of moderately-elevated grounds, diversified by ridges and valleys, tending towards the acclivities of the more considerable mountains, or approaching the confines of extensive forests. Such districts are by no means uncommon in Java : they are covered with long grass, and shrubs and trees of moderate size, growing in groups or small thickets and they generally intervene between cultivated tracts and the deep forests. Their vegetation is peculiarly adapted to afford this animal a very abundant supply of nourishment ; their surface is covered with long grass (*Saccharum* (Holcus) *spicatum*), well known to persons who have visited the interior of Java by the name of Allang-Allang, and the groves and thickets abound with *Phyllanthus emblica*, Linn. : these two plants constitute its principal food. They also produce many species of *Hibiscus*, *Grewia*, *Urena*, and other malvaceous plants, all of which are greedily eaten by the kijang . . . The kijang is impatient of confinement, and is not fitted for the same degree of domestication as the stag. It is however occasionally found in the enclosure of natives and Europeans, but requires a considerable range to live comfortably : it is cleanly in its habits, and delicate in its choice of food. The flesh affords an excellent venison, which is often found on the tables of Europeans. The natives eat the males, and always present them in a conspicuous place in their feasts ; but in consequence of some peculiarities in the habits of the females, they have an aversion to them as food."

Cervulus moschatus, the Kegan or Kakr. It is the *Cervus Moschus* of Desmarest, *C. Ratwa*, *Styloceros Ratwa* of Hodgson, *Prox Rutwa* of Sundevall, *P. albipes* of Wagner, *P. styloceros* of Wagner, the Musk-Deer of Nepaul ; the jungle sheep. It is of a bright reddish-yellow colour, with the chin and gullet whitish. The hair is not ringed as in the following species. The Ratwa are natives of India, where they live in forests, in the mountains, or at their bases. They live six or eight together. The horns fall in May. The females have bristly tufts ending in a knot instead of a horn.

Cervus Reevesii, the Chinese Muntjak, is of a grayish-brown colour, with short pale ringed hair. It is a native of China. Dr. J. E. Gray says (" Brit. Mus. Cat.") :—" The Earl of Derby has these three kinds (the three last species) at Knowsley, but they breed together, and it has hence become impossible to discriminate the males from the original species."

Cervulus Pygargus, the Ahu. It is the *Cervus Pygargus* of Pallas, *Cervus Ahu* of Griffith, the Siaga of the Tartars, Dikaja kosa of the Russians, Tailless Roe and Tailless Deer of Pennant and Shaw. It is a native of Central Asia.—*Eng. Cyc. page* 862.

(2518) CETACEA, an order of Aquatic Mammals with fin-like anterior extremities, the posterior extremities being absent, or rather having their place supplied by a large horizontal caudal fin or tail ; without an external ear, without hair on their external integument, and the cervical bones so compressed as to leave the animal without any outward appearance of a neck. This order comprises the Whales, the largest animated forms in existence. Some of the genera composing it are phytophagous, or plant-eaters ; others are zoophagous, or animal-eaters.

Balæna mysticetus (the Right Whale). It is the *B. Grœnlandica* of Linnæus ; *B. vulgaris* of Brisson ; *B. Rondeletii* of Willughby ; the Right Whalebone, Common, or Greenland Whale of English writers. One variety is called the Nord Kapper or Nord Caper, another the Rock-Nosed whale. The habitat usually assigned to this whale is most extensive : thus, Mr. Lesson states that it inhabits all the seas of the globe, especially the two poles ; but it is not improbable that the Whalebone Whale or Black Whale of the South Seas (*Balæna australis*, Desmoulins, *B. antarctica*, Less.) which has every appearance of being distinct, and moreover of being infested with parasitical cirrhipedes (*Tubicinella*, *Coronula*, &c.) of different species from those which infest the Greenland Whale, has been mistaken for the last named Cetacean. Multitudes of the Southern *Balæna* were seen by Captain James Ross, R, N., in very high southern latitudes during his last expedition.

Balæna marginata, the Western Australian Whale, has very long and slender baleen, with a rather broad black edge on the outer or straight side. From the character of the baleen Dr. Gray considers this a distinct species.

Balæna australis, the Cape Whale. It is the Right Whale of South Sea Whalers, the southern Whalebone Whale of Nunn, the common Black Whale of Sir James Ross. It inhabits the south seas, and is of a uniform black colour,

Balæna Japonica, the Japan Whale. It is an inhabitant of the coasts of Japan, which it visits periodically. Its head is covered with barnacles Only the baleen has been seen in England. The species has been described from Chinese drawings.

Balæna antarctica, the New Zealand Whale. A species described by Dr. J. E. Gray as *B. Antipodarum*, from a very accurate drawing of a specimen taken in Jackson's Bay, New Zealand. It is the Tuku Peru of the natives.

Megaptera Kuzira, the Kuzira. It inhabits the Japanese seas.

Physalis Iwasi, the Japan Finner. It is very rare; one was cast ashore at Kii in 1760. It was 25 feet long.

Physalis antarcticus, named from the baleen of a New Zealand species by Dr. J. E. Gray.

Physalis Brasiliensis, Bahia Finner. Named from baleen; brought from Bahia.

Physalis australis, Southern Finner, inhabits the seas of the Falkland Islands.

Catodon macrocephalus, Northern Sperm-Whale. This is the *Physeter macrocephalus* of Linnæus; the Sperm-Whale, the Spermaceti Whale, the Blunt-Headed Cachalot of English writers. It is the *Physeter Trumpo* of Bonnaterre; the *Catodon Trumpo* of Gerard; the *Physeter gibbus* of Schreber; *Cetus macrocephalus* of Oken. Small fishes are occasionally swallowed in quantities by this whale, and one has been known to eject from its stomach a fish as large as a moderate-sized salmon; but the principal food of the Sperm-Whale appears to consist of squids or cuttle-fishes, "Sepiadæ."

Catodon Colneti, the Mexican-Sperm-Whale, is an inhabitant of the North Pacific, the South Seas, and equatorial oceans, and often referred to the last species.

Catodon polycyphus, the South Sea Sperm-Whale, is found in the Southern Ocean, and is also spoken of as the Cachalot, or Sperm-Whale.

Kogia is the generic name given by Dr. J. E. Gray to a form of whale with a shorter head, which has been taken at the Cape of Good Hope. It has been sometimes regarded as the young of the Sperm-Whale.

Beluga Kingii is the representative of the white whale, B. Catodon, in the Southern Hemisphere. It has been taken off the coasts of Australia.

Neomeris Phocænoides is the name given by Dr. J. E. Gray to species of Dolphin found in the Indian Ocean, the *Delphinus melas* of Temminck.

Phocæna communis, the Common Porpoise, or Porpesse. It is the *Phocæna Rondeletii* of Willughby, *Delphinus Phocæna* of Linnæus.

Grampus Sakamata. Described by Schlegel in 'Fauna Japonica' as *Sakam kuzira*. It has been found off the coasts of Japan.

Grampus Sieboldii is a native of the coasts of Japan, where it is called Naiso-Gota.

Grampus Macrorhynchus is the Black Fish of the South Sea whalers. It inhabits the South Seas.

Delphinapterus Peronii. It is the Right Whale-Porpoise of the whalers. It is black, with the exception of the beak, pectoral fins, and under part of the body, which are white. It is found on the Brazil Bank, off New Guinea, and the higher southern latitudes. There are two skulls in the museum at Paris. They live in large shoals, and the flesh is esteemed a delicacy.

Delphinus. The English name for this genus is Dolphin, but as Dr. J. E. Gray observes:—"most maritime persons call these animals Bottlenoses, Bottleheads, Flounderheads, Grampuses, Porpoises, Porpesses or Porpusses, sometimes adding Whale to the name. They generally confine the name of Dolphin (most used by landsmen) to the Scomberoid Fish (*Coryphæna*), which changes colour in dying." We subjoin a synopsis of the characters with the localities of the species of this large genus.

Delphinus Heavisidii, the Hastated Dolphin, inhabits the South Sea—Cape of Good Hope.

Delphinus obscurus, Dusky Dolphin, inhabits the Southern Ocean—Cape.

Delphinus Abusalam inhabits the Red Sea.

Delphinus Eutropia inhabits the Pacific Ocean —Chili.

Delphinus Novæ Zelandiæ, the New Zealand Dolphin, inhabits New Zealand and Cape Gable.

Delphinus Forsteri, Forster's Dolphin, inhabits the Pacific Ocean between New Caledonia and Norfolk Island.

Delphinus Sao inhabits Madagascar.

Delphinus longirostris, the Cape Dolphin, inhabits the Southern Ocean—Cape of Good Hope.

Steno Malayanus. It is the Dolphin à Ventre Roux of the Paris Museum; *Delphinus plumbeus* of Cuvier. It is a native of the Indian Ocean.

Steno frontanus. It inhabits the Indian Ocean and the Pacific.

Platanista Gangetica. It is the Sou sou of India, the Susu of Buffon, the Platanista of Pliny, Dauphine du Gange of Cuvier, Delphinus Sinensis of Blainville.

Halicore Dugong, Indian Dugong. It is the *Trichechus Dugong* of Gmelin; *Dugungus Indicus* of Hamilton; Le Dugong des Indes of French writers. *Halicore Dugong* is an inhabitant of the Indian Ocean. The haunts of the Dugong, which does not appear ever to frequent the land or fresh-water, are generally in the sea-shallows, where the water is not more than two or three fathoms. The flesh of the Dugong is delicate, and is said to be superior to that of the Buffalo or common Ox. It is considered by the Malays as a royal fish, and the king has a right to all that are taken. Sir Stamford Raffles states that this species afforded much satisfaction on the tables as the flesh proved to be most excellent beef.

Halicore Tabernaculi, the Dugong of the Red Sea, is considered by Ruppell a distinct species. He gave it its specific name under the impression that it was with the skin of this species that the Jews were directed to veil the Tabernacle. He saw it swimming among the coral banks on the Abyssinian coast near the Dalac Islands. The fishermen harpooned a female, which he dissected, 10 feet long. The Arabs stated that they live in pairs or small families, that they have feeble voices, feed on *Algæ*, and that in February and March bloody battles occur between the males, which attain the length of 18 feet. The female brings forth in November and December. The flesh, teeth, and skin are esteemed by the Arabs.

Halicore australis. It is a native of the north-west coast of Australia. It is the Manate of Dampier and the Whale-Tailed Manate of Pennant. Two upper jaws and three skulls of this species are in the British Museum.—*Eng. Cyc.* p. 913.

(2519) CETACEUM, *Latin.* Spermaceti. A concrete, fatty substance, found in several parts of the body of the *Catodon macrocephalus*, a species of whale called also the great-headed cachalot. The head is the chief repository of this secretion, especially a cavity in the upper jaw, in which it exists mixed with oil. The spermaceti whale occurs in the Pacific, Indian, and Chinese seas. The liquid first drawn from the head of the animal is a mixture of spermaceti and sperm oil; from this the solid matter is separated by filtration through bags, and subsequent compression. After this it is melted in water, skimmed, and re-melted with a little potash water, to remove the last traces of the oil; lastly, it is permitted to concrete slowly, during which it crystallizes in brilliant white masses. Pure spermaceti is white, tasteless, inodorous, crystalline, insoluble in water, slightly soluble in boiling alcohol; it forms a soap with potash. It is composed of carbon 81.66, hydrogen 12.86, oxygen 5.47. Spermaceti was once much used internally as a demulcent and emollient, especially in troublesome catarrhs and dysentery. It is at present employed solely as an external application, being an ingredient in numerous cerates and ointments.—*O'Shaughnessy, page* 687.

(2520) CEVADILLA.—Seeds of Veratrum Sabadilla and Helonias officinalis.

(2521) CEYLANITE. The dark blue, or blackish varieties of spinelle, called Ceylanite or pleonaste, are often offered for sale by the Shans in Tenasserim, under the same name as the sapphire.—*Mason.*

(2522) CEYLON. The late Sir George Anderson sent the following list of the principal TIMBER TREES in CEYLON, drawn up by ADRIAN MENDIS, Mohandiram of Moorrotto, and Master Carpenter, Royal Engineer's Department.

NAMES.	Locality Provinces.	Weight per cubic foot. lbs.	Durability. years.	USES, &c.
A				
1 Andere. Acacia vera.	Eastern.	71	15	Cross-bars of fishing dhonies, and pins for wooden anchors.
2 Madetiye. Adenanthera pavonina.	Western.	56	30	Common house buildings. Produces a red seed which is roasted and eaten.
3 Kebelle. Oblique agimea.	Northern.	40	20	Common house buildings.
4 Cottamba. Almond.	W. & Southern.	38	30	Common house building; and fruit eaten for food.
5 Welipiyanna. Anissaphyllum zeylanicum.	Western and Northern.	35	40	Common house buildings.
6 Cocatiye. Aponogeton crispum.	Western.	56	30	Do. do.
7 Puwak. Arecea nut.	Western Eastern and Southern.	57	60	Pins for furniture and pingo sticks. The nuts esteemed a luxury, are chewed with beetel leaves, tobacco and chunam.
8 Patta Del. Artocarpus, sps.	Southern.	34	30	Boats and buildings. Fruit (3+2½ in.) boiled and eaten as food.

	Names.	Locality Provinces.	Weight per cubic foot. lbs.	Durability. years.	Uses, &c.
9	Cos. Jack. Artocarpus integrifolia	South Eastern and Western.	42	25—80	Fruit weighing from 5 to 50lb. used in various ways for food. Timber in general use for building, boats, and all kinds of furniture.
10	Del. Artocarpus pubescens.	E. S. & Western.	40	25—50	Boats and buildings. The fruit (9 in.+ 2½ in.) is used as an article of food.
11	Aludel. Artocarpus pubescens.	Western.	51	35—70	Fishing boats and house buildings. The fruit (9 in.+ 3 in.) is boiled and eaten as food by the natives.
	B				
12	Bairiye.	Northern and Western.	57	10—30	Found chiefly near the mouths of the rivers—used for anchors and in house building.
13	Mee Bassia longifolia.	Northern.	61	25—80	Keels for dhonies, bridges, and house buildings. A useful medicinal oil is obtained from the nut of this tree.
14	Petan. Bauhinia tomentosa.	Eastern.	57		Boxes, chests, walking sticks, cornice work, &c.
15	Lunu Midelle. Common Bead tree.	Western.	15	8—20	The small sticks and branches used in common buildings, and outriggers for dhonies and fishing boats; the timber for panels of carriages, buoys, targets, &c.
16	Hal Milile. Berrya ammonilla.	Northern and Eastern.	48	10—80	Casks, tubs, carts, waggons and house building. The best wood for oil casks in the Island.
17	Tal. Palmira. Borassus flabelliformis.	Northern and Eastern.	65	80	Reepers, rafters. From its leaves the native ola books are made. Toddy is drawn from the flowers, from which jaggery is manufactured. This is used occasionally for hardening mortar, as also for medicinal purposes.
18	Calukeale. Butea frondosa	Central.	38	30	Common house building.
	C				
19	Calu Mediriye. Calamander.	Southern and Western.	57	80	A scarce and beautiful wood; the most valuable for ornamental purposes in Ceylon.
20	Waldombe. Calophyllum acuminatum.	Western.	39	20	Common house buildings.
21	Gorrukeenee. Calophyllum calaba.	Western.	44	25	Poles for bullock carts, and house buildings.
22	Dombe. Sweet scented Calophyllum.	Western.	40	5—10	Masts, and cross sticks of yettra dhonies and fishing boats; and poles of bullock carts.
23	Mahadan. Calyptranthes cumini.	Northern and Western.	36	20	Common house building, wheels, &c. The berries are eaten when fully ripe.
24	Battedombe, Clove-tree leaved Calyptranthes.	Western.	45	20	Common house building.
25	Alubo. Jambolana Calyptranthes.	Central.	49	20	Common house building.
26	Kahatte. Careya arborea.	W. and Southern.	38	10—20	Axles for bullock bandies, and buildings.
27	Davette. Carallia zeylanica.	Western.	42	25	Roofings for common buildings.
28	Kittool. Nepera. Caryota urens.	W. and Southern.	71	30—90	Reepers and window bars. The toddy drawn from the flowers is a sweet and cooling drink; and is also converted into jaggery.
29	Dawol kuroendoo. Cassia cinnamomum.	Central.	39	20	Common house building.
30	Arremene. Sumatra Cassia.	Central.	57	50	Furniture and house buildings.
31	Hedde woke. Choecarpus pungens.	Western.	58	50	Common house building.
32	Burute. Satin. Chloroxylon.	Southern and Eastern.	55	10—80	Oil presses, waggon wheels, bullock carts, bridges, cog wheels, buildings and furniture.
33	Mal burute. Flowered Satin Chloroxylon.	Northern and Eastern.	57	80	Furniture. This wood is perhaps the most valuable in Ceylon next to Calamander.
34	Nelly. Cicca distica.	Central.	49	30	Buildings, wheels, &c. Used in wells, the wood is said to purify the water. The berries are made use of for sweet-meats, and also for medicinal purposes.
35	Cocoanut. Cocos nucifera	Sea coast generally.	70	20—50	Buildings, fancy boxes and furniture. The fruit furnishes almost all the staple articles of food in a tropical climate—milk, curry, water, oil:—the flower yields toddy, from which arrack, jaggery and vinegar is manufactured; the husk coir for ropes, mats, &c.; the leaves are woven into cadjans; and every part of the tree is useful in a multitude of ways.

Names.	Locality Provinces.	Weight per cubic foot. lbs.	Durability. years.	Uses, &c.
36 Wea warene. Cratæva religiosa.	Central.	62	60	House buildings and pestles.
37 Hal Mendora. Branch flowered Cynometer.	Western.	56	8—20	Bridges and house building.
38 Gal mendora. Branch flowered Cynometer.	W. and Southern.	57	15—60	Bridges and buildings. The best kind of wood for under-ground purposes.
D				
39 Nendoon. Dalbergia lanceolaria	W. and Southern.	56	60—80	Buildings and furniture,
40 Daminne.	Eastern.	44	40	Gun-stocks, and common house buildings.
41 Gode parre. Toothed Dillenia.	Western	51	60	Roofs for houses.
42 Horre. Turbaned Dipterocarpus.	Western.	45	15	Roofs of common buildings.
43 Doon. Dipterocarpus, sp.	Central..	29	50	House buildings.
44 Dive parre.	Western.	44	20	Common house buildings.
E				
45 Caluvere. Ebony,	N. and Eastern.	71	80	A fine black wood, used largely for buildings and furniture.
46 Kadoembeiriye. Bastard Ebony.	Western.	45	40	Furniture. The heart of this wood is occasionally met with of extraordinary beauty.
47 Kiri walla. Lance leaved Echites.	Northern.	35	30	Used principally for inlaying ornamental furniture and cabinet work.
48 Rook attene. Echites Scholaris.	Western.	26		Coffins.
49 Timbery. Embryopteris glutinifera.	Northern.	45	20	Common house buildings. The juice of the fruit is used to rub over fishing lines for the purpose of hardening and preserving them.
50 Walboamboo. Eugenia laurina.	Central.	36	15	Common house buildings.
51 Naw, Iron wood.	Western.	72	10—60	Bridges and buildings, &c.
52 Kiripelle. Indian fig tree. Ficus indica.	Southern.	30	20—30	Common furniture and house buildings.
53 Hunukirille, Grela paniculata.	Southern.	44	25	House building.
54 Belygobel. Telia leaved hibiscus.	Western.	38	20	Carriages, palanqueens and hackeries—found near rivers.
55 Nerreloo. Illicebrum latrum.	Central.	56	40	Common house building.
56 Dive ratembela. Jancein asoca.	Northern.	58	25	Common house building.
57 Katie kale.	Eastern.	42	25—50	Common house building, and in the construction of yettra dhonies.
58 Murute. Lagerstræmia regina.	W. and Southern.	42	30—40	Water casks and buildings.
M				
59 Hulanhick Melia sp.	Central.	39	50	House building.
60 Rameneidelle. Millingtonia, sp.	Western.	48	20	Common house buildings. The sticks make excellent fences.
61 Sappoo. Michelia champa.	Central.	42	20—50	Carriages, palanqueens. &c. also in buildings.
62 Sooriva Mara. Mimosa.	Central.	42	20—30	Buildings and common furniture.
63 Moone Mal. Mimusops elengi.	Southern.	61	50	House building and furniture.
64 Paloo. Mimusops hexandra.	Eastern.	68	10—70	Oil presses, bridges and buildings. The berries are eaten when ripe.
65 Morre. Eye ball.	Central.	62	25	Common house building. Berries eaten when ripe, Furnishes the best fire-wood for lime and brick-kilns, next to Gal morre, Nephelium.
66 Etteiriye. Ash leaved Murraya.	Eastern.	61	10—70	Handles of mamoties, hammers and bill-hooks; and rafters for cadjan roofs.
N				
67 Helembe. Nauclea parviflora.	W. and Northern.	42	40	Common house building.
68 Nebede.	Sou. and Western.	51	20	Common house buildings.
69 Gal morre. Nephelium, sp.	Central.	65	30	House building. Berries are eaten when ripe by the natives. Supplies the best kind of fire-wood for brick and lime kilns.
O				
70 Koang. Ceylon Oak.	Southern.	42	5—10	Native oil presses and wooden anchors. Berries are eaten by the natives.

Names.	Locality Provinces.	Weight. per cubic foot. lbs.	Durability. years.	Uses, &c.
71 Melle. Olax Zeylanica. P	Eastern.	64	40	Common house building.
72 Patkeale.	Western.	42	40	Common house building.
73 Penebarroo.	Eastern.	61	50—90	Rafters, &c. Fences made of the sticks of this tree are the most durable of all.
74 Sooriya. Persian.	Central and Western.	49	20—40	Admirable for carriages, hackeries, and gun-stocks;—also useful for blocks and buildings.
75 Velenge. Pterospermum ruberifolium. R	Central.	36	5—70	Poles of bullock carts, beetel trays, and gun stocks.
76 Hirikaddol. Rhizophora.sp.	W. and Northern.	49	35	Common house building. From the bark a dye is extracted.
77 Cadol. Leafy mangrove. Rhizophora.	Northern and Western.	65	40	Found chiefly near the mouths of the rivers:—the wood is used for common house buildings, and from the bark a dye is extracted for colouring leather, nets, sails, &c.
78 Pehimbive. Rhus disipium.	Central.	68	50	Buildings.
79 Otte. Rottleria, ps. S	Western.	36	10	Common house building.
80 Lawoloo. Sapota, sp.	Western.	39	10	Common house buildings. Berries are eaten by the natives.
81 Pamburoo. Simonia citrifolia.	Southern.	48	40	House building, &c. When variegated it is a beautiful wood and is used for furniture and cabinet work.
82 Daanga. Long flowered Spathodea.	N. and Western.	23		Buoys for fishing nets, &c.
83 Telemboo, Sterculia fœtida.	Central.	26	30	Common house buildings.
84 Suvande.	Western.	56	30	Common house buildings.
85 Siyembela. Tamarindus Indica.	North Eastern and Western.	80	80	Oil presses, furniture and buildings. The fruit is a well known and agreeable article of diet.
86 Teak Ceylon. Taikke Ceylemey. Tectona grandis	Western.	55	15—60	Bridges and buildings.
87 Teak Cochin. Taikke Cotchiye.	Cochin.	44	15—90	Carts and waggons, bridges, buildings, and arrack casks. The wood of these casks imparts a fine colour and flavour to the arrack.
88 Teak Maulmein. Taikke Molmine.	Maulmein.	42	15—90	Do. do. do. do.
89 Ukbeiriye.	Southern.	51	80	Common house buildings.
90 Hal. Vateria indica.	Western.	26	10	Packing cases, cielings, coffins, &c.
91 Caha Milile. Vitex trifoliata.	Southern and Western.	56	15—80	Water casks, pade-boats, waggon wheels, bullock carts, bridges and house building.
92 Mecan Milile. Vitex trifoliata.	Western.	56	20—90	Bridges, pade-boats, carts and waggon wheels, water tubs, and house buildings.
93 Sappoo Milile. Vitex trifoliata.	Western and Southern.	49	10—40	Water casks, cart and waggon wheels, pade-boats, bridges and house buildings.
94 Samedera. Vitmannia trifoliata.	Western.	26	60	Buoys, &c.
95 Walukeene.	W. and Southern.	39	10	Masts of dhonies.
96 Tarrene. Webera cerifera.	Northern.	57	30	Roofings, and in the construction of fishing boats and dhonies.

(2523) CEYLON MOSS. (*Gracelaria*, or *Gigartina, lichinoides*), a small and delicate fucus, is well known for the amylaceous property it possesses, and the large proportion of true starch it furnishes. The fronds are filiform; the filaments much branched, and of a light purple color. It grows abundantly in the large lake or back-water which extends between Putlam and Calpentyr, Ceylon. It is collected by the natives principally during the south-west monsoon, when it becomes separated by the agitation of the water. The moss is spread on mats and dried in the sun for two or three days. It is then washed several times in fresh water, and again exposed to the sun, which bleaches it, after which it is collected in heaps for exportation. Professor O'Shaughnessy has given the best analysis of this moss, which he described under the name of *Fucus amylaceus*; 100 grains weight yielded the following proportions:—

Vegetable jelly	54·50
True starch	15·00
Ligneous fibre	18·00
Sulphate and muriate of soda	6·50
Gum	4·00
Sulphate and phosphate of lime	1·08
Total...	99·00

—with a trace of wax and iron. *Decoction of Ceylon Moss.*—Ceylon moss ground to fine powder two drachms, water one quart, boil for twenty minutes, strain through muslin. Use.—Mucilaginous and demulcent. By increasing the proportion of the ground moss to half an ounce, the filtered solution on cooling becomes a firm jelly, which when flavoured by cinnamon or lemon peel, sugar and a little wine, is an excellent article of light food for sick children, and convalescents.—*Beng. Phar. p.* 276.

(2524) CHAK OR CHUK. An extract: very sour: eaten in Ajmere to give appetite and promote digestion. It is probably the extract of "chuka" or sorrel: one tola is sold for one anna.—*Gen. Med. Top. page* 132.

(2525) CHAKOON SEEDS. Seeds of Cordia myxa. Chakoon ointment is prepared from the seeds of the cordia myxa: it is an excellent native application to ringworm.—*Beng. Phar. p.* 382

(2526) CHALICIDES, Daudin's name for a family of Lizards, which, like the Seps-Lizards, are very long and serpent-like; but whose scales, instead of being imbricated or disposed like tiles, are rectangular, and form, like those of the tail in the ordinary lizards, transverse bands which do not intrench upon each other. Some, says Cuvier, have a ridge on each side of the trunk, and the tympanum still very apparent. There is a species with five toes in the East Indies, the *Lacerta Seps* of Linnæus.—*Eng. Cyc. p.* 921.

(2527) CHALK.

Velaitie chunna, DUK.
Khurree muttee, HIND.
Gilsafeed, PERS.
Carbonate of Lime, ENG.
Tyn-abyaz, ARAB.
Rattahoonoo, CYNG.
Craie, FR.
Kreide, GER.
Kurroo, GUZ.
Creta, IT.
Creta, Calcis Carbonas, LAT.
Capoor-engrees, MALAY.
Creda, PORT.
Mjel, RUS.
Greda, SP.
Simie-chunamboo, TAM.
Sima-soonum, TEL
—*Ainslie's Materica Medica, p.* 9. *Faulkner.*

This is found in the Dhone Talook at Kurnool. It is a massive opaque substance, of a white-gray, or yellow colour, having an earthy fracture. It varies much in hardness, but is generally soft to the touch, and adheres to the tongue. Its uses are well known in furnishing lime for manure and cement in polishing metals and glass, and in painting and white washing.—*Faulkner.* Chalk, is well known in Europe, as an extensive secondary formation, of a dull white earthy appearance; tasteless, but adhering to the tongue; usually friable, sometimes hard; Sp. Gr. 2.3; but either variety may be employed, though the softer is usually preferred for medical use. Its chemical characters are the same as those of Marble. In the arts it is commonly known by the name of *Whiting*, which is Chalk ground in a mill, and the grosser impurities separated by sinking in water, while the pure Chalk, being suspended, is allowed to settle, and made into small loaves. For medical use, it is similarly but more carefully prepared by the process of lævigation, and in drying is made up into small conical masses.—*Royle.*

(2528) CHALK BLACK. A grayish, or bluish-black kind of clay, of a slaty texture, used in drawing and painting. Localities, France, Spain, Italy, &c.—*Faulkner.*

(2529) CHALYBÆUS, a genus of Birds, separated by Cuvier from the Cassicans of Buffon; *Barita* of Cuvier. The bill has the same form as that of the Cassicans, but it is a little larger at the base than that organ is in the last named genus, and the nostrils are pierced in a large, membranous space.—*Eng. Cyc. p.* 929.

(2530) CHALYBÆUS PARADISÆUS. This richly-plumed bird is the *Paradisea viridis* of Gmelin; Le Calybe de la Nouvelle Guinee of Buffon; Le Grand Chalybe of Le Vaillant; Oiseau de Paradis Vert of Sonnerat; *Paradisea chalybea*, Blue-Green Paradise Bird, of Latham; *Cracticus chalybeus* of Vieillot; Barita viridis of the first edition of the 'Regne Animal' (where it was placed under the Cassicans, *Barita*), and Chalybœus *paradisæus* of the last edition. It is the Mansinème of the Papuan tongue, according to Lesson, who, writing, states that "the *Chalybœus* lives solitary in the forests of New Guinea. He often saw it perched in the great trees, where it seeks for fruits. Its manners appeared to have great analogy to those of the crows."—*Eng. Cyc. page* 930.

(2531) CHAMACEA OR CHAMIDÆ, a family of Conchiferous *Mollusca*, the third of the Acephalous or Headless *Testacea*, according to Cuvier, who places them between his *Mytilacea* (Mussel-like Testaceans), and his *Cardiacea* (Cockle-like Testaceans.) Under the Linnæan genus *Chama*, many heterogeneous forms were assembled; and as G. Sowerby observes, "in his arrangement regular and equivalve shells are placed with such as are irregular and equivalve." Brugniere first divided this genus, and Lamarck carried out the reformation. The latter makes the Chamidæ to consist of the genera *Diceras*, *Chama*, and *Etheria*, placing *Tridacna* and Hippopus under his Tridacnées, the first section of his second order Conchiferes Monomyaires. Cuvier made the Camacees consist of the genera *Chama*, *Tridacna*, *Hippopus*, *Chama* (Brug.), *Diceras*, and *Isocardia*. The number of recent species given in Deshayes's edition of Lamarck (1835) is seventeen, including *Chama albida* (Camostrée of De Roissy; *Cleidothærus* of Stutchbury). Broderip, in the paper above alluded to, describes eleven additional species with varieties not noticed by Deshayes, who has however some observations on the following species, *Chama Lazarus*, *C. gryphoides*, *C. unicornis*, *C. asperella* (the living analogue of *C. echinulata* in Lamark's

fossil list), and *C. albida*, well worthy the attention of the student. *Chama gryphoides* (*C. gigas*, Linn.) is famous for its enormous size. Individuals have been known to weigh above three-hundred pounds. The byssus by which it adheres to rocks is so tough that in order to procure the shell it must be cut with an axe. The animal may be eaten, but its flesh is very tough: to be seen in most museums. One of the valves is sometimes used as a font for baptism in the country churches of Europe. The species of Chamadæ are apparently confined to the warmer seas, the Mediterranean being the locality of the lowest temperature where any of them have been hitherto found.—*Engl. Cyc. page* 931.

(2532) CHAMÆROPS. Of the Asiatic species of this palm, the C. excelsa produces materials for the *So-e* of China. The brown fibre surrounding its trunk is very strong, and employed by the Chinese, in many domestic purposes, for bed bottoms used by all the population, and for ropes and cables for their junks: it grows in northern and central China.—*Seeman.*

(2533) CHAMÆROPS EXCELSA. This species of *Chamærops* is particularly valuable to the northern Chinese who use its large, brown, hair-like bracts for many purposes. Ropes and cables for their junks are made out of this substance, and seem to last, even under water, for a very long time. It is probably better and stronger for those purposes than the fibre of the cocoanut, which it resembles to a certain extent. Bed-bottoms are wrought out of this, and are largely used in the country by all classes of the natives. Agricultural labourers and coolies are fond of wearing hats and cloaks made out of the same substance, which in wet weather keeps out a great deal of rain; and there are many other purposes to which this useful tree is applied. Besides all this, it is most ornamental in the country where it grows. In the 'Botanical Magazine' for March, 1850, Sir Wm. Hooker thus writes of it:—"A palm, *Chamærops excelsa*, (?) sent to the Royal gardens by Mr. Fortune, has braved, unharmed, and unprotected by any sort of covering, the severe winter now passed." (1849-50).—*Fortune's Tea districts, page* 59.

(2534) CHAMÆROPS OR HEMP PALM. The north-eastern part of China produces a very valuable tree known by the name of the hemp-palm, from the quantity of fibrous bracts it produces on the stem just under the blossoms. This Hemp-palm (Chamærops sp.) is a tree of great importance to the Chinese in a commercial point of view, on account of the sheets of fibre which it produces yearly on its stem. Seeds of this hemp-palm, so valuable on account of the fibre which it yields, and Cryptomeria Japonica, a fine timber tree, were obtained by Fortune in large quantities on the hills near Tein-tung. —*Fortune's Res. among the Chinese, page* 154.

(2535) CHAMÆROPS KHASIANA. The fan-palm, ("Pakha," Khas.), grows on the cliffs near Maunloo on the Khasia hills: it may be seen on looking over the edge of the plateau, its long curved trunk rising out of the naked rocks, but its site is generally inaccessible: while near it grows the *Saxifragis ciliaris* of English Gardens, a common plant in the north-west Himalaya, but extremely scarce in Sikkim and the Khasia mountains. This species of Chamærops is very closely allied to, if not identical with *P. Martiana* of Nepal, which ascends to 8000 feet in the western Himalaya, where it is annually covered with snow: it is not found in Sikkim, but an allied species occurs in Affghanistan, called P. Ritchiana. The dwarf palm of Southern Europe is a fourth species.—*Hooker Him. Jour. Vol.* II, *page* 280.

(2536) CHAMÆROPS RITCHIANA; Griffith, (Sindee, "*Phees*") grows in masses, on the barren hills and passes below five thousand feet, leading up to the table land of Beloochistan and Afghanistan. Its leaf bud or cabbage is eaten. Its wood is used as fuel: its scurf with saltpetre as tinder for matchlocks, and its leaves "phurra" are fabricated into baskets, fans, brushes, sieves, sandals, pouches, platters, and ropes for water wheels.—*Seeman.* The Chamærops, called *Palmetto*, is among those best known of the palms in Europe. *C. Ritchiana*, called *Maizurrye* in Pushtoo, and *Pfees* in Sindhee, is a most useful plant. Of it are made sandals, baskets, mats, &c., and its moonyah or fibre makes twine and ropes in Sindh. It is of extensive use in Affghanistan for making cordage; in the same way that the Hemp Palm, also a species of Chamærops, was found by Mr. Fortune to be employed in Northern China; and as *Chamærops humilis*, or Palmetto, is in the North of Africa and South of Europe, for making baskets, brooms, mats, and cordage. Indeed, paper and pasteboard are made of its fibres by the French in Algeria.— *Royle Fib. Pl. page* 95.

(2537) CHAMELEONS, CHAMELON-TRIBE, CHAMELEONIDÆ, the name for a well-defined family of Saurians (Lizard-like Reptiles), whose differential and essential characters may be summed up as existing in the form of their feet, the toes of which are joined or bound up together in two packets or bundles opposed to each other—in their shagreen-like skin, in their prehensile tail, and in their extensile and retractile vermiform tongue. Their reproduction is by means of eggs, which are numerous at each deposit, oval, and enveloped in a white, tough, parchment-like skin. The Chameleons spend their lives in trees, clinging to the branches by means of their feet and tail. There they lie in wait for the insects which may come within their reach: and it is highly probable that, in such situations, their faculty of changing their colour becomes highly important in aiding them to con-

ceal themselves. They move about with great regularity and a kind of affected gravity. The powers of abstinence possessed by this singular race are very great, and hence most probably arose the old fable of their living on air, which was for a long time considered to be "the chameleon's dish." The power possessed by these creatures of changing colour has been a subject of wonder and exaggeration from an early period. But this extends only to the various shades of green and greenish yellow, according to the darkness of the colour of the objects below them. This family embrace but the one genus, *Chamæleo*. Dr. J. E. Gray places the *Chamæleonidæ* in the tribe *Dendrosaura*, of the sub-order Pachyglossæ, of the order *Saura*, or Lizards. The tribe *Dendrosaura* embrace only this family, and have the following characters :—scales of the belly, sides, and back, granular. Tongue elongate.—*Eng. Cyc. p.* 937.

(2538) CHAMÆLEO BIFURCUS, the Large-Naped Chameleon. A native of Madagascar.—*Eng. Cyc. p.* 937.

(2539) CHAMÆLEO CUCULLATUS, the Hooded Chameleon. An inhabitant of Madagascar.—*Eng. Cyc. p.* 937.

(2540) CHAMÆLEO LATERALIS, the *Side-Crested* Chameleon, is a native of Madagascar. Back and belly with a toothed crest. Sides simple.—*Eng. Cyc. p* 937.

(2541) CHAMÆLEO NASUTUS, the Sharp-Nosed Chameleon. A native of Madagascar.—*Eng. Cyc. p.* 937.

(2542) CHAMÆLEO PARDALIS, the Bourbon Chameleon. Scales unequal, larger tubercles. Muzzle simple. A native of Bourbon.—*Eng. Cyc. p.* 937.

(2543) CHAMÆLEO PARSONNII, Parson's Chameleon. A native of Madagascar.—*Eng. Cyc. p.* 938.

(2544) CHAMÆLEO RHINOCERATUS, the Rhinoceros-Chameleon. Scales unequal. Muzzle (of male) with a central prominence. A native of Madagascar. Specimens of this and the last species were presented to the British Museum by Sir Edward Belcher.—*Eng. Cyc p.* 937.

(2545) CHAMÆLEO TIARIS, the Fringed Chameleon. Found in the Seychelle Islands.—*Eng. Cyc. p.* 937.

(2546) CHAMÆLEO VERRUCOSUS, the Warty Chameleon, inhabits Madagascar.—*Eng. Cyc. p.* 937.

(2547) CHAMÆLEO VULGARIS, the Chameleon. It is the *C. Mutabilis*, Meyer; *C. cinereus*, Aldrovandus; *C. Parisiensis*, *C. Zeylandicus*, and *C. Mexicanus*, Laurent; *C. carinatus*, *C. subcroceus*, *C. calcaratus*, Merrem; *C. Zebra*, Bory; *Lacerta chameleon*, Linnæus. It is a native of the East Indies, and is the species which is most frequently taken to England.—*Eng. Cyc. p.* 937.

(2548) CHAMOIS LEATHER, SHAMMY LEATHER.

Chamois, FR.	Camoscio, IT.
Samischleder, GER.	Semschanui, Koshi, RUS.

Strictly speaking is the dressed skin of the chamois goat; but common goat, kid, or sheep skin is generally substituted for it. It is much valued on account of its softness, pliancy, and capability of bearing soap without sustaining injury. It is used for washing the varnished parts of carriages cleaning silver and plated ware &c.—*Faulkner*. It is now manufactured in India.

(2549) CHAMP is the name given to a valuable kind of timber, produced in the East Indies by *Magnolia excelsa*.

(2550) CHAMOMILE. Anthemis nobilis and variety plena. An Aromatic herb, leaves used in garnishing, the flowers used as bitters, and in fomentations. Of easy culture, raised from seed, held in estimation, both in domestic and scientific medicine.—*Jaffrey*.

(2551) CHAMPAC, BARK. Champacæ Cortex. Bark of Michelia Champaca, used in Medicine.

(2552) CHAMPAGNE. One of the most deservedly esteemed and dearest of the French wines. It is named from the province of France, of which it is the produce. There are two distinct classes of this wine, viz. *white* and *red*, each either still or sparkling; but there is a great variety in the flavour of the produce of different vineyards.

(2553) CHANK SHELLS.

Sankha, Sangoo, TAM	Shenkoo, SANS.
Senkhum, TEL.	Sukk, DUK.

These shells are the several species of the genus Turbinella. Common conch shells, are fished up by divers in the Gulf of Manar, on the coast opposite Jaffnapatam in Ceylon in about 2 fathoms water, and at Travancore, Tuticoreen, and other places. Large fossil beds of chanks have also been found. They form a considerable article of trade in India, where they are in extensive demand all over the country. They are sawn into narrow rings or bracelets, and are worn as ornaments, for the arms, legs, fingers &c. by the Hindoo women; many of them are also buried with the bodies of opulent and distinguished persons. Those which, from being taken with the fish, are called green chanks, are most in demand. The white chank which is the dead shell thrown upon the beach by strong tides having lost its gloss and consistency, is not worth the freight up to Calcutta. The value of the green chank depends upon its size. A chank opening to the right called in Calcutta the right handed chank, is so highly prized, as sometimes to sell

for 400 or 500 or even 1,000 Rupees. The zungum caste of Hindoo religious mendicants and those of the Veeranroosty caste, blow them as horns.—*Rohde M.S.S.* The commercial returns show an exportation from Madras of ten to twenty-four lacs of these shells in one year.

	No.	Value.
1852—1853.	15,15,495	Rs. 54,780
1853—1854	24,60,727	104,481
1854—1855	10,84,575	56,165
1855—1856	Not given, supposed 7,50,000	26,171
Total...	59,10,777	2,41,597

(2554) CHARCOAL. Carbo Ligni.

Koyla, DUK.	Carbo-ligni, LAT.
Fuhm-chobie, ARAB.	Arang, MAL.
Lippe-anghoroo, CYNG.	Zeghal-i-chobie, PERS.
Charbon de bois, FR.	Adapoo-currie, TAM.
Reine Kohle, GER.	Poiboogooloo, TEL.
Koo-e-la, GUZ	Carbon de lena, SP.
Carbone di legna, IT.	Bogoo, TEL
Karri, TAM.	Kolsah, HIND.

Good charcoal consists of wood burned with as little exposure to the action of the air as possible. It is black, brittle, easily pulverised, perfectly insipid, solid, and inodorous. It possesses remarkable antiseptic properties, as it resists the putrefaction of animal matter, and destroys the smell and colour of many substances. It is mostly used as a fuel, and in the manufacture of gun-powder.—*Faulkner.* For the forge, the best is that prepared from Bamboo and from stems of palmyra leaves (Tel. Tate Gummaloo). The Tamarind yields a good charcoal for the same purpose, as do most hard woods. For gun-powder, the root of the milk hedge Euphorbia Neriifolia, and of the Calotropis gigantea is preferred. At the Government Powder Mills, Madras, that of the gram bush, Dolichos uniflorus: and in that of Bengal, the Cajanus Indicus or Pigeon Pea, is used. It is of great importance to this country that more economical modes of preparing charcoal should come into general use, the destruction of firewood in the neighbourhood of iron works is grossly wasteful: indeed between the loss in preparing the charcoal and the loss of heat in preparing the iron, the consumption of the fuel is probably at least ten times as great as it ought to be, inducing great loss and in many cases rendering useless extensive beds of most valuable ore. The common native mode of preparing charcoal is to set on fire a heap of small wood and after allowing it to burn for some time to quench it either by water or by heaping earth upon it: charcoal so prepared is of little value in reducing iron ore. The charcoal of the Acacia sundra is said to be the best for this purpose. The Parkinsonia is said to yield a good charcoal for gun-powper.—*Rohde M.S.S.* The *Charcoal* for gun-powder considered the best, is manufactured from the Sesbania Ægyptica. The best charcoal for a dentifrice, is that of the Betel-nut. The gun-powder charcoal used at the Damoodah coal works is made from an *Acacia*: the Seiks, employ *Justicia Adhatoda*, which is also in use all over India: at Aden the Arabs prefer the *Calotropis*, probably because it is most easily procured. The grain of all these plants is open, whereas in England, closer-grained and more woody trees, especially willows, are preferred.—*Hooker Him. Jour. Vol.* 1. *page* 9.

(2555) CHARLOMBI, the Tamil name of a Ceylon tree which grows to about fifty feet high, and twenty inches in diameter. It is very close-grained and light, and resembles some kinds of mahogany. It is used in house-work, &c.: the fruit which it produces is of little value.—*Edye, Ceylon.*

(2556) CHART.

Zeekarten, DUT.	Carte marine, IT.
Cartes marines, FR.	Cartas de marear, PORT. and SP.
Seekarten, GER.	

A plan or map of a sea or coast, constructed for the purpose of ascertaining the position of a ship with reference to the land, and of shaping a course to any place. They are distinguished into several kinds, as plain, globular, and Mercator charts.—*Faulkner.*

(2557) CHAULMOOGRA ODORATA.

Chaolmoogra, Petarcura. HIND.; Taliennoe. BURM.

This a native of Sylhet. There are a few trees of this plant about Rangoon, and it is also met with on the banks of streams in the Tounghoo Forests, but must be considered scarce. Wood, white coloured, adapted for fancy work and cabinet making —*McClelland.* The seeds are employed extensively in the treatment of cutaneous diseases and have been recommended in Tape worm. The seeds are various in shape, nearly oval, smooth, grey, hard. Embryo white. The seeds yield by expression about 10 per cent. of a thick fixed oil, of unpleasant flavour, and rather offensive smell; one drachm given to a dog caused violent vomiting in 15 minutes. They are much used by the natives in the treatment of cutaneous disorders, being beaten up with ghee into a soft mass, and applied three times daily.--*O'Shaughnessy.* Chaulmoogra odorata is officinal in the Punjab and to be met with throughout Hindostan. The expressed oil of the seeds is in use in lower Hindostan, in cutaneous diseases.—*Honigberger, p.* 255. Chaulmoogra ointment, prepared from the seeds of Chaulmoogra odorata, is a favorite and good application among the native practitioners for the treatment of several cutaneous diseases, especially herpes and tinea.—*O'Shaughnessy, Beng. Phar. page* 382.

(2558) CHAURAPUPPOO.

Charul also Chirouji, HIND.

This is the kernel or seed of the Buchanania

latifolia. The chironji is the seed removed from the small stone of the "achhar" or fruit: it is brought to Ajmeer from Kotah: and to Madras from Cuddapah, the seed is very palatable and nutritious, especially when roasted; is used also in medicine, and considered heating: one seer and a half costs a rupee. The fresh fruit is very agreeable.—*Gen. Med. Top. page* 131.

(2559) CHAY-ROOT. CHOY-ROOT.

Emboorel, Ramiserem-vayr, TAM.	Tsheri-vello, Saya-wer, TEL.

This is a small slender root, yielding a scarlet dye, obtained from a plant (*Oldenlandia umbellata*), cultivated on the coasts of Coromandel and Malabar, and in Ceylon. The colouring principle exists only in the bark of the root, and is employed to dye the durable reds for which Indian cotton yarns and chintzes have long been famous. Chay root forms a considerable article of export from Ceylon, but it is not much esteemed as a dye in England, owing probably to its deteriorating in quality during the voyage. A decoction of the leaves is prescribed by native doctors for consumptive and asthmatic affections. —*Faulkner.* At the Madras Exhibition of 1855 eight specimens were exhibited from Guntoor, Masulipatam, Nellore, Tanjore, Tinnevelly, Travancore, and Madura. The plant is a small biennial weed, growing in light sandy ground near the sea where its roots strike very deep—the colouring matter resides entirely in the bark of the root, the inner portion is white and useless. The root is of great importance to the Indian dyer, yielding a red dye similar to munjeet, which is used to a great extent in the southern parts of Hindostan. The celebrated red turbans of Madura are dyed with the Chayroot, which is considered superior of its kind, but this is probably owing to some chemical effect which the water of the Vigay River has upon it, and not to any peculiar excellence of the dye itself. Wild chay is considered to yield one-third more colouring matter than the cultivated root, this probably arises from too much watering, as much rain injures the quality of the root. Roots of two years growth are preferred when procurable. It is currently reported that chay-root rapidly deteriorates by being kept in the hold of a ship, or indeed, in any dark place.—*M. E. J. R.* It is much cultivated in light sandy soils near the sea, particularly about Masulipatam. The root is used to dye the best and most durable red cotton cloth. The wild is supposed to yield one fourth more colouring matter than that which is cultivated, and if old is worth double as much. It is not much used in Europe where it is said that it can produce no effect which cannot be more cheaply produced by madder. The usual mode of cultivation is by sowing the seed (which being very minute is collected with the sand on the surface of the field where it is grown), in land previously prepared, and watering it until it is year in the ground, it is then dug and sells at Rupees the Candy of 500 lbs, if left longer the ground it increases in value, and does require further watering. On first sowing it usual to mix cowdung in the water with whi it is watered which serves to bind the surface the soil and prevent the seed from being blo away; much rain injures its quality, it is said be injured by keeping in a dark room. T Malabars test the value of the root by mixi some of the pounded root and quick lime: good, the mixture soon assumes a fine red col if the color becomes pale or brown or if change of color take place it is considered of value. If a white colour prevail in the inside the bark, and on the wood we may be pret certain that the root is spoiled, a green colour a sure indication of its goodness.—*Rhode M.S. Chay-root*, says Simmonds, from the pla called chay, the *Oldenlandia umbellata*, extensively cultivated as a dye plant in t East, especially on the Coromandel coast, at N lore, Masulipatam, Malabar, and other parts India. The outer bark of the roots furnish the coloring matter for the durable red for whi the chintzes of India are famous. Chay-ro forms a considerable article of export from Ce lon. The wild plant there is considered prefe able; the roots, which are shorter, yielding on fourth part more coloring matter, and the rig to dig it is farmed out. It grows spontaneous on light, dry, sandy ground on the sea coast the cultivated roots are slender, with a fe lateral fibres, and from one to two feet lon The dye is said to have been tried in Europ but not with very advantageous effect. D Bancroft suspects it may be injured by the lon voyage, but he adds that it cannot produce a effect which may not be more cheaply obtain from madder. This red dye, similar to munjee is used to a great extent in the southern part of India by the native dyers. It is n held in very good estimation in Europe b seems to deserve a better reputation than it a present possesses. Attention was drawn to it a *a dye-stuff in 1798*, by a special minute of th Board of Trade recommending its importation but Dr. Bancroft, who made some experiment with a sample of damaged chay-root, considere it inferior to madder and hence discouraged it further importation.—*Simmonds.*

(2560) CHEROOTS. CIGARS. Consist c the dried leaves of the Tobacco plant, forme into small rolls for the purpose of smoking Havannah cigars are usually reckoned the bes in Great Britain and the continent. In Indi Manilla cigars are most esteemed. Imitatio Manillas, Chinsurah cheroots and Trichonopol cigars are the kinds manufactured in India; th former are made in Calcutta. These several va rieties are imported into Bombay.—*Faulkner.*

(2561) CHEESE.

Kaas, Dut.	Caseus, Lat.
Fromage, Fr.	Paneer, Pers.
Kase, Ger.	Queijo, Port.
Paneer. Guz & Hind.	Sur, Rus.
Formaggio, Cacio. It.	Queso, Sp.

An article of food formed of the curd of milk, separated from the whey, which is pressed, and then left to dry. It is frequently coloured with annotto, the juice of orange, carrot, the flower of marigold, hawthorn-buds, turmeric, &c. There are various kinds of cheese, deriving their names chiefly from the place of manufacture, such as single and double Gloucester, Stilton, Cheddar, Dunlop, Dutch, &c. Surat is famed for a mild description of cream cheese.—*Faulkner.* In England, the principal season for cheese-making is from May to September, and it is carried on in nearly every county of England, but there are particular districts which have acquired great repute for the cheese produced therein. The process is in nearly all cases the same. In Cheshire cheese the salt is well mixed with the curd, and not merely rubbed on the outside. This, which is the most celebrated English cheese, is made in quantities amounting to nearly 14,000 tons annually. The rich cheese called Stilton is made in Leicestershire: it is not sufficiently mellow for use under two years old. Double and single Gloucester cheese is also well known. The former is made of the milk and cream, the latter of the milk and half the cream. Bath and York are famous for cream cheeses. Good cheeses are produced in large quantities in Holland. In Gouda cheese, which is considered the best made in that country, muriatic acid is used instead of rennet. Hence it is never infested with mites. Parmesan cheese from Parma, in Italy, is skim-milk cheese, owing its rich flavour simply to the fine herbage on the banks of the river Po. Swiss cheese, especially that of Gruyere, is pleasing to some tastes. It is flavoured with herbs. English imports of cheese have hitherto been chiefly from Holland. —*Tomlinson, page* 359.

(2562) CHEERONGIE OIL. Chirongia sapida or Buchanania latifolia.

Saraypuppoo nooney, Tel.	Cheeronjie, or Charoolie ka tel, Hind.

The kernels of this tree are eaten by the natives, to promote fatness, they abound in a straw colored, sweet tasted and limpid oil which is seldom extracted. The tree grows plentifully in Mysore and Cuddapah.—*Mad. Ex. Jur. Rep.*

(2563) CHEHOOR, a pale brownish colored cordage of Beerbhoom, coarse and of moderate strength.—*Royle.*

(2564) CHEIRANTHUS CHEIRI. *Cruciferæ.* Wall Flower. Named from Cheir, the hand, Anthos a flower. This flower derives its name from the circumstance of its growing wild on old walls and ruins in England. It is of a light yellow colour, but, when cultivated in gardens, assumes a much richer and darker tint, mixed with brown. The double variety, of a yellow colour, and striped with deep orange, is seldom known to blossom here.—*Riddell.*

(2565) CHEIROPTERA (χείρ, a hand, πτερόν, a wing), the name of a natural family or division of Mammiferous Animals; the Bats or Flitter-Mice of the English; Fledermauser of the Germans; *Vespertiliones* of the Latins; Pipistrelli and Nottoli of the Italians; Chauvesouris of the French. The animals belonging to this wing-handed family embrace those which come under the genus *Vespertilio* of Linnæus. Gudhul, also chum Gudhul, *Hind.*—Shub-para, *Pers.* They all have the faculty of sustained flight, and their organisation and habits point them out as a separate and well-defined group, distinguished by a folding extension of the membranous skin, which, rising from the sides of the neck, is spread between their fore feet and their fingers. The following are Asiatic genera of this tribe.

Vespertilio pictus. The ears are shorter than the head, oval, wider than they are high. Earlet oval-shaped. The fur is reddish, passing into bright yellow upon the back, and of a tarnished yellow on the belly. Citron-coloured rays mark the course of the fingers in the wings, which are chestnut-brown. Locality, Ceylon.

Cheiromeles, Horsfield. Two incisors above and two below; the upper ones large.

Cheiromeles torquatus, Horsfield, 'Researches in Java;' *Molossus Cheiropus* Auct; *Dysopes Cheiropus*, Temminck. Length, 5½ inches. Expansion nearly 2 feet. Localities, Siam and Western Asia.

Rhinopoma Hardwickii, the Indian Rhinopome.

Megaderma Lyra, *Lyre*-Nosed Broad-Winged Bat. Java, India, Madras and Bengal.

Megaderma Spasma, the Cordate Bat. Java and Singapore.

Rhinolophus morio, the Black Horseshoe-Bat. Singapore.

Rhinolophus tragatus, Nepaul Horseshoe-Bat. Nepaul.

Hipposideros fulvus, Foxy Horseshoe-Bat. India, Madras.

Hipposideros murinus, House-Coloured Horseshoe-Bat. India, Madras.

Hipposideros bicolor, *Rhinolophus bicolor*, Two-coloured Horseshoe-Bat. Java.

Hipposideros apiculatus, Apicillated Horseshoe-Bat. India, Madras.

Hipposideros larvatus, Masked Horseshoe Bat. Java.

Hipposideros penicillatus, Pencilled Horseshoe-Bat. Madras.

Hipposideros vulgaris, Javanese Horseshoe-Bat. Java.

Hipposideros nobilis, Noble Horseshoe-Bat. Java.

Hipposideros armiger, Hodgson's Horseshoe-Bat. Nepal.

Petalia Javanica, Kuhl's Petalia. Java.

Vespertilio muricola, the Wall-Bat. Nepaul.

Trilotitus Blepotis, the Blepote. Timor.

Trilotitus Horsfieldii, the Lowo-Manir. Java, India.

Kerivoula picta, the Kerivoula. Java.

Kerivoula formosa, the Nepaul Kerivoula. Nepaul.

Kerivoula Sykesii, Sykes's Kerivoula. India, Calcutta.

Kerivoula trilatitoides, the Javanese Kerivoula. Java.

Kerivoula Hardwickii, Hardwicke's Kerivoula. Java.

Scotophilus fuliginosus, the Sooty Scotophile. Nepaul.

Scotophilus Hodgsonii, the Indian Bat. India, Calcutta.

Scotophilus labatus, the Lobed Scotophile. India.

Scotophilus Maderaspatanus, the Madras Bat. Madras.

Scotophilus Temminckii, Temminck's Noctule. Calcutta, and Java.

Scotophilus falcatus, the Falcated Noctule. India.

Scotophilus Leachii, Leach's Noctule. India.

Scotophilus fulvus, the Foxy Noctule. Java and Madras.

Noctrilinea Malaccensis, the Singapore Noctule. Singapore.

Noctrilinea labiata, Large-Lipped Noctule. Nepaul.

Murina suillus, the Pig-Nosed Bat. India.

Taphozous perforatus, the African Taphozous. Africa and Mauritius.

Taphozous longimanus, the Long-Armed Taphozous. India, Calcutta.

Taphozous melanopogon, the Black-Bearded Taphozous. Caves of Kenneri, Hindustan.

Taphozous saccolaimus, the Javanese Taphozous. Java.

Centurio senex, the Wrinkled-Faced Epaulet Bat. Amboyna.

Nyctinomus plicatus, the Groove-Cheeked Bat. Java and Bengal.

Nyctinomus Ruppellii, Ruppell's Groove-Cheeked Bat. Fernando Po and Singapore.

Pteropus Edwardsii, the Wurba-Gool. India, Nepaul, and Molucca.

Pteropus edulis, the Kalong. Sumatra.

Xantharpyia amplexicaudata, the Xantharpye. Amboyna.

Cynopterus marginatus, the Margin-Eared Cynoptere. India, Java, and Nepaul.

Cynopterus Horsfieldii, Horsfield's Cynoptere. Java, and India.

Cynopterus brevicaudatus, the Short-Tailed Cynoptere.

Cynopterus affinis, the Indian Cynoptere. Himalaya.

Macroglossus minimus, the Kiodote. Java.—*Eng. Cyc. p.* 976.

(2566) CHELONE. *Scrophulariaceæ*.—Flowering plants named from *Chelone*, a tortoise, to the back of which the helmet of the flowers is fancifully compared, the flowers are scarlet, orange, white and purple, the species thrive in any good garden soil, and may be increased by dividing the roots.—*Riddell.*

(2567) CHELONIA (χελωνη, a Tortoise), Tortoises and Turtles, a numerous and highly interesting order of Reptiles, generally considered the first by herpetologists. They are also termed *Testudinata* (from *Testudo*, the Latin name for a Tortoise), and are distinguished at the first glance by the double shield in which their body is normally inclosed, whether they are terrestrial, fresh water, or marine. They were all comprised by Linnæus under his genus *Testudo*.—*Eng. Cyc. p.* 978. The following are Asiatic species of Gymnopus.

Gymnopus Duvaucelii (*Trionyx Gangeticus*, Cuv., *T. Hurum*, Gray).

Gymnopus ocellatus (*Trionyx ocellatus* Hardwick; *T. Hurum*, the young, Gray).

Gymnopus lineatus (*Trionyx Ægyptiacus*, var., Hardw; *T. Indicus*, Gray).

Gymnopus Javanicus (*Trionyx Javanicus*, Schiveigg).

Gymnopus subplanus (*Trionyx subplanus*, Geoff).

Gymnopus Euphraticus (*Trionyx Euphraticus*, Geoff.).—*Eng. Cyc. page* 1003. Though many of the other *Chelonia* are highly useful to man, especially as articles of food, none are of such great utility as the Thalassians. The advantages to be derived from them were not lost upon the ancients; and though Mercury is said to have taken the first hint for the structure of a lyre from the dried carapace and tendons of a tortoise (a *Gymnopus*, probably), found by the god after an inundation of the Nile, and which sounded when he struck 'the chorded shell,' the benefits arising from the Thalassians, are, if not so refined, of a much more substantial and varied nature.

The inhabitants of those countries where the turtles grow to a large size do not merely derive from them a supply of food, but they convert their carapaces into boots, into huts, into drinking-troughs for their domestic animals, and baths for their children. The *Chelonophagi* of old, who inhabited the shores of India and the Red Sea converted the enormous shells of the turtles which they caught into roofs for their houses and boats for their little voyages, as Strabo and Pliny testify.—*Eng. Cyc. page* 1004. As an article of food the Green Turtles (Tortues Franches of the French), are so highly prized that they have become a considerable article of commerce. The fat of many species, when fresh, is used with success in lieu of butter and oil in cookery ; and in those species which have a musky odour (*Chelonia Caouana* and *C. Caretta* for instance), is used for embrocations, leather-dressing, and as lamp-oil. The Imbricated Turtles furnish that valuable article, tortoise-shell, or rather the best sorts of it, so highly prized in ancient and modern times, and so ornamental and useful in the arts. The eggs of all the species, particularly those of the Green Turtles, are excellent. The following list of Asiatic *Chelonia*, arranged according to their geographical distribution, is from Dr. J. E. Gray's 'Catalogue of the Tortoises and Crocodiles, &c., in the collection of the British Museum.' When a species is found in two of the larger divisions of the list on account of its extensive range, it is preceded by an asterisk.

ASIA.

River Tigris.

Tyrse Euphr.

CABUL.

Testudo Horsfieldii.

INDIA.

Testudo Indica.
Emys tectum.
Emys tentoria.
Emys Duvaucellii.
Emys trijuga.
Emys lineata.
Emys Dhongoka.
Emys Thurjii.
Emys Trivittata.
Emys ocellata.
Emys Hamiltonii.
Tetraonyx Batagur.
Emyda punctata.
Tyrse Gangetica.
Dorgania subplana.
Chitra Indica.

CEYLON.

Testudo stellata.
Emys seba.

CHINA.

* *Geoemyda Spengleri.*
Geoemyda Bealii.
Geoemyda Reevesii.
Geoemyda mutica.
Geoemyda nigricans.
Cistudo trifasciata.
Platystemon megacephalum.
Tyrse perocellata.

JAPAN.

Emys Japonica.

SUMATRA.

Geoemyda spinosa.
Emys crassicollis.
Emys platynota.

AMBOYNA.

Cistudo Amboinensis.

JAVA.

Cistudo dentata.
Tyrse Javanica.

INDIAN OCEAN.

Caouana caretta.

RED SEA.

Caretta imbricata.—Eng. C. page 1007.

(2568) CHENOPODIACEÆ. The Chenopodium tribe, a natural order of Exogens, of numerous species, used either for culinary purposes or for the manufacture of Soda. Garden Orach [*Atriplex*], Chard-Beet, Beet, Mangold Wurzel [Beta], belong to this order. Soda is obtained from species of *Salsola* and *Salicornia*. —*Eng. Cyc. p.* 1011.

(2569) CHENOPODIUM.

Bhutwa, HIND.

Several species in India used as food—*O'Shaughnessy, page* 523 ; viz C. album (Betu Sag.) common in Bengal, used by the natives as a pot herb : C. laciniatum, an erect annual, and C. viride, of which there are two varieties. C. olidum, stinking goose foot, smells like putrid saltfish and exhales ammoniacal gas : herb employed as an emmenagogue and antispasmodic.

(2570) CHENOPODIUM ALBUM. Lin. —*Ainslie's Mat. Med. p.* 255.

Paroopoo keeray. TAM. | Papoo koora, TEL.
Khooljeh ke bawjee, DUK. | Ructanala, SANS.

(2571) CHENOPODIUM BOTRYS, (Jerusalem oak.) South of Europe, and Siberia, and Upper India ; whole plant very fragrant, said to be a powerful expectorant, and very useful in catarrh and humoral asthma.—*O'Shaughnessy, page* 524.

(2572) CHEPOOROO VALELLOO, a grass grown in Kimedy, from the roots of which neat table mats and teazing brushes are made. At the Madras Exhibition of 1855, a few neat table mats were exhibited from Kimedy, and some teazing brushes made from the roots of this grass. These are likely to command a ready sale, if they could be brought prominently to notice. The botanical name of the plants from which they are made is not yet ascertained.

(2573) CHICORY, CICHORIUM INTYBUS. WILD ENDIVE. Chicory, a root of the endive or dandelion family, used for adulterating coffee. It is cultivated largely in Germany, and is exported to Britain from Hamburg in large quantities. It is also grown in Yorkshire, Lincolnshire, and Suffolk, and in several of the places in Southern Asia. The seed is sown in April, and the harvest is gathered in September. The roots are pulled up and washed : they are then cut across into pieces about the size of a walnut and dried at a kiln. To prepare it for use it is roasted in the same manner as coffee, which changes it into a blackish brown colour. The powdered chicory resembles coffee but is finer in the grain and of a lighter brown colour. When put into water it melts almost entirely away. It soils the fingers more than coffee, and on this account may be distinguished therefrom. The presence of chicory may be detected in coffee by putting a spoonful of coffee gently into a tumbler of clear cold water : if pure it will float on the surface ; if not, the chicory will separate and discolour the water as it subsides. In its fresh state chicory is said to be a good tonic, and to have the effect of an aperient. The dandelion tribe is so widely diffused that it is probably intended by nature for the benefit of man and animals. The presence of chicory in coffee is said to give *body* to that beverage, to deepen its colour, and to assist that soft and pleasing aroma which

makes coffee acceptable. This however is very doubtful. It may also diminish, in some degree, the constrictive effects of coffee. Of course the only safeguard for the consumer is to grind his own coffee and add the chicory himself. It is stated that in 1840 for 36,000,000 lbs. of coffee, 12,000,000 lbs. of chicory were sold. A correspondent in *Chambers's Edinburgh Journal* (No. 304, N.S.) states that chicory must be regarded altogether as an adulterant: that the best coffee all over the continent is obtained by *roasting high*. "The rule is to roast as high as possible without burning; and the higher the roasting which the bean will stand, the better will be the coffee. When the beans are too ripe, the fine pale green colour has vanished and they are sooner burnt; and likewise, when unequal in size one portion will burn before the other is highly enough roasted. To make the beverage good, a large quantity of ground coffee must be used, and the pot must never by any means be allowed to boil. Abundance of sugar is likewise necessary." Prussian chicory is considered as the best. British chicory when roasted is much paler in colour and of inferior value. A factitious colour is given to it by means of Venetian red (sesquioxide of iron). The great demand for chicory has led to its extensive adulteration; first, by what is called *Hambro' powder*, which consists of roasted and ground peas, damaged corn, &c. coloured with Venetian red: and secondly, by *coffee flights*, the thin membrane which separates from coffee seeds in the act of roasting. Parsnips, turnips, &c. are also sliced and roasted as substitutes for chicory. Chicory is also used for adulterating snuff, and for coloring porter.—*Tomlinson, page* 361.

(2574) CHICKRASSIA, a genus of plants belonging to the natural order *Cedrelaceæ*.—*Eng. Cyc. page* 1013.

(2575) CHICKRASSIA TABULARIS. CEDRELACEÆ.

Chittagong wood, ENG.	Aglay marum, TAM.
Chetakum kurra, TEL.	

Chickrassa Swietenia, Roxb. Fl. Ind. ii. p. 399). This tree occurs in the mountainous countries to the East of Bengal. It was discovered by Mr. Nimmo on the Toongur Hills, in 1838. It is the Swietenia Chickrassa of Roxburgh and Ainslie and furnishes the Chittagong-wood of commerce. In Coimbatore, in common with one or two other light red coloured woods, it currently passes under the general name of cedar and bastard cedar, and is extensively employed in cabinet making: this has quite a cedar-like smell.—*Wight.* This wood is not known to Mr. Rohde as a product of the Northern Circars, but it is imported there among the "Chittagong woods." Beautifully veined and mottled pieces are occasionally met with, but its complaints during the season of the hot winds and dry northerly winds of November and December in the Northern Circars render articles made of it containing wide planks and framing, as armouries, very disagreeable bed-room companions. The Chittagong wood is used at Madras for all purposes for which ordinary Mahogany would be used in Britain as furniture, panels of carriages, &c.; one variety is sufficiently tough to be employed for felloes of wheels. Mr. Rohde concludes that all the wood imported under the name of "Chittagong" is not the produce of the same trees, the only wood of the Circars at all resembling it is the "pinn ayeinpa" of Ganjam and Northern parts of the Vizagapatam districts. Indeed it would be difficult, so far as his recollection enables him to state, to distinguish one from the other, though he believes it to be from a species of neem,—*Melia Azadarachta. Rohde.* In Madras the wood is extensively used in cabinet making, under the denomination of "Chittagong wood" being imported from that province, but it is abundant in the mountainous parts of the Peninsula of India. It makes beautiful and light furniture, but is apt to warp during the season of hot land winds.—*M. E. J. R.* The bark is powerfully astringent—*O'Shaughnessy, p.* 250.

(2576) CHIKSA. This is a perfumed powder composed of a variety of odoriferous substances, generally mixed up, when used, with sweet scented oil (phoolail ka tel).—*Herklots.*

(2577) CHILLIES, CAPSICUM. CAYENNE PEPPER.

Mirch, DUK.	Lombok, JAV.
Mirchee, GUZ. & HIND.	Chubui, MAL.

The scientific relations of the plants producing these fruits will be found under the article Capsicum, and we will here attend chiefly to the commercial relations. Chillies or capsicums are long roundish taper pods, divided into two or three cells, full of small whitish seeds. When this fruit is fresh, it has a penetrating acrid smell; to the taste it is extremely pungent, and produces a most painful burning in the mouth. When dried they form a large article of local and foreign traffic, and form the basis of Cayenne pepper; but in vinegar, when green or ripe, they are an acceptable pickle. In Bengal the natives make an extract from the chillies, which is above the consistence and color of treacle. The consumption of chillies in Southern and Eastern Asia is immense, as both rich and poor daily use them, and it is the principal ingredient in all chutnies and curries; ground into a paste, between two stones, with a little mustard, oil, ginger, and salt, it forms the only seasoning which the millions of poor in those countries can obtain to eat with their rice. They are worth in the Bombay market about 40s. the candy of 600 lbs. Immence quantities of the capsicum are used by the native population of the West Indies, Africa and Mexico; the consumption there as a condiment being almost universal, and perhaps equal in quantity to salt. Ten barrels of these peppers

were shipped from Montego Bay, Jamaica, in the first six months of 1851. The wholesale price of chillies in the London market is from 14s. to 25s. the cwt., and there is a duty of 6d. per pound on them. Cayenne fetches 9d. to 2s. the pound. Chilli is the Mexican name for all varieties of *Capsicum*. They are natives of the East and West Indies, and other hot climates. *C. annuum* is the species commonly noticed, but there seems to be numerous varieties, which by many are reckoned species. Thus *C. frutescens* is a shrubby plant, which grows to a larger and more bushy size; *C. minimum*, supplies the variety called bird-pepper: *C. baccatum* has a globular fruit, and furnishes cherry or berry capsicum. They are all of the simplest culture, but culture appears to increase the size, and to diminish the pungency of the fruit. Their acridity is owing to an oleaginous substance called capsicin. Cayenne pepper is used in medicine chiefly in the form of tincture, as a rubefacient and stimulant, especially in cases of ulcerated sore throat. It acts on the stomach as an aromatic condiment, and when preserved in acetic acid it forms chilli vinegar. Red pepper may be considered one of the most useful vegetables in hygiene. As a stimulant and auxiliary in digestion it has been considered invaluable, especially in warm countries. A kind called the tobacco red pepper, is said to possess the most pungent properties of any of the species. It yields a small red pod, less than an inch in length, and longitudinal in shape, which is so exceedingly hot that a small quantity of it is sufficient to season a large dish of any food. Owing to its oleaginous character, it has been found impossible to preserve it by drying, but by pouring strong boiling vinegar on it a sauce or decoction can be made, which possesses in a concentrated form all the essential qualities of the vegetable. A single drop of this sauce will flavor a whole plate of soup or other food. The "wort" or Cayenne pottage may be termed the national dish of the Abyssinians, as that, or its basis "dillock," is invariably eaten with their ordinary diet, the thin crumpet-like bread of teff or wheat flour. Equal parts of salt and the red cayenne pods are powdered and mixed together with a little pea or bean meal to make a paste. This is called "dillock," and is made in quantities at a time, being preserved in a large gourd-shell, generally suspended from the roof. The "wort" is merely a little water added to this paste, which is then boiled over the fire, with the addition of a little fat meat and more meal to make a kind of porridge, to which sometimes is also added several warm seeds, such as the common cress or black mustard, both of which are indigenous in Abyssinia.—("Johnston's Abyssinia.")—*Simmonds, p.* 429.

(2578) CHIMONANTHUS. The fragrant Chimonanthus, which is now a favourite in England, where it blooms in the open air at Christmas, is quite common in China—*Fortune's Tea Districts, page* 79.

(2579) CHIMPANZEE, the name by which one of those forms which approach nearest to man is most generally known. The term has been applied to the *Simia Satyrus* of Linnæus, the Oriental Orang.—*Engl. Cyc. page* 1015.

(2580) CHINA-BARK, a name given to the bark of *Buena hexandra*, a plant belonging to the natural order *Cinchonacea*. It is used as a febrifuge, but is less powerful than the barks obtained from the species of *Cinchona*.—*Eng. Cyc. p.* 1023.

(2581) CHINA BOX.—Murraya exotica.

(2582) CHINA-GRASS, RHEEA, OR RAMEE FIBRE, URTICACEÆ. *Boehmeria nivea.*

Chû or Tchou Ma, CHINA.	Gambe, in EAST CELEBES.
Tsjo, Karao, JAPAN.	Kunkhoora and Kunchoora, RUNGPORE
Caloee, SUMATRA.	Rheea, ASSAM.
Ramee, MALAY.	Pan, in SHAW.
Inan, in BONOA.	

The species among the Nettles of Eastern and Southern Asia, which is most famous for its fibre, is that formerly called *Urtica*, but now *Boehmeria nivea*. Kæmpfer, in his 'Amœnitates Exot.,' gives *Mao*, *Tsjo*, *Karao*, as the Japan names of the plant; and Thunberg says of it, copying from him: "Cortex pro funibus conficiendis, et filis validis ad texturas, expetitur;" and "E seminibus oleum causticum exprimitur." It is only within the last few years that Sir W. Hooker has published, in the 'Kew Journ. of Botany,' vol. i, p. 25, and vol. iii, p. 313, that he has obtained satisfactory information, through Sir George Staunton and Dr. Wallich, that the so-called China-grass is the fibre of this *Urtica nivea* of Linnæus, the *Boehmeria nivea* of Gaudichaud. Though the beautiful fabric known as China-grass cloth has long been known, its fibre has only in comparatively recent times attracted much attention, and the plant producing it was long unknown. When imported, however, into England, it sold for £60 to £80, and even for £120 a ton. It can be, at most times, had at Ningpo for about 6 dollars a picul of 133 pounds. The above high prices following every demand, have prevented this fibre from coming into general use for our manufactures. But a small black, almost invisible spot, which occasionally occurs on the fibre has also prevented its use for fine purposes. Full descriptions of the mode of preparing the fibre are given in Chinese works. One of these accounts was translated and transferred to the 'Journ. of the Hortic. Soc. of London,' in vol. iv, part iv, under the head of the Cultivation and Preparation of the *Tchou Ma*, or Chinese Flax; and from the importance of the material this is republished below. By this account we learn that the plant is cultivated with considerable care; that it may

be obtained from seeds, but more quickly by parting the roots, as it throws up numerous shoots; that these may be cut down, and that fresh ones will spring up, so that three several crops are obtained in the season. Great care is also taken in the scraping, peeling, steeping, and bleaching of the fibre. We also learn that the first crop yields strong and coarse fibres, and the second and third crops, delicate fibres for the finer fabrics. This China-grass fibre has of late years attracted considerable attention in Europe, and no less than three Prize Medals were given at the Exhibition of 1851, for finely prepared specimens of it, to the Messrs. Wright, Messrs. Hives and Atkinson, and Messrs. Marshall and Co., of Leeds. These looked like fine white silk or asbestos, some dyed of different colours, and some woven into cloth. The Jury Report of Class IV mentions that "the process of Messrs. L. W. Wright and Co., for the preparation of China-grass, &c., for which a patent was obtained in 1849, consists, essentially, in a very ingenious arrangement for boiling the stems in an alkaline solution, after they have previously been steeped for twenty-four hours in water of a temperature of 90°. The fibre is then thoroughly washed with pure water, and finally subjected to the action of a current of high-pressure steam till nearly dry. Dr. Roxburgh, when making his experiments on Fibres at the beginning of this century, took much pains with one of a species of Urtica, *Caloee or Ramee* (*Urtica tenacissima*, Roxb.) giving it this name because he considered it one of the strongest fibres he had ever met with. He first became acquainted with it in consequence of four plants having been sent to him by Mr. Ewer from Bencoolen, in Sumatra. He afterwards wrote that "some thousand plants have been reared from these four, so readily does it grow and multiply;" in fact, that "it may be grown from cuttings as readily as the willow." He further describes it as thriving anywhere, but most luxuriantly in shade, where there is much moisture. In four months it attains the height of eight or ten feet, when its shoots flower and can be cut down. Other shoots then spring up, which are also soon fit to be cut; and so on successively for almost any period. If left alone, the plant will in a short time produce a complete jungle. He, however, experienced considerable difficulty in separating the fibre. The Malays, he learned, merely steep the shoots in water for ten or twelve days, peel off the bark, and dry it in the sun. Besides its strength, he considered that the beauty, fineness, and softness of the fibre, are also greatly in its favour. In Sumatra it is called *Caloee*; but the Malays call it *Ramee*, and use the fibre for sewing thread, for twine, and for making fishing nets. Marsden states, that the shoots are cut down, dried, and beaten, after which the rind is stripped off; but Dr. Roxburgh did not find this method to succeed with him. He was afterwards informed by a friend at Canton that the grass cloth of China was made from the fibres of this plant. In the year 1810 three bales of this Caloee fibre were sent to the India House, having been produced in the Botanic Garden at Calcutta. In December, 1811, one of these bales was sent to Messrs. Sharpe, then of Mark Lane. On the 4th Feb., 1812, they reported, that having brought the Caloee fibre to the state of Hemp for the use of cordage, a thread was spun, of the size of those spun in the Royal Rope-yards, which bore 252 lb., whereas the weight required to be borne in the Royal yards by Russian Hemp of the same size is only 82 lb. Other bales were subsequently received on several occasions, and in 1815 one was sent to Dr. Taylor, of the Society of Arts. The Society voted one of their medals to Capt. J. Cotton, of the East India Company, for his efforts in introducing this fibre into England. A bale of this fibre having been given to Mr. Lee, he observed that the fibre appeared to have been peeled off the plant while it was in a green state, and that this rendered it of less value. He conceived that it would be more easily cleaned if the plants were taken dry, without water-steeping or dew-retting. But when cleaned the fibre is strong, soft, and fine, and of more value than the best Russian Hemp. Two more bales were sent in December, 1814, to the Court of Directors by Dr. F. Buchanan, who had succeeded Dr. Roxburgh, with a letter, dated 16th December, 1814, in which he mentions that the Caloee plant is by no means a new species of Urtica, as Dr. Roxburgh supposed. It is the *Urtica nivea* of Willdenow and the *Ramium majus* of Rumphius." Rumphius observes, respecting the separation of the fibre, that it is more easily effected when the stem is in a dry state: "Caulium cortex tenuis est, inque fila findi potest præsertim in siccata planta;" and, again, "Caules autem isti sponte siccari debent tum facile separatur ipsorum cortex, qui in fila commode findi potest." "Alii adultos sumunt viridis herbæ caules, ipsorumque deglubunt exteriorem viridem, et succosum ad interiorem album qui ligno incumbit, quum in tenuissima findunt fila." (l. c., p. 214.) He further says, "It is diligently cultivated in all places inhabited by the Orang Badjos." ('Flora Amboin.,' v, to. 79, fig. 1.) and that "the plant under the name of Kankora has from time immemorial been cultivated in the Dinagpur and Rongypur districts of Bengal, and its fibres used for a few purposes that require great strength with little thickness, but the expense of cleaning the fibrous part has always prevented it from coming into general use." He therefore proposed discontinuing the cultivation. But if we refer to Roxburgh's 'Flora Indica,' iii, p. 591, then, certainly, in manuscript, we find that he was quite aware of his plant being

identical with that of Rumphius, though it appeared to him to differ from the description of the *U. nivea* of Willdenow. We observe that it was considered at that time that Indian fibres could never be introduced into Britain, as the freight could not be calculated on at less than £12 per ton, of fifty cubic feet. Now about 30,000 tons weight are imported. The Court, in a dispatch dated 8th May, 1816, in sending out some of Lee's machines and referring to this plant, observed: "The Caloee is a plant that appears to be comparatively in its infancy as to cultivation, but being a perennial, the expense attending other fibrous plants is not incurred; and if this process, instead of scraping and peeling, will furnish its fibre clear of its mucilaginous coat, you may rejoice in the acquisition of the invention: for we have found the fibre stronger than Russian Hemp of the best description: and by some further improvements of this person's invention it has been brought to a thread, preferable to the best material in Europe for Brussels lace." So that at that time one of the most important applications of this fibre was well known. The above very valuable plant *Rheea* of Assam; *Kunkhoora* of Rungpore, (*Urtica tenacissima.*) was for some time lost sight of. But attention having been directed, by Major Jenkins and the officers employed with him in Assam, to the fibrous plants of that valley, Major Hannay and Capt. Dalton were induced to cultivate a small portion of land with this fibre; and the former having prepared ten bales of a fibre which he called Rheea fibre, and five bales of another called Bon Rheea, and eleven of these having been sent to the Court of Directors of the East India Company, were referred to Dr. Royle to report upon. This he did to the following effect: "The Rheea fibre forwarded by the Government of Bengal as the produce of Assam in order that its properties and value may be correctly ascertained in Britain appeared to him likely to prove one of the most valuble products of India, for in strength it far exceeds the best Hemp, and in fineness it rivals superior kinds of Flax. Its culture is well known to the natives of Assam as well as of the districts of Rungpore, of Dinagepore, also in Burma, Siam, and of other Eastern countries and islands. It can now be produced and sold with profit at as cheap a rate as Russian Hemp. This opinion is probably at present incorrect, from Dr. Royle misunderstanding a passage in Major Hannay's report. If any machine could be invented for facilitating the separation of the fibre from the woody part of the stalks, the Rheea would speedily undersell all other fibres, as from four to five crops of fibre can be obtained from the same plants within the year. "The Rheea fibre, though a new import from Assam, is well known under another name, being identical with the highly valued article of commerce, known by the

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name of China-grass, the Chu-Má of the Chinese, and from which the famed Grass-cloth of China is manufactured. The proof is very complete of the identity of the plants from which these two differently named fibres are obtained. One of the educated Chinese introduced into Upper Assam on the establishment of the Tea Manufactory in that valley, recognised the *Rheea* as identical with the *Chai Má* of his own country. 'I went, says Major Hannay, this morning to the old Chinese Doctor of Medicine here, with a good grass cloth handkerchief in my hand; on seeing which he immediately said it was the *Hengchung Hapo* of China, and identical with the *Rheea* of the Doms of Upper Assam, the stuff being whitened by bleaching. I can trust to what this old man says, as he is an intelligent man and a great reader: his account was corroborated by another intelligent Chinese, formerly one of the Government head teamakers.' The Rheea of Assam had been ascertained by botanists to be the same plant as the *Urtica tenacissima* of Dr. Roxburgh, who, half a century ago, was informed by a friend at Canton that the plant which he had obtained as the *Caloee* of Sumatra, and to which he had given the above botanical name, was that from which the Chinese grass cloth was made. Lately, Dr. Macgowan, settled at Ningpo, sent specimens of the Chû Mâ to Calcutta. These Dr. Falconer found to be the same plant as the *Boehmeria nivea* of botanists, described under the name of *Urtica tenacissima* by Roxburgh and which will be found under its proper head. He says: 'The specimens from China correspond exactly with those grown in the Botanic Garden, with which I have compared them.' (May 5, 1849.) Sir W. Hooker has also identified these two plants as being identical, and has described the former as yielding what is called *China-grass*. Further, manufacturers in Britain have found the two fibres to be the same for all practical purposes." Mr. Sangster, who has paid much attention to this fibre, writes, that "our engineer, who prepared all our China-grass, is satisfied that your samples are equal to the best sorts from China." So Mr. Marshall, of Leeds, who is the largest consumer of China grass in this country, is satisfied that the Assam is the same for all practical purposes. "The identity of the Rheea fibre with China-grass, or the Chû Má, and consequently its value having been proved, it is important to find that it is a plant very widely diffused in the East. Dr. M'Gowan writes from Ningpo ('Agri-Hortic. Soc., vi, p. 241), that 'the Chû Ma is found at the base of the hills from Cochin China to the Yellow River, and from Chusan to the farthest west that researches can for the present extend.' We find that it is known in Celebes and Borneo, cultivated in Java and Sumatra, and many other of the islands of the East, where it seems to be known chiefly by the names *Rami* and *Caloee*. It is known in Siam and at Singapore; the string made of it is called

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tali rami, and the fishing nets manufactured with it are conspicuous for their elegance and strength. Col. Burney, in 1836, obtained it from Pivela and Youkyouk, in the Shan province of Ava, where it is called *Pan*, and where Mr. Landars afterwards found it. Plants sent by the Colonel to Moulmein and to Tavoy succeeded well, but required much water. It has long been known as cultivated by fishermen in the Bengal districts of Rungpore and of Dinagepore, where it is called *Kunkhoora*. Col. Jenkins first sent it from Cochin in 1836; and it is found in different parts of Assam, where it is called *Rheea*, and from whence specimens have frequently been sent to the Agri-Hortic. Society of Calcutta, and whose 'Journal,' vols. iii to viii, contain numerous notices respecting it. In Assam, Rungpore, and Dinagepore, this plant seems to be very generally cultivated, though only in small quantities by the Dooms or fishermen, near their huts. The climate of Assam, and of these districts, being moist, is very suitable to the plant. Manure is useful, moisture essential for quick growth, as well as shade and protection from storms to allow it to grow to the height of eight feet, from which a six-feet fibre may be extracted. Hence it is most common in the districts along the foot of hills. It is grown from the separated roots, and may be cut down several times, so that four or five crops may easily be obtained during the year, and the aggregate produce of an acre of ground be about twelve maunds. The different crops vary in strength and fineness. All the officers of the district state that the culture is perfectly understood, and though cultivated only in small quantities by the fishermen for their own use, it is susceptible of easy and rapid extension, if the cultivators had any inducement to grow it. The expense seems to be about five rupees a maund; for Major Hannay, referring to the fact of £20 a ton having been offered for any quantity in Calcutta, observes that, as 'it costs at least five rupees per maund, you will see that it can scarce be sent to Calcutta at the price offered.' He says, also, that if any cheaper method of separation from the stalk could be discovered it would undersell all other fibres." From the mode of expression adopted as above by Major Hannay, Dr. Royle was led to think that the whole expense for the production of the fibre was five rupees a maund. But in another place he says, the expenses of cultivation are ten rupees a maund. Capt. Jenkins ('Journ. Agri-Hort. Soc.,' viii, p. 379) also says, the present cost is ten rupees a maund; but as the plant can be grown with the least possible trouble, and the preparation of the Flax from it is a very facile process, he states, that "there is no doubt the Flax can be grown at half this price." The dearness is no doubt owing partly to only small quantities being produced for the use of the fishermen, who do not for their purposes require very large quantities. Mr. Henley, in a letter in the 'Journ. Agri-Hort. Society,' says, that "it must necessarily be a much more expensive article than either Sunn or Jute, inasmuch as a labourer can prepare one and a half to two maunds of Jute per day's work, whilst of the *Kunchoora* he cannot manufacture more than as many seers." It is evident that some improved method of separation is the most essential requisite. "Various attempts have been made to make this fibre more generally known, and to bring it into demand as an article of commerce. It has frequently been sent by Col. Jenkins, and the officers employed in Assam, to the Agri-Horticultural Society of Calcutta. Mr. Henley, and others, have sent small quantities to the markets of England, but without attracting much attention, or selling it at remunerative prices. Samples were sent by Major Hannay, Capt Reynolds, Baboos Deena Nath, and Lokenath, to the Exhibition of 1851, when honorable mention was made of their exertions. A Prize Medal was, however, awarded for some beautifully white and silky looking fibre sent by the Singapore Committee, from M. Weber, of Java, as the produce of a plant which he called *Boehmeria candicans*, and also *Linum usitatissimum* on the same label. The former is probably only another name for this plant, as it is said to be the *Rami* or *Ramee* of the Malays. The plant is cultivated by the Dutch in Java, and its fibre has been introduced into Holland, and gold medals awarded to Messrs. Meerburg, of Leyden, for specimens of sail-cloth, ropes, cables, &c., and also for some finer kinds of cloth and table-cloths. The plant producing this fibre was called *Boehmeria candicans*, and also *B. utilis*, by Professor Blume, but it is probably only a variety of *B. nivea*, or perhaps a nearly allied species. Major Hannay who has long paid attention to this fibre, and to whom much praise is due, was induced to grow and prepare the present samples together with some grown by Capt. Dalton (six bales of Don Rheea and five of Bon Rheea), in consequence of applications from England by merchants who, however, did not offer a sum (£20 a ton at Calcutta) which would pay for the expenses of culture and preparation. Since the sample arrived in Britain, Dr. Royle endeavoured to make the fibre known, and its value appreciated. Specimens of both the Rheea and the Wild Rheea were sent to the Society of Arts, and an account of them published in their 'Journal' for the 9th of December, 1853. Specimens were also sent to Mr. Marshall, of Leeds; likewise to the Commercial Association of Manchester, to Belfast, to Paris, and to the Chamber of Commerce at Dundee. Its fibres have been shown to, and specimens given to numerous individuals well acquainted with such subjects. The letter of Mr. Marshall is most satisfactory, as he is him

self a spinner of the finest yarns, and the largest if not the only consumer of China grass:" Dear Sir,—We have examined the samples you sent to us, and I now give you the result. No. 1. Cultivated Rheea.—This is evidently just the same fibre we are using, imported from China, under the name of China-grass. It is not so fine in quality as the best descriptions we obtain from China, which are still longer than this sample, and of a green colour. We should class it with the middle or coarse quality, and estimate its value, delivered in England, at £48 to £50 per ton. It appears to be clean and regular in colour, and free from dead fibres, which are often a great detriment; and would be an useful quality of fibre, of which we could take a regular supply. No. 2. Rheea fibre, sent to the Exhibition of 1851, is the same as No. 1, but coarser in quality. No. 3. Fibre from Java, we think this is the Rheea fibre prepared, but can hardly judge from so small a sample: it seems to be a good, clean fibre, and worth further inquiry. No. 4. Wild Rheea fibre, is very coarse; only fit for rope-making. I hope this report will be satisfactory to you. It would certainly be an important advantage to us, as consumers of China-grass or Rheea fibre, to be able to obtain a supply from Assam. If it could be supplied at lower rates than those I have mentioned, that would, of course, much encourage the consumption of it in this country. I have stated what we consider the *full* value at present in our market here. At present there is not much consumed in England, but a good supply from a nearer market than China might enlarge the demand. I am, sir, very truly, J. G. MARSHALL. Leeds; *Dec.* 10, 1853.—Major Hannay, in one of his papers to the Agri-Horticultural Society of Calcutta, mentions that some specimens of his Rheea fibre having been sent direct to Leeds were valued at £50 a ton. Mr. Sangster, of the firm of Wright and Co., to whom one of the Prize Medals was awarded, has no doubt of the identity of the Assam produce with that of China, and therefore of its being of equal value. Mr. Dickson, who has had much experience with different fibres and the finer kinds of Flax, pronounced it to be a splendid fibre. Mr. Norrie, of Dundee, who has also examined many of these Indian fibres, finds it a very superior article, which can be brought to different qualities of fineness to suit the market it is sent to. It can be prepared to a quality suitable for the Dundee market, and also to a much finer quality, suitable for the markets requiring it finer; but says it must be kept soft and silky, which no mere mechanical means will do. These are very different opinions from one given a few years ago by a practical man, who stated that it might answer for carpet warps. Within the last years many have applied to Dr. Royle for information respecting this fibre, and how it could be obtained. One house in Belfast applied through the Secretary of the Commercial Association of Manchester, for fifty tons of the fibre, and one gentleman, who paid attention to China-grass, and has carefully examined the Rheea fibre of Assam, addressed a letter to the Court of Directors of the East India Company, stating that he wished to obtain it to the extent of fifty tons monthly for a Continental house. As to the utility of The Rheea Fibres for Rope-making,—though Dr. Royle has no doubt that when the peculiarities of the Rheea fibre, or China-grass, are more generally known, its excellent qualities will be fully appreciated, as it will come into more general use as a rival to the finer kinds of Flax; yet at present there are, he believes, but few spinners who thoroughly understand its management, or have machinery to do it justice. It is not likely therefore to realise its full value in the market at present. Hence it was desirable to have its strength tested as a substitute for Hemp, as it might not all be required to supply the place of Flax. Mr. W. Cotton had a bale of Rheea fibre, and also one of the Wild Rheea, twisted into five-inch rope, and prepared by the warm register in Messrs. Huddart's rope-manufactory at Limehouse; the strength of each was carefully tried and compared with similar rope made of Russian Hemp. The experiments were most satisfactory, neither rope breaking until the Rheea fibre bore above nine tons weight, and the Wild Rheea, within a few pounds, nearly as much. Though it is to be hoped that the Rheea fibre will prove too valuable to be only employed for rope-making, '*Bon Rheea or Jungle Rheea*, the Wild Rheea, on the contrary, is well calculated, and was indeed sent, for this purpose. No information has been sent respecting the plant yielding it, but it is no doubt one of the Nettle tribe, and from being called Bon or Jungle Rheea, it has been inferred that it is the Rheea in a wild state. But though we have no proof of this, it is satisfactory to find that Major Hannay describes it as 'uncultivated, but very common in all parts of the province:' and again, 'common in most of our forests; by proper management, any quantity of young shoots can be obtained, and as the divided roots afford numerous shoots, and the plant can be propagated by slips as well as by seed, its cultivation for its fibre might be carried on with facility.' He further says, 'it is cultivated largely by the Hill tribes on the west of Yeunan, and by the Singpoos and Dhoanncas of our own north-eastern frontier, to a small extent only for a coarse cloth, but chiefly for nets.' It is recognised by the Nepaulese as the Leepeeah of Nepal. Capt. A. Thompson, of the firm of Thompson and Co., rope-makers, of Calcutta, says of it, that it is all that can be desired for either canvas or lines, and only requires to be known to be generally used for that purpose." "Having ascertained in the most satisfactory manner that the fibres in ques-

tion are possessed of the requisite degree of strength, and the Rheea fibre of fineness in addition, the next point to determine is how to make their good qualities so known in the market, that the fibres may not be condemned as new things and of no value. Dr. Royle has been informed by the best judges, that, having taken the best means to determine the real value of the articles, they must next be sent into the market for three or four years in sufficient quantities to attract the notice of the best manufacturers; and for this purpose from ten to twenty tons annually would be sufficient: others say twice a year, but this in the case of India would be needlessly troublesome. "The next difficulty is to induce the natives of the districts containing these valuable fibres to extend their ordinary cultivation of the Rheea or of the Hemp, or to collect the Wild Rheea in increased quantities, and to prepare them all as carefully as possible for the English market. The officiating Commissioner of Revenue in Assam recommends that, as the culture of the Rheea fibre is sufficiently well understood, 'the best way to encourage its extension would be to secure to the ryots a sure market at remunerating prices.' Capt. Dalton, Collector of Debrooghur, states, 'that the best method would be for Government to offer a premium of so much a ton on all that is produced for three or four years.' Both recommendations might be united in one, if the officers who take so zealous an interest in the improvement of their districts were authorised to purchase (unless they find individuals willing to do so) from ten to twenty tons of these fibres in their respective districts, taking care that they were as carefully and cleanly prepared as possible, and as closely resembling as possible the specimens of Petersburgh Hemp which Mr. W. Cotton has been good enough to send for transmission to India. The improved appearance of the Rheea fibre sent by Major Hannay is owing to specimens sent out to him by Mr. W. Sangster. I would include in this direction for the Rheea fibre also the districts of Rungpore and of Dinagepore, where the same fibre is cultivated under the name of Kunkhoora, and where labour is more abundant than in Assam." In conformity to the orders of the Court of Directors, directions were sent by the Governor-General of India, with printed copies of the papers, to the Commissioners in Assam and Rajeshaye, and to Singapore. Colonel Jenkins, in his reply, dated 2d August, 1854, reports that Capt. Dalton, Collector of Luckimpore, did not expect to be able to obtain more than two or three tons, as the cultivation of the Rheea is at present confined to a few villages of fishermen, and that Major Hannay some time since abandoned the experimental cultivation which he had commenced, on account of the low prices then offered, which would not pay the cultivators.

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But it is stated—"As the large introduction of this article amongst our articles of commerce is likely to be a matter of great importance, I would beg to recommend that Government should buy up any quantity, up to ten tons, procurable each season for the next three years." This has been sanctioned by the Indian Government. Capt. Dalton writes: "The lowest price at which it is likely to be procurable is six annas a seer, or about £42 sterling a ton. When it is more extensively cultivated, and the best method of preparation thoroughly understood, so that, as in the reeling of silk, women and children may be employed as well as men, it ought not to cost more than four annas a seer, or £28 a ton." He continues: "The process described in Dr. Royle's paper, quoting from Major Hannay, is that commonly used by the natives of the province. Major Hannay practised a different method, which he calls the Indo-Chinese, which is not only the most cleansing, but also the cheapest." (*v. p.* 363.) Major Hannay, besides describing this method as below, states that he had been requested to forward to England some of the Rheea as stripped from the stalk, and without any further scraping or cleaning. But he is of opinion that if the Rheea is not immediately deprived of its gummy and mucilaginous matter, it would most probably rot before reaching England. This, however, would only be the case if it were not perfectly dry, and this may be difficult to effect in a moist climate like that of Assam. "A cleaning factory established in the Rheea-growing districts, and capital employed to encourage the ryots to cultivate, would be the most likely means to cheapen the article in the market and increase its subsequent consumption." Ten bales of the Dom Rheea, had however, been sent off to this country. Dr. Oxley, in reply to the requisition for some of the fibre from Singapore, writes (19th July 1854) that the *Ramee* is indigenous all over the Malayan Archipelago; it grows freely at Singapore, but is not cultivated or planted to any extent, and therefore it could not be obtained in any quantity, though it is used by the Malays as twine, their common name for which is "*tali ramee*." They make their fishing lines of it, and prefer their own lines to any of European manufacture. The refuse in preparing the fibre is admirably adapted for making paper, and is used for this purpose in Java. As this fibre is remarkable for fineness, flexibility, and strength, it seems well worthy of cultivation, especially if any cheaper method of cleaning can be devised, as it is an object of attention in Java, whence it is imported into Holland, and various goods made of it, as we have already stated, by the Messrs. Meerburg, at Leyden. The Ramee, that is, the *Rheea* of Assam, yielding four or five cuttings in the year, amounting to about twelve maunds of valuable fibre, must, therefore, be well worth cultivation in many localities from Assam to Arra-

can, also in Pegu, and down to Singapore, and perhaps also on the Malabar Coast. We therefore republish modes of cultivation and of preparation. The first, from Chinese works, is very similar to the directions from similar sources given by Dr. M'Gowan, of Ningpo (*v.* 'Journ. Agri-Hortic. Soc.,' vol. vi, p. 209); while the second is that which Major Hannay so successfully practises in Assam. The following extract on the Chinese cultivation of the Tchou-ma, or Chinese Flax (Urtica nivea) is translated from the Chinese, by M. Stanislas Julien, and retranslated from the French. It possesses much interest, in addition to what it derives from its Chinese origin, in consequence of its being not impossible that attempts may be made to introduce the cultivation of Tchou-ma into Great Britain. Its delicate fibre forms the Flax from which the finest of the Chinese linen fabrics are manufactured. Amongst the products of Chinese industry which were exhibited a few years ago in the Rue St. Laurent, were some pieces of a fine silky tissue, called by the Chinese *Hia-pou* or summer cloth, and made of the fibres of the plant called by botanists *Urtica nivea*. Some seeds of this plant were sent from Canton in 1843, by M. Hebert, but they never arrived; and I was at that time told that they would probably not grow in our climate. I am sorry that I was not then able to translate the papers which I now lay before the public. After reading the following account of the cultivation of the plant in question, it will be readily seen, by those who are competent judges of the matter, that the supposed want of success was owing to nothing but ignorance of the care and delicate treatment which are necessary for the culture of the plant now before us. The way in which its valuable threads are peeled, steeped, and bleached, is, as will be seen, described by the Chinese authors, with a precision and minuteness amply sufficient to enable any person to pursue this new branch of industry in our own country. Until a new supply of seeds is received from China, roots or young plants of the *Urtica nivea* may be obtained from the Garden of Plants, and be propagated in the way mentioned below; and thus may a substance be given to our manufacturers, which will, in their hands, be made into a tissue as soft as silk, and as fine as, but stronger and tougher than, the best French cambric.

Cultivation of the Tchou-ma (*Uritica nivea*). ('Imperial Treatise of Chinese Agriculture,' lib. xxviii, fol. 3.) For the purpose of sowing the *tchou-ma* in the third or fourth month, a light sandy soil is preferred. The seeds are sown in a garden, or where there is no garden, in a piece of ground near a river or a well. The ground is dug once or twice, then beds one foot broad, and four feet long are made; and after that the earth is again dug. The ground is then pressed down, either with the foot or the back of a spade. When it is a little firm, its surface is raked smooth. The next night the beds are watered, and on the following morning the earth is loosened with a small-toothed rake, and then again levelled. After that half a *ching* (four pints and a half) of moist earth and a *ho* (one pint) of seeds are taken and well mixed together. One *ho* of seeds is enough for six or seven beds. After having sown the seeds it is not necessary that they should be covered with earth; indeed, if that were done, they would not germinate. The next thing to be done is to procure four sticks, sharp at one end, and to place them in the ground in a slanting position, two on one side of the bed and two on the opposite side; they are for the purpose of supporting a sort of little roof two or three feet high, and covered with a thin mat. In the fifth or sixth month, when the rays of the sun are powerful, this light mat is covered with a thick layer of straw. If this precaution were not adopted, the young plants would be destroyed by the heat. Before the seed begins to germinate, or when the young leaves first appear, the beds must not be watered. By means of a broom dipped in water the roof of matting is wetted so as to keep the ground underneath moist At night the roof is removed in order that the young plants may catch the dew. As soon as the first leaves have appeared, if parasitical plants appear they must be immediately pulled up. When the plant is an inch or two high, the roof may be laid aside. If the earth is rather dry, it must be slightly moistened to the depth of about three inches. A stiffer soil is now chosen and thrown into beds, to which the young plants are to be transferred. The following night the first beds, in which the young plants are, are to be watered, the next morning the new beds are to be watered also. The young plants are then dug up with a spade, care being taken to keep a small ball of earth round their roots, and are picked out at a distance of four inches the one from the other. The ground is often hoed. At the end of three or five days the earth must be watered, and again at the end of ten days, fifteen days, and twenty days. After the tenth month the plants must be covered with a foot of fresh horse, ass, or cow dung. (Extract from the General Treatise on Agriculture, intituled 'Nontching-tsiouen-chou.') When the *tchou-ma* is cultivated for the first time it is raised from seed. The roots of the seedling plants give of themselves new shoots. At the end of a few years the roots cross each other and intertwine, when the stems must be separated and replanted. At the present day it is very common in the countries of An-king and Kien-ning, to disentangle the roots with a knife, and to replant them. Those who cannot procure seeds follow the plan adopted for obtaining young mulberry trees from layers. This plan is a very quick one. In those countries, however, where there are no roots of the *tchou-ma*,

and where it is not easy to procure them from other places, the seed is had recourse to. As soon as the young plants are a few inches high they are watered with a mixture of equal quantities of water and liquid manure. Immediately after the stems are cut the ground must be watered, and this ought to be done at night or on a cloudy day; for if the plants were watered in the sunshine, they would rot. Great care must be taken not to make use of pig's dung. The *tchou-ma* may be planted every month; but it is necessary that *the ground be moist. Transplantation and Propagation of the Tchou-ma.* ('Imperial Treatise on Agriculture,' lib. lxxviii, fol. 5.) When the tufts of the *Tchou-ma* are strong enough, the earth around is dug, and new stocks are detached and transplanted elsewhere. The principal stock then grows more vigorously. At the end of four or five years, the old stock becoming excessively strong, they are divided and replanted in other beds. Some persons are satisfied with bending the long stems down and obtaining layers in the ordinary way. When a bed becomes too crowded, another must be formed, and then another. In this way the plants may be propagated to any extent. A stiff soil that has been well worked in autumn is chosen and manured with fine muck. In the following spring the plants are transplanted. The best time for carrying on this operation is when vegetation commences; the next best is when the new shoots appear; and the worst is when the stems have attained a considerable size. The new plants are placed a foot and a half from each other, and when they have been well surrounded with earth they are watered. In summer as well as in autumn advantage must be taken of the time when the earth has just been moistened by rain. The offsets can be transplanted to places near at hand; but it is essential to have a ball of earth around each plant. To propagate the *tchou-ma*, portions of its roots two or three inches long are detached by a knife, and are placed by twos and threes in little trenches that are about a foot and a half from each other. The roots are then surrounded with good earth and watered; the watering is renewed three or five days afterwards. When the new stems have attained a certain height, the earth must be often hoed. If the earth is dry it must be watered. If the plants have to be carried to a distance, their roots ought to be surrounded by the soil in which they have been growing, well enveloped in leaves of the reed. They are placed, in addition to this, in a mat folded so as to exclude them from air and light. They may then be carried without danger to a distance of many hundred miles. The first year, when the plants are a foot high, they are gathered; they are gathered again in the second year. The fibres of the cut stems are fit for spinning. In the tenth month of every year, before cutting the offsets which pass beyond the roots, the earth is covered with a thick layer of cow or horse dung. In the second month the manure is raked off, in order to allow the new plants to come up freely. At the end of three years the roots become excessively strong. If part of the plants which come up in close tufts were not removed, the others would be smothered. *Gathering the tchou-ma*—The *tchou-ma* may be gathered three times a year. When the stems are cut, the little shoots springing from the rootstock should be about half an inch high. As soon as the large stems are cut, the suckers spring up with more vigour, and soon furnish a second crop. If the young shoots be too long, the large stems ought not to be cut; but the ground shoots would not become vigorous, and would be prejudical to the development of the larger stems. The first crop is got in towards the commencement of the fifth month; the second in the middle of the sixth, or at the beginning of the seventh month; and the third and last in the middle of the eighth or the beginning of the ninth month. The stems of the second crop grow much faster than the others, and are by far the best. After the crop, the stocks of *tchou-ma* are covered with manure and immediately watered. *Peeling the Fibres of the Tchou-ma*—When the stems are all got in they are split longitudinally with knives of iron or of bamboo. The bark is first removed; then the lower layer (which is white, and covered with a shrivelled pellicle which comes off by itself) is scraped off with a knife. The interior fibres are then seen; they are to be removed and softened in boiling water. If the *tchou-ma* be peeled in winter, the stems must be previously steeped in tepid water in order that they may be the more easily split. The first layer of *tchou-ma* is coarse and hard, and is only good for making common materials; the second a little more supple and fine; the third, which is the best, is used for making extremely fine light articles. *Steeping and Bleaching the Tchou-ma*—The stems are tied up in little sheaves and placed on the roof of a house, in order that they may be moistened by the dew at night, and dried again by the sun in the day. In the course of from five to seven days they become perfectly white. If the weather be cloudy or rainy the stems are placed under cover in a current of air. If they are wetted by the rain they immediately turn black. Another author says, after peeling the fibres they are tied in skeins, arranged in a circle, and steeped for a night in a pan of water; they are then spun on a wheel. This done, they are again steeped in water containing the ashes of burnt mulberry wood. Having taken them from the pans they are divided into packets of 5 oz. weight each: the packets are placed for a night in a tub of a mixture consisting of a cup or pure water and an equal quantity of powdered chalk to each packet.

The next day the chalk is got rid of, and the fibres are boiled in water containing straw ashes, by which process they become white and supple. Being now dried in the sun they are again boiled in pnre water; they are then stirred about in more water, which finishes the cleansing process, and lastly they are dried in the sun. This done, the fibres are joined end to end on the wheel so as to make long threads, which form the warp and the woof, and are manufactured into stuff in the usual way. Another author says, after having spun the fibres of *tchou-ma*, they are boiled in lime water, and when cool, carefully washed in pure water. Then by means of a bamboo sieve, placed on the surface of the water, they are spread out in equal layers in order that they may be as it were half wetted below, and half dried above. As night approaches, they are taken out, strained and dried: the same process is repeated the next and following days, until the threads are perfectly white. They are then, but not before, fit for being made up. According to another process, the *tchou-ma* is first soaked, then spun and made up, instead of being soaked after the spinning. Other persons again take the fresh fibres, expose them at night to the dew, and in the day to the sun; then spin and weave, bleaching last of all. Others, lastly, following those who employ the plant *Ko*, cut the stems, soften the fibres in the steam of boiling water, then weave, and do not bleach at all. Fibres thus prepared give a material that is more supple and fibrous. *Mode of gathering the best seeds of Tchou-ma*—When seeds of *tchou-ma* are wanted for the purpose of sowing, those which are found on the main shoots are to be preferred. In the ninth month, after the period *choang-kiang* (after the 2d of October), the seeds are collected and dried in the sun; they are then mixed with damp sand, and put in a bamboo basket, carefully covered with straw. This precaution is needed, for, if the seeds are frozen, they will not grow. The seeds of the lateral shoots are not fit for sowing. Before sowing, the seeds are thrown into water, and those that sink are used, while the others are of no use. The seeds are sown before the first half of the first month, The best seeds are those which are spotted black. After they are sown they are covered with ashes. If they are sown thick the plants coming from them will be weak and sickly; they will be strong and healthy, on the contrary, if the seeds are thinly sown. As soon as the leaves appear the plants are watered with liquid mauure. In the seventh month the seeds are collected, put on canvas, and hung in a strong current of air; this aids and hastens germination. ('Journal of the Horticultural Society of London,' vol.iv, part iv.) The following is the INDO-CHINESE METHOD *for preparing the Rheea Fibre, as practised in Upper Assam, By Major Haunay. To cut the Rheea*,—The Rheea is fit for cutting when the stems become of a brown colour for about six inches upwards from the root. Hold the top of the stalk in the left hand, and with the right hand strip off the leaves by passing it quickly down to the root, and cut off with a sharp knife, taking care to be above the hairy network of the roots, as these should be covered up with manure immediately to ensure another crop quickly; lop off the tender top to the stalk, and make the reeds up into bundles of 200 or 250, if the stripping process is not to be carried on in the field or garden; but it is best to strip off the bark and fibre on the spot, as the burnt ashes of the stem afford a good dressing for the roots along with dry cow dung. *To strip off the Bark and Fibre*,—The operator holds the stalk in both hands nearly in the middle, and pressing the forefinger and thumb of both hands firmly, gives it a peculiar twist, the inner pith is broken through; and then passing the fingers of his right and left hand rapidly, alternately, towards each end, the bark and fibre is completely separated from the stalk, in two strands. *Making up into Bundles*,—The strands of bark and fibre are now made up into bundles of convenient size, tied at the smaller end with a shred of fibre, and put into clean water for a few hours, which he thinks deprives the plant of its tannin or colouring matter, the water becoming quite red in a short time. *Cleaning Process*,—The cleaning process is as follows: The bundles are put on a hook fastened in a post, by means of the tie at the smaller end, at a convenient height for the the operator, who takes each strand separately of the larger end in his left hand, passes the thumb of his right hand quickly along the inner side, by which operation the outer bark is completely separated from the fibre, and the riband of fibre is then thoroughly cleaned by two or three scrapings with a small knife. This completes the operation, with some loss, however, say one fifth, and if quickly dried in the sun it might at once be made up for exportation; but the appearance of the fibre is much improved by exposure (immediately after cleaning) on the grass to a night's heavy dew, in September or October, or a shower of rain during the rainy season. After drying, the colour improves, and there is no risk from mildew on the voyage homewards.—*Royle Fib. Pl. page* 344.

(2583) CHINA ROOT, SMILAX CHINA.

Khusb-sinie, ARAB,	Chob-cheenee, GUZ. and HIND.
Sook-china, BENG.	Esquina, PORT.
China-alla, CYNG.	Raiz-china, Cocolmeca, SP.
China-wortel, DUT.	Paringay-puttay, TAM.
Squine, Esquine, FR.	
China-worzel, GER.	

A large tuberose knotty root, of a dark reddish brown colour on the outside, and reddish white within; produced by the Smilax China. It is produced in China and the West Indies; that from the former place is considered the best. It

was formerly employed in medicine, but has of late years been neglected by European practitioners. China root is imported into India from China, and small quantities are occasionally exported to England and the Persian Gulf.—*Faulkner.* It may be employed in the preparation of the simple and compound decoctions of Sarsaparilla, when sarsaparilla is not obtainable. —*O'Sh. Beng. Phar. p.* 279. The native practitioners of India, like the Japanese, supposed this root to have considerable virtue in old venereal cases, particularly in what the Tamools call "Mayghum Vaivoo," a complaint in which the limbs are stiff and contracted. What is found in the bazars of the Peninsula is brought from China, where it grows in the province of Onansi, in great abundance; the plant however is said to be common in Bengal. The Abbe Richon, in his "voyage to Madagascar and the East Indies," tells us that the Chinese often eat this substance instead of rice, and that it contributes to make them lusty.—*Ainslie's Mat. Med. p.* 10.

(2584) CHINA-WARE, or porcelain, once so extensively exported from China, is now almost confined to the commonest and cheapest descriptions of stone-ware, by far the greatest portion of which goes to India The patterns made by the Chinese seldom change, while the European manufacturers both consult and lead the taste and fancy of their customers, and it is owing to this, in some degree, that the demand for the Chinese fine ware has ceased, though the Mongols, Siamese, Hindus, and islanders in the Archipelago are still chiefly supplied from China.—*Morrison.* When the productions of the East were first carried round the Cape of Good Hope, the porcelain of China bore an enormous price, and the profits of manufacturing it having been ascertained, the European nations began to make it, and soon out-rivaled the Chinese. China-ware is sold in sets, consisting of a table set of 270 pieces, at from 12 to 75 taels; a breakfast set of 20 pieces, at three taels; a long tea set of 101 pieces, at 11 to 13 taels; and a short tea set of 46 pieces, at from 5 to 6 taels. Flower-pots, vases, jars, fruit baskets, table ornaments, &c., are made of porcelain to any pattern by the Chinese. It is now sent to Bombay and other parts of India, and also to the United States.—*Compendium.*

(2585) CHINTZ.

Sits, Dut.	Chint, Pers.
Indiennes, Fr.	Chitas, Port.
Zitze, Gez.	Siz, Rus.
Chint, Gus. Hind.	Chites, Zaraza, Sp.
Indiane, It.	

A peculiar style of fast-printed calicos, of many different colours impressed upon a white, or light coloured ground.—*Faulkner.* In the Madras Presidency, the principal sites of this manufacture are the towns of Masulipatam, Arnee and Sydapet. Those of Masulipatam are called "Kalankauree," literally "firm colour:" they are of various hues. Each piece is 2 cubits in breadth, and 12 in length, priced at from 4 to 12 Rupees each, and are used for under garments by Hindoo females. Those of Arnee and Sydapet are ordinary, and 8 by 2 cubits, sold at 1 to 3 Rupees each; they are used for pillow covers and other purposes, as well as the undergarments of humbler native women At the Madras Exhibition of 1855, the Chintzes from Masulipatam were of great variety as to color, size, quality of the dye and price: the whole collection was interesting, very well colored and the dyes good, and there was a Palempore by Aga Ismail of Masulipatam embroidered in gold of a chaste and elegant pattern —*M. E. J. R.*

(2586) CHIOCOCCA (from χιων and Κόκκος), a genus of plants belonging to the natural order *Cinchonaceæ. Chiococca Javanica*, the Java Snow-Berry, is a parasitical shrub, with oblong lanceolate leaves, acuminated at both ends, glabrous, velvety, and shining above; corymbs terminal, trichotomous. This native of Java, is found on the mountains, upon trees.—*Eng. Cyc. p.* 1031.

(2587) CHIRETTA, CREYAT ROOT.

Kalapnath, Kalamegh, Muha tita, Beng.	Creyatta, Guz. & Hind.
Kiriat, Can.	Kairata, Sans.
Attadie, Cyng.	Kiriat, Tam.
Kreat, Duk.	Nella Vemoo, Tel.
Create, Fr.	*Faulkner.*

Chiretta, or Creat, or Chirayta, for all three pronunciations are in use, is closely allied in its medicinal properties to gentian for which it is a perfect substitute. Like gentian, it promotes digestion, improves the appetite, and gives a tone to the system, without producing much stimulant effect, or causing constipation. It contains a resin and yellow bitter matter, on which the activity of the plant depends. Its use is admissible in all inflammatory states of the intestinal canal and in febrile diseases. The Chiretta of the bazars, however, is the produce of the several following plants.

Adenema hyssopifolium. Hind. Chota Chirayta, is common in various parts of Southern India, is very bitter, also somewhat laxative, and much used by the natives as a stomachic.

Agathotes chirayta (Don); Ophelia chirayta, (Grisebach); Gentiana chirayta (Fleming); Beng. and Hind. *Chirata*; grows in Nepaul, the north of India, and Morung Hills. All parts of the plant are extremely bitter and are identical in composition with the common gentian. It is highly esteemed as a tonic and febrifuge all over India. The Ophelia chiretta is a common and abundant plant in the bazar, supplied chiefly by the lower ranges of the Himalayas.

Andrographis (Justicia, Roxb.) *paniculata*, Beng. Kalamegh, Hind. kalupnath or muha tita is the genuine or original chiretta.

Chironia centauroides of Roxburgh (Erythræa Roxburghii (Don), is another and powerfully bitter species found in India.

Cicendia hyssopifolia (Syn. Exacum hyssopifolia): common in various parts, of the East Indies, the whole plant is bitter and somewhat laxative: is used by the natives as a stomachic.

Exacum bicolor grows, rare, on the Neilgherries, below Kotagherry, and abundant a mile below Nedawuttum, where it flowers during the autumnal months. This species enamels the swards of the Western Ghauts with its beautiful blossoms, has the same bitter stomachic principles for which the Gentiana lutea is so much employed, and it is believed may be used with advantage in lieu of Gentian, for medicinal purposes. It is known in Mangalore as country creat and sold there at 1 anna 6 pie per lb. The infusion of *E. bicolor*, is a mild pure bitter.

Exacum tetragonum. It is another species of this genus, called *Ooda chiretta* or purple *chiretta*.

Ha'enia.

Ophelia angustifolia (Don), O. Swertia (Royle), is called *pukarree chiretta*, is substituted for the true kind.

Ophelia elegans, Wight, grows plentifully in several parts of the Madras presidency, is considered febrifuge by the Native physicians, who prefer it to the Himalayan Chiretta. It grows plentifully in the Jeypoor Zemindary of Vizagapatam, and is annually exported, as *Silaras* or *Selajit*, to the value of about Rupees 2,500. The infusion of O. elegans has a powerful bitterness.

Villarsia indica; *aristata*; *and nymphæoides*, occur in every part of India.

Chiretta, may be regarded as a type of the simple bitters, so many of which have been employed in Europe as febrifuges. For such purposes it is employed in India, and it will do whatever a simple bitter can in stopping intermittents. This is of course not very much at least in the tropics, notwithstanding the opinions of physicans of a past age, for instance Boerhaave, who had great faith in gentian. Chiretta is an extremely useful tonic, and of much service in convalescence from fever. It is one of the few articles of the Indian Materia Medica, which is in every respect an adequate substitute for the corresponding European article, and there is no occasion for any gentian being imported into India, although Twining, with the fondness for particular remedies which is engendered by exclusive modes of practice, imagined that extract of Chiretta had not the peculiar virtues which he attributed to Gentian in dysentery. Chiretta is a useful vehicle for other remedies and not long ago infusion of Chiretta with powder of gall-nuts was tried as a fever remedy in dispensary practice with indifferent success. Probably Chiretta by itself would have been quite as efficacious. Chiretta is given in infusion and tincture like Gentian. It is the basis of the celebrated drogue amere, a compound of mastic; frankincense, resin, myrrh, aloes, and creat root, steeped in brandy for a month, and the tincture strained and bottled. Chiretta is met with in a dried state, tied up in bundles, with its long slender stems of a brownish colour, having the roots attached, and which have been taken up when the plant was in flower. The whole plant is bitter. Being universally employed throughout India as gentian is in Europe. it is procurable in all native druggists shops.—*Faulkner*. The Extracts of Chiretta agree in being valuable bitter tonics. Both these and gentian contain a peculiar principle termed the gentisic acid. The dose is ten to thirty grains twice or three times daily, usually prescribed with sarsaparilla, hemidesmus or iron.—*Beng. Phar. p.* 290. The wine of Chiretta, is cordial, bitter and tonic in a dose of two fluid drachms. A compound tincture of Kreat is prepared by Kreat root six ounces, myrrh and aloes, each one ounce, French Brandy two pints, macerate for three days and strain. This preparation is equivalent to the celebrated "drogue amere." Its effects are tonic, stimulant, and gently aperient. It is a valuable preparation in the treatment of several forms of dyspepsia and torpidity of the alimentary canal: in a dose, of one fluid drachm to half an ounce.—*Beng. Phar. p.* 429.

(2588) CHIRITA SINENSIS, the "manneen-chung of the Chinese, is a dwarf species of *Lycopodium*, highly prized by that people.—*Fortune's Tea Districts, p.* 8.

(2589) CHIRONIA. GENTIANEÆ.—This genus of plants are all indigenous to the Cape of Good Hope, the flowers are rose coloured, white, yellow and purple, the plant grows to the height of two feet, and for ornamental purposes, should be continued by cuttings. They require a light loamy soil.

(2590) CHIRONIA CENTAUROIDES of Roxburgh (Erythræa Roxburghii, Don) is a powerful bitter, found in India.—*O'Shaughnessy, p.* 460. Nye, *Hind.* is the name given to this herb and leaves, used as a chiretta.

(2591) CHIRONGIA GLABRA, Buch.

Muruculu pullum, TAM.

This fruit, Dr. Buchanan says, is eaten in Mysore, but Ainslie believed that it is not much esteemed.—*Ainslie*.

(2592) CHIRONGIA SAPIDA, Roxb.

Tumbi pullum, TAM.

This fruit is not much sought after: it grows in the woods and is eaten by the poor people.—*Ainslie, p.* 234.

(2593) CHITRA.

Lal chitra HIND. | Blistering plumbago, ENG.
Plumbago rosea, LAT. |

Its root is employed in medicine, but rarely.—*Ben. Phar. p.* 211.

(2594) CHITTAGONG is a large town of Mahomedans and of Mugs, a Burmese tribe, who inhabit many parts of the Malay peninsula, and the coast to the northward of it. The town stands on the north shore of an extensive delta, formed by rivers which issue from the lofty mountains separating this district from Birmah. These mountains are fine objects on the horizon, rising 4,000 to 8,000 feet ; they are forest-clad, and inhabited by turbulent races, who are coterminous with the Cookias of the Cachar and Tipperah forests ; if indeed they be not the same people. The mountains abound with the splendid timber-trees of the Cachar forests, but like these are said to want teak, Sal and Sisso ; they have, besides many others, magnificent Gurjur trees (*Dipterocarpi*), the monarchs of the forests of these coasts.—*Hooker Him*: *Jour*: *Vol.* 2 *p.* 345. Chittagong, formerly possessed a factory subordinate to the one at Dacca, and still manufactures inferior fabrics of strong texture. The rough towels made here, are of an excellent quality : they are stout, and durable, and would be found to be superior to the Baden towels, now so much used in dressing rooms in Britain. This station could also supply specimens of an inferior sort of isinglass, a considerable quanity of which is prepared here, and sold to Chinese traders. *Dr. Taylor.* The natives of Chittagong are excellent shipbuilders and active traders, and export much rice and timber to Madras and Calcutta. The town is large and beautifully situated, interspersed with trees and tanks ; the hills resemble those of Silhet, and are covered with a similar vegetatation : on these the European houses are built. The climate is very healthy, which is not remarkable, considering how closely it approximates in character to that of Silhet and other places in Eastern Bengal, but very extraordinary, if it be compared with Arracan, only 200 miles further south, which is extremely unhealthy. The prominent difference between the physical features of Chittagong and Arracan, is the presence of mangrove swamps at the latter place, for which the water is too fresh at the former. To the south, undulating dunes stretch along the coast, covered with low bushes, of which a red-flowered *Melastoma* is most prevalent, and is considered a species of *Rhododendron* by many of the residents. But in addition to Melastoma, there occur the Jasmine, Calamus, Ægle Marmelos, Adelia, Memecylon, Ixora, Linostoma, Congea, climbing Cæsalpinia, and many other plants, and along their bases large trees of Amoora, Gaurea, figs, Mesua, and Micromelon.—*Hooker Him. Jour. Vol.* II. *page* 347.

(2595) CHIVENDI, the Tamil name of a Ceylon tree which grows to about eighteen inches in diameter, and twenty feet in height. It is used in house work and for other purposes. —*Edye, Ceylon.*

(2596) CHIVES. Allium schænoprasum. A variety of the onion held in much estimation for its leaves and small bulbs, and used in soups and salads. This vegetable will grow in any common garden, soil requires plenty of water and protection from the vertical rays of the sun. *Jaffrey.* Propagated either by slips or dividing the roots : this may be done at any season, but best after the rains. Nine or ten inches of space must be allowed between each bulb.—*Riddell.*

(2597) CHLORANTHUS, a genus of plants belonging to the natural order *Chloranthaceæ.*—*Engl. Cyc. page* 1051.

(2598) CHLORANTHUS OFFICINALIS, is a smooth shrub 3-4 feet high, with opposite straggling branches, tumid at the articulations fistular when young. All the parts are powerfully aromatic ; the roots, if quickly dried, retain their properties for a long time. The plant is a native of Java, in the moist woods, at an elevation of 1,500 feet above the level of the sea. The mountaineers of Java employ the roots in infusion as a remedy for spasms ; also when united with Anise or *Ocymum* it is given in small pox. In fevers and a suppression of the functions of the skin it is said to be of the greatest service. It is no doubt a powerful and active stimulant.—*Engl. Cyc. page* 1052.

(2599) CHLORANTHUS BRACHYSTACHYS, is also a native of the coast of Java. Its properties are like those of the last species.—*Engl. Cyc. page* 1052.

(2600) CHLOROXYLON SWIETENIA, *Cedrelaceæ*, Ill. 56 bis. Satin wood tree.

Kodawah porsh, TAM. | Dhoura, HIND.
Billu kurra, TEL. |

This tree grows abundantly in the mountainous districts of the Madras Presidency, in the jungles of Goozerat and the Deccan, but seldom attains a large size. Occasionally planks of 10 to 15 inches in breadth may be procured. The wood is very close grained, hard and durable, of a light orange colour, takes a fine polish, and is situated for all kinds of ornamental purposes, but is somewhat apt to split. For picture frames, it is nearly equal to American maple. The timber bears submersion well, in some instances it is beautifully feathered. There is this peculiarity, satin wood loses its beauty by age, unless protected by a coat of fine varnish.—*M. E. J. R.* The Billu Kara of the Circars, says Mr. Rohde, is a most serviceable hard wood well suited for naves of wheels and were it procurable in any quantity for all frame work requiring strength and durability. The Peradenia bridge, a single arch of

205 feet on the road to Kandy, was designed and principally executed in this wood, it is chiefly procured in the jungles on the Eastern side of Ceylon where it attains a diameter of 18 inches of sound wood. The flowered or feathered satin wood when first polished is one of the most beautiful woods in the world. Mr. Rohde has seen specimens surpassingly beautiful, these logs are not distinguishable from ordinary satin wood till sawn, and twenty or forty may be cut without one of any beauty being found—the feathered satin wood seems very liable to sever when dry and old: articles of satin wood get darker and lose much of their beauty by age, unless protracted by a coat of fine varnish.—*Rohde.* The satin wood, so highly esteemed in Ceylon where it attains a large size, until very lately Dr. Wight has never seen it exceed a good sized shrub in India. Planks have been obtained 15 inches broad from the Animullay Forests. The wood is very close grained, takes a fine polish and is fit for all kinds of ornamental purposes. In Ceylon where it is abundant and well known, it is very highly esteemed, and their shell boxes are made of it.—*Wight.* An essential oil is found in *Chloroxylon Swietenia.*

(2601) CHOLOROXYLON DUPADE. Indian dammer wood.

Goglam, TEL. | Ghooglat, HIND. | Koongillium, TAM.

(2602) CHOCOLATE.

Chocolade, DUT.	Chocolate, PORT.
Chocolat, FR.	Schokolad, RUS.
Schokolate, GER.	Chocolate, SP.
Cioccolata, IT.	*Faulkner.*

This agreeable and nutritious substance was introduced into Europe from Mexico by the Spaniards, in 1520, and its source and mode of manufacture was by them long kept secret. Linnæus was so fond of chocolate that he gave the specific name of *Theobroma* (θεὸς, and βρῶμα, the food of gods) to the cacao-tree which produced it. The Mexicans call the tree *chocolalt*; hence our word *chocolate* applied to the prepared seeds. The *Theobroma Cacao*, or chocolate-nut-tree, is a small tree, of which whole forests occur in Demerara. The Mexican cacao, however, is yielded by another member of this family. The capsules of the fruit of this tree are large, somewhat resembling a cucumber, and containing from twenty to thirty seeds, arranged in five regular rows, enveloped in a pulp, which has a sweet and not unpleasant taste, and is frequently used as food in places where the trees are grown. The trees are evergreen, and bear fruit and flowers all the year through; but the usual times for gathering the fruit are June and December. The fruit, which is produced in the West India Islands, Berbice, and Demerara, is much smaller than that of South America. By far the largest quantity of seeds received in England is from the West Indies, and of these the Trinidad nuts are considered the best. The species of this tree are somewhat numerous, and the fruits thereof vary in size, form, and the number of the seeds which they contain. "The general number is from twenty-five to thirty in each fruit; being more abundant as well as of better quality in the cultivated than in the wild plants. They vary much in bitterness, and in the quantity of oil they yield, not only according to the species from which they are obtained, but the manner in which they are treated, after being gathered and taken out of the pulpy fruit. In some instances they are buried in the earth in heaps, and allowed to ferment for thirty or forty days; a process which greatly improves them, and destroys the germinating power of the seed. The different kinds met with in commerce derive their names either from the place where they grow, or from some corruption of the native designation. The average size of good beans is that of a sweet almond, but somewhat thicker. The most esteemed of the known sorts is that termed *Soconuzco* or Mexican, with very small beans, with a remarkably fine flavour, and scarcely any acrid taste. These beans are always buried. This sort never comes to Europe. The next most valuable comes from the Esmeraldas, and has a very agreeable flavour: the chocolate prepared from it has a golden colour: it is seldom met with out of Mexico. The Gautemala cocoa consist of very large beans, very convex, often angular, and very much pointed at the one end. They contain much oil, and are mild, with a pleasant flavour. The beans from Guayaquil, which are three times as large as those of Soconuzco, are less prized than those of Guatemala. The Caraccas or New Granada cocoa, which is among the more highly prized kinds that reach Europe, is obtained from the *Theobroma bicolor*, called by the natives Bacao, and cultivated at Carthago. The beans are of medium size, and very oily. But chocolate made of these alone is not very agreeable, and another kind is commonly mixed with them, which are much smaller and harder. Berbice cocoa beans are not unfrequently mingled with those of Granada. These are also smaller and thinner, but in other respects difficult to distinguish: the shell separates very easily from the kernel, which is reddish brown, and has a strong smell but a pleasant flavour. The Surinam and Essequibo cocoas are not unlike that from New Granada, but are harder, thicker, and not so sweet. All the foregoing are *earth-dried*, the following are called *sun-dried*, being merely collected in heaps and then turned over in the sun: they are consequently much cheaper. Brazilian, called also of Para, and of Maranham, is very extensively employed: the beans are small, smooth, long, somewhat flattened, externally reddish brown with a bitter astringent taste: it is only worth the amount of the former. The West Indian, called *Cocoa des isles*, or *des*

Antilles, is still less valuable, and is employed to form the low-priced cocoas and chocolates." The colouring matter above alluded to amounting to 2·01, was a reddish dyestuff, somewhat akin to the pigment of cochineal. According to Lampadius, the kernel of the West India cacao consists of:—

Fat oil, ...	53·10
Azotized substances (theobromine),	16·70
Starch, ...	10·91
Gum and colouring matter, ...	9·76
Lignine, ...	0·90
Water and loss, ...	8·63
	10·000

The *butter of cacao*, or fatty matter of the nut, is of the consistence of tallow, of a white colour, and of a mild agreeable taste. It is not apt to become rancid by keeping. It is said to be very nutritious, and to act as an anodyne. It is particularly recommended for making ointments. Its proportion, as well as that of the other ingredients, varies greatly in the different sorts. as will be seen by comparing the above analyses. The manufactured chocolate, is made to assume a variety of forms, to which various names are attached, according to the object proposed by the mode of manufacture. The chief of these forms, are chocolate *nibs*, *soluble* chocolate and *chocolate*, properly so called, and lastly *flake cocoa*.—*Tomlinson, p.* 370. See CACOA.

(2603) CHŒNOSTOMA POLYANTHUM. SCROPHULARIACEÆ.—These are pretty dwarf plants, of a white and light yellow colour, well adapted for borders, and thrive in any garden soil.

(2604) CHOKHA. The root of a plant that is brought from Delhi to Ajmere, it is heating: taken internally as a narcotic, is bitter. It is chiefly used mixed with sulphur and oil to cure the itch in camels.—*Gen. Med. Top. p.* 131.

(2605) CHOMONDRI, or Chalembry, the Tamil name of a Ceylon tree, the wood of which is of a very dark colour, and durable. It grows to between twelve and twenty inches in diameter, and twenty feet in height. It is used by the native carpenters for general purposes. It produces a fruit which is used as medicine.—*Edye, Ceylon.*

(2606) CHONEMORPHA MACROPHYLLA. APOCYNACEÆ.—Takes its name from *chone* a funnel and *Morpha* form; a very handsome climbing shrub, with large white flowers, well adapted for a screen or covering a wall.—*Riddell.*

(2607) CHOOKEH. RUMEX VESICARIUS. *Sorrel.* This is of common native growth, and where water is abundant may be had for eight months in the year; it is sown in drills or on the edges around other beds; the leaves are sold in bundles from one to two pice a seer. There is also another species called the Indian Red Sorrel.—*Riddell.*

(2608) CHOOLAEE, *Hind.* This name is indifferently given to Spinacia Tetrandra, Tetrandous Spinach and Amarantus polygamus. The former is a common sort of native greens, and, when boiled, resembles spinach; it is procurable nearly all the year round. The latter is much cultivated by the natives. It is sown broad-cast in beds from June to March. The leaves are sold in the bazar at one pice the seer. Used as a greens and also in curries.—*Riddell, Jaffrey.*

(2609) CHOOPREE ALOO, *Hind.* Tubers roundish, very large, white inside and much esteemed; the skin thin and smooth like a potato. The stems require strong sticks to creep over; it bears a large roundish fruit, like an oak apple in appearance, which is also edible.—*Riddell.*

(2610) CHORIZEMA SPECTABILIS. LEGUMINOSÆ. This ornamental flowering plant was first found on the West Coast of New Holland by Labillardiere, some of the species have scarlet coloured flowers, others yellow and red: they grow best in a rich loamy soil, and may be raised from cuttings, as well as seeds, which they produce in abundance.—*Riddell.*

(2611) CHOR PUTTA, OR SURAT, *Urtica crenulata*, a gigantic stinging nettle, a native of the hills and valleys on the east of Bengal; Luckipore, Pundua Hills and Assam. This nettle affords a quantity of fine white fibre of no great strength, but not durable. The Hill tribes fabricate it into coarse cloths.—*Royle Fib. Pl.*

(2612) CH'HOTA KULPA, *Hind.* Borago Indica.—Indian Borage. This is a common plant and grows wild in many parts.—*Riddell.*

(2613) CHOTIE SAYME KE PULLIE, *Hind.* Dolichos Lablab.—Native Bean. This is a smaller species of the Dolichos Lablab; the legume and seeds are both eaten; it is sown in the rains and sells from one pice or two a seer. —*Riddell.*

(2614) CHOWAT KURNAT. This fibrous material from the Baram River, is supposed to be from a species of Artocarpus, its bark and bark cloth were sent to the Exhibition of 1851.—*Royle Fib. Pl. page* 341.

(2615) CHOWNREE, A swish or fly flapper made of horse hair, the hair of the tail of the Yak of Thibet, or the fine shavings of Sandal-wood, and used by domestics and horsekeepers to brush flies away. They are sometimes made of the stems of sweet smelling grass.—*Herklots.*

(2616) CHOWNSUT KHUMBEH, or Chownsut Sutoon, as it is commonly called, is quite close to the tomb of Nizam-ood-deen

Aolcea near Delhi, and is a singular structure. As the name implies, it is composed of 64 pillars. They are of white marble, supporting a square roof of the same material, which occupies a tolerably wide area. It is a building of great purity, its pale aspect of white throughout being interrupted by no other color. The lattice work that surrounds it is of very delicate execution and well polished. This building seems to be erected to the memory, if not actually over the remains, of a celebrated poet and historian, Ameer Khoosroo, a native of Samarcand and a prince. He was a contemporary and friend of Sheikh Nizam-ood-deen Aoleea, not far from whose tomb, this building is raised.—*French's Tour, page* 13.

(2617) CHROME IRON ORE. CHROMATE OF IRON. A compound of oxide of chrome with protoxide of iron. It is met with massive, and in octahedral crystals of a blackish colour, and imperfect metallic lustre, and is used in the manufacture of chromate of potash. Localities, Unst in Shetland, France, and Baltimore in America; Salem district in the Madras Presidency. At the Madras Exhibition of 1855, a very fine sample of chrome ore weighing about 5 cwt. was exhibited by Mr. Fischer of Salem. The ore has been so largely exported to England as to have lowered the commercial value of the mineral.

(2618) CHRYSANTHEMUM a genus of plants belonging to the natural order *Compositæ* and the sub-order *Corymbiferæ* or *Asteraceæ*. The species are very numerous in the temperate parts of the earth.—*Eng. Cyc. page* 1058.

(2619) CHRYSANTHEMUM INDICUM. CHRISTMAS FLOWER. "*Gool Davodee.*" The origin of the name is from two Greek words Chrysos, gold, and Anthos, flower. There are several varieties common in all gardens. They commence flowering generally in November, and continue for several months The colours are mostly yellow, orange, and a purplish colour mixed with white. They are propagated by seed roots, and suckers, and grow well in any tolerably good soil.—*Riddell.* The beautiful, yellow, fragrant flowers of this plant are made into garlands, and offered at the shrines of Vishnoo விஷ்ணு and சிவம், Sheva.—*Ainslie.* If grown in pots they require a good rich soil to which pounded bricks should be added and a little lime, to preserve the foliage from mildew, to which they are subject. Owing to their succeeding so well in India, the introduction of some of the finer varieties from England is worthy of consideration.—*Jaffrey.*

(2620) CHRYSANTHEMUM SINENSE, is most extensively cultivated in European gardens.—*Eng. Cyc. page* 1052. The chrysanthemum is the Chinese gardener's favourite 'winter flower,' although it is generally past its full beauty at the Chinese new year. There is no other plant which he takes so much pains with or which he cultivates so well. His camellias, azaleas, and roses are well grown and well bloomed: but, in all these, the English excel him in England. In the cultivation of the chrysanthemum, however, he stands unrivalled. The plants themselves seem, as it were, to meet him half way and grow just as he pleases; sometimes Fortune found them in the form of animals, such as horses and deer, and at other times they were made to resemble the pagodas, so common in the country. Whether they were trained into these fanciful forms, or merely grown as simple bushes, they were always in high health, full of fresh green leaves, and never failed to bloom most profusely in the autumn and winter. The method of cultivating the chrysanthemum in China is as follows. Cuttings are struck every year from the young shoots, in the same manner as is done in England. When they are rooted they are potted off at once into the pots in which they are to grow and bloom; that is, they are grown upon what would be called by English gardeners "the one-shift system." The soil used in potting is of a very rich description. About Canton it is generally obtained, in the first instance, from the bottom of lakes or ponds, where the Nelumbium or water-lily grows. It is then laid up to dry and pulverise for some months, when it is mixed with old night-soil taken from the manure tanks found in every garden. A heap of this kind after being laid up for some time and frequently turned over, is in a fit state for potting the chrysanthemum. Manure-water, taken also from the tanks is liberally supplied during the growing season, and its effects are visible in the luxuriant dark-green leaves which cover the plants. In forming the plants into nice compact bushes, which, with due deference to Chinese taste, Fortune thinks much prettier than animals and "Seven-storied pagodas," their system is as follows:—The plants are trained each with a single stem; this is forced to send out numerous laterals near its base, and these are tied down in a neat and regular manner with strings of silk-thread. By having the plants clothed with branches in this way, and by keeping the leaves in a green and healthy state, the specimens never have that bare and broomheaded appearance which they often present in England when they are taken into the greenhouse in winter. In China, as in England, the chrysanthemum flowers during the winter months. When in bloom it is in great request among the people, and is used in the decoration of court-yards, halls, and temples. It is everybody's plant, and blooms alike in the garden of the lowly chinese cottager and in that of the red-buttoned mandarin.—*Fortune's Tea Districts, p.* 125.

(2621) CHRYSOBALANUS ICACO. *Rosaceæ.* This the cocoa plum-tree of the West Indies, has been lately introduced into India.

(2622) CHRYSOBERYL. A gem of a green colour, sometimes with a yellow or brownish tinge, and occasionally presenting internally an opalescent blueish-white light. When transparent and free from flaws, it is much prized. Localities, Ceylon, Connecticut, and Brazil. The finest specimens are obtained from the latter place.—*Faulkner.*

(2623) CHRYSOLITE. An ornamental stone of a bright yellow colour, sometimes tinged with green or brown; transparent, and possessing double the power of refraction. The best specimens are obtained from Egypt.—*Faulkner.*

(2624) CHRYSOPHYLLUM ACUMINATUM. *Sapotaceæ.* Star Apple. Peetakara. Hind. This tree grows to a large size, thirty feet or more, the branches round, and leaves having a ferruginous down upon them when young. The flower is of a pale yellow, and the fruit ripens in October, about the size of a large crab apple: the pulp is of a yellowish colour and firm inside, the outer rind being of a dark brown. It requires no particular soil. There are several trees in the Residency garden at Hyderabad.—*Riddell.*

(2625) CHRYSOPOGON (ANDROPOGON) ACICULARIS. The most common grass on the Tenasserim Coast is a species of the modern genus Chrysopogon, concerning which, Roxburgh well remarks; "Its seeds are exceedingly troublesome to those who walk where it grows, as they stick in the stockings, and produce a disagreeable itching."—*Mason.*

(2626) CHRYSOPRASE. A rare pale-green calcedony, found in Upper Silisia, and Vermont, which owes its colour to the presence of nikel.—*Faulkner.*

(2627) CAUCHOONDA. Hind. Tricosanthes Anguina.—The Snake Gourd. This is sown in the rains, and grown generally over a high pandall, that the fruit may have space to hang down from; a small stone or weight is then tied to the end to increase its length, which varies from a foot and a half to three feet or more. Raw, it resembles a cucumber in flavour, but is better dressed in a stew or curry.—*Jaffrey.*

(2628) CHUCKOONDA, Beta Vulgaris. Common Beet.

(2629) CHUKA KE BINJ. Rumex acetosa: Sorrel. The seed is considered cooling and astringent: It is cultivated in Ajmeer.—*Gen. Med. Top. p.* 130.

(2630) CHUKKAR, a sikh weapon, resembling a quoit in size and shape, thrown from the finger, with a rotatory motion.—*Herklots.*

(2631) CHULCHILHERA, Lichen of the Himalayas. This is the *Borrera ashneh* of Royle; with ammonia it gives a reddish brown colouring matter, and is used accordingly as a dye stuff. Dr. O'Shaughnessy has examined this and several other Indian lichens, and repeated upon these the processes described under the heads of cudbear and litmus, but without success in the production of any valuable colour.—*O'Shaughnessy, page* 672.

(2632) CHUMPOUTE. The Berry of a small plant, brought to Ajmeer via Pali, used in scents and also in medicine: one seer is sold for one rupee.—*Gen. Med. Top. p.* 131.

(2633) CHUMBRANUK. A single valve of the muscle shell without the fish: used in Ajmere as an aphrodisiac.—*Gen. Med. Top. p.* 132

(2634) CHUNDRUS, Opal resin. The fine shavings of it are used in medicine to stop hæmoptysis, made up into a medicine called "Khairwa." It is much used in varnishes. In Ajmere one maund costs thirty-five rupees.—*Gen. Med. Top. p.* 132.

(2635) CHUNAM, Quick Lime.

Chúnná, Chunnam, Guz and Hind.	Chunamboo, Tam. Choonnoo, Tel.

In oriental commerce, a term applied to quick lime, made from calcined shells, also applied to plaster. The plaster of Madras, has long been famed for its marble like polish. Chunam is prepared at this place either from shells or lime-stones. The shells generally used at the Presidency are fossil, but of recent species. They are found in extensive beds, a few feet below the surface on the banks of the Pulicat Lake and other low marshy places on the sea coast, which are covered by the sea at high water. These are calcined with charcoal, one Parah of charcoal being allowed to every two Parahs of Chunam. The kilns generally used are calculated to hold altogether 60 parahs, that is 40 of shells and 20 of charcoal. A small arch, 1 feet 3 inches in height the same in breadth and raised 5 feet above the surface of the ground, runs longitudinally through the kiln, the top of this arch is a grating of brick on edge which is partially covered with broken tiles so that neither the shells nor charcoal can drop through them but small apertures are left for the escape of the ashes and for the necessary circulation of air. Over this bed a layer of charcoal is first placed throughout, about 3 inches in thickness and fire applied: when sufficiently kindled, the mixed shells and charcoal are laid in small heaps of not more than ½ of a parah each at about 1 foot 6 inches apart, and when the fire has been communicated to them the intermediate spaces must be filled up, with more shells and charcoal, to a level, and when the fire has thoroughly extended to them also, another row is to be laid in a heap upon this mass as was done in the first instance, and in the subsequent operations are to be repeated in the same manner until the kiln is filled. The transverse arches are to promote the requisite current of air and the windward ones are invariably to be kept open whilst those on the opposite side must be closed. The kilns used at Madras are built of brick or

clay and require renewal every three years. The shells will be sufficiently calcined in 12 hours, and 24 more are required to cool them so as to admit of their being moved and the charcoal sifted from them. It is found that chunam thus prepared and slaked to a powder is increased to double its original bulk when in the form of shells. The following is the method of plastering with Chunam, at Madras. If for *one coat*, the plaster is composed of one part of Chunam and one and a half of river sand thoroughly mixed and well beaten up with water. This operation is usually performed by women who stand round a small stone trough prepared for the purpose into which the ingredients are thrown and gradually moistened with water, as the process of mixing proceeds. The women use a wooden stick shod like a rice pounder. The plaster when mixed is taken out of the troughs and made into conical heaps where it remains till required and may be kept without injury for several months, but when left for any time a small cistern or hollow is made at the top of the heap into which water is occasionally poured. Before applying the plaster the wall is trimmed with a trowel and swept perfectly clean and then slightly sprinkled with water. The wall being ready, the plaster is put into small wooden boxes at convenient places among the bricklayers by whom it is mixed up with jaggery water, $\frac{3}{4}$lb. of jaggery or coarse sugar being allowed to every parah of quick lime, until it is brought to the required consistency: it is then laid on with a trowel above half an inch thick and levelled with a flat wooden rule, being afterwards smoothed with a wooden rubber till it acquires an even surface. During the process of rubbing, the plaster is occasionally sprinked with a little pure lime mixed with water to give it a hard surface. If for *two coats* of Chunam, the first coat is applied, as already described with the exception that the surface is left rough and no pure lime is applied during the process of rubbing. A day or two after the first coat is applied and while moist, the second is laid on. The plaster used for the second coat consists of three parts of lime and one of white sand. These are mixed as before and afterwards ground by women on a flat stone with a small stone roller till they are reduced to a fine paste. This is laid on a wooden rubber and applied with care over the first coat about $\frac{1}{8}$ of an inch thick. It is then rubbed down perfectly smooth with a small trowel and afterwards polished with a crystal or smooth stone rubber and as soon as it has acquired a fine polish a little very fine (Ballapum) potstone powder is sprinkled on it to increase the whiteness and polish, and the polishing continued. The second coat ought to be applied and finished in one day for it usually hardens too much during the night to be polished the following day except in damp weather. The practice is to continue polishing the plaster until it is quite dry, and a number of bricklayers are employed in order that it may be well polished the first day. Moisture continues to exude from the plaster for some days after it is completed: this must be carefully wiped off with a soft cloth and the wall kept perfectly dry till the moisture entirely ceases. For *three coats* of Chunam, the first coat is as above but it is left a fortnight or three weeks to dry before the second coat is applied. The plaster for the second coat consists of one part of lime and one of fine river sand freed from the coarser particles and from clay by sifting. It is well mixed and beaten up in a clean trough, and applied over the first coat about $\frac{1}{4}$ of an inch in thickness, the first being previously moistened with a little water. It is next rubbed down in the same manner as the first coat but acquires a much smoother surface, the plaster being of a finer quality. A day or two afterwards when it has had time to dry, the third coat is applied. It consists of 4 parts of lime, and one of fine white sand. These, after being well mixed, are reduced by grinding to a very fine paste quite free from grittiness. This is put into a large earthern jar of the size nearly of half a hogshead, and mixed with the whites of eggs, (Tyre) sour-milk, and ghee, in the proportion of 12 eggs, $1\frac{1}{2}$ measures of Tyre, and a $\frac{1}{2}$ lb. of ghee to every parah of Plaster. These are all thoroughly mixed and rubbed between the hands till the ingredients are thoroughly incorporated and the composition reduced to an uniform consistent paste a little thicker than cream and perfectly free from grittiness. The Plaster is now fit for use and is put on with a wooden rubber about $\frac{1}{8}$ of an inch thick and gently rubbed till it becomes perfectly smooth. Immediately after this, another coat of still finer plaster is applied consisting of pure lime ground to a very fine powder and afterwards mixed with water in a clean tub, till it is of the consistency of cream. This is put on about $\frac{1}{16}$ of an inch thick with a brush and rubbed gently with a small trowel till it acquires a slight degree of hardness. It is then rubbed with a rock crystal or stone rubber till a beautiful polish is produced not forgetting to sprinkle the wall with fine pot-stone (Ballapum) powder during the process of polishing. If the plaster is not entirely dry on the second morning, the operation of polishing ought to be continued until it is quite dry. The moisture as above directed must be carefully wiped off and the wall kept quite dry till all appearance of moisture cease. The result of the process depends chiefly on the Plaster for the upper coat being reduced to a very fine paste perfectly free from grittiness, and on its being after it is applied to the wall, rubbed constantly with great care till it is quite dry and has acquired a very fine polish. The wall ought then to be frequently wiped with a fine clean cloth to remove the

moisture and it may be occasionally dusted with Ballapum powder. The stone used in polishing it is rock-crystal or a white quartz pebble about 3 inches long and 1½ broad, the face of which has a very fine polish. The wall is rubbed with this for one or two days, the moisture being carefully wiped off every morning, and Potstone (Ballapum) powder sprinkled on it several times during the day. When the lime is prepared from Sea shells, these are first cleaned and washed and then calcined with charcoal, care being taken to exclude every thing likely to injure the whiteness of the lime : very white sand only is employed, as common sand destroys the brilliancy of the plaster. When white sand is not procurable white rock crystal or quartz pebbles reduced to a fine powder may be substituted. Mortar for building consists of one part of chunam and two of sand. Immediately before being used the mortar is mixed with Jaggery water, 1lb. of Jaggery being allowed to every parah of lime. It is used in a much more fluid state than is the practice in Europe. When shell lime is used in situations requiring a hydraulic cement it should be mixed with burnt clay in powder, fresh burnt tiles more or less broken are in general conveniently procured. In building the pier at Masulipatam. Captain Buckle employed a cement consisting of 1 part of lime, one of the tile dust and two of sharp river sand and it appeared to answer well. Jaggery was used in the usual proportion of 1lb. to a parah of chunam. Limestone abounds in most districts of Southern Asia but the qualities of the different varieties are best ascertained by experiment. When found in large blocks of very compact stone, the breaching of it forms a considerable item in the expense. Such stone as yields very hydraulic lime is not suited to the purposes of ordinary building, unless the precaution is taken of keeping the work constantly wet. The best form of kiln for burning stone with charcoal is given by Captain Smith in his translation of Vicat, Plate 1, fig. 11 and 12. When wood is used the spheroidal form of kiln is recommended. It will be found to facilitate the expulsion of carbon, if the stone is well moistened in water previous to placing it in the kiln. It should be remarked that nothing but clean sand should be added to the hydraulic limes; such limes should be used immediately after slaking. When used in situations requiring hydraulic cement, no more water should be used in slaking it than is sufficient to reduce it to a fine dry powder, Magnesian limestone has been found at Salem and in the Tanjore district, where it has been used with success by Captain Cotton in forming the *annicuts* : the cement formed with it was stronger than that formed with other lime. It appears that it should not be immersed immediately on being used; the mode used in the preparation of this cement is given in Capt. Cotton's report, published at page 28, Engineer professional papers. Much controversy has occured in regard to the advisability of using the lime while hot : the generally received opinion is that it should be so used; but in regard to the pure limes free from clay and iron that is without hydraulic properties, this course is questionable. It was not permitted in Rome, and lime mortar kept moist has been found suitable for building after the lapse of several hundred years, lime used *hot* is seldom thoroughly slaked. A common practice in this country is to mix the slaked lime and sand, form it into heaps, on the summit of which is formed a hollow which is kept constantly filled with water. Shell lime, so kept and subjected to the usual beating when used, seems to Mr. Rohde at least as good as that first burned : hydraulic limes, including of course all which become hard under water ought no doubt to be used hot.—*Rohde M.S.S.*

(2636) CHURRA. A Sanatorium hill station on the N. E. frontier of India. The mean temperture of Churra (elev. 4000 feet) is about 66°, or 16° below that of Calcutta; which, allowing for 2½° of northing, gives 1° of temperature to every 290 to 300 feet of ascent. In summer the thermometer often rises to 88° and 90°; and in the winter, owing to the intense radiation hoar-frost is frequent.—*Hooker Him. Jour. Vol.* II. *page* 284.

(2637) CHURRUS. A resinous intoxicating substance which exudes on the leaves, slender stems, and flowers of the hemp plant (*cannabis sativa*); (WHICH SEE) separated and in masses, it forms *churrus*. Its odour is fragrant and narcotic; taste slightly warm, bitterish, and acrid. It is used for smoking, which causes torpor and intoxication; its effects sometimes prove fatal. Churrus is to be met with in Indian bazars.—*Faulkner*. In collecting this resinous exudation of the flowers of the hemp, a man covers himself with a blanket or leathern dress, runs through a field of hemp early in the morning and the dew and gum of the plant which adheres to the blanket is scraped off. It produces in the inebriate sensuous voluptuous emotions.—*Herklots*.

(2638) CHUTNEE. The Chutnees of India are warm condiments used in every family, either prepared fresh daily, from ripe vegetables or preserved. The following is a recipe for the *Delhi or Celestial Chutnee*. Take of green mangoes; raisins; mustard seed; salt; green ginger; and garlic; each one seer : onions (none or) half a seer; dried red chillies half to one seer : moist or soft sugar, one to two seers; white wine vinegar four bottles. The ginger, garlic and onions are to be peeled, and together with the chillies are to be cut into thin slices previously to being pounded; the mustard seed to be washed and dried, then gently bruised and winnowed; the raisins to be washed and freed from the stones; the sugar to be made into a thick syrup; the mangoes to be picked of their rinds,

cut into thin slices (some boil them in three bottles of the vinegar, adding the fourth when mixing them up with the other ingredients) and pounded; the remaining articles are to be separately pounded, and then the whole is to be incorporated, put into a stone jar, well closed, and placed in the sun for a month or two. If put into a glass bottle, it is occasionally to be put out in the sun. It will keep good for years. 2. *Love-apple Chutnee*: Take of love-apple (solanum lyco-persicum, *Lin.*) a large plateful, the rinds and seed to be rejected, and only the pulp used; dried salt-fish cut very fine (as if rasped), a piece about two inches square; six onions cut into thin longitudinal slices; eighteen green *chillies* chopped fine, dried tamarind two *pice* weight (or once ounce), mashed up in about three or four ounces of water (stones and fibres to be rejected); salt, a teaspoonful; *ghee* or butter, five *pice* weight (or two ounces and a half). First put the *ghee* into a tinned copper vessel placed on the fire, when it is melted add the onions, and as the latter begin to assume a reddish hue add the *chillies*, stirring them well for five minutes: then add the salt fish, and continue stirring the whole; when the *ghee* has nearly evaporated add the love-apples, and stir it about for a good while; lastly, add the tamarind water and salt, and mix the composition well until it acquires a pretty dry consistence (like that of *brinzal-chutnee* or *sambal*). This *chutnee* is only for immediate use, and will not keep above a day or two.

(2639) CIBOTIUM BILLARDIERI, (the Dicksonia antarctica, of Labillardiere), containing the edible pith or bread fruit eaten by the natives. Many other species of ferns are esculent. Typha bread is prepared in Scinde from the pollen of the flowers of the Typha elephantina, and in New Zealand from another species of bulrush (Typha utilis)—*Simmond's Com. Products, page* 380.

(2640) CICCA DISTICHA. PHYLLANTHUS LONGIFOLIUS, Jacquin.—*Roxb. Fl. Ind.* iii. *p.* 672.

Cheramella, or Hurriphul, Beng.	Urfalayoorie, Duk.
Hurfarori, also chelmeri, Hind.	Cherambola, Port.
Arnellie pullum, Tam.	Cheremin, Malay.
	Chillimillie, Tel.
	Country Gooseberry.

A small tree, leaves pinnate, from one to two feet long, scattered about the ends of the branches. Its flowers small, and of a reddish colour. It yields a roundish sub-acid fruit about the size of a large marble.—*Ainslie, p.* 222. The fruit is universally used as an article of food, raw or cooked, or in pickles or preserves. Leaves are sudorific, and seeds cathartic.—*O'Shaughnessy, page* 551. This tree, which is larger than the jujube, is planted by the Burmese all over the Tenasserim Provinces, who value its fruit highly. It bears some resemblance to a gooseberry both in appearance and taste; and Mr. Mason has heard it called "the Otaheite gooseberry." The tree in Tenasserim is diœcious.—*Mason.* Wood inferior.—*Hort. Garden* 31.

(2641) CICENDIA HYSSOPIFOLIA. Nat. Ord. Gentianeæ. (*Syn.* Exacum hyssopif.)

Chota Chyretta. Hind

This plant has been used as one of the kreats; It is common in various parts of the East Indies and in Southern India, the whole plant is bitter, and used by the natives as a stomachic, being also somewhat laxative.—*O'Sh. p.* 460.

(2642) CICER ARIETINUM. Lin.

Cadalay, Tam. & Can.	Chennay, Hind.
Chena, Guz	Cadalacca, Mal.
Hurbareh, Duk.	Bengal gram, Chick Pea, Eng.
Sanigheloo, Tel.	Cheunaka. Sans.
Himis, Arab.	
Nakhood, Pers.	

This valuable pulse is much prized in India particularly in the more northern provinces of Hindoostan, where it is common, and is that generally given to horses. When parched, it tastes not unlike the toasted cashew nut. Professor Link in his travels informs us that it constitutes the chief food of the lower class in Spain, where it is called Garvanzos.—*Ainslie, p.* 237. The chick pea, or Bengal gram, is grown extensively by the Burmese, especially in Burmah, and large quantities are imported into the Tenasserim Provinces from Rangoon.—*Mason.*

(2643) CIDER or CYDER.

Cidre, Fr.	Sidor, Rus.
Zider. Apfelwein, Ger.	Sidra, Sp.
Cidro, It.	

The wine of the apple. It is made in Great Britain, on the Continent of Europe, and in the United States.—*Faulkner.*

(2644) CICHORIUM INTYBUS. Chicory. Wild succory, Κιχωριον, Diosc. Europe. Leaves radical, oblong, deep green, deeply lobed, lobes toothed, cauline leaves small, sessile, and very entire; inodorous, taste very bitter. An Indian species called *Kasni*, scarcely differs from the *C. Intybus*. The roots contain nitrate and sulphate of potash, mucilage, and some bitter extractive principal. An infusion of succory mixed with syrup causes a thickening of the liquid, and a substance is formed termed by the discoverer, M. Lacarteria—Saccho-Cichorine Gum.—*O'Sh. page* 408. Wild Chicory vegetates luxuriantly during the summer in Cashmere, and in the Punjab during the cold season. The Hakims use the Succory-seeds, which are consequently kept in the bazars.—*Honigberger, p.* 256. See Chicory.

(2645) CICUTA VIROSA occurs in Cashmere, where it is called Zehr-i-googul or poison turnip, and in Persian, Salep-i-Shaitan, or Devil's Salep.—*Royle, p.* 426.

(2646) CIGARS.

Pogaku, Tel. | Choota. Hind.

The most celebrated of these manufactured in the Madras Presidency are the Trichinopoly and the Lunka, or those formed of Tobacco grown on the lunkas or islands in the Godavery.—*Rohde M.S.S.* See Cheeroots.

(2647) CINCHONA, a genus of Monopetalous Exogenous Plants, the different species of which have a great reputation in medicine. It constitutes the type of the natural order *Cinchonaceæ.—Engl. Cyc. p.* 1075.

(2648) CINCHONA. [*Cosmibuena*, Ruiz and Pav.] Of the true Cinchonas Lindley describes 24, and under the heads of Lasionama, Cosmibuena, Remija, Hymenodictyon, Exostema, Manettia and Pinkneya, 11 articles are also mentioned. The true Cinchonas, are trees which thrive best at moderate elevations (1000 to 1300 toises), several attain a great height, and the trunk may become as thick as a man's body. M. Fee presents us with a copious tabular view of the geographical distribution of the family He assigns 18 to Peru, 4 to Brazil, 1 to Coromandel, and he enumerates also 15, the localities and characters of which were not perfectly ascertained at the time of the publication of his book. The true cinchonas extend from 20° south to 11° north latitude, at elevations varying from 1200 to 10,800 feet, the mean temperature being estimated at 68°. The enormous consumption of these barks may be estimated by the fact that Pelletier in one year consumed 200,000 lbs. of yellow bark, in the preparation of *Sulphate of Quinine.* The persons engaged in the collection are called *Cascarilleros.* They judge of the fitness of bark by slices of it rapidly reddening when exposed to the air: longitudinal incisions are made with sharp knives along the branches through the entire thickness of the bark, which is then removed by the back of the instrument. The harvest takes place during the dry season, the bark is then placed to dry before the sun. If the pieces are thin they roll up longitudinally into thin cylinders like quills. The larger pieces may retain their original form, shewing thus that the old distinction of *quill, round* and *flat* barks, as characteristic of *species*, are altogether delusive. As the bark of moderately grown trees is the richest in the powerful alkalies, too great *quilling* or its total absence, are unfavourable characters of barks, as showing that the branches were either too young or too old. The superior barks are also very heavy. The best colour is the orange, the worst white; and in proportion to the prevalent tint is the article esteemed by the dealers into whose hands it first passes. The leading varieties of the barks found in the druggist's shops, are denominated the *pale*, the *yellow*, and the *red*. The first of these is now comparatively rare in commerce, and is also known as *Crown* bark; it reaches Europe in chests covered with skins, and containing about 200lbs.; the pieces are about 9 inches in length, smell trifling, slightly aromatic, taste acidulous, pleasantly bitter, rather astringent; some scarcely 1-10th inch in thickness, singly or doubly quilled; the epidermis is cracked, grey-

substance of pale fawn colour, when dry orange; when moistened, the powder is paler than the bark itself. The *red* bark reaches Europe in chests of from 100 to 160 lbs.; the internal part is of a dark rust colour, and the powder a deeper colour still; the pieces are of various sizes, and usually flat, smell weak and peculiar, taste bitter, but more astringent and nauseous than in the *pale* bark. The *yellow* bark is the most employed and esteemed in Europe. The tree grows at an altitude of about 7000 feet in the mountains of Loxa and Quito. The bark reaches Europe in chests of from 90 to 100 lbs., the bundles consisting of pieces about 10 inches long, some quilled, but the greater number flat. The epidermis is greyish brown, often as thick as the bark itself, (about ½ of an inch). The inner bark has a yellow colour passing into orange. In odour it resembles the pale variety. The taste is more bitter, and scarcely at all astringent or rough; when moistened the colour passes to a bright orange, the fracture is woody and fibrous; the colour of the powder is still brighter than the bark itself. It has been clearly shewn by Lindley that these specific names are all erroneously applied—that the *pale* barks are furnished by C. condaminea and C. micrantha —the *yellow* bark chiefly by C. lanceolata—the source of the red bark is still doubtful, while those of the commercial varieties of white Loxa Calisaya, Carthagena, Cusco, and many others are yet altogether unknown.

1. GREY, OR PALE BARKS. a. *Of the grey or pale Loxa bark or Crown bark.* This bark has long been known in Europe, and is admitted to belong to the Cinchona condaminea; it occurs in solid pieces of variable thickness, 12 to 18 inches long, covered with clear or deep grey epidermis, with transverse fissures and wrinkled between ¼ and two lines thick; light, fibrous inner surface pale yellow or reddish, fracture clear or slightly fibrous; powder deep brown, odour peculiar, taste bitter and astringent, adulterated sometimes with willow bark, and with other kinds of cinchona. Imported in packages holding 60 to 90 lbs., or chests of 100 lbs.

b. *Of the grey Cinchona of Lima. Syn* "Silver," or "grey Cinchona" in England and Germany. "Huanuco, or Guanuco bark." Of variable thickness, but seldom exceeding an inch epidermis thin, cracked or flaky, variable in colour according to the parasitic plants by which it is covered, but generally pale grey, with transverse fissures, easily broken or cut, clean, resinous, and more or less compact; odour weak taste astringent and bitter.

2. YELLOW BARKS. *Royal yellow bark Royal bark. Calisaya.* This bark was first brought to Spain in 1789, and was monopolized for the Royal family. The name Calisaya is that of a province in South Peru, where the tree pre-

3. THE RED BARKS. These barks stain the fingers red, contain both *Quinine* and *Cinchonine*, and are at the same time bitter and astringent to an extreme degree. *The common red bark.* (*warty* or *plein*, Guibourt)—*China rubra* of Bergen. Introduced into England in 1779; imported in chests, quills or flat pieces; the bark is frequently warty, the colour of the fine quills is faint red brown: in thick pieces this darkens to chesnut, sometimes with a purple tinge,(Pereira); fracture of quills smooth, of larger pieces fibrous, taste strongly bitter, and rather aromatic. Feé and Pereira deem the tree to be unknown, and the supposition of the bark belonging to the Cinchona oblongifolia to be erroneous; Lindley participates in these opinions.—*O'Sh. page* 391.

(2649) CINCHONA EXCELSA. Roxb. Hymenodictyon excelsum, Wall.

Pundaroo, TEL.

Pundaroo is the Teling name of a large tree which grows in the mountainous parts of the Northern Circars, of Peninsular India: the bark of which, Dr. Roxburgh informs us, possesses both the bitterness and astringency of the Peruvian bark, and when fresh, even in a stronger degree. —*Ain's. Mat. Med. p.* 194.

(2650) CINERARIA AZUREA, *Compositæ*. This genus of flowering plants known by the name of Cape Aster produces abundance of showy flowers of orange coloured, yellow, purple and red varieties. They grow from two to three feet high, the leaves being covered with a soft white down. They are grown from seed and thrive in any good garden soil.—*Riddell.*

(2651) CINNABAR, VERMILLION, RED SULPHATE OF MERCURY.—BI-SULPHURET OF MERCURY.

Zunjefer, ARAB.	Cinnabrium, Hydrargiri-bisulphuretum, LAT.
Paak Shengherf, DUK.	Sedilengam, MAL.
Cinaber, Vermilioen, DUT.	Shengherf, PERS.
Cinnabre, FR.	Kinowar, RUS.
Zinnober, GER.	Inghoolum, SANS.
Hingda, or, Hingra, GUZ.	Cinabrio, SP.
Hingda, Durdar, HIND.	Shadilingum, Enghilicum, TAM.
Hingoor, HINDO.	
Cinabro, IT.	

This is found in commerce native and manufactured. *Native cinnabar* is red, heavy, brilliant; the best is of a high colour, brilliant, and free from earthy or stony matter. It is found in various places, chiefly in quicksilver mines, being one of the ores of that metal. *Artificial cinnabar*—When two parts of mercury and one of sulphur are triturated together, the mercury gradually disappears, and the whole assumes the form of a black powder. When this is heated red hot, it sublimes, and if a proper vessel be placed to receive it, a cake is obtained of a fine red colour, which, when reduced to a fine powder is known by the name of *Vermillion* (*Thomson's Chemistry*). Artificial cinnabar is largely manufactured in Calcutta, and in small quantities at Surat, from both of which places it is brought to Bombay, these are the only kinds procurable in the bazars there. Vermillion is imported into Bombay from China; and is occasionally re-exported to England.—*Faulkner* Cinnabar occurs abundantly in Shensi, and all the quicksilver shwin yin "water silver," i. e. hydrargyrum, not imported into China, is there obtained from this ore, it is said, by a rude process of burning brushwood in the wells, and then collecting the metal after condensation.—*William's Middle Kingdom, p.* 245. Manufactured cinnabar is found in all the Tenasserim bazars, but it is imported there. The native doctors use it considerably to salivate their patients, which they do most effectually by causing them to inhale its fumes. The Burman name appears to be derived from the Sanscrit.—*Mason.* Cinnabar or bisulphuret of Mercury is sold in Calcutta in red, striated, crystalline lumps, also in powder; it is often adulterated by red lead and brick dust. It is entirely volatile from a slip of talc, while these impurities remain behind. Compound Cinnabar Ointment, is Captain Aitkin's well known and useful "ringworm ointment."—*Beng. Phar. p.* 382.

(2652) CINNAMOMUM, a genus of Plants belonging to the natural order *Lauraceæ*. It is confined to Eastern and Southern Asia.—*Engl. Cyc. page* 1087. Lindley includes in the genus Cinnamomum, all the following twelve species.

Names.	Habetat.	Product.
C. aromaticum,.....	China,.....	Source of Chinese cinnamon according to Nees.
C. Culilawan,.....	Amboyna,.....	Culilawan bark.
C. javanicum,.....	Java and Borneo,.....	Bitter and aromatic bark, strongly recommended by Blume in spasmodic colic, and the after-pains of labour.
C. Kiamis,.....	Cochin China,.....	Said to produce one kind of Massoy bark.
C. Loureirii,.....	Cochin China,.....	Flowers of Cassia, and a very inferior cinnamon.
C. nitidum,.....	India, Java, Ceylon,...	Furnished the greater part of the old "Folia Malabathri."
C. rubrum,.....	Cochin China,.....	Similar to C. Culilawan.
C. Sintoc,.....	Neelgherries,.....	Similar, to do. but more bitter.
C. Tamala,.....	India,.....	Tej-pat leaves, or Folia Malabathri of Indian shops.
C. xanthoneuron,.....	Moluccas,.....	Similar to C. Culilawan, but extremely like Massoy bark.
C. zeylanicum,.....	Ceylon,.....	True cinnamon.
C. zeylan.; var. Cassia,	India,.....	Cassia lignea.—*O'Shaughnessy. page* 544.

Dr. Wight, in Icones, gives figures of the following 14 species :—

C. albiflorum,	140	C. nitidum,	124
C. aromaticum,	136	C. obtusifolium,	139
C. Culilawan,	137	C. ovalifolium,	125
C. dubium,	135	C. perpetuoflorens,	141,127,134
C. dulce,	138	C. recurvatum	133
C. iners,	122,122,130	C. villosum,	127
C. multiflorum, β	126,131	C. Zeylanicum,	123,134 7,126,9

It will be seen from the above that the genus contains several species, some of which yield Cinnamon and others Cassia, two aromatic barks which appear to differ from each other in little, except in the degree in which the aromatic principle exists in them. These products have been noticed at some length under the head Cassia. It was long supposed that a Ceylon plant called *Laurus* Cinnamomum yielded true Cinnamon, and another, called *Laurus Cassia*, produced the inferior Cassia bark of the coast of Malabar ; but, according to Nees von Esenbeck, at least two distinct species yield the Cinnamon of the shops, and it is altogether uncertain which out of several yields Cassia. Cinnamon has been known to European nations from very high antiquity. The Greeks procured it, together with the name, as Herodotus (iii. 111) remarks, from the Phœnicians, who are by some supposed to have formed the name Kinnamomon from kagu-manis, or Kaschu-manis, two Malayan words signifying sweet wood ('Annals of Philosophy', 1817); and Cassia itself may have originated in the same word Kaschu, 'wood.' That which is now chiefly consumed in England is the aromatic bark of a small tree found in the Island of Ceylon. With regard to *Cassia lignea*, or Cassia Bark, it seems altogether uncertain what it is that yields it ; whether it is some peculiar species, as it has long been supposed to be, or inferior samples of Cinnamon gathered in unfavourable seasons, or from trees growing in bad situations. The differences in Cassia-Bark are of such a nature as to render the last the most probable conjecture ; it possesses less aromatic oil, a circumstance likely to occur to trees in unfavourable situations ; and in proportion as the oil disappears there is an increase in mucilaginous and resinous matter. But on the other hand there are so many inert or comparatively inert species of *Cinnamomum*, that Cassia may very well belong to one of them. There is *C. dulce* in China, *obtusifolium*, *iners*, *Bazania*, and others, any of which may possibly yield such a bark. The question is however one more of curiosity than real consequence. The only important thing about Cassia was the supposing it to be furnished by what is really a most valuable species, and that error is now removed. Cinnamon of the genuine Ceylon kind is cultivated in Guyana, the island of St. Vincent, the Cape de Verd, Brazil, the Isle of France, Pondicherry Guadaloop, and elsewhere, and it is said that plants obtained from Paris by the Pasha of Egypt have thriven when transported to Cairo.

There is however no probability that the tree will succeed as an article of commerce in any country that has not the hot damp insular climate and bright light of Ceylon. With regard to Cinnamon and cassia Barks as they occur in commerce, we are most indebted to Nees von Esenbeck, who has paid great attention to the subject. According to him, the finest or Ceylon Cinnamon is procured from the three-year-old branches of the *Cinnamomum Zeylanicum* (Blume), which is found native in the island of Ceylon only ; the cultivation however has been extended to Java and to South America. Though found in various parts of the island, it is most abundant in the south-west part, near Colombo, and yields the best Cinnamon when growing in a sandy quartz soil. The time for stripping off the bark is from May to October. The bark, after being removed from the branches, is tied up in bundles for twenty-four hours, during which time a sort of fermentation takes place, which greatly facilitates the separation of the outer part of the bark from the cuticle and epidermis, which is very carefully scraped off the Ceylon Cinnamon. It is then rolled up into quills, or pipes, about three feet in length ; the thinner or smaller quills being surrounded by larger ones — a mark which always distinguishes Cinnamon from Cassia. It is then conveyed to Colombo, where it is sorted by Government inspectors into three kinds, of which the two finest alone were allowed to be exported to Europe, while the third, or inferior kind, was reserved to be distilled along with the broken pieces of the other two for the purpose of obtaining the oil of cinnamon. The select Cinnamon is formed into bales of about 92½ lbs. weight, containing some pepper or coffee, and wrapped in double cloths made of hemp, and not, as stated by some writers, of the cocoa-tree. This fine Cinnamon occurs in pieces about forty inches in length, generally containing from six to eight rolls or quills in each, one within the other, of the thickness of vellum paper, of a dull golden-yellow colour, smooth on both outer and inner surface. It is very fragrant, agreeably aromatic, taste pleasant, warm, aromatic, slightly astringent. Analysed by Vauquelin it yielded volatile oil, tannin in large quantity, an azotised colouring-matter, a peculiar acid, mucilage, and fæculum. The root of the Cinnamon tree yields a kind of camphor, and the leaves yield an oil which resembles oil of cloves, which it is often used to adulterate. This is quite distinct from the oil of cinnamon obtained from the bark. The ripe berries yield by decoction a solid volatile oil, similar to the oil of juniper. Cassia, according to Marshall and others, is the bark of the old branches and trunk of the *Cinnamomum Zeylanicum* already mentioned, while others assert that it is the bark of an entirely different species, namely, of the *Cinnamomum Cassia* (Nees

fratres, et Blume), a native of China, but cultivated in Java. This last view is much the more probable; for not only is no Cassia exported from Ceylon (except the rejected or third sort of Cinnamon, which is introduced into England incorrectly under that name), but almost all the Cassia which reaches Europe comes from Canton. Re-agents produce very different effects both on the infusion and oil of these two barks, which is a rational ground for believing them to be obtained from different species. Cassia is easily distinguished from Cinnamon. The bales in which it arrives are much smaller, containing only from two to four pounds, bound together by portions of the bark of a tree. The quills are thicker, rolled once or twice only, and never contain thinner pieces within; the diameter of the bark is much thicker than that of Cinnamon, and harder, the outer rind less carefully removed (large patches of the cuticle and epidermis often remaining upon it), the colour deeper, of a brownish fawn-colour (that raised in Guyana is yellowish), with the odour of Cinnamon, but fainter and less grateful; the taste more acridly aromatic, pungent, less sweet, at the same time more powerfully astringent and mucilaginous. Cassia is often substituted for Cinnamon, and it is also frequently adulterated with Cassia Lignea (which is the bark of a degenerate variety of the *Cinnamomum Zeylanicum*) Blume, growing in Malabar, Penang, and Silhet, with the bark of Cinnamomum *Culilawan*, and with portions which by distillation have been deprived of their volatile oil. Oil of Cinnamon is obtained chiefly from the fragments which fall from the quills during the inspection and sorting at Colombo. These fragments are coarsely powdered, and after being immersed for forty-eight hours in sea-water, are distilled, when a milky fluid comes over, which separates into two parts, a light oil which floats, and a heavy one which sinks in the water. Eighty pounds weight of Cinnamon yield about two ounces and a half of light oil, and five ounces and a half of heavy oil. About 100 gallons of oil of Cinnamon are annually obtained at Colombo. As the oil which is met with in commerce is a mixture of these two, the specific gravity is variable, 1·035 to 1·090. In time a spontaneous separation takes place, and there are formed beautiful transparent crystals of a stearoptin, or Cinnamon-Camphor. Sometimes benzoic acid is formed. Oil of Cassia is also obtained by distillation; at first it is whiter than oil of Cinnamon, afterwards it becomes yellow, but never of such a fiery yellow as Cinnamon-oil. The odour is agreeable, but not so delicate and Cinnamon-like taste, acrid, burning but different from Cinnamon. Specific gravity 1·0608, it reddens litmus paper. At a low temperature crystals show themselves, which disappear with an increase of heat. Some consider these a camphor, others benzoic acid. Benzoic acid unquestionably exists in this oil.

Oil of Cinnamon is adulterated with oil of Cassia-buds, with the oil of the *Cerasus lauro-cerasus*, or Cherry-Laurel, and it is also said with oil of bitter-almonds, an exceedingly dangerous intermixture.—*Eng. Cyc. p.* 1090.

(2653) CINNAMOMUM AROMATICUM, *Nees v. Esenb.*, from which Cassia Bark and Cassia Buds are supposed to be obtained, is a tree of considerable size. Branches angular, twigs and petioles covered with down. Leaves often nearly opposite, though usually alternate, oblong-lanceolate, acute at each end, triple-nerved, or with three nerves which unite into a single nerve above the insertion of the leaf-stalk, and disappear towards the apex of the leaf; the nerves are, like the twigs, covered with broken (strigulose) downiness, with curved veinlets on the under surface. Panicles narrow, silky. This is the *C. Cassia* of Blume, introduced from China, and the *Laurus Cassia*, t. 3. of the brothers Nees in their paper on the Cinnamon, also of Hort. Kewensis, ii. p. 427, and the Laurus Cinnamomum of Andrews's Repos. t. 595, often quoted 596. The leaves taste mucilaginous and Cinnamonic. Dr. Lindley says that as grown in stoves they are almost insipid, mucilaginous, and somewhat astringent. Dr. Royle received a specimen of this plant (named *Cinnamomum chinense*) from the Messrs. Loddiges, who informed him that it was imported by their house from China in 1790. This is probably the source of the various plants in hot-houses. The leaves taste mucilaginous but also aromatic.—*Royle, p.* 543. According to the Cyclopædia, *C. aromaticum* (Esenbeck), is the species which by some is believed to produce the Cinnamon of China and Cochin China. This plant, which is not uncommon in the hot houses of Europe, has long been reputed the kind that yields cassia but that opinion is also involved in doubt. It is said to grow in the dry sandy districts, lying north-west of the town of Faifoe, between 15° and 16° N. lat. The leaves are very much larger than in the true Cinnamon, they usually hang down from the stalks, have never more than three ribs, and never are in any degree cordate at the base; sometimes they are taper-pointed, sometimes blunt. The aromatic fruits called Cassia-Buds are also yielded by this species. [Cassia Buds.]—*E. C. p.* 1088. Some writers suppose the *Cinnamomum aromaticum*, the *Laurus cassia* of Linnæus, to be the chief source of the "Cassia Lignea" of commerce. Malabar cassia appears to be the produce of another species of *Cinnamomum* probably *C. eucalyptoides*, or *Malabathrum*. Dr. Wight, of the Madras Medical Service, in a report to the East India Company, expresses his belief that the Cassia producing plants extend to nearly every species of the genus Cinnamomum. "A set of specimens submitted for his examination, of the trees furnishing Cassia on the Malabar coast, presented no fewer than

four distinct species; including among them the genuine cinnamon plant, the bark of the older trees of which, it would appear, are exported from the coast as cassia. Three or four more species are natives of Ceylon, exclusive of the cinnamon proper, all of which greatly resemble the cinnamon plant, and in the woods might easily be mistaken for it and peeled, though the produce would be inferior. Thus we have from Western India and Ceylon alone, probably not less than six plants producing cassia, add to this nearly twice as many more species of cinnamomum, the produce of the more eastern states of Asia, and the Islands of the Eastern Archipelago, all remarkable for their striking family likeness; all, he believes, endowed with aromatic properties, and probably the greater part, if not the whole, contributing something towards the general result, and we at once see the impossibility of awarding to any one individual species the credit of being the source whence the cassia lignea of commerce is derived, and equally the impropriety of applying to any one of them the comprehensive specific appellation of cassia, since all sorts of cinnamon like plants, yielding bark of a quality unfit to bear the designation of cinnamon in the market, are passed off as cassia." The Cassia tree according to Mr. Crawfurd, is found in the more northern portion of the Indian isles, as in the Philippines, Majindanao, Sumatra, Borneo, and parts of Celebes. It is also grown on the western Coast of Africa. The principal seat of its culture is, however, the Malabar coast and the provinces of Quantong and Kingse, in China. The famous Cassia of China is incomparably superior in perfume and flavor to any spice of its class. Its native place is supposed to be the interior provinces of China. The market price is said to be £5 per lb.

(2654) CINNAMOMUM CULILAWAN is a native of Amboyna especially in Leitimoo near the villages of Saya, Rutton, and Ema. The bark when dry is aromatic like cloves, but less pungent and sweeter. It has some astringency, and owes its medicinal activity to a combination of volatile oil resin, and bitter extractive. It is useful in dyspeptic complaints, diarrhœas, &c. The natives of Amboyna use it both as an internal medicine and as a stimulating liniment.—*Eng. Cyc. page* 1089.

(2655) CINNAMOMUM EUCALYPTOIDES. Branches roundish, smooth; lower leaves elliptico-oblong, upper ones subovate, acute at the base, subattenuate, obtuse at the apex, 3-nerved, nearly veinless. Panicles sessile, subterminal and axillary. Flowers with silvery silkiness: segments of the perianth obovato cuneiform, deciduous from the middle—*Laurus Malabarathrica*, Roxb. Hort. Calc. p. 30. Wall. Cat. n. 2513, B. "Sapor et odor foliorum fortis et acris caryophyllorum cum levi camphoræ tinctura." The berry not seen.

(2656) CINNAMOMUM INERS. Nees. LAURINEÆ, Icon. 122 bis.

Sembela or pooli pilia, TAM.

This is a tall tree, rather slender in proportion to its height. The wood is fine, even grained and supposed very good, but apparently has never been used by the carpenters of Coimbatore, as none of them are acquainted with it.—*Wight.* Cassia has long been known to be a product of the forests of the Indian Peninsula. It is stated to have been a cause of jealousy between the Dutch and Portuguese that the latter sold some of the *Wild Cinnamon* growing in Cochin, &c. Buchanan, in his Travels in Mysore (ii. 336), mentions it as common on all the hills of the Malabar coast, also that Mr. Brown had planted it at Anjarakandy, as well as the Ceylon cinnamon (ii. 545—6). He states that at Mangalore it was called *Dhal-China* (that is, Cinnamon), and exported to Muscat, Cutch, Scind and Bombay; also that the buds of the tree were called *Cubob-China*, and likewise exported to the same place. This export still continues, as it appears by the reports of the commerce of Madras and of Bombay that 107,856 lbs. of Cassia, were exported from Malabar and Canara, and that in 1844—45, there were imported into Bombay from Malabar and Canara, of Cassia, 52,686 lbs. and of Cassia Buds, 69,860 lbs. Some of these probably find their way into the English market. This plant Dr. Wight considers to be the famous *Carua* of Rheede, Hort. Mal. i. t. 57, referring it, doubtfully however, to *C. iners*, Reinwardt, a plant of Java and Penang, but which seems to be sufficiently distinguished by being devoid of the aromatic qualities of the Malabar plan. *Cinnamomum iners* is however, closely allied to another species, *C. eucalyptoides*, which is intermediate between *C. iners* and *C. nitidum* (Nees). Dr. Wight's drawing of the Malabar Cassia Plant sent to the India House (*v.* his Icones), appears to Dr. Royle to agree very closely with that of *C. eucalyptoides*, given by Nees and Ebern., in their Pflanz Med. and which Nees v. Esenb. describes as Cinnamomum eucalyptoides of *Nees von Esenb.* The *Cinnamomum iners* of *Reinw.* is distinguished chiefly by the leaves being more lanceolate, 3-nerved, nearly veinless. Panicles pedunculate. Segments of the perianth deciduous below the apex. But both require careful re-examination with good specimens, and comparison with the Malabar plant, before any one can determine whether this be identical with either or different from both. In the latter case, it ought to be called *Cinnamomum Carua*. The Chinese *Cinnamomum aromaticum* might, no doubt be successfully cultivated where this thrives so well. Dr. Wight says, "a set of specimens (submitted officially to his examination) of the trees furnishing Cassia on the Malabar coast, presented no fewer than four distinct species, including among them the genuine Cinnamon

plant, the bark of the older branches of which it would appear are exported from that coast as Cassia." And besides, he infers that all sorts of Cinnamon-like plants, yielding bark of a quality unfit to bear the designation of Cinnamon, are passed off as Cassia. Mr. Huxham, of Quilon, also states, that the former is coarser and thicker than the latter. Both are obtained from the same tree, the Cassia being the bark of the larger parts of the tree and the Cinnamon being peeled from the younger shoots and small branches.—*Royle, p.* 544.

(2657) CINNAMOMUM JAVANICUM, is a tree with a trunk 20 feet to 30 feet high, growing in Java and Borneo. The bark is of a deep cinnamon-brown colour, more bitter than Culilawan bark, and the leaves, when rubbed, have a very sharp aromatic odour. Blume says the bark deserves the attention of medical men on account of its powerful anti-spasmodic properties.—*Eng. Cyc. page* 1089.

(2658) CINNAMOMUM LOUREIRII; grows on the lofty mountains of Cochin China, to the west towards Laos, Japan. The flowers of Cassia are produced by this species. The old and young branches are worthless, but the middle-sized shoots are superior to that of Ceylon, and are sold at a much higher price.—*Eng. Cyc. page* 1089.

(2659) CINNAMOMUM NITIDUM, is a shrub or small tree growing on the continent of India. It is the plant which furnished the principal part of the 'Folia Malabathri' of the old pharmacologists.—*Eng. Cyc. page* 1089.

(2660) CINNAMOMUM RUBRUM, grows in Cochin China, and contains an essential oil, like the last species, smelling of cloves, but not so agreeable.—*Eng. Cyc. page* 1089.

(2661) CINNAMOMUM SINTOC, grows on the Neilgherry mountains in Hindustan, and the higher mountains of Java. It is a tree 80 feet high. The bark is in quality very like the true Culilawan, but not so agreeable; it is more bitter and drier, and more powdery when chewed.—*Eng. Cyc. page* 1089.

(2662) CINNAMOMUM TAMALA, is a native of India, wild in Derwanee and Gongachora, cultivated in the gardens of Rungpoor. The taste of the leaves when dried is aromatic; they are sold in the shops under the name of folia Malabathri Tamalapathri of India.—*Eng. Cyc. page* 1089.

(2663) CINNAMOMUM XANTHONEURON, is a tree growing on the Papuan Islands and the Moluccas. The bark has great fragrance when fresh, but loses this quality in time. It is so extremely like Massoy bark as to be confounded with it.—*Eng. Cyc. page* 1089.

(2664) CINNAMOMUM ZEYLANICUM. BLUME. Laurus Cinnamomum. Cinnamomum tree. This is a native of Ceylon, and Java, and is cultivated in various parts of the world. Branches somewhat 4-cornered, smooth, leaves ovate or ovato-oblong, 3 nerved, flowers hoary or silky, segments oblong, deciduous in the middle, fertile stamens 9 in 3 rows, anthers 4-celled, 3 capitate, abortive stamens next the centre. Trunk 15 to 20 feet high, by 1½ feet in diameter. This is the source of the true cinnamon, and indeed nearly all parts of the tree are of value and importance.—*O'Shaughnessy, page* 539. The leaves of the Ceylon Cinnamon-tree, are of an oblong figure, generally more or less heart-shaped at the base; of a thick leathery texture, very smooth and shining on the upper side. The tree is supposed to produce a considerable number of varieties to which native names are given, but it is uncertain whether these are not, in part at least, distinct species. In addition to the aromatic oil contained in its bark, the root of the Cinnamon-tree yields camphor; the liber, oil of cinnamon; the leaves, oil of cloves; and the fruit a peculiar terebintaceous ethereal oil. When the branches are peeled, the finest sticks of Cinnamon are said to be obtained from the liber of the middle sized branches, an inferior sort from the youngest shoots, and that which is produced by the thickest branches is considered of very little value. It is said to require a rich sandy soil mixed with vegetable earth. Some degree of shade is necessary to the young plants, which therefore are not cultivated in open plains, but in spaces in the woods where a few large forest-trees are left scattered about to shade them. In about six or seven years from the time they are sown, young cinnamon bushes are from four to six feet high: they are not however generally barked before the ninth year. The cinnamon peeling begins in May, at the end of the rains, and lasts till November; the operation of peeling consists in nothing more than slitting the bark longitudinally and then cutting it across, so that it can be readily turned back from the wood, and it is the more easy in consequence of the shoots which are cut for peeling not being more than three years old.—*Eng. Cyc. page* 1088.

(2665) CINNAMON.

Darsini, ARAB	Cinnamomum, Canella, LAT.
Kurundu, CYNG.	Kaimanis, MALAY.
Kaneel, DUT.	Dulchenee, PERS.
Cannelle, FR.	Canella, PORT.
Zimmet, Kanehl, GER.	Canela, SP.
Tuj, Dalcheenee, GUZ. and HIND.	Carrnwa puttay, TAM.
Canella, IT.	Sanalinga putta, TEL.
	Darasita, SANS.

Cinnamon is the Bark of Cinnamomum Zeylanicum, *Nees von Esenbeck*, (*Laurus Cinnamomum*, Linn.), and *True Cinnamon* of the shops. Cinnamon is the *Kinnemon* of Exod. xxx. 23 (see Bible. Cycl. ii. p. 210), and the κινναμωμον of Herodotus, a name which he states the Greeks learned from the Phœnicians. The name seems derived from the Cingalese

Cacynnama (dulce lignum), or the Malay *Kaimanis*, which Mr. Marshall says is sometimes pronounced *Kainamanis*. (*v. Antiq. of Hind. Med.* 84 and 141.) The Cinnamon tree of Ceylon is about 30 feet high. The root has the odour of Cinnamon as well as that of Camphor, and yields this principle upon distillation. The twigs are somewhat 4-cornered, smooth, shining, and free from any downiness. The leaves are liable to variation, ovate, or ovate-oblong, terminating in an obtuse point, triple or three-nerved, that is, there are three principal nerves, which sometimes remain separate to the very base, but usually approach each other a little above the base, but without uniting; there are, moreover, in many cases, two shorter nerves external to these. Leaves reticulated on the under side, smooth, shining, the uppermost the smallest, with a good deal of the taste of cloves. The leaf-buds are naked. Panicles terminal and axillary. Flowers usually bisexual, rather silky. Perianth 6-cleft segments oblong, the upper part deciduous. Fertile stamens 9, in 3 rows, and 3 inner with 2 sessile glands at the base. Anthers ovate, 4-celled the 3 interior opening outwards. 3 abortive capitate stamens (staminodia) in the interior of all. Ovary 1-celled, with a single ovule. Stigma disk-like. Drupe (or berry) 1-seeded, seated in the cup-like six-lobed base of the perianth. Seed large, with large oily cotyledons: embryo above.—Native of Ceylon, now cultivated elsewhere, as on the Malabar coast, in Java, Cayenne, &c.— *Nees von E. as Laurus Cinnamomum* 128. *Sl. and Ch.* 121.

Ceylon Cinnamon.—Cinnamon is cultivated in plantations situated on the south-west of the island of Ceylon, between Negombo and Matura, where the soil is nearly a pure quartzose sand, the climate damp, showers frequent, and the temperature high and equable. (*Dr. Davy.*) Trees may be cut when six or seven years old. Branches three years old, or which are from half an inch to three inches in diameter, are selected and lopped off, commencing in May and continuing till October. The bark is divided by longitudinal incisions, of which two opposite to each other are made in the smaller shoots, several in the larger, and then peeled off in strips. After twenty-four hours, the epidermis and the green matter under it are scraped off after the strips of bark have been placed on a convex piece of wood. The bark soon contracts into the form of quills, which are about forty inches in length, of which the smaller are introduced within the larger ones, and form the ordinary rolls of Cinnamon. They are dried first in the shade and then in the sun, and sorted into Cinnamon of different qualities, known in commerce as first, second, and third Cinnamon. It is imported chiefly from Ceylon; some also from Tellicherry on the Malabar coast, probably grown at Anjarakandy. (*v. Royle, p.* 371, and *Buchanan's Mysore, p.* 546.) Some is also exported from other parts of the Madras presidency, where it was long since introduced by Dr. Anderson, and grown at Tinnivelly, &c. *v. Roxb. Fl. Ind.* ii. *p.* 296. It has been exported from Quilon *v. Royle, p.* 544. Besides Cinnamon, Oil of Cinnamon is produced and from the ripe fruits a fatty substance called *Cinnamon Butter* is expressed, which *Royle* supposed to be the *Comacum* of Theophrastus. (*Antiq. of Hind. Med.* p. 546.) He finds it noted in Rheede, *Hort. Mal.* i. p. 110. Ceylon Cinnamon of the best quality is in long and slender cylindrical bundles, about forty inches in length, composed of numerous quills rolled up within one another, each about the thickness of cartridge paper, smooth, pliable, breaking readily with a splintery fracture, and easily powdered. The colour of the bark is a dull, yellowish-brown, now usually called a Cinnamon-colour. The surface is intersected by pale glistening fibrils. It has a pleasant, grateful odour, a warm, sweetish, and very agreeable taste. Besides the three qualities of Ceylon Cinnamon, it is also imported of different qualities from the Malabar Coast; and Dr. Wight has ascertained that the Cassia of the Indian Peninsula is sometimes exported as Cinnamon. *v. Royle, p.* 544. But the Cinnamon plant itself has been introduced into so many places, that small quantities are occasionally imported from them, as for instance from Cayenne. Some of these are employed for adulterating the superior and more expensive Ceylon Cinnamon. The inferior kinds are thicker and less grateful, and more resembling Cassia. Analysed, Cinnamon is found to contain Volatile Oil (about 6 parts in 1000), Tannin (of the nature of Catechu Tannin), Mucilage, Resin, Colouring matter, Cinnamic acid, and Ligneous fibre. Oil of cinnamon is imported into Britain from Ceylon, being obtained by macerating the powdered rejected bark in a saturated solution of salt, and then distilling. The water which passes over is milky, from holding the Oil in suspension; but this soon separates. About 8 ounces are obtained from 80lb. of recently prepared Cinnamon. Some of it is heavier and some lighter than water. For a long time the Dutch depended solely for their supply of this bark for the home market on the produce of the wild cinnamon trees in the King of Kandy's territories there. At last, from the increasing demand, they resorted to the growth and more careful culture of the tree themselves. About the year 1794, the cultivation had succeeded so well that they were enabled to meet the demand for the spice from trees of their own growth, independent of any supplies from the Kandian monarch's territory. In 1796, when this island fell into British hands, the local government endeavoured, after the former fashion of the Dutch, to restrain the production of this article of commerce within due bounds, by destroying all

above a certain quantity. General Maitland, in 1805, and his successors in the government, seeing the folly of such a ridiculous policy, very wisely fostered and promoted the extended cultivation of cinnamon plantations. In the island of Java, and in Cochin-China, cinnamon culture has within the last few years made considerable progress. The leaves of the cinnamon tree, when first developed, are of a bright red hue, then of a pale yellow, and lastly of a dark shining green; when mature, they emit a strong aromatic odour if broken or rubbed in the hands, and have the pungent taste of cloves. The young twigs of the true cinnamon tree are not downy, like those of the cassia bark. The plant blooms in January and February, and the seeds ripen in July and August. The blossoms grow on slender foot-stalks, of a pale yellow color, from the axillæ of the leaves and the extremity of the branches. They are numerous clusters of small white flowers, having a brownish shade in the centre, about the same size as the lilac, which it resembles. The fruit is a drupe, about the size of a small hedge strawberry, containing one seed, and of the shape of an acorn, which when ripe is soft and of a dark purple color. The roots are fibrous, hard, and tough, covered with an odoriferous bark; on the outside of a greyish brown, and on the inside of a reddish hue. They strike about three feet into the earth, and spread to a considerable distance. Many of them smell strongly of camphor, which is sometimes extracted from them. The trees in their wild state will grow ordinarily to the height of 30 feet. The trunk is about three feet in circumference, and throws out a great number of large spreading horizontal branches, clothed with thick foliage. When cultivated for their bark, the trees are not permitted to rise above the height of ten feet.

Eastern Archipelago and its general range. According to Mr. Crawfurd, Cinnamon, the Kayu-manis, or sweet-wood of the Malays, the true cinnamon of Ceylon, is certainly not a native plant of any island of the Asiatic Archipelago, nor are the cinnamons of Cochin-China and China. Most of the large islands, however, produce one, or perhaps several species, with little aroma, and consequently of little value. A cinnamon of this description is produced in Java, Sumatra, Borneo, and Luzon, but is described as most abundant in Mindano. Of late years, however, the cinnamon of Ceylon has been cultivated with some success in Java, and in the British settlements in the Straits of Malacca, and as the climate is suitable and the plant a hardy one, requiring but a moderate fertility of soil, it seems to be one of the exotics most likely to succeed. —*Crawfurd Dic: page* 100. But although, (according to Mr. Crawfurd) the true cinnamon is not a native of the islands of the Eastern Archipelago, Marshall, in his description and history of the tree, ("Annals of Philos," vol. x.) assigns very extensive limits to its cultivation. He asserts that it is found on the Malabar coast, in Cochin-China, and Tonquin, Sumatra, the Soolo Archipelago, Borneo, Timor, the Nicobar and Philippine islands. It has been transplanted, and grows well in the Mauritius, Bourbon and the eastern coast of Africa; in the Brazils, Guiana, in South America, and Guadaloupe, Martinique, Tobago, and Jamaica: but produces in the West a bark of every inferior quality to the Oriental. Rumphius has remarked, that the trees which yield cinnamon, cassia, and clove bark (*Cinnamomum Culilaban*), though so much alike, are hardly ever found in the same countries. The term clove bark has been applied to the barks of two different trees belonging to the natural order *Laurineæ*. One of these barks is frequently called "Culilaban bark." It consists of almost flat pieces, and is obtained from *Cinnamomum Culilaban*, a tree growing in Amboyna, and probably other parts of the Moluccas. The other bark, known as clove bark, occurs in quills, which are imported from South America. Murray says it is produced by the *Myrtus caryophyllata*, a tree termed by De-Candolle *Syzigium caryophylleum*. It appears, however, that this is an error, for both Nees and Von Martius declare it to be the produce of *Dicypellium caryophyllatum*; and the last quoted authority states that this tree is the noblest of all the laurels found in the Brazils, where it is called "Pao Crao." It grows at Para and Rio Negro.

Cultivation—Cinamon may be propagated by seeds, plants, or layers; roots also, if carefully transplanted, will thrive in favourable localities, and yield useful shoots in twelve months. It is usually cultivated from suckers, which should not have more than three or four leaves, and require continual watering. If raised from seed, the young plants are kept in a nursery for a year or two, and then transplanted; but the trees from seeds are longer in arriving at maturity. The plants are kept well earthed about the roots to retain the moisture, and cocoa-nut husks are placed above them, which in time form an excellent compost. A cinnamon plantation, even in a favorable locality seldom yields much return until eight or nine years have elapsed. The mode of cultivation pursued by the natives differs from that followed in the plantations of the Europeans. The native system is to allow the cinnamon to grow large before cutting; the European practice is to cut it young. The result is that the native produces quantity, but coarse; the European produces quality, but less in quantity. Native growers, consider the bush or tree decidedly weakened by its being kept down by constant cutting twice a year; and that their plants are stronger and better. The two systems might be judiciously blended. In cutting the cinnamon sticks for peeling, as the

Europeans do it twice a year, there is always risk of losing much valuable young wood, which is destroyed in slashing into the bushes with *cattles* (bill-hooks) to take out that which is in a fit state for peeling, all of which is so much loss from the next cutting; and on this ground we should be inclined to advocate cutting once a year. There are, we know, other considerations than the mere growth of the sticks to be taken into account. Of these may be named the time when the bark peels best from the stick, which of course must depend upon age as well as season, the excited or unexcited state of the shoots, and their several effects upon the quality of the spice. Weeding the plantations does not seem to be of so much consequence, if the shrub gets plenty of free air all round it. Cinnamon land continues to yield abundantly crop after crop, not for years but for scores of years. The greater portion of the late preserved plantations in Ceylon were planted by the Dutch, one hundred years ago, and the bushes are stated to be as vigorous as ever, and quite likely to go on yielding crops till the year 2000. This productiveness can only be accounted for on Liebig's principle of returning to the soil a portion of what we take from it. In the operation of peeling cinnamon, the tops and lateral branches are cut off, and left by the peelers on the ground close to the bushes. These, no doubt, furnish a considerable quantity of manure to the plants. The general appearance of the plantation is that of a copse, with laurel leaves and stems, about the thickness of hazel; occasionally a tree may be seen which, having been allowed to grow for seed, has reached a height of forty or fifty feet, with a trunk eighteen inches in diameter. When in full bloom, the cinnamon bushes have a very beautiful appearance, the small white petals affording a most agreeable contrast with the flame-colored extremities of the upper, and the dark green of the inferior foliage, with the blossoms of various lovely parasitical plants. The cinnamon tree flourishes only in a small portion of the island of Ceylon. It is chiefly confined to the south-west angle, formed by the sea coast, from Tangalle in the south to Chilaw on the west. It is in a climate of agreeable temperature, which is at once hot and moist; hot from its tropical position, and moist from the frequency and plentifulness of rains. The general level of the country is low, in the midst of fresh-water lakes, divided from the sea by a narrow riband of land. And the water in the soil of the cinnamon gardens is of extraordinary purity, so as to be for that reason much in request in the neighbouring city as a beverage. This exact combination of influences does not occur anywhere else in the island, at least not in the same degree. The cultivation principally centres round Colombo, the capital and principal port. On the hills and valleys, in the neighbourhood of Kandy, which have a temperate climate, the tree flourishes well: a rather elevated situation, with shelter, contributing to the luxuriance of the plants. The best soil for it appears to be a pure quartz sand, which in some places rests on black moss or mould. From the surface to the depth of a few inches, this sand is as fine in its nature and as pearly white in its appearance as the best table salt; but below that depth and near the roots of the bushes, the sand is greyish. A specimen of this soil being carefully dried by Dr. Davy, was found to consist of 98·5 silicious sand, 0·5 vegetable matter, and 1·1 water —in 100 parts. This circumstance impresses one very strongly on visiting the cinnamon gardens; it seems so strange to see a plain of pure quartz sand whitened in the sun, and yet covered over with a luxuriant growth of trees. In richer soils the aroma does not seem to develop itself in the same concentrated form. A mixture of loam and peat, with sand, is said, however, to form a good soil in some localities. These plantations may well suggest a doubt as to the truth of the proposition so unqualifiedly laid down by some authors, that "earth destitute of organic matter cannot sustain vegetation." Certainly it is not organic matter which supports the cinnamon trees of Colombo.

Peeling.—The best cinnamon is obtained from the stalks or twigs, which shoot up in a cluster of eight or ten together from the roots, after the parent bush or tree has been cut down. These shoots are cut once in about three years, close to the ground. Great care is requisite, both as to the exact size and age; for if the bark is too young it has a green taste, if too old it is rough and gritty. These shoots yield an incomparably fine cinnamon bark. When cut for peeling they are of various sizes and lengths, depending on the texture of the bark. These rods afford the hazel-like walking sticks so much esteemed by strangers, and which, though difficult to be procured during the prevalence of the oppressive cinnamon regulations, may now be very easily obtained from proprietors of grounds producing that spice. Cinnamon is barked at two periods of the year, between April and December. Those suckers which are considered fit for cutting, are usually about three-fourths of an inch in diameter, and five feet or more long. The first operation is to strip them of the outside pellicle of bark. The twigs are then ripped up lengthwise with the point of a knife, and the liber or inner bark gradually loosened, till it can be entirely taken off. While drying they are cut up into long narrow rolls, called "quills," then stuck into one another, so as to form pipes about three or four feet long, which are afterwards made up in round bundles. During the first day the cinnamon is suspended under shelter upon open platforms, and on the second day it is placed on wicker-work shelves, and exposed to

the sun until sufficiently dry to be examined and sorted for shipment. It is brought home in bags or bales of 80 or 90 lbs. weight, and classed before export into three sorts; first, second, and third quality. The different kinds of cinnamon bark may be thus classified, according to quality.

1. That which ranks above all others in quality, is known by the Singhalese name of *penne* or *rasse kuroondu*, sharp sweet, or honey cinnamon.

2. *Naya kuroondu*, snake cinnamon.

3. *Kapoorn kuroondu*, camphorated cinnamon, from the very strong smell of camphor which it possesses. This variety is principally obtained from the plantations of the interior.

4. *Kahate* or *canalle kuroondu*, astringent cinnamon. In this species the bark peels off very easily, and smells agreeably when fresh, but it has a bitter taste.

5. *Savel kuroondu*, mucilaginous or glutinous cinnamon. This sort acquires a very considerable degree of hardness, which the chewing of it sufficiently proves. It has otherwise little taste, and an ungrateful smell; but the color is very fine, and it is often mixed with the first and best sort; the color being much alike, excepting only that in the good sort some few yellowish spots appear towards the extremities.

6. *Dawool kuroondu*, or drum cinnamon. The wood of this tree, when grown hard, is light and tough, and the natives make some of their vessels and drums of it. The bark is of a pale color.

7. *Nika kuroondu*, wild cinnamon, whose leaf resembles that of the nicasol (*Vitex Negundo*). The bark of this tree has neither taste nor smell when peeled, and is made use of by the natives only in physic, and to extract an oil from to anoint their bodies.

8. *Mal kuroondu*, flowering cinnamon, because this tree is always in blossom. The substance of the wood never becomes so solid and weighty in this as in the other named species, which are sometimes nine or ten feet in circumference. If this ever-flowering cinnamon be cut or bored, a limpid water will issue out of the wound; but it is of use only for the leaves and bark.

9. *Toupat kuroondu*, trefoil cinnamon, of which there are three varieties, which grow in the mountains and valleys of the interior about Kandy.

10. *We kuroondu*, white ant's cinnamon. The first-named four of these are, however, alone varieties of the *Cinnomonum verum*. Good cinnamon is known by the following properties:—It is thin and rather pliable; it ought to be about the substance of royal paper, or somewhat thicker. It admits of a considerable degree of pressure, and bends before it breaks; the fracture is then splintering. It is of a light color, approaching to yellow, bordering but little upon the brown; it possesses a sweetish taste, at the same time it is not stronger than can be borne without pain, and is not succeeded by any after-taste. The more cinnamon departs from these characteristics, the coarser and less serviceable it is esteemed; and it should be rejected if it be hard, and thick as a half-crown piece; if it be very dark colored or brown; if it be very pungent and hot on the tongue, with a taste bordering upon that of cloves, so that it cannot be suffered without pain. Particular care should be taken that it is not false-packed, or mixed with cinnamon of a common sort.

Malacca Cinnamon.—The following remarks, by Mr. Dunewille, of Malacca, as to the suitability of the Straits' Settlements for cinnamon culture, are interesting, although in some instances a repetition of previous observations:—It appears, from experience, that the soil of Ceylon is more favourable to the growth of cinnamon than to that of any other aromatic plant, and I find the climate of Ceylon, if at all, differs but in a very slight degree from that of the Straits. I therefore conclude that the spice, if cultivated in the Straits, will prove superior to that of Ceylon, if one may judge from the various spices that grow here almost wild, and it would moreover yield a better return than in Ceylon. My supposition is confirmed from having seen the spice which was prepared last year in Pringet by the Honorable Resident Councillor of Malacca, and which I found to be equally as good in every respect as that grown and cultivated in the maritime provinces in Ceylon. A sandy soil is that which is generally selected for cinnamon, but other soils may be chosen also, such as a mixture of sandy with red soil, free from quartz, gravel, or rock, also red and dark brown soils. Such land in a flat country is preferable to hilly spots, upon which, however, cinnamon also grows, and are known by the name of the "Kandian Mountains." The soil that is rocky and stony under the surface is bad, and not adapted for the cultivation of cinnamon, as the trees would neither grow fast, nor yield a remunerative return. When a tract of land of the above description is selected, the whole of the ground should be cleared, leaving a few trees for shade, to which the laborers might return for rest and relaxation; these may be from 50 to 60 feet apart. The trees felled should be well lopped, burnt and cleared away, the stumps should be removed with roots, after which they may be allowed to remain, in order to save expense of carriage, merely by observing some degree of order in the disposition, by forming regular rows of which the intervening spaces are planted with cinnamon. The ground being thus cleared, holes may be dug at eight to ten feet apart, and of one foot square; the distance from each plant will depend upon the nature of the soil:—that is, the poorer the soil, the nearer to each other should the trees be planted, and *vice versa*. When

this operation is over, should the holes be intended for cinnamon roots, or stumps, the latter must be carefully removed with as much earth as can be carried up with them and placed in the holes, taking care not to return the earth removed originally in digging the holes, which are to be filled with the soil scraped from the surface, which has been previously burnt, exposed, and formed into manure. Should no rain have fallen after the placing of the roots in the holes, the stumps should be well covered, and watered morning and evening, until such time as the sprouts shoot out fresh buds, which will be in a fortnight or so from the time they were transplanted, when the watering may be discontinued. In a month the new shoots will be three or four inches high; this much depends upon the weather. If the holes be intended for young plants or seedlings, the plants must be removed with boles of earth from the nurseries, and placed in the holes, taking the same care as with the stumps, both in watering and covering, in the event of its being dry weather. When the seedlings take root, the coverings should not be removed until the plants throw out a new pair of leaves from the buds, which is a sign of their having taken root. When a plantation is formed of old stumps, all the branches should be cut down within six inches from the ground; this should be done with one stroke of a sharp instrument, in order to avoid the splitting of the stem. From these stumps cinnamon may be cut and peeled within eighteen months from the time of transplanting. Often this is done after the lapse of twelve months from the time of transplanting. From seedlings one cannot expect to gather a crop before two or three years from the time the plants were transplanted, when there will be but one or a single tree, which when cut down as already shown, four or six inches to the ground, ought to be covered with fresh earth gathered from the space between the rows, and formed in a heap round the plant. The next crop will be three or four times as much as the first, from the number of sprouts the stem will throw out, and so on every year, the crop increasing according to the number of sprouts each stem will throw out yearly from the cuttings. In the course of seven or eight years, the space left between the rows will only admit the peelers and others to go round the bushes, weed, clear and remove cuttings, as the branches from each bush will almost touch each other at their ends. It is essentially necessary to take every care not to allow any creepers or other weeds to grow, the former interfere with the growth of the bushes by entangling, because it not only takes out so much of the support feeding the cinnamon trees, but interferes with the peelers during the cutting season, and prevents the branches growing up straight with a free circulation of air. The plantation ought to be kept clean and free from weeds; the cinnamon requires no manuring, but when the plantation is weeding the bushes should be covered with the surface soil and raising the ground round the bush by making a heap of the earth, which answers well in lieu of manure. This operation must be attended to as soon as the cinnamon sticks are removed for peeling. The plantation requires weeding three or four times a year during the first two or three years, then twice a year will answer the purpose; as by that time the trees will form into bushes and destroy the seeds of the weeds on the ground. The forming of a nursery is necessary, for which a space of ground, say an acre, should be selected in a rich bit of soil free from stones. Clear the whole brushwood, only leaving the large trees for shade, remove all stones, stumps, and roots, dig the place well six or eight inches deep, then form into long beds of three or four feet wide, put the seeds down nine or twelve inches apart, cover them eight or twelve inches above the ground by a platform, and water them every other day until the seeds grow up and give one pair of leaves, then leave off watering (unless great dry weather prevail, when it ought to be continued) but not uncover until the plants grow up six or eight inches high, and can bear the sun; these seedlings will be ready for transplanting after three months from the time they were sown. The forming of nurseries is done at the close of the year, before December. When this is done first, the party commences clearing and preparing the land during the dry season, which is from the beginning of December up to the end of March following. April will set in with heavy rain (it is generally so in Ceylon), and it will continue wet weather till the end of August, very often till September and October, and you have the benefit of four or five months rain. The cinnamon seeds are to be gathered when they are fully ripe, they must be heaped up in a shady place, to have the outside red pulp rotted, when it turns quite black, then have the seeds trampled or otherwise freed from the decomposed pulp, without injuring the seeds, and well washed in water (just as is done to cherry coffee, before they are made into parchment in the whole shell). Finally, have the seeds well dried in the air without exposing them to the sun, and then put them in on the ground prepared for their reception. In washing the seeds, those that float on the surface should be rejected. If cinnamon seeds after washing be exposed to the sun, even for twenty minutes, the shells will crack in two, and this prevents the seeds from growing. There are five different sorts of cinnamon, viz.:—

1st	is	called	Panny Meers	Carundoo.
2nd	,,		Tittha	,, ,,
3rd	,,		Kahatte	,, ,,
4th	,,		Wallee	,, ,,
5th	,,		Savell	,, ,,

Of these, the first kind is the best of all, the 2nd and 3rd, although inferior, are peeled likewise, the 4th and 5th are spurious. The distinction in the cinnamon can be known both by taste, and by the shape of the leaves on the tree, and experienced "Challya" men will judge the cinnamon by first sight. The quality of the bark depends upon its situation in the branch, that peeled from the middle of the bush or branch being the *most superior*, and classed as 1st sort, that taken from the upper end is the 2nd quality, while the bark removed from the base of the branch, or the thickest end, is the inferior, and called the 3rd sort. From the cinnamon bark refused in the sorting store of all kinds, in separating the first, second and third qualities and in making bales for exportation, the refuse is collected, and by a chemical process cinnamon oil is extracted, which sells very high, with an export duty of 3s. or 1½ rupees on each ounce, exclusive of the British duties payable in England for importation, which is at present one shilling and three pence per pound. No export duties exist in the Straits Settlements. Of the cinnamon roots camphor is made, which sells well both in Ceylon and other parts of the world. Cinnamon, as a medicine, is a powerful stimulant, but it is not much used alone. It is generally united with other tonics and stimulants, but its ordinary use is to mask the disagreeable odor and taste of other medicines. The oil of cinnamon is prepared by being coarsely powdered and macerated in sea water for two days and two nights, and both are put into the still. A light oil comes over with the water, and floats on its surface; a heavy oil sinks to the bottom of the receiver, four hours before the light oil separates from the water, and whilst the heavy oil countines to be precipitated for ten, twelve, or sometimes fourteen days. The heavy oil, which separates first, is about the same color as the light oil, but sometimes the portion which separates last has a browner shade than the supernatant oil. The same water can be used advantageously in a second distillation. Professor Duncan informs us that 80 lbs. of newly-prepared cinnamon yield about 2½ ozs. of oil, which floats upon the water, and 5½ of heavy oil. The same quantity of cinnamon, if kept in store for many years, yields 2 oz. of light oil and 5 oz. of heavy oil. Cinnamon oil is obtained from the fragments of bark which remain after peeling, sorting, and packing. It is distilled over with difficulty, and the process is promoted by the addition of salt water, and the use of a low still. The oil thus obtained by distillation is at first of yellow color, but soon assumes a reddish brown hue. It has an odor intermediate between that of cinnamon and vanilla, but possesses in a high degree both the sweet burning taste and the agreeable aromatic smell of cinnamon. It is heavier than water, its specific gravity being 1·035. The ripe fruit of this tree yields a concrete oil called cinnamon suet, which was formerly employed to make candles for the Kandian kings. An oil, called clove oil, is also distilled from the leaf, which is said to be equal in aromatic pungency to that made from the clove at the Moluccas. The following were the quantities sold, and the average prices realised during the Dutch rule in Ceylon:—

			s.	d.	
1690	3,750	bales sold at	4	8	all round.
1709	3,750	,,	4	6	,,
1710	3,500	,,	4	4	,,
1720	5,000	,,	4	4	,,
1740	4,000	,,	9	3	,,
1760	5,000	,,	8	5	,,
1780	2,500	,,	12	6	,,
1784	2,500	,,	17	4	,,

The last quotation appears to have been the highest ever obtained for cinnamon, for 17s. 8d. average would give about 22s. for the first sort In later years we find the deliveries and prices to have been as follows:—

			s.	d.	
1824	5,934	bales sold at	6	6	all round.
1828	3,918	,,	6	0	,,
1830	5,649	,,	7	8	,,
1842	1,018	,,	—		,,
1845	3,245	,,	—		,,

The comparative exports of cinnamon from Ceylon in the first six months of 1853, as compared with the same period of 1852 are as follows:—

	1853. lbs.	1852. lbs.
Quarter ending 5th January ...	99,778 ...	93,291
,, 5th April ...	73,815 ...	135,248
Total.....	173,593 ...	228,539

The diminished export was caused by the prospective abolition of the export duty, which came into operation on the 1st July last. The quantity that will be sent to the English market by the close of the year (1853) will be something prodigious compared with the average consumption. From October 10, 1852, to July 22, 1853, the shipments were 496,326 lbs.

RETURN OF CINNAMON EXPORTED FROM CEYLON, SHOWING THE QUANTITY AND VALUE.

Year.	Quantity. lbs.	Value. £	Year.	Quantity. lbs.	Value. £
1836 ...	724,361 ...	—	1845 ...	408,211 ...	40,821
1837 ...	558,110 ...	—	1846 ..	491,956 ...	49,165
1838 ...	398,198 ...	—	1847 ...	447,369 ...	44,736
1839 ...	596,592 ...	—	1848 ...	491,688 ..	49,168
1840 ...	389,373 ...	—	1849 ...	733,782 ...	73,378
1841 ...	317,919 ...	24,857	1850 ...	644,857 ...	64,485
1842 ...	121,145 ...	15,207	1851 ..	500,518 ...	50,051
1843 ...	662,704 ...	66,270	1852 ...	427,667 ...	42,766
1844 ...	1,057,841 ...	105,784			

The question of the export duty on cinnamon has, during the last twenty years, occupied a considerable space in Ceylon correspondence and the Island journals. This duty was first imposed in 1832, on the abolition of the Government monopoly, and was then fixed at the rate of 3s. per lb. on all qualities. From the 19th April, 1835, it was fixed at 3s. per lb. on the best, and 2s. on the second quality. It was reduced in

January, 1837, to 2s. 9d. on the first and second sorts, and 2s. on the third ; and in June, 1841, to 2s. on all qualities ; in 1843, to 1s. ; and in September, 1848, to 4d. per lb. Such a rate of export duty could be maintained only on an article for which there was a considerable demand, and which could not be supplied from other places, and this was for a long time the case. The circumstances are now different, and the abolition of the duty, which has so repeatedly been brought under the notice of the Treasury, has at length been determined on. The quantity of cinnamon, &c., taken for consumption in the United Kingdom, scarcely amounts to 2,800 bales per annum. The sale and consumption is nearly stationary, and cinnamon is only in demand for those finer purposes for which cassia, its competitor, cannot be used. Whilst Britain imported the large amount of 700,095 lbs. in 1850, only 28,347 lbs. went into consumption. The consumption has declined in the last two years to about 21,500 lbs. Cinnamon is now imported into the United Kingdom duty free. The land under cultivation with cinnamon in Ceylon is about 13,000 acres, principally in the western and southern provinces. The number of gardens being eleven at Kaderane, seven at Ekelli, seven at Morotto, six at Marandham, and two at Willisene.

Khasya Hill Cinnamon.—In the Khasia Hills, the trade in Cinnamon is of recent introduction, and was much encouraged by Mr. Inglis, to whose exertions, the people there are so greatly indebted ; the cinnamon is the peeled bark of a small species of *Cinnamomum* allied to that of Ceylon, and though inferior in flavour and mucilaginous (like cassia), finds a ready market at Calcutta. It has been used to adulterate the Ceylon cinnamon ; and an extensive fraud was attempted by some Europeans at Calcutta, who sent boxes of this with a top layer of the genuine to England. The smell of the cinnamon loads was as fragrant as that of the fish was offensive. —*Hooker Him. Journal, Vol.* II. *page* 309.

Straits of Malacca Cinnamon.—Several enterprising planters have recently commenced the cultivation of this spice at Singapore and Malacca. The plants already promise well. Indeed there can be little doubt of its thriving, as the tree has been long grown in gardens and pleasure grounds in those settlements, as an ornamental plant, and has always flourished. The Ceylon article is being supplanted in the continental markets by a cheaper one, of China and Malabar growth.

Java Cinnamon.—The Javanese, tempted by the fatally high prices caused by the excessvie duties on our Colonial spice, smuggled a quantity of seed, and with it a cinnamon cultivator, out of the island, and have since paid considerable attention to its growth. The Dutch have at present more than five millions of plants, equal to upwards of 5,000 acres, the greater part of which are in tolerably full bearing. The cinnamon trees in Java begin to blossom in the month of March. They do not all flower at the same time, but in succession. The fruit begins to ripen in October in the same manner, so that the crop lasts from October to February. In Ceylon the blossom begins to appear in November. The seeds when plucked ought to be fully ripe, and after being separated from the outer pulpy covering, should be dried in the shade. They can be kept for two or three months in dry sand or ashes, but must not be exposed to the sun, as they would split, and thus be rendered useless. The plants in nurseries must be well sheltered from the sun and heavy rains, but the plants are strengthened by the covers being removed at night when heavy rains are not expected to fall, and in the day time when only light rains prevail. The mode of planting out, cultivation, preparing the bark, &c., appears to be the same in Java as that practised in Ceylon. The only difference is that while in Ceylon the cinnamon, when ready for market, is packed in " gunny" or canvass bags, in Java it is put into boxes, made of wood free from any smell or flavor which would injure the spice. The inferior cinnamon, however, is packed in straw mats. The following is a return of the extent of cinnamon culture in Java :—

	In 1840.	In 1841.
Residencies in which cinnamon is cultivated,	10 ...	10
Number of plantations, ...	48 ...	49
,, families devoted to this culture..	7,901 . .	9,688
,, paid *budjans*, ...	294 ..	345
Extent of ground occupied by the cultivation, in *bahus* of 71 decametres, ...	1,690 ...	1,880
Cinnamon trees of which the bark can be taken, ...	1,106,566 ...	1,407,213
Young trees in the parks, ...	2,478,427 ...	2,565,774
For renewing, ...	307,000 ...	86,803
Total....	3,891,998 ...	4,059,787
Cinnamon crop, in Dutch lbs	57,074 ...	38,219
,, refuse, ...	23,283 ...	82,803

The number of trees peeled in 1842 was taken at 1,824,599, and the crop reckoned at 108,905 lbs. In the residency of Bantam, four trees suffice to produce a pound of cinnamon, whilst in the other residencies eleven trees must generally be stripped to furnish the same quantity ; in 1839 one pound could scarcely be obtained from thirteen trees. This cultivation increases each year, and the quantity of the produce improves, whilst the expenses diminish. However, the Dutch Government has judged it proper not to extend it, although the soil of Java appears favourable to this culture. From 200,000 to 300,000 lbs. of true cinnamon, not freed from its epidermis, is exported annually from Cochin-China.

JAVA CINNAMON SOLD IN HOLLAND.

	lbs.		lbs.
In 1835	2,200	In 1841	23,900
„ 1836	1,300	„ 1842	13,000
„ 1837	1,600	„ 1843	23,000
„ 1838	2,100	„ 1844	101,400
„ 1839	4,700	„ 1845	134,500
„ 1840	7,900	„ 1848	250,550

STATISTICS OF PACKAGES IN LONDON.

	1842.	1843.	1844.	1845.
Imported	2,196	4,458	9,197	8,909.
Exported	3,661	3,964	6,712	6,081.
Duty paid	838	738	801	1,912.
Stock	2,709	2,622	4,230	5,549.

Simmonds, p. 393.

London Market.—"Four kinds of cinnamon are distinguished in the London markets; namely Ceylon, Tellicherry, Malabar, and Java cinnamon. The latter however, is rarely met with. A fifth kind, called Cayenne, occurs in French commerce. "1. Ceylon cinnamon.—This is the most esteemed kind. The fasciculi or compound quills, of which the bales are made up, are about three feet six inches long, slender and shivery, and are composed of several smaller quills, inclosed one within the other. The bark is thin (the finest being scarcely thicker than drawing-paper,) smooth, of a light yellow-brown, or brownish-yellow colour, moderately pliable, with a splintery fracture, especially in the longitudinal direction. The inner side, or liber, is darker and browner, and contains, according to Rees, small medullary rays filled with a red juice, and which he regards as the peculiar bearers of the aroma. The odour of the bark is highly fragrant. The flavour is warm, sweetish, and agreeable. Inspection and tasting are the methods resorted to for ascertaining the qualities of cinnamon. Ceylon cinnamon is characterized by being cut obliquely at the bottom of the quill, whereas the other kinds are cut transversely. In the London market, three qualities of Ceylon cinnamon are distinguished; viz, first, seconds, and thirds, inferior kinds thicker, darker, browner, and have a pungent, succeeded by a bitter, taste. "2. Tellicherry or Bombay cinnamon, is grown on one estate only, at Tellicherry, by Mr. Brown, and is wholly consigned to Messrs. Forbes and Co., only 120 or 130 bales are annually imported. In appearance, it is equal to the Ceylon kind, but the internal surface of the bark is more fibrous, and the flavour is inferior. It is superior to the Malabar variety. "3. Madras or Malabar cinnamon, is of inferior quality. It is coarser and inferior in flavour to the other kinds. In thickness, it approximates to cassia lignea. Its quality has annually deteriorated since its introduction into the market. It does not meet with a ready sale, and it is expected that its importation will cease. "4. Java cinnamon. This is said to be equal in quality to the Ceylon sort. "5. Cayenne Cinnamon. This is unknown in the London market. Its volatile oil is more acrid and peppery than the oil from Ceylon cinnamon."—*Hassel's Food and its adulterations, p.* 399.

(2666) CINNAMON OIL.

Tuj-ka-teil. Dalcheenee-ka-teil. HIND.

Is generally prepared from the coarsest part of the bark, by maceration in sea-water, and then distilling with a slow fire. It is one of the most powerful stimulants in the *Materia medica*. The finest has the flavour of cinnamon, and the inferior a considerable mixture of the clove taste. Cassia oil is sold in Bombay under the designation of cinnamon oil; no importations of the latter kind into Bombay being on record during the last few years.—*Faulkner.*

(2667) CINNAMON STONE. A precious stone of a red colour, with occasionally a brown or orange tinge; translucent, rarely transparent, and lustre resinous. They are procured in Ceylon and Brazil.—*Faulkner.*

(2668) CINNAMON TREE, WOOD. The Wood of the Cinnamon tree is used for fuel, and for some articles of furniture: the roots are said to contain a large quantity of pure and very volatile Camphor, highly esteemed in Ceylon. It has been introduced into Sicily, the Cape de Verd Islands; Brazil; the Mauritius, Pondicherry; Guadaloupe, St. Vincents, and Cayenne, the produce of the last locality being inferior only to that of Ceylon.—*O'Shaughnessy.*

(2669) CISSAMPELOS. Nemooka, HIND.

The extract of Pareira is a valuable astringent diuretic in doses of twenty grains dissolved in water thrice daily. The extract of nemooka affords a good substitute for this useful article. An infusion of neemooka is also made. In its use, and dose, it is the same as the infusion of Pareira, for which the nemooka is an efficient substitute—*Beng. Phar. p.* 302.

(2670) CISSUS QUADRANGULARIS. Lin. Seed and leaf of the four-angled cissus.

Perundei codie and elley, TAM.	Nulleroo vitooloo and akoo, TEL.
Nillur kee binj and paat, DUK.	Vajira vullie. SANS.
Harjora, *Hind.*	*Ainslie's Mat. Med. p.* 260.

Stems four angled, winged and jointed; it has all the properties of a parasite; the stems are succulent, and beaten up into a paste, are given by the natives for asthma.—*Riddell.*

(2671) CISTUS, CISTACEÆ. ROCK-ROSE.—This genus of ornamental plants are mostly used for ornamenting rock-work, though some grow to the height of four feet: they do well in most garden soils, and may be cultivated either from seed or by cuttings.—*Riddell.*

(2672) CITRIC ACID.—*Lat.* Acidum Citricum. Is obtained from lime juice by a chemical process, and is met with in beautiful and variously modified crystals. It is employed by calico printers; in the form of lime-juice it is used as an acidulous drink, and in preventing scurvy.—*Faulkner.*

(2673) CITRON. The citron is cultivated in Tenasserim, and Mr. Mason has met with citron trees in the jungles apparently indigenous. The fruit however, is much inferior to the Bengal citron.—*Mason.* See CITRUS MEDICA.

(2674) CITRONELLA OIL, is described by Simmonds as a product of the Citronella grass much grown in the southern province of Ceylon, and about Galle; several estates in the neighbourhood of which city, are cultivated with it. The exports of this oil, from Ceylon, in the three years 1850 to 1852 were,

Year.	ounces.	Value.
1850	80,048	£3,344
1851	114,959	3,742
1852	131,780	2,806

Simmond's Comm. Products, page 573. See ANDROPOGON.

(2675) CITRUS, a genus of Aurantiaceous Plants, one of whose species yields the orange, another the Lemon, and others the Citron, Shaddock, Lime, and similar fruits. Among the other genera of the natural order to which it belongs, it is known by its stamens being numerous and irregularly combined into several parcels, and by its fruit having a leathery rind which can be easily separated from the pulpy part that lies beneath. Independently of the historical facts that citrons and lemons at least were obtained from the Persians, it is certain from the researches of Wallich and other Indian botanists that it is among the lower ranges of hills in Nepaul, and extending most probably into China also, that the wild plants of the genus *Citrus* find a home. It is added that the Sweet Orange itself comes from the southern provinces of China and the Malayan Archipelago, but it is by no means clear that the plant in those countries is really wild. It is however beyond all question also of eastern origin.—*Engl. Cyc. page* 1120.

(2676) CITRUS ACIDA. Acid Lime. Lin.

Neemboo, HIND.

A variety of Citrus Limonum.

(2677) CITRUS AURANTIUM. Orange.

Elimitchum pullum, TAM.	Cherroo Narrange, MALAYALUM.
Neemboo, HIND. DUK.	Nemma pundoo, TEL.
Lemon, ARAB.	Jambira, SANS.
Jerook, MALAY.	

Aglfastier, in his "Padaurtasindaumanic (a treatise on the qualities of aliments), says a great deal in praise of this fruit, particularizing its virtues in putting a stop to bilious vomitings and its good effect in maniacal cases. It is much used by the Natives in making sherbet; and is termed Cherroo Narrange in Malayalum.—*Ainslie, p.* 224.

Citrus Aurantium, Var. Orange.

Dubbakai, pullum, TAM.	Dubba pundoo, TEL.

The Dubbakai is a large coarse, and rather austere fruit of the orange kind, very common in the Northern Circars.—*Ainslie, p.* 224.

Citrus Aurantium, Lin.

Kolinjie pullum. TAM.	Jerooc Manis, MALAY.
Naringhie, DUK.	Kounla, HIND.
Kichilie pundoo, TEL.	Swadoo Naringa, SANS.
Madra Narrange. MAL.	

This variety of the orange fruit (of which there are various sorts) is in high estimation amongst the Tamool Medical Practitioners, who suppose that it purifies the blood, improves the appetite and cures Catarrh.—*Ainslie.* The wood of the Orange tree is not available of any size, or in any quantity—*M. E. J. R.* This tree is now extensively cultivated all over the Deccan. The finest sorts are the Cintra, Cowlah, and a small sweet orange which grows on a tree more like a creeper. The principal method of culture is by budding, the stocks generally being either seedlings or cuttings from the sweet lime. The best Cintra, with a thin close rind, is produced upon the seedling stock, and it is said that the fruit grown upon the sweet lime stock is generally loose and soft: this is very perceptible with some of the oranges. The best time for budding is in the cold season.—*Riddell.* The leaves are rather bitter, and contain essential oil. A still more fragrant oil, called oil of *neroli* by the perfumers, is afforded by the flowers. The berries while unripe are gathered, dried, and turned in the lathe to the size of peas, and are used in issues on account of their fragrant odour. The rind or peel of the orange is bitter and aromatic, and affords a very useful stomachic tincture and syrup. The juice of the ripe fruit contains sugar, malic and citric acids, citrate of lime, mucilage, albumen, and gum. Like the lemon juice it makes an excellent cooling drink, and is an invaluable specific in the treatment of scorbutic diseases. The seeds of the orange yield oil by expression.—*O'Shaughnessy.*

(2678) CITRUS BERGAMIA, large lime. Large varieties of the acid lime are diffused all over the Tenasserim Provinces; and Europeans usually call them citrons; but the trees are easily distinguished by their leaves, as the leaf of the citron is simple, while that of the large lime is winged.—*Mason.*

(2679) CITRUS DECUMANA, *Lin.* Shaddock or Pumplemose.

Poomlimas pullam. TAM	Poomplemoos, MALAY.
Chukotrah. DUK.	Paravata. SANS.
Chukkoturu, HIND.	

This is the shaddock of the West Indies and though now seldom seen on fashionable tables in India, is certainly a fine fruit. It is cooling and aperient and in taste somewhat resembles a fine orange.—*Ainslie, p.* 231. It is the largest of the orange tribe, and is universally cultivated in Southern Asia in gardens; the varieties are red and white—the former preferred by some persons. The tree grows to a large size in a rich soil, and requires much pruning: the best time for doing this is when the crop of fruit is off. Fruit as fine as any seen has been produced

at Ellichpoor from the seed of a pumplemose brought from Bombay. The tree, when planted, should have a space of twelve feet all round it: the blossom is used for flavouring sweetmeats.—*Riddell.*

(2680) CITRUS GALGALA. At Lahore, a species of lemon the size of a doubled fist, called Galgala, is pickled for domestic use and much eaten by the natives.—*Honigberger, p.* 258.

(2681) CITRUS JAPONICA, the "Kumquat," is extensively grown by the Chinese in pots and at one season of the year is literally covered with its small, oval, orange-coloured fruit. This as well as various other species of the orange is mixed with the forced flowers, and together produce an excellent effect. I think if the "kum-quat" were better known, it would be highly prized for decorative purposes during the winter months. It is much more hardy than any other of its tribe; it produces its flowers and fruit in great abundance, and it would doubtless prove a plant of easy cultivation. In order, however, to succeed with it as well as the Chinese do, one little fact should be kept in view, namely, that all the plants of the orange-tribe which bear fruit in a small state are grafted.—*Fortune, p.* 122.

(2682) CITRUS LIMETTA, Bergamot lime, or Sweet lime. This species is chiefly remarkable for the abundance of essential oil afforded by the rind, and which constitutes an important article in commerce, under the name of oil of Bergamot. It is much used by perfumers.

(2683) CITRUS LIMONUM. Lemon tree.
Jambira, Sans; Nimbooka, Neboo, Lembo, Beng. Hind.

Of the Lemon or Lime, there are so many varieties that they can hardly be described separately. The large and small yield abundance of acid juice, and the tree is easily cultivated by layers, which soon throw out root fibres. The lime, which is of the smaller description, does not bear fruit so quickly as the larger sorts, but if carefully pruned, and watered, will continue fruiting all the year round, and be very productive. The *Sweet Lime, Meeta Neemboo,* is a sweet variety, and grows to the size of a large orange. It is easily propagated by seed. The juice of the fruit is very grateful to persons with fever, although rather tasteless. It will also grow from cuttings. The young shoots make a very good stock for orange grafts.—*Riddell.* The *Essential Oil of lemons,* is yellow, light, very volatile. It is prepared by rasping the lemons until the oil-vesicles are removed. These are then pressed between glass plates, and the expressed juice allowed to stand till the impurities subside. This oil is composed of 10 atoms carbon and 8 atoms hydrogen, (citrene). If a current of muriatic acid gas be passed through it at a low temperature, it concretes into a solid mass of neutral crystals, containing 1 atom of muriatic acid, and forming a salt called muriate of citrene. This oil is used chiefly to give flavour to various medicinal mixtures, and is seldom or never employed by itself. Its rind called *Lemon peel* is of a pale yellow colour, rough, dotted, odorous, and bitter; it is used principally, like the oil, for imparting its aromatic taste to medicines, and as a gentle stomachic stimulant. Its juice, the *Lemon juice* of commerce, contains nearly 2 per 100 of citric acid, water 97½, the remainder being gum, malic acid, and extractive matter. It is a most grateful and useful material for the preparation of cooling drinks. Mr. Pereira gives a good formula for these beverages, which are particularly useful in fever cases;—two lemons sliced, two ounces of sugar, two pints of boiling water, mixed and allowed to settle and cool. In scurvy, lemon juice has long been esteemed as a certain specific. As it is difficult to preserve the juice on long voyages, citric acid and the essential oil have been in most cases substituted for the juice itself.—*O'Shaughnessy.*

(2684) CITRUS MEDICA, Citron. (Μηλεα μεδικη of Dioscorides.)

Comuttee madalum pullum, Tam.	Lemon Sussu, Malay.
Turenj, Pers and Duk.	Matooloonga, Sans.
Madipala, Tel.	Kurua-neeboo; Bejoura, Hind.
Utrej, Arab.	*Ainslie, page* 223.

The Citron grows to a large size, the outer rind very rough and covered with excrescences, and when ripe of a deep yellow colour and fragrant; used to form a preserve, and the juice is made into lemonade. It is propagated by cuttings, layers, or seed.—*Riddell.*

(2685) CITRUS MONOPHYLLA. This species of Citrus grows wild along the western Ghauts of the Peninsula of India.—*Riddell.*

(2686) CITRUS TOROSA. This is a species of Citrus at Tavoy with a leaf that looks like two leaves joined together, the wings on the petiole being as broad, or even broader, than the leaf itself. The fruit is small and there are two varieties, one with a smooth, and another with a rough skin. Mr. Mason does not find it noticed in any of our Indian Floras, but Dr. Pickering met with a similar tree on the Samoan Islands, a member of the Philippine Flora.—*Mason.*

(2687) CITRUS TRIFOLIA. This Citrus is a native of China, and is about the size of a marble.

(2688) CITRUS VULGARIS, Bitter, Seville orange. *Syn.* C. Bigarradia, (Duhamel.) The leaves differ from those of the sweet orange by the petiole only. The flowers are alike in both species. The rind of the fruit is bitter, acrid, and hot to the taste, the pulp acid and bitter, the seeds excessively bitter. The bark of the tree participates in these qualities. The rind of the fruit is used in making the celebrated liqueur *curacoa.*—*O'Shaughnessy.*

(2689) CIVET.

Civet, Dut.	Zabad, Arab.
Civette, Fr.	Ruse, Malay.
Zibeth, Ger.	Dedes, Jav.
Zibetto, It.	Kasturi, Sans.

Civet, a substance used in perfumery, has a powerful scent, resembling musk and ambergris. It is obtained from the civets (Viverra), a genus of carnivorous animals, approaching nearest in their form and habits to the fox and the cat. But the distinctive character of the civets consists in an opening near the tail, leading into a double cavity of considerable size, furnished with glands for the secretion of this odorous substance. When the secretion is in excess, the animal frees itself from it by a contractile movement, which causes the civet to ooze from the bag. This is carefully collected and sold (not without adulteration with butter or oil, to increase its weight) at a very high price.—*Eng. Cyc.* In Malay and Javanese this perfume is known by the native names of rase and dedes, but the Sanscrit Kesturi and the Arabic zabad corrupted jabad, are also used as synonyms. In the Eastern Archipelago, this article is produced by two distinct species of Viverra, rase and zibetha, which are kept in a half domesticated state for the purpose of yielding it. The first is a native of Java, and the last of the other large Eastern islands, where the natives of rank are great consumers of this perfume, a not generally acceptable one to Europeans.—*Crawfurd Dic. p.* 100. A variety of this termed Poollughoo Shuttum, *Tam.* Javad, *Duk.* Civet Cat Perfume. Ghendamaly alubeeyum, *Sans.*, is an inferior sort of Musk bag procured from a species of civet cat, zibetha, found in many parts of lower Hindoostan. This animal is called in Tamil, Poollughoo poonay, and in Telugoo, Poonghoo pillie. The article is chiefly used by the people as a perfume and in the preparation of certain liniments.—*Ains. Mat. Med. p.* 192. These animals are carefully kept and tended in North Africa, for the sake of the perfume: they are also common in South America and in the forests of Japan. Civet contains free ammonia, resin, fat, and extractiform matter, and a volatile oil to which its odoriferous properties are due. It is imported into England from the Brazils and from Guinea. When genuine, it is worth from 30 to 40 shillings an ounce.—*Tomlinson, page* 375.

(2690) CIVET, MALACCA. Viverricula Malaccensis.

Viverra malaccensis, ...	Gmelin.
„ *Itasse*.....	Horsfield.
„ *Gunda*, ...	Buchanan Hamilton MSS.
„ *indica*,.....	Geoffroy.
„ *bengalensis*, ...	Gray: Illustr.
„ *pallida*	Gray: Illustr.
Genetta manillensis, ...	Eydoux.

The Indian civet-cats secrete an odoriferous substance identical with civet, though not the civet of commerce. This species is not infrequently found in the villages, and its secretion enters into the Burmese Materia Medica.—*Mason.*

(2691) CIVET, ZIBETH.

Viverra Zibetha, ...	Linne.
„ *undulata*, ...	Gray.
„ *melanurus*, ...	Hodgson.
„ *orientalis*, ...	„
„ *civettoides*, ...	„

This is another species of civet cat, not so abundant as the preceding, which the Burmese call "the horse-cat," from the mane on its neck. —*Mason.*

(2692) CLADANTHUS. Compositæ. Cladanthus Arabicus.—These are small dwarf plants, bearing yellow flowers, and grow in any soil.—*Riddell.*

(2693) CLARET. A term generally used to designate the red wines, the produce of the Bordelais The most esteemed are, Lafitte, Latour, Chateau-Margaux, and Haut-Brion. In France, *Claret* is a general name for all rose coloured wines, and what the English call Claret is styled Bourdeaux.

(2694) CLARKIA. Onagraceæ—These are handsome annuals which make a showy display in flower borders, their colours are rose, white and purple, they ripen seed in abundance which may be sown in any good soil.

(2695) CLAY, a compound, or perhaps only a mixture, of the two earths, alumina and silica, with water. Clay is an essential ingredient in all fertile soils. The following are some of the common varieties of clay :—

1. *Pipe-clay.* Namum, *Tamil*, ; Khurra, *Dukhanee.* This is of a greyish white colour, with an earthy fracture, and a smooth greasy feel; it adheres to the tongue, and is very plastic, tenacious and infusible. When burnt it is of a cream colour, and is used for tobacco-pipes and white pottery. This is found in abundance in several parts of lower India and is used for nearly the same purposes that it is in Europe. The different castes of Hindoos, too, employ it for making the distinguishing marks on their foreheads, and (moistened with water) it is often applied round the eye, in certain cases of ophthalmia, as well as to parts of the body that are bruised.

2. *Potter's clay* is of various colours, chiefly reddish or grey, and becomes red when heated. Mixed with sand it is formed into bricks and tiles. This is abundant in Southern Asia.

3. *Stourbridge clay* resembles potter's clay to a certain extent, but is far more refractory in the fire. It is of a dark colour, owing probably to the presence of carbonaceous matter. It is extensively used in making crucibles, glass pots, &c.

4. *Brick-clay* or *loam* also abundant in Southern Asia. It varies greatly in appearance, texture and composition, its colour depending on the proportion of oxide of iron contained in it.

5. *London clay* is a very extensive deposit of a bluish clay. Near the surface, however, it has often the usual clay colour.

6. *Plastic clay* skirts the London clay within the London chalk basin, and it appears also at the Isle of Wight. This formation comprises a variable number of sand, clay, and pebble beds, alternating irregularly, and lying immediately upon the chalk. The sand-beds of this formation supply the deep well in and about London with soft water.—*Tomlinson, page* 376.

7. *Porcelain clay* is very abundant in Southern and Eastern Asia. The clays of Tenasserim have not been analyzed, but there are clays at the bases of some of the granite mountains, where the felspar has decomposed so much, that the paths are thick with a coarse quartzose sand, and a few grains of mica that remain. As porcelain clay is produced by the decomposition of felspar, such is probably the clay in the localities to which reference has been made.—*Mason.*

8. *Fire clays* are procurable at Streepermatoor, Tripasoor, Chingleput, Metapolliam, Cuddapah.—*Dr. Hunter.*

(2696) CLEARING NUT. Strychnos Potatorum.

(2697) CLEMATIDEÆ. The name is derived from Clema, a vine branch, from the climbing properties of the family. This tribe is acrid and poisonous; the leaves and fresh stems, if bruised and applied to the skin, cause vesication. Royle describes 10 Himalayan species. There is one, the *Clematis gouriana*, abundant among the ruins of Gour, and which doubtless participates in the properties of the others. In France the *Clematis vitulba* is used by mendicants to cause artificial sores for the furtherance of their impostures. In Cochin China, according to Louriero, the *Clematis sinensis* is used as a diuretic and diaphoretic. At the Mauritius the *Clematis mauritiana* is employed to blister the cheek for the relief of tooth-ache. No species of Clematis is admitted in the British pharmacopeiæ —still from the experiments of Storck, Wendt, and Mueller with several species, in the treatment of syphilis, scrofula, and rheumatsim, there seems much reason to hope for beneficial effects from the cautious trial of the Indian kinds. Storck used an infusion of 2 scruples of the dried leaf in a pint of boiling water, the dose 4 ounces thrice daily.—*O'Shaughnessy, p.* 160.

(2698) CLEMATIS. Griffith says there is one species, the virgin's bower, of this northern genus in the Tenasserim Provinces "with simple fleshy leaves."—*Mason.*

(2699) CLEMATIS GOURIANA. The Gouriana or Traveller's joy, flowers white, at the close of the rains, and gives out a very strong perfume, it is a hardy plant grows in any soil. The whole species are adapted for trellis work and easily increased by dividing the plants. The colours are various, white, blue, lilac, yellow, &c. —*Riddell.*

(2700) CLEMATIS WIGHTIANA.

(2701) CLEOME. There are about fifty species of the genus *Cleome* described; many of them are now referred to the genus *Polanisia*. Most of them are worth cultivating on account of their beauty. The shrubby species do best in a rich light soil. In England, they may be propagated by ripened cuttings in a moderate heat under a hand-glass, or by seed. The seeds of the annual species should be sown on a hot-bed in spring, and when the young plants are of sufficient size they may be planted out in the open border but not before the middle of May. The biennial species must be kept in the stove; they may be propagated by cuttings, as the shrubby species.—*Engl. Cyc. p.* 1132.

(2702) CLEOME PENTAPHYLLA. This and other species of this genus are very pretty and grow well in a light rich soil, the colours of the flowers are white, red, purple and yellow, cultivated easily from seed.—*Riddell.* Mr. Jaffrey mentions, Cleome pentaphylla, syn. Gynandropsis, *Valay-keeray*, T., as a common weed in cultivated places; a variety with rose colored flowers, is cultivated in flower gardens. The leaves of the wild varieties are used as greens in soups, &c.—*Jaffrey.* Cleome pentaphylla, grows plentifully at Lahore, but the seeds are little used by the Hakims, they use them in convulsions, those of Cleome viscida are said to be anthelmentic.—*Honigberger, p.* 258.

(2703) CLEOME VISCOSA. VISCID CLEOME. Hoorhooriga, HIND.

This is a very common annual weed in Rajwarra especially at Ajmeer; the plant has a very strong nauseous smell, the seeds are eaten in curries.—*Genl. Med. Top. p.* 201.

(2704) CLERODENDRON. One of this genus grows in the Terai, forming a large shrub beneath every tree, generally intermixed with ferns, as polypodium, Pteris, and goniopteris, and its sweet odour is born far through the air. Clerodendron leaves bruised, are used to kill vermin, fly-blows &c. in cattle, and the twigs form tooth-picks. Its flowers are presented to Mahadeo, as a god of pence; milk, honey, flowers, fruit (ambrosai) &c. being offered to the pacific gods, as Vishnu, Kishna, &c. while Mudar (Calotropis, Asclepias) Bhang, Cannabinus sativus, Datura, flesh, blood, and spirituous liquids, are offered to Siva, Doorga, Kali and other destroying deities.—*Hooker Him. Jour. Vol.* 1, *p.* 387.

(2705) CLERODENDRON, DOUBLE FLOWERED CLERODENDRON. The Burmese cultivate a fragrant double clerodendron, which appears to be a variety of the next species.—*Mason.*

(2706) CLERODENDRON, FRAGRANT CLERODENDRON. In the most arid parts of the Tenasserim forests, during the hottest months of the dry season, the path of the traveller is perfumed by the fragrant flowers of a large leaved species of clerodendron. Major Macfarquhar

sent specimens to the Agricultural and Horticultural Society of Calcutta a few years ago, but they were unable to determine the species satisfactorily.—*Mason.*

(2707) CLERODENDRON INFORTUNATUM, is a bark used by the Arabian and Indian doctors.—*Honigberger, p.* 258.

(2708) CLERODENDRON NUTANS, NODDING CLERODENDRON. The Karen mountain glens of Tavoy and Mergui are embellished with one of the most elegant flowering shrubs that ever beautified a landscape—it is the nodding clerodendron. The flowers are tinged with rose, but nearly white, growing in long panicles at the extremities of the branches from which they make a graceful curve, and hang down perpendicularly from ten to fifteen inches, like an inverted cone, so that the soft greening foliage seems canopied with rosy-white vails. The flowerets are few, the divisions of the panicle being remote, and each bearing only three or five flowers. The divisions and subdivisions being all rectangular, and each blossom hanging from its pedicel like an ear drop, order and beauty are inseparable associations with this rare plant. It deserves a place in every conservatory, yet from Loudon's Encyclopedia of plants before me, it had not reached England when that was printed; and it is not in Wright and Eaton's Botany of North American plants, indigenous and cultivated. The shrub blooms in the dry season, and rarely exceeds in its native soil, more then ten feet in height.—*Mason.*

(2709) CLERODENDRON SQUAMATUM, SCARLET CLERODENDRON. The Burmese compounds are ornamented with this species of clerodendron, which bears a large cone of superb scarlet flowers, and, although said to be originally from China, it appears to be naturalized on this Coast.—*Mason.*

(2710) CLIMATE. Meyen, in his division of the horizontal range of vegetation, into zones, extends,—1. *The equatorial zone* to fifteen degrees on both sides of the equator. In this division we shall find the Cape Verd Islands. Sierra Leone, Ascension and St. Helena, the republic of Liberia, the European and native settlements in the Gulf of Guinea and on the Western Coast of Africa; Abyssinnia, Zanzibar on the East Coast, Mocha and Aden in the Red Sea, the northern portion of Madagascar, the Seychelles, the Madras Presidency, Northern India, Ceylon and the Nicobar Islands, Sumatra, Siam, Malacca, Singapore and the Straits Settlements, Cochin China, the Philippine Islands, Borneo, Celebes and the Moluccas, Java and Madura, Banca, the Johore Archipelago, Timor and the eastern group of Islands, with New Guinea, a large portion of Northern Australia, the Marquesas, Society's and other Oceanic islands. In South America the Republics of Peru, Bolivia, Ecuador, New Granada and Venezuela, British, French and Dutch Guiana, and a large portion of the empire of Brazil; Trinidad, Barbados, and most of the islands in the Carribean Sea. This zone has a mean temperature of 78½ to 82½ Fahrenheit.

2. *The tropical zone* reaches from the 15th deg. on each side of the equator to the tropics in 23 lat. The mean temperature is 73½ to 78½ deg. Summer temperature 80½ to 86 deg.; winter temperature in the eastern coast districts, 59 deg. In this region is comprised the following countries:—Sandwich Isles, Canton, in province of China, Burmah, Calcutta, and a portion of the Bengal Presidency, the Bombay Presidency, Madagascar, Mauritius and Bourbon; the southern portion of Brazil, Cuba, St. Domingo, Mexico, and Central America.

3. *The sub-tropical zone* extends from the tropics 23 to 34 deg. of latitude. There are a number of tropical fruits in this region. The winters are mild and vegetation is green throughout the year. In the northern division of the zone palms and bananas grow on the plains. In this region is comprised all the extreme northern portions of Africa, coasting the Mediterranean, comprising Algiers and the Barbary States, Egypt, part of Persia, Cabool and the Punjab; the greater portion of China, Lower California, Texas, the South-Western States of America, the Bermudas, the Cape Colony and Natal, New South Wales, Southern and Western Australia—the Government settlements in the Northern Island of New Zealand, the largest portion of Chile, Paraguay, Uruguay and the Argentine Republics, the Provinces of Brazil from St. Paul to Rio Grande, Madeira and the Canary Isles. To define accurately the conditions of temperature which a plant requires to maintain it in a flourishing condition, we must ascertain within what limits its period of vegetation may vary, and what quantity of heat it requires. This most remarkable circumstance was first observed by Boussingault, but unfortunately we do not as yet possess sufficiently accurate accounts of the conditions of culture in the various regions of the earth, to enable us to follow out this ingenious view in all its details. His theory is, that the time required by a plant to arrive at maturity is as the inverse ratio of the temperature; therefore, knowing the mean temperature of any place, and the number of days which a plant takes to ripen, the time required at any other point more or less elevated, can easily be ascertained. Peter Purry, a native of Switzerland, who settled in Charleston in the eighteenth century, in a memorial to the Duke of Newcastle, then Secretary of State, sets out with this postulate, that "there is a certain latitude on our globe, so happily tempered between the extremes of heat and cold, as to be more particularly adapted than any other for certain rich productions of the earth; among which are silk, cotton, indigo," &c.—and he fixes on the latitude of 33 deg. whether north

or south, as the one of that peculiar character. The following Table, showing the climate, duration and production of certain plants cultivated in tropical America, is from the proceedings of the Agricultural Society of Grenada. The second column gives the altitude in English yards above the level of the sea. The third, the mean temperature by Fahrenheit's thermometer. The fourth, the average time required to commence bearing. The fifth, the number of plants in a spanish "fanegada" of 170 varras, about 150 square yards. The sixth, the average duration of each plant. The seventh, the average produce of each plant in the year :—

	2 Level of the Sea, to	3 Mn.Temp. Deg. Min.	4 Time required.	5 No. of plants.	6 Years.	7 Average produce.
Cacao (*Theobroma Cacao*), ...	587 yds.	81·17 46·00	6½ yrs.	1156	40	1¼lb. per tree.
Plantain (*Musa paradisiaca*, ...	630 yds. to 1077	81·17 46 00 4·061	9 mths. 9½ „ 11 „	3613	30	50 plantains.
Indian Corn (*Zea mays*), ...	1077 1260 to 1890 2880	81·17 40·61 36to37·8 25·20to27	90 days. 110 „ 120 „ 180 „	28,900	Annual.	238 for every seed planted.
Manioc or Cassava,	1077 1195	81·17 40·61 43·00	10 mths. 12 „ 120 days	28,900	Biennial	One cassava weighing ¾ lb. & ¼ oz. starch.
Coco nut (*Cocos nucifera*), ...	630	81·17 46·00	5 yrs. 6 „	452	60	4 bottles oil per tree.
Tobacco (*Nicotiana tabacum*),...	360 1077 1980	81·17 46·00 40·61 33·30	150 days 170 „ 180 „ 225 „	28,900	Annual.	½ lb. *dried* to each 5 plants.
Cotton (*Gossypium*)	630 1077 1415	81·17 46·00 40·61 34·61	6½ mths. 7 „ 7½ „ 9 „	28,900	3½	½ lb. nett per plant.
Coffee (*Coffea Arabica.*)	230 630 1077 to 2250 2453	47 46 37·80 to 39·60 33·30	24 mths. 25 „ 28 „ 36 „	5,300	45	1½ lb. per tree.
Sugar-cane (*Saccharum officinarum.*) ...	630 1080	84·17 46·00 41·40	11 mths. 12 „ 14 „	28,900	5	10 per cent. sugar upon the weight of the raw cane.
Indigo (*Indigofera tinctoria.*)...	90 630 1077	48·60 46·00 40·61	2½ „ 3 „ 3½ „	57,800	1½	70 plants produce 1 lb. coloring matter.
Potato (*Solanum tuberosum.*)...	1080 1980 2700	38·70 33·30 27·00	140 days. 165 „ 210 „	116,600	Annual.	4½ lb. each plant.
Wheat (*Triticum aestivum.*)...	567 1170 2520	42·30 38·70 32·99	80 „ 100 „ 120 „	57,800	Annual.	37 for every seed planted.

The plantain bears at 1,529 yards, in a temperature of 61 deg. Fahrenheit, and requires fifteen months, but its cultivation is of little benefit in so high a latitude. It is the same with the cassava root. The cane at 1,160 altitude, in a temperature of 66 deg., gives no sugar; and indigo at 1,620 affords no coloring matter.—*Simmonds, page* 10. Dr. Royle gives the following arrangement of the countries of which the plants will grow in the different parts of India.

Tropical & East-Indian Islands, Tropical Africa, Brazil, Guiana, West-Indies, and Florida.	Travancore, Cochin, Malabar, Ceylon, Malayan Peninsula. Chittagong, Bengal, Lower Assam.
East and West Coast of Africa.	Coromandel Coast, Northern Circars, Concan.
Southern States of North America, Egypt, north of Africa, Syria.	Gujerat, Behar, Doab, Delhi, Malwa.
Mexican Highlands, Lower Mountains of Spain	Mysore, Hilly ranges in Deccan, Rajpootana.
South of Africa, Extra-Tropical New Holland, South America beyond 23½° S. lat.	Saharumpore and Northern Doab.
Mediterranean Region.	Deyra Doon, and Himalayan Valleys to moderate elevations.
Chino-Japanese Region, Middle Andes, Peru, and Mountains of Brazil.	Neilgherries, Upper Assam, Himalayan Mountains.
North of Europe, North of Asia, and North America.	Himalayan Mountains, Regions of Oaks and Pines.
Arctic regions, Mountains of Europe, Elevated Andes.	Himalayas above Region of Forest.

[*Royle Prod. Res. of India.*

At another place he states that the northern like the southern part of India, enjoys two crops during the year, one called the *khureef*, or rain crop, sown in June, and reaped in October, the other sown in October, and reaped in March and April, called the *rubbee* crop. The latter, embracing the months which approximate in temperature to that of the seasons of cultivation in older countries, corresponds with them also in the nature of the plants cultivated, as for instance, Wheat, Barley, Oats, and Millet, Peas, Beans, Vetch, Tares, Chick-peas, Pigeon-peas, and Lentils; Tobacco, Safflower, and Succory; Flax, and plants allied to Mustard and Rape, as Oil Seeds; Carrot, Coriander, Cummin, and other seeds of a similar kind, as *ajwain*, *sonf*, *soya*, *aneeson*. In the rainy season, a totally different set of plants engages the agriculturist's attention, as Rice, Cotton, Indigo, and Maize, with Sorghum, joar, koda, most of the tropical legumes, as well as several of the Cucumber and Gourd tribes, together with the Sesamum for Oil, and the varieties of the Egg plant, as a vegetable. The Sun and Sunnee, two cordage plants, are also cultivated at this season.—*Royle's Productive Resources of India.* Mr. Fortune says that in China, the staple summer crops are those which yield textile fibres. A plant well known by the name of jute in India, a species of Corchorus—which has been largely exported to Europe of late years from India is grown here to a very large extent. In China this fibre is used in the manufacture of sacks and bags for holding rice and other grains. A gigantic species of hemp (Cannabis) growing from ten to fifteen feet in height is also a staple summer crop. This is chiefly used in making ropes and string of various sizes such articles being in great demand for tracking the boats up rivers and in the canals of the country. Every one has heard of China grass-cloth—that beautiful fabric made in the Canton province and largely exported to Europe and America. The plant which is supposed to produce this (Urtica nivea) is also abundantly grown in the western part of this province and in the adjoining province of Kiangse. Fabrics of various degrees of fineness are made from this fibre and sold in these provinces, but I have not seen any so fine as that made about Canton: it is also spun into thread for sewing purposes, and is found to be very strong and durable. There are two very distinct varieties of this plant common in Chekiang—one the cultivated, the other the wild. The cultivated variety has larger leaves than the other; on the upper side they are of a lighter green, and on the under they are much more downy. The stems also are lighter in colour, and the whole plant has a silky feel about it which the wild one wants. The wild variety grows plentifully on sloping banks, on city walls, and other old and ruinous buildings. It is not prized by the natives, who say its fibre is not so fine, and more broken and confused in its structure than the other kind. The cultivated kind yields three crops a year. The last great crop which I observed was that of a species of juncus, the stems of which are woven into beautiful mats, used by the natives for sleeping upon, for covering the floors of rooms and for many other useful purposes. This is cultivated in water, somewhat like the rice-plant, and is therefore always planted in the lowest part of these valleys. At the time of my visit, in the beginning of July, the harvest of this crop had just commenced, and hundreds of the natives were busily employed in drying it. The river's banks, uncultivated land, the dry gravelly bed of the river, and every other available spot was taken up with this operation. At grey dawn of morning the sheaves or bundles were taken out of temporary sheds, erected for the purpose of keeping off the rain and dew, and shaken thinly over the surface of the ground. In the afternoon, before the sun had sunk very low in the horizon, it was gathered up again into sheaves and placed under cover for the night. A watch was then set in each of the sheds; for however quiet and harmless the people in these parts are, there is no lack of thieves, who are very honest if they have no opportunity to steal. And so the process of winnowing went on day by day until the whole of the moisture was dried out of the reeds. They were then bound up firmly in round bundles, and either sold in the markets of the country, or taken to Ningpo and other towns where the manufacture of mats is carried on, on a large scale. The winter crops of this part of China consist of wheat, barley, the cabbage oil-plant, and many other kind of vegetables on a

smaller scale, Large tracts of land are planted with the bulbs of a liliaceous plant, probably a Fritillaria, which are used in medicine. This is planted in November, and dug up again in April and May. In March these lily fields are in full blossom, and give quite a feature to the country. The flowers are of a dingy greyish white, and not very ornamental.—*A. Res. among the Chinese, page* 259.

(2711) CLIMBERS. At Tonglo, in Sikkim, at an elevation of several thousand feet, Dr. Hooker found great scandent trees twisting around the trunks of others, and strangling them: the latter gradually decay, leaving the sheath of climbers as one of the most remarkable vegetable phenomena of these mountains. These climbers belong to several orders, and may be roughly classified in two groups.—(1.) Those whose stems merely twine, and by constricting certain parts of their support, induce death.—(2.) Those which form a net-work round the trunk, by the coalescence of their lateral branches and aerial roots, &c.: these wholly envelope and often conceal the tree they enclose, whose branches appear rising far above those of its destroyer. To the first of these groups belong many natural orders, of which the most prominent are—*Leguminosæ*, ivies, hydrangea, vines, Pothos, &c. The inosculating ones are almost all figs and *Wightia*: the latter is the most remarkable, for its grasping roots.—*Hooker Him. Journ. Vol.* I, *page* 163-164.

(2712) CLINTONIA ELEGANS. This and other species are pretty border plants, colours white and blue: they flower and give seed abundantly and thrive in any good soil.

(2713) CLITORIA TERNATEA, Ternate Clitoria. (Crow's beak),

Upurajita, Beng.	Neela gheeria, khurne, Sans.
Upuragita, kowa, kowa-theti, Hind.	Kalizer-ke-jur, Hind.

This may be cultivated as a flowering plant, and there are several varieties. The most common are the blue and white. They blossom all the year round, and being shrubby twining plants, are well suited for covering trellis work. They are of easy growth, and the blue flowers are used sometimes for colouring boiled rice. Are propagated by seed, and in any soil.—*Riddell.* In some parts of Southern Asia, it is a common wild creeper during the rains, and Dr. Hooker mentions that a beautiful blue-flowered *Clitoria* creeps over the path to Syong on the Khasia Hills, with the ground-raspberrry of Darjiling.—*Him. Jour. Vol.* II, *page* 291. In Tenasserim the clitoria ternatea, with its deep blue flowers, is seen tangled with other climbers, wandering over trees, and arbors, in all parts of the country.—*Mason.* Dr. Ainslie informs us that the sweetish, somewhat warm white root of this plant (which is common all over India) is given in substance ground into powder in croup cases, that it sickens and sometimes vomits, the dose being half a pagoda weight for a child of two or three years. Dr. O'Shaughnessy used the root extensively in order to test its alleged emetic effects, but never observed the occurrence; an alcoholic extract acts however as a brisk purgative in from 5 to 10 grain doses. But griping and tenesmus are often produced, and during the operation of the medicine the patient is feverish and uneasy. He does not recommend its use.—*O'Shaughnessy, page* 315.

(2714) CLOTH AND CORDAGE MATERIALS. See Fibrous Materials.

(2715) CLOTHS. Long cloths or punjums of various qualities were formerly manufactured to a great extent in the Northern Circars, as well as in other parts, the greater proportion consisted of 14 punjums or cloths, containing fourteen times 12 threads in the breadth, which varied according to local custom from 38 to 44 inches. 14lb. was considered the proper weight of such cloths, the length 36 cubits, half lengths being exported under the denomination of salampores. The manufacture of the finer cloths which went up to and even exceeded 50 punjum has long been discontinued.—*Rohde M.S.S.*

Cloths, Long.—Very superior kinds of cloths were formerly manufactured at Vizagapatam and sold at from 70 to 350 Rs. each, but the large supplies of Long cloths from England selling at the more moderate prices of from 6 to 40 Rs. per piece, has quite destroyed that old manufacture.

Cloths, Men's.—These cloths are manufactured all over the country, but those of the Madura District have Lace borders: they are sold as high as 70 Rs. for a suit of two pieces. Conjeveram is noted for its silk bordered cloths which are sold for not more than fifteen Rupees a pair.

Cloths, Native Female, Cotton.—This description of cloths forms an article of manufacture in every district, and are in constant use by all classes of the country. Madras manufactures a nicely coloured woman's cloth called "oolloor sailay," sold for seven Rupees and upwards. Arnee is noted for its manufacture of a superior quality of white Cotton Cloths of various patterns. Those of Sydapet in Chingleput, a country town in the out-skirts of Madras, are of ordinary quality and of different colours. Ganjam also fabricates a common sort, with a few of more value, worked with Lace borders but not sold for more than 50 Rs.

Cloths, Native Female, Silk.—The principal places for the manufacture of Native Female Silk cloths are the towns of Benares, Berhampore, and Tanjore. Those of Benares are generally of superior quality with rich lace borders, and they are sold at from Rupees 50 to 350 or up-

wards. Berhampore cloths are wholly of Silk but nicely finished. Tanjore cloths are also neatly finished with nicely worked borders, both of Lace and Silk of various colours: they are sold at from Rupees 15 to 150.

Cloths, Silk, called *Pethambaram.*—These are chiefly brought from Benares, and Nagpore: they are also made at the town of Combaconum. The Benares cloths are highly prized for their superior quality: they measure 12 by 2½ cubits a piece, two pieces make one suit of an upper and under garment. Hindoos wear these cloths during their devotions and holiday time. They are sold from Rupees 50 to 350 or even more. The fabrics of Combaconum are good, although not equal to those of Benares.

Cloth, White, is manufactured all over Southern India, but those of Manamadoo in the district of Trichinopoly is very superior in quality and used by the more respectable of the inhabitants as clothing under the name of "Manamadoo Sullah." That at Arnee in the district of Chingleput, known as "Arnee Sullah," is of different quality.

Cloth, Woman, Cotton, Coloured.—These Cotton colored cloths are largely made in the Madura district. They are of various sizes, with or without Lace worked borders. Those with Lace vary in price from Rupees 15 to 200 each; they are generally purchased by respectable natives, by whom they are highly prized. These fabrics are known in the market as:—

Vankey, Lace bordered.	Joonnady, Lace bordered.
Thomboo, do. do.	Amboooresa, do. do.

Cloth, Woman's Silk.—These are brought chiefly from Benares and Nagpore; but they are fabricated also at Berhampore, Tanjore, Combaconum, and Conjeveram, in the Madras Presidency. Those of Benares and of the Mahratta countries are celebrated for their superiority and are highly prized for their Lace borders: their size is 16 by 2½ cubits, and they are sold at Rupees 50 to Rupees 300 and upwards; those made at Berhampore, Tanjore, and Combaconum are not equal to the Benares cloths, but are well made and sold at from Rupees 15 to 70 each. The woman's cloths of Tanjore and Madura manufacture, and men's head-cloth, also from Madura, are good articles, and will compete with the production of any other Loom in the world.

(2716) CLOVES.

Kerenful, ARAB.	Woh-kayu-lawang, JAV.
Buwahluvung, BALI.	Chankee, MAL.
Warrala, CYNG.	Meykhek, PERS.
Kruidnagelen, DUT.	Cravos da India, PORT.
Clous de girofle: Girofles FR.	Gwosdika, RUS.
Naglein, Gewurznelken, GER.	Lavanga, SANS.
Luvung, GUZ. HIND.	Clavillos, SP.
Garofani, IT.	Craumboo, TAM.
	Lawangum. TEL.
	Thenghio, CHIN.—*Faulkner,*

The cloves of commerce are the unopened flowers, the flower buds of the Clove-tree, *Caryophyllus aromaticus* (*Eugenia caryophyllata*), which was originally a native of the Moluccas, but is now cultivated in several parts of the East and West Indies. They have the form of a nail, and when examined are seen to consist of the tubular calyx with a roundish projection, formed by the unopened petals. It is a very handsome tree, growing to the height of about twenty feet. The trunk is straight, and rises four or five feet before it throws out branches. The bark is smooth, thin, of a grey color, and the wood of the trunk too hard for ordinary cabinet work. The leaves are opposite, smooth, narrow, pointed, of a rufous color above, and green on the under side. They have a very aromatic odor when bruised between the fingers. The flowers produced in branched peduncles, at the extremity of the bough, are of a delicate peach color. The elongated calyx, forming the seed vessel, first changes to yellow, and, when ripe, to red, which is from October to December, and in this state it is fit to gather. If left for a few weeks longer on the trees, they expand, and become what are termed "mother cloves," fit only for seed or for candying. The ground under the tree is first swept clean, or else a mat or cloth is spread. The nearest clusters are taken off with the hand, and the more distant by the aid of crooked sticks. Great care should be taken not to injure the tree, as it would prevent future bearing. The cloves are then prepared for shipment by smoking them on hurdles near a slow wood fire, to give them a brown color, after which they are further dried in the sun. They may then be cut off from the flower branches with the nails, and will be found to be purple colored within, and fit to be baled for the European market. In some places they are scalded in hot water before being smoked, but this is not common. The tree may be propagated either from layers or seed. Layers will root in five or six months if kept moist. A strong dark loam, a gravelly, sandy, or clayey soil, but one not retentive of moisture, seems that best suited for its successful culture. It does not thrive well near the sea, nor in the higher mountains, the spray of the sea and the cold being found injurious. The plants at first require the shade of other trees, such as the mango, cocoa-nut, &c. Although generally a hardy plant, it suffers from excessive drought. They should be planted about twenty feet apart. In its native country the tree begins to yield fruit in the sixth year, but a crop can seldom be looked for in other quarters under eight years. It is very long lived, sometimes attaining the age of 130 years. There appears, according to Mr. Crawfurd, to be five varieties of the clove, viz—the ordinary cultivated clove; a kind called the female clove by the natives, which has a pale stem; the kiri or loory clove; the royal clove, which is very scarce, and the wild clove. The three

first are equally valuable as spices, the female clove being considered fittest for the distillation of essential oil. The wild clove, having scarcely any aromatic flavor, is valueless. The produce which may be expected from the tree seems to be uncertain; it may, however, be averaged at five or six pounds. A clove tree, well weeded and taken care of, will produce from five to twenty pounds. On the other hand, a tree that is neglected will not give above two or three pounds. At intervals of from three to six years they usually produce one extraordinary crop, but then a year now and then intervenes, when they yield none at all; in others they will afford a double harvest. The clove tree was originally confined to the five principal Molucca islands and chiefly to Macheam. From these it was conveyed to Amboyna, a very short time only before the arrival of the Portuguese. By them the cultivation was strictly restricted to Amboyna, every effort being made to extirpate the plant elsewhere. It has now, however, spread to Java, Singapore, and the Straits' Settlements, Ceylon, the Mauritius and Seychelles, Bourbon, Zanzibar, Cayenne, Dominica, Martinique, St. Kitts, St. Vincent, and Trinidad. Cloves contain a volatile oil, associated with resinous, gummy, and astringent matter, which is yielded in larger proportion than by any other plant. Neuman obtained by distillation two ounces and two drachms from sixteen ounces of cloves. On an average cloves yield from 17 to 22 per cent. of oil, including the heavy and light oils. The oil is aromatic and acrid, and has been used as a condiment and a stimulant carminative. It is also extensively used by distillers and soap makers. It is said that the clove does not thrive well on the soil of Java, the plantations of which trial had been made not having succeeded to the extent expected, although they were directed by skilled persons from Amboyna; the places they made choice of did not differ materially as to soil and climate from those of the Moluccas. M. Teysman, Director of the Botanical Gardens at Batavia, seems to have bestowed much attention on the subject. The exports however from the island have been considerable. In 1830, there were 803 piculs shipped; in 1835, 4,566; in 1839, 2,334; in 1843, 2,027 piculs of 133 lbs. In Singapore, about ten years ago, there were then about 15,000 clove trees planted out, a few of which only had come in bearing. If these plantations had proved equally productive with those of the sister settlement of Pinang, it would have been able to export 60,000 lbs. of cloves, its own produce; but this expectation, it will be seen, has not been realised. In the season of 1841-42, there was 1,000 piculs of cloves shipped from Pinang, but none were exported in the two previous years. The quantity of land under cultivation with cloves there, in 1843, was 463 orlongs in Prince of Wales' Island, and 517 in Province Wellesley. The number of trees planted out in the former island was 72,779; in the latter province 7,639. There were in the island 25,161 plants in nursery. The average consumption of cloves in the United Kingdom, in the four years ending 1841 was 49,000 lbs. The largest quantity of cloves imported during the past twenty-five years was 1,041,171 lbs., in 1847. The quantities imported and entered for home consumption in the last five years have been as follows:—

	Imports.	Home consumption.
1848	117,433 lbs.	..... 126,691 lbs.
1849	274,713 „	..... 133,713 „
1850	749,646 „	..... 159,934 „
1851	253,439 „	..... 138,123 „
1852	313,949 „	.. .. 175,287 „

In 1848 were received 60,000 lbs. of cloves from British India.—*Simmonds' Comml. Product, p.* 401. The trees in bearing were—In Prince of Wales Island, 28,739; not bearing, 44,040; produce in 1843, 87 piculs, 50 catties; gross value, 3,399 dollars; estimated produce of cloves for 1844, 469 piculs. In Province Wellesley —Trees in bearing, 1,073; not bearing, 6,566; produce in 1843, 1 picul, 13 catties; gross value 45 dollars. The export of cloves from Pinang was, in 1849, 24,000 lbs.; in 1850, 52,400; in 1851, 27,866; in 1852, 45,087. From tabular statements drawn up in 1844, by Mr. F. S. Brown, Chairman of the Pinang Chamber of Commerce, it appears that there were, in 1843, in that island and Province Wellesley adjoining, 96 clove plantations, containing 80,418 clove trees; besides many young trees in nurseries ready to be planted out. The produce of cloves there, in 1842, was 11,813 lbs., and this was a very short crop, it having that year proved a complete failure; the average crop for some years previous had been 46,666 lbs. Pinang only began to export this spice in 1832. Of the clove trees in Pinang there were then only 29,812 in bearing, leaving 75,767 in that settlement alone to come to maturity; estimated to yield about 300,000 lbs. No success has attended repeated trials of cloves in Singapore. Until the trees reach the age of bearing, they grow and look extremely well; but any expectation of a crop that may have been raised by their hitherto fine condition, ends in disappointment, for just then the trees assume the appearance of sudden blight, as if lightning-stricken, and then die. 125 clove plants and 350 seedlings were sent to Singapore from Bencoolen, by Sir T. Raffles, in the close of 1819; but although every care was paid them—while the nutmegs which accompanied them throve amazingly well—little or no progress has been made with clove culture. Two or three hundred-weight were shipped in 1845, but since then hardly any mention is made of the spice. In a petition presented by the spice planters of Pinang and Province Wellesley, to

the authorities at home, in 1844, praying that the duty on British Colonial nutmegs, mace, and cloves might be reduced to 1s. 9d., 1s. 2d., and 3d. respectively, on importation into England, in order to compete with foreign produce, it was stated that a few years hence Prince of Wales Island might be expected to produce 60,000 lbs. of nutmegs, 200,000 lbs. of mace, and 300,000 lbs. of cloves; whilst Singapore, if equally successful in the culture of the same, would yield yearly 137,000 lbs. of nutmegs, 45,000 lbs. of mace, 60,000 lbs. of cloves. In short, the planters needed only encouragement to produce in the course of a few years a full supply of those valuable spices for the whole consumption of Great Britain. Dr. Ruschenberger, who visited Zanzibar in 1835, thus speaks of the clove plantations there:—"As far as the eye could reach over a beautifully undulated land, nothing was to be seen but clove trees of different ages, varying in height from five to twenty feet.—*Simmonds' Com. Prod. p.* 400. Mr. Crawfurd tells us that the clove is remarkable for its limited geographical distribution. It is only in its native localities, the five small islets on the western coast of the large island of Gilolo, that it is easily grown, and attains the highest perfection. There, it bears in its seventh or eighth year, and lives to the age of 130 or 150. Rumphius informs us, that shortly before the arrival of the Portuguese it had been carried to and reared in Amboyna, where, however, it does not bear until its fifteenth year, and where the average duration of its life does not exceed 75 years. He informs us further that large islands are not favourable to its growth—that it succeeds indifferently even in such islands as Gilolo and Ceram, and that the natives of Celebes and Java who had attempted to grow it in their own country had obtained plants which bore no fruit. Europeans, however, have succeeded somewhat better. The clove has been long transferred by them from the Moluccas to Sumatra,—to the islands in the Straits of Malacca,—to Bourbon,—to Zanzibar, on the eastern coast of Africa, and to Cayenne. In some of these places the culture has virtually failed, even where that of the nutmeg has succeeded, and everywhere the produce is of inferior quality to that even of Amboyna. A suitable soil seems to be as indispensable, as a suitable climate. The soil of the Molucca Islands is volcanic, which is not the case with any of the countries to which the tree has been transferred, except the Island of Bourbon, and here the suitable climate seems to be wanting. The clove appears, from Pigafetta's statement, to have been private property, and entirely free in culture and trade; Malays, Javanese, Chinese, Macassars, and Arabs, all competing for it in an open market. The annual quantity produced, according to him, in the five islands, seems to have been from 1500 to 2000 bahars; and the bahar is an Arabian weight, computed in the Moluccas at about 590 pounds. The companions of Magellan themselves loaded two ships with cloves at a single island, Tidor, after a stay, from their arrival to their departure, of no more than forty-four days. The Portuguese made their first appearance in the parent country of cloves in the year 1512: and having been expelled by the Dutch in 1605, they had the principal share of the clove trade for ninety-three years,—a period of rapine, violence, and bigotry. Their main object was the exclusive monopoly of spices, by the expulsion of all rivals. Their successors pursued the same object in a manner still more rigorous. They extirpated the clove trees in their native islands, and endeavoured to limit their growth to the five Amboyna islands, in which the clove is an exotic. Periodical expeditions for the extirpation of young plants that might spontaneously have sprung up, or been propagated by birds, formed part of this system. The clove monopoly still exists, but in a very tottering condition. The periodical exterminating expeditions have been merely nominal during the present century; and for the last thirty years, although the monopoly be persevered in, in the five Amboyna islands, where the parks, as they are called, are the property of the government, the culture and trade are legitimate everywhere else.—*Crawfurd Dictionary, page* 104. The clove tree may be seen in a few gardens on the Tenasserim Coast, and cloves are abundant in the bazars. At the Madras Exhibition of 1855, Cloves were forwarded from Travancore, Tinnevelly, Canara, and Cochin. The plumpest and heaviest were from General Cullen's Gardens near Oodagherry, 1800 feet above the sea, these had a strong aromatic odour, and were of a dark brown colour; they were quite entire, and when pressed with the nail, the oil exuded. The specimens from S. Warrier, Dewan of Cochin, and those from Tinnevelly District were almost equally good.—*M. E. J. R.*

(2717) CLOVE OIL.

Woorula-teil, CYNG.	Oleo de garafano, IT.
Huile de girofle, FR.	Kiramboo taylum, TAM.
Lavang ka teil, HIND.	Lawangha taylum. TEL.

Is procured from cloves by distillation. When new, it is of a pale reddish-brown colour, which becomes darker by age. It is extremely hot and fiery, and sinks in the water. The smell is agreeable, and not unlike that of *Koolfa*, or *Malabar Cassia oil*. The kind met with in Bombay, is chiefly made at Surat.—*Faulkner.*

(2718) CLOVER, INDIA CLOVER. The most valuable grass in the country of Tenasserim is not a proper grass, but, like the English clover, is a leguminous plant. It is a species of hedysarum, "which in India," says Dr. Wight, "supplies the place of the species of *Trifolium* and *Medicago* in Europe." In other words, the farmer finds it a good substitute for clover and

lucerne; and there is another leguminous plant at Tavoy, *Smithia sensitiva*, which is said to make "excellent hay."

(2719) CLOVER SEED.

Klaver-zaad, Dut.	Trifolium. Lat.
Semence de trefle, Fr.	Trilistnik, Rus.
Kleesaat, Klee, Ger.	Trebol, Sp.
Trifoglio, It.	

The produce of a plant (*Trifolium*), of which there are two principal kinds: *red clover*, a biennial; and *white* or *Dutch clover*, a perennial. They are largely produced in Great Britain, on the Continent, and in the United States.—*Faulkner.*

(2720) CLUPEIDÆ, a family of Fishes of the section *Abdominales*. The *Clupeidæ* are placed by Cuvier between the *Salmonidæ* and the *Gadidæ*: in fact they form the fifth and last division of his section 'Malacopterygiens Abdominaux.'—*Engl. Cyc. p.* 2.

(2721) CLUSIA, a genus of plants belonging to the natural order *Clusiaceæ* or *Guttiferæ*, named after Charles de l'Ecluse, or Clusius, one of the most celebrated botanists of the 16th century.—*Engl. Cyc. Vol.* II. *p.* 4.

(2722) CLUSIACEÆ, or Guttiferæ, *Guttifers*, a small natural order of Exogenous Plants, inhabiting the hotter parts of tropical countries in both the Old and New World. Their fruit is succulent, juicy, and in many cases resembling a large apple or orange. The Mangosteen (*Garcinia Mengostana*) is probably the most delicious of any known; but it has never been seen in a fresh state in Europe, for the tree will hardly exist out of its native humid heated atmosphere in the Indian Archipelago. The most remarkable product of this order is an acrid, purgative, yellow gum-resin. In one of its forms this is the Camboge or Gamboge of commerce. This substance is well known as a yellow pigment, as also a purgative medicine. The plant which yields the Gamboge of commerce is still unknown. The London College of Physicians in their 'Pharmacopæia' refer it to some species of *Garcinia*, others refer it to species of *Cambogia*, *Xanthochymus*, *Hebradendron*, and *Stalagmitis*. The East India Tacamahaca is yielded by a species of *Calophyllum*. The Butter or Tallow-Tree of Sierra Leone is the *Pentadesma butyracea*. The fruits of many species are esteemed, besides the Mangosteen. The Mammee Apple, or Wild Apricot of South America, is said to be very delicious. Its seeds are anthelmintic; its flowers yield on distillation a spirit known as Eu de Creole, and wine is obtained by fermenting its sap. The large berries of the Pacouryava (*Platonia insignis*) of Brazil are highly prized on account of their delicious flavour. The fruits of several species of Garcinia besides the Mangosteen, are brought to table in the countries where they grow, but they are regarded as very inferior. The blossoms of *Mesua ferrea* are remarkable for their fragrance, and are sold in the bazars of India under the name of Nagkesur.—*Engl. Cyc. Vol.* II. *p.* 5.

(2723) CLUYTIA COLLINA, *Euphorbiaceæ*, Roxb. c. 169.

Woadoogoo marum, Tam. | Kadishen, Tel.

A small tree, frequent in the Walliar jungles. Flowers in hot season, seed ripens in December and January. Flowers diœcious, calyx five-parted, petals five, stamens five, capsule three-celled, three-seeded.—*Roxb. p.* 732. Bark or outer crust of capsule said to be exceedingly poisonous.—*O'Shaughnessy, p.* 552. Wood red coloured, exceedingly hard and durable but of small size. Notwithstanding its hardness, being very even grained, it is easily worked and is from its fine close grain a pretty wood.—*Rohde M.S.S.*

(2724) CLUYTIA PATALA. A much larger tree than Collina a native of moist valleys amongst the Circar mountains. It flowers during the hot season. The wood of this tree is of the colour of dried rose leaves, also hard and durable.—*Rohde, M.S.S.*

(2725) COAL.

Steenkull, Dan.	Lithanthrax, Lat.
Steenkoolen, Dut	Carvoes de terra, ou de pedra, Port.
Charbon de terre. Fr.	Ugolj, Rus.
Steinkohlen, Ger.	Carbones de tierra, Sp.
Welaety-kooela Guz. Hind.	Stenkol, Sw.
Carbonfossili. It.	

Coal, is an opaque combustible mineral substance of a black or brown colour, and in all cases giving indications of having been derived from a vegetable source. Coal differs considerably in its physical properties, and it has obtained various names in the markets. The mineralogist generally divides it into two varieties. First, Coal without Bitumen; Second, Coal with Bitumen. The first variety is known by the general name of *Anthracite*. It has however various local names. It is sometimes very hard, and has a high-lustre, and is often iridescent. Besides being used for fuel it is often made into inkstands, small boxes, and other articles of use. This is more especially the case with the Anthracite of America. It is the most common form of Coal in the Welsh beds. The Bituminous varieties of Coal present greater differences of structure and appearance, and have a larger number of names, the quantity of Bitumen, or substances resembling it differ very much in different specimens of coal. It is generally softer and less lustrous than Anthracite, although occasionally specimens exhibit a very brilliant fracture. Its specific gravity is less than that of Anthracite, seldom exceeding 1·5, whilst the specific gravity of Anthracite ranges from 1·3 to 1·75. The kinds of this coal are known by various names. The following are

analyses of the different kinds of Coal which occur in the Newcastle beds:

	Splint Coal.	Caking Coal. No. 1.	Caking Coal. No. 2.	Cherry Coal.
Density,	1·302	1·247	1·280	1·266
Carbon,	74·961	83·588	87·809	84·694
Hydrogen,	6·254	5·150	5·159	5·054
Nitrogen and Oxygen,	4·873	8·743	5 139	8·176
Ash,	13·912	2·591	1·393	1·576
Relative heat by the same weight of Coal,	110·310	114·980	122·560	116·630
Relative heat by the same volume of Coal,	108·990	111·310	110·030	112 070

Pitching or *Caking Coal* is known by its velvet or grayish-black colour. When first thrown on a fire it breaks into small pieces, but on the continued application of heat the pieces again unite into a solid mass or cake. It burns readily with a yellow flame, but on account of its caking quality it is likely to clog the fire unless it is frequently stirred. The Newcastle beds mostly yield this form of coal.

Cherry Coal resembles in external appearance the pitch coal, and when exposed to heat it cracks and flies, but does not cake It is very brittle, and on this account much loss is occasioned in mining it. It burns with a clear yellow flame. This kind of coal occurs in the Glasgow beds.

Splint Coal is a variety found in connection with the last, and is remarkable for its hardness; for which reason it is sometimes called Hard Coal. It is also found at Glasgow.

Cannel Coal has little lustre, is very compact and smooth in its texture, and breaks with a large conchoidal fracture. It burns very readily, giving out a clear yellow flame without melting. In consequence it has been employed for the making of candles—hence its name. It is often employed for making inkstands, snuff-boxes, and other articles of use. At the Great Exhibition of 1851 several models of public buildings, monuments, &c. were exhibited, formed of Cannel Coal. The above coals are those most commonly burned. Their goodness for heating is tested by the quantity of water they evaporate. The following are the results of some recent experiments:—

	lb.	oz.
Common Scotch Bituminous Coal	5	14
Carr's West Hartley Main (Newcastle)	7	5
Merthyr Bituminous Coal,	8	0
Pure Welch Anthracite,	10	8½

From which it will be seen that the heating power of anthracite nearly doubles that of some bituminous coals.

Brown Coal, Wood Coal, Lignite, are names given to less perfect varieties of coal than the last. Specimens of these coals have a brownish-black colour, and burn with an empyreumatic odour. On placing sections of Lignite under the microscope, the structure of the wood of the plant forming it can be readily detected. This is not the case with the other kinds of coal, where, although the woody fibre can be frequently made out, it has evidently undergone considerable change. Professor Quekett, on this ground, proposes to confine the term coal to those fossil or mineral substances alone which are evidently made up of the woody tissue of plants. He maintained that the Torbane mineral was not coal, on the ground that it was not composed of the debris or remains of vegetable woody tissue. Although woody and vascular tissue can be seen in the Trobane mineral, Professor Quekett maintains that this has been accidentally introduced, and that no true vascular or spiral tissue is found in coal. The term *Brown Coal* is frequently applied to coal more recently deposited than that of the great coal-beds of the world, and this quite independent of its structure or any peculiarity in combustion. *Lignite* is also a term applied to the semi-carbonised forms of wood which are frequently found in deposits later than those of the coal deposits. Most of these varieties of coal contain a large quantity of water, and the quantity of matter given off at a moderate heat by distillation is at least equal to that of the carbon contained. It occurs in the tertiary deposits around all the shores of India.

"*Dysodil* is a yellow or grayish highly laminated substance, often found with lignite, and burning vividly, and spreading an odour of assafœtida."—(*Austed.*)

Jet is another variety of coal belonging to the bituminous series. It sometimes occurs in elongated reniform masses, and sometimes in the form of branches with a woody structure, It is soft and brittle, with a conchoidal fracture. Its specific gravity is but little greater than that of water. It is opaque, of a velvet-black colour, and has a brilliant and resinous lustre. It is found in Saxony, and also in the Prussian amber-mines in detached fragments. It is sometimes washed upon the shores of Great Britain, and has been found in Southern India. The finer sorts are used in the manufacture of ornaments and trinkets of various kinds. The coarser sorts are burned as fuel It gives out when burned a greenish flame and a strong bituminous smell, and leaves a yellowish ash. It contains about 37½ per cent of volatile matter.—*Eng. Cyc. Vol.* II, *p.* 10. In China, Coal is generally used for fuel in all those places which have been visited, and the supply might probably be greatly increased by introducing Europe machinery and modes of working it. The boats on the North river, below Nanhiung, lie near the mouth of a horizontal shaft worked into the mine, above which the cliffs are scraped down as the shaft advances. The ignorance of the Chinese of the best modes of draining and ventilating mines, must necessarily prevent working many of them beyond a certain depth and extent. The mountains of Shansi and Chihli supply large quantities of this valuable

mineral, and many boats find constant employment in bringing a course anthracite from Kaichau in Liautung to Tientsin. One locality of the mine in Liautung is about lat. 39° 10' N., and long. 121° 25 E. Several kinds, both of anthracite and bituminous, have been seen in marts at the north; and coal dust and refuse is mixed with a little moistened clay at Peking, and made into cakes for the fires of the poor: that which is brought to Canton is hard, and leaves a large proportion of ashes after combustion; during ignition, it throws off a suffocating sulphureous smoke, which prevents the natives using it for cooking. It is employed in the manufacture of copperas from hepatic iron pyrites, according to Du Halde, but is less frequently employed in the arts than it would be if the people knew better how to use it.—*William's Middle Kingdom, p.*242. Coal (Fossil), in Malay, Arana-tanah, literally, "earth-charcoal," has been found in the Malay peninsula, Sumatra, Java, and Luzon, and in Borneo of good quality and suited to economical uses. A seam of the Bornean coal was first discovered in one of the islands in the river of Brunai, where it crops out. It was afterwards found in the mainland, near the banks of the same river, and subsequently in the island of Labuan, about 12 miles from its embouchure. In these places it is at present mined by European skill and capital, and been found, on ample trial, superior to any Asiatic coal hitherto tried. The coal on the left bank of the Borneo river has been traced for several miles into the interior. On the southern coast of the island, coal has been found in the territory of Banjarmasin, and mined by the Dutch. This, from all accounts, is of the same quality as the coal of the northern side, and may be a continuation of the same field, which would make the Bornean coal-fields the largest in the world, after those of North America. Steam navigation has given a value to the coals of Borneo, which, without it, in a country inhabited by rude people and covered with forest, might have lain for ages as useless as the lime and sand-stones in which it is imbedded.—*Crawford Dictionary, page* 195. The Mergui coal was regarded by the Coal Committee as true mineral coal, but of inferior quality. A similar coal is found on the banks of the Tenasserim north of the latitude of Tavoy; but Capt. Tremenheere regards both as superior varieties of lignite. "Lignite or brown coal," says Hitchcock, "appears to be peat which has long been buried in the earth, and has undergone certain chemical changes, whereby bitumen has been produced. Bituminous coal is probably the same substance, which has been longer buried in the earth, and has undergone still further changes." The coal of the great Tenasserim valley appears to have been so long buried in the earth, that the best parts of it are better than ordinary lignite and equal to the inferior portions of bituminous coal, which is true of beds of lignite in other parts of the world. On the banks of the Little Tenasserim, coal of a superior quality is said to exist, and in that direction further examination ought to be made. Of that section of country I have no knowledge from personal observation, but the Coal Committee say: "Eighty miles from Mergui inexhaustible beds of coal of an uniformly good quality occur on the Thian Khan, one of the main branches of the Little Tenasserim. The various beds appear to be what is called cannel coal, remarkable for consisting of upwards of 50 per cent of bitumen, which, to use the words of Mr. James Prinsep, shews it to be a superior blazing material, which is the main point in getting up steam." Coal has also been found on the banks of the Lenhea river, south of Mergui; but of these nothing is known. It is a field for examination.—*Mason.* No indications of bituminous coal have been found in Maulmain Province, but there is reason to believe that anthracite exists under the town of Maulmain itself. In digging a well in one of the Baptist Mission compounds, beneath several alternating beds of sandstone and slate, or shale, more than twenty feet below the surface, beds of carbonaceous matter were reached. One thin bed contained Tremenheerite, which, from Mr. Piddington's analysis is nearly allied to anthracite. Another thin stratum consisted principally of sand and carbonaceous matter, and similar beds are said to accompany the anthracite of America. Below this, is a stratum of shale and carbon containing fossil plants. One was decidedly an impression of a part of a leaf belonging to the palm tribe; and others unquestionably fern leaves, such as indicate the anthracite coal formation in America. One of the ferns, and apparently the most numerous one, cannot be distinguished from specimens of *Neuropteris Scheuchzeri* from the anthracite coal mines of Rhode Island, and Massachussetts in my possession, and others bear a strong resemblance to *Neuropteris Odontopteris* of the American anthracite coal fields that have been figured, but not described. These are the only impressions of ferns that have ever been discovered in the Provinces; but from the bottom of a well deepened last dry season on the margin of the north west corner of Mr. Paterson's compound, an abundance of Tremenheerite was brought up, and it is very probable that the fossiliferous strata are below it; though not the same as those in my compound, the inclination of the strata showing that they are above them. I have also noticed indications of Tremenheerite in the old piles of rocks brought up from a well within Mr. Paterson's grounds at the same corner; and from Mr. Hough's description it would seem that he came to similar strata at the bottom of his well.—*Mason.* The coal of Churra is excellent for many purposes. Dr. Hooker found it generally used by the Assam steamers, and was informed on board

that in which he traversed the Sunderbunds, some months afterwards, that her furnaces consumed 729 lbs. per hour; whereas the consumption of English coal was 800 lbs., of Burdwan coal 840 lbs., and of Assam 900 lbs.—*Hooker Him. Jour. Vol.* II. *page* 303. The coal of the Damoodah valley, adds Dr. Hooker, crops out at the surface at Taldangah; but the shafts worked are sunk through thick beds of alluvium. The age of these coal-fields is quite unknown, and I regret to say that my examination of their fossil plants throws no material light on the subject. Upwards of thirty species of fossil plants have been procured from them and of these the majority are referred by Dr. McClelland in his Reports of the Geological Survey of India, Calcutta, 1850, to the inferior oolite epoch of England, from the prevalence of species of *Zamia*, *Glossopteris* and *Tæniopteris*. Some of these genera, together with *Vertebraria* (a very remarkable Indian fossil,) are also recognised in the coal-fields of Sind and of Australia. I cannot, however, think that botanical evidence of such a nature is sufficient to warrant a satisfactory reference of these Indian coal-fields to the same epoch as those of England or of Australia; in the first place the outlines of the fronds of ferns and their nervation are frail characters if employed alone for the determination of existing genera, and much more so of fossil fragments: in the second place, recent ferns are so widely distributed, that an inspection of the majority affords little clue to the region or locality they come from: and in the third place, considering the wide difference in latitude and longitude of Yorkshire, India, and Australia, the natural conclusion is that they would not have supported a similar vegetation at the same epoch. In fact, finding similar fossil plants at places widly different in latitude, and hence in climate is in the present state of our knowledge, rather an argument against than for their having existed contemporaneously. The *Cycadeæ* especially, whose fossil remains afford so much ground for geological speculations, are far from yielding such precise data as is supposed. Species of the order are found in Mexico, South Africa, Australia, and India, some inhabiting the hottest and dampest, and others the driest climates on the surface of the globe; and it appears to him rash to argue much from the presence of the order in the coal of Yorkshire and India, when we reflect that the geologist of some future epoch may find as good reasons for referring the present Cape, Australian, or Mexican Flora to the same period as that of the Lias and Oolites, when the *Cycadeæ* now living in the former countries shall be fossilised. Specific identity of their contained fossils may be considered as fair evidence of the contemporaneous origin of beds, but amongst the many collections of fossil plants that I have examined, there is hardly a specimen, belonging to any epoch, sufficiently perfect to warrant the assumption that the species to which it belonged can be again recognised. The botanical evidences which geologists too often accept as proofs of specific identity are such as no botanist would attach any importance to in the investigation of existing plants. The faintest traces assumed to be of vegetable origin are habitually made into genera and species by naturalists ignorant of the structure, affinities and distribution of living plants, and of such materials the bulk of so-called systems of fossil plants is composed.—*Hooker Him. Jour. Vol.* I. *page* 7 and 9. In conlusion, we place collectively a list of all the sites of coal at present known to exist on the continent of India.

Burdwan,—Ranigunje. the principal Colliery,...	Discovered by Jones.
Chinakooree, the best quality of coal,	Mr. Betts.
Various other beds have been occasionally opened.	
Adjai Seedpoorie,...	Opened by Mr. Erskine.
Pariharpoor,	
Darbadanaghat, in boring,	By Jones.
Benares road, 149th mile stone, and other places,	Everest.
Hazareebagh,	Colonel Shelton.
Rajmahal,—Patsandeh Baghelpoor,	By Captain Tanner.
Skrigully,	
Hurra,	
Palamoo,—Two principal beds,	Discovered by Mr. A. Prinsep.
Amarath,	In Mr. Homfray's Survey.
Bidjegurh,	By Mr. Highland.
Nerbudda,—Towar river,	Captain Ousely, Lt. Finnis and Dr. Spilsbury.
Hoshungabad,	
Jubulpoor	
Sohagpore,	
Amerkanta,	Captain Jenkins.
Chanda,	Specimens from natives.
Warda nala,	
Cuttack, —Mahanadi,	By Lieutenant Kittoe.
Assam, —Deuphapance, near Bramakoond,	Discoverd by Capt. Wilcox.
Namroop river,	Lieutenant Bigge and Mr. Griffiths.
Suffry or Disung river, near Rungpore,	Mr. Bruce.
Dhunsiree river...	Mr. Scott.
Jumoona river,	
Kossila river, near Gowahate.	
Chilmari and Doorgapoor.	Mr. Scott.
Silhet, — Laour and other sites,	Mr. I. Stark 1815—Jones.
Kasya hills, Chirrapunjie,	Mr. Furnell. Mr. Cracroft.
Sarrarim,	Ditto.
Manipur.—near capital....	Captain Pemberton.
or boundary, Gendah, on Kuenduan river,	Dr. Richardson.
Arracan, —Sandoway District,	Mr. H. Walters.
Kyook Phyoo Island,	Captain Foley.
Moulmein—Anthracite at Bothoung,	Captain Foley.
Southern India,—Travancore Fossil seeds carbonized	Colonel Cullen.
Himalaya, —Kamoan lignite,	Captain Herbert.
Moradabad, lower range,	Mr. Ravenshaw.
Indus, — Cutch,	By Captain Burnes.
Peshawar,	

To these may be added the indications of coal discovered in boring at a depth of 400 in Calcutta and 300 feet at Goga in Guzerat. "In the foregoing situations coal has been traced from Burdwan to the westward, across the Valley of Palamow, and from thence through the district of Sohagpore to Jubulpore, and the neighbourhood of Saka, and the Towa river in the Nerbudda territories, 420 miles distant from Burdwan. Observing nearly the same parallel of

latitude, it is found in the province of Cutch, whilst it is extended in the same line across the centre of India to the N. E. extremity of Assam, forming a zone that stretches from 69° to 93° E. longitude, embraced in an opposite direction between the 20° and 25° N. latitude. Chanda on the Warda river, Cuttack, and Arracan being its southern boundary, whilst the Vale of Callinger west of Allahabad, the Teesta river at the base of the Sikim Mountains, and Upper Assam, from the northern limit. There are however, two situations in which coal has been found distinct from this extensive and well defined belt, namely, Hurdwar and Attok; the first near the source of the Ganges. and the second near that of the Indus. Although situated in the plains, yet both these situations appear to be too closely connected with the Himalaya, and too much detached from the tract now under consideration, to allow of their being considered in common with it. In the infancy of researches of this nature, for such we must as yet consider the state of our information upon the subject of coal, it would be wrong to attach exclusive importance to the peculiar distribution of the mineral just noticed, farther than to observe, that this distribution appears to be highly favourable to all those objects for which coal is desirable. Cutch, the extreme western limit of what here might be named the carboniferous zone, is placed in the most favourable situation for yielding supplies for the navigation of the Indus, the coast of Malabar, and the Red Sea. The Nerbudda river extends 700 miles along the very centre of this zone, and coal in three situations is already found on its banks. 'By minute surveys which have been made of its course, it appears the Nerbudda is navigable for small craft from the sea to eleven miles above Tulluckwarrah, a distant of more than one hundred miles. Here comes a wild and hilly tract which extends to a distance of ninety miles, in some parts of which the breadth of the river is so diminished and its current so obstructed by rocks and shallows, that its navigation is altogether impossible. Above *Hurn-Pahl* or Deer's Leap, it is narrow and rapid, but becomes again navigable above fifteen miles below Chiculdah, and with the exception of a few places where short land carriage might be established, continues so for some distance to the eastward of Hoshingabad.'—(Vide Cent. Ind. vol. 1, p. 5.) The Soane, the Ganges, and the Hooghly, are each intersected by it, and the Bramaputra and probably the Irrawaddy, are extended parallel to it throughout their navigable extent. Now, if on the other hand, this belt had been extended from the Punjab towards the south, scarcely a navigable river but the Indus alone would in such case be approached by it, and the interests of navigation would be as little benefited by the presence of a carboniferous zone, as if the valuable production by which it is distinguished, were buried beneath the table lands of the Himalaya. It is therefore sufficiently encouraging to find the general distribution of coal so favourable, nor need we, as is evident from the Attok and Hurdwar coal, despair of finding supplies available for the navigation of the northern portions of the Ganges and Indus as soon as inquiries are directed in those remote quarters to the objects here in view." The third section of the Report treats of the geological features of that portion of India in which the coal measures occur, and of the difference of level observed therein. At Cherra Ponji a bed of coal is raised on an insulated summit 300 feet above the level of the sea; the accompanying rocks are identical in character with those having a similar relative position to other beds of coal of the same formation, whether above or below the level of the sea. "The insulated situation of the coal measures at Cherra Ponji affords an excellent opportunity for their examination, owing to the great extent of surface which is free from soil and alluvium, so that the geologist has no obstacle to encounter but the dense vegetation peculiar to the climate. The great sandstone composing here as elsewhere the base of the coal measures, forms the lofty front of the mountains facing the plains. The lower beds consist of a coarse conglomerate, resting on greenstone after the manner of similar conglomerates in nearly all countries in which their fundamental rocks have been observed. When we consider that this is not merely the case with the sandstone of the Kasya mountains, but that the whole series of sandstones throughout Central India rest on the flanks of ranges of sienite, greenstone, and basalt, we cannot apply more appropriate language in elucidation of this general feature in our geology, extending as it does over an area of 1,800 geographical miles in length, and 300 in breadth, than the following remarks of De la Beche :—'As we can scarcely conceive such general and simultaneous movements in the interior strata immediately preceding the first deposit of the red sandstone series, that every point on which it reposes was convulsed and threw off fragments of rocks at the same moment; we should rather look to certain foci of disturbance for the dispersion of fragments, or the sudden elevation of lines of strata, sometimes perhaps producing ranges of mountains in accordance with the views of M. Elie de Beaumont.' Had this idea resulted from observations in India, rather than in Europe, it could not have been more appropriate, or formed so as to convey a more accurate notion of the nature and connexions of our red conglomerates. Ascending through the series of beds of this rock in the Kasya mountains, we find the coarser strata occasionally reappear, succeeded again by the normal beds which are fine, durable, and grey coloured. In some places, but especially

when approaching the upper third of the series, the colours become variegated, and ultimately the whole, or nearly so, assume a brick red colour. The higher strata form a barren table-land with lengthy sloping summits extending to the distance of ten miles towards the interior of the mountains. The limestone and coal about to be described, repose in an elevated position on either side of the adjoining summits; whether the rocks of which these last are composed, occupy a superior geognostic position with regard to the coal or not, is somewhat doubtful; but as far as it is safe to determine from inquiries of a partial nature, we may consider the sandstone from the base of the mountains to the higher peaks along their flanks as an uninterrupted series of beds, and consequently, that the coal is a newer rock than the sandstone composing adjacent summits. In the sandstone upon which the coal and limestone immediately rest at Cherra, a bed of boring shells occur composing a considerable portion of the rock in certain places. The shells were of the size and form of the Teredo navalis, but they are mineralized so unfavourably as to render it doubtful to what genus they really belonged. Reposing on the teredinite sandstone near Cherra, a detached accumulation of limestone with alternating beds of sandstone, coal, and shale, disposed in horizontal strata form a precipice about a hundred feet high from the base. Coal, to a thickness of fifteen feet in place, occupies a middle position in these strata. A bed of loose, coarse and sharp sand, five feet deep, forms the roof of the coal, and a layer of soft sandstone, about two feet in thickness, rests directly under the soil upon a bed of clay about twenty feet deep. The clay holds an intermediate position between the roof of the coal and the superincumbent sandstone, it is of yellow colour, but dark in some places, and intersected horizontally with thin layers of gravel, coal, and an iron pyrites of little value, and in small quantity. From their softness these beds are easily, though not uniformly, acted upon by surface water, which peculiarity may have given rise to that waved appearance observed by Mr. Jones and Captain Sage in the Burdwan and Palamow coal fields. "*Silhet Coal District*—The existence of Coal at Burdwan had been known as early as 1804, when it was observed by the officers of a regiment marching across the district. This discovery was communicated to the late Major General Hardwicke, and although the country was at the time depending for supplies of coal on England and New Holland, no farther attention appears to have been directed to the subject until 1809, when the Military Board, having been called upon for information, appears to have reported unfavourably of the quality of the coal in question. "*Arracan.*—Coal has been discovered at Kyuk Phyu in the Arracan district near Oogadong, close to the anchorage of ships. It was first observed by Lieutenant Foley in 1833, and afterwards described by that gentleman and Captain Margrave (vol. II. Asiat. Jour. p. 595). The quality of this coal is good, but the quantity so far as it has yet been discovered is deficient. "At Sandowy, in the same district, Lieut. Mackintosh found coal in the Kingtellie neighbourhood; one specimen of this coal mixed up with silicious matter is said by Mr. Walters to form the substance of an entire hill (vide Jour. Asiat. Soc. II, p 264); iron ores are also said to occur here in considerable quantity. "*Burdwan and Adji Coal Districts.*—The Burdwan coal district is certainly next in importance to that of Silhet. That part of it in which the Collieries are situated is 140 miles N. W. of Calcutta and is traversed by two rivers, the Damuda and and the Adji; the first enters the Hoogley about 25 miles below Calcutta, and the second enters that branch of the Hoogley called Bhagarutty about 70 miles above that city. The point at which the Damuda forms a junction with the Hoogley is 160 miles from the site of the coal mines: whereas Cutwa, the town at which the Adji joins this river is only 110 miles from the mines, while it is 70 miles nearer the great line of navigation on the Ganges, making a difference of 120 miles in favour of the Adji compared with the Damuda, as a line of conveyance to that part of the Ganges for the navigation of which the provision of coal is now chiefly required to be made. As a drawback however from this very marked advantage, there would be a land carriage of 10 miles across the country from the present mines on the Damuda to the Adji; but as these rivers extend parallel to each other for the distance of 40 miles (according to Arrowsmith's map), the most favourable portion of this space might be selected for the construction of a rail road from the present mines on the Damuda to boats on the Adji. "The advantage of the Adji compared with the Damuda as a line of conveyance, has here only been considered with reference to coal already worked; but the assistance which the Committee is receiving from the communications of Captain Forbes with Mr. Erskine, a gentleman residing on the spot, leaves scarcely a doubt as to the existence of good workable coal close to the Adji itself; and in a letter received from Mr. E. dated 6th July 1837, four situations are pointed out in which good coal may be raised, and delivered into boats at an expense of from ¼ to ½ an anna per maund. He moreover announces the dispatch of 2,000 maunds which will be delivered at Cutwa, at the rate of 3 annas per maund including all contingent charges. "The first situation in which Mr. Erskine points out coal is, Mamamudpore, two coss south of the Adji Ghat at Seedpooria;—land carriage per maund ⅛ths of an anna, but this coal as it appears on the surface of a ravine in which there is a stream of water is somewhat heavy and hard. The quality may

probably improve by pursuing the vein to a distance from the surface, or by sinking a shaft, better beds may be reached. "The second locality pointed out by Mr. Erskine, is a little to the west of the first, and 2½ coss from the same Ghat,—carriage per maund ¼ of an anna, quality better than that of the first. "The third place, and that from which Mr. Erskine himself has been in the habit of taking coal is Pariharpore, a good deal west of the other situations and only two coss, Mr. Erskine thinks, from the Damuda, and four coss in south-westerly direction from Durbadanga, the nearest Ghat on the Adji, which is one coss above Seedpore,—carriage 1½ anna per maund. This is a lighter and more brittle coal than either of the others, presenting a glistening and resinous lustre, and on exposure is inclined to crumble. "Mr. E. says that to the eastward of Mammudpore, all traces of coal or indeed any rocks disappear, while on the contrary the quality of the mineral improves on advancing towards the west. Mr. Erskine adds, that the last time the late Mr. Jones visited Elambazar, he said that in his borings about Beerkoolthee, near the Seedpore and Durbadanga Ghats on the Adji, he had met with coal even superior to that on the Damuda, and wished much to open a mine in that situation in conjunction with the late Mr. D. Erskine. "*Palamow Coal-field.*—The coal field of Burdwan is connected by means of what would seem to be the shattered remnants of coal measures with another principal coal field in the valley of Palamow on the opposite side of the Mongyr mountains. To the notice of this, as next in importance, we may at once proceed. "Coal has been known to exist in Palamow still earlier than the period at which it was brought to notice at Burdwan, as appears from a spot marked coal mine on Arrowsmith's map, but it was not till after the introduction of steam navigation that the fact excited any interest, when the late Mr. A. Prinsep, then the principal civil officer of the district had the merit of first directing attention to its importance; since that period, Palamow has been frequently visited by scientific and practical men, from whose reports the following particulars are gleaned. "The coal fields of Burdwan and Palamow are separated from each other by the prolongation to the eastward of the Vindhya chain, to which they bear a similar relative position, both reposing in low hills of sandstone, the one at the southern, and the other at the northern foot of the chain. "The valley of Palamow, situated at the source of one of the great branches of the Soane, is scarcely raised at its outlet above the general level of the plains of India, but is inclined with a slight ascent to the granitic mountains by which it is surrounded, except towards the north, at which side the Caile or Palamow river joins the Soane. The length of the valley from north to south may be about 70 miles, but its breadth is much contracted by the approximation of steep granitic hills on opposite sides, between which small diversified valleys are extended laterally. *Sakar river.*—Captain Ousely has recently brought to light a third site of coal in the Nerbudda, of excellent quality and inexhaustible quantity, within eight miles of Chukeli and twelve or fourteen from Gorahwarah proper on the Sakar. "What has been said in another section regarding the navigation of the Nerbudda, from Baug to Hoosingabad, a distance of three degrees, may enhance the value of the two last mentioned discoveries, but the great difficulty is the rapids of the Nerbuddah. "*Rajmal.*—At Rajmal, coal has been found by Captain Tanner in two situations, viz. at Sicrigully on the banks of the Ganges, and at Hurrah, twenty five miles distant. With regard to Sicrigully this place has been recently visited by Lieutenant Don, who reports to the Committee that as far as he and Lieutenant Egerton who accompanied him, could determine, no coal exists at the foot of the Mootee Jarma waterfall where it was supposed to have been observed by Captain Tanner."—*Report of Coal Committee.*

(2726) COBÆA SCANDENS. This is a fast growing creeper, the flowers of which are purple, and the stems attach themselves to any rough surface, like some of the Cereus species, and is well adapted for screening walls.—*Riddell.*

(2727) COBÆACEÆ, a small natural order of Plants.—*Engl. Cyc. Vol.* II. *page* 40.

(2728) COBITIS, a genus of Fishes belonging to the Abdominal *Malacopterygii* and family *Cyprinidæ.* This genus includes the Loaches.—*Engl. Cyc. page* 41.

(2729) COCCIDÆ, (of Leach) the *Gallinsecta* (of Latreille), a family of Insects placed by Latreille and others at the end of the *Homoptera.* The insects belonging to this family live upon trees or plants of various kinds: they are of small size, and in the larva state have the appearance of oval or round scales, hence they are called Scale Insects. They are closely attached to the plant or bark of the tree they inhabit, and exhibit no distinct external organs. At certain seasons, when about to undergo their transformation, they become fixed to the plant, and assume the pupa state within the skin of the larva. The pupa of the males has the two anterior legs directed forwards, and the remaining four backwards; whereas in the females the whole six are directed backwards. When the males have assumed the winged or imago state they are said to issue from the posterior extremity of their cocoon. In the spring time the body of the female becomes greatly enlarged, and approaches more or less to a spherical form. In some the skin is smooth, and in others transverse incisions or vestiges of segments are visible. It is in this state that the female receives the embraces of the

male, after which she deposits her eggs, which are extremely numerous. In some, the eggs are deposited by the insect beneath her own body, after which she dies, and the body hardens and forms a scale-like covering, which serves to protect the eggs until the following season, when they hatch. The females of other species cover their eggs with a white cotton-like substance, which answers the same end.—*Eng. Cyc. Vol.* II. *page* 43.

(2730) COCCOLOBA, a genus of plants belonging to the natural order *Polygonaceæ*.—*Eng. Cyc. Vol.* II. *page* 45.

(2731) COCCOTHRAUSTES, a genus of Insessorial Birds belonging to the family *Fringillidæ*.—*Eng. Cyc. Vol*, II. *page* 45.

(2732) COCCULUS, a genus of Plants belonging to the natural order *Menispermaceæ*, consisting of climbers, whose leaves are usually more or less heart-shaped, and the flowers small, and either white or pale green, in loose panicles or racemes; in most cases they are diœcious, and are always very minute. The species are usually powerful bitter febrifuges.

(2733) COCCULUS ACUMINATUS, Coromandel and Bengal. Syn. M. polycorpon, (Rox. vol. iii. p. 816.) Tiliacora racemosa, Colebrooke, Trans. Lin. Society, xiii. 67.—*O'Shaughnessy, page* 202.

(2734) COCCULUS BAKIS, Senegal Root, diuretic and very bitter, used in intermittents and gonorrhœa.—*Ibid.*

(2735) COCCULUS CRISPUS, a twining plant found in Sumatra and the Moluccas, with a tubercled or warted stem, it is employed by the Malays for the cure of intermittent fevers. Owing to its intense bitterness and twining habit it was called *Finus felleus* by Rumf. Another plant, the *Menispermum fenestratum* of Roxburgh, is in great repute among the Cingalese, who slice it, steep it in water, and swallow it along with the infusion as a stomachic.—*Engl Cyc. page* 46.

(2736) COCCULUS CINERASCENS, Rio Janeiro. Root, used in intermittent and liver diseases.

(2737) COCCULUS CORDIFOLIUS, Menispermum cordifolium, see *Fl. Ind.* iii. *p.* 811.

Guluncha, Gudancha, Hind. | **Goolwail,** Duk.

This is one of the most common and valuable plants in India. The stem is twining, perennial, succulent, running over the highest trees. The root is large, soft, and spongy, and when fresh is used extensively by the natives of Bengal, being mixed with sour rice gruel, and sugar, for the cure of heat of urine of gonorrhœa. On the mode of preparing the guluncha in its various forms, and its uses in disease, some very curious information is given by the Dewan Ramcomul Sen, in a paper published in the Trans. Medical and Physical Society of Calcutta, 1827, vol. iii. p. 294. An extract called *Palo* is procured from the stem, and is used dissolved in water for the same purpose. The stems, roots and leaves are bitter, and afford a decoction called *Pachana*, much used as a bitter tonic, in convalescence from fevers and acute diseases generally. The *Palo* is prepared by cutting the stem into small pieces, which are cleaned and bruised in a mortar, then soaked in water for 24 to 48 hours. The mass is then squeezed between the palms of the hands, and the woody particles separated from the fluid, which is strained through a cloth. The solution is evaporated to dryness before the sun, and when dry the residue resembles sugar; the dose is half a rupee to one rupee weight, taken with sugar, milk, and rice gruel. The decoction *Pachana* is made from 2 to 5 rupees weight of the stem cut into small pieces, bruised in a mortar, and boiled with a pound (½ a seer) of water down to two ounces; this is then strained and drunk with honey. An infusion in cold water is also prepared, and is much employed in the treatment of cutaneous diseases. The species employed by Mr. Piddington, he names the *Menispermum verrucosum* and *glabrum*, neither of which properly refers to our article. The *M. verrucosum*, though cultivated in the Botanic Garden, is not indigenous, it is a native of Java and Amboyna, and is now known to be the *Funis felleus* of Rumphius. It is a much more powerful bitter than the guluncha. The alcoholic extract Mr. Piddington described as likely to prove of great value in the treatment of intermittent fever. The highly satisfactory effects of *M. verrucosum* in Java and Manilla promised indeed similar advantages from the use of guluncha here. Dr. Hardie of Oudepore and Dr. Stewart of Calcutta used the extract in several cases of intermittent fever in 1829, and reported on it very favourably. Our article, in common with all the order, should be collected during the hot season, when the bitter principle is most abundant and concentrated. Dr. O'Shaughnessy, in several trials made at the Calcutta College Hospital, found the guluncha to be a very useful tonic, but could scarcely attribute to it any very decided febrifuge effect. The decoction, or cold infusion used in the same manner as sarsaparilla was of very great utility in the treatment of several cases of chronic rheumatism, and of secondary venereal affections. Its action is decidedly diuretic and tonic in a very high degree. The Roots and Stems are the officinal part given in the form of Extract, tincture, infusion, and decoction.—*O'Shaughnessy, pages* 198—200. The heart-leaved Cocculus is a twining shrub with scabrous corky bark, and broad cordate leaves. The flowers are mostly whitish green and the berries scarlet. This plant possesses febrifuge properties. The Cocculus Cordifolius or Goluncha Creeper is found especially on neem trees, whence it is called also nim gilo ka

sath, its roots and stem are intensely bitter. Mr. Piddington found that the bitterness varied according to the season when the plant was gathered. No later analysis has been made of Goluncha than that of Mr. Piddington, whose experiments indicated starch, mucilage, extractive and a crystalline substance. Dr. H. H. Goodeve considered extract of Goluncha, if not equal to Quinine as a febrifuge, at least as good as the common Cinchona bark and much better than Chiretta. Some of the dispensaries in the North-West report very favorably of this substance. There are however no good recent accounts of it, and the substance certainly demands further examination as also does Cocculus Crispus, the Menispermum Verrucosum of Roxburgh, to which Mr. Piddington called attention in 1829. The extract is undoubtedly a useful tonic and its decoction has a great reputation among native practitioners in old intermittents, when the dose is about 1½ oz. thrice daily. A tincture is prepared from the stems, 8 oz. and spirits one pint. The dose of it is 2 drams to half an ounce. That of the extract is one dram to three drams daily.—*Ind. Ann. Med. Sci. for Apl.* 1856. *p.* 392. The Extract of Gulaucha is a very valuable bitter tonic; the preparation given by Dr. O'Shaughnessy is the Palo of the native physicians. Dose, one drachm and a half or three drachms, in divided portions daily, diffused through milk, and the taste disguised by sugar.—*Beng. Phar. p.* 290.

(2738) COCCULUS CRISPUS. Syn. *Menispermum verrucosum*, grows in Java and Amboyna. The whole is extremely bitter, and is used with complete success by the Malays as a febrifuge remedy.—*O'Shaughnessy.*

(2739) COCCULUS FIBRAUREA, Cochin-China, and China; used by the Malays in agues and liver diseases.—*O'Shaughnessy.*

(2740) COCCULUS INDICUS, Indian Berry.

Kakmari-kee-beenge, Duk.	Galla di Levante, It.
Coque de Levant, Fr.	Tubabidga, Mal.
Fischkorner, Ger.	Kakamari, Sans.
Jermaee, Guz.	Kaka collie vereí, Tam.
Kakmari kee-beenge, Jermaee, Hind.	Kakichempoo vittiloo, Tel.

Anamirta Cocculus: this is a kind of seed imported from the East Indies under the name of Cocculus Indicus Berries, which possess a powerful bitter poisonous principle, that, according to Goupil, exists principally in the kernel. The plant is found in the forests of Malabar, and when transplanted to the botanic garden, Calcutta, grew in a few years so as to extend over a large mango-tree, with a stout woody stem as thick as a man's wrist, covered with deeply cracked, spongy, ash-coloured bark. The leaves were very exactly cordate, entire, obtuse, or emarginate, of a hard texture, shining on the upper surface, and from 4 to 12 inches long, by from 3 to 8 inches broad. This plant is the *Menispermum Cocculus* of Linnæus, the *Cocculus suberosus* of De Candolle; but according to Messrs. Wight and Arnott, it does not properly belong to the latter genus, having the stamens combined into a central column and no corolla. They call it *Anamirta Cocculus*, under which head it will be found described. The *Cocculus Indicus* berries are never used internally in the practice of medicine, but an ointment formed of the powdered berries is very efficacious in some cutaneous diseases, such as *Porrigo Capitis* and *Sycosis Menti*. It speedily allays the inflammatory state; but its employment requires great care. Creosote will probably supersede it in such cases.—*Eng. Cyc. p.* 48. Dr. Royle tells us that Cocculus Indicus, is the fruit of a climbing plant common in the mountainous parts of the Malabar coast, whence our supplies, and they are large, are now all derived through Bombay, Madras, and Ceylon. But formerly these berries reached Europe by the Red Sea and the Mediterranean, whence they were called Grana Orientis by Ruellius, 1536, Coque du Levant, by Pomet, &c. There is no proof, though it is probable, that they were known to the Arabs. The Mahizuhra (Fish-poison) of Rhases, Serapion, and Avicenna, and referred by Sprengel to these berries, seems to have been a plant and its bark, "qua juvat in doloribus juncturatarum et contortione digitorum." (Serapion.) Plempius coined the name *Icthyoctonum*, to indicate "fish-poison." The plant yielding these berries was ascertained by Dr. Roxburgh. It was named *Anamirta paniculata* by Colebrook, and subsequently *A. Cocculus* by Wight and Arnott; the latter name has been adopted by the Edinburgh Pharmacopœia. It was the *Menispermum Cocculus* of Linnæus. The name Cocculus is probably derived from the Tamul *Kukacollie*, which signifies *crow-killing*, as does the Sanscrit *kakmare*. The Cocculus plant is a powerful climber, with ash-coloured, deeply cracked, corky bark, whence the plant was called Cocculus suberosus. The leaves are stalked, large, broad-ovate, or rather roundish, truncated or somewhat cordate at the base, acute at the apex, firm in texture, soft and downy when young, with 5 digitate ribs,—petioles a little shorter than the leaves, tumid at both ends. Flowers diœcious, in lateral compound racemes. Calyx of 6 sepals in a double series with 2 close pressed bracteoles. Corolla none. Cocculus berries were described by Dale as being kidney-shaped and something like bay-berries, but somewhat smaller. They are blackish-brown, and wrinkled externally, with the outer coat thin and dry, and within it is a white, woody, bivalvular shell, enclosing the whitish, semilunar, oily, and very bitter-tasted seed; which never fills the whole of the cavity, but, this in old seeds, is sometimes entirely empty. "The kernels should fill at least two-thirds of the fruit." E. P. *Chem.* The kernels of Cocculus indicus were analysed by Boullay, most recently by Couerbe and Pel-

letier, who obtained *Picrotoxine*, Resin, Gum, Fatty acid, and a Waxy matter, Malic acid, Mucus, Starch, and Salts. In the shell they obtained two alkaloids, but in small quantity, which they called Menispermia and Paramenispermia. But the nucleus being the part used, it is necessary to notice only its active principle. *Picrotoxine* is colourless, crystallizes in needles, sometimes in silky filaments, in plates, and in rhombic prisms. Its taste is intensely bitter. It is soluble in 150 parts of water at 75° F., and in 25 of boiling water, in 2 of Ether, and in about 3 parts of Alcohol. It is insoluble in both the fixed and the volatile oils. It does not combine with acids, but it is soluble in Acetic acid, and as it forms combinations with alkalis, it is therefore considered to be of the nature of an acid. It consists of C_{12}, H_7, O_5. To obtain it, Dr. Christison recommends, to separate the oil first from the kernels by expression, then to exhaust the residuum by percolation with rectified spirit, which is then to be distilled off. The residue is agitated with boiling water and a little H Cl. The dissolved Picrotoxine may be obtained, on the water cooling after moderate concentration. *Action. Uses.* Poisonous; used for taking fish and game, and employed by unprincipled brewers for adulterating porter, being unblushingly recommended by Childe and by Maurice in their books "on Brewing." It is used chiefly in the form of a bitter extract, known by the name of B. E., *black extract*, which is ostensibly prepared for tanners. (*v.* Cycl. of Pract. Receipts.) It produces giddiness, tetanic convulsions, and coma: applied externally, in powder, it destroys vermin, and is useful in scabies, ringworm, and porrigo.—*Royle.*

(2741) COCCULUS PALMATUS. *Syn.* Menispermum palmatum. Cocculus colomba.

Colombo ke jur, HIND. | Colombo root, ENG.

A native of the shores of Oizo and Mozambique, introduced into Madras, and now successfully cultivated in the Calcutta garden. The root is common in the bazars, being brought from Ceylon, whither it comes from Africa. Colombo having been long the intermediate stage in the traffic, has given its name to the root. In commerce, Colombo root is met in slices of one to two inches diameter, half an inch thick, often perforated in the centre, much wrinkled, greyish externally, bright yellow within; the taste is excessively bitter, smell heavy, powder of a greenish grey colour, and very apt to attract moisture from the air. The commerical parcels are often adulterated with the roots of the *Costus indicus, C. speciosus and C. arabicus*, (Kust, Kushmut, Putchuk, Keemooko, *Vern.*) with *Bryony* dyed with turmeric, and with the root of another species of *Cocculus*. Colombo root is one of the most valuable tonics we possess; it seldom occasions any unpleasant sensation in the stomach or alimentary canal; it improves the appetite and digestive powers, does not costipate, and though destitute of absolute febrifuge qualities, is one of the best remedies for persons convalescent from fevers. The dose of the powdered root is fifteen grains to one drachm. The tincture is the best form, as the spirit dissolves all the active, and removes none of the inert ingredients; the dose of the tincture is from one to three drachms. The watery infusion is very apt to spoil, on account of its containing a large proportion of starch. A root called American Colombo is very commonly met with. It is the root of the *Frasera Carolinensis*, or *Walteri*, a native of North America, of the natural order Gentianeæ. It may be at once distinguished by the absence of starch, in consequence of which it does not give a blue colour with tincture of iodine. It also contains tannic acid, which may be detected by the deep black colour struck with the permuriate of iron. The true Colombo contains no astringent principle. Another spurious Colombo arrives in Europe from Algiers, and may also be distinguished by the tests above-mentioned. The Costus speciosus and Arabicus are at once known by their very different appearance, and violet smell. The adulteration by *bryony* is rare. This root is white, and cold water will remove the turmeric employed to dye it yellow. But even to the eye of an inexperienced person the characters of true Colombo once carefully examined, are so decided that no mistake can be apprehended. It is not improbable that the roots of other species of Cocculus may resemble the Colombo sufficiently to be substituted for the latter, not only in trade, but in medicine. Experiments with this family are however peculiarly dangerour, on account of the presence in some of the bitter and very poisonous picrotoxic acid. The root is used in infusion, tincture, and compound tincture.—*O'Shaughnessy, pages* 196-198.

(2742) COCCULUS PLATYPHYLLUS, Brazil.

(2743) COCCULUS VILLOSUS, a plant common in the hedges of Bengal, with variable downy leaves and axillary solitary female flowers, succeeded by deep purple berries the size of peas, is a species of considerable importance to the Hindoos. The juice of its ripe berries makes a good durable bluish-purple ink, according to Roxburgh, who adds some further particulars concerning its uses;—"A decoction of the fresh roots, with a few heads of long pepper, in goat's milk, is administered for rheumatic and old venereal pains; it is reckoned heating, laxative, and sudorific. The fresh leaves taste simply herbaceous; rubbed in water they thicken it into a green jelly, which is sweetened with sugar, and drank, when fresh made, to the quantity of half a pint twice a day, for the cure of heat of urine in gonorrhœa. If suffered to stand for a few minutes, the gelatinous or mucilaginous parts separate,

contract, and float in the centre, leaving the water clear, like Madeira wine, and almost tasteless. Curry is made of the leaves, for people under a course of its roots, or jelly of the leaves." —*Engl. Cyc. Vol.* II. *p.* 47.

(2744) COCCUS, *Linn.* Order *Hemiptera.* The entire insects are the Cochineal. Several of the genus Coccus are used as dyes; as the Kermes insect, or *Coccus Ilicis*, found on the Ilex Oak; the *Coccus Lacca*, or Lac insect, found in various trees and shrubs in India, much used as a substitute for Cochineal and its Resin (Shell-Lac) for various purposes; the *Coccus polonicus*, found on the root of *Soleranthus perennis*. Something similar is found on the roots of a plant in the marshes of Herat. (*Burnes.*) The true *grana fina* of the Spaniards, is found in the cool parts of Mexico, as near Oaxaca, whence one kind of Elemi is obtained. The *grana sylvestra*, an inferior species, is found in hot parts, as near Vera Cruz, and in Brazil. The female of the Cochineal insect is alone collected from off the Cactus plant where the impregnated females have previously been placed by the natives of Mexico to produce their numerous young. These, when matured, are brushed off, and killed by artificial heat. Three harvests are annually collected. The *Silver* and *Black* varieties of the *Grana fina* are known. The insects are oblong, roundish, plano-convex, from one to two lines in length, wrinkled, the former of a colour resembling silver-paper, owing to fine down with which they are covered, and by which the genuine may be distinguished from any imitation of the colour with powdered Talc, &c. They are of a purplish-grey colour, while the *black* variety is without bloom, and of a dark-reddish colour. An inferior kind (granilla) made up of smaller insects, and broken fragments is also sold. Cochineal, when powdered, is of a carmine colour, without odour, but having a slightly-bitter taste. It contains some fatty matters, with a brilliant colouring principle which has been called *Cochenilline*, making it valuable as a dye. It is used for giving colour to some tinctures.—*Royle.* This insect feeds upon a particular kind of Indian fig, which is cultivated for the express purpose of rearing it.—*Eng. Cyc. Vol.* II, *page* 44. The Cochineal insect was introduced into Java a few years ago, as a Government experiment, and apparently with more success in its production than in British India, for as long ago as 1844 it was exported from Batavia to the estimated value of 93,319 guilders.—*Crawfurd Dict. page* 112. After prolonged efforts on the part of Dr. James Anderson and Berry of Madras in 1795, the Sylvestre or wild species of the Cochineal insect was introduced into Bengal by Capt. Neilson of H. M. 74th Regt., and throve rapidly on the Cactus indica, the indigenous opuntia, the country Nopal, and between 1800 and 1807, 74,366½ lbs. of the Cochineal amounting to Rs. 142,916 in value was shipped to England, but at a loss, as the wild species was greatly inferior to the true.—*Royle Prod. Re. page* 57.

(2745) COCCUS LACCA. But we are not alone indebted to the Coccus tribe for the dyes they yield; the substance called Lac is also procured from one of these insects, the *Coccus Lacca*. This species inhabits India, where it is found on various trees in great abundance. "When the females of this Coccus have fixed themselves to a part of the branch of the trees on which they feed (*Ficus religiosa* and *F. Indica*, *Butea frondosa*, and *Rhamnus Jujuba*), a pellucid and glutinous substance begins to exude from the margins of the body, and in the end covers the whole insect with a cell of this substance, which when hardened by exposure to the air becomes lac. So numerous are these insects, and so closely crowded together, that they often entirely cover a branch; and the groups take different shapes, as squares, hexagons, &c. according to the space left round the insect which first began to form its cell. Under these cells the females deposit their eggs, which, after a certain period, are hatched, and the young ones eat their way out." (Kirby and Spence, Vol IV, p. 142.) —*Eng. Cyc. Vol.* II, *page* 44.

(2746) COCCUS POLONICUS is another species which is used in dyeing, and imparts a red colour. It is now chiefly employed by the Turks for dyeing wool, silk, and hair, and for staining the nails of women's fingers. (Kirby and Spence, vol. I, p. 320).—*Eng. Cyc. p.* 44.

(2747) COCHINEAL.

Conchenilje, Dut.	Kermij, Pers.
Cochenille, Fr.	Cochenilha, Port.
Koschenilje, Ger.	Konssenel, Rus.
Kermij Guz, & Hind.	Cochinilla, Grana, Sp.
Coccinigliia, It.	Cochineel poochie, Tam.

Cochineal is met with in small rugose inodorous grains, commonly of a deep mulberry colour, and covered more or less with a whitish down. They are the female of a small insect (*Coccus cacti*), a native of Mexico, and feed on the leaves of the *Cactus cochinellifera*. This article, although yielding a crimson solution, is generally used for dyeing scarlet. Cochineal is imported into Bombay from England; two sorts are distinguished, *Silver* and *Black* cochineal: the former is considered of superior quality to the latter. Cochineal is extremely rich in the finest red colouring-matter, and has been long employed in scarlet dyeing and in the manufacture of carmine. The chief use of Cochineal is the dyeing of scarlet: the fine colour which it yields being converted to this tint by means of chloride of tin usually called Muriate of Tin, and by the dyer Tin Spirits. The insect which constitutes Cochineal feeds chiefly upon the *Cactus cochinellifera* but also on *C. opuntia* and other species. The female insect only is collected. Several varieties are distinguished in commerce, and have different degrees of value attached to them, dependent chiefly upon the dif-

ferent methods employed to kill and dry the insects. When dried they resemble small grains scarcely so large as a pepper-corn, ovate, convex above, plane below, transversely furrowed, externally blackish-brown, but as if dusted with a white powder, light, friable, the internal substance consisting of extremely small grains, obscurely purple, but when reduced to powder of a rich purple. Inodorous, but with a bitter-sweet acrid taste. They impart to water or alcohol by digestion an intensely red colour. The colouring principle is termed Carmine. Adulterations are effected either by mixing old insects consisting of the mere skin or grains artificially prepared with the genuine. Cochineal has hitherto been employed mostly as a colouring material either of tinctures or of other things the nature of which it is wished to disguise; but lately it has been stated to possess diuretic and antispasmodic powers, and to be useful in pertussis, or hooping-cough. Its claim to this character requires yet to be established by further evidence.—*Engl. Cyc. page* 48. At the Madras Exhibition of 1857, the *Cochineal* exhibited from *Chittledroog* was from "*Coccus cacti.*" The cochineal exhibited was "silver grain." It forms a very fine and permanent dye in red, crimson, scarlets. It answers on wool and silk, but not on cotton. It is a most expensive colour, and is rarely in the hands of the dyer, but if supplied to him, he understands the method of using it. The attention of the East India Company was for many years directed to the production of this dye, but with little success. Insects were with much difficulty procured, and introduced about 50 years ago, and a large quantity was produced under the superintendance of Dr. Anderson, and encouragement held out by the Madras Government, but unfortunately the insect turned out to be the wild species. What was exported, proved to be small and deficient in colouring matter, and very inferior to any brought from new Spain. The Court of Directors offered £2000 for the introduction of the true Mexican Cochineal, but this never was accomplished.—*M. E. J. R.*

(2748) COCHLOSPERMUM, a genus of Plants placed by Lindley in the natural order *Cistaceo*, found in Asia, Africa, and South America. Botanists usually place it amongst the Theads (*Ternströmiaceæ*); but its parietal placentæ, acrisomerous flowers, and curved embryo lying in the midst of albumen, seem fatal objections to that association.—*Engl. Cyc. page* 49. Dr. Hooker, in his Himalayan travels, writes that these trees have curious thick branches which spread out somewhat awkwardly, each tipped with a cluster of golden yellow flowers, as large as the palm of the hand, and very beautiful: it is a tropical Gum-Cistus in the appearance and texture of the petals, and their frail nature. The bark abounds in a transparent gum, of which the white ants seem fond, for they had killed many trees. Of the leaves the curious rude leaf-bellows are made, with which the natives of the Assam valley hills, smelt iron.—*Hooker Him. Jour. Vol.* I, *page* 53.

(2749) COCHLOSPERMUM GOSSYPIUM. Yellow-flowered cotton tree. *Syn.* Bombax Gossypium, L. *Off-product.* Kutira gum of the bazars. Dr. Roxburgh describes this tree as common on the Arracan mountains. It is a large tree with downy shoots. It occurs also in Bundlecund, on the hills round and near Adjigurh and Kalingur, as well as on those near Hurdwar, and the Kheree pass.—*O'Shaughnessy, page* 225. Leaves 5-6 inches long, 5-lobed; ovary beneath on cylindrical downy stalks. Panicle terminal. Flowers large, and bright yellow, and appear in March and April, when the tree is destitute of leaves. Capsules large, containing a silky cotton, used merely for stuffing pillows. The trunk yields the gum Kuteera, which in the North-Western Provinces of India, is substituted for Tragacanth. —*Engl. Cyc. p.* 49.

(2750) COCHLOSPERMUM SERRATIFOLIUM.—A tree resembling the gossypium, but with the lobes of the leaves serrated.

(2751) COCK. One species of the genus Gallus is found in the wild state in the Malay Peninsula, two in Sumatra, two in Java, and one in the Philippine Islands. It is remarkable, however, that no bird of the genus in the wild state is to be found in Borneo, Celebes, or any island of the Molucca Sea. Several of these supposed species are probably the same. The two of Java are distinct species; they will pair, but the progeny is a male, a beautiful bird kept by the wealthy Javanese as an ornament of their poultry-yards, under the name, well known to them, of Pakiser. The wild fowl of the Philippines is sometimes tamed, and by the courage it displays, shows that it is of the true game breed, and probably identical with the domesticated bird. This is what the authors of the Spanish Geographical Dictionary say of it in their introduction:—"In the woods there are beautiful wild cocks. These are very brave in the combat and always come off victors with the large but cowardly cocks of China, and not with these alone, for they will contend with the famous gallant band of the Laguna." Most of the advanced nations of the Asiatic Islands are gamblers, and the favourite shape which gaming takes with them is cock-fighting. This includes the people of Bali, Lamboc, Celebes and all the Philippine islands, the only material exception being the Javanese. The passion for cock-fighting is impressed on the very language of the Malays. Thus there is a specific name for cock-fighting, one for the natural spur of the cock, and another for the artificial; two names for the comb, three for the crow, two for a cock-pit, and one for a professional cock-fighter. The passion is no where carried further than in the

Spanish dominions in the Philippines. There, it is licensed by the government, which derives from it a yearly revenue of about 40,000 dollars, or about £10,000.—*Crawfurd Dic. p.* 118.

(2752) COCKS-COMBS. These flowering plants are little better than weeds in Madras, unless planted in well manured soil and watered with good water, they are not worth pot cultivation : raised from seeds in September and October.—*Jaffrey.*

(2753) COCOA. CACAO.

Cacao, Fr. | Cocao, It., Port., and Sp.
Kakao. Ger.

This has already been described at some length under the heads cacao and chocolate. The bruised seeds or nuts of the cacao, or chocolate tree (*Theobroma cacao*). The seeds or *nibs*, of which there are several varieties, more or less esteemed, are oval, about as large as an olive, and covered with a violet or ash-gray skin, which encloses two cotyledons of a fatty nature. When simply bruised, they constitute the cacao of the shops ; reduced to a paste, mixed with sugar, and flavoured with vanilla, cinnamon, &c. they become chocolate. The tree is a native of Mexico, but is extensively cultivated in the West India Islands.—*Faulkner.* At the Madras Exhibition of 1855 the Cocoa seeds sent by General Cullen from his gardens near Oodagherry, 1,800 feet above the sea, were the only samples ; they were of good quality, the beans being plump, ripe and clean, but small, not well cured and without colour. The jury considered them deserving of honorable mention. Considering how much of this article is employed daily in private life, it is of great consequence to get good Cocoa grown in India. The climate and soil of the Western coast would appear peculiarly favorable. For the cultivation of the tree, from which this valuable nut is produced, the Cocoa flourishes best in the alluvial soil of mountain vallies, though it will grow well at some elevation on mountain sides. Great care should be taken in the selection of plants, as the varieties are numerous, some producing very superior fruit to the others ; judgment on this point must chiefly be acquired by experience. Considerable diversity of opinion exists as to the distance at which the plants should be placed ; some authorities considering that from 12 to 16 feet apart is sufficient, others maintaining that 30 feet is not too much. It is clear that a free ventilation of air should be insured to the tree, after it has come to its full growth, and this cannot well be attained with a smaller space than 30 feet. The Cocoa plant requires large forest trees of favourable sorts to be scattered amongst them, to protect them—the e used for this purpose in the West-Indies and uth America is one of the Bombaceæ. The erage return of Cocoa per tree, when the trees planted close together, is from 1 to 3 lbs. re being two crops in the year, but as much from 9 to 16lbs may be procured by proper planting and cultivation. The plants begin to bear at from 5 to 7 years of age : during this period, the interspaces between the rows of trees can be rendered productive by planting Yams and Vegetables in them. Great care is required in curing the Cocoa, after it is separated from the pod, and on the method of fermenting and drying depends very much the production of a good or bad article.—*M. E. J. R.*

(2754) COCOS or EDDOES, Arum esculentum. The various species of Arum in Southern Asia, have already been noticed under that head, and our present observations are confined to one, very suitable for the food of man. This root has not hitherto been considered of sufficient importance to demand particular care in its cultivation, except by those who are engaged in agricultural pursuits, and derive their subsistence from the productions of the soil. But though the cultivation of the root is almost unknown to the higher classes in society, and little regarded by planters in the colonies, it is a most valuable article of consumption. Amongst the laboring population of the West Indies it is the principal dependance for a supply of food and it well merits to be more extensively cultivated than it now is, in Eastern and Southern Asia. Long droughts may disappoint the hopes of the yam crop, storms and blight may destroy the plantain walks, but neither dry for wet weather materially injure the coco ; it will always make some return, and though it may not afford a plentiful crop, it will yield a sufficiency until a supply can be had from other sources. For this reason the laborer in the West Indies always takes care to put in a good plant of cocos into his provision ground as a stand by, and knowing their value, is perhaps the only person who bestows any degree of care or attention upon them. Previous to their emancipation, whole families of negroes lived upon the produce of one provision ground, and the coco formed the main article of their support. Where the soil is congenial to the white and black Bourbon coco, the labor of one industrious person once a fortnight will raise a supply sufficient for the consumption of a family of six or seven persons. The coco begins to bear after the first year, and with common care and cultivation the same plant ought to give annually two or three returns for several years. In Jamaica, a disease something similar to that affecting the potato, has been found injurious to the coco root. This disease, which has baffled all inquiry as to its origin, affects the plants in and after the second year of their being planted. The first institution of it is the change in the leaves, which gradually turn to a yellow hue, have a sickly appearance, and at length drop off at the surface of the earth. The stock or "coco head," as it is called, below ground, having become rotten, nothing but a soft pulpy mass remains. In some fields every third or fourth root is thus af-

fected, in others much greater numbers are destroyed, so much so that the field requires to be almost entirely replanted, by which not only an expense is entailed, but a heavy loss sustained, from the field being thrown out of its regular bearing. The black coco seems to suffer less than the white. Another species, the Taro (*Arum colocasia, Colocasia esculenta* and *macrorhizon*), is an important esculent root in the Polynesian islands. In the dry method of culture practised on the mountains of Hawaii, the roots are protected by a covering of fern leaves. The cultivation of taro is hardly a process of multiplication, for the crown of the root is perpetually replanted. As the plant endures for a series of years, the tuberous roots serve at some of the rocky groups as a security against famine. It is also extensively cultivated in Madeira and Zanzibar, and has even withstood the climate of New Zealand. It is grown also in Egypt, Syria, and some of the adjacent countries, for its esculent roots. A species is cultivated in the Deccan, for the sake of the leaves, which form a substitute for spinach. Farina is obtained from the root of *Arum Rumphii* in Polynesia.—*Simmonds, p.* 364.

(2755) COCOA-NUT PALM. Cocos NUCIFERA, *Linn.*

Nur, MAL.	Tenna marum, TAM.
Kalapa, JAV.	Tenkoi chettoo, TEL.
Narel ka jbar, HIND.	Kinghena, CAN.
Narikel, BENG.	

The Nut.

Taynga, TAM.	Cocos, FR.
Naril, DUK.	Kokonusse, GER.
Tenkaia, TEL.	Narul, Nareel, GUZ. HIND.
Tangha, MALAY.	Cocchi, IT.
Calapa, MALAY.	Nargeel, PERS.
Narikayla, SANS.	Kokos, RUS.
Nareel, ARAB.	Narikela, SANS.
Kokosnooten, DUT.	Cocos, SP.

The Palm Wine.

Tennang khulloo, TAM.	Tenkaia khulloo, TEL.
Narillie, DUK.	Cocoanut Toddy, ENG.
Nargillie, ARAB.	

Its Cabbage.

Tennam Koortoo, TAM.	Tenkaia chettu kurtu, TEL.
Naril ka kroote, DUK.	Cocoanut cabbage, ENG.

Its Sugar or Jaggery.

Tenne vellum, TAM.	Tenkaia bellum, TEL.
Naril ka goor, DUK.	Jaggary of Cocoanut toddy, ENG.

Its Oil.

Taynga unnay, TAM.	Cobri, CAN.
Naril ka teyl, DUK.	Cocoanut oil, ENG.
Tenkaia noonay, TEL.	Narikaylum, SANS.

Its Water or Albumen.

Yellayneer, TAM.	Cocoanut water, ENG.—*Faulkner, also Ainslie's Mat. Med. p.* 268 *&* 270.
Yell-neer ka panie, DUK.	
Yellaneeroo, TEL.	

Its Fibre.

Tennam nar, TAM.	Coir, HIND.
———, TEL.	

The Cocoa-nut Palm, little if at all known to the Ancients, was particularly noticed by the Arabs, being by them called *Jouz hindee* or Indian nut; but at much earlier periods, in Sanscrit works, by the name of Nari- and Nali-kera. It is, no doubt, the "great nut of India," which Sir John Maundeville mentions among the trees of that country, as producing nuts as large as men's heads. In the East, where it is indigenous, it must from the earliest times have attracted the attention of the inhabitants. But it would be impossible in the present day to distinguish the trees which have been introduced from those which are now growing apparently wild, on the various tropical coasts and islands where they are found in such vast abundance. As, for instance, in the Maldive and the Laccadive Islands; also, on the Malabar coast and in Ceylon, as well as on the eastern side of the Bay of Bengal, whence it ascends both the Burrampooter and Ganges Rivers to considerable distances. Likewise, in most of the islands of the great Archipelago forming the *India aquosa* of old authors, from the Sunda Isles to Molucca, and in those of the Pacific Ocean. It is, moreover, cultivated in various tropical parts of the New World. The Cocoa-nut (*Cocos nucifera*) and the Oil Palm (*Elæis guineenis*) have been remarked by a distinguished botanist, Mr. Brown, as the only two of their group (*Cocoinæ*) found in the Old World. The Cocoa-nut Palm is one of the great ornaments of the shores of tropical countries. The cylindrical stems, with a diameter of about two feet, attain an elevation of from sixty to one hundred feet, and are surmounted with their crowns of numerous, wavy, and which, from their appearance may almost be said to be, feathery leaves. These are by botanists often called fronds, and by travellers their footstalks are often called branches. They are gigantic in size, being about twenty feet in length, with a strong, tough stalk, which forms the midrip, and has a number of narrow and long leaflets ranged along the two sides. The fruit is borne in bunches, of which there are from eight to twelve, each bearing, on trees growing in favorable situations, from five to fifteen nuts, so that each tree may produce from eighty to one hundred nuts annually. Mr. Bennett has well observed that the tough and thick (and it may be added, light) covering of the nut protects the germ while it floats even on salt water, and it is thus borne to barren spots, where it germinates, and causes even the smallest islets, just appearing above water, to become covered with clumps of Cocoa-nuts, as the fruit falling springs up and forms young trees around the original tree. Thus the Cocoa-nut is found on barren, uninhabited islands, as well as in populous districts; and though it attains the greatest perfection on the coast, it may yet be seen at considerable distances in the interior, and even at some elevation, as 800 feet in Ceylon. The Singalese have a saying, that the Cocoa-nut trees only flourish where you can walk and talk among them. This evidently

means that the trees must not be planted too close together; nor should any undershrubs be allowed to grow about their roots. The Laccadive Islands are famed for the good quality of the coir which is made there and exported to the Malabar coast. The cocoa-nut tree is almost the sole object of culture and the chief means of subsistence, each person consuming about four nuts per diem. The principal inhabitants generally own considerable numbers of trees, and the custom prevails of marking trees with certain house marks, in the same way that sheep are marked in other countries. Taxes are levied on these trees, according to immemorial usage; and mortgages are secured on them at the rate of one rupee per tree of good quality. The soil and climate of these islands is so well adapted to the cocoa-nut, that they require to be looked after only for the first year; after which they are transplanted, and watered for a few weeks, until they take root, when they are left entirely to themselves, and come into bearing at periods varying from eight to twenty years, and will continue to bear for seventy or eighty years. In the island of Kiltan, it is said that a nut buried with a knife will grow, requires no attention, and comes into bearing early. The tree is not so large and strong as that of the coast, and the nut about two thirds of the size only, and rounder in shape. The husk is smaller and less woody, and the fibre finer and more delicate, but stronger than that of the coast nut. The nut is also said to be more compact and oily, and to keep better than the coast nut, although, for the sake of the coir, the nut is cut before being quite ripe. Many of the trees are cut for their sap, there called *neara*, which the islanders drink in its unfermented state. The juice is drawn frequently, and fermentation checked by the addition of lime or chunam. "They are still so strict in the abstinence from all fermented liquors, that the manufacture of toddy would not be tolerated in the islands." (Robinson on 'Laccadives,' 1846.) Of the extent of the cultivation, we are informed that in the islands under British protection—that is, in Amendeevy, Kadamat, Kiltan, and Chetlat, containing in 1844 a total population of 3609—there were 122,153 Cocoa-nut trees. Of these, 8129 were chouk or unproductive, 45,070 young trees, and plants, and 69,254 were fully productive. Of the abundance of the Cocoa-nut tree on the Malabar coast, we may form an idea from the description of the chief town, Cannanore; as the topes or clumps of Cocoa-nut are said "to be seen between the officers' houses, surrounding the cantonments in every direction, and extending in the distance as far as the eye can reach; and the cantonment may be said to be imbedded in a forest of these trees." But it is abundant everywhere, and in many places forms a belt along the whole coast. The majority of the houses on the Malabar coast are roofed with

Cadjan—that is, with the dried leaves of the Cocca-nut—which resist the rain better than tiles; but the roofs should be fresh thatched before the accession of the rainy season. The average produce of Cocoa-nuts in the whole of Malabar is estimated at from 300 to 400 millions annually, which are valued at half a million of rupees; but in addition to this, from 20,000 to 25,000 candies of Copra (or the dried kernels) are exported, valued at 400,000 rupees. The Cocoa-nut flourishes on the coasts of the southern provinces of the Indian peninsula, and succeeds on many parts of the western coast of the Bay of Bengal, as well as in the southern parts of that province. It also succeeds well on the eastern coasts of that bay, though the cultivation has not been carried on in the former Burmese territories to the extent of which the coasts are susceptible, nor even to the degree which the people require for their own consumption, as considerable quantities have long been imported from the Nicobar Islands. The trees are said to begin to produce fruit in the eighth, and to be in full bearing in the twelfth year after planting, and yield from eighty to a hundred nuts annually. But this is probably above the average. Mr. Baumgarten, in a paper on the agriculture of Malacca ('Journ. Indian Archipelago,' iii, p. 710), while considering what kinds of cultivation are most inviting, states that those of an indigenous kind claim a preference, such as the Cocoa-nut, Betel-nut, Sago, and Kabong, with the usual variety of fruit trees found in the Dusans of Malacca. All these are Palms; and of them, *Cocos nucifera* and *Areca Catechu* are no doubt the first two. The Sago tree is probably *Sagus lævis*, and the Kabong, *Arenga saccharifera*. He further states, that, "Supposing a planter purposes opening a Cocoa-nut plantation, he should choose a gently sloping or level surface, with a portion of swampy land in its vicinity for a paddy-field for food for the labourers." "The Malays," he says, "bestow little care on their Cocoa-nut gardens. The Cocoa-nut there begins to bear at the end of the seventh year, but full crops cannot be expected until the ninth year, During this interval the utmost average quantity that can be expected will not exceed twenty-five nuts annually. But the fruit-bearing power of the trees may be considerably improved by extracting toddy from the blossom-shoots for the manufacture of jaggery, during the first two years of its productiveness; after which it may be discontinued. The subsequent annual produce may be safely reckoned at fifty nuts per annum; and forty may be considered the average number obtained from trees that are crowded to within fifteen feet of each other. The Cocoa-nuts sell for about eleven dollars per thousand." Mr. Baumgarten also recommends, that during the first four or five years, Millets, Chillies, Kechong (pulse), Sweet

Potatoes, Yams, and Pumpkins, be cultivated in the intervals of the Cocoa-nut plantation. Dr. Buchanan, in his journey across Mysore and down to the Malabar coast, in 1803, observes that in some places he found the green Cocoa-nuts sold for making ropes, at the rate of 2000 for about 8*d.*; but the husk of the ripe Cocoa-nut was not fit for the purpose (i, 156). These are commonly burnt for fuel (ii, 50). The green husks of the nuts which have been cut for their juice are steeped in water for six months. They then beat them on a stone with a stick, and rub off with their hands the rest of the adhering substance. The fibres, or Coir, are then fit to be twisted into yarns. In South Malabar (ii, 401), he says, a little bad Coir is made from the husks of the nuts that are used green in the country; a few of the nuts are exported with the husk on, but in general they are sent to the north inclosed in shell only. The Cocoa-nut tree is valued not only as applicable to many of the same purposes as other Palm trees, but for the sap procured by cutting the spathes, of the flower-stalks, which is either drank in its fresh state, boiled down to a coarse sugar or jaggery, or allowed to ferment into spirit and vinegar: The milk of the nuts also forms a wholesome drink, while the kernel is used as an article of diet or in cookery in its fresh state, or dried and exported by the name of Copra. In both states it is well known to abound in oil, which is used in the East for anointing the body, for the lamp, and for culinary purposes, and is now exported in such enormous quantities to Europe. The nut, besides, yields large quantities of a fibre which will be more especially the object of our attention. That the Cocoa-nut is one of the most valuable trees of tropical regions has long been known. It is therefore well worthy of cultivation in such situations as are suitable to it; as it abounds in products useful as articles of diet, as well as for commerce and manufactures.—*Royle Fib. Plants.* Though the common Cocoa-Nut Palm, is found all over the tropical parts of the world, especially in the vicinity of the sea, growing within reach of salt-water, and establishing itself upon reefs and sandbanks as soon as they emerge from the ocean, nevertheless its principal range is said by Mr. Marshall to be between the equator and the 25th parallel of latitude, and in the equinoctial zone, to an altitude of about 2900 feet. Its great importance to man has caused it to be cultivated wherever the climate is favourable to its growth; and accordingly it is sometimes found occupying extensive tracts to the exclusion of all other trees: the whole Brazilian coast from the river San Francisco to the bar of Mamanguape, a distance of 280 miles, is, with few breaks, thus occupied; and it was estimated that in the year 1813 no fewer than 10,000,000 trees were growing on the south-west coast of Ceylon.—*Eng. Cyc. p.* 54. This palm is one of the most useful

of the extensive family to which it belongs, supplying food, clothing, materials for houses, utensils of various kinds, rope and oil; and some of its products, particularly the two last, form important articles of commerce. An old writer, in a curious discourse on palm trees, read before the Royal Society, in 1688, says, "The coco-nut palm is alone sufficient to build, rig, and freight a ship with bread, wine, water, oil, vinegar, sugar, and other commodities. I have sailed (he adds) in vessels where the bottom and the whole cargo hath been from the munificence of this palm tree. I will take upon me to make good what I have asserted." And then he proceeds to describe and enumerate each product. Another recent popular writer speaks in eloquent terms of the estimation in which it is held, and the various uses to which it is applied. "Its very aspect is imposing. Asserting its supremacy by an erect and lofty bearing, it may be said to compare with other trees, as man with inferior creatures The blessings it confers are incalculable. Year after year the islander reposes beneath its shade, both eating and drinking of its fruit: he thatches his hut with its boughs, and weaves them into baskets to carry his food; he cools himself with a fan plaited from the young leaflets, and shields his head from the sun by a bonnet of the leaves: sometimes he clothes himself with a cloth like substance which wraps round the base of the stalks, whose elastic rods, strung with filberts, are used as a taper. The larger nuts, thinned and polished, furnish him with a beautiful goblet; the smaller ones with bowls for his pipes; the dry husks kindle his fires; their fibres are twisted into fishing-lines and cords for his canoes. He heals his wounds with a balsam compounded from the juice of the nut; and with the oil extracted from its pulp embalms the bodies of the dead. The noble trunk itself is far from being valueless. Sawn into posts, it upholds the islander's dwelling; converted into charcoal, it cooks his food; and, supported on blocks of stone rails in his lands. He impels his canoe through the water with a paddle of the wood, and goes to battle with clubs and spears of the same hard material. In Pagan Tahiti, a cocoa-nut branch was the symbol of regal authority. Laid upon the sacrifice in the temple, it made the offering sacred; and with it the priests chastised and put to flight the evil spirits which assailed them. The supreme majesty of Oro, the great god of their mythology, was declared in the cocoa-nut log from which his image was rudely carved. Upon one of the Tonga Islands there stands a living tree, revered itself as a deity. Even upon the Sandwich Islands the coco palm retains all its ancient reputation; the people there having thought of adopting it as the national emblem." Besides the foregoing and following uses, I am aware of several scents and spirituous liquors being procur- from the flowers and pulp of the coco-nut. This

palm tree is one of the finest objects in nature. Its stem is tall and slender, without a branch; and at the top are seen from ten to two hundred coco-nuts, each as large as a man's head; over these are the graceful plumes, with their green gloss, and beautiful fronds of the nodding leaves. Nothing can exceed the graceful majesty of these intertropical fruit trees, except the various useful purposes to which the tree, the leaf, and the nut are applied by the natives.

1. The stem is used for—bridges, posts, beams, rafters, paling, ramparts, loop-holes, walking sticks, water butts, bags (the upper cuticle), sieves in use for arrowroot

2. The coco-nut is used for—milk, a delicious drink; meat from the scraped nut, for various kinds of food; jelly, *kcra*, pulp, nut, oil, excellent and various food for man, beast, and fowl. The shell for vessels to drink out of, water pitchers, lamps, funnels, fuel, *panga* (for a game). The fibre for sinnet, various cordage, bed stuffing, thread for tying, combs, scrubbing-brushes, girdle (ornamental), whisk for flies, medicines, various and useful.

3. The leaf is used for—thatch for houses, lining for houses, *takapau* (mats), baskets (fancy and plain), fans, *palalafa* (tor sham fights), combs (very various), bedding (white fibre), *tafi* (brooms). *kubatse* (used in printing), *mama* (candles), screen for bedroom, waiter's tray. Here are no less than forty-three uses of which we know something; the natives know of others to which they can apply this single instance of the bounty of the God of the nature. For house and clothes, for food and medicine, the coco-nut palm is their sheet anchor, as well as their ornament and amusement, who dwell in the torrid zone.—*Simmonds' Com. Products.* In hot countries indeed the uses to which the Cocoa-nut tree is applicable are innumerable. The roots are chewed in place of the areca-nut; gutters, drums, and the posts of huts are formed from the trunk; the young buds are a delicate vegetable; shade is furnished by the leaves when growing, and after separation from the tree their large size and hard texture render them invaluable as thatch for cottages; they are moreover manufactured into baskets, buckets, lanterns, articles of head-dress, and even books, upon which writing is traced with an iron stylus. Their ashes yield potash in abundance; their midrib forms oars; and brushes are formed by bruising the end of a leaf with a portion of the midrib adhering to it. The sap of the tree during the time of blossoming ascends in large quantities: it is very sweet, and flows freely on the stem being punctured. In Ceylon it is daily collected by a class of people known as 'toddy-drawers', who get up early to procure it for the use of the inhabitants. If allowed to stand, this toddy ferments, and forms palm-wine, from which an ardent spirit called arrack is distilled. By further distillation sugar is procured from this spirit, which is called 'jaggery sugar.' This sugar, mixed with lime, forms a powerful cement, which resists moisture, endures great solar heat, and will take a fine polish. A farinaceous matter contained in the stem is a good substitute for sago. The ripe fruit is a wholesome food, and the milk it contains is a grateful, cooling beverage; indeed these together form the principal sustenance of the poor Indians in many countries. The nuts are inclosed in an outer husk, which has three flat sides terminating at the top in a blunt point. This peculiar form seems to be a special provision for the dissemination of the species; growing, as it does, near the shores of seas and rivers, its large seeds drop into the water, and their shape particularly adapts them for sailing; one edge, being downwards, forms the keel, while the upper surface being flat, is acted upon by the wind, and so propelled along on the surface until it reaches some coral reef or shore, where, when stranded, it vegetates and rises to be a magnificent palm, affording food and shelter in abundance. The shell of the Cocoa-nut is enclosed in a fibrous husk, which has now become a considerable article of commerce on account of the strength and durability of the fibre. Its preparation is very simple, consisting of little more than beating the husks to separate the fibres, which are dry and but loosely held together, and afterwards drawing them through a coarse comb or heckle, by which the refuse is cleaned out; it is then spun into yarns of different thickness, and is now extensively manufactured in Europe into ropes and matting: it is also used to stuff mattrasses and cushions. In India it is very generally used as cordage for vessels, and for fishing-nets; its lightness recommends it specially for the latter purpose. Its durability is surprising; perhaps no other vegetable-fibre will resist so long the action of alternate dryness and moisture. The hair-like fibre is made also into scrubbing-brushes; and the poorer classes in many places use the entire husk for the same purpose. The imports of cocoa-nut yarn and rope into England are greatly increasing: in the year 1851 (as nearly as can be ascertained) 10,661 tons were brought into Liverpool from Ceylon and Bombay. The oil of the Cocoa-nut is valuable as an export: it is used largely in Europe for burning, in the manufacture of torches, and in the composition of pharmaceutical preparations. Mixed with dammer (the resin of shorea robusta), it forms the substance used in India for paving the seams of boats and ships.—*Eng. Cyc. page* 54. The celebrated Rumphius has given a very elaborate account of the Cocoa-nut Palm, and of its uses, under the name of *Palma indica major*, or Calappa, in his 'Herb. Amboin.,' i, pp. 1—25, Mr. G. Bennett, in his 'Wanderings,' has also given a very interesting

account of it (vol. ii, p. 295): as also Mr. Robinson, of the Madras Civil Service, in his 'Report on the Laccadive Islands,' published in the 'Madras Literary and Scientific Journal.' From these sources we condense the following notice of the useful products of this "Prince of Palms." See also the 'Wernerian Trans.,' vol. v, for a full account of the uses of this tree; as also Mr. Marshall, in his 'Natural and Economical History of the Cocoa-nut,' 1832. The Cocoa-nut, valued as it is in its ripe state, is probably, in the countries where it is indigenous, most used as an article of diet in its young or green state. It then affords both solid food and a pleasant drink, because it contains an abundance of the fluid, which Mr. G. Bennett says is beautifully clear, and has a sweetness, with a slight degree of astringency, which renders it a very agreeable beverage. Mr. Bennett mentions that in Ceylon, house-plasterers use the water of the green Cocoa-nut as an ingredient in their white-washes, made of pure lime. It is a general practice of the natives of India to add some vegetable matter to their cements. This he always found cooling and refreshing in all his excursions in intertropical countries. The pulp of the young nut is delicate, easily removed with a spoon, and may very well be named a vegetable blancmange. The ripe fruit is also eaten, but it is more frequently employed in cookery; the grated kernel being placed in a cloth, water is poured on it, a white juice is extracted by pressure, which, Mr. Bennett says, "may with propriety be termed 'Cocoa-nut milk.' It is used either with or without the grated kernel in their various curries and muligatawnies." Besides these edible parts, the heart, or the very young leaves of this Palm, as well as of some others, is called the *cabbage*, and, according to all accounts, forms "an excellent vegetable, either cooked or dressed in stews, hashes, or ragouts." The beverage known to Europeans as toddy or palm wine, is obtained from the flower-spathes, before the flowers have yet expanded. These are themselves astringent, and used medicinally. To procure the toddy, the spathe is first tied with the young leaves, and is then cut a little transversely from the top, and beaten either with the handle of the toddy-knife or with a piece of hard wood. After some days, an earthen chatty or vessel, or a calabash, is hung to the spathe, so as to receive the toddy as it exudes. This is collected every morning and evening; the spathe being cut a little every day. If this palm wine is drawn early in the morning, it forms a pleasant drink. But fermentation takes place in the liquor a few hours after it has been collected, and it is then used by the bakers as yeast. The fermented liquor or toddy is much drank by the natives; at other times the spirit is distilled from it, and forms one of the kinds of arrack or *ark* that is, spirit. One hundred gallons of toddy produce by distillation, it is said, twenty-five of arrack. Or it may be allowed to undergo the acetous fermentation and produce very good vinegar. Or instead of being allowed to ferment, the toddy may be made to yield *jaggery* or sugar. For this purpose, a supply of sweet toddy is procured mornings and evenings, particular care being taken that the vessels employed have been well cleaned and dried. Eight gallons of sweet toddy, boiled over a slow fire, yield two gallons of a lusciously sweet liquid, which is called *jaggery* or *sugar-water*; which quantity being again boiled, the coarse brown sugar called jaggery is produced. The lumps of this are separately tied up in dried banana leaves. Cocoa-nut oil is one of the best-known products of this Palm, from its extensive employment in Europe especially for making the excellent candles known as Stearine. In the East, it is employed as a lamp-oil, and for anointing the body, especially after it has been rendered fragrant by mixture with such aromatic oils as those of sandal wood and of jessamine. The oil is obtained by first removing the kernel from the shell, which is boiled in water for a short period; it is then pounded in a large mortar, taken out, and pressed. The milk, as it is called, is then boiled over a slow fire, when the oil floats on the top, which being skimmed off, is afterwards boiled by itself. Two quarts of oil, it is said, may be procured from fourteen or fifteen Cocoa-nuts. "The Malabar method of extracting the oil, is by dividing the kernel into two equal parts, which are ranged on shelves made of laths of the Areca Palm or of split bamboo, spaces being left between each lath of half an inch in width; under them a charcoal fire is then made, and kept up for about two or three days, in order to dry them. After this process they are exposed to the sun on mats, and when throughly dried (then called Koppera or Copra), are placed in an oil-press, or siccour." These form articles of export to Bombay and elsewhere. Cocoa-nut oil is liquid at the ordinary temperature of the countries where it is produced, but becomes solid at lower temperatures, as about 70°, and has a specific gravity of 892. It is one of the fixed or fatty oils, of which such large quantities are now imported into this country, and, like them, consists of both solid and fluid constituents; the latter, or Oleine, being separated by pressure from the solid parts called Stearine. The solid fat of the Cocoa-nut is by others distinguished by the name of Cocein, which has been so largely employed in making Stearine candles, but which, from the chemical changes taking place in the process, are now called Stearic, and which are made in such enormous quantities and of such excellent quality under Mr. G. Wilson's intelligent superintendence at Belmont, Vauxhall. In consequence of this increased demand, and the facilities afforded by the establishment of a Go-

vernment steam-engine at Colombo for separating the oil with greater facility, as well as to the duty having been taken off, we may account for the great increase in the importation of this oil. Cocoa-nut oil was sent to the Exhibition of 1851, from different parts of the Madras territories, and of very fine quality, by Messrs. Sainte, of Cossipore—for these a Prize Medal was awarded. The refuse or oil-cake is stated to be excellent food for fattening pigs and poultry. The imports, which were in 1838, 32,666 cwt., had risen to 85,463 cwt. in 1848, and have since continued to increase.

	Cwt.		Cwt.
1848 - - -	85,463	1851 - - -	55,915
1849 - - -	64,452	1852 - -	101,863
1850 - - -	98,039	1853 - - -	164,196

How large a proportion of this is brought from India, will appear from the following analysis of the quantities:

	Imported into United Kingdom in 1850.
Cocoa-nut Oil imported from British Possession in India.. ..	85,095
" " " in Australia	6,316
" " other parts.....	6,628
	98,039

Cocoa-nuts, from the quantity of fibre on their exterior and oil in their interior, are necessarily well suited for burning. Hence they are sometimes fixed on stakes, and used to illuminate roads, &c. The shell itself, when burnt, yields an excellent kind of charcoal. In their entire state they are used for a variety of purposes, such as hooqas, vessels to hold water, cups to drink out of; and with handles fixed into them, they serve as ladles and spoons. We sometimes see them brought home as curiosities, highly polished on the outside; sometimes scraped so thin as to be semitransparent; at other times, stained black, elaborately carved, and mounted in silver. Flowers and ornaments are made from the Cocoa-nut fruit dried, and are meant to represent the garlands given to visitors of distinction on visits to the palace. They are worn by Tanjore ladies at a particular festival. Besides these various products, the wood of the Cocoa-nut tree, one of the Porcupine woods of commerce, is used for various purposes, as among the Singalese, when it has become old and the tree has ceased to bear, for making small boats, frames for houses, rafters, &c.; also for spear-handles, furniture, and fancy articles of different kinds. It is also exported to European markets, where it is known by the name of *porcupine wood*. The Singalese split the fronds in halves, and plait the leaflets neatly, so as to make excellent baskets, and, under the name of *cadjans*, they form the usual covering of their huts, as well as of the bungalows of Europeans; and are exported to northern parts, where the Cocoa-nut does not flourish so well: 149,500 were imported into Bombay in the year 1850-51. The dried fronds are sometimes used as torches or for fuel; their midribs, tied together, are sometimes used as brooms for the decks of ships, as the fibres of the stalk are woody, brittle, and difficult to clean. The leaves are also in other places plaited into baskets; and combs are said by Mr. Bennett to be made of the midrib of the leaflets in the Friendly Islands. In the Laccadive Islands mats are made of the Cocoa-nut leaf, cut out of the heart of the tree just before the unfolding of the leaf, though this involves the loss of the bunch of fruit which comes out with each leaf. It is probable that the leaves of the *chouk* or unproductive trees are chiefly employed. These mats are, however, of fine quality, and much esteemed when exported. In this Island they are employed for the sails of the smaller boats.—*Royle Fib. Plants.*

This fine palm, which always forms a prominent feature in tropical scenery, is a native of Southern Asia, but it is cultivated nowhere so abundantly as in the Island of Ceylon, and those of Sumatra, Java, &c. On the shores of the Red Sea it advances to Mokha, according to Niebuhr; but it does not succeed in Egypt. It is cultivated in the lower and southern portions of the Asiatic Continent, as on the coasts of Coromandel and Malabar, and around Calcutta. In the island of Ceylon, where the fruit of this tree forms one of the principal aliments of the natives, the nuts are produced in such quantities that in one year about three millions were exported, besides the manufactured produce in oil, &c. According to Marshall it requires a mean temperature of 72 deg. Its northern limit, therefore, is nearly the same as the southern limit of our cereals. Rumphius enumerates thirteen varieties of this palm, but many of these have now been placed under other genera, and Lindley resolves them into three species—*C. nucifera*, the most generally diffused species, a native of the East Indies; and *C. flexuosa* and *plumosa*, natives of Brazil. The trunk, which is supported by numerous small fibrous roots, rises gracefully, with a slight inclination, from forty to sixty feet in height; it is cylindrical, of middling size, marked from the root upwards with unequal circles or rings, and is crowned by a graceful head of large leaves. The terminal bud of this palm, as well as that of the cabbage palm (*Euterpe montana*), is used as a culinary vegetable. The wood of the tree is known by the name of porcupine wood. It is light and spongy, and, therefore, cannot be advantageously employed in the construction of ships or solid edifices, though it is used in building huts; vessels made of it are fragile and of little duration. Its fruit, at different seasons, is in much request; when young, it is filled with a clear, somewhat sweet, and cooling fluid, which is equally refreshing to the native and the traveller. When the nut becomes old, or attains its full maturity, the fluid disappears, and the hollow is filled by a sort of almond, which is the germinating organ. This pulp or kernel,

when cut in pieces and dried in the sun, is called copperah, and is used in curries throughout Eastern and Southern Asia; and from it a valuable species of oil is expressed, which is in great demand for a variety of purposes. The refuse oil cake is called Poonac, and forms an excellent manure. A calcareous concretion is sometimes found in the centre of the nut, to which peculiar virtues have been attributed. The most favorable situation for the growth of the coco palm is the ground near the sea-coast, and if the roots reach the mud or salt water, they thrive all the better for it. The coco-nut walks are the real estates of India, as the vineyards and olive groves are of Europe. I have seen these palms growing well in inland situations, remote from the sea, but always on plains, never upon hills or very exposed situations, where they do not arrive to maturity, wanting shelter, and being shaken too violently by the wind. The stems being tall and slight, and the whole weight of leaves and fruit at the head, they may not unaptly be compared to the mast of a ship with round top and topmast without shrouds to support it. Ashes and fish are good manures for it. The coco-nut is essentially a maritime plant, and is always one of the first to make its appearance on coral and other new islands in tropical seas, the nut being floated to them, and rather benefiting than otherwise by its immersion in the salt water. Silex and soda are the two principal salts which the coco-nut abstracts from the soil, and hence, where these do not exist in great abundance, the tree does not thrive well. Salt is very generally applied to the coco nut when planted. Far in the interior of Brazil Dr. Gardner states, he has seen as much as half a bushel applied to a single tree, and that too when it cost about 2s. a pound, from the great distance it had to be brought. That the application, therefore, of salt, of seaweed, and saline mud, does more than supply soda, must be very evident, if we only recollect how difficult it is to dry any part of our dress that has been soaked in salt water, and what effect damp weather has on table salt, which, in a balance, has often been made use of as an hydrometer. Moisture is always attracted by salt, and the more sea mud and other such little matters that coco-nut planters can apply round the roots of their trees, there will most assuredly be the less occasion for watering them in the dry season. Sea weed contains but very little fibrous matter, being chiefly composed of mucilage and water; and the experiments of Sir J. Pringle and Mr. C. W. Johnson, prove that salt in small quantities assists the decomposition of both animal and vegetable substances. Decomposed poonac, or oil-cake, is one of the best manures that can be applied, as it returns to the soil the component parts of which it has been deprived to form the fruit. The primary direction of the planter's industry will be to the establishment of a nursery of young plants. In Ceylon, for this purpose, the nuts are placed in squares of 400, covered with one inch of sand, or salt mud; are watered daily till the young shoots appear, and are planted out after the rains in September. Sand and salt mud are to be found on almost all the coasts where it would be desirable to plant nuts, and if they are put into the ground at the commencement of the rainy season, artificial watering will scarcely be necessary. Any period, when there are showers, would answer for transplanting them. I should say from the middle to the end of January would be best, when they are placed in the nursery in October and November; and in October when they are planted in June. It is said that they should be allowed from 20 to 30 feet space apart, but I will calculate their return when planted 27 feet apart every way. This will give 51 coco-nut trees per acre. If manured, for the first two years, with seaweed and salt mud, and supplied with water in dry weather, there need be no loss, and the plants will thrive the better. The land must be kept clear of weeds till the plants are matured, in order to permit them abundance of air and light. In five years, when well cared for, the flower may be expected, but the plants, will not be in full bearing before the seventh or eighth year. From 50 to 80 nuts are the annual crop of a tree; but I will calculate at the lowest rate. One hundred nuts will yield, when the oil is properly expressed, at least two gallons and a half. I shall not take into account the making of jaggery sugar and toddy, or spirit from the sap, as I do not consider that the manufacture would be remunerative; and it must be attended with much trouble, besides requiring a great deal of care and some skill. Take the case now of a plantation of 100 acres in extent. This would give us 5,800 trees, which, at 50 nuts per tree, 290,000 nuts, at 2½ gallons of oil per hundred would yield 7,250 gallons of oil, the value of which any person may calculate, but which, at the low rate of 3s. over charges, would furnish, as the gross plantation return in oil, a sum of £1,087 10s. sterling. If the cultivator, instead of making his produce into oil, were to sell it in its natural state, his gross return in the West Indies would be nearly £600 sterling, at the rate of ten dollars per thousand. Either of these sums would be a handsome return from 100 acres of any land, *requiring no cultivation or care whatever, after the fourth year and yielding* the same amount for upwards of half a century! But this is not all. An outlay of a few pounds will secure other advantages, and ought to enable the owner of a coco-nut plantation to turn his gross receipts for oil into nett profits. The coir made from the husk of the nut is calculated to realise nearly one-fourth of the proceeds of the oil, but if we put it down at one-fifth, we shall have, in addition to the value of the oil, £217 10s., thus

making a total of £1,305 sterling. If we obtained 60 nuts from each tree, the return would be £1,566 sterling, and if 75, £1,957, 8s. sterling: and this from 100 acres of sea side sand! But even *this* does not exhibit the whole return of this article of culture. Each nut may be calculated to give a quarter of a pound of poonac or oil-cake, being the refuse after expression, fit for feeding all kinds of stock, which may be estimated as worth £10 per ton. We must, therefore, add on this account to our first calculation, the sum of say £325; to the second, £390; and to the third, £485. This would give, in round numbers, the entire returns of the 100 acres planted:—At 50 nuts per tree, £1,630; at 60 ditto, £1,957; at 75, ditto, £2,446. These are striking results, and may appear exaggerated; but I will, to show how very moderate has been my calculation, give two returns, with which I have been favored from Ceylon. These, it will be seen, differ materially, but the latter I can rely on as a practical result, from a plantation in Jaffna, the peninsula of the northern portion of the island. After estimating the expense of establishing the plantation, the first writer sets down his return thus:—"The produce, calculating 90 trees to an acre, and 75 nuts to a tree, sold at £2 per 1,000, would yield 675,000 nuts, worth £1,350; or if converted into oil, calculating 30 to give one gallon, it would produce 22,500 gallons, or about 90 tons from 100 acres." From Jaffna, the following is an abridged estimate of return of 100 acres in full bearing:—"At 27 feet apart, 58 trees per acre, 5,800 trees, at 60 nuts per tree, 3,480 nuts per acre, 100 acres, 348,000 nuts, at 40 nuts per imperial gallon, 8,700 gallons of oil, at 2s. per gallon, netted £8 14s. per acre. The poonac left will pay the expense of making the oil. If shipped to England, at the present time (close of 1848), the selling price there being 55s. per cwt., measuring 12 imperial gallons, say, 4s. 7d. per gallon, and the cost and charges of sending it home and selling it being 23s., it would leave 3s. per gallon, or £13 per acre." This sum is *nett proceeds*. It will be seen by the above, that I have been extremely moderate in my computation of the return which may be anticipated, for there is no doubt that planters can, in favorable localities on the coasts of most of our colonies, cultivate this palm with as much success as attends its culture in Ceylon. By the first of the calculations I have cited from that island, the gross return appears thus:—

22,500 gallons at 4s 7d.	£5,156	5
Coir—one-fifth of value,... ...	1,031	4
Cake from 675,000 nuts, say ¼lb. each, 75 tons at £10.	750	0
Total gross return from 100 acres.	6,937	9

According to the other calculation, the return will stand thus:—

8,700 gallons at 4s. 7d.	£1,993	15
Coir...	398	15
Cake from 348,000 nuts, 34 tons..	340	0
Total gross return from 100 acres.	2,732	10

It will be seen that in my calculation I have set down the return lower than it is rendered in the less favorable statement from Ceylon by a sum of upwards of £1,000 sterling. But even supposing *one-half* of the amount of the lower Ceylon estimate could be realised, we should have a return of £1,366 5s. sterling from 100 acres of sea side sand. I now proceed to point out the very small outlay required to obtain these results. In places where the Cocoa-nut would be grown, there is generally no heavy woodland requiring great labor with axe and fire, and consequently one able-bodied man should get through the felling and clearing away bush, on an acre of the land to be prepared for the plant, in a short period,—say, on an average, four days. I will calculate, that for wages and rations, each hand employed will cost sixteen dollars per month, an outside price. Let us then say that ten laborers shall be at work. They fell two acres and a half per diem. In one month there should be nearly 70 acres felled; but I will say that the 100 acres will occupy them two months in felling and stacking the wood. During this period our planter may be considered to have had the aid of two more hands, engaged in the preparation, planting out, and care of the nursery of young plants. Two more hands must also be occupied in the construction of tanks and sheds, except where there is a stream of fresh water. For grubbing up the roots, if not very large size, the assistance of about a dozen cattle would be required, a labor which would be performed by means of the common grubbing machine, an implement in the form of a claw. We will consider that all hands are occupied another month in this manner, and in removing and re-stacking the wood, and turning up the land. The planting out would require but little time and labor. At the end of three months then, one-half of the hands, besides those engaged in the nursery and tanks, might be discharged. We must make an allowance for provision for the fodder of the cattle. Six thousand nuts would be required. Let us now see what are the planter's expenses; making ample allowance on account of each item:—

	dollars.
6,000 picked nuts at 10 dollars per 1,000,	60
Hire and rations of 12 hands, at 16 dollars, for 8 months, ..	576
Two hands at nursery, for same period,	96
Purchase of 12 cattle at 20 dollars,	240
Foddering cattle one month,	32
Hire of two extra hands, making tanks and sheds, 3 months,	96
Hire of 6 hands for 9 months,	864
Tools (including plough),	100
Total...	2,064

About £415 sterling for expenses for the first year. Where fencing is required, we must add

for making about three miles of fence, say £30 sterling. Two carts would also have to be provided, which will cost, say £20 more. In all we may compute the first year's expenditure at £460 sterling. Second year's expenditure: ploughing land, or hoeing it twice, watering plants, manuring, repairing fences, and supplying plants, say hire of eight men for six months, about £150 sterling. The same for the third. Fourth year's expenditure; hire of six hands for three months, cleaning land, and manuring plants, about £60 sterling, and the like, at the cultivator's option, for the fifth year.

SUMMARY OF EXPENSES.

	£
First year,.....	460
Second year,.....	150
Third year,.....	150
Fourth year,.....	60
Fifth year,.....	60
Total expenditure,...	880
Add for buildings,...	80

And we have a grand total of £960 sterling expended; for what purpose? To secure a net income of *at least* £1,200 sterling per annum for at least 50 years! In the first year's expenses many items might be cut down, but I leave the calculation as one to be considered by a party with small capital, intending to establish a Cocoa-nut plantation. I have allowed nothing for the cost of land, as it is impossible to compute that. In general it would cost next to the nothing mentioned. I have, by careful calculation, arrived at the conclusion that by combining the cultivation of provisions with the gradualbut steadily progressive establishment of a coco-nut plantation, any man of energy and perseverance may, with the aid of but four hands, clear, fence, and plant, in a favorable locality, 50 acres of coco-nuts within the year, yet have a balance in his pocket at its close. Such a person would, ere doing anything beyond putting in his nursery plants, establish a provision ground, of considerable extent, for the purpose of supplying himself and his laborers with bread kind, and vegetables, and of enabling him, by the disposal of the surplus produce in the market, to raise a sufficient sum of money to furnish the wages and rations of the men. I need not enter into a calculation to show how this could be done, as every one must be aware of an easy method of following out so simple a suggestion. Of course he would have to bear in mind that the provision ground is of secondary importance, and limit his exertion in that line accordingly; devoting to the coco-nut plantation the strictest daily attention. The cultivation of this tree deserves much more attention than has hitherto been paid to it, particularly in the East, where it not only forms part of the daily food of all classes of the community, but is an exportable article to neighbouring regions, the oil which

it yields having of late years become in great demand in England,for the manufacture of composite candles and soap, and there is no doubt of its continually extended application to such purposes. Supposing, nevertheless, the result of an increased cultivation of the coco-nut should be such as to cause a fall in price, and sink the nett return in England to 2s. per gallon; this being clear profit, would make this kind of plantation a safe and sure investment for both capital and labor in the Colonies. The coco-nut is usually planted as follows:—Selecting a suitable place, you drop into the ground a fully ripe nut, and leave it. In a few days a thin lance-like shoot forces itself through a minute hole in the shell, pierces the husk, and soon unfolds three pale green leaves in the air; while, originating in the same soft white sponge which now completely fills the nut, a pair of fibrous roots pushing away the stoppers which close two holes in an opposite direction, penetrate the shell, and strike vertically into the ground. A day or two more, and the shell and husk, which in the last and germinating stage of the nut are so hard that a knife will scarcely make any impression, spontaneously burst by some force within; and, henceforth, the hardy young plant thrives apace, and needing no culture, pruning, or attention of any sort, rapidly arrives at maturity. In four or five years it bears; in twice as many more it begins to lift its head among the groves, where, waxing strong, it flourishes for near a century. Thus, as some voyager has said, the man who but drops one of these nuts into the ground, may be said to confer a greater and more certain benefit upon himself and posterity, than many a life's toil in less genial climes. The fruitfulness of the tree is remarkable. As long as it lives it bears, and without intermission. Two hundred nuts, besides innumerable white blossoms of others, may be seen upon it at one time; and though a whole year is required to bring any one of them to the germinating point, no two, perhaps, are at one time in precisely the same stage of growth. Coco-nuts form a considerable article of export from many of the British colonies: 375,770 were exported from Honduras in 1844, and 254,000 in 1845; 105,107 were shipped from Demerara, in 1845; 3,500,000 from Ceylon in 1847. They are very abundant on the Maldive Islands, Siam, and on several parts of the coast of Brazil. Humboldt states, that on the south shores of the Gulf of Cariaco, nothing is to be seen but plantations of coco-nut trees, some of them containing nine or ten thousand trees. Ceylon is one of the localities where the greatest progress has been made in this species of culture. In 1832 several Europeans settled at Batticaloa, expressly for the purpose of cultivating this palm to a large extent. They planted cotton bushes between the young trees, which were found to ripen well, and nurse and shade

them. There are now an immense number of coco-nut topes, or walks, on the coasts of the island, and about 20,000 acres of land are under cultivation with this tree. The value of this product to Ceylon, may be estimated by the following return of its exports in 1847, besides the local consumption:—

	£
Declared value of nuts,.....	5,485
Ditto of Coir,.....	10,318
Kernels, or Copperah,..	6,503
Shells,...	210
Oil, ...	19,142
Arrack,.....	11,657
Total...	£53,315

The annually increasing consumption of the nuts holds out a great inducement to the native proprietors to reclaim all their hitherto unproductive land. The fruit commands a high price in the island, (ranging from ¾d. to 3d. per nut), owing to the constant demand for it as an article of food, by both Singhalese and Malabars; there is not so much, therefore, now converted into copperah for oil making. In the maritime provinces of the island, it has been estimated that the quantity of nuts used in each family, say of five persons, amounts to 100 nuts per month' or 1,000 per annum. It needs only a reduction in the cost of transit, to extend the consumption in the interior of the island to an almost unlimited extent. In 1842, Ceylon exported but 550 nuts, while in 1847 she shipped off to other quarters three millions and a half of nuts, valued at £5,500. The average value of the nuts exported may be set down at £7,000. In Cochin China the cultivation of the coco-nut tree is much attended to, and they export a large quantity of oil. At Malacca and Pinang it shares attention with the more profitable spices. Since the palm has been acclimatised in Bourbon, about 20,000 kilogrammes of oil have been produced annually. About 8,000 piculs of oil are exported annually from Java. A correspondent, under date December, 1849, has furnished me with the following particulars of coco-nut planting in Jaffna, the northern district of Ceylon, in which the culture has only recently been carried on; the facts and figures are interesting:—The Karandhai estate, the property of the late Mr. J. Byles, was sold last month for £2,400, part of it bearing. It consists of 303 acres, of which 229 are planted with coco-nuts—about half the trees six years old. The Victoria estate, in extent 170 acres, planted and part in bearing, and about seventy acres of jungle, was also sold for £1,500. Mr. G. Dalrymple was the purchaser of the latter, and Mr. Davidson of the former. Both lots were cheap. The properties are among the best in the district, the latter, especially, is a beautiful estate. About two-thirds of the estates planted are looking well, and the remainder but

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indifferently, in fact, ought never to have been planted, and I believe will never give any return. About 7,000 acres are now under cultivation here, and clearing is still going on. Estates can now be put in for about one half what they cost formerly, viz., about £4 or £5 per acre, and can be kept in order, inclusive of all charges, for about 15s. to 20s. per acre for the first two years, and about half that afterwards. Estates, in some instances, have been put in for about £3 per acre. Elephants have almost disappeared; now and then a stray one comes. Pigs are still a great nuisance, but the greatest anxiety among planters is regarding beetles. You will be sorry to hear that the first year the trees showed fruit or flowers, one-tenth of them were destroyed by the beetle; the insects still go on destroying, and hardly a tree attacked ever recovers. This is a very serious evil, and upon which the fortunes of those involved in coco-nut planting depend. The trees come into bearing but very slowly, and I consider no estate will give any return over its current expenses under twelve years. It takes twelve months from the formation of the flower, till the fruit ripens. On an estate, perhaps one of the oldest and best in this district, out of 120 acres, part seven and eight years old, about 12 per cent. are in flower or in bearing, and give a return of about twenty-four nuts per tree, on an average, yearly. On the next oldest, the return is not near so great. But few of the estates here will, I think, pay interest on the money laid out, and many will never pay anything over the expense of keeping them up, even after coming into bearing. I doubt if any estate in this district, however economically managed, will ever give a net return of more than £2, or perhaps of £2 10s. per acre, at least without there is a great increase in the consumption of oil in Europe. The consumption of this oil, in Europe, is under 5,000 tons. If the beetles do not destroy half the trees, the estates here when in bearing, if they yield anything, will give half that quantity; and it must be borne in mind that coco-nut oil is not a strong oil, like palm oil, and that soap boilers will never use it to any extent, for it will allow but little admixture of rosin, &c.; its use in Europe will be principally for candles and fancy soaps; but as by refining and compression they can now purify tallow, and make of it candles fully equal to those made from coco-nut oil, the consumption of the latter is not likely to increase. The consumption of candles is always limited on the continent of Europe, liquid oil being preferred, and in many instances gas is now being used where candles formerly were. The return of land planted with coco-nut trees in Ceylon, in 1851, was 22,500 acres; but this refers only to regular estates recently opened and cultivated chiefly by Europeans. Let us suppose that the natives possess besides, twenty millions.

of trees; Butolac in his time estimated the the number at thirteen millions. At 100 trees to the acre, twenty millions of trees give 100,000 acres, so that the total amount of land planted with cocoa nut trees would be 122,500 acres. An hydraulic press, for the manufacture of cocoa-nut oil, 1,200 horse power and weighing twenty-three tons, was cast at the Ceylon Iron Works, in 1850, by Messrs. Nelson and Son. In the island of Singapore there are now many extensive plantations in a very flourishing condition, holding out favorable prospects to the proprietors. Hitherto the island has been supplied almost wholly from abroad with nuts and oil for its consumption, which will, before long, be obtained exclusively from its own soil. In 1846 there were 10,000 coco-nut trees in bearing in Singapore. I have omitted to notice, in the foregoing observations, a very mistaken notion which prevails in many quarters, that it is best to let the trees drop their fruit, and not to pick the nuts when ripe. Nature directs differently. As soon as the husk of the nut is more brown than green it should be picked. It then makes better oil and better coir, than when left to shrivel up and fall from the tree. Colonel Low, in his "Dissertation on Pinang," gives some interesting details and statistics on coco-nut planting:—On a rough estimate—for an actual enumeration has not been lately taken—the total number of *bearing trees* in Pinang may be stated at 50,000, and those in Province Wellesley at 20,000; but very large accessions to these numbers have of late years been made. The tree is partial to a sandy soil in the vicinity of the sea, and Province Wellesley offers, therefore, greater facilities, perhaps, for its cultivation, than Pinang does, as its line of clear beach is longer, and has many narrow slips of light or sandy land lying betwixt the alluvial flats inland. There are several kinds of this tree known here; one has a yellowish color, observable both on the branches and unripe fruit; its branches do not droop much. A second has green spreading branches, more drooping than the former, the fruit being green colored until ripe; this is, perhaps, the most prolific; it also bears the soonest, if we except the dwarf cocoanut, which fruits at the second or third year, before the stem has got above one foot high. This last kind was brought from Malacca; it attains in time to the height of the common sort Its fruit is small and round, and of course less valuable than the other sorts. There is also a cocoanut so saturated with green, that the oil expressed from its kernel partakes of that color. It is a mistaken supposition that the coco-nut tree will flourish without care being taken of it. The idea has been induced by the luxuriant state of trees in close proximity to houses and villages, and in small coves where its roots are washed by the sea. In such circumstances, a tree, from being kept clear about the roots, from being

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shaded, and from occasional stimuli, advances rapidly to perfection; but in an extended plantation, a regular and not inexpensive system of culture must be followed to ensure success. The nuts being selected, when perfectly ripe, from middle-aged trees of the best sort, are to be laid on the ground under shades, and after the roots and middle shoots, with two branches, have appeared, the sooner they are planted the better. Out of 100 nuts, only two-thirds, on an average, will be found to vegetate. The plants are then to be set out at intervals of thirty or forty feet—the latter if ground can be spared—and the depth will be regulated by the nature of the soil, and the nut must not be covered with earth. The plants require, in exposed situations, to be shaded for one and even two years, and no lalang grass must be permitted to encroach on their roots. A nursery must be always held in readiness to supply the numerous vacancies which will occur from deaths and accidents. The following may be considered the average cost of a plantation, until it comes into bearing:—

FIRST COST—100 ORLONGS OF LAND.

	Spanish dollars.
Purchase money of land, ready for planting, ...	1,000
7,000 nuts at 1½ dollars, per 100.	105
Houses of coolies, carts, buffaloes, &c., &c., ...	100
Spanish dollars, ...	1,205

YEARLY COST OF SEVEN YEARS.

First year, 10 laborers at 3 dollars per month, including carts, &c., ...	360
Wear and tear of buildings, carts, and implements, ...	50
Overseer, at 7 dollars per month, ...	84
Quit-rent, average, ...	50
Nursery and contingencies,...	50
Total per annum, ...	594
Seven years at the rate will be, ...	4,158
Total, Spanish dollars, ...	4,752

To this sum interest will have to be added, making, perhaps, a sum total of 6,000 Spanish dollars, and this estimate will make each tree, up to its coming into bearing, cost one Spanish dollar at the lowest. The young tree requires manure, such as putrid fish and stimulating compounds, containing a portion of salt. On the Coromandel coast, the natives put a handful of salt below each nut on planting it. The cultivators of Kiddah adopt a very slovenly expedient for collecting the fruit. Instead of climbing the tree in the manner practised by the natives on the Coromandel coast, by help of a hoop passing round the tree and the body of the climber —and a ligature so connecting the feet as will enable him to clasp the tree with them—the Malays cut deep notches or steps in the trunk, in a zig zag manner, sufficient to support the toes or the side of the foot, and thus ascend with the extra aid only of their arms. This mode is also a dangerous one, as a false step, when near the top of a high tree, generally precipitates the climber to the ground. This notching cannot prove otherwise than injurious to the tree. But the besetting sin of the planter of coco nuts, and other productive trees, is that of crowding. Coco-nut trees,

whose roots occupy, when full grown, circles of forty to fifty feet in diameter, may often be found planted within eight or ten feet of each other; and in the native campongs all sorts of indigenous fruit trees are jumbled together, with so little space to spread in, that they mostly assume the aspect of forest trees, and yield but sparing crops. The common kinds of the coco-nut, under very favorable circumstances, begin to bear at six years of age; but little produce can be expected until the middle or end of the seventh year. The yearly produce, one tree with another, may be averaged at 80 nuts the tree; where the plantation is a flourishing one—assuming the number of trees, in one hundred orlong, to be 5,000—the annual produce will be 400,000 nuts, the minimum local market value of which will be 4,000 Spanish dollars, and the maximum 8,000 dollars. From either of these sums 6 per cent, must be deducted for the cost of collecting, and carriage, &c. The quantity of oil which can be manufactured from the above number of nuts will be, as nearly as possible, 834 piculs of 133¾lbs.

The average price of this quantity, at 7 dollars per picul	5,838
Deduct cost of manufacturing, averaged at one-fourth, and collecting, watching, &c.	2,059
Profit, Spanish dollars	3,779

The Chinese, who are the principal manufacturers of the oil, readily give a picul of it in exchange for 710 ripe nuts, being about 563 piculs of oil out of the total produce of the plantation of 100 orlongs. The price of coco-nut oil has been so high in the London market as £35 per ton, or about an average of ten dollars per picul. It is said that English casks have not been found tight enough for the conveyance of this oil to Europe, but if the article is really in great demand, a method will no doubt be discovered to obviate this inconvenience. So long, however, as the cultivator can obtain a dollar and a half, or even one dollar for 100 nuts, he will not find it profitable to make oil, unless its price greatly rises. Soap is manufactured at Pondicherry from this oil, but it is not seemingly in repute; the attempt has not been made in Pinang with a view to a market. There is scarcely any coir rope manufactured at this island, so that the profit which might (were labor cheaper) arise from this application of the coco-nut fibre, is lost. The shell makes good charcoal; the leaves are scarcely put to any purpose, the nipah or attap being a superior material for thatching. The coco-nut tree is extremely apt to be struck by lightning, and in such cases it is generally destroyed. It is a dangerous tree, therefore, to have close to a house. If the trees are widely planted, coffee may be cultivated under their shade. It is generally believed that the extracting of toddy from this tree hastens its decline. The Nicobar and Lancavi Islands used partly to supply the Pinang market with this indispensable article; but their depopulation has

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greatly reduced the quantity. On the whole it may be said that there is no cultivation which insures the return of produce with so much certainty as that of the coco-nut tree; and as Rangoon, the Tenasserim coast, and Singapore will, probably, always remain good markets for the raw nut, there appears to be every chance of the value of the produce affording ample remuneration to the planter. *Coco-nut beetle.*—The chief natural enemy of this tree is a destructive species of elephant-beetle (*Oryctas Rhinoceros*), which begins by nibbling the leaves into the shape of a fan; it then perforates the central pithy fibre, so that the leaf snaps off; and lastly, it descends into the folds of the upper shoot, where it bores itself a nest, and if not speedily extracted or killed, will soon destroy the tree. At Singapore, on account of the depredations of this beetle, the difficulties have been considerable. In Pinang and Province Wellesley it has only been observed within the last two years, and it is believed to have come from Keddah. A similar kind of beetle is, however, found on the Coromandel coast. The natives of Keddah say that this insect appears at intervals of two, three, or more years. Its larvæ, which are also very formidable insects or grubs, about three inches long, with large reddish heads, are found in decaying vegetable matter. It is when the tree has made considerable progress, however, that the parent insect does most mischief. When they are from one to two years old, throwing out their graceful branches in quick succession with the greatest vigor, and promising in three or four years more to yield their ruddy fruit, this destructive enemy begins to exercise his boring propensities; and, making his horn act as an auger, he soon penetrates the soft and yielding fibre of the young tree, and if not discovered in time, destroys the leading shoot or branch. The only remedy which has been adopted in Ceylon, is the following:—Several intelligent boys are provided each with an iron needle or probe, of about a foot long, with a sharp double barbed point, like a fish-hook, and a ring handle; they go through the plantation looking narrowly about the trees, and when they perceive the hole in the trunk, which indicates that the enemy is at work, they thrust in the barbed instrument and pull him out. Sometimes he may only have just commenced, when his capture is more easily effected, but even should he have penetrated to the very heart of the tree, the deadly needle does not fail in its errand, but brings the culprit out, impaled and writhing on its point. This is the only known way of checking the ravages of this beetle, except destroying its larvæ. Some cultivators, however, think pouring salt water or brine on the top of the tree, so as to descend among the folds of the upper shoots, a good plan to get rid of the larvæ. Nearly two million coco-nuts are shipped annually from Bahia. From Ceylon, 114,000 coco-

nuts were shipped in 1851, and 70,185 in 1852. Coco-nut oil; 98,159 gallons were shipped from Ceylon in 1852; 359,233 gallons in 1851. The prices of Ceylon oil have ranged from £31 to £33 10s. per ton; of Cochin oil, £34 to £35, within the last two years. The price per leaguer in Colombo, without casks, has been £8 10s. to £9. *Copperah* is the name given by the natives to the dried kernel of the ripe nut after it has been exposed to the sun on mats. It has recently been shipped to England in this state for the purpose of converting into oil. The exports of copperah from Ceylon were, in 1842, 115 cwts.; in 1843, 2,194; in 1844, 2,397; and in 1852, 39,174 cwts. The returned value of the copperah or kernels exported from Ceylon, as entered in the Custom House books, is—

1840	£2,508	1847	£6,503
1841	1,460	1848	12,639
1842	3,022	1849	7,819
1843	5,795	1850	4,166
1844	6,194	1851	9,678
1845	3 282	1852	13,325
1846	5,517		

632 cwts. of poonac (being the refuse or cake, after expressing the oil) were exported from Ceylon in 1842. It is worth there about £10 the ton. The oil from the nut is obtained for culinary purposes by boiling the fresh pulp, and skimming it as it rises. That for exportation is usually obtained by pressing the copperah in a simple press turned by bullocks. Recently, however, steam power has been applied in Colombo, with great advantage. About 2½ gallons of oil per 100 nuts, are usually obtained. It is requisite that care should be taken not to apply too great and sudden a pressure at once, but by degrees an increasing force, so as not to check the conducting channels of the oil in the press. In many of the colonies the oil is expressed by the slow and laborious hand process of grating the pulp. The quantity shipped from Ceylon was 2,250 tons, in 1842; 3,985 in 1843; 2,331 in 1844; 1,797 in 1845. The quantity in gallons shipped since, was 101,553 in 1846; 197,850 in 1847; 300,146 in 1848; 867,326 in 1849; 407,960 in 1850; 442,700 in 1851; and 749,028 in 1852. The duty on importation is, of and from British possessions, 7d. and 7-8ths. per cwt.; if the produce of foreign possessions, 1s. 3¼d. per cwt. In the close of 1852, the price of coco-nut oil in the London market was, for Ceylon, £32, £33, to £33 10s. per ton; Cochin, middling to fine, £34 to £35. The following return shows the Custom House valuation of the oil shipped from Ceylon for a series of years, and which is of course much below its real value:—

1839	£26,597	1846	£ 7,939
1840	32,483	1847	19,142
1841	24,052	1848	24,839
1842	34,242	1849	34,831
1843	43,874	1850	38,035
1844	24,067	1851	31,444
1845	15,945	1852	58,045

Among the coco-nut oil exported from Ceylon, in 1849, there were 47,427½ gallons, valued at £3,595, the whole of which, I believe, was Cochin oil; the raw material of this kind not being, like the copperah generally in Ceylon, subjected to the action of fire, the product is finer, and fetches a better price in the London market. Amongst the imports from British possessions in Asia, were 2,600 cwts., of copperah (dried coco-nut kernels, from which oil is expressed), valued at £1,100; amongst the imports re-exported to Great Britain, we find 870 cwts. of the same article, valued at £300. Of the oil exported a quantity of 11,000 gallons was shipped for the United States. About 600,000 piculs of cocoa-nut oil are annually exported from Siam. A large quantity of oil is made in Trinidad, chiefly on the east coast, where, in one locality, there is an uninterrupted belt of coco-nut palms fourteen miles in extent. They usually bear when five years old. The cultivation of the coco-nut in a proper soil presents a very profitable speculation for small capitalists. Whether sold at the rate of a dollar per hundred in their natural state, to captains of ships, who freely purchase them, or manufactured into oil, they are a very remunerative product. Each tree in the West Indies is calculated to produce nuts to the value of one dollar yearly. There is one thing to which we should draw the attention of chemists and other scientific men. For twenty-four or even forty-eight hours after its manufacture this oil is as free from any unpleasant taste as olive oil, and can be used in lieu of it for all culinary purposes, but after that time it acquires such a rancid taste as to be wholly unpalateable. If any means could be discovered of preventing this deterioration in quality and preserving it fresh and sweet, it could compete with olive oil, and the price and consumption would be largely raised.

COCOA-NUT OIL IMPORTED INTO THE UNITED KINGDOM.

	Imports. cwts.	Retained for home consumption. cwts.
1835	19 838	11,015
1836	26,058	26 062
1837	41,218	28,641
1838	—	38 669
1839	—	15,153
1840	—	37,269
1841	—	26,528
1842	—	26,225
1843	—	29,928
1844	—	42,480
1848	85,453	54,783
1849	64,451	14,622
1850	98,040	46,494
1851	55,995	2,333
1852	101 863	27,112

A London coco-nut oil soap was found, on analysis by Dr. Ure, to consist of:—

Soda,	4·5
Coco-nut lard,	22·0
Water,	73·5
	100·0

This remarkable soap was sufficiently solid; but it dissolved in hot water with extreme facility. It is called marine soap, because it washes linen with sea water. Of the six principal vegetable oils, namely—palm, cocoa-nut, castor, olive, linseed and rape, the first four are imported in the state of oil only; the two last chiefly as seed. The proportion in which they were imported is shown in the following tables; and if to these quantities are added about a million and a half cwt. of tallow, and nearly twenty thousand tons of whale oil and spermaceti, they will nearly represent the total quantity of oil imported into Great Britain.

IMPORTS IN 1849.

	Palm oil. cwts.	Olive oil. tons.	Castor oil. cwts.
Western Africa	475,364	1	—
United States,	13,349	—	290
Naples and Sicily,	14	9,661	—
East Indies,	—	—	6,315
Canary Islands,	3,719	—	—
Malta,	—	2,237	—
Turkish Empire,	—	1,712	—
Tuscany	—	832	—
Spain,	—	753	—
Brazil	525	—	—
Ionian Islands,	—	506	—
Morocco,	—	368	—
Madeira,	353	—	—
Sardinia,	—	333	11
Miscellaneous	7	471	65
Total	493,331	16,864	9,681

IMPORTS IN 1850.

	Linseed. quarters.	Rape seed. quarters.
Russia,	482,813	3,235
Sweden,	870	—
Norway,	268	—
Denmark,	37	3,092
Russia,	87,273	645
Hanse Towns,	1,153	2,872
Holland,	7,734	201
Naples,	1,476	—
Austrian Territories,	40	2,580
Greece	—	1,637
Wallachia and Moldavia	910	1,280
Egypt,	17,517	—
East Indian Empire,	26,142	13,126
Miscellaneous	262	022
Total	626,485	29,495

Cocoa-nut Oil-cake.—It has been observed by Evelyn that one bushel of walnuts will yield fifteen pounds of peeled kernels, and these will produce half that weight of oil, which the sooner it is drawn is the more in quantity, though the drier the nut the better its quality. The cake or marc of the pressing is excellent for fattening hogs and for manure. Among the various seeds used in the manufacture of oil-cake, flour of linseed is the most important. Rape seed is also employed, but is considered heating. In Lubeck, a marc, called dodder cake, is made from the *Camelina sativa*. Inferior oil-cake is made from the poppy in India. Cotton-seed cake has lately been recommended on account of its cheapness, being usually thrown away as refuse by the cotton manufacturers. It is extensively used as a cattle food, in an unprepared state, in various parts of the tropical world, and to a limited extent in Great Britain. The cost of seed, freight included, was 2d. per lb. from Charlestown to Port Glasgow. Cotton oil-cake is now ordered at the same price as linseed cake. The produce of oil-cake and oil from cotton seed is two gallons of oil to one cwt. of seed, leaving about 96 lbs of cake; 8 lbs. is the daily allowance for cattle in England. Cotton seed oil, very pure, is manufactured to a considerable extent at Marseilles, by De Gimezney, from Egyptian seed; and he received a prize medal at the Great Exhibition.—Account of the export of linseed and rapeseed cakes from Stettin, principally to England, in—

	cwts.		cwts.
1834	33,518	1839	115,416
1835	27,028	1840	162,457
1836	56,581	1841	143,816
1837	70,643	1842	119,814
1838	119,549		

The quantity of oil-seed cakes imported into the United Kingdom was in—

	tons.		tons.
1849	59,462	1851	55,076
1850	65,055	1852	53,617

Cargoes of oil-cake, to the value of £22,207, were exported from the port of Shanghae, in China, in 1849. Seven samples of American oil-cake gave the following results:—

Oil,	11·41
Water,	7·60
Nitrogen,	4·74
Ash,	6·35

From the above figures, the scientific farmer will see that the manure formed by 100 lbs. of oil-cake is more than that derived from 300 lbs. of Indian corn. 300 lbs. of corn contain about 1¼ lbs. phosphoric acid; 100 lbs. oil-cake contain about 2½ lbs.—*Simmonds' Com. Product.*

(2756) COCOA-NUT SHELL. In India the thick fibrous husk is made into the Coir rope, and in Europe into rope, matting brushes, &c.; the substance of the shell is very brittle, and its structure is somewhat fibrous, but it admits of being turned in an agreeable manner. Those shells which are tolerably circular are used for the bodies of cups and vases, the feet and covers being made of wood or ivory. Common buttons are also made of the cocoa-nut shell, and are considered better than those of horn, as they do not, like that material, absorb moisture which causes them to swell and twist.—*Tredgold.*

(2757) COCOA-NUT MILK is made from the kernel. For this purpose the kernel is grated, a

little warm water is poured over it, and the liquid is then poured through an open cloth. This milk is excellent with coffee, and is indispensable for curry.

(2758) COCOA-NUT OIL. Cocos NUCIFERA.

Taynga yennai, TAM.	Narel ka tel, HIND.
Tencaya noona, TEL.	

The native method of making this oil is very simple. The kernel having been removed from the shell and dried is subjected to pressure in a mill, and the oil is expressed, but when prepared in small quantities, the kernel is boiled in water, for a short period; it is then pounded in a mortar, taken out and pressed. The *milk*, as it is called, which exudes, is then boiled over a slow fire, when the oil floats on the top, and being skimmed off is afterwards boiled by itself. Two quarts of oil may be procured from fourteen or fifteen cocoanuts. When fresh, the oil has an excellent flavour. It is used as an unguent on the bodies of the natives, after bathing, and as an oil for the hair. It is employed as a lamp oil, and is manufactured into soap. It is said to have all the virtues of cod Liver oil. The purest oil is obtained by grating the kernel and depositing it in some hollow vessel, to expose it to the heat of the sun, during the day, and the oil drains away through hollow spaces left for the purpose. The Malabar method of making the oil, is by dividing the kernels into two equal parts, which are ranged on shelves made of laths of the Betel-nut palm, or split Bamboo, spaces of half an inch wide being left between each lath. Under these a charcoal fire is lit and kept up for two or three days, in order to dry them. After which they are exposed to the sun on mats, and when thoroughly dried are subjected to pressure in an oil press. The remains of the cocoanut, from which the oil has been extracted, Posknakkull, *Hind.* Tenga Poonak, *Tam.* Tenga Pindee *Tel.* Poonak, *Cing.*, affords an excellent material for feeding pigs, poultry &c., and the best is obtained when the oil is extracted by pressure. The average annual quantity of this oil exported from Madras from 1847-48 to 1852-53 is about Galls. 9,00,000 per annum. Of this by far the largest portion is sent to the United Kingdom and France, the remainder finds its way to Arabia, Mauritius, Bombay and the French (Indian) Ports. The prices of this oil vary considerably in different parts of Southern India. For the quarter ending 31st October 1854 the max: and min: were Rs. 8. 5. 4 at Jubbulpore and Rs. 1. 12. 9 at Mhow per maund. The average of twenty-one large Stations in the Madras Presidency giving Rs. 4. 9. 5 per maund, or about £41-2 per ton. The market-value of "Cochin oil" in London (January 1855) was £46. 10— the average being £46 to 48. The best oil is that exported from Cochin, and the neighbouring ports on the Malabar Coast. It usually fetches 20*s.* per ton more than the Ceylon or Coromandel coast article. In Europe, for Candle and soap manufacture, for lubricating machinery, &c. &c. In India, for making soap, anointing the person, for cookery, lamps and in medicine.—*M. E. Jur. Reports.* A very excellent sample of this oil was shown by Monsieur Godéfroy of Pondicherry—The Canara Local Committee, the Madras Tariff, Soobroya Pillay, Mr. Kholhoff and Lieut. Hawkes also contributed excellent specimens.—*M. E. J. R.*

(2759) COCOA-NUT, DOUBLE. The Double Cocoa-nut of the Seychelles or Mahé islands, is the fruit of the Lodoicea. When preserved whole, and perforated in one or two places, the nut serves to carry water, and some of them hold six or eight pints; and by slicing them in different directions, they are formed into plates, dishes, drinking cups &c. known in the Islands as Vaisselle de l' isle Prasten. The crown of the trunk is eaten like the American cabbage palm. The down attached to the young leaves serves for filling mattresses and pillows; the ribs of the canes and fibres of the petiole are fabricated into baskets and brooms and the young canes are plaited to form hats. The Lodoicea attains a height of eighty or ninety feet. It might be introduced into India with advantage. Germinating nuts were sold in London in 1854 at £10 a piece.—*Seeman.*

(2760) COCOON. A term applied to the ball formed by the silk-worm, by winding around itself the silk which it spins.—*Faulkner.*

(2761) COCOS, a genus of plants belonging to the natural order of palms. It is thus defined by von Martius:—Both male and female flowers on the same spadix. Spathe simple; flowers sessile. Males calyx 3-leaved; corolla of 3 petals; stamens 6; a rudiment of a pistil. Females 3 sepals and 3 petals rolled together; ovary 3-celled; stigmas 3, sessile; drupe fibrous; putamen with three pores at the base; albumen homogeneous, hollow; embryo next one of the pores at the base; stems either lofty or middle-sized, slender ringed, or crowned by the bases of the petioles, with a pale fibrous wood; leaves pinnated; the pinnæ lanceolate or linear; flowers pale yellow; drupes brown, green, or orange-colour, rather dry. The genus contains several species.—*Eng. Cyc. Vol.* II. *page* 53.

(2762) COCUM OIL, or butter, is obtained from the seeds of a kind of mangosteen (Garcinia purpurea) and used in various parts of India to adulterate ghee or butter. It is said to be exported to England for the purpose of mixing with bears' grease in the manufacture of pomatum. It is a white, or pale greenish yellow, solid oil, brittle, or rather friable, having a faint but not unpleasant smell melting at about 95 degrees, and when cooled after fusion remaining liquid to 75 degrees—*Simmonds.*

(2763) COD.

Kabliau, DAN.	Gadus, LAT.
Kabeljaauw, Baukaelja, DUT.	Bacalhao, PORT.
Marue, FR.	Bacalao, SP.
Kabljau, Bakalau, GER.	Kabeljo, SW.
Baccala, Baccalare, IT.	

A well-known species of white prolific fish. Two kinds of prepared cod are distinguished—*pickled cod*, and *dried cod*. The former is gutted, salted, and then barelled; and the latter is simply dried and cured.—*Faulkner*.

(2764) CODILLA OR TOW. The part separated or picked out in cleaning hemp or flax. —*Faulkner*. Is composed of the short fibres of the flax. The quantity of Flax and Tow, or Codilla of Hemp and flax imported into Great Britain increased from 13,686 tons in 1801 to 95,123 tons in 1853.—*Royle*.

(2765) CODIPASSAELI KEERAY, *Tam.* BASELLA ALBA. *Syn.*

Bayl ke butchla ke baujee, DUK.	Kalumbi, SANS.
Tinghe Batsalikoora, TEL.	*Ainslie, p.* 253.

(2766) CODLÆUM CHRYSOSTICTON. *Syn* CROTON VARIEGATUM. Variegated croton. This shrub with handsome variegated leaves is sometimes seen in Tenasserim gardens.—*Mason*.

(2767) COD LIVER OIL. *Lat.* Morrhuæ oleum. Is obtained from the liver of the common cod (*Asellus*), and has long been in use as a remedy in the northern parts of Europe for pulmonary consumption, especially in the incipient stage. It is now in general use among all European practitioners. This oil has a disagreeable nauseous taste, to overcome which, it may be floated on milk, some aromatic water, a bitter infusion, cold tea or coffee, or wine.—*Faulkner*.

(2768) COFFEA, a Cinchonaceous genus, consisting of many species of tropical berry bearing shrubs, one of which, *Coffea Arabica*, is celebrated for the agreeable stimulating effect of an infusion of its roasted albumen. This substance, the coffee of commerce, is to that plant what the flour is to corn, the white meat to cocoa-nut, and the aromatic ruminated substance to a nutmeg. It is a secretion formed in the interior of the seed, and enveloping the embryo plant, for whose support it is destined when it first begins to germinate: it constitutes the principal part of the seed, the embryo itself being a minute body lying in a cavity at one end of the albumen. Unskilful observers are often unable to find the embryo; but it may readily be seen by the following simple means:—Take a new sample of small fine unroasted Mocha coffee, and throw it into boiling water; the embryo will, after a little while, be expelled with force from the albumen in a majority of cases.—*Engl. Cyc. page* 58. Wight describes Coffea alpestris, Arabica, Grumelioides, and Wightiana.

(2769) COFFEE. The berry of Coffea Arabica.

Bun, ARAB.	Coffea, Caffea, LAT.
Copi-cotta, CYNG.	Kawa, MAL.
Kaffe, Kaffebonner. DAN.	Kawa, PERS.
Koffy, Koffiboonen, DUT.	Caffe, PORT.
Eleave, EGYPT.	Kawa, POL.
Cafe, FR.	Kofe, RUS.
Koffe, Koffebohnen, GER.	Cafe, SP.
Kawa, Coffee, GUZ. HIND.	Capie-cottay, TAM.
Caffe, IT.	Chaube, TURK.

The Coffee plant is a native of Yemen, in Arabia, whence it has been introduced into other parts of the world. The Coffee plant thrives well all over India in the open air, and bears annually a few berries even one thousand miles further to the north west, that is, in the Botanic Garden at Saharunpore, in 28° of north latitude. But the cold in winter is too great for this cultivation so far north, though it might probably be carried as far as the Rajmahl Hills, and into Assam and the Silhet Hills, or south into the Malayan Peninsula.—*Royle's Productive Resources of India. Coffea Arabica* is an ever-green shrub, with oval shining wavy sharp-pointed leaves white fragrant five-cleft clustered corollas with projecting anthers, and oblong pulpy berries, which are at first of a bright red, but afterwards become purple. It is stated by Niebuhr to have been brought from Abyssinia to Yemen by the Arabs from a country similar to their own plains and mountains. By that people it has for ages been cultivated in the hilly range of Jabal, in a healthy temperate climate, watered by frequent rains and abounding in wells and water-tanks. Here the plants are grown in grounds that are continually irrigated, and in soil from one to one and a half foot deep. Among the plantations are interspersed various kinds of trees, whose shade has a beneficial effect upon the coffee-bushes. When in flower they diffuse a most delicious fragrance, in the midst of which the natives fix their habitations. The fruit begins to ripen in February; and when the seeds are prepared, they are conveyed to the city of Beitel Fakih, whence part goes to Mocha, and another portion to Hodeida and Loheia, whence it finds its way to Djedda and Suez for the Turkish and European markets.—*Engl. Cyc. page* 59. The coffee-plant begins to produce fruit when two or two and a half years old; but the quality of the seeds from young stems is not so good as that from stems four or five years old. The size and colour of the bean (as the inner part of the seed is called) vary considerably, those from the West Indies being larger than those from the East. Much more depends upon the manner of roasting and making the Coffee, than upon the quality of the bean. The superiority of French Coffee, in the preparation of which little or no Mocha Coffee is used, proves this position. Beans of a good quality are hard and heavy, sink quickly in water, are of a light yellowish-green colour, not discoloured or black,

and possess the odour of coffee, which, though faint, is peculiar, and are free from any damp smell. Beans recently collected, or only two or three months from the tree, are not so good as those about a year old; when older than this they become deteriorated. From the analysis of Seguin and Schrader, coffee consists of coffee-bitter (impure cafeine), solid fat, resin, a little aromatic principle, gum, albumen (this albumen, according to Seguin, unites with the yellow coffee-bitter, and forms a green), and lignin.—*Engl. Cyc. Vol.* II. *page* 63. The taste of raw coffee is somewhat sweetish; but the application of heat in the process of roasting produces important changes. The bean increases to nearly twice the original size, while it loses about one third of its weight: a powerful and agreeable odour is evolved, and a large quantity of empyreumatic oil, which appears in small drops on the surface, is formed along with a bitter principle, probably by an alteration in the cafeine, and of the saccharine matter. The roasting should take place in a close revolving iron cylinder, over a clear but moderate fire, and should not be carried too far: when the beans have acquired a light chesnut colour, the roasting should be discontinued. The beans are then to be cooled quickly by being tossed up into the air, and the grinding, or rather rough pounding, should be performed in a covered mortar or mill. The drink should be prepared from it as soon as possible, by infusion, which is preferable, unless some apparatus be employed by which a kind of decoction is made in a close vessel. About half an ounce of coffee powder should be used for every eight ounces (half a pint) of water. In Britain the roasting is generally carried too far; and the subsequent parts of the process, instead of being performed immediately, are often postponed for days or even weeks, by which the aroma is dissipated: when made, the liquid is generally deficient in strength and clearness. The employment of white of egg or fish-skin for clarification is decidedly objectionable: clearness is thus purchased, but at the expense of the strength. The addition of milk (which should always be hot) and of sugar heightens the nourishing qualities of this beverage, and in the morning renders it a more substantial article for breakfast. When taken after dinner to promote digestion it should be without milk, and, where the palate can be reconciled to it, without sugar. The adulterations of ground coffee are very considerable; the most important of these is chicory, a dark brown powder made from the roasted roots of the *Cicorium Intybus*. It is by some thought to be perfectly harmless, and an agreeble addition to the coffee: it is not however of so much value, and should not therefore be added to the coffee by the dealer, but sold separately, so that those who desire to add it may purchase it themselves. Various other seeds are used either as imitations or adulterations of coffee, such as Rye-Chick Peas (*Cicer arietinum*), Broom Seeds (*Spartium scoparium*), the yellow Water-Iris (*Iris pseudacorus*), and the Dandelion root (*Leontodon taraxacum*). It has been suggested to use the leaves of the coffee-plant in infusion the same as those of the tea-plant, and it is said they form a very agreeable beverage; but the berries are too valuable in themselves to permit the trees being injured by the loss of their leaves, as they would be were there any demand for them as an article of diet. —*Engl. Cyc. page* 60. Home consumption and Revenue of Coffee for the years:—

Years.	lbs.	£
1824	8,262,943	420,988
1825	11,082,970	315,809
1828	17,127,633	440,245
1835	23 295,046	652,124
1839	26,789.045	779,115
1840	28,723,735	921,551
1844	31,394,225	681,616
1845	34 318.095	717,871
1846	36,793.661	756,838
1847	37,441.373	746,436
1848	37,106,292	710 270
1849	34 431 074	643,210
1850	31,226,840	566,822
1851	32.564,164	445 739
1852	35,044,376	438,084

In a little treatise on coffee and its adulterations, published in 1850 it was estimated that not less than 18,000,000, lbs. of vegetable matter of various kinds were sold annually, under the deceptive name of coffee. Three-fourths of these 18,000,000 lbs. of pretended coffee were composed of chicory, and the remaining fourth of other ingredients prejudicial to health, as well as a fraud upon the revenue. The various substances used in adulterating both chicory and coffee, when sold in the powdered state, have been specifically pointed out and set forth from time to time in memorials from the trade and the coffee-growers. Mr. M'Culloch and other competent judges set down the actual consumption of chicory in the United Kingdom at 12,500 tons per annum. When we consider the vast difference of price between chicory and coffee, as purchased by the wholesale dealer, the temptation to its fraudulent use was obviously great, and there was no penal restriction against it. In the year 1832 chicory was first imported into England, subject to a duty equivalent to that levied upon colonial coffee, and permitted to be sold by grocers *separately* as chicory; but notices were at the same time issued, that the legal penalties would be rigidly enforced, if discovered mixed with coffee. In 1840, in consequence of memorials from the grocers and dealers in chicory, and also from the circumstance of exceedingly high rates then ruling for coffee, together with the disruption of our commercial relations with China, simultaneously advancing the price of tea (thus rendering both these popular beverages excessively dear to the consumer), an order was

issued from the Treasury to the Excise Board, authorizing the admixture of chicory with coffee; a duty, however, being still maintained on the former of £20 per ton on the kiln-dried, and 6d. per lb. on the powdered root, when imported from abroad. The changes in the sources of supply, within the last fifteen or sixteen years, have been very remarkable. The British possessions in the East have taken the place which our islands of the West formerly occupied. The British West Indies have fallen off in their produce of Coffee from 30,000,000 to 4,000,000 lbs. Ceylon which, fifteen years ago, had scarcely turned attention to coffee, now exports nearly 35,000,000 lbs. San Domingo, Cuba, and the French West India colonies are gradually giving up coffee-cultivation in favor of other staples; and it is only Brazil, Java, and some of the Central American Republics that are able to render coffee a profitable crop. The export crop of Brazil (the greatest coffee-producing country), grown in 1850, for the supply of the year ending July, 1851, amounted to no less than 302,000,000 lbs., of this a large quantity remained in the interior to supply the deficiency of the current year. It is scarcely thirty years ago that the coffee-plant was first introduced into Bengal by two refugees from Manilla; and the British possessions in the East Indies now yield 42,000,000 lbs. Sufficient extent has not yet been given to enable it to be decided in what district of *Continental* India it may be most advantageously cultivated. It is in the fine island of Ceylon, however, that coffee-culture has made the most rapid progress. It is an imporant fact that the supply of coffee from Ceylon, even at the present moment, and irrespective of land already planted but not yet come into full bearing, is in excess of the whole consumption of Great Britain, and the planter is thus compelled to carry the surplus to continental markets. The exports of coffee from Ceylon have been rather stationary the past three years, averaging about 300,000 cwt. In the sixteen years ending with 1851, Ceylon had exported 130,083 tons of coffee! The present *produce* of the various coffee-growing countries in the world, may be set down at the following figures:

SOUTH AND CENTRAL AMERICA.	Millions of lbs.
Costa Rica, ...	9
La Guayra and Porto Cabello,..	35
Brazil,...	302
British West Indies, ...	8
French and Dutch West Indies,	7
Cuba and Porto Rico, ...	30
St. Domingo, ...	33½
ASIA AND THE EAST.	
Java, ...	140
The Philippine Isles, ...	3
Celebes, ...	1½
Sumatra, ...	5
Ceylon, ...	34
Malabar and Mysore, ...	5
Arabia (Mocha), ...	3
	616 = 275,000 tons.

I shall now proceed to describe the cultivation of the tree and preparation of the berry, as carried on in different countries.

Cultivation of Mocha.—In Arabia Felix, the culture is principally carried on in the kingdom of Yemen, towards the cantons of Aden and Mocha. Although these countries are very hot in the plains, they possess mountains where the air is mild. The coffee is generally grown half way up on their slopes. When cultivated on the lower grounds it is always surrounded by large trees, which shelter it from the torrid sun, and prevent its fruit from withering before their maturity. The harvest is gathered at three periods; the most considerable occurs in May, when the reapers begin by spreading cloths under the trees, then shaking the branches strongly, so as to make the fruit drop, which they collect and expose upon mats to dry. They then pass over the dried berries a heavy roller, to break the envelopes, which are afterwards winnowed away with a fan. The interior bean is again dried before being laid up in store. The principal coffee districts are Henjersia, Tarzia, Oudein, Aneizah, Bazil, and Weesaf. The nearest coffee plantations are three-and-a-half days journey (about 80 miles) from Aden. The following information is derived from Capt. S. B. Haines of the Indian Navy, formerly political agent at Aden.

A camel load is about 400 lbs = 25 frazlas or bales.

	G.C.	Commassees.
The price of ditto inland,...	31	41
At Mocha, duty to Dewla uncertain...		
Bake fee one butsha on each frazla,...		25
Weighing and clerk's fee, ...		20
Packing, ...		40
Camel hire to the coast, ...	12	50
Cost from Sana to Mocha, ...	44	15

Coffee is brought into the Sana market in December and January from the surrounding districts. The varieties are—

1. Sherzee, best—price 1 G.C. frazla 25 butsha.
2. Onceaime.
3. Muttanee,
4. Sharrazee.
5. Hubbal from Aniss.
6. Sherissee from ditto—price per frazla 1 G.C. 15 B.

The nearest place to Sana where the coffee tree grows, is at Arfish, half a day distant. Attempts have been made to introduce the shrub in the garden of the Imaum at Sana, but without success, ascribed to cold. Kesher is more prized at Sana; best is Anissea, and is sold at a higher price than other coffee, namely, g. c. 12 per 100 lbs.; inferior, at from 4, 5, and 6. Rain falls in Sana three times in the year. 1st. In January, in small quantities. 2nd. Beginning of June, when it falls for eight or ten days. By this time the seed is sown, and the cultivators look forward to the season with anxiety. 3rd. In July, when it falls in abundance. A few farmers defer sowing till this period, but it

is unusual, when they expect rain in June. The coffee plant is mostly found growing near the sides of mountains, valleys, and other sheltered situations, the soil of which has been gradually washed down from the surrounding heights, being that which forms its source of support. This is afforded by the decomposition of a species of claystone (slightly phosphoritic), which is found irregularly disposed in company with a few pieces of trap-rocks, amongst which, on approaching Sana from the southward, basalt is found to preponderate. The clay-stone is only found in the more elevated districts, but the debris finds a ready way into the lower country by the numerous and steep gorges which are conspicuous in every direction. As it is thrown upon one side of the valley, it is carefully protected by means of stone walls, so as to present to the traveller the appearance of terraces. The plant requires a moist soil, though much rain does not appear necessary. It is always found in greater luxuriance at places where there is no spring. The tree at times looks languid, and half withered; an abundant supply of water to the root of the plant seems necessary for the full growth and perfection of its bean.

Progress of Cultivation in India.—There are said to be ten varieties of the coffee, but only one is found indigenous to India, and it is questionable if this is not the Mocha species introduced from Arabia. The cultivation of this important crop is spreading fast throughout the east, and has been adopted in many parts of Hindostan. In the Tenasserim provinces, on the table land of Mysore, in Penang, and especially in the islands of Bourbon and Ceylon, it is becoming more and more an object of attention. It is known to have given good produce in Saugur and the Nerbudda; also in Mirzapore. as well as Dacca, and other parts of Bengal; Chota Nagpore, Malabar, and Travancore. From three to four million pounds of coffee are now exported from the Indian presidencies annually. The highest quantity was four and quarter million pounds in 1845, but the progress of culture, judging from the export, has been small. On the hilly districts on the east coast of the Gulf of Siam, the cultivation is carried on on a limited scale. The annual produce is not much more than about 400 cwt., although it is understood to be increasing. The quality of the berry is reckoned to be nearly equal to Mocha, and it commands a high price in the English market. The soil recommended in India is a good rich garden land, the situation high and not liable to inundation, and well sheltered to the north-west, or in such other direction as the prevailing storms are found to come from. A plantation, or hill affording the shrubs shade, has been found beneficial in all tropical climates, because, if grown fully exposed to the sun, the berries have been found to be ripened prematurely. The spot should be well dug to a depth of two feet before the trees are planted out, and the earth pulverised and cleared from the roots of rank weeds, but particularly from the coarse woody grasses with which all parts of India abound. The best manure is found in the decayed leaves that fall from the trees themselves, to which may be added the weeds produced in the plantation, dried and burnt. These, then, dug in, are the only manure that will be required. Cow-dung is the best manure for the seed-beds. The seed reserved for sowing must be put into the ground quite fresh, as it soon loses its power of germination. Clean, well-formed berries, free from injury by insects, or the decay of the pulp, should be selected. These berries must be sown in a nursery, either in small, well manured beds, or in pots in a sheltered spot, not too close, as it is well to leave them where sown until they acquire a good growth; indeed, it is better if they are removed at once from the bed where they are sown, to the plantation. Here they should be planted as soon as they have attained two years of age, for be it remembered, that if they are left too long in the nursery, they become unproductive and never recover. The distance at which they should be put out in the plantation need not exceed eight feet apart in the rows, between which, also, there should be eight feet distance. The seedlings appear in about a month after the seed is sown. The culture requisite is, in the first instance, to afford shade to the young plants; many consider that this shelter should be continued during the whole period of their culture; but this is somewhat doubtful, as it has been found that plants so protected are not such good bearers as those which are exposed. The best plants for this purpose are tall, wide-branching trees or shrubs without much underwood. The other culture, requisite is only to keep the ground tolerably clean from weeds, for which one cooly on from five to ten biggahs is sufficient. He should also prune off decayed or dead branches. This treatment must be continued until the fourth year, when the trees will first begin bearing, and, after the gathering of each crop, the trees will require to be thinned out from the superabundant branches, their extremities stopped, and the tops reduced to prevent their growing above seven or eight feet in height; the stems, also, should be kept free from shoots or suckers for the height of at least one foot, as well as clear from weeds. Irrigation must be frequent during the first year that the plants are removed to the plantation, and may be afterwards advantageously continued at intervals during the dry and hot weather, as a very hot season is found unfavorable to the plant, drying up and destroying the top branches and the extremities of the side shoots; whilst, on the other hand, a very long rain destroys the fruit by swelling it out and rotting it before it can be ripened: hence it is necessary to attend to

a good drainage of the plantation, that no water be anywhere allowed to lodge, as certain loss will ensue, not only of the crop of the current year, but most frequently of the trees also, as their roots require to be rather dry than otherwise. The crop will be ready to gather from October to January, when the ripe berries should be carefully picked from the trees by hand every morning, and dried in the shade, the sun being apt to make them too brittle; they must be carefully turned to prevent fermentation, and when sufficiently dry the husks must be removed, and the clean coffee separated from the broken berries. After being picked out and put aside, and then again dried, it is fit to pack. The first year's crop will be less than the succeeding ones, in which the produce will range from ½ a lb. to 1 lb. in each year.—(Simmond's "Colonial Magazine," vol. xv.)

Ceylon.—Coffee is stated to have been introduced into this island from Java, somewhere about the year 1730. It was extensively diffused over the country by the agency of birds and jackalls. In 1821 its cultivation may be said to have partially commenced, and in 1836, it had become widely extended through the Kandyan provinces. In 1839 not a tree had been felled on the wide range of the Himasgaria mountains. In 1840 a small plantation was, for the first time, formed. In 1846 there were fifty estates, then averaging, each, 200 acres of planted land, and yielding an average crop of 80,000 cwt. of coffee. Every acre is now purchased in that locality, and in large tracts, or there would have been twice the number of estates in cultivation. In 1848, the Galgawatte estate, situate in this range, at an elevation of 4,000 feet, containing 246 acres, of which 72 were planted, was purchased by Mr. R. D. Gerard, for £1,600. The quantity of land which had been brought under cultivation with coffee in this island in the ten years previous to the last reduction of duty in 1844, was, in round numbers, 25,000 acres; but so rapid was the subsequent increase, that in the succeeding three years, that extent of land was doubled; so that, in 1847, there were upwards of 50,000 acres of land under cultivation with coffee, giving employment to 40,000 immigrant coolies from the continent of India, and upwards of two millions of capital were invested in the cultivation of this staple. The quantity of land under culture with coffee by Europeans, was about 55,000 acres in 1851. Allowing 20,000 acres to produce the quantity of native coffee exported, and 5,000 for that consumed in the island, the total extent of coffee cultivation in Ceylon, European and native, will be 80,000 acres. The produce exported in 1849 was 373,593 cwt., while in the year 1836, when attention was first directed to this island as a coffee-producing country, the crop was not more than 60,330 cwt. Large profits were made by the first planters, more capital was introduced, until, between the year 1840 and 1842, the influx of capitalists, to undertake this species of cultivation, completely changed the face of the colony, and enlarged its trade, and the produce of coffee in sixteen years has increased six-fold. The general culture resembles the practice in Java. Of the Ceylon coffee, that grown about Ramboddi fetches the highest price, from the superiority of the make, shape, and boldness of the berry. The weight per bushel, clean, averages 56lbs; 57½lbs. is about the greatest weight of Ceylon coffee. The lowest in the scale of Ceylon plantation coffee is the Eoombera, which averages 54½lbs., clear, per bushel. The following have been the prices of good ordinary Ceylon coffee in the port of London for the last eight years in the month of January: 1853, 46s. to 48s; 1852, 40s. to 42s; 1851, 38s. 6d. to 40s. 6d.; 1850, 56s. 6d. to 57s. 6d; 1849, 31s. to 32s. 6d.; 1848, 31s. 6d. to 33s,; 1847, 39s. 6d. to 41s. 6d.; 1846, 49s. to 50s. Forest lands are those usually planted in Ceylon, and the expense attendant on clearing and reclaiming them from a state of nature, and converting them into plantations, is estimated to average £8 per acre. The lowest upset price of crown lands in the colony is £1 per acre. Coffee planting has failed over a considerable portion of the southern province of the island, where the experiment was tried. The temperature was found to be too equable, not descending sufficiently low at any time to invigorate the plant; which, though growing luxuriantly at first, soon became weak and delicate. Nurseries are established for young plants. The districts in which the coffee is principally cultivated, extend over nearly the whole of the hilly region, which is the medium and connecting link between the mountainous zone and the level districts of the coast. The mania for coffee planting has recently subsided, in consequence of the barely remunerative returns at which that article has been sold, ascribable partly to over-production, and in some measure, perhaps, to the temporary glut of foreign coffee thrown on the British market by the reduction of the duty. As regards the yield, some estates in Ceylon have produced upwards of 15 cwt. per acre, but it is a good estate that will average seven, and many do not give more than 4 cwt. the acre. The shipments from Colombo for five years, are stated below, with the class of coffee:—

	Plantation. cwt.	Native. cwt.	Total. cwt.
1845 ...	75,002 ...	112,889 ...	187,891
1846 ...	91,240 ...	70,991 ...	162,231
1847 ...	106,198 ...	143,457 ...	249,655
1848 ...	191,464 ...	88,422 ...	279,886
1849 ...	243,926 ...	118,756 ...	362,682
1850 ...	198,997 ...	56,692 ...	255,689
1851 ...	220,471 ...	97,091 ...	317,562

While, in 1839, the total value of the exports from Ceylon was only £330,000, in 1850 the

value of the single staple of coffee was no less than £609,262, and in 1851 had still further increased. I append a memorandum of the quantities of coffee exported from Ceylon since 1836 :—

	Quantity. Cwt.	Value. £
1836	60,329	
1837	34 164	
1838	49.541	
1839	41,863	
1840	68,206	
1841	80,584	196 048
1842	119.805	269,763
1843	94,847	192,891
1844	133,957	267,663
1845	178.603	363,259
1846	173,892	328.781
1847	293 221	456,624
1848	280 010	387,150
1849	373,593	545 322
1850	278,473	609 262
1851	339,744	
Total in 16 years	2.600,832	
Average	162,552	(Ceylon Almanac for 1853.)

The local export duty of two-and-a-half per cent., was abolished from 1st September, 1848.

Peeling, pulping, and winnowing.—The coffee-peeler, used for separating the bean from the pellicle, was formerly a large wheel revolving in a trough, the disadvantage of which was the flattening more or less of the bean when not thoroughly dry. A new machine has been recently introduced, the invention of Mr. Nelson, C.E., of the Ceylon iron works, by which this evil is obviated : its principal being not weight, but simple friction, of sufficient force to break the parchment at first, and, when continued, to polish the bean free from the husk. A very simple winnowing machine for cleaning the coffee as it comes out of the peeler, is attached. From the winnowing machine it runs into the separating machine, which sorts it into sizes, and equalizes the samples, by which a vast amount of time and manual labour are saved. The same principle is intended to be applied by Mr. Nelson to pulping, which will obviate the injury now inflicted by the grater upon the fresh berry. In spite of the greatest care, numbers of the beans in a sample, on close examination, will be found scratched or pecked ; and when the closest attention is not paid, or the person superintending the process is devoid of mechanical skill, the injury is proportionate. The ordinary pulping-mill in use, consists of a cylinder of wood or iron, covered with sheet brass or copper, and punctured similarly to a nutmeg grater. This cylinder, technically called the barrel, runs upon a spindle, which turns a brass pick on each side of a frame. Immediately in a line with the centre upon which it turns, and placed vertical to each other, are two pieces of wood, frequently shod with iron or copper, called "the chops," placed about half an inch apart, or sufficient to allow the passage of "parchment" coffee between them. The lower chop is placed so close to the barrel, yet without contact, that all coffee must be stopped by it and thrown outwards. The upper chop is adjusted to that distance only which will permit the cherry coffee to come into contact with the barrel ; but will not allow the berries to pass on till they have been denuded of their red epidermis by a gentle squeeze against its rough surface. The far greater portion of the pulps are separated by being carried past the lower chops upon the sharp points of the copper, and thrown out behind, and a few are left with the parchment coffee. As from the different sizes of the berries, and their crowding for precedence as they descend from the hopper above to the gentle embrace of the barrel and upper chop, some pass unpulped, the coffee as it comes from the lower chop is made to fall upon a riddle, which separates the unpulped cherries. These are put back again, and passed through a pulper with the upper chop set closer. The secret of working appears to be the proper setting of the chops, and many have been the schemes proposed for reducing this to a certainty. Perhaps, after all, few plans are better than the old wedges, by tightening or loosening of which the chop is kept in the required position. Within the last few years, the machine, has been considerably improved by being formed entirely of iron, cog-wheels being substituted in the place of straps and drums to move the riddle, and the riddle itself is now formed of two sieves, by which the chance of unpulped berries reaching the parchment is lessened. On some estates water-wheels have been put up to drive several pulpers at one time, which otherwise would require from two to four men each to work them, but from the costly buildings and appurtenances which such machinery renders necessary, they are rare. Although the operation of pulping is so simple, it is one which requires the machine to be set in such a way that the greatest quantity of work may be done, or, in other words, the smallest quantity of unpulped berries be allowed to pass through. On the other hand, the berries must not be subjected to injury from the barrel ; for if the parchment skin is pricked through, the berry will appear, when cured, with an unsightly brown mark upon it. Several new coverings for barrels, instead of punctured copper, have been tried ; among others, coir-cloth and wire-net, but the old material is not as yet superseded. After pulping, the coffee in parchment is received into cisterns, in which it is, by washing, deprived of the mucilaginous matter that still adheres to it. Without this most necessary operation, the mucilage would ferment and expose the berry to injury from its highly corrosive qualities. As some

portion of pulp finds its way with the coffee to the cistern, which, if suffered to remain would, by its long retention of moisture, lengthen the subsequent drying process, various methods have been adopted to remove it. One mode is to pass the coffee a second time through a sieve worked by two men; another to pick it off the surfaces of the cistern, to which it naturally rises. In August, 1846, premiums were awarded by the Ceylon Agricultural Society to Messrs. Clerihew and Josias Lambert for the improvements they had introduced into coffee-pulpers, which, by their exertions, had been brought to great perfection. The first improved complete cast-iron pulper received in the island, was made for Mr. Jolly, from drawings sent home by Mr. Lambert to Messrs. B. Hick and Son, engineers. This pulper is one of the most perfect in every respect that has yet been brought into use, the disadvantages belonging to the old machine having been entirely remedied. The sieve crank has a double eccentric action. The chops are regulated by set screws, and the sieve suspended in a novel and secure manner, the whole combining strength and efficacy, together with an elegance of form, which will likewise be appreciated. Mr. W. Clerihew, of Ceylon, submitted to the Great Exhibition a model of his approved apparatus for drying coffee (which has been patented in the name of Robert R. Banks, Great George Street, Westminster), and received the Isis gold medal for the same. The intention is to dry the vegetable and aqueous moisture of the berry. Before this is required, the coffee has previously undergone the process of pulping, or removal from the soft fleshy husk. Here let Mr. Clerihew describe the advantages for himself. "When the coffee berry is picked from the tree it bears a close resemblance to a ripe cherry, both in size and appearance: and several processes have to be gone through before the article known in commerce as coffee is produced. In the first place, the pulpy exterior of the cherry has to be removed by the process of pulping, which separates the seed and its thin covering called the parchment, from the husk. When the pulping process is completed, we have the parchment coffee by itself in a cistern, and the next process consists in getting rid of the mucilage with which it is covered." Having become assured, both by experiment and by Liebig's reasoning, that the successive stages of decomposition were wholly ascribable to the action of the stagnant air which occupies the interstices between the beans, and taking into account that a mass of coffee presented a medium pervious to air, it occurred to Mr. Clerihew that it was possible, by means of fanners, working on the exhausting principle, so to withdraw air from an enclosed space as to establish a current of air through masses of coffee spread on perforated floors, forming the top and bottom of that space. The plan he carried into execution at Rathgoongodde plantation in 1849. No sooner was the plan put in operation than, instead of stagnant air occupying the interstices of the beans and gradually acting on them, a stream of air was established and flowing through the mass of coffee, each bean of it became surrounded by a constantly renewed atmosphere of fresh air.

Java.—When Arabia enjoyed the exclusive monopoly of coffee, it could not be foreseen that one day the island of Java would furnish for the consumption of the world from 125 to 130 millions of pounds per annum. The cultivation was introduced by M. Zwendenkroom, the Governor-General of Batavia, who obtained seeds from Mocha, in 1723. According to official statements the following are the exports. In 1839 there were exported 46,781,729 kilogrammes, valued at 48 million florins. Eight years labor, 1833 to 1841, brought its produce of coffee from 12 million kilogrammes annually, up to 55 millions. In 1846, the exports were 916,876 piculs, but in 1850, they were only 14,801 piculs. The total coffee crop of Java was in 1850, 1,280,702lbs.; in 1851, 1,436,171 lbs,; in 1852, 1,229,349lbs.

	1840	1841
Residences in which this produce has been cultivated in 1840 and 1841, ...	20	20
Number of families destined for the labor,..	470,673	453,289
Trees which have yielded a crop, ...	216,193,894	236,085,600
Trees which have produced the average quantity of a picul of 125 lbs. Dutch, ...	280	248
Quantity of coffee furnished to the godowns in piculs,.....	706,258	877,444
Trees according to the reckoning made in the month of March, 1841 and 1842.	336,922,460	329,898,963

The comparative result of this table shows—1st. That, in the year 1841, coffee had been gathered from 20,000,000 more trees than the number in 1840, and that the crop had increased by 171,000 piculs. 2nd. That, in the month of March, 842, there were above 7 millions less of coffee trees than in 1840. This diminution is merely nominal, seeing that these trees have served to replace those which by their small produce have to be suppressed in the lowlands of the residency of Baylen. On the contrary, the increase of trees, planted from 1839 to 1840, amount to very nearly the same number, of 7 millions. 3rd. That, in the season of 1842, there was planted nearly 20 millions of plants; of which 12 millions are to serve to replace the old trees, and 8 millions are destined to extend this culture. It is calculated that this island will very soon be in a condition to produce a million of piculs, or 125 millions more of Dutch pounds of

coffee. Previous to 1830, Java scarcely exported as much as 40 millions of pounds.

Cultivation and Preparation of Coffee in Java.—For the following valuable details the public are indebted to M.de Munick,the inspector of the agricultural department, Batavia, as contributed to Simmond's "Colonial Magazine" (vol. xi. p. 46).

Soil and Situation.—Elevated lands are found to be those best suited for the growth of coffee in Java. Land situated between 1,000 and 4,000 feet above the level of the sea may be generally said to be adapted to the cultivation of coffee. It must not be taken for granted that all ground of less elevation is unsuited. Suitable ground is to be found lower down, but the cultivation on it is more difficult; the tree gives less fruit, and the plant is less durable. Valleys lying between high mountains are more especially fit for coffee plantations, because the soil which is washed down from the heights affords fresh food continually to the lowlands; the valleys themselves are moist, since the hills surrounding them attract the rain; and they are shut out from severe winds by the same protecting enclosure. The soils best suited to the successful growth of coffee may be classed as follows:—

Firstly.—Cleared forest lands, especially those in which the black, leafy, or vegetable mould is found to considerable depth. These are the richest grounds, and will support the coffee plant for many years, and they are also cultivated with the least trouble.

Secondly.—Dark brown soils, approaching to black, which, without having much clay in them, appear to the eye to have a mixture of coral. The greater the depth of this coral-like stratum, and of the reddish or deep yellowish soil, the better is the ground for coffee. This kind of land also has sufficient strength and substance to afford nourishment for many years to the plant; but it entails more trouble than the before mentioned soils, because the young plant does not so speedily strike root into it, and sometimes dies, so that provision has to be made against failures.

Thirdly.—Reddish and loose ground, such as is generally found in the neighbourhood of volcanic lands. This kind is frequently found well adapted for coffee; it flourishes on such land luxuriantly, but does not last long, as the ground possesses less strength and nourishing substance. (In the West Indies, from my own experience, I have found this to be one of the worst descriptions of soil. *P. L. S.*) By digging in different places we become better acquainted with the nature of the ground, but we may take it as a rule, that rich old forest land on which many large trees are found, and plains covered with heavy underwood, most frequently offer eligible sites for coffee plantations. Grounds in which loam is found, and stony soils, are unfit for coffee. But I do not mean by "stony soils" land on which many stones are lying, for on that very account it may be most suitable; but I mean land which shows a pebbly stratum just below the surface, or such as is of a porous, stony nature. In the choice of situation care must be taken to select that which is as much as possible protected against the south-east wind, because its dry influence is very injurious to the coffee plant, and also prevents the growth of the *Erythrina* (known here locally as the Dadap tree) which is so necessary for its shade. Flat grounds, or gentle declivities, are better than steep slopes; yet the latter can be well employed, if proper care is taken.

Cultivation.—After the ground has been cleared in the dry season—that is, after the bushes have been rooted out, the undergrowth burnt off, and the thickets removed—ploughing is commenced in September. When the ground has twice been deeply ploughed, the weeds and roots must be brought together with the rake and carefully burnt. The depth of the ploughing must be regulated by the nature of the ground. In all kinds of cultivation, deep ploughing is recommended, but in Java we ought not to plough deeper than the stratum of fertile soil, as a kind of subsoil may be brought uppermost injurious to plants, and which, before it can become fertile, must for a year at least have been exposed to the atmosphere. The ground having been turned up, should be left exposed for some days to throw off the vapor arising from it; and must then be again ploughed and cleared with the rake. After waiting for some days, it should be ploughed for the fourth and last time, and made as clean and friable as possible. In small plantations this is to be done with the spade, but on large estates the roller must be used. This roller consists of a heavy piece of round wood, eight or ten feet long, to which a pole is fastened in the middle to have oxen harnessed to it. It is drawn slowly over the ploughed land, and presses the clods to earth. To give it greater force the driver sits or stands upon it. Before the field has been properly ploughed and rolled in the above way, the middle of October will have arrived, and we then begin to open a path through the plantation from the highest to the lowest point, about two roods broad, and the whole of the land is then divided into separate parcels. Portioning off the estates into divisions of equal size is a system to be much recommended. By this means labor may be equally divided, superintended and inspected. Order and regularity, which are necessary in all things, are most especially required in cultivation on a large scale. The size of these parcels is regulated by the nature of the estate. On flat or gently declining land they may be greater than on steep grounds, because, in order to prevent the washing away of the soil on precipitous land, the water must be led off by trenches, which of themselves make

the divisions of land smaller. On flat ground the divisions may be each 625 square roods, each of which may contain, if planted—

	Trees.		Trees.
12 feet by 12 „	625	8 feet by 8	1406
10 „ 10	900	6 „ 6	2500

The distance between the coffee bushes cannot be definitely laid down, as it depends on the nature of the soil. On the most fertile forest lands twelve feet by twelve is a good distance. Only on low and meagre grounds, where the tree grows less luxuriantly and strong, can six feet by six be reckoned a proper distance. Between the divisions a path should be left, one rood in breadth. Along the middle paths and by the side of the divisions drains must be cut, the former two feet in breadth and depth, the latter one foot. The drains along the divisions must be cut in such a way as to conduct the rain-water to the larger drains which flank the middle paths. On precipitous ground, when the coffee is planted, small ridges should be raised between the rows, to prevent the rich earth from washing down in the heavy rains. The steeper the land is, the closer these ridges should be; and care should be taken to incline them, so as to break the descent, the direction of which they should in some degree follow. The first ridges may be made with the branches of the trees which have been felled, or with the rubbish cleared from the ground on the first raking of it.

Placing the pickets.—When the ground has been worked and divided in the above manner, the pickets are placed. These are slips of bamboo one-and-a-half to two feet long. First—two long canes (which do not stretch like string), each one hundred feet long, are marked off in feet according to the distance at which the planting is to take place; heavy stakes are made fast to each end of them, by which they can be well secured on the ground. At the places where they are marked off in feet, strings are fastened so tightly that they cannot be displaced; and then the canes are laid down and well fixed in the ground, one in the length and the other in the breadth. Picketing does not give much trouble; it ensures regular planting, and makes the daily inspection simple. The planting thus takes place in straight lines, which give an ornamental appearance, and afterwards renders the view over the whole plantation easy. At every place where a string has been tied, a picket is stuck in the ground; then the cane is removed to another place, and so on till all the estate is marked out by pickets. After the picketing, a hole is made with the spade at every mark; it should be a good foot broad and deep, and the earth inside should be made very fine and clear. The earth is now ready to receive the coffee plant, and the time has only to be waited for when the first rains fully begin.

Nurseries.—In the month of October, or earlier, if coffee trees are near at hand, nurseries must be prepared in the neighbourhood of the land about to be planted. This can be done in the ravines, or, if they are too far from the spot where the plants are wanted, pieces of ground most convenient can be selected. If the ravines are preferred, places must be chosen which are shaded by trees not prejudicial to the coffee plants. On ground where there are no trees, the nurseries may be covered, at the height of four feet, with leaves of jack (*Artocarpus integrifolia*), areca, or other palm trees, in a manner to admit the air. The ground made loose and fine, coffee plants newly opening, or seeds only, are planted or sown at a distance of four inches square; 500 square roods will in this way furnish 648,000 plants, which are sufficient for an estate of 300,000 trees. Transplanting from nurseries is absolutely necessary in coffee cultivation, and the trouble it costs is always doubly repaid. Having a choice of plants, a person can be convinced he has taken none but healthy trees, and he proceeds therefore with a confidence of success. After the first year, all failures having been nearly replaced, the estate is fully planted, the trees are of regular growth, and no useless clearing is required — a thing which is always necessary in irregular plantations. It is easy also to pick the berries from the trees which are planted with regularity; the work goes on smoothly; and when the estate has lived its time, it may be abandoned altogether, without leaving patches of living trees here and there, which renders superintendence so very difficult. There should always be a plentiful supply of plants, to give an ample choice and to make up for failures. When plants are placed in the nurseries, they should not have more than two offshoots, or leaves, above each other; and when the ball plants are transplanted, they should not be higher than a foot, as large plants always give meagre trees. At the end of November or beginning of December, if the nurseries are kept free from weeds, and, if necessary, occasionally watered, the plants will be about a foot high, and will have put forth 4 or 5 leaves; they are then just fit to be transplanted. Then the ground is cloven with the spade, at a distance of an inch and a half round the stem of the plant, to about three inches deep; the plant, with the ball of the earth adhering to it, is carefully lifted out of the ground, and the ball is wrapped in a jack, plantain, or other leaf, and tied to prevent the earth falling of; but, before the plants are thus taken from the ground, it must be moistened to make the earth adhesive.

Planting the coffee trees.—The plants, which, after the above operation are called "ball plants," are then placed in a bamboo wicker frame, and are carefully carried by two men to the place where they are to be put into the ground. They are then taken out of the frame and placed in the holes next to the

pickets. The pickets are removed, and the plant is fixed upright; the leaf surrounding the ball is made loose, but not taken away; the planter presses the plant down with his hand and fills up the hole with fine loose earth, and the business of planting the coffee tree is finished.

Planting the Dadap trees.—This is a species of Erythrina, probably *E. indica* or *E. arborescens*; that used for the purpose in the West Indies is *E. Corolladendrum*. In Java, as soon as the coffee is planted, the operation of planting the dadap tree is commenced. The best sort of dadap comes from Serp or Mienyak; it is smooth and broad-leaved, and shoots up quickly. Thick young stems are chosen, about three feet long, and the lower part is pointed off. If the dadap is moist or juicy, it should be cut twenty-four hours before it is planted. The dadap is planted uniformly by the measuring cane in the same way as the coffee itself. Between every two rows of coffee one of dadap is planted, not on a line with the coffee plants, but alternately with them; thus, if the coffee is eight feet by eight, the dadap is sixteen by sixteen. The dadap is planted to the depth of a foot, with somewhat of a westerly inclination, in order that the morning sun may fall on a large surface of the stick. The ground must be stiffly trodden round the bottom of the stem, and the upper part of it should have some kind of leaf tightly bound around it to prevent the sap from escaping. When the coffee and dadap plants have thus been put out, every fifth day the young plantation should be carefully inspected, and a picket placed wherever there is a failure, as a mark to the planter that a new plant is there required. This operation of replacing failures is carried on all through the wet season, and the dadaps which have not succeeded are at the same time changed.

Keeping up the estate.—In the first six months of the planting, the estate should be cleaned each fortnight with the hoe; the ground being well moved and the weeds taken out. Those weeds which are too close to the plants to be removed in this manner, must be pulled out with the hand. When the plantation is thus wholly or partially cleaned the earth must be taken off the weeds, and they must be collected and thrown on the pathways. The weeding in this manner gives at first a great deal of trouble, but it is most advantageous in the long run, as the weeds are thus easily kept down. Great care must be taken to do away with an old custom of burying the weeds in large holes on the estates. It conduces to bad and slovenly habits, such as cutting off the tops of the weeds by wholesale, and thus giving the plantation an appearance of cleanliness, whilst it, in fact, is as dirty as ever. This is soon discovered by the weeds showing themselves again above ground in a very few days, and even if they rot under ground, they breed insects which are very hurtful to the bushes, and the seeds vegetate. After the first six months, this weeding will be sufficient if it takes place once a month, but this must be persevered in till the third year, when there may be a much greatee interval between the weeding. When the trees ar coming to full growth, the hoe should be less frequently used in cleaning; the hand must be used to the full extent to which the branches reach, as the roots of the tree spread to a like distance, and if they are injured the growth of the tree is prejudiced. The well-being of an estate chiefly depends on frequent cleaning of the plantation in the beginning. The idea of some persons that cleaning in the dry season is of little consequence, must be given up, as it is principally at that very time that it is extremely profitable to remove and clear the ground round the trees in their growth. In the first place, this destroys the weeds which take the nourishment away from the trees: secondly, the ground is rendered more open to receive the slight showers and dews which moisten it, and to benefit by the influence of the air; the roots are thus considerably refreshed. The dew falling on ground which has been recently moved, penetrates at once into it, and does good to the plant; but if it falls on the weeds, the first rays of the sun absorb it, and deprive the tree of this source of refreshment. The dadap is to be taken care of whilst clearing goes on; it must be cropped so as to cause it to grow upright, and to throw as much shade as possible on the coffee without pressing upon it. In warm fertile ground, where the coffee plant grows rapidly, the trees should be topped in the third year; but this should be done sparingly, and as a general measure it is not to be recommended; it should be resorted to only as a means to prevent the too rapid growth of the tree, or its running up to a point. Topping and taking off suckers are both necessary on meagre soils, where the trees run much to wood; and it prevents the trees being injured in the picking season, which often occurs without this precaution. The top or middle stem is broken off at a height of six or seven feet, but care must be taken not to tear the tree; when the top shoots out again it must be cropped a second time, and it is seldom necessary to do this more than twice. The cropping causes the tree to shoot out in breadth, and to push forth a greater number of sprigs, and good strong ones.

Picking Coffee.—When the estate becomes productive, it must in the picking season, just before the work begins, be kept exceedingly clear of weeds, and be even swept clean with brooms, in order that the berries which fall off may be gathered up. The picking should take place under proper superintendence, the trees be picked row by row, and care taken that each berry is plucked off separately, and not a heap together, by which the trees are torn and the first off-shoots prevented. In picking high trees, light ladders

should be used, made out of two or three bamboos tied together.

Customary preparation of the berry in the pulp.—When the coffee is picked and brought into the village, it is piled up in a heap in the open air, and left in that manner for twenty-four hours. Thus heaped up it gets warm, and this creates a certain fermentation of the juice which is in the berry. That fermentation promotes the drying and loosens the silvery pellicle which is attached to the bean inside the parchment, and which cannot be entirely got rid of in any other way. Coffee which still retains that pellicle is called in trade "grey coffee," and is lower priced than good clean sorts. After the fermentation, the coffee is spread out in rather thick layers, and turned over twice a day. If it rains during this first spreading out, the coffee does not require to be sheltered, as the washing causes the juicy substance to evaporate, and this accelerates the drying afterwards. In proportion as the coffee becomes dryer, the thickness of the layer must be reduced, and the turning over must be more frequent till the coffee is quite dry outside and the pulp has become hard. Then the coffee is laid out on drying floors, which can be easily and speedily covered in rainy or damp weather, and is dried by the powerful heat of the sun. This system of drying in the pulp requires six weeks or two months, as it is advisable not to be over hasty with drying. When the coffee is entirely dry, it is either at once pounded or placed in the stores to await that operation. In order to know if the coffee be sufficiently dry, take a handful of it and shut your hand close; shake it to your ear, and listen if the beans rattle freely in the pulp. Or try them by biting the berry, and see if the bean and pulp are both brittle and crisp, which shows that the fruit is dry enough.

Preparation of the coffee in the parchment, or the West India system.—Only sound and fully ripe beans can be prepared in the West India manner. In picking, therefore, all unripe, green, or unsound beans must be taken away to dry in the pulp. As soon as the coffee is brought in, it must be pulped. This operation is performed by means of small peeling mills. These mills consist of two horizontal wooden cylinders rubbing on a plank; they are covered with hoop-iron, and set in motion by a water-wheel. The coffee is driven under the cylinder, and kept constantly moist; by being turned through the mill, the pulp is so bruised that the bean in the parchment falls from it into the bamboo open frame, which is placed in front of the mill. The coffee is then pressed with the hand, and falls through the frame into a basket. The pulp, and beans not rid of the pulp, remain on the frame; the first is cleared away, the rest passes a second time into the mill, and this operation is continued till all the coffee is stripped of the pulp, and the parchment beans are in the basket. When the parchment coffee is thus separated from the outer skin, it is thrown into the washing troughs, and remains there for twenty-four hours; this drains from it the slimy substance adhering to it. After being thus steeped, it is washed with pure water two or three times in the basket, so that it becomes quite free from slimy matter. The parchment coffee is then spread out on drying frames, and exposed for six or eight days to the heat of the sun, till the outside is perfectly dry. To do this equally it must be stirred about every hour. These frames, which serve also to dry the coffee in the pulp, are made as follows:—A bamboo roof is set up, resting on four wooden pillars, and sloping considerably; it is covered closely with reeds; its length is ten feet, its breadth six feet; the pillars are from nine to ten feet high; a wooden framework is attached to this, about thirty feet long, or three times the length of the space covered by the roof. On this frame are brought out three platforms, one above the other, which are pushed out by means of little rollers, under them; they are ten feet long by six broad, and six inches deep. The borders are of wood, and the bottom of platted bamboo. In rainy weather, or when the drying cannot go on, the three platforms are pushed under the covered space. These drying places are set up near the overseer's dwelling, where they stand free, and are not shaded by trees or buildings. After this first drying on platforms, the parchment coffee is again dried inside the house, and bamboo huts are for this purpose erected on each side of the outhouse of the planters. These huts have trays, divided into two or three compartments, one above the other, to keep the coffee separate, according to the time of its having been picked. The parchment coffee is spread out as thin as possible, and turned over with a small wooden rake every hour. In proportion to the dryness of the weather, from one to two months are required to dry the coffee fully. In drying inside the houses, the greatest care must be taken to prevent heating the coffee; this is the great object of the West Indian system, as such heating is very prejudicial. On this account the huts in which the platforms are placed must be very airy, so that the wind may have good play among the trays, on which the coffee must be thinly spread and frequently turned.

Pounding.—Coffee in the pulp, as well as that in the parchment, must, before being pounded, be exposed for some hours to the sun to make it crisp and hard; but it must be allowed to cool again before the pounding begins, or the beans will be liable to be broken. The pounding is done in small baskets of a conical form, two feet high, at the top eighteen inches in diameter, and at the bottom one foot. These baskets are, up to one-third of their height, thickly woven round with coir and fastened on the ground between four thick bamboo poles, and with the bottom

half an inch in the ground itself. The coffee is pounded by small quantities at a time with light wooden pestles; the baskets must not be more than half full. When the coffee is sufficiently pounded, the basket is lifted from between the poles and the beans are thrown into sieves, on which it is cleaned from skin, and white, black, or broken beans. According to the West Indian system, the coffee must now be instantly put in bags, to preserve its greenish colour, which is very peculiar. If the green coffee is not instantly sent to the packing stores to be bagged, it must be put up in a very dry place, and be turned over once every day, to prevent heating, which damps and discolors the berry.

Celebes.—Coffee is grown to some extent in Celebes—the average crop being from 10,000 to 12,000 piculs of 133 English pounds. The production has rather fallen off than increased during the last few years. The whole of the coffee grown must be delivered by the inhabitants to the government exclusively, at twelve copper florins per picul. It is much prized in the Netherlands, and maintains a higher price in the market than the best Java coffee. As the treatment of the product in Java differs wholly from that which is in vogue in Celebes, and this, in our eyes, is much inferior, I know not whether the higher price is ascribable to the name, or to an intrinsic superiority in quality. It is certain that this cultivation is susceptible of much improvement, and might be advanced to a much higher condition. From tables given by M. Spreeuwenberg ("Journal of the Indian Archipelago," vol. ii. p. 829) of the quantity of coffee delivered from each district of this island, for the years 1838 to 1842, it appears that the average annual delivery of coffee was 1,288,118 lbs. Of the production of Sumatra I have no details, but a very fair proportion is grown there—about five million pounds. *Aden*, alias *Mocha* coffee, is, along with the other coffees of the Red Sea, sent first to Bombay by Arab ships, where it is "garbelled," or picked, previously to its being exported to England. An excellent sample of coffee, apparently of the Barbera (Abyssinia) variety, was contributed to the Great Exhibition from Norfolk Island. It was of good color, well adapted for roasting, and a most desirable novelty from that quarter. Dr. Gardner, of Ceylon, has taken out a patent for preparing the coffee leaf in a manner to afford a beverage like tea, that is, by infusion, "forming an agreeable refreshing and nutritive article of diet." An infusion of the coffee-leaf has long been an article of universal consumption amongst the natives of parts of Sumatra; wherever the coffee is grown, the leaf has become one of the necessaries of life, which the natives regard as indispensable. The coffee-plant, in a congenial soil and climate, exhibits great luxuriance in its foliage, throwing out abundance of suckers and lateral stems, especially when from any cause the main stem is thrown out of the perpendicular, to which it is very liable from its great superincumbent weight compared with the hold of its root in the ground. The native planters, availing themselves of this propensity, often give this plant a considerable inclination, not only to increase the foliage, but to obtain new fruit-bearing stems, when the old ones become unproductive. It is also found desirable to limit the height of the plant by lopping off the top to increase the produce, and facilitate the collecting it, and fresh sprouts in abundance are the certain consequence. There are so many causes of the development of a vegetation which becomes injurious to the quantity of the fruit or berry unless removed; and when the superabundant foliage can be converted into an article of consumption, as hitherto the case in Sumatra, the culture must become the more profitable; and it is clearly the interest of the planters of Ceylon to respond to the call of Dr. Gardner, and by supplying the leaf on reasonable terms, to assist in creating a demand for an article they have in abundance, and which for the want of that demand is of no value to them. It ought to be mentioned also, that the leaves which become ripe and yellow on the tree and fall off in the course of nature, contain the largest portion of extract, and make the richest infusion; and I have no doubt, should the coffee leaf ever come into general use, the ripe leaf will be collected with as much care as the ripe fruit. The mode of the preparation by the natives is this, The ends of the branches and suckers, with the leaves on, are taken from the tree and broken into lengths of from twelve to eighteen inches. These are arranged in the split of a stick or small bamboo, side by side, forming a truss in such a manner, that the leaves all appear on one side, and the stalk on the other, the object of which is to secure equal roasting, the stalks being thus exposed to the fire together, and the leaves together. The slit being tied up in two or three places, and a part of the stick or bamboo left as a handle, the truss is held over a fire without smoke, and kept moving about, so as to roast the whole equally, without burning, on the success of which operation the quality and flavor of the article must depend. When successfully roasted the raw vegetable taste is entirely dissipated, which is not the case if insufficiently done. When singed or overdone, the extract is destroyed and the aroma lost. When the fire is smoky, the flavor varies with the nature of the smoke. The stalks are roasted equally with the leaves, and are said to add fully as much to the strength of the infusion. By roasting, the whole becomes brittle, and is reduced to a coarse powder by rubbing between the hands. In this state it is ready for use, and the general mode of preparing the beverage is by infusion, as in the case of com-

mon tea. That it would soon become a most valuable article of diet amongst the laboring classes, and on ship-board particularly, if once brought into use, there can be no doubt. The coffee-tree can be grown to advantage for the leaf in the lowlands of every tropical country, where the soil is sufficiently fertile, whilst it requires a different soil and climate to produce the fruit. (Correspondent of the Singapore *Free Press*, December, 1852.) Dr. Hooker, in the Jury Reports, observes upon the prepared coffee leaves, submitted by Dr. Gardner, of Ceylon, to be used as tea leaves, that they are worthy of notice as affording a really palatable drink when infused as tea is; more so, perhaps, than coffee is to the uninitiated. That this preparation contains a considerable amount of the nutritious principles of coffee is evident from the analysis; but as the leaves can only be collected in a good state at the expense of the coffee bush, it is doubtful whether the coffee produced by the berries be not, after all, the cheapest, as it certainly is the best.—*Simmonds' Comm. Products.* Coffee, originally an article of Eastern growth alone, became a product of considerable importance and value to England in her West India Islands, where, and in Java, the bulk of the then Coffee produce of the world was raised. The Dutch, at all times anxious to encourage agricultural and commercial progress in their Colonial possessions, though not always adopting the most enlightened mode of effecting the object, shewed not a little anxiety to foster, by every means in their power, the growth of this favorite berry. The Dutch Governors of Ceylon had, from their earliest possession of that fertile island, endeavoured to foster the production of coffee amongst the Singhalese villagers, by offering to take the berry from them at certain fixed rates, in payment of tithes and taxes. In spite of the constant endeavours to promote this cultivation, the Dutch Governors do not appear to have met with much success: for on the capture of Colombo by the British at the end of the last century, the total produce of the island amounted to not more than a few thousand bags. In a paper drawn up by an ex-official of the local Dutch Government, for the information of Sir Alexander Johnstone, we learn that the coffee of Ceylon was considered superior to that of Java or Bourbon, and approached more nearly to that of Mocha, whence the first plants were brought. It was matter of complaint that the Singhalese did not attend to its culture, but contented themselves with picking up the fruit as it fell from the trees in their wild state, which consequently produced but half the quantity of those in other places. The same "Memoir" states that Ceylon did not yield more than 25,000 pounds weight of coffee, though it was deemed capable of producing ten times that quantity under the supervision of experienced hands. We have lived to see it export in one year 5,000,000 cwts. Between the years 1830 and 1835, the coffee produce of the West India Colonies had fallen below the annual consumption of Great Britain, and in the latter year it was actually seven millions of pounds short of the quantity required. Necessity then compelled the Home Legislature to do an act of bare justice to British territories in the east, as a rate of import duty similar to that levied on the article from the West Indies, viz., six pence a pound, in place of nine pence, which it had previously been subject to, and which foreign coffee still had to pay on importation into Great Britain. The capabilities of Ceylon as a coffee producing country attracted the attention of the then Governor, Sir Edward Barnes, who was soon followed in his experiments by a few enterprising civilians and merchants. In 1837 several plantations were formed, which in a year or two gave indisputable signs of success. Prices rose at home, in consequence of consumption outstripping production, and when in 1842 an additional penny protection in the import duty was accorded British Colonial coffee over foreign, Ceylon rose rapidly into importance. The rush to the jungles of Ceylon at that time was, on a reduced scale, what the rush to the Diggings was in 1851. The following list of Crown Lands sold for the purpose of coffee planting at that period will bear witness to the eagerness with which capitalists and speculators entered this new field of Colonial industry:—

In	1837	the Government sold	3,661 Acres.
,,	1838	.....	10,401 ,,
,,	1839	....	9,570 ,,
,,	1840	....	42,841 ,,
,,	1841	....	78,685 ,,
,,	1842	....	48,533 ,,
,,	1843	....	58,336 ,,
,,	1844	....	20,415 ,,
,,	1845	....	19,062 ,,

The disasters of the years 1847 and 1848 are still fresh in the recollection of our readers. Ceylon planters felt the shock, and for a time were unable to stand the effects of low prices and ruined credit. During the coffee panic a few men of experience, having both capital and confidence, became the purchasers of estates at almost nominal figures. Plantations in full bearing—though overgrown with low jungle, were sold for less than the original cost of the land, many of them too with extensive works upon them erected at a heavy outlay. Two estates in Badulla, of 350 acres of three-years-old coffee, and which had cost £10,000, were sold for £350. Another plantation in the Dolosbagie district of 100 acres was sold for £105; having cost the proprietor £4,000. The Hindogalla estate had cost £15,000, but in 1849 realised only £500. The following statement shews the gradual but marked effect, first of want of cultivation, and

afterwards of care and skill in the management of the Ceylon estates. Coffee shipped from Ceylon during the following seasons:—

1848-49	Plantation Coffee.....	210,633
	Native ditto.....	121,215
		331,848
1849-50	Plantation Coffee.....	230,866
	Native ditto.....	99,071
		329,937
1850-51	Plantation Coffee.....	197,636
	Native ditto.....	90,274
		287,910
1851-52	Plantation Coffee.....	155,386
	Native ditto.....	152,621
		308,007
1852-53	Plantation Coffee.....	208,658
	Native ditto.....	115,451
		324,109

From this period the production of this island has continued to progress steadily, until in last year, the crop amounted to Cwts. 500,000, the chief increase being in the yield of plantation crops, arising partly from the formation of new estates, but principally the effect of skilful cultivation and the liberal application of manures. The author of "Coffee planting in Ceylon" tells us in regard to manuring on Coffee estates that "there are many difficulties to surmount in this "operation, owing to the localities of coffee plantations, though there can be no doubt that as "facilities are discovered in practice, the returns "obtained from plantations will richly repay all "this by a high standard of bearing, to which "we have been hitherto strangers. Cattle "manuring is the most generally available; the "cattle being stall-fed on guinea grass, planted "where the elevation of the plantation will permit it, or on Mauritius grass, which is planted "in the ravines amongst the coffee; thus at the "same time yielding a profit, and keeping weeds "out of places where they are apt to grow. "Pigs are also kept, and the pulps of the coffee "are added to the fertilizing mass; indeed, "rotting wood, weeds, burned Dolomite, and "anything which will produce ammonia, is now "taken care of on the estate. The economical "application of the enriching compost requires "it to be carried out by hand, and each laborer is "made to take out a basket as he goes to his "work, which a few men are employed afterwards, with mamoties, or forks, in burying "around the roots of the trees. The whole of "an estate has only in one instance within our "knowledge been manured at one time, and it is "seldom required. In a few years we expect to "see manuring so systematically managed, that "every part of the plantation will be brought "under its operation every second or third year, "and on this we base our expectation of a continued and increasing production from the estates already formed, far exceeding any returns we have hitherto seen. The estate which "was wholly manured, without limit as to expense, has amply returned the outlay by a "production of about 20 cwt. to the acre; lime, "cattle manure, and mould from the neighbouring forest, were used in a compost, and the "soil turned up every where round the plants "to apply it." Page 52. Amongst the many improvements introduced into Ceylon cultivation during the last few years, may be mentioned a magnificent set of water-works, erected by the late Mr. Morton, and his partner Mr. Tytler in the Vale of Doombera, for irrigating the Rajawella estate from the Mahavilla Ganga. The plantation to be thus watered contains about seven hundred acres of coffee: the land is fertile in the extreme, but subject to frequent severe droughts, which by means of this mechanical contrivance will no longer be feared. The works are completed, and were tried a short time since with perfect success: and there is no doubt but that the outlay will soon be amply repaid in heavier crops. At the present moment there are at least thirty establishments in Colombo for the preparation and shipment of coffee, the greater portion of which goes home in casks. The number of persons thus employed, from the reception of the berry from the estate in the damp "parchment skin," to the final shipment of the cured bean, cannot be fewer than twenty thousand, of whom by far the larger number are women. Such then has been the career of Ceylon in the production of coffee. The Dutch, whilst accomplishing so little in this island, where so much has since been done, met with more success in Java, which to this day is one of the principal coffee-producing countries of the east. The cultivation of the plant was commenced in January 1728 by the Governor-General of Batavia, who spared no pains to induce the inhabitants of the rural districts to propagate the berry and prepare it for market. By dint of a lavish outlay in the first instance, and afterwards by means of immunities and premiums, aided by climate and soil admirably adapted to the culture, the Dutch Government succeeded in their object, and rendered the export of coffee from Java a most valuable branch of the local trade. From the early period we have indicated to the end of the last century, the progress made was not nearly so rapid as during the last thirty years, when the produce of this island has reached nearly a million hundredweights. M. Munnick, the Inspector General of Agriculture in Batavia, in a paper on the subject, states that coffee was produced in twenty differ-

ent departments of the island, giving occupation to nearly half a million of persons, and that there were ten years ago 350 millions of trees in the island. The soil and localities selected for coffee cultivation in Java appear to be precisely those chosen in Ceylon: fine loamy forest land situated on the slopes of mountain ranges, at an altitude ranging between one and four thousand feet. The modes of culture followed in the islands differ very materially. Whilst in Ceylon nothing in the first instance is needed beyond felling and burning the forest trees, and planting the young coffee seedlings at regular intervals in spacious holes between the huge stumps left to rot in the ground;—in Java, after the ground has been thoroughly cleared from jungle and weeds, the whole has to be ploughed three or four times, and eventually rolled or raked smooth previous to being planted. Shade, which has been for many years quite abandoned on coffee plantations in Ceylon, is stoutly maintained in Java; the same care in the after cleansing of the planted land is observed in both islands. But whilst the Ceylon planters have availed themselves of every possible improvement in the cropping and growing of their coffee, by the use of valuable machinery and carefully arranged stores, the Javanese grower is content with the rude contrivances which satisfied his ancestors in 1723. Coffee is produced in Sumatra and Celebes, the former exporting about 50,000 cwts. and the latter about 15,000 cwts. annually. The produce of Celebes is very highly esteemed in Holland, where it commands a better price than the finest Java sorts; this too in spite of the rudest culture, and a mode of preparation of the berry far more primitive than that adopted in Batavia. The entire quantity, which appears to have remained stationary for some years past, is taken by the Government from those who grow it at certain fixed rates, and by them shipped to Europe. A small production of this berry takes place on the elevated lands of the eastern coast of Siam, amounting until recently to not more than a thousand cwts. yearly. The quality has been approved in the English and some of the continental markets, where it is thought to approach more nearly than any other description to the Mocha berry, in appearance and flavor. The cultivation of the Siamese plant is being gradually extended, and now that the rulers of that country are pursuing a liberal and enlightened policy, in regard to internal industry and improvement, and external trade, it is not too much to expect a considerable increase in this article of its produce. Penang supplies a small quantity of rather inferior coffee to the markets of the world, but there is no reason to doubt its capability of furnishing a much larger quantity of a good article, if sufficient attention were bestowed upon the cultivation. The islands of Bourbon and Mauritius furnish a considerable quantity yearly, especially the former; the bulk of its crop being shipped to France, where, however, it is being rapidly supplanted by the produce of Costa Rica and Ceylon. Of the coffee culture of the Tenasserim provinces we are without any reliable data. Mysore has for a long period furnished an article which has gradually grown into public favor in England at a medium value. The coffee of Travancore sells in the London market at about the rate of ordinary Ceylon plantation kinds, but the produce of the Neilgherries bids fair to rival some of the better qualities of that coffee. It is now about twelve years since the slopes of the Neilgherries first attracted attention as suitable for the growth of coffee. The altitude, the soil and the climate were highly reported upon by such of the Ceylon planters as visited the early clearings about ten years since. Labor is most abundant and cheap, and the land, although not to be bought, is obtainable for long tenures on very favorable terms. Some of the sites selected turned out unfortunate, as might have been expected, in the first instance; but experience has now enabled the planters to proceed with far greater certainty, and the result of late gatherings shews that success is all but complete. Here, as in Ceylon, the planters have the choice of a great variety of altitudes and aspects, so that if a due supply of moisture at the periods of blossoming and ripening can only be secured, they have little to fear. Transport of crops from the estates to the sea-board has been a source of some difficulty, but even this is gradually disappearing, and at the present moment we are assured the planters of this part of the Peninsula can place their produce on board ship at a less cost than can be done in Ceylon, where the transport of coffee from the Central Province plantations to Colombo averages a higher rate per cwt. than the freight to London or Liverpool. In Lower Bengal the cultivation of the coffee plant has within the last few years made some progress, and contrary to the expectation of very many who were entitled to speak on the subject, it has proceeded with highly satisfactory results. In all the coffee-producing countries of the east, and in most of those in the west, the berry is produced on land more or less elevated, at an altitude rarely less than one thousand feet, the average being certainly two thousand feet above the sea-level. There is a little coffee produced in one district of Ceylon where the altitude does not exceed nine hundred feet, but this is a very rare exception to the general rule. The two localities in Bengal which have thus far proved favorable to this cultivation, are not more than two hundred feet above the level of the sea: the one at a distance of about two hundred miles to the north west of Calcutta, the other scarcely more than eighty miles from the capital in an easterly direction. This latter, planted under the eye of a gentleman practically acquainted with the Ceylon and West India

modes of culture, consists of a fine vegetable mould, on which trees of large growth have been found, together with a rich vegetation of jungle plants. The system pursued has been that of the Ceylon planters, with one or two trifling modifications. The estate, which is of about one hundred and twenty planted acres in extent, contains some thirty or forty acres of plants now in their third year, wearing a most luxuriant appearance, and bearing what promises to be a heavy crop. These plants gave a small first picking in their second year, a result of which we have never heard a parallel. The berry attains a medium size, short but well-grown, with a good proportion of pea-berry. A few sample bags were shipped during last season, and being favorably reported upon, realized fifty-four shillings in Mincing Lane. The proprietor estimates that he can place his crop on board ship at Calcutta, not costing him more than six shillings per cwt.; but this must of course depend mainly on the average extent of future crops, to pronounce an opinion on which would, we think, be rather premature at the present time. It is true the plantation is well situated for irrigation, being close to the banks of a fine river, which advantage may in a great measure compensate for occasional insufficiency of rain at critical periods; but it remains to be seen if the forcing nature of the climate of Bengal will enable the coffee plant to yield full crops during a succession of years. At any rate the prospects are most encouraging for the proprietors, who can well afford to have a certain proportion of light coffee, whilst the efficacy of manure added to irrigation has yet to be tested in this locality. The plantation formed in the Hazarebaugh district, at a greater distance from Calcutta, promises equally well as regards quality. The distance to be traversed with the crop is greater, but it is within reach of the railway, and in a district where labor is at once easily obtained and cheap: it is situated at a somewhat greater elevation than the first-named estate, and the berry gives promise of a bolder sample. It is now in its second year, and giving a maiden crop. Whether other localities in British India may be found more suitable for the growth of coffee, and at not too great a distance from a port of shipment, has yet to be seen. There is land enough and labor enough in many directions; it has but to be seen if India can produce coffee with more advantage than other commercial staples. Without a doubt there are abundant means of remunerative employment for all her people and all her land, if justice be done to the country by greater security being afforded to capital, and if more ready means of communication be found between the plains of the South and the Delta of the North-west. It may interest many of our readers to learn the present actual yield of the coffee-producing countries of the world, and on referring to the statement below, to remember that at the close of the last century, the only varieties known in the London market were those from Jamaica, Grenada and Mocha, the consumption of the United Kingdom being at that time, about one million of pounds annually. On the continent of Europe at the same period, the varieties from Mocha, Brazil, Bourbon, and Netherlands India, were alone used. The following is about the present production of coffee throughout the world:—

IN THE WEST.

Brazils,	300	millions of lbs.
La Guayra and Porto Cabello,	30	„
St. Domingo,	32	„
Cuba and Porto Rico,	25	„
Costa Rica,	10	„
British West Indies,	6	„
French and Dutch ditto.	6	„
		409

IN THE EAST.

Java,	140	millions of lbs
Ceylon	56	„
Indian Peninsula,	6	„
Sumatra,	5	„
Arabia,	3	„
Philippine Islands,	3	„
Celebes and Siam	2	„
		215
Millions of lbs.		624

The present consumption of the world, excepting of course the countries of production, is stated to be as follows:—

	Millions of lbs.
United States and British America,	170
Holland and Belgium,	125
German Customs Union,	95
Other German States,	46
France,	33
Great Britain,	32
Sweden and Denmark,	20
Mediterranean Countries,	20
Spain and Portugal,	15
Switzerland	13
Russia	12
Australia and Cape of Good Hope,	6
	587

Cal. Rev. 1857, *p.* 107.

Dekhan. In gardens of the Deccan, this plant seldom exceeds nine or ten feet in height, plants are easily raised from fresh seed in a nursery bed where they may remain until they are one or two feet high, when they should be carefully removed to the situation where they are to remain for good, and placed at about twelve feet apart, they will thrive well in almost any good light soil; but require a certain amount of protection from the sun, the most favourable situation for a plantation is the side of a hill exposed to the east, as the plants suffer much from hot winds, the shade of plaintain trees offers a good protection to them. In the neighbourhood of Aurungabad, there are some coffee trees which have borne fruit in abundance in a garden enclosed on all sides, and which even in dry weather is moist from being shaded.

by a number of high cocoanut and sooparie trees and the whole further protected by surrounding buildings, from the dry winds during the greater part of the year.—*Riddell.*

Tenasserim. Coffee not inferior to the best from Mocha, has been raised at Tavoy, but the plants do not flourish after the fourth or fifth year.—*Mason.*

Madras. At the Madras Exhibition of 1855, many good samples of coffee were exhibited from various districts, and some of very superior quality from the virgin forest land of the Western ghauts —the cultivation of this plant is now extending greatly, and becoming of much importance. It has been pursued with great success by private individuals. Mr. Green of Munzeerabad exhibited a beautiful series of very fine and well picked coffees, including the pearl or pea berry, but the aroma was defective, as the samples had absorbed an effluvia from the oily wood of the boxes in which they were enclosed. The jury awarded a second class Medal. Mr. Cannan's coffee from Annoor in Mysore, Mr. Ouchterlony's from the Western slopes of the Neilgherry range below Naidoobettah, and Mr. Fischer's of the Shevaroy Hills in Salem district, were all of the best quality, and in the best condition. Mr. Fischer's sample tho' deficient in colour, was exceedingly carefully cured and prepared, and the beans being close and well formed, it was deemed worthy of honorable mention. Mr. Ouchterlony's sample was also very carefully prepared, and well cured; the bean is large, and remarkably well shaped, in this respect and in color this sample surpasses Mr. Fischer's. Mr. Cannan's coffee, however, excelled both in color and aroma, being in these respects unexceptionable; the bean is large, but more irregular in shape and size, than either of the other two. These two last were considered the best and worthy of second class Medals.—*M. E. J. R.*

Assam.—Mr. Bonynge spent fourteen years in the East, and describes a variety of coffee acclimated in a region so high above the ocean, that the tree bears well in a climate subject to pretty severe frosts —*Bonynge America, p.* 55.

Adulteration of Coffee.—The effects of this may be briefly summed up as follows: 1st. While in Britain, the consumption of all other articles, during the past few years has progressively increased with the increase of the population, coffee, during that period, has remained comparatively stationary, although, as is well known, the use of an article, under the name of coffee, is now much greater than formerly, especially amongst the members of the different temperance and total abstinence societies. 2nd. It has been ascertained that a much larger quantity of a substance called coffee is annually sold than passes through the custom-houses. 3rd. Chicory is cultivated in large quantities, in various parts of Britain, and as little chicory is retailed to the public under its own name, the inference is, that it is employed, and annually consumed, in the adulteration of coffee. The chief articles although many others are occasionally employed with which coffee is adulterated are, chicory, different kinds of corn as wheat, rye, and barley, potato, and beans. But to be employed, it is necessary that these substances, like the coffee-berry itself, should be roasted —that is that they should be partially charred, and so far reduced to the condition of charcoal, or carbon. We will now describe sufficient of the structure of each of these substances as will be necessary to enable us to detect the adulteration of coffee with any one or more of the above substances.

Structure of the Coffee-Berry.—Two parts are to be discriminated in the coffee-berry—the substance of the berry and the testa, or investment, by which it is surrounded. The berry, previous to roasting and even after it has been soaked for a long time in water, is hard and tough, in which respect it differs from all those substances which enter into the adulteration of coffee and which become softened by immersion in cold water, the hardness is even retained subsequently to the charring and is so great, that by this character alone the fragments of the ground and roasted coffee-berry may be readily distinguished from those of chicory. It consists of an assemblage of vesicles or cells of an angular form, which adhere, so firmly together that they break up into pieces rather than separate into distinct and perfect cells. The cavities of the cells include, in the form of little drops a considerable quantity of aromatic volatile oil, on the presence of which the fragrance and many of the active principles of the berry mainly depend. *The testa*, or investing membrane, presents a structure very distinct from that of the substance of the berry itself, and when once seen it cannot be confounded with any other tissue which has yet been observed entering into the adulteration of coffee. It is made up principally of elongated and adherent cells, forming a single layer and having oblique markings upon their surfaces; these cells rest upon another thin membrane which presents an indistinct fibrous structure.

Structure of Chicory Root.—Chicory is the root of the Cichorum intybus, a plant belonging to the natural order Cichoraceæ, which includes the Dandelion; and, as might be supposed, from the very dissimilar characters of roots and seeds, it differs very greatly in structure from the coffee-berry. In it also two parts require to be discriminated—cells and vessels. The chief bulk of the root is made up of little utricles or cells which are generally of an elongated form, but sometimes rounded and which unlike the cells of the coffee-berry separate from each other with great readiness and present appearances which when once observed cannot be mistaken. The

cells do not, like those of coffee, contain globules of essential oil, a fact of much importance. Running through the centre of the root in a longitudinal direction are bundles of vessels varying greatly in size, but all of the dotted or interrupted spiral kind. Now there is nothing analogous to these beautiful structures in the coffee-berry, or in the majority of the substances ordinarily employed in the adulteration of that article. Chicory, owing to the absence of essential oil, unlike coffee, readily imbibes water, and when immersed in that fluid it quickly becomes soft in which respect also it differs from the roasted coffee-berry.

Structure of the Farina of the Gramineæ.—Each grain of the different species of corn deprived of its investing tunics or husks consists of a network of cells the substance of which has been denominated cellulose and in each of which a variable number of starch granules is included. These starch granules differ in character in different plants, and this frequently even in species belonging to the same natural family, so that by their means it is often easy to name the particular species to which any given granule belongs. In the majority of the corn tribe, the granules are flattened and rounded discs, of moderate size, obscurely marked with concentric lines or rings; the starch granules of many species also possess other perfectly distinctive markings, and characters, of which in this place, it is not necessary to give a detailed description, as in a future report the starch of wheat, rye, oats, &c., will be fully described and accurately represented.

Structure of the Farina of the Leguminosæ.—The different species of beans and peas deprived of the seed-covering, possess a structure analogous to the grain of corn decorticated: that is each pea or bean consists of a reticulation of cells, the cavities of which are occupied with numerous starch granules. The cells differ, however, from those of the seeds of the Gramineæ in their stronger and stouter character, and particularly in the thickness of their parietes. The granules in the pea, bean and many other species of this tribe, are large, oval, sometimes reniform, and the central cavity is usually of an elongated shape, presenting the appearance of a furrow under the microscope. These also will be figured and further described at a future stage.

Structure of the Farina of the Potato.—Pure potato flour is seldom used in the adulteration of coffee, it being too expensive and otherwise not well adapted for the purpose: it is usually the whole potato which is employed and which is probably first boiled and then roasted. The general structure of the potato resembles, to some extent, that of the corn, pea, and bean already cursorily described. In the unboiled state the cells form a coherent reticulation, but after boiling, they readily separate from each other, and thus show that each is really a distinct and independent structure. The cells after boiling present a somewhat fibrous appearance, and are, of course, much larger than the starch granules, many of which are contained in each cell. The granules themselves, as seen in pure potato flour, are large, ovate, and beautifully marked with concentric rings, but in the boiled potato, they lose much of their form and beauty, and become, for the most part, mis-shappen and collapsed. The very different effects of the action of water on ground coffee and chicory afford, then, one useful and practical means of discriminating between genuine coffee and that adulterated with chicory. The natural colour thus produced does not, however, satisfy the trade, and a material is very extensively employed to heighten the tint and thus to hide the nature of the adulterations practised: this is called "the coffee-colorer." The specimens of this article which we have examined have consisted of burnt sugar, the great coloring properties of which are well known. From an examination of samples of the substances sold in London as coffee it appears,

1. That of thirty-four coffees, thirty-one were adulterated.

2. That chicory was present in thirty-one of the samples.

3. Roasted corn in twelve.

4. Beans and potato flower, each in one sample.

5. That in sixteen cases the adulteration consisted of chicory only.

6. That in the remaining fifteen samples, the adulteration consisted of chicory, and either roasted corn, beans, or potatoes.

7. That in many instances the quantity of coffee present was very small, while in others, it formed not more than one-fifth, fourth, third, half and so on, of the whole article. Chicory root is no substitute for coffee, as it completely wants the peculiar fragrance, and the invaluable stimulant qualities of that berry. The adulterations by means of roasted corn, beans, potato, and coffee-colorer, are altogether indefensible, since the only thing in common between these and coffee is the colour which they yield on infusion or decoction. Some years since roasted corn, principally rye, was largely sold and employed to make a beverage which by a fiction was dignified by the name of coffee: the chief argument, independent of price, urged in favor of it, was its supposed nutritive properties. When it is recollected that the starch of roasted corn is nearly all reduced to the condition of charcoal, it will at once be perceived that its nutritive qualities cannot be very great, and that a single mouthful of wholesome bread contains more nourishment than a dozen cups of beverage made from roasted corn. Although "roasted corn" is now no longer sold openly, yet, the grocer has not failed to avail himself of it for his own benefit, but to the great disadvantage of the public. The adulteration of

coffee by substances so cheap and, for the purpose to which they are applied, so worthless as this, is a gross fraud, requiring emphatic condemnation and when ascertained to be practised, meriting exposure and punishment. Thus every person in England who is desirous to have good coffee should never buy ground coffee, except of tradesmen of unquestionable integrity, but should procure the roasted berry. In chosing this, care should be taken to notice that it be not too dark, for if so, it has been too much roasted and some of its active properties have been injured or destroyed. It should be ground to rather a fine powder, as this, by setting free the essential oil contained in the cells, allows more readily of the action of water upon it. Immediately on being reduced to powder it should be placed in a tin canister. Lastly, an infusion and not a decoction of the berry should be made, as, during the process of boiling, the active principles, and especially the delicate aroma, are in part dissipated. By attending to these directions, not only will good coffee be obtained but " a heavy blow and great discouragement" inflicted on the adulterators of coffee. Above all, the coffee-drinker should never buy the coffee contained in canisters, for he may be assured that it is even more adulterated than other coffee, as it is necessary not only that the purchaser pay for the coffee, but also for the canister itself.—*Hassal, Food and its adulterations, page* 3.

(2770) COFFEE-TREE WOOD, (COFFEA ARABICA). The wood is of a light greenish-brown or dusky-yellow, with a bark externally resembling box-wood, but thicker and darker. The specimen I have is nearly as close-grained and hard as box-wood : it has no smell, and but little taste. The tree does not grow more than a few feet high, and it is cut down in the plantations to five or six feet and is not therefore useful in manufactures. The tree called Kentucky coffee-tree, or hardy bonduc, is very different from the common coffee, it forms a large tree called Gymnocladus canadensis. The wood is compact, of a rosy hue, and used by cabinet makers.—*Tredgold.*

(2771) COHUNE OIL, a product of the kernel of the " Attalea funifera," of Martius, a native palm tree of South America. It is something like the cocoanut, but is more oleaginous. Its introduction into Southern Asia merits attention.—*Seeman.*

(2772) COIR. Coir is one of the many products of the cocoa-nut palm Tree to which article, accordingly, we refer. Though in commerce, the Cocoanut is best known for the fibrous covering of its nuts which is so well known under the name of Coir, it also produces a downy fibre which is used to stop bleeding from wounds. This is altogether of a more delicate nature, and forms a kind of network, which is beautifully white, and even transparent, when young. It is thus seen at the bases of the young fronds ; but as these attain maturity, this natural matting becomes coarser, tough, and of a brownish colour. It may be stripped off the tree in large pieces, which are used both in India and Ceylon as strainers for palm wine or cocoa-nut oil, or for straining sago or arrow-root. Mr. Ellis describes it as " consisting of long and tough fibres which regularly diverge from both sides of the petiole of the leaf. Sometimes there appear to be two layers of fibres, which cross each other, and the whole is cemented with a still finer, fibrous and adhesive substance : the singular manner in which the fibres are attached to each other, causes this curious substance, woven in the loom of nature, to present to the eye a remarkable resemblance to cloth spun and woven by human ingenuity" (vol. i, p.53). This is very similar to the arrangement of the Ejoo fibre, but in which both coarse and fine fibre are intermixed. The husk or rind of the Cocoa is thick and full of fibres, which in their separated state are so will known by the names of Coir or Khair. In order to remove this husk, an iron spike, or sharp piece of hard wood, is fixed in the ground. The nut is then forced upon the point, which passes through the fibres, and thereby separates the rind from the shell. In this manner, Mr. Marshall says, a man can clear 1000 nuts daily. The husk, cut transversely, is frequently used for polishing furniture, scrubbing floors, and as a substitute for brushes and brooms. Mr. Robinson describes the method of making Coir in the Laccadives, as follows : " As the husk gets hard and woody if the fruit is allowed to become quite ripe, the proper time for cutting it is about the tenth month. If cut before this, the Coir is weak ; if later, it becomes coarse and hard, and more difficult to twist, and requires to be longer in the soaking pit, and thus becomes darker in colour. When cut, the husk is severed from the nut and thrown into soaking pits. These, in some of the islands, are merely holes in the sand, just within the influence of the salt water. Here they lie buried for a year, and are kept down by heaps of stones thrown over them to protect them from the ripple. In others, the soaking pits are fresh-water tanks behind the crest of coral. In these, the water not being changed becomes foul and dark coloured, which affects the colour of the Coir. When thoroughly soaked the fibrous parts are easily separated from the woody by beating. If taken out of the pits too early, it is difficult to free the Coir from impurities. If left in too long, the fibre is weakened, as is said to be the case also with that soaked in fresh water." These different modes are also practised in Ceylon. " At Calpentyra and the Akkara-pattoo, the natives separate the Coir by burying the husks along the border of the extensive salt-water lake, and when, after six months or more, they are dug out very clean, the fibres easily separate

from the cellular tissue of the husk. This mode of preparing the fibre prevents the offensive smell emanated by macerating the husk, so common along the road from Colombo to Matura" (Ondatjee). The Coir from the islands of Kadamat Kiltan, and Chetlat, in the Laccadives, is said to be of the best description. The manufacture into cordage of the Coir is entirely in the hands of the women of the Laccadives. When soaked sufficiently long, it is taken out of the pit and beaten with a heavy mallet. Subsequently, it is said to be rubbed with the hands until all the interstitial cellular substance is separated from the fibrous portion. "When quite clean it is arranged into a loose roving, preparatory to being twisted, which is done between the palms of the hands in a very ingenious way, so as to produce a yarn of two strands, at once. No mechanical aid, even of the rudest description, has yet found its way into these islands." (Robinson.) It is curious that in these islands, Coir is one of the chief commodities of barter for the necessaries of life, as rice, salt, tobacco, &c. The Coir is made up for their petty traffic in short *kale* of a mixed length and weight, and at the end of the year these are collected and made up into lengths, of 70 to 75 fathoms, as received by the Government. Mr. Robinson, in his 'Report on the Laccadives,' states that the difference in the quantity of Coir manufactured from a coast nut and from an island nut is very considerable. We may premise that forty Cocoa-nuts are said to yield 6 lb. of Coir in Ceylon, Mr. Robinson says: "Three large coast nuts will yield 1 lb. of Coir, measuring twenty-two fathoms: whereas, ten small, fine island nuts go to about 1 lb. of Coir—but this will measure thirty-five fathoms: 2 lb. of such yarn, measuring from 70 to 75 fathoms, are made up into sooties, of which there are fourteen to a bundle, averaging about a maund of 28 lb. A Mangalore candy of 560 lb. will thus be the produce of 5600 nuts, and should contain about 20,000 fathoms of yarn. The actual price of Coir received by the islanders, is about thirteen rupees per candy. The value of the Coir produce of a tree is calculated to be from two to two and a half annas; and that of the produce of one hundred trees, from fourteen to fifteen rupees. "The average value of the total raw produce of a tree bearing fruit, would then be seven annas to half a rupee; and that of a plot of one hundred trees, forty-five rupees." For the nuts which they export to the Malabar coast, they get from seven to ten rupees per thousand, or rather 1,100, as ten per cent. is always allowed for luck in these sales. The islanders export from 300,000 to 400,000 nuts annually. The natives bring their Coir to the coast, in March and April, which is then received into the Government godowns. Until the year 1820, all Coir was paid for at the rate of twenty-one rupees fourteen annas per Mangalore candy, or twenty-five rupees per Calicut candy of 640 lb. After that year, the Coir was divided into three classes. Since then, the average price paid for a Mangalore candy of Ameendevy and Kadamat Coir, has been twenty rupees and two annas (or twenty-three rupees per Calicut candy of 640 lb). But for the Kiltan and Chetlat Coir, which are the best, an average of twenty rupees twelve annas and seven pie, or twenty-three rupees twelve annas per Calicut candy, is paid. Up to A. D. 1825-26, the Bombay and Bengal Governments took almost the whole of the Coir brought from these Islands, and credited the Mangalore collectorate with twenty-five rupees per candy. The price has since fallen very much during the last twenty years. It has been frequently below the price paid to the islanders, and at best, has never yielded above twelve to twenty per cent. profit. The average imports of Coir have been from five hundred to six hundred candies. (Robinson.) Coir, besides its principal use as cordage, is much used in India in place of hair for stuffing mattresses, and is certainly preferable to those stuffed with ox-and cow-hair, which are still sent out to India. It is also employed for stuffing cushions for couches, and saddles. Dampier also mentions that the Spaniards in the South Seas make oakum to caulk their ships, from the husk of the Cocoa-nut, "which is more serviceable than that made of hemp; and they say it will never rot." He adds: "I have been told by Capt. Knox, who wrote the relation of Ceylon, that in some places of India they make a sort of coarse cloth of this husk of the Cocoa-nut, which is used for sails. I myself have seen coarse sail-cloth made of such a kind of substance." ('A Voyage round the World.') But this seems to be made from the fibrous substance found at the bottom of the leaves; for in Knox's 'Ceylon,' Suppl., p. 250, it is stated: "The filaments at the bottom of the stem may be manufactured into a coarse cloth called *gunny*, which is used for bags and similar purposes." From the details which we have given respecting the preparation, and other points connected with Coir, it is evidently a substance of considerable value; and though there is some difficulty both in separating and in twisting this fibre, it seems long to have been applied to useful purposes—as cordage for the boats and shipping of the East. Some of the boats even, in Ceylon and on the Coromandel coast, are composed of planks sown together with Coir yarn. So Sir J. Maundeville says in that island are ships without nails or bands, on account of the rocks of adamants (loadstones), &c." Though imported from the islands in the form of sinnet, it may be manufactured into cordage of any size and cables of various bulk. A quantity of hawsers and cables are now annually exported from Ceylon. The character of Coir

has long been established in the East, and is now well known in Europe as one of the best materials for cables, on account as well of its lightness as its elasticity combined with considerable strength. These are further valuable as being durable, and little affected even when wetted with salt water. Numerous instances have been related of ships furnished with cables of this light, buoyant, and elastic material, riding out a storm in security, while stronger-made, though less elastic ropes of other vessels have snapped in two, and even when chain cables have given way. Indeed, until chain cables were so largely introduced, most of the ships navigating the Indian seas were furnished with Coir cables. Mr. H. Dalrymple, Master-Attendant, &c., at Madras, states in one of his reports: "Cordage from good Coir is extensively used by vessels of all descriptions in India. In vessels of 600 tons it is commonly used for lower rigging. The yarns being tarred previous to its being laid up in Europe, are preferred for lanyards to the lower rigging." Though rough to handle, and not so neat-looking as hemp cordage for rigging, it is yet, when properly made sufficiently pliable, and being elastic, is well suited for running rigging where lightness is an advantage, as for the more lofty sails and sheets; but from its elasticity it is not considered so well adapted for standing rigging. Dr. Roxburgh, in his experiments, found that tan was not applicable, and it is sometimes stated that it is not capable of taking tar; but even in Dr. Roxburgh's time, tar had been successfully used in the Coir cables made at Calcutta. Mr. Hornby already mentioned, states, that he could make from the Cocoa-nut fibre (Coir), rope of every size up to a 14-inch cable; indeed that such has been made by the prisoners, and was then under trial by the Government Marine authorities. Some beautiful specimens of 8 inch rope were sent by Messrs. Harton, of Calcutta, to the Exhibition of 1851, in the form both of cold and of warm register rigging. The latter is well covered with tar. The comparative strength of Coir cordage is well known, but we may, nevertheless, mention, that in some experiments made by Dr. Wight, Coir cordage broke with 224 lb., when *Hibiscus cannabinus* bore only 190 lb., but the Moorva, 316 lb. It having been inferred, a few years ago, that instead of sending Russian Hemp and Europe-made cordage to Bombay, it would be practicable to make good cordage and cables there, as had long been the case at Calcutta. It was observed, in reply, that a good manufactory of Coir rope could no doubt be established there: as when a Mr. Rennie had his manufactory at Bancoot, several of the country ships used Coir for standing rigging. Also, that with good materials and machinery he manufactured cordage which superseded some of the imports from Europe; with the exception of buntlines and leechlines, which chafe against the sails, and for which, therefore, Coir will not answer. The largest ropes used there are for hawsers and for messengers: and of these, Coir hawsers are much employed in the port of Bombay. As it may be interesting to know the kinds of cordage chiefly employed in the East, as well as its weight and cost, we subjoin the following,

STATEMENT SHOWING THE COST OF EVERY DESCRIPTION OF COIR CORDAGE USED BY THE GOVERNMENT VESSELS, INCLUDING THE CHARGES FOR MANUFACTURE, ETC.

	No.	Ms.	Sr.		Co. Rs.	A.	P.
Coir Cable of 14 -inch,.....	1	44	15	at 6 1 11 per md.	271	9	1
Coir Hawser, 8 -inch,.....	1	16	25	"	101	11	10
" 7 -inch, ...	1	12	30	"	78	0	5
" 6 -inch,.....	1	9	20	"	58	2	3
" 5 -inch,.....	1	5	32	"	35	7	11
Coir Rope of 4½-inch coil,	1	5	6	"	31	8	3
" 4 -inch coil,	1	3	35	"	23	11	5
" 3½ inch coil,	1	2	37	"	17	14	5
" 3 -inch coil,	1	2	12	"	14	1	3
" 2½ inch coil,	1	1	28	"	10	6	5
" 1½ inch coil,	1	0	28	"	4	4	6
" 1 -inch coil,	1	0	20	"	3	1	0

STATEMENT SHOWING THE VALUE AND WEIGHT OF A COIL OF COIR ROPE OF THE DIFFERENT DESCRIPTIONS MADE IN BOMBAY AND BENGAL.

Description.	Bengal. Weight. Ct qr lb	Bengal. Value. Rs.	Bombay. Weight. Ct qr lb.	Bombay. Value. Rs.	Difference. Rs.
1 Coir Cable of 14 in.	32 2 4	—	32 1 8	—	—
" 8 in	12 0 21	—	11 1 10	—	—
" 7 in	9 1 10	—	10 1 9	—	—
" 6 in.	6 3 24	—	7 1 0	—	—
" 5 in.	4 0 27	—	4 0 0	—	—
1 coil Coir Rope 4½ in	3 3 2	—	3 2 16	—	—
" 4 in.	2 2 27	—	3 0 22	—	—
" 3½ in.	2 0 15	—	2 2 20	—	—
" 3 in	1 2 20	—	2 0 0	—	—
" 2½ in.	1 0 27	—	1 1 25	—	—
" 1½ in	0 2 1	—	0 2 20	—	—
" 1 in.	0 1 13	—	0 1 25	—	—
	76 3 7	649 14 9	79 1 14	592 13-4	57 1-6

Supposing 648 cwt. of the above kinds of cordage were required:

Value of this at the Bombay rates of 7 7 6 per cwt		Rs. 4839 12 0
Ditto at Bengal rates, viz., at 8 5 9 per cwt., is Rs.	5416 14 0	
Freight to Bombay, say, at one rupee per cwt., ...	648 0 0	
		6064 14 0
Difference in favour of Bombay Coir.....		Rs. 1225 2 0

In calculating the rate per cwt., the Bengal maund is estimated at 82 lb.; and in turning the maunds into English weight, fractional parts

have been omitted. As the authorities at Bombay complained that the market could not always be relied on, for meeting demands as they arose for good Coir cordage for the public service; and as each fresh demand was taken advantage of for raising the price or for trying to pass off inferior articles at a high rate: a rope-walk has been authorised (January 1853) to be established at the Mazagon Dockyard, in order to enable the Indian Navy and Public Department to be supplied with good Coir cordage. The Collector of Mangalore was to supply the Maldive, probably Laccadive Coir, at thirty rupees per candy, and three rupees for boat freight to Bombay. The above account of this use of the Cocoa-nut palm would be very incomplete if we omitted all notice of the various purposes to which Cocoa-nut fibre is applied in Britain and in which so much ingenuity is displayed. The statement frequently made of the Cocoa-nut Palm growing only in the vicinity of the sea, in consequence of the presence of salt in the soil, has not been noticed; nor the common custom of placing some salt round a cocoa-nut, when it is planted and expected to germinate. The sea-coast is well known to be distinguished by its moist climate, as well as by the soil below the surface being moist. Both these afford facilities for the growth of the plant, while the salt which is often placed round the germinating nut is positively useful in preventing white ants from eating it up. In consequence of the injury these cause, it is considered preferable to transplant the young plants when they have put forth three or four leaves, and in rainy weather, *i. e.*, in May and June, keeping the plantation clear from weeds and white ants. We therefore borrow the following contemporary account of the articles exhibited at the Great Exhibition of 1851. "It is instructive to witness the many useful and ornamental purposes to which the vegetable fibre of the Cocoa-nut may be applied. Of the manufacture of the fibre which envelopes the shell of the nut, the principal exhibitors at the Crystal Palace were Messrs. Wildey and Co., of Holland Street, Blackfriars Road, and Mr. Treloar, of 42, Ludgate Hill. The first-named firm showed specimens of Cocoa-nut fibre in various stages of preparation. Commencing with the husk, we have first the cleaned fibres, separated from the intervening vegetable substance; then, a selection and preparation by patented machinery of the fibre for making brushes and brooms—a substitute for bristles; and next we have the fibres still further cleaned, curled, and dyed to resemble horse-hair, such as upholsterers use for stuffing mattresses; and, lastly, follow samples of yarn and cordage of different kinds, together with matting, door-mats, and netting for sheep-folds. "The articles exhibited by Mr. Treloar still further illustrate this novel and interesting manufacture. The stair-carpets and floor-mattings produced by this exhibitor consist of upwards of twenty different registered patterns, all of which are new, and one of which now covers the floors of the Symposium, at Gore House. The brushes comprise every kind; and, so far as it is possible to form an opinion from mere observation, they appear quite as well adapted, for all ordinary purposes as the best bristle brush—while no doubt, the difference in price is considerable. It is not easy, one would suppose, to place much ornament about a door-mat, without interfering with its utility. But Mr. Treloar has succeeded in producing, from a variety of shades of colour, a very ornamental door-mat, having a crown worked in the centre. There are a great number of small articles, such as table-mats, fancy baskets, &c., all made of the same useful material. But the greatest novelties yet produced from Cocoa-nut fibre are the bonnets and hats shown by this exhibitor. These are of a bright Cinnamon colour, and attract considerable notice on account of the ingenuity displayed in their fabrication." The Esoo fibre might well be intermixed with that of the Cocoa-nut for some of the above purposes. To give some idea of the importance of the Cocoa-nut Palm, we may conclude with the following table of the value of the Imports of Coir and Coir rope into the three Presidencies for three years; for which I am indebted to the tables of the Statistical Department of the India House.

Coir and Coir Rope imported into	In year 1847-48.		In Year 1848-49.		In Year 1849-50	
	Foreign	India.	Foreign	India.	Foreign	India.
Calcutta.....Rs...	27,438	85,780	21,615	55,999	21,073	65,261
Madras.....	45,987	15,598	57,323	17,309	44,711	23,900
Bombay.....	873	76,571	333	116,338	1.618	148,210

Subjoined is a tabular view of the Exports and Imports of the different products of the Cocoa nut, for the year 1850-51, in order to show the extensive influence of the plant This must not be estimated simply according to the value of money in Europe but in India, and the tree viewed as the source of employment and of comfort to great numbers of the people of the East. But it is obvious that these Exports and Imports give but a small idea of the usefulness of the plant to the people where it is indigenous, as they find a use for every part of it. In the following table, a few trifling entries appear, and also some imports from places from whence we should not expect them; but this is owing to ships' stores being sometimes landed and sold, instead of being used on board of ship. In some cases the value only is given, but generally both quantity and value, in the official Reports published in India. It is from these that the following facts have been taken:

COIR.

BENGAL PRESIDENCY.

From May 1st, 1850, to April 30th, 1851.

Imported into Calcutta.	Cocoa-nuts.	Shells.	Kernels.	Oil.	Coir and Coir Rope.
From United Kingdom, ...	—	—	—	—	515
„ North America, ...	—	—	—	—	192
„ Pegu, ...	—	Rs. 125	—	—	—
„ Penang, ...	Rs. 20	—	—	—	—
„ Ceylon,...	12,116	1,676	—	—	449
„ Maldives, ...	109,299	4,169	—	—	3,826
„ Coast of Coromandel, ...	11,100	—	—	Mds. 33.	—
„ Malabar, ...	16,996	—	Mds. 56,507	—	9,259
Total...	—	—	Mds. 56,507	Mds. 33	14,241
Value...	Rs 149,646	Rs. 5,970	Rs. 176,398	Rs. 231	Rs. 56,542
Exports from Calcutta.					
To United Kingdom,...	—	—	—	363	138
„ North America, ...	—	—	—	—	638
„ Cape of Good Hope, ...	—	—	—	—	139
„ China,...	—	—	—	—	126
„ Mauritius....	—	—	—	201	193
„ New South Wales, ...	—	—	—	20	349
„ Pegu, ...	—	—	—	382	1,076
„ Penang, ...	—	—	—	52	—
Total...	—	—	—	Mds. 1,018	Mds. 2,654
Value...	—	—	—	Rs. 6.891	Rs. 18,009

MADRAS PRESIDENCY.

Exports.	Cocoa-nuts.	Shells.	Kernels.	Oil.	Coir and Coir Rope.
From Rajahmundry.					
To Pegu, ...	Rs. 10,140	—	—	Galls. 4,537	—
„ Mauritius, ...	—	—	—	420	—
„ Bengal, ...	—	—	—	2,009	—
From Malabar.					
To United Kingdom, ...	—	—	—	173,394	Cwt. 10,388
„ Arabian Gulf,...	—	—	Cwt. 82	686	3,761
„ Ceylon, ...	—	—	867	36,670	3,361
„ France, ...	—	—	—	11,663	667
„ Maldives, ...	—	—	—	510	15
„ Mauritius and Bourbon, ...	—	—	—	116,715	881
„ Bengal, ...	—	—	914	—	3,418
„ Bombay, ...	—	—	108,701	251,402	74,735
„ Indian French Ports, ...	—	—	652	33,229	—
„ Goa, ...	—	—	—	—	1,324
„ Malacca Straits, ...	—	—	—	—	92
„ Travancore, ...	—	—	—	24,883	17
From Canara.					
To Arabian & Persian Gulfs,... ...	—	—	—	—	1,038
„ Bengal, ...	—	—	—	—	4,500
„ Bombay, ...	—	—	—	—	5,091
Total...	—	—	Cwt.111,216	Gls. 656,118	Cwt. 109,288
Value...	Rs. 10,140	—	Rs. 431,008	Rs. 144,952	Rs. 246,852

COIR.

BOMBAY PRESIDENCY.

Bombay Imports.	Cocoa-nut.	Cadjans.	Kernels.	Oil.	Coir and Coir Rope.
From Ceylon,...	—	—	143	—	Cwt. 239
„ Goa.	3,822,220	—	86	—	53
„ African Coast, ...	694,830	—	—	—	—
„ Arabian Gulf, ...	—	—	142	—	—
„ Malab. & Canara, Br.	19,243,154	—	88,225	102,875	61,273
„ „ Foreign,..	1,974,786	—	72,530	—	10,405
„ Concan, British, ...	969,415	149,500	3,024	1,234	5,934
„ „ Foreign, ...	65,000	—	—	—	—
„ Cutch, ...	—	—	—	57	—
„ Guzerat, ...	—	—	—	164	8
„ Sindh, ...	—	—	—	469	—
„ Aden, ...	—	—	20	—	—
Total	26,670,105	149,500	164,223	Gls. 104,799	77,912
Value	Rs. 375,243	Rs. 2,990	Rs. 689,722	Rs. 76,417	Rs. 175,392
Exports.					
To Arabian Gulf, ...	—	—	—	—	141
„ Goa, ...	—	—	—	—	4
„ Malabar, ...	—	—	—	—	2
„ Aden, ...	—	—	—	—	117
„ Concan, ...	—	—	—	—	42
„ „ Foreign, ...	—	—	—	—	5
„ Guzerat, ...	—	—	—	—	4,214
Total, ...	—	—	—	—	5,705
Value...	—	—	—	—	Rs. 19,65[illegible]

The details of the foregoing tables do not yet give a complete view even of the external commerce of Coco-nut products, for the Imports and Exports *by land* from or into neighbouring districts or from and into Foreign States do not appear. And of those imported, the quantities retained for home consumption are not distinguished from those which are re-exported, and which, though they cannot be enumerated again in the grand total, yet contribute to the activity of commerce. We have, therefore, prepared the following table of the Re-Exports of Cocoa-nut products, from the same official Reports. Some discrepancies appear, as, for instance, no Cocoa-nuts are entered as exported from Malabar, Canara, or Goa; and yet, in the Bombay lists, they are stated to be largely imported from these very districts.

BENGAL PRESIDENCY.

Re-Exports.	Cocoa-nuts.	Kernels.	Oil.	Coir and Coir Rope.
From Calcutta.				
To United Kingdom	—	—	—	265
„ Penang	—	—	—	12
Total,,	—	—	—	Mds. 277
Value,,,	—	—	—	Rs. 1,161

MADRAS PRESIDENCY.

Re-Exports.	Cocoa-nuts.	Kernels.	Oil.	Coir and Coir Rope.
From Vizagapatam.				
To Bengal	664,455	—	—	—
From Malabar.				
To United Kingdom	—	—	19,999	Cwt. 5,193
„ Arabian Gulf	—	—	—	1,289
„ France	—	—	11,663	126
„ Ceylon	—	344	3,400	504
„ Mauritius and Bourbon ...	—	—	—	69
„ Bengal	—	411	—	4,302
„ Bombay	—	4,330	—	9,720
Total..	664,455	Cwt. 5,085	Gals. 35,062	Cwt. 21,203
Value..	Rs. 2,681	Rs. 17,135	Rs. 7,545	Rs. 65,983

BOMBAY PRESIDENCY.

To United Kingdom	—	—	—	Cwt. 37,467
„ Mauritius	—	—	—	461
„ African Coast...	—	—	—	198
„ North America	—	—	—	871
„ Arabian and Persian Gulfs ...	—	Cwt. 198	—	803
„ Calcutta	26,300	12,434	—	449
„ Cutch	1,109,799	1,265	—	1,877
„ Soumeianee...	625	37	—	—
„ Goa	—	3	—	16
„ Malabar and Canara	—	—	—	107
„ Aden	—	—	—	4
„ Sindh	134,355	9,800	—	473
„ Concan, British	8,551,025	51,953	—	2,586
„ „ Foreign	—	149	—	32
„ Guzerat	12,685,658	19,319	—	8,435
„ „ Foreign.	933,835	8	—	10
Total.....Mds...	23,421,597	Cwt. 95,079	—	Cwt. 53,789
Value.....	Rs. 373.743	Rs. 452.605	—	Rs. 180.010

In the Imports into Bombay from the African Coast, there appears an article entitled Cocoa-nut Jarry, of which 449, valued at 386 rupees, were imported; and there were re-exported, 280, valued at 170 rupees, to the Persian and Arabian Gulfs, and 2600, valued at 43 rupees, to Sindh. Here there is evident discrepancy, but the total is made 2880, valued at 213 rupees. In addition to these purely Indian exports and imports, it must be remembered that this Palm is extensively cultivated, and everywhere equally useful. The culture has greatly increased in Ceylon, as well as on the Malabar coast of India. The imports of Oil we here see have greatly increased, and amounted, in the year 1853, to 164,196 cwt.; and will probably continue to increase, as it will be long before there is a limit to the demand. Of Coir, about three millions of pounds used to be manufactured in Ceylon, when the Dutch held that colony. In the year 1838, there were imported into Britain—of Coir rope and twine, 5842 cwt., and of Coir fit for making into mats, 167 tons 13 cwt. Of the imports of Coir, &c., from Malabar and from Ceylon, we may form some idea, from the following note, from the best authority, that of the Messrs. Noble, who state respecting the "imports from Cochin of Coir yarn, rope, junk, and fibre into this country that there exist no certain data in this article on which to form a correct judgment (a great portion being taken into the same ship, both at Cochin and Ceylon, as broken storeage, of which a very uncertain account is kept), a general idea can only be given of quantities, which are as under:

Coir Yarn, - - -	about 1300	tons annually.
„ Rope, - - -	„ 800	„
„ Junk, - - - -	„ 1000	„
„ Fibre, - - -	„ 150	„

"From Ceylon we get rather over 2000 tons of yarn and about 900 tons of rope. Junk is now only a small article from this port. Of fibre we get about 260 tons to 300 tons."—*Royle.*

(2773) COIX, a genus of plants belonging to the natural order of Grasses. And of the species, *C. Lachryma*, has hard strong fruits, which are known by the name of Job's Tears. These fruits are supposed by some writers to be strengthening and diuretic.—*Engl. Cyc. page* 60.

(2774) COIX INDICA. COIX MILLET. A Burmese species of Coix, Job's tears, has large esculent seeds which are parched, like Indian corn in America, and they are often for sale in the Tenasserim bazars.—*Mason.*

(2775) COIX LACHRYMA, is extensively cultivated in the South of China, for weaving floor-matting of various degrees of fineness, the coarser kinds of which are used also for constructing sheds to screen workmen when building houses and even the walls of the huts tenanted by the poor; the best comes from Lientan, west of Canton. No grasses are cultivated in China for food for animals, but the country produces many species fitted for rearing flocks and herds.—*Williams' Middle Kingdom, page* 277. A great deal of *Coix* (Job's tears) is cultivated in the Khasia Hills about Moflong: it is of a dull greenish purple, and though planted in drills, and carefully hoed and weeded, is a very ragged crop. The shell of the cultivated sort is soft, and the kernel is sweet; whereas the wild Coix is so hard that it cannot be broken by the teeth. Each plant branches two or three times from the base, and from seven to nine plants grow in each square yard of soil: the produce is small, not above thirty or forty fold.—*Hooker Him. Jour. Vol.* ii. *page* 289.

(2776) COLCHICACEÆ. MELANTHACEÆ, *R. Brown.* Herbaceous plants. Root fibrous or fasciculate. Rhizoma sometimes a fleshy corm, sometimes creeping horizontally. Stem simple, seldom branched. Flowers complete, or from abortion unisexual, often radical. Perianth free, corol-like, 6-leaved, all distinct, or united at the base into a tube. Stamens 6, inserted into the receptacle, or into the perianth. Anthers opening outwards. Ovary 3-celled. Style 3-parted. Ovules affixed to the inner angle of the cells. Capsule divisible into 3. Seeds with a membranous testa. Embryo straight within a fleshy or cartilaginous albumen. (*R. Brown* chiefly.) The Melanthaceæ are allied to Junceæ and to Liliaceæ, are found in temperate parts of the world, and are remarkable for secreting Veratria.—*Royle.*

(2777) COLCHICUM. The Cormus and Seeds of Colchicum autumnale, *Linn.* Colchicum, or Meadow Flower, is well described by Dioscorides. It was used by the Arabs, and is their *sorinjan*; they give *kuljikoon* as its Greek name. The Hermodactyls (Sweet and Bitter *sorinjan* of the Arabs) of the later Greeks and Arabs were no doubt species of this genus. Dr. Royle's specimens have been described by Dr. Pereira.—*Royle, p.* 601. A tincture of Hermodactyl is prepared by taking Hermodactyl (*soorinjan tulk*) powdered five ounces, proof spirit two pints; and in use and dose is the same as of the colchicum tincture, for which on emergency this may be substituted.—*O'Shaughnessy.*

(2778) COLEOPTERA, (κολεόπτερα) a name first applied by Aristotle ('Hist, Anim.' i. &c.), and now universally adopted, to designate one of the orders into which Insects are divided, the species of which order are commonly known by the name of Beetles. The insects, then, which constitute the order *Celeoptera*, may be characterised as having four wings, of which the two superior are not suited to flight, but form a covering and protection to the two inferior, and are of a hard and horny or parchment-like nature, and when closed, their inner margins, which are straight, touch and form a longitudinal suture (*fig.* 16, *c.*); the inferior wings, when not in use, are folded transversely under the superior, and are membranous. From this character of having the wings in a sheath, the term *Coleoptera* was applied, it being composed of the two Greek words κολεός a sheath, and πτερά, wings. The superior wings, which form the sheath, are generally called elytra.—*Engl. Cyc. page* 62.

(2779) COLEUS BARBATUS, a very aromatic plant of India, of the family Labiatæ.—*O'Sh. page* 491.

(2780) COLE-WORTS. Brassica oleracea. A variety of cabbage, of little value for the plains, might succeed on the hills, requires treatment similar to cabbage.—*Jaffrey.*

(2781) COLLINSIA. *Scrophularineæ.* COLLINSIA GRANDIFLORA.—These plants are mostly all of a bright colour, and well adapted for borders to a flower garden, the colours are mostly yellow; but the *Scabriuscula* is red and yellow, these plants require a tolerable good soil with plenty of water.—*Riddell.* Seeds of this annual often come to Madras, usefulness very doubtful owing to its tender nature; the generally cultivated varieties are natives of California.—*Jaffrey.*

(2782) COLLOMIA COCCINEA. *Polemoniaceæ.*—These plants have a weedy appearance and though cultivated in Europe are hardly worth the trouble.—*Riddell.*

(2783) COLOCASIA, a genus of plants belonging to the natural order *Araceæ.* The species are excessively acrid; the leaves of *C. esculenta* excite a violent salivation and burning sensation in the mouth. Notwithstanding this property many of the species are used as food by the natives of the South of Europe. The leaves and roots of *C. esculenta, C. himalensis, C. antiquorum,* and *C. nucerenata,* under the names of Cocoa-nut, Eddoes, and Yams, when boiled or roasted, are common articles of diet in

hot countries. Whole fields of *C. macrorhiza* are cultivated in the South Sea Islands under the name of Tara or Kopeh roots. In the Himalayas the species which is called *C. himalensis* forms a chief portion of the food of the Hill tribes. Medicinally the root is stimulant, diaphoretic, and expectorant. The whole of the species are remarkable for containing a milky juice. They are cultivated in Portugal, Greece, and Egypt.—*Engl. Cyc. p.* 69. Wight describes Colocasia antiquorum, cuculata, fornicata, Indica, montana, nymphæifolia, odora, and virosa.

(2784) COLOCASIA ANTIQUORUM. This plant of the arum tribe is grown by the natives of Tenasserim for its tubers, that supply the place of potatoes.—*Mason.*

(2785) COLOCYNTH, Citrullus (*Cucumis*, Linn.) Colocynthis. Coloquintida, Bitter Apple, Bitter Cucumber.

Hun-zil, Arab.
Makhal, Beng.
Titta Commodoo, Cyng.
Indrahun ka-phul, Duk.
Bitter appelen, Dut.
Dahak, Egypt.
Coloquinte, Fr.
Koloquinten, Ger.
Indrain, Guz. Hind.
Coloquintida, It.
Hunzil, Pers.
Vishala, Indravaruni, Sans.
Coloquintidas, Sp.
Peycoomutikai, Varrie Coo mutie kai, Tam.
Pootsakia, Tel.
Colocynthis, L. E. D.
Peponum Pulpa exsiccata, L. D.
Pulp of the fruit, E.
Cucumis, *Linn.* (now Citrullus) Colocynthis.
Colocynth.
Monœcia Monadelphia Linn.

The Colocynth (κολυκμυδις of the Greeks and *Hunzal* of the Arabs) has been used in medicine from the earliest times, and is one of the plants supposed to be the *Pakyoth* or *wild gourd* of Scripture. Annual Herb. Roots thick, whitish. Stems procumbent, angular, hispid. Leaves cordate-ovate, divided into many lobes; lobes obtuse (but rather acute in the Linnæan specimen, and as represented by St. and Ch. iii. t. 138, from a plant grown in Chelsea Garden from seed sent from the Mediterranean, of a bright green on the upper surface, whitish below, and muricated, from being covered with small white hairs and often hair-bearing tubercles. Petioles as long as the lamina. Tendrils short. Flowers axillary, solitary, stalked. Calyx with 5 subulate segments. Female flowers with the tube of the calyx globose, and somewhat hispid, the limb campanulate, with narrow segments. Petals small, yellow, with greenish veins, scarcely adherent to each other and to the calyx. Fruit globose, smooth, about the size of an orange, with a thin but dense rind, 6-celled, pulp very bitter. Seeds ovate, not marginate, whitish, sometimes brownish, bitter. Extending from the south of Europe to Syria and the south of India. Found in various parts of India, as on the sandy lands of Coromandel (*Roxburgh*), Peninsula (*Wight*), Deccan (*Col. Sykes*), sea-shores of Guzerat (*Gibson*), Kaira (*Burns*), near Delhi (*Mackintosh and Rankin*), in Bengal Dispensatory also (*Falconer*). Dr. Royle had heard of it in this direction, but on sending for *Indrayun* and *Bisloombah* plants, which are Arabian and Indian names for the Colocynth, a species of a nearly allied species, with oval instead of globular fruit, was obtained. This he named *C. Pseudo-Colocynthis*, and figured (Himal. Bot. t. 47. fig. 2). A good supply of Colocynth may therefore be obtained for the public service or for commerce, from India, whence it has sometimes been imported; north of Africa, Egypt, and Nubia. It is possible that in some of the localities usually cited, some nearly allied species may be found instead of the true Colocynth. Colocynth occurs in two forms. 1. *Unpeeled*, from Mogadore, in its entire state, and covered by its hard yellow rind. 2. *Peeled*, from the Levant, North of Africa, and South of Spain; with the rind peeled or pared off, and the pulp dried, when the fruit is ripe. It then appears in the shape of white balls, which are light, porous, and spongy, but tough, usually with the seeds forming about ¾ of the whole weight. The smaller variety of fruit is considered the best, and is sometimes imported with the seeds removed. This is always required to be done before any preparations can be made. The seeds are bitter; but a good deal of the bitterness may be removed by repeated washings in water. The pulp is without odour, but is nauseously and permanently bitter. It is with difficulty reduced to powder (*Poudre de Coloquinte*), and may therefore with a magnifier be seen in pills which have been made up with the pulp instead of from the Extract. Both water and Alcohol extract its active properties. Analyzed by Meisner, the pulp was found to contain of Fixed Oil 4·2, Bitter Resin, 13·2, Bitter Principle (*Colocynthin*) 14·4, Extractive 10, Gummy matters 30, Phosphate of Lime and Magnesia, 5·7, Lignin 19·2. The *Colocynthin* is not, however, a pure vegetable principle. Examined by Herberger and Braconnot, it was of a reddish-yellow colour in mass, but yellow when in powder, transparent and friable, excessively bitter, burning like resins, soluble in five parts of cold and in less boiling water; equally soluble both in Alcohol and Ether. Acids and the deliquescent salts precipitate it as a coherent and viscid mass; alkalis do not precipitate it, neither does gall-nut when it is quite pure. It contains Nitrogen, and, according to Braconnot, restores the colour of Litmus reddened by acid. (*Soubeiran.*) *Action. Uses.* Colocynth is a powerful Hydrogogue Cathartic, but an irritant poison in large doses. —*Royle, p.* 494. Dr. Burn states colocynth of two kinds, occur in Guzerat, the Cucumis colocynthis, and the C. pseudocolocynthis.—*Spry's Suggest. p.* 43.

(2786) COLOPHANE. This is a resinous powder procured in a peculiar way by treating Pine Resin with nitric acid. Its febrifuge proper-

ties have been attested by 55 cases from distinguished practitioners, but Military Surgeons at Ajaccio, Rome and Rochefort, think very slightly of its powers, and it is not a substance likely ever to become of any importance in medicine.

(2787) COLOPHONIA, (in French the wood is called Bois de Colophane), a genus of Plants belonging to the natural order *Burseraceæ*. It has an urceolar, bluntly 3-lobed calyx; 5-roundish ovate petals inserted under the disc; imbricated in the bud: 6 stamens one half shorter than the petals; equal in length to the calyx; the disc 6-lobed. It is to this genus that De Candolle refers the tree producing the Bois de Colophane of the island of Mauritius, and calls it *C. Mauritiana*. In his description of the tree he says the fruit is unknown. Lindley, in his 'Flora Medica,' gives *Colophonia Mauritiana*, De Cand. *Bursera paniculata*, Lam., *Amyris Zeylanica*, Retz., and *Balsamodendron Zeylanicum*, DeCand., as synonyms of *Canarium commune*. This last is described as a small tree with 7-11 leaflets on long stalks, Ovate-oblong, acute or shortly acuminated, quite entire, stipules oval; the panicles of flowers terminal, divaricating; the flowers 2-3 together; almost sessile; when young covered over by broad ovate concave silky bracteala, the calyx silky externally, the drupes oblong, black. The bark of this plant yields a limpid oil, with a pungent turpentine smell, which congeals into a buttery camphoraceous substance. It possesses the same properties as Copaiba. Don says:—"When the nuts are mature they contain a sweet kernel, which does not become rancid, and which resembles a sweet chestnut; they are eaten both raw and dressed by the inhabitants of the Moluccas, Banda and New Guinea: and an oil is expressed from them, which is used at the table when fresh, and for lamps when stale; bread is also made from them, cakes, biscuits, &c. for the table. Eaten fresh they are apt to bring on diarrhœas and dysenteries, and to occasion an oppression at the breast." The same tree is also said to yield East Indian Elemi. It is a native of the continent of India and of the islands of the Eastern Archipelago. —*Eng. Cyc. Vol.* II. *page* 70.

(2788) COLOMBO ROOT, CALUMBO ROOT.

Kalamboo khoo, CYNG.	Radice di Columbo. IT.
Columbo wortel, DUT.	Raiz de Calumba, PORT.
Racine de Calumbo, FR.	Raiz de Colombo, SP.
Kolumba wurzel. GER.	Columboo vayr, TAM.
Kalumb-ka jur, GUZ. HIND.	

The Colombo plant (*Cocculus palmatus*), is produced on the Eastern Coast of Africa, and in small quantities in Malabar. As met with in commerce, it is in slices of one or two inches in diameter, one-eighth to half an inch thick, occasionally perforated in the centre, much wrinkled, grayish externally, and a dull yellow within; the taste is exceedingly bitter, smell heavy, powder of a grey colour, and very apt to attract moisture from the air. Colombo-root is very subject to decay by worms, and is therefore generally packed in black-pepper to preserve it. It is brought to Bombay from Mozambique; and is re-exported to England.—*Faulkner*.

(2789) COLOURS, from the mineral kingdom, are procurable in Southern India from the following places:—

Alumina coloured with madder lake (prepared from the munjeeth or Rubia tinctoria),	Chingleput.
Antwerp red,	Ganjam.
Burnt sienna,	Hills near Salem.
Bright yellow ochre,	Hills near Cuddapah.
Brown ochre,	Chingleput.
Cologne brown.	Neilgherry Hills.
Cream colored ochre.	Hills near Salem.
Dark shade of grey ochre,	Nuttum Hills
Dark umbre,	Neilgherry Hills.
Deep yellow ochre (common in the bazars of Madras,	Madras.
Flesh coloured ochre.	near Salem.
Indian red.	Hills near Chingleput.
Iron sand,	Bimlipatam.
Lavender coloured ochre,	Bangalore.
Light red ochre (prepared from the yellow ochre,)	Nuttum Hill.
Orange ochre, (made from the yellow ochre by heat),	near Cuddapah.
Pale yellow ochre,	in Nuttum Hills.
Peroxide of manganese.	Mahratta Country.
Plumbago or black lead,	Vizianagarum and Gol. condah.
Puce coloured ochre,	Bangalore.
Purple ochre,	Hills near Chingleput.
Raw umber,	Neilgherry Hills.
Raw sienna,	near Salem.
Roman ochre,	Chingleput.
Salmon coloured ochre,	Salem.
Silvery white kaolin,	Bimlipatam.
Ultramarine (prepared from the lapis lazuli,	from Bombay.
Venetian red,	in the Bazars in Madras.
Warm stone coloured ochre,	near Chingleput.
White ochre or porcelain earth,	Bangalore.

(2790) COLUBRIDÆ, a family of snakes, the last of the sub-order *Colubrina* of Dr. J. E. Gray. The Colubrina include the families *Hydridæ*, *Boidæ*, and Colubridæ.—*Eng. Cyc. p.* 71.

(2791) COLUBRINA, a genus of plants belonging to the natural order *Rhamnaceæ*. —*Eng. Cyc. p.* 71.

(2792) COLUMBIDÆ, a natural family of Birds, comprising the Pigeons, Doves, and Turtles. The distribution of this family is very extensive, the form occurring almost everywhere, except within the frigid Zones. The species are most abundant in Southern Asia and the Great Indian Archipelago. The following definition includes the *Columbidæ*, to which we shall refer in the present article:—Bill moderate, compressed, covered at the base of the upper mandible with a soft skin, in which the nostrils are pierced, and more or less curved at the point. Feet with three divided toes in front, and one behind.—*Eng. Cyc.*

Vinago (Cuvier.) The species of vinago inhabit intertropical Asia and Africa. They feed on berries and fruits. They are shy and timid, and inhabit the woods. Mr. Selby gives the following, on the authority of Mr. Neill, who, speaking of *Vinago sphenura*, says: "I had two, but both, I believe, were males. Both had a song, very different from the mere cooing

f the ringdove. When they sang in concert hey gave the same little tune, but on different eys. After the death of one, the survivor used o sing at command, or, at all events when inited to it by beginning its tune."

Vinago aromatica.—It is the *Columbia aromaica* of Latham. "The Aromatic Vinago is of a nild and timorous disposition, and is generally een in flocks or societies, except during the peiod of reproduction, when they pair, and reire to the recesses of the forest. The nest is simple, and composed of a few twigs loosely put together, and the eggs are two.

Carpophaga (Selby.) *C. oceanica.* It is the *Columba oceanica* of Lesson. This species, according to Lesson, is the Moulouesse, or Mouleux, of the natives of Ovalan, and though it approaches the Nutmeg Pigeon, *Columba* (*Carpophaga*) *onea*, very nearly, it differs from it in size, being one-third less, and in the distribution of some of its colours. "The Nutmeg Pigeon lives more particularly in the eastern Moluccas, and especially at New Guinea and Waigiou, while the Oceanic Fruit-Pigeon is abundant in the little isle of Oualan, in the midst of the great archipelago of the Carolines, and seems to exist in the Pelew Islands, where Wilson mentions it under the name of cyep." Lesson further observes, that it may be possibly spread over the Philippines, and at Magindanao.

Geophilus nicobaricus. It is the *Columba nicobarica* of Latham, the *C. Gallus* of Wagler. It inhabits the isles of Nicobar, Java, Sumatra, and many of the Moluccas. Authors differ about its habits, some asserting that its nest is placed on the ground, and that the female lays several eggs, the young running as soon as hatched; but Mr. Bennett, who saw them in Mr. Beale's aviary at Macao, says that they were usually seen perched upon the trees, even upon the loftiest branches, and adds, that they build their rude nests and rear their young upon trees similar to all the pigeon tribe.

Lophyrus coronatus. It is the *Columba coronata* of Latham; *Phasianus Cristatus Indicus* of Brisson; *Columbi Hocco*, Le Vaill.; Colombe Galline Goura, Temm.; Great Crowned Pigeon, Edw. A species surpassing in size all the other Columbidæ. Total length from 27 to 28 inches. This bird is found in many of the islands of the great Indian group. Not rare in Java and Banda, abundant in New Guinea and in most of the Moluccas. Nest built in trees; eggs two; cooing of the male hoarse, accompanied by a noise somewhat like that of a turkey-cock when strutting. Its food consists of berries, seed, grain, &c. Flavour of the flesh said to be excellent. "In this magnificent and beautiful bird," says Mr. Selby, "we observe a combination of form different from that of the ground-pigeons; for, instead of the marked affinity to the typical rasorial families, the *Pavonidæ* and *Tetraonidæ*, so decidedly exhibited by these species, both in their mode of life and in their deviation from the usual Columbine figure, we have in the present instance, an approximation of structure much nearer that of some of the *Cracidæ*, another tribe of birds which constitutes an aberrant family of the Rasorial Order; and it is on this account we think that this bird cannot well be placed in the same division with the ground-doves but must constitute the type of a separate group."—*Eng. Cyc. pages* 72, 75, 78, 90 *and* 91.

(2793) COLUTEA, a Papilionaceous genus of Exogenous Plants, consisting of hardy shrubs with pinnated leaves and inflated membranous pods, which explode when suddenly compressed, and which look like vegetable bladders, whence the common English name of Bladder-Senna. The species have yellow or yellow and red flowers of some beauty; and are all found in the south of Europe, in Palestine, and in the Himalaya mountains.—*Eng. Cyc. page* 93.

(2794) COLYMBIDÆ, a family of Swimming Birds (*Natatores*,) having a smooth, straight, compressed, and pointed bill. The species of Podiceps are called Grebes. They haunt the sea as well as the rivers, are excellent swimmers, and dive frequently, as all who have watched the Dabchick or little Grebe (*Podiceps* minor), and have been amused by its quickly repeated plungings, well know. They feed on small fishes, frogs, crustaceans, and insects, and their nests, formed of a large quantity of grass &c. are generally placed among reeds and carices, and rise and fall with the water. *Podiceps* occipitalis (Lesson) may be taken as an example. This Grebe, according to M. Lesson, is remarkable for the delicate tints of its plumage, which is slate-gray (gris ardoise) above and of a satiny white below.—*Engl. Cyc. p.* 95.

(2795) COMBRETACEÆ, an order of Polypetalous Exogenous Plants, with 1-celled inferior fruit, the seeds of which are solitary or nearly so, and pendulous, the stamens definite in number, and the cotyledons convolute. It cannot be doubted that this order has a near relation to *Myrtaceæ* and especially to *Punica*. Dr. Lindley considers it to be in closer alliance with *Lauraceæ* and *Compositæ*. The species known as Myrobalans are tropical shrubs or trees, with alternate or opposite leaves destitute of stipules, and long slender stamens. The order does not contain any plants of much importance for their useful properties. Some of them are astringent and used for tanning, and the kernels of others are eatable; they are chiefly valued for their brightly coloured showy flowers, especially in the genus Combretum —*Eng. Cyc. page* 100.

(2796) COMBRETUM WIGHTIANA. A fragrant flowered species of Combretum is com-

mon on the hills near Maulmein—it is a straggling shrub, with winged fruit.—*Mason.*

(2797) COMBS.

Peignes, Fr.	Peltini, It.
Kamme, Ger.	Pentes, Port.
Kunghae, Guz. Hind.	Peines, Sp.

Combs are well-known implements formed of horn, bone, tortoise-shell, wood, &c. for cleaning and adjusting the hair.—*Faulkner.* In Ceylon the marginal pieces of tortoise shell are used at Point de Galle in the manufacture of bracelets and necklaces formed of a chain of shell, it resembles amber in appearance: these bear a higher price than such as formed by the darker shell. In Ceylon there is a great demand for tortoise-shell for the manufacture of Combs which are worn by males as well as females among the Cingalese. In the numerous excesses into which English costume has been carried the size of the back Comb worn by ladies has never attained that of the Cingalese men, who also wear a narrow long bent Comb across the forepart of the head—the lighter colored shell is most esteemed by them. Five pounds is a moderate price for a tortoise shell back comb, which increases in value according to the size and quality of the shell: hair pins of tortoise-shell are worn by the women: gold and silver being substituted for full dress: these hair pins are among the articles purchased by passengers in the steamboats.—*Rhode M.S.S.*

(2798) COMEPHORUS, a genus of Fishes belonging to the family of Gobies. There is only one species, which is found in the fresh-water lake of Baikal. It is not taken by the fishermen, but is found dead on the shores after the severe storms to which that lake is frequently exposed. The fish is about a foot in length, and of a soft greasy texture. It is collected and pressed for oil, but is not eaten.—*Engl. Cyc. p.* 100.

(2799) COMMELYNA. Commelyneæ. Some of the plants of this genus are very handsome, the colour of the flowers mostly blue, and propagated by dividing the tubers.—*Riddell.* Wight describes Commelyna Bengalensis; cristata; nana; papilionacea; polyspatha; and scapiflora.

(2800) COMMELYNA COMMUNIS, Lin.—Calf-Grass.

Kunnoo koottie pilloo, Tam.	Neeroo kussuvoo, Tel.
	Vatsa priam, Sans.

The succulent leaves of this plant, which is improperly called a grass, are used by the Hindoos of the southern provinces for feeding young calves, when they wish to wean them from their milk. The plant has a small delicate blue flower and is found growing on the banks of water courses; along which it spreads rapidly sending suckers into the ground.—*Ainslie's Mat. Med. page* 301. Mr. Jaffrey describes the Commelyna communis under the Tamul name of Kannangkeeray, as a weed with pretty blue flowers, commonly found in lawns; the leaves are used by the natives mixed with other greens.

(2801) COMMELYNA NUDIFLORA, is a species of cucumber which Dr. Honigberger received from the Himalayas under the name of Kandoolee.

(2802) COMMIA, a genus of plants belonging to the natural order *Euphorbiaceæ. C. Cochin-chinensis* is a small tree with a resinous juice. It has alternate entire smooth leaves. The male flowers are amentaceous, the catkins consisting of imbricated 1-flowered scales, axillary and short; the female flowers racemose terminal, and small. This tree yields a gum which possesses emetic and purgative properties. It is recommended in cases of dropsy, but has not been introduced into European practice. It is a native of Cochin China.

(2803) COMMIPHORA MADAGASCARENSIS. (*Lindl. Fl. Med.* 173.) *Syn.* Amyris Commiphora, (*Roxb. Fl. Ind.* ii 244.) Balsamodendron? Commiphora, (*Wight and Arnott, Prod.* i. p. 96.) This is a native of Sylhet, Assam, and Madagascar; it blossoms in the Botanic Garden of Calcutta about February and March, but seldom ripens its seed. It has been briefly noticed under its synonim. A resinous substance named Googul, (*Hind.*) Moogl (*Arab*) is met with in all the bazars of India. It much resembles myrrh, and is said by some good authorities to constitute the bulk of the article exported from Bengal as East Indian myrrh. Royle considers the *Googul* identical with the Bdellium of commerce and he ingeniously traces in *Budleyoon* and *Madelkon* (the Greek synonymes of Googul), the Βδελλιον and μαδελχον of Dioscorides. A tree in the Seharunpore Garden, pointed out as the Googul tree, had scaly bark exactly conformable to Roxburgh's description of his Amyris. *Bdellium*, Dr. Ainslie, vol. i. p. 29, gives an excellent summary of all the information extant when his work was published, regarding this interesting substance. He adduces as synonymes, Bdellium. Kookool, *Tam.*, Googooloo. *Tel.*, Googula. *Cin.*, Aflatoon, *Arab.*, Mukul, *Pers.*, Googul, *Hind.*, known as Bdellium. He describes the gum resin as semi-pellucid, yellowish, or brown, inodorous and brittle, softening between the fingers, in appearance not unlike myrrh, of bitterish taste, and rather strong smell. He states however that it is all brought from Arabia and Persia, where the tree is called *Durukht-i-mukul.* In the bazars of India it is said that the googul "comes from the Hills." (Royle. p. 177.) The medicinal properties of Bdellium are exactly like those of myrrh, and being much cheaper, it may be preferred for Dispensary practice.—*O'Shaughnessy, p.* 287.

(2804) COMOCLADIA DENTATA, of Cuba, is remarkable for a milky corrosive juice which

turns to a fixed black colour.—*O'Shaughnessy, page* 281.

(2805) COMPASS.

Soekompass, DAN.	Bussola. IT.
Zeekompass. DUT.	Composso de marear, PORT.
Compas de mer, Boussole, FR.	Kompass korabelnui RUS.
Kompass. GER.	Sjocompass, Aguja de marear, SP.

A well-known instrument, composed of a magnetized needle and card, employed in directing the course of vessels at sea.—*Faulkner.* The compass, for nautical purposes, is, at present, used by the principal native traders of Southern and Eastern Asia and of the Archipelago. The Bugis of Celebes, for example, use small rude compasses, made expressly for them by the Chinese of Batavia, at the very moderate cost of from one shilling to eighteen-pence a-piece. The directive power of the magnet is said to have been known to the Chinese for many ages,—by their own account, no less than 2634 years before the birth of Christ.—*Crawfurd Dict. page* 115.

(2806) COMPOSITÆ, the largest known natural order of Plants. It consists of Monopetalous Exogens with syngenesious stamens, and an erect solitary ovule in a simple 1-celled inferior ovary, the style of which is divided into two arms; the flowers are always arranged in dense heads, or capitula, and are surrounded by one or more external rows of bracts forming an involucre.—*Engl. Cyc. page* 102.

(2807) CONCH OR CHANK SHELLS. These and their uses have already been noticed under the heads, *Bracelets and Chanks*, to which reference can be made. The manufacture of rings for the arms and ancles, from conch-shells imported from the Malayan Archipelago, is still almost confined to Dacca: the shells are sawn across for this purpose by semicircular saws, the hands and toes of the workman being both actively employed in the operation. The introduction of circular saws has been attempted by some European gentlemen, but steadily resisted by the natives, despite their obvious advantages. —*Hooker Vol.* II. *page* 254.

(2808) CONCHA FLUVIATILIS. Sea-shell is used by the Hakims as a medicine, and with the common people, this river fresh water shell serves for a spoon, out of which they take their medicine.—*Honigberger, p.* 260.

(2809) CONCHOLOGY is that branch of science which teaches the structure and forms of the shells which are the hard external covering of the animals belonging to the class *Mollusca.* Although these shells present great variety of forms, and are variously marked, they are only a subsidiary part of the structure of the animals to which they belong. Hence amongst naturalists the shells are only studied in connection with the structure of the animals which inhabit them. I would have wished to have given an account of these animals with their shells, in articles Mollusca, Brachiopoda, Tunicata, Conchifera, Gasteropoda, Pteropoda, Cephalopoda; also under the heads of the more important of the families and genera of the *Mollusca*, but my arrangements to obtain the same have failed.—*Eng. Cyc. p.* 117.—*Editor.*

(2810) CONDAMINEA, a genus of plants belonging to the natural order *Cinchonaceæ.*—*Engl. Cyc. page* 117.

(2811) CONNESSI BARK, TELLICHERRY BARK.

Conessie, FR.	Corte-de-pala, PORT.
Curayia, Curaija, GUZ. HIND.	Cheeree, Kutaja, SANS.
	Veppalei, TAM.
Palapatta, MALEAL.	Pala codija, Manoopala, TEL.
Codaga pala, MAL.	

Conessi bark is the produce of a plant belonging to the natural order *Apocynaceæ*, a native of the western coast of Hindustan. It is the *Wrightia* (Nerium) *antidysenterica*, and is a valuable astringent.—*Engl. Cyc. page* 122. Mr. Faulkner describes it as a native of Ceylon, Mauritius, the Malabar Coast, and many other parts of India. It is astringent and bitter, and is considered febrifuge; it has also been given with alleged advantage in chronic dysentery. The seeds of the plant are termed *Indrajow.* —*Faulkner.*

(2812) CONESSI SEED.

Lisan ul assafeer. ARAB.	Indrayava, SANS.
Indrajow, GUZ. HIND.	Veppalei arisee, TAM.
Ahir, PERS.	

The seed of Wrightia antidysenterica (*Nerium antidysentericum*), are covered with a kind of downy tuft, somewhat resembling the down of the thistle. Two kinds are distinguished, the *sweet* and *bitter.* The former has a pleasant taste not unlike that of oats, which they also resemble somewhat in appearance; but are longer and more slender. An infusion of the roasted seed is given as a safe and gentle restrainer in bowel complaints; the decoction is employed in fever cases. The latter are intensely bitter, and used as a vermifuge.—*Faulkner.*

(2813) CONFECTION OF BLACK PEPPER. In compounding this drug in India, for elecampane root (inula helenium), Dr. O'Shaughnessy recommends the substitution of the goonch root, Abrus precatorius. The Edinburgh Pharmacopeia uses liquorice root and for the fennel seeds of the London preparation, the seeds of Panmuhori, or Sonf, (Fæniculum panmorium) are an adequate substitute.—*Beng. Phar. p.* 273.

(2814) CONFERVÆ abound in the warm water from the hot springs of Soorujkhund, in Behar, and two species, one ochreous brown, and the other green, occur on the margin of the tanks themselves, and in the hottest water; the brown is capable of bearing the greatest heat and forms a belt in deeper water than the green:

both appear in broad luxuriant strata, wherever the temperature is cooled down to 168° and as low as 90°.—*Hooker Him. Jour. Vol.* 1. *p.* 28.

(2815) CONIUM MACULATUM, *Linn.* Conii Folia, L. E. D. Conii Fructus. L. Leaves and Fruit of Hemlock. There is little doubt of this being the κωνειον of the Greeks, and the *cicuta* of the Romans, as has been long supposed and as has been well argued by Dr. Pereira. This must not, from the similarity of name, be confounded with *Cicuta maculata*. *Cicuta virosa* occurs in Cashmere, where it is called *Zehr-googul*, or poison turnip. Persian, *Salep-e-Shaitan* or Devil's Salep. The objection that it is not so clearly described as to be readily distinguished from other Umbelliferæ, would apply to accounts of many officinal plants, even in comparatively modern works. It is the *shokran* of the Arabs, who give *chunun* as the Greek name.—*Royle.* Conium Maculatum. (Spotted Hemlock.) Κωνειον, Dios. is found in Europe, east of Asia and America. This plant is of great importance as a medicine, and derives additional celebrity from being considered to have been used as the Athenian state poison, by which Socrates and Phocion perished. In the form of fruit, in locality (Crete and Candia), in the effects as a poison, and in some properties as a remedy, this article corresponds exactly with the descriptions of Dioscorides and Nicander—one very strong fact is, that no other poisonous Umbelliferous plant is found in Greece but this, which grows plentifully in the localities from which historians state the Athenian poison was gathered. For medical uses the extract of hemlock is chiefly employed as an anodyne in scrofulous or cancerous affections. In rheumatism, neuralgia, and painful ulcerations, especially those of a syphilitic character, hemlock is employed with decided benefit. *Hemlock poultices*, prepared in various ways, are often applied with great advantage to irritable sores, particularly those of a cancerous, or scrofulous, or syphilitic character; 2 ounces of the extract with a pint of water thickened by linseed meal constitute the London form. The bruised leaves themselves are occasionally employed: an ointment is made according to the Dublin Pharmacopœia, by boiling the fresh leaves in prepared lard, and is much used in the cases above mentioned, and also as an application to painful piles.—*O'Shaughnessy, pages* 371.

(2816) CONGANI, a Hood or Pent House, made of reeds, in the Western parts of Tinnevelly, to protect the person from rain.

(2817) CONGEA, In the neighborhood of Maulmain and Amherst, but rarely in the southern provinces, the forest scenery is often ornamented with the numerous large purple bracts surrounding the small inconspicuous flowers of a species of congea. In the distance it bears a strong resemblance to the dogwood tree of the Ohio valley when in flower. There are three different species in the Tenasserim Provinces, Congea azurea, C. tomentosa, C. velutina, but they are all called by the same native names.—*Mason.*

(2818) CONGEA VILLOSA, has leaves of heavy smell, and is used by the natives in medicine.—*O'Shaughnessy, page* 486. Wight gives Congea azurea, 1479; velutina, 1479 & 1566; *villosa*, 1479; and tomentosa, 1479 or 1565.

(2819) CONIFERÆ, a natural order of Gymnospermous Exogens (called by Dr. Lindley *Pinaceæ*), consisting of resinous, mostly ever-green, hard-leaved trees or shrubs, inhabiting all those parts of the world in which arborescent plants can exist.—*Eng. Cyc. p.* 123. In Sikkim and Bhootan, there are twelve Coniferæ, viz. Juniper, 3; Yew; Abies Webbiana, Brunnoniana, and Smithiana; Larch; Pinus excelsa and longifolia, and Podocarpus neriifolia. Of these, four, viz. Larch, Cupressus funebris, Podocarpus neriifolia and Abies Brunoniana, are not common to the North-west Himalaya, west of Nepal, and the other eight are common. Of the 13 natives of the North-west Provinces again, only the following five, Juniperus communis; the Deodar Pinus Gerardina, Pinus excelsa and Cupressus torulosa are not found in Sikkim.—*Hooker Vol.* 1. *p.* 256.

(2820) CONNARUS NITIDA, a shrub about ten feet high, is very plentiful, especially in the Rangoon district, and affords an oil seed of small size, but rich in a sweet oil.—*McClelland.*

(2821) CONNARUS SPECIOSA.

Gwai-douk, Burm.

A large tree, very plentiful throughout the Rangoon, Pegue and Tounghoo districts, where it is known under the name of *Kadon-kadet.* Plentiful in all the forests growing scattered with Teak in the Tounghoo district and in the forests of Pegu. It is a large, heavy and strong timber. Wood, white-colored, adapted to every purpose of house building, remarkable for the quantity of its seed, which are of large size, abounding in sweet oil.—*McClelland.*

(2822) CONOCARPUS ACUMINATA.

Pauchinon, Tel.

This species is a large timber tree, a native of the same places, it flowers during the cold season. These trees are valuable on account of their wood, particularly the first seriman, its timber is universally esteemed for almost every economical purpose. Towards the centre, it is of a chocolate colour and is there exceedingly durable. For house and ship building the natives reckon it superior to every other sort; Pentaptera tomentosa, and teak excepted. The wood of Pauchinon is exceedingly like, and fully

as strong, and as durable, if kept dry as the *C. latifolia*, but exposed to the water, it soon decays; of course it is unfit for the marine yard, but equally fit for house building when it can be obtained straight, which is seldom the case. Rose-wood, Yerroogudda cheva karra, *Tel.* the tulip tree Poorsha, *Tam.* or Gungarani, *Tel.*, are tough woods and well adapted for fine furniture, the latter is generally hollow and can only be obtained fit for chairs &c. It is not, I believe, found in the jungles but abounds in old gardens and about European stations near the sea.—*Rhode M.S.S.*

(2823) CONOCARPUS LATIFOLIA, SERIMAN, *Tel. Combretaceæ*, Icon. 294.

Vellay naga marum, Tam.

This is one of the largest timber trees that are found amongst that chain of mountains, on the Peninsula of India, which separates the Circars from the Mahratta Dominions, where it is a native. It flowers during the cold season, in January and February. Its trunk is erect, straight, varying in length and thickness, the largest or thirty-five, being five feet to the branches, and about six feet in circumference.—*Roxb.* Dr. Wight, writing from Coimbatore, says it is a tall handsome tree furnishing an excellent and very strong timber. The specimens tried there, though not the best, sustained 500lbs. Roxburgh speaks of it in very high terms. Mr. Rohde cannot find that its timber of any size or value is found in Rajahmundry or Masulipatam Circar, these being the only localities in which he has met with it in common use. He thinks this wood is over estimated. He has seen many instances in which it has, though sound when put out, given way in buildings, and he has never seen it above a foot in diameter —*Rohde M.S.S.* On another occasion Mr. Rohde says, if this be the wood known by the name of *Seriman* given by Roxburgh, I must say I never met with any worthy of the character he gives it—it is the common timber of Masulipatam, where I never saw a log of a size exceeding 12 inches diameter. The Tamil name given by Dr. Wight is that of the white Eugenia.—*Rohde.* Other notes in my possession describe this as a large tree, in some cases, but the stem is often so deeply furrowed as to prevent it yielding a good plank. It is found about the sources of the Concan rivers; Kennery jungles; and on the inland Deckan Hills; where it has a stunted and gnarled form; there is a fine specimen of this tree in the neighbourhood of Sydapet, near Madras.

(2824) CONOCARPUS ROBUSTA.

Baibyah, Burm.

This is a very large and strong timber tree, growing plentifully in the Pegu, Tounghoo and Prome Forests along with Teak. Wood, white colored, adapted for fancy work and cabinet making.—*McClelland.*

(2825) CONOPS, a genus of insects belonging to the order *Diptera* and the family *Conopidæ*. —*Engl. Cyc. page* 127.

(2826) CONSERVE OF ROSES.

Gulcund, Guz. Hind.

Consists of rose-petals and sugar mixed in certain proportions, and bruised in a mortar. The conserve of roses met with in the bazars of Bombay, is chiefly obtained from Surat.—*Faulkner.*

(2827) CONUS, a genus of Gasteropodous *Mollusca*, founded by Linnæus. The species are found in southern and tropical seas; and are very numerous. Lamarck records 181 recent; and several of these include varieties.—*Engl. Cyc. page* 128.

(2828) CONVOLVULACEÆ, a natural order of Monopetalous Exogenous plants, with bell-shaped flowers, opening or contracting beneath the influence of light, a plaited æstivation of the corolla 5 stamens, and a fruit with 2 or 3 cells, in which 1 or 2 ovules stand erect. The embryo is crumpled up in the midst of very firm albumen. The common Bind-weeds of the British hedges, the *Ipomœa* and *Convolvuli* of the gardens, offer illustrations of the ordinary state of this order, the species of which have purgative roots; and in the case of scammony, yielded by *Convolvulus Scammonia*, and of jalap, produced by various species of Ipomeæ, are of great medicinal importance. Occasionally the purgative principle is so much diffused among the fæcula of the root as to be almost inappreciable, as is the case in the *Convolvulus* Batatas, or sweet Potato of America, which was the forerunner of the common potato, and gave it its name, and which is still cultivated in the south of Spain and France. —*Engl. Cyc. page* 129. Wight, in Icones, gives Convolvulus bicolor, 835; calycinus, 833; capitulatus, 1366; glomeratus, 1366; hirtus, 834; microphyllus, 1367; pentaphyllus, 834; rhynospermus, 1368; and rufescens, 1365;

(2829) CONVOLVULUS ARVENSIS has angular striated stems; leaves sagittate, somewhat auricled; peduncles usually flowered; sepals ovate, roundish; corolla white or rose colour. It is native throughout Europe in sandy fields and by road-sides; also in China, Persia, and some parts of India. It is very common in Great Britain. This species is said to possess a purgative quality, as also *C. Soldanella*, *C. maritimus*, and *C. macrocarpus.—Eng. Cyc. page* 140.

(2830) CONVOLVULUS ARGENTACEUS. Silver-leaved Convolvulus. (*Hind.* Sumundersokh) Cultivated as a flower: the leaves and juice of the plant are acrid, and applied by the natives to stimulate sores. The seed is used along with salep misri as an aphrodisiac: the half roasted leaves applied to the skin are escharotic: one tola of the seeds is a dose.—*Gen. Med. Top. p.* 181.

(2831) CONVOLVULUS BATATAS. SWEET POTATOES.

Sukkaray vullie kalung, TAM | Uby Castela MALAY.
Pendaloo, DUK. | Kappa kelenga, MAL.
Sukkara Velligudda, TEL. | Sharkara kunda, SANS.
Shukurkund, PERS.

The batatas, or camote of the Spanish colonies (*Convolvulus batatas*, Linn ; *Batatas edulis*, of Choisy, and the *Ipomœa Batatas* of other botanists), belongs to a family of plants which has been split into several genera. It is a native of the East Indies, and of intertropical America, and was the " potato" of the old English writers in the early part of the fourteenth century. It was doubtless introduced into Carolina, Georgia, and Virginia, soon after their settlement by the Europeans, being mentioned as one of the cultivated products of those colonies as early as the year 1648. It grows in excessive abundance throughout the Southern States of America, and as far north as New Jersey, and the southern part of Michigan. The varieties cultivated there are the purple, the red, the yellow, and the white, the former of which is confined to the South. The amount of sweet potatoes exported from South Carolina in 1747-48, was 700 bushels ; that of the common potato exported from the United States, in 1820-21, 90,889,000 bushels ; in 1830-31, 112,875,000 bushels ; in 1840-41, 136,095,000 bushels ; in 1850-51, 106,342,000 bushels. The sweet potato is cultivated generally in all the intertropical regions, for the sake of its roots, and as a legume in temperate countries. In the Southern States of North America, the culture ceases in Carolina under latitude 36 degs. ; in Portugal and Spain it reaches to latitude 40 and 42 deg. ; and as a legume its cultivation is attempted to the vicinity of Paris. In India it is a very common crop ; its tubers are very similar to the potato, but have a sweeter taste, whence the common name ; but it must not be confounded with the topinambur (*Helianthus tuberosus*), a native of Brazil, which is less cultivated. The root contains much saccharine and amylaceous matter. Several marked varieties of the sweet potato are raised in the Polynesian groups. In some islands it forms the principal object of cultivation. It is grown in the Northern districts of New Zealand, at Zanzibar, Monomoisy, Bombay, and other parts of the East Indies. They are raised on the bare surface of the rock in some parts of the Hawaiian islands, and a sourish liquor is procured from them. It was early cultivated on the Western Coast of Africa, for the Portuguese Pilot (who set out on his voyages to the colony at St. Thomas, in the Gulf of Guinea) speaks of this plant, and states, that it is called " batata by the aboriginals of St. Domingo. They are abundant at Mocha and Muscat. Sweet potatoes form a principal and important crop in the Bermudas. The sweet potato of Java, says Mr. Crawfurd, is the finest I ever met with. Some are frequently of several pounds weight, and now and then have been found of the enormous weight of 50 lbs. The sweetness is not disagreeable to the palate, though considerable, and they contain a large portion of farinaceous matter, being as mealy as the best of our own potatoes. In Java it is cultivated in ordinary upland arable or in the dry season as a green crop in succession to rice. A tuberous root (Ocymum tuberosum) an inhabitant of the hot plains is frequently cultivated in Java. It is small, round, and much resembling in appearance the American potato, but has no great flavor. Its local name is kantamy.—*Simmonds' Com. Product, p.* 367.

(2842) CONVOLVULUS BI-COLOR. Two-coloured convolvulus.

Zurd-kulmi, HIND.

A yellow and buff flowered Convolvulus cultivated in gardens.—*Gen. Med. Top. p.* 181.

(2833) CONVOLVULUS DIANÆ (?) Moonlight convolvulus. Chand, HIND.

Cultivated in gardens ; the large fragrant white flowers open in the evening and fade in the morning.—*Gen. Med. Top. p.* 181.

(2834) CONVOLVULUS GANGETICUS : Pink flowered Convolvulus. Cultivated as a flower, and also abundantly wild with several varieties of different colours.—*Gen. Med. Top. p.* 180.

(2835) CONVOLVULUS GEMELLUS. Lin.

Sirroo talie elley, TAM. | Tsinnatalicakoo, TEL.

These leaves are said to have a pleasant smell and mucilaginous taste. When dried, powdered and boiled with a certain portion of ghee, they are considered as a valuable external application in Apthous affections.—*Ains. Mat. Med. p.* 115.

(2836) CONVOLVULUS GRANDIFLORUS. (Ainslie, vol. ii. 219.)

Nagha mooghatei kai, T. | Puthmapoo todmie, SANS.
Munda Valli, RHEEDE. | Alanga, CYNG.

Moonflower. Common on the Coromandel Coast. Capsule or pericarp containing four seeds the size of kidney beans, when dried used in snake-bites ; dose three daily in powder.—*O'Sh. page* 506.

(2837) CONVOLVULUS MALABARICUS.

Paymoostee, TAM. | Kattu kelungu, RHEEDE.

A native of the Malabar coast and of Cochin China, considered by the farriers in India a good horse medicine. Roxburgh in his *Flora Indica*, pp. 466 to 487, describes 34 species of Convolvulus.—*O'Shaughnessy, page* 506.

(2838) CONVOLVULUS REPTANS, Mandavalli, *Rheede*.

Kulmi shak, BENG. | Tootu kura, TEL.

This plant is the Mandavallie of *Rheede* and the Olus vagum of *Rumph*, a native of standing sweet waters, very common in India, affords a

milky juice which when dried is nearly equal to scammony in purgative efficacy. (*Ainslie*, on the authority of Plumier and the Hortus Malabaricus.) The tops and leaves are eaten in stews by the natives.—*O'Shaughnessy, page* 506.

(2839) CONVOLVULUS PÆS COPRA, Roxb. Rabbit weed.

Chagul khooru, BENG. | Schinanna Adamboe ,RHEEDE.
Dapetiluta, HIND. | Bala banda, TEL.

This is a native of the sandy shores of India, where it grows naturally helping to bind loose sand and render it sufficiently stable to bear grass: goats, horses and rabbits eat it. Roxb. —*Rhode M.S.S.*

(2840) CONVOLVULUS REPENS. Lin.

Wullie keeray, or Vullie keeray, TAM.

Ainslie's Mat. Med. p. 258.

(2841) CONVOLVULUS SCAMMONIA. A native of Syria and the Levant, recently discovered by Dr. Burn in Kaira in Guzerat. The proper juice when dried is called *Scammony*. The Scammony of Aleppo occurs in fragments, voluminous, dry, light, spongy, friable, pulverulent, with dull fracture of blackish grey, but covered with grey powder resulting from the reciprocal friction of the pieces, slightly transparent in small flakes, which become white and rather adherent when rubbed with a wet finger, odour disagreeable, taste weak, acrid, bitter, and repulsive, powder greyish white. The species of scammony is often adulterated with concrete juices of a similar kind, with flour, chalk, sand, and earth. According to the analysis of Bourtron La Grange and Vogel, good scammony consists of resin 60, gum 3, extract 2, and earthly and vegetable impurities 25 per 100. The most abundant harvest of scammony is in Smyrna and Aleppo. There are several modes of collection, which gives rise to corresponding commercial varieties. The neck of the root being laid bare is divided transversely, and shells placed around the edges to receive the juice as it exudes. This subsequently thickens in the air. The drug collected in this mode, is called shell scammony. This occurs in small porous masses, sometimes smooth, of reddish or whitish grey colour; of wax fracture, yellowish and half transparent, in thin layers, of disagreeable taste and smell; on drying it becomes adhesive. Instead of shells the leaves of the chesnut tree are sometimes used, and a flattened scammony of good quality collected. If the roots be cut in successive layers, the scammony is inferior, but still esteemed. It is dried either over a slow fire or before the sun, and then moulded into stamped pastiles, of whitish colour. This variety is very rare in commerce. Lastly, an extract is prepared from the expressed juice of the roots and stalks, this is moulded into round masses, of black, vitreous, and resinous fracture. The Arab name of this drug, Ul Sugmoonia, signifies the *purgative*. Several old preparations called "diagredium" (διακρηδιον) are mixtures of scammony with sulphur and liquorice, and are now no longer used.—*O'Shaughnessy, page* 500, 501.

(2842) CONVOLVULUS TURPETHUM ROOT. *Indian Jalap.*

(2843) CONYZA ALOPECUROIDES, Martinique, diuretic. *Syn.* Pterocaulon alopecuroideum, D. C.—*O'Shaughnessy, p.* 419.

(2844) CONYZA ANTHELMINTICA, India. *Syn.* Vernonia anthelmintica, D. C. Bukchie, *Hind.* All parts of this plant are bitter. The powdered seeds are used as a warm medicine. —*O'Shaughnessy, p.* 419. Dr. Honigberger at p. 261, states that Conyza Anthelminthica, Vernonia anthelmintica; Serratula anthelmintica—is officinal at Lahore. It is said, that when the flea-bane is roasted, flies take to flight (see *Bane, Amygdala* and *Juglans regia*) and when the powder of the flea-bane is sprinkled on the floor, fleas disappear.

(2845) CONYZA BALSAMIFERA, India. Soomboong of the Javanese. *Syn.* Blumea balsamifera, D. C. A substitute for sage.—*O'Sh. page* 419.

(2846) COOKIA, a genus of plants belonging to the natural order *Aurantiaceæ*. The species are small trees with impari-pinnate leaves. One species, *C. punctata*, is a native of China and the Moluccas; it has ovate lanceolate leaflets, acuminated, hardly unequal at the base. It is a middle-sized tree bearing eatable fruit about the size of a pigeon's egg, yellow on the outside, the pulp white, rather acrid, but sweet. This fruit is esteemed as an article of diet in China and the Indian Archipelago, and is known by the name of Wampee. There are two or three other species, natives of the East, all known as Wampee Trees. —*Engl. Cyc. Vol.* ii, *p.* 131. In India, Cookia Punctata, the Wampee tree, bears its rough skinned fruit in April and May: it grows in clusters, containing a sweetish acid juice, resembling black currant in flavour. It grows to a large tree, and has very dark green shining leaves. Is rather ornamental, and requires very little care. —*Riddell.* In China, the hwangpi, or whampee, *i. e.* yellow skin, is common and is deemed a superior fruit.

(2847) COOLING MIXTURES, *without Ice.*

Parts.		Degree of cold produced.
Nitrate of ammonia, water, ... each ...	1	45
Nitrate of ammonia, carbonate of soda, water, each	1	57
Phospate of soda,.....	9	62
Sulphuric acid,.....	4	
Sulphate of soda,.....	8	50
Muriatic acid,.....	5	
Sulphate of soda,.....	5	47
Dilute sulphuric acid,.....	4	
Phosphate of soda,.....	9	47
Nitrate of ammonia,.....	6	
Dilute sulphuric acid,.....	4	

The fall of the thermometer is here calculated from 50°, and the full effect is not produced, unless the materials employed, and the substance acted upon, be previously cooled to that point.—*O'Shaughnessy, page* 46.

Cooling mixtures with Ice.

	Parts.	
Pounded ice or snow.....	2	From any temperature to,— 5°
Common salt,.....	1	
Snow or pounded ice,.....	12	Ditto,.....—25°
Commou salt,.....	5	
Nitrate of ammonia,.....	5	
Snow,.....	3	From..... 32° to—23°
Dilute sulphuric acid,.....	2	
Snow,.....	8	Ditto, ... —27°
Muriatic acid,.....	5	
Snow,.....	7	Ditto, ... —30°
Diluted nitric acid,.....	4	
Snow,.....	4	Ditto, ... —40°
Muriate of lime, ...	5	
Snow,.....	2	Ditto, ... —50°
Cryst, muriate of lime,....	3	
Snow,.....	1	From ..... 0° to—60°
Cryst, muriate of lime,.....	2	
Snow,.....	1	From ..... 40° to—73°
Cryst, muriate of lime,....	3	
Snow,.....	8	From ..... 68° to—98°
Diluted sulphuric acid,.....	10	

—*O'Shaughnessy, page* 46.

(2848) COOROOKOO OR BRUMADUNDOO OIL. ARGEMONE MEXICANA.

Brumadundoo yennai, TAM.	Oil of Prickly Poppy, or
Brumadundie Noona, TEL.	Jamaica yellow thistle,
Faringie datura ka tel, HIND.	ENG.

This pale yellow, limped oil, may be obtained in large quantities from the round corrugated seeds of the prickly poppy, which was originally introduced from Mexico in ballast, but now flourishes luxuriantly in all parts of India. It was noticed under the head of Argemone mexicana. It is sometimes expressed by the natives and used in lamps, but is doubtless adapted to other and more important uses. In North Arcot it costs from Rs. 1-14-0 to Rs. 2-1-0 per maund. —*Madras Exhibition of* 1855. See ARGEMONE MEXICANA.

(2849) COOPPAY KEERAY, *Tam.* This is the Amarantus polystachyus. Lin.—*Ainslie, p.* 253.

(2850) COOTTOOPASSALEI KEERAY, *Tam.* Oopodaki. SANS. | Poti Batsoli koora. TEL.

This is the Basella lucida, Lin. *Ainslie. p.*253.

(2851) COPAIVA, COPAIBA.

Baume de Copahu, FR.	Capayva, SP.
Kopaiva balsam, GER.	Faulkner.

Copaiba is the fluid resinous exudation of several species of Copaifera, of C. Langsdorffii. *Dec.* of C. officinalis. Capaiba was first described by Marcgraaf and Piso in 1643 ; but the species is uncertain, as the latter gives no figure, and the former only one of the fruit (supposed by some to be of *Copaifera bijuga*, Willd). Jacquin, in 1763, described a species of Copaifera from Martinique, which he named *C. officinalis*, and which probably yields the little Copaiba obtained from the West Indies. It has, however, been ascertained that several species yield the Copaiba of commerce. The Wood-Oil of some species of *Dipterocarpus* yields a substance closely resembling Copaiba.—*Royle, page* 364.

(2852) COPAL. Chundroos, GUZ. HIND.

A peculiar kind of gum-resin, obtained from a large tree (*Rhus Copallinum*), found in various tropical countries. It is usually met with in irregular, hard, shining, transparent masses; brittle, tasteless, indorous, and generally of a lemon hue, though the best is nearly colourless, bearing a great resemblance to Animi and Amber. It is fusible and inflammable, insoluble in water, and very sparingly so in alcohol. It is, however, dissolved by ether and some other essential oils, though with difficulty. The gum-resin is employed with oil of turpentine in making "Copal Varnish." Copal is largely imported into Bombay from Zanzibar, the major portion of which is re-exported to England, and occasionally to France and Calcutta. Copal is liable to be confounded with *Animi*, when the latter is clear and good, but the solubility in alcohol furnishes a useful test—the *Animi* being readily soluble in this fluid, while Copal is sparingly so. Copal is also brittle between the teeth, whereas *Animi* softens in the mouth. Copal resin is possessed of peculiar properties, differing from most other resins in its very sparing solubility in alcohol; and of the little that dissolves with the assistance of heat the greater part is deposited as the solution cools. It is dissolved by ether and some essential oils. A substance resembling Copal is found mineral, and is called *Fossil Copal.* It is however insoluble in alcohol.—*Eng. Cyc. p.* 122.

(2853) COPPER. Venus of the Ancients.

Nehass. ARAB.	Miedz, POL.
Tung. CHIN.	Cobre, PORT.
Kobber, DAN.	Mjed Krasnoimjed, RUS.
Koper, DUT.	Tamra, Tamraka, SANS.
Cuivre, FR.	Cobre, SP.
Kupfer, GER.	Kopper, SW.
Thamba, GUZ. HIND.	Shemboo. TAM.
Rame, IT.	Tambran, TEL.
Cuprum, LAT.	Tambaga, MAL.
Miss, PERS.	

Copper was, with Gold and Silver, one of the most anciently known of the metals. It is abundantly diffused in nature, being found native as an Oxide, a Sulphuret, and as a Sulphate, Carbonate, Arseniate, and Phosphate. Copper is found in Persia, Sumatra, Borneo and Japan. Copper ore in the form of sulphuret is chiefly abundant in Ramgurh in Shekawattie: near Ajmeer the carbonate of copper is found in small veins, and in connexion with ores of iron.—*Genl. Med. Top. p.* 169. A silicate of Copper occurs in Nellore collectorate, but not in workable lodes. Copper ores are found in several

arts of Upper India, particularly in the Jeypoor ominions, and in the vicinity of Nejeebabab, nd Captain Hardwicke mentions, that, at Nag- ore and Dhumpore, places lying betwixt forty nd fifty coss and east of Sirinagur, two copper ines are worked during eight months of the ear. In lower Hindoostan, a copper mine was iscovered, some years ago, by Mr. J. B. Travers, hen Collector of the Ongole district, betwixt oodala and Ardinghie; which, for a short time, ttracted notice, but seems to have fallen into isrepute. The produce, as far as I can learn, s a variegated purple ore, containing a consider- ble portion of Iron, and Captain Arthur of he Corps of Engineers mentioned to Dr. Ainslie, hat the green carbonate of copper called Mala- hite, is a product of Travancore. The copper re of Japan is certainly the finest in the world, and is an article of trade from the island. Copper is also found in Thibet, in the Bur- mah dominions, in Nepaul, and in great abundance in Sumatra, where it is, by all accounts, combined with much gold. It would appear, by Le Gentil's description of the Phi- lippine islands, that this metal is common too in those delightful regions; where I cannot, how- ever, learn that white Copper is to be obtained; this singular mineral, seems peculiar to China and has been supposed, by the celebrated Dr. Black, to owe its distinguishing colour to an alloy of nickel.—*Ains. Mat. Med. page* 53. Dr. Helfer says, that the existence of copper on the Lampei Islands, the very first he supposes in this part of India as yet traced, is worthy of attention, and may lead to farther discovery of extensive veins of this ore." Mr. O'Riley states, " that specimens of copper ore have been brought from several islands of the Mergui Archipelago, and all obtained appears to be of the same character, viz. the grey copper ore, containing from forty to fifty parts of the metal in combina- tion with antimony, iron, and sulphur." He has also " traced the existence of the sulphuret of copper" on the Ataran; and Mr. Mason had a fine specimen of the green carbonate, or mala- chite, brought him by a Burman who said he re- ceived it from a Karen, who represented that it was found near the head waters of the Ataran; and other natives have assured him, that the same mineral exists up the Salwen. The blue carbo- nate of copper is seen in the same specimen unit- ed with the green carbonate. The natives say it is found in Province Amherst, but he has seen it only in specimens from Cheduba near the coast of Arracan.—*Mason.* Copper ores have been found in Sumatra, Celebes, and Timur. In the two former, mines of it are said to be worked, but if such be the case, even their locality has certainly never been shown. The probability is that this metal has always been, as it now is, im- ported. The prevailing name for it is tambaga, a corruption of the Sanscrit tamra.—*Crawfurd Dict. paye* 116. In the island of Borneo, it has been lately discovered, and it has been for a long time known to exist in Sumatra and Timur. The utensils made of this metal in those islands al- ways contain some iron, and the bars or cakes into which it is cast when sold for unalloyed copper, require much labor to make them pure and malleable. The copper found in Japan con- tains gold in alloy; it occurs in the market, in small red bars, six inches long, flat on one side and convex on the other, weighing 4 or 5lbs. each; this copper is the most valuable of any found in Asia. The Chinese and Dutch export upwards of 2,000 tons annually. South American copper is brought to the China market and from England and the United States, but it is scarcely ever landed; much of that in slabs is sent on to India and that in sheets, rods, and bolts is used by the foreign shipping. There is a natural alloy found in China, known under the name of *white copper*, which is used by the natives in great quantities, and prevents the consumption of foreign copper. The constituents are not known, but copper and iron are probably the chief. It is used for dish covers, candlesticks, tripods, plates, &c. &c., which when new and polished look almost as well as silver. Acetate of Copper (arugo, verdigris) is, like the sulphate, a com- mon bazar article in India, being imported chiefly from France. Verdigris is prepared on the large scale by strewing copper plates with grape husks. During the fermentation of the traces of sugar in the husk, the copper combines with oxygen, and the oxide with acetic acid formed by the grape sugar. The process is extremely tedious. We have made a very good article by using tamarind pulp instead of the grape.—*Beng. Phar. p.* 324.

(2854) COPPER, SULPHATE OF. CUPRI SULPHAS, *Cuprum Vitriolatum. Vitriolum Cæruleum.* Blue Vitriol. *Blue Stone.*

Sulphate de Cuivre, FR. | Kupfer Vitriol, GER.

The salt is produced naturally in the water of many mines. It was no doubt employed by the an- cients, as it was by the Arabs and Hindoos: by the latter it is called *neela tootia*, or blue vitriol. —*Royle.* The Sulphate of Copper (neela tutiya) is a common bazar article in India, being manu- factured in many parts of Bengal and the eastern Islands; it is easily prepared by heating copper to redness in contact with the air, removing the black scales which form, and dissolving these in dilute and boiling sulphuric acid, and crystaliz- ing. In the refining of silver it is incidentally prepared in very large quantities.—*Beng. Phar. p.* 322. Sulphate of Copper is much used in dyeing operations, and in the printing of cotton and linen; also for various other purposes in the arts. It has been employed to prevent dry rot by steeping wood in its solution, and is a power- ful preservative of animal substances; when imbued with it and dried they remain unaltered. It is afforded by the decomposition of copper

pyrites, in the same manner as green vitriol from iron pyrites. It is manufactured for the arts from old copper sheathing, copper turnings, and copper refinery scales.

(2855) COPPER-WARE and tutenague utensils, with *coral* and *glass beads*, all form a small portion of the Chinese trade to India; the Chinese seldom use glass beads as ornaments.

(2856) COPRA, DRIED COCOANUT KERNEL.

Copra, GUZ. HIND.	Narel, HIND.
Goabberekaya, TEL.	Coapparic tangoy, TAM.

The dried kernel of the cocoanut, from which cocoanut-oil is expressed; it is also used as an ingredient in curries by the natives of India. Copra is imported largely into Bombay from the Malabar Coast, and is occasionally re-exported to Calcutta.—*Faulkner*. It is the dried albumen, which when soft and pulpy is easily removed by a spoon.—*Seeman*. In preparing copra, the kernel of the cocoanut is taken out when fully ripe, divided in the middle and dried. Used as ingredient in curries and in medicine, and largely exported from India. The kernel of the cocoanut has much the taste of a filbert, and is a valuable ingredient in curries. It is considered by the Vytians as very nutritious. They conceive it to have the power of making the body corpulent.—*Ainslie*.

(2857) COPTIS TEETA. Wall, *Ranunculaceæ*. *Vern*. Mishmee Teeta, *Assamese*. Hong-lane. *Chinese*. Golden-thread root of Assam. The Coptis Teeta is a native of the mountainous regions bordering on upper Assam, and is in high repute among the Mishmee, Lanass, and Assamese. Dr. Wallich, in a paper in the VIIth volume of the Transactions of the Medical and Physical Society of Calcutta, informs us that quantities are sent down to Assam in neat little baskets with open meshes, made of narrow strips of rattan, and measuring 3 to 4 inches in length by 2½ in breadth, and 1½ in width; each basket contains about an ounce of small pieces of the root from 1 to 3 inches long. The roots are nearly cylindrical, and uneven, scabrous, more or less curved, of a greyish brown colour externally, internally bright yellow, varying in thickness from the size of a crow quill, to double that diameter. The root is perfectly dry and brittle, occasionally a few fibrillæ issuing from one end. The taste is intensely and purely bittery, very lasting, with only a slight aroma. On mastication the root tinges the saliva yellow. In North America the Coptis trifolia is much employed as a bitter tonic, and has been accurately described by Bigelow. The chemical properties of the American correspond exactly with those of the Assamese root, which contains neither tannic nor gallic acid, but abounds in a yellow bitter principle, soluble in alcohol and water. The root of the Coptis Teeta has found its way through the drug shops of Bengal, and is even occasionally exposed for sale in the upper provinces: it brings a very high price, and is deemed a tonic remedy of the greatest value. It was used extensively in the Calcutta General Hospital by the late Mr. Twining, who reported that its influence in restoring appetite, and increasing the digestive powers, were very remarkable, and that it might be said to possess all the properties of our best bitter tonics. Further trials in the Calcutta College Hospital were equally satisfactory. It did not seem to exercise any febrifuge virtue, but under its influence several patients recovering from acute diseases, manifestly, and very rapidly, improved in strength. The dose was 5 to 10 grs. of the powder, or an ounce of the infusion thrice only.—*O'Shaughnessy, pages* 162, 163. Latterly, Medical Officers in Assam, and amongst others have been Dr. Shurlock and the late Dr. Johnston Long, have had great faith in it, and have used it as a substitute for Quinine, both in remittent fever and in common agues. A tincture of Mishme Teeta is a bitter tonic, and its flavour and colour are much more agreeable than the tincture of Colomba.—*Beng. Phar. p.* 422.

(2858) COQUILLA NUTS are produced in South America, in the Brazils, by Attalea funifera, according to Martius, or the Cocos lapidea of Gartner; the latter title is highly descriptive. The plant might advantageously be introduced into Southern Asia. The coquilla nut shell is nearly solid: two separate cavities, each containing a hard, flattened, greasy kernel, generally of a disagreeable flavour: the cells occasionally enclose a grub or chrysalis, which consumes the fruit. The passages leading into the chambers are lined with filaments or bristles, and this end of the shell terminates exteriorly in a covering of these bristles, which conceal the passages; this end is consequently almost useless, but the opposite is entirely solid and terminates in the pointed attachment of the stalk. Sometimes the shell contains three kernels, less frequently but one only, and one coquilla nut has been seen entirely solid. The substance of the shell is brittle, hard, close, and of a hazel brown, sometimes marked and dotted, but generally uniform. Under the action of sharp turning tools it is very agreeable to turn, more so than the cocoa-nut shell; it may be eccentric turned, cut into excellent screws, and admits of an admirable polish and of being lackered. On the whole it is a very useful material, and suitable for a great variety of small ornamental works both turned and filed.—*Holtzappfel*. Seeman remarks that Coquilla nuts being excessively hard, beautifully mottled with dark and light brown, capable of taking a very high polish, they are extensively used for turnery work, especially in making the handles of Bell-pulls, small tops, the knobs of walking sticks, umbrellas and other articles.—*Seeman*.

(2859) CORACIAS, a genus of Birds belonging to the Insessorial or Perching division.

(2860) CORAL.

Pavalum, TAM.	Corail, FR.
Goollie, DUK.	Korallen, GER.
Busud, ARAB.	Murjan, Munga, GUZ.
Merjan, PERS.	Corale, IT.
Moonga, HIND.	Corallium, LAT.
Poalum, MALAY.	Coral, PORT.
Pagadum, TEL.	Korallu. RUS.
Birbat, SANS.	Vidruma, Prabala, SANS.
Bubalo, CYNG.	Coral. SP.
Koraalen, DUT.	*Faulkner. Ainslie.*

Mr. Faulkner says there are several varieties, of which the black is highly esteemed, and the red is next most prized; yellow and white corals are also met with. The value of coral depends upon its size, solidity, and the depth and brilliancy of its colour. Coral is found in great abundance in the Red Sea, the Persian and Arabian Gulfs, in various parts of the Mediterranean, on the Coast of Sumatra, in Japan, &c. It is imported into Bombay in the shape of beads from the Red-Sea, and overland from the Mediterranean.—*Faulkner.* Coral is brought to China from all the islands of the Indian Archipelago in native vessels, and is there wrought into many ornaments and official knobs or buttons. It sells from $ 40 to $ 60 per peeul according to the color, density, and size of the fragments. In former years, considerable quantities were imported in Company's ships from the Mediterranean, viâ England, but none for years past, nor is it likely to be again imported, which is the reason it is left out of the tariff.

(2861) CORAL PLANT. Jatropha multifida.

(2862) CORAL TREE.—Erythrina Indica.

(2863) CORALLINACEÆ, a family of Marine Plants belonging to the order *Algæ*. According to Harvey's definition it includes the *Corallinæ* and *Spongiteæ* of Kutzing, and the *Corallinidæ* and *Nulliporidæ* of Dr. Johnston.—*Eng. Cyc. page* 143.

(2864) CORCHORUS. A genus of plants belonging to the natural order Tiliaceæ.—*Engl. Cyc.* See JUTE. Wight describes corchorus acutangulus, capsularis, humilis, and prostratus.

(2865) CORCHORUS CAPSULARIS. This species is one of the plants from which the Jute of India is prepared.

(2866) CORCHORUS FUSCUS. This annual affords a strong and abundant fibre, springing up about Rangoon in the rainy season and mostly found growing along with *Urena*, but not to the same extent. It affords a strong fine grey fibre—*McClelland.*

(2867) CORCHORUS OLITORIUS.

Bhunghe, BENGALEE. | Phetwoon, BURM.

An annual plant common in Bengal. There are two varieties, the green (Pat, *Beng,*), the reddish, (Bun-pat, *Beng.*) both are used for their fibres, which are called *jute* and *pat.* A coarse kind of cloth (*tat*) is woven from the jute, and affords the materials of the well known gunny bags. An infusion of the leaf is much employed as a fever drink among the natives of the Lower Provinces, and Mr. Twining mentions the practice with approbation in the 2d. vol. of his admirable work on the diseases of Bengal.—*O'Sh. page* 229. The Bunghi of Bengal grows wild about Rangoon during the rainy season, and probably also in other districts, though not to the extent that *Urena* does. The plant might of course be cultivated to any extent. The fibres of the bark is the jute of Bengal.—*McClelland.* The leaves of this plant are used in Egypt as a pot-herb, and, under the name of Nurcha or Sag Greens, they are in common use amongst the natives of India.—*Jaffrey.* It will be seen from the above that Jute, Jew's Mallow, is the product of *Corchorus olitorius* and *capsularis* of the family *Tiliaceæ*. Fibre Jute (Sans., *Putta*; Beng. *Pat*; fibre, *Jute*; cloth, *tat, chotee, megila. Gania*, Amboynese, *Rami Tsjina*, Malay, *Oimoa*, Chin is now so familiarly known, and is so extensively employed in some of our manufactures, that one is apt to think that it must have long been established as an article of commerce. This is far from being the case, for we find no notice of it even in comparatively recent dictionaries of commerce; and it is not above fifteen years since that it has come to be much employed in the manufactures of Britain though it has long been so employed in India, and its fibres much used there for making both cordage and cloth. Under the name of Jute, however, the fibre of two very distinct plants is included, though no recent accounts of these, have been published by any of the present growers of Jute. Both plants are common in almost every part of India; the leaves of both are used as pot-herbs, and the stems of both yield fibre, and are cultivated on both these accounts; and both are placed by botanists in the genus Corchorus, which is so named from the *Korkhoros* of the Greeks, which also was a pot-herb, and, indeed, is by many supposed to have been one of the very plants which we now describe. This is the species called *Corchorus olitorius*, which is still cultivated in the neighbourhood of Aleppo, and is described by travellers in the East as eaten for a pot-herb in Egypt and Arabia, as well as in Palestine. Rauwolf saw the Jews about Aleppo using the leaves as a pot-herb; hence the old name of "Olus judaicum" in old authors; which by the French is translated Mauve de Juif, and by us "Jew's Mallow." It is supposed to be the plant alluded to in 'Job,' xxx, 4. 'Mallauch,' in Kitto's 'Cyclopædia of Biblical Literature.' It is the same plant which, small and herbaceous in the dry soil of Syria, grows to a height of four or five feet in the North of India; but in the hot, moist climate of Bengal, attains a size that allows fibres of twelve feet in length to be separat-

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ed from it. The other plant, which we suppose also yields some of the Jute of commerce, is *Corchorus capsularis*, easily distinguished from the former by the form of its seed-vessels being globular instead of elongated and cylindrical. It is also more remarkable for an east and west, than for a north and south distribution. We have stated that it is to be found in most parts of India, and likewise in Ceylon. It is curious that Rumphius, in his 'Herb. Amboinense,' v. 212, t. 78, describes it under the name of Ganja (but this may be pronounced Gania), which is that applied in India to the true Hemp. By Malays it is called *Rami Tsjina*, that is, Chinese Rami; a name which is also applied by them to other fibre-yielding plants, as to the true Hemp, according to Rumphius, and also to the *Urtica nivea*, as we have seen under the head of China-grass. It is no doubt cultivated in China, where Roxburgh states it is called *Oi moa*. This so-called Chinese Hemp—but a true Corchorus—was at one time supposed to be superior to the true Hemp, and attempts were made to introduce it into England; the account of which is detailed in the 'Phil. Trans.,' vol. lxxii. It is there stated, that seeds sown in England produced plants fourteen feet high, and nearly seven inches in circumference, though few produced mature seeds. Some, however, which came to maturity in the second season produced a crop of good Hemp, greater by one third than was ever known to be obtained in England. We may easily believe, therefore, that this may grow to a great height in the congenial climate of Bengal. As both those plants seem to yield the fibre called Jute, though already noticed under their respective heads, we may again describe both, before proceeding to treat of their culture or the mode adopted by the natives of India for separating their fibre. *Corchorus olitorius*, Pot-herb, or Jew's Mallow, as seen in the Mediterranean region, is an herbaceous annual plant, only a foot or two, but in India of several feet, in height, and erect in habit. The stem is smooth, cylindrical, and more or less branched. The leaves are of a lively green colour and smooth, alternate, on footstalks, oval or ovo-lanceolate in shape, with the margin dentate, and with the two lower dentilures terminated by a slender filament. The stipules are simple, awl-shaped, and reddish coloured at their base. The peduncles or flower-stalks are one to two-flowered. The flowers are small, having the calyx consisting of five pieces or sepals, and the corolla of five yellow petals. Stamens numerous. Torus, or nectary cup-shaped, with glands at the base of the petals. Ovary solitary, ripening into a long, nearly cylindrical capsule, ten-ribbed, six to eight times longer than it is broad, five-celled, and formed of five valves, with five terminal points. Seeds numerous, with nearly perfect transverse partitions between them. This is called *Puti* in Sanscrit, and *Pat* in Bengalee: flowers in the rainy season, and fructifies in October and November. Cloth made of it is called *Tat*, the fibre *Jute*. Dr. Roxburgh states that there is a reddish variety of this, which the natives call *Bun Pat*, that is Wild Pat. *Corchorus capsularis*, or Capsular Corchorus, is also an annual, with a straight, smooth, and cylindrical, afterwards branched stem, from four and five to eight and ten feet in height. The leaves have long footstalks, and are oval, acuminate, thin, and of a light green; serrated at their margins, with the two lower serratures terminating in narrow filaments. The flowers are small, yellow, and like those of the other species in the number of their parts. The capsules are short and globose, wrinkled and muricated, with five cells, and composed of five valves: seeds few in each cell, and without transverse partitions. It flowers in the rainy season, and the fruit is ripe in September and October. This is the *Ghi-nalita pat* of the Bengalese, and its fibre sometimes called *Nalta jute*. It is called *isbund* in North-West India. It has been called Chinese Hemp (*Rami tsjina*) by the Malays, and its fibre *China pat* by Roxburgh. The kind called *Teetah* pat is said to be a variety of this species. It is cultivated both in Bengal and in China, on account of its fibre, which is separated by maceration, and used as cordage, both for agricultural purposes and for river navigation, as well as for making paper. It is also employed for making the coarse kind of cloth called Megila in Bengal; and another kind called *tat* or *choti*, whence, probably, has been derived the name *Jute*. This kind of cloth is now well known by the name *gunny*, and used for making *gunny bags*; a name derived either from the Ganja or Gania of Rumphius, or from *goni*, a name of *Crotalaria juncea* on the Madras side (Buchanan); there the name Jute is in some places applied to its fibre, and also to that of *Hibiscus cannabinus*. There are several other species of Corchorus common as weeds in every part of India, but all may easily be distinguished from the last by the roundish form of its capsules. Dr. Royle found species at as great an elevation as 5000 feet in the Himalayas, but only in the rainy season. Dr. Buchanan found both the above species cultivated in the districts of Dinajpore, Rungpore, and Purneya. In the last he was informed, that the Corchorus which is used for cordage is the species called by botanists *olitorius*, while that used as a pot-herb is the *capsularis*; just the reverse of what is the case in some other places, showing the probability of both species being cultivated indifferently for their fibres. The fibre is long, soft, and silky and well fitted for many of the purposes to which Flax is applied, as it is divisible into very fine fibrils, which, like those of the other species, are easily spun. It is possessed also of some strength and durability, even after 116 days'

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maceration, as in Dr. Roxburgh's experiments. Under the microscope, the fibres of the two species seem exactly alike. It is generally stated that the fibres of Jute, or of those employed in making gunny bags, cannot be bleached. This is incorrect; they may not be bleached by ordinary methods. Indeed, a paper-maker mentioned to Dr. Royle, having discovered Jute in some rope, because it would not bleach. But the late Col. Calvert brought several specimens of beautifully bleached Jute to the India House, as well as some furniture damask made of it: and we observe that Mr. Rogers presented some of his bleached specimens to the Agri-Horticultural Society, in May, 1846. Dr. Roxburgh has described the species *C. olitorius* as the Pat of the Bengalese, and as partially grown for the leaves and tender shoots, which are used by the natives —both Hindoos and Mahomedans—as an article of food. When wild, it shoots out many lateral branches, which renders it a difficult matter to separate the fibres from the woody parts. In preparing the filaments, the plant requires much longer steeping in water than Hemp—a fortnight or three weeks being scarcely sufficient for its proper maceration. (*v.* p. 248.) He called attention to it as a substitute for Flax, from the length and fineness of its fibre. The gunny bags, in which sugar and similar commodities are brought to Europe from India, are made of this material. These are now sent to America for packing their cotton. Though only made known in the beginning of the century, it is now imported in immense quantities, and used for a variety of purposes, as it spins so easily, and being cheap, is therefore used for mixing. It was formerly employed for mixing with Codilla; this is now used for mixing with Jute. A description of the cultivation and manufacture of Jute was given by Baboo Ram Comul Sen (in 'Trans. Agri-Hortic. Soc.,' vol. ii, p. 91), where he mentions that the principal places where it is cultivated are Malda, Purnea, Natore, Rungpore, and Dacca—where both land and labour are cheap. He mentions four kinds—*Pat*, *Tasa*, *Mestah*, and *Coshta*—but without describing them; and quotes Roxburgh's descriptions of *C. olitorius*, *C. capsularis*, and *C. fuscus*. Other names are given in other districts, as at Jungypore: 1, *Ghore Sun*; 2, *Paut*; 3, *Cooch-murda Paut*; 4, *Amleeath Paut*. The first and fourth may be Crotalaria and Hibiscus, and the second and third species of Corchorus. These may also be included under the names of *Amrah Sun*, *Chunduna Sun*, and *Putooa Sun*. Some Jute sent to the Exhibition of 1851, from Rungpore, was distinguished by the names of Suffed (white) Hemanty Pat; 2, Lal (red) Hemanty Pat; and 3, Lal Petrie Pat.

Culture.—The seeds are sown in April or May when there is a sufficient quantity of rain to moisten the ground, which is generally low, and harrowed in the same manner as paddy (rice) land (in any land that will produce summer rice, which requires to be well ploughed and smoothed). The field is weeded after the plants are a foot and half high. When it has flowered, which happens about July and August (to 14th Sept.,—B.), it is cut. The plants are three to twelve feet high, and the circumference of the stalk is about one inch. As the seed is not ripe when the plants are cut, some of them are left to allow the seeds to come to maturity. After the plants are cut down close to the roots, their tops are clipped off, and fifty to a hundred are tied together; ten to fifteen of these bundles are laid in a shallow tank or reservoir of water, like rafts, over which a quantity of turf and clods of earth are laid to make them sink under the surface of the water; it is allowed to remain there for eight or ten days, during which the cultivator daily visits it, in order to see that it is properly laid, and the trunks are not unduly rotted. When the bark separates, and the stalk and fibres become soft, the weight upon the raft is removed, and the stalks are unbundled. The dresser descends into the water knee-deep, and takes up five or eight sticks at a time. He breaks off two feet of them at the bottom; the bark, which is become soft like thread, is held in both hands, and the stalks are taken off. The fibres thus separated (and by mere washing are brought to the state of separated fibres,—B.), are dressed, and exposed to the sun, by hanging the bundles of fibres over bamboos to dry; they are afterwards partially cleaned, and finally made up into bundles of from one to two maunds for the market. After the Pat has been removed, the fields of which the soil and elevation are suitable grow a winter crop of tobacco or mustard seed. The produce is differently stated to be from 400 lb. to 700 lb. per acre. The harvest price, according to Dr. Buchanan, was, in his time, about 12½ annas per 100 lb. Mr. Henley informed Dr. Royle that "Jute used to be sold some years ago for R. 1 8 for the bazar maund; but the demand in Britain has had the effect of raising the price of Jute to double its old Indian value. At present, any fine, long, silky Jute is eagerly bought up at Rs. 2 8; still for inferior Jute I should say, dealing face to face with the village dulals, the price would not exceed R. 1 8 per bazar maund." The culture of Jute has of late years been greatly improved in many places, as may be seen in much of that sent to market, and of which we have an instance in sample of a Jute presented for report by Mr. P. Carter of Bhojepore Factory to the Agri-Horticultural Society. This having been submitted to the members of the Flax Committee, the following favorable opinions have been expressed on it: Mr. Hodgkinson says,—This is the finest specimen of Jute I have ever seen—being bright, clean, strong, and of excellent

staple; the root ends particularly well freed of the hard woody bark which characterises bazar Jute, and deteriorates its value. I should say that £16 to £17 could be obtained for Jute of similar quality at home, being fully £2 per ton more than the ordinary descriptions now fetch. Mr. Fergusson says--It is very good Jute, worth £3 to £4 per ton more than what is generally shipped. Dr. Buchanan and Ram Comul Sen describe the Pat as spun by two kinds of spindles, the Takur and Dhara. A bunch of the raw material is hung up in every farmer's house, or to the protruding stick of a thatched roof, and every one who has leisure, forms with one or other of these spindles, some coarse packthread (sutoli), of which ropes are twisted for the use of the farm. The Dhara is a reel, on which a thread when sufficiently twisted, is wound up. The Takur is a kind of spindle which is turned upon the thigh or the sole of the foot. Ghurghurea is a third kind of spinning machine. It is only the lower Hindu castes, called Rajbongsi, Konget, and Polya, that form this packthread for being woven into sackcloth, and spin a finer thread from which the cloth called Megili, or Megila, is woven. By far the greater part of the cloth that is used dyed, receives the colour in the state of thread. The coarse cloth, called Megili, is woven by the women of the lower class of people. Most families have a loom, and the people, especially the women in the afternoons, work a little occasionally, and this serves to clothe the family. The pieces consist of three or four narrow cloths sewed together, some four or five cubits long, and from two to three cubits wide, and are worth from two to eight annas each. Some have red and black borders. It is said to be more durable than cloth made of cotton. Since the foregoing remarks were written by Dr. Royle, he has been favored with the following remarks from Mr. Henley. The plant in question is by far the most extensively cultivated of all the fibrous family throughout the delta of Bengal. Its easy culture, rapid growth, and comparatively large produce present advantages not to be overlooked by that eminently practical and economical people, the natives of Bengal. Had it combined along with these advantages, the qualities of strength and durability, it would probably have superseded all other fibrous materials; but, rapid in its growth, it is again remarkably rapid in its decay—being in fact the most perishable of fibres. It is generally grown as an after-crop, during the rainy season, on high land, or land not subject to submersion, like rice land. A hot and moderately rainy season suits it best; excessive rains or bad drainage injure and deteriorate it. In this point of view it is a precarious and delicate crop; otherwise it presents the advantage of affording a more valuable return from land at that season, than any other crop which the cultivator can employ. It is sown broadcast, requires careful weeding when young, but soon acquires strength enough to keep off all intruders. The young leaves are eaten by the natives as a sort of spinach; they have, however, a coarse, weedy flavour, little suited to our European palates. No plant is more grateful for good cultivation than the one in question, in a good, loamy soil, well manured, or which has been well manured under a former crop. It attains a height of ten or twelve feet, with stems of three quarters of an inch in diameter. A poor crop, or one which had suffered from excessive rains, would have a height of only from three to six feet. The crop being ripe, the stems are cut down close to the roots, made up into bundles, and laid to steep in some neighbouring ditch, where lumps of mud are placed on them to keep them submerged. Here they are carefully watched from day to day, the operator trying the bark with his nail, until he finds the decomposition arrived at the proper point. In preparing Jute intended for export, he will push the water-retting process to its utmost limits, short of actually destroying the fibre by excessive putrefaction. This is done in order to obtain that thoroughly detached silky character of fibre, according to which it is valued in the export market. Such Jute has always suffered more or less in strength.—Jute or Paut prepared for native consumption is much more durable than that prepared for export. It is likewise cheaper, as the yield per acre is much larger. It is much darker coloured, and not so clean. The natives are very particular in the selection of Jute for such purposes as pack-saddle bags for their transport oxen; or for their store-grain bags—great packages of six or eight feet diameter, erected on bamboo stages, and looking like our European brewery tuns. There are also a multitude of manufactures in this fibre, many of them possessed of considerable strength, some again of very fine texture. To return to our water-retting process. The proper point being attained, the native operator, standing up to his middle in water, takes as many of the sticks in his hand as he can grasp, and removing a small portion of the bark from the ends next the roots, and grasping them together, he strips off the whole with a little management, from end to end, without breaking either stem or fibre. Having prepared a certain quantity into this half state, he next proceeds to wash off: this is done by taking a large handful; swinging it round his head he dashes it repeatedly against the surface of the water, drawing it through towards him, so as to wash off the impurities; then, with a dexterous throw he fans it out on the surface of the water, and carefully picks off all remaining black spots. It is now wrung out so as to remove as much water as possible, and then hung up on lines prepared on the spot, to dry in the sun. Jute is never so beautiful as at the first moment of its preparation; for such is

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its proneness to decay—a true eremacausis of Liebig—that it changes colour from day to day, gradually descending from the beautiful pearly white, through shades of fawn colour and brown, with proportionate loss of strength. These changes, also, are occasioned or accelerated by causes which hardly affect other fibres; hence, one of the difficulties of bleaching, and the tendency to become brown, of all fabrics consisting of this material. That portion of the hank of fibre next the root, or where it has been held in the hand, being always more or less contaminated with bark and impurities, is cut off for about nine inches. These ends are sold to the paper-makers and for mixing and making up various thick, coarse fabrics, of which whole cargoes, amounting to tens of thousands of pieces, are now annually taken off by the Americans from Calcutta, for cotton bagging and similar purposes, forming an entirely new trade. The manufacture of Jute whiskey from these ends was tried experimentally, by subjecting them to the process of conversion into sugar with sulphuric acid, and afterwards fermenting. The produce had much resemblance to grain whiskey. But the great trade and principal employ of Jute is for the manufacture of Gunny chuts or chuttees, *i. e.*, lengths suitable for making bags. This industry forms the grand domestic manufacture of all the populous eastern districts of Lower Bengal. It pervades all classes, and penetrates into every household. Men, women, and children find occupation therein. Boatmen in their spare moments, husbandmen, palankeen-carriers, and domestic servants; everybody in fact, being Hindoos—for Mussulmans spin cotton only—pass their leisure moments, distaff in hand, spinning Gunny twist. Its preparation, together with the weaving into lengths, forms the never-failing resource of that most humble, patient, and despised of created beings—the Hindoo widow—saved by law from the pile, but condemned by opinion and custom for the remainder of her days, literally to sackcloth and ashes, and the lowest domestic drudgery in the very household where once, perhaps, her will was law. This manufacture spares her from being a charge on her family—she can always earn her bread.—Amongst these causes will be discerned the very low prices at which Gunny manufactures are produced in Bengal, and which have attracted the demand of the whole commercial world. There is, perhaps, no other article so universally diffused over the globe as the Indian Gunny bag. All the finer and long stapled Jute is reserved for the export trade, in which it bears a comparatively high price. The short staple serves for the local manufactures, and it may be remarked, that a given weight of Gunny bags may be purchased at about the same price as a similar weight of raw material—leaving no apparent margin for spinning and weaving. The stems or stalks of the Jute crop are of almost equal value with the fibrous portion. They are beautiful white and straight stems, of a light, brittle wood, somewhat like willow switches, and have a multitude of uses amongst the natives, such as for the manufacture of charcoal for gunpowder and fireworks, for the formation of fences and enclosures, for pea and similar cultivation, and for the construction of those acres of basket-work which the traveller may remark near every native village. These are the enclosures in which the betel-pepper vine is cultivated, the leaf of which is universally consumed by the million—peer or peasant. These stems have another extensive employ which cannot be passed unnoticed—that of furnishing a peculiar quality of fuel suited to the native process of careening boats on the banks of the rivers. Great flaming fires may be observed at night under the bottoms and sides of the native craft; men running to and fro with bundles of flaming faggots, applying them assiduously, as if they were occupied in trying to burn the craft. Looking at the structures themselves, built up of mats and thatch, and appearing like slovenly, ill-conditioned hay stalks, that an accidental spark would ignite, it appears surprising that such a determined effort should not produce that result. The only object, however, is to effect the destruction of the myriads of worms or teredæ, which, if not destroyed, would in a very short time have eaten up the whole fabric. Bengal Jute has now attained such an important position in the commerce of the world that any suggestion for its improved production merits attention; and there can be no doubt but that the application to it of the process of preparing the fibre without water-retting, would effect the most signal improvement in its qualities. Such could never make it equal to Flax or Hemp; but the method would increase the qualities of strength and durability, and fit it for all purposes in which moisture took no part, for to this agent it is peculiarly obnoxious. In reference to this point it may be worth noticing, that in cases in which it is desirable to ascertain the amount of Jute adulteration in such fabrics as sail-cloth (in which it appears to me to be a highly criminal fraud), a very good test may be found in high-pressure steam. A piece of such sail-cloth, kept for four hours in steam of 30 lbs. pressure, lost on simple washing thereafter, 22 per cent.—the decomposed Jute actually washing out, and with little injury to the remaining fabric. Besides being used in India and exported to England, it is sent to America, and will probably be required on the Continent of Europe but it is necessary for the people, if they wish to retain or extend their trade, to keep up the quality of their produce, which is complained of in the following extract from a letter from America to Dr. Royle. "The article of Gunny bagging for cotton is imported largely into this country

from India; in fact, is superseding all other descriptions of cloth for that purpose. I have been asked several times what it is made of, and where manufactured. On both points I am ignorant, and should be much obliged if you will give me the information. It is superior to and liked better than any other bagging; but the manufacturers are already commencing to make it inferior, by mixing ordinary (Indian) Hemp or tow with it. They will spoil their market unless they desist from such practices, for the planters will not use an inferior, if they can procure a good article." *Georgia, 15th April*, 1853. Some of the Jute lately imported into England has been twelve feet in length, in bales of about 4 cwt., bound round with Gunny cloth. The exports of Jute have already been alluded to when referring to the great increase which has taken place in this trade. Many other Indian fibres are possessed of equally good properties in some respects, and of very superior ones in others, and which require only to be known to be very generally appreciated in Europe.

JUTE, GUNNY CLOTH, AND GUNNY BAGS EXPORTED FROM CALCUTTA, IN THE YEAR 1850-51.

Exports.	Jute.	Gunnies and Gunny Cloth.
To United Kingdom, ...	Ms. 768,945	Nos. 69,636
„ France, ...	13,931	—
„ Hamburgh, ...	128	2,180
„ North America, ...	9,242	2,290,427
„ Coast of Coromandel, ...	598	1,955,150
„ Malabar, ...	—	2,054,075
„ Penang and Singapore, ...	—	1,043,600
„ Ceylon, ...	—	357,290
„ New South Wales, ...	54	32,125
„ Trieste, ...	401	—
„ Java, ...	—	242,550
„ Pegu, ...	—	672,950
„ Mauritius, ...	—	213,980
„ Cape of Good Hope, ...	—	82 750
„ Guam, ...	—	15,000
„ Arabian and Persian Gulfs,	—	4,000
Total..	Mds. 793,299	9,035,713
Value...	Rs. 1,970,715	Rs. 2,159 782

The following statement shows the proportion of Gunnies and of Gunny Cloth; and also that a decrease took place in the former, and an increase in the latter in the two years given:

Exports from Calcutta.	1849-50.	1850-51.
Gunnies, ...	12,961,441	8,759,185
Gunny Cloth, ...	238,039	276,528
Total...	13,199,480	9,035,713
Value....	Rs. 2,683,551	2,159,782

Besides these there were exported from the Madras Presidency 58,950 gunny bags; but there is reason to believe that these are made of *Sunn* or *Crotalaria juncia*. Bombay being on a small island, cannot export any of its own growth; but as Gunny cloth is much required for packing cotton, it is imported in large quantities, as 167,820 pieces, valued at Rs. 397,097 (but in 1849, to the value of Rs. 548,384), from the United Kingdom, Ceylon, East Coast of Africa, and Soumeeanee, but chiefly from Calcutta; also from Cutch, Malabar, and Canara, Aden, Sindh, Concan, and Guzerat. But we also find the places mentioned after Calcutta as those to which Gunny cloth was exported, but not in any quantity, except 296,757 pieces to the Concan—the whole export for that year amounting to 391,279 pieces, and the re-exports to 3,403,453, valued at Rs. 468,177, therefore greatly exceeding the imports, and hence probably including some brought by the Causeway. The kind of cloth called *chatee* is made from the same material, and is made of three different kinds, and always woven in pieces from three quarters to one cubit wide, of which two or three are sewn together into one piece before it is sold. The first kind, intended for bedding, is from four to five cubits long, and from two and a quarter to three cubits wide, and sells at about 8 rupees per 100 pieces. Secondly, that intended for covering bales of cloth is of the same dimensions, but is thicker than the former kind. The 100 pieces cost from 6 to 10 rupees. Thirdly, that intended for making rice and sugar-bags is four cubits long, and one and a half or one and a quarter cubit wide, and ten bags cost 4 or 5 rupees. These are sewed or doubled and made into bags. The value of the manufacture in the Dinajepore district amounted to 160,000 rupees. (Buchanan.) The principal places where Chatees are manufactured are Malda, Purnea, Natore, Rungpore, and Dacca; where the cultivation of Jute is extensive, and the price of labour and land very cheap. Ram Comul Sen says, "If the labour of spinning the Jute and weaving Chatee, are to be done according to the rules of labour at Calcutta, the price of gunny would be more than double that for which it is sold." The greater part is cultivated by those who use or manufacture it; for almost all the small Hindu farmers weave cloth of this material, and every farmer requires some for the use of his farm. On all the eastern frontier a great proportion of the women are clothed in the coarse cloth made of the Corchorus, which also gives them much employment. The value of the material consumed in those days was about 70,000 rupees. In the cold weather the poor cover themselves by night, and often by day with a sackcloth rug; and the rich usually put one under their bedding. Some is required for the packing of tobacco and for some grains, but much even in those days was exported to Calcutta, Patna, and other places.

In the north-west port of Bengal a great porportion of the people used to be clothed with Megili or Pata. Specimens of this Pat clothing were sent to the Exhibition of 1851.—*Royle, Fibrous Plants, pages 240 to 252.*

(2868) CORDAGE.

Touw-werk, Dut.	Russee, Hind.
Manœuvres, Cordage, Fr.	Caolame, It.
Tauwerk, Ger.	Jarcia, Cordaje, Sp.
Doodah, Guz.	

A term used in general for all sorts of cord, whether small, middling, or great. Coir cordage is largely manufactured on the Malabar Coast, and the Laccadive and Maldive Islands, and is the kind in general use in rigging native craft, &c. Cordage of excellent quality is manufactured in Calcutta: the principal of the fibrous plants of Southern Asia are as follows:—

Abelmoschus esculentus, ...	Vendee fibre.
Abelmoschus ficulneus, ...	
Abutilon indicum, ...	Toottee.
Abutilon polyandrum, ...	
Abutilon tomentosum, ...	
Acacia leucophlœa, ...	Oody nar.—This tree is common near Cape Comorin. The fibres from the bark are used by the fishermen in making nets. A coarse kind of cordage is also made from it.
Acacia indicum, ...	Karoovalum nar.
Agave americana, ...	Pita fibre or great Aloe.
Agave vivipara, ...	Kathalay.
Ailantus malabaricus, ...	Poroomarum.—Inner bark. Not much used.
Aloe indica, or vulgaris, ...	Kuttally nar.
Aloe perfoliata, ...	Aloe fibre.
Ananassa sativa, ...	Pine Apple fibre.
Andropogon schœnanthus,	Camachy.
Antiaris saccidora, ...	Arengee.
Bauhinia racemosa, ...	Malthun.
Bauhinia diphylla, ...	
Bauhinia Vahlii, ...	Yepy tree bark.
Bauhinea tomentosa, ...	Vellay Aatee nar.
Baehmeria; several species,	
Borassus flabelliformis, ..	Palmyra fibre.
Butea frondosa, ...	Brown hemp.
Callicarpa lanata, ...	Thondy nar.—Inner Bark. Not much used.
Calotropis gigantea, ...	Ak, Mudar, or Yercum.
Cannabis sativa, ...	Hemp.
Chamœrops or Hemp palm,	
Crotalaria juncea, ...	Canamboo or Wuckoo.—Cultivated extensively in the Southern districts. It is not exported. Fishing nets are made from them; the best kinds are grown in the Northern districts of Travancore.
Cordia obliqua.....	Pothooveroosen nar.—Moderate strength.
Crotalaria juncea, ...	Sunn (wuckoo nar.)
Crotalaria tenuifolia, ...	
Cocos nucifera, ...	Cocoa.
Corchorus olitorius, ...	Jute.
Corchorus capsularis, ...	
Cyperus textilis, ...	Mat-grass, or Coaray.
Decaschistia crotonifolia, ...	
Dœmia extensa, ...	Ootrum ka bel.
Eriochlœna Candollii, ...	
Eriodendron anfractuosum,	Bast.
Erythrina indica, ...	
Ficus religiosa, ...	Arasa nar.
Ficus racemosa, ...	Atti nar.
Ficus indica, ...	Aulamarum nar, Aallen nar. —Not much used.
Ficus oppositifolia, ...	Bodda nar.
Ficus mysorensis, ...	Kul-aallun nar.—Not much used.
Fourcroya gigantea, ...	Seemay Kathalay.
Girardinia Leschenaultiana,	Neilgherry nettle.
Gossypium indicum, ...	Indian Cotton.
Gossypium acuminatum, ...	Brazil Cotton.
Grewia asiatica, ...	Bast.
Grewia tiliæfolia, ...	
Grewia rotundifolia, ...	Oonoo.--Moderate strength.
Guazuma tomentosa, ...	
Hibiscus cannabinus, ...	Poolychay fibre.
Hibiscus sabdariffa, ...	Roselle fibre,
Hibiscus vesicarius, ...	Wild ambara.
Hibiscus rosa chinensis, ...	Shoe plant fibre.
Hibiscus vitifolia, ...	
Hibiscus lampas, ...	
Hibiscus macrophyllus, ...	
Isora corylifolia, ...	Valumbrikai, Kywen nar. This is the most valuable fibre in Travancore. The plant grows abundantly at the base of the hills. It is from the stem of this shrub that the natives produce fibre.
Linum usitatissimum, ...	Flax.
Mimosa Intsia, ...	Eenjy nar.
Musa paradisiaca, ...	Plantain fibre.
Pandanus odoratissimus, ...	Fragrant Screw Pine.
Paritium macrophyllum, ...	
Paritium tiliaceum, ...	
Rhaphis, ...	
Saccharum sara, ...	Sara.
Sanseviera zeylanica, ...	Moorghee, or Marool.
Salmalia malabarica, ...	Elavum parooty.
Sesbania cannabina, ...	
Sida populifolia, ...	Used for Cardage &c.
Strychnos potatorum, ...	Katha vennar.
Smilax ovalifolia, ...	Krinkoddy nar.—Used for tying bundles &c.
Sterculia guttata, ...	
Sterculia ornata, ...	
Terminalia alata, ...	Mooroothen nar.—Bark, very strong and lasts many years: used for dragging timber, cordage &c. Common in the forests.
Terminalia belerica, ...	Umburathee nar.
Tylophora asthmatica, ...	Koorinja.
Vernonia anthelmintica, ...	Coat seeragum.
Yucca gloriosa, ...	Pita or Adam's Needle.
Yucca aloifolia, ...	

In the Tenasserim Provinces, as in other parts of India, cordage is made of coir, the outside shell of the cocoa-nut, but ropes are more frequently made from the bark of three different trees belonging to the genera hibiscus, paritium, and sterculia, viz, Paritium macrophyllum and P. tiliaceum; Hibiscus macrophyllus, Sterculia guttata and Sterculia ornata.—*Mason.*

(2869) CORDIA, a genus of Plants belonging to the natural order *Cordiaceæ*. It has a tubular calyx, 4-5 toothed. Corolla funnel shaped or

campanulate with a flat 5-7 cleft limb, and a hairy or naked throat. Stamens 5, short, inserted in the throat of the corolla. Style protruding, bifid, with 4 stigmas. Ovary 3-4 celled. Drupe containing 1 stone with 1 or 3 cells, two of which are usually abortive.—*Eng. Cyc. page* 146. In the southern part of the Peninsula, the Tamil name, Narvillie marum, seems to be applied indiscriminately to three or four species of the genus, Cordea Rothii, Icon. 1379, Cord. obliqua, Icon. 1378, Cord. fulvosa, Icon. 1380, *Borragineæ*, so that it is impossible to say which is the one meant by it. Cordea obliqua, C. Rothii and C. fulvosa have all been brought to Dr. Wight, under this name. He believes the wood of all is very inferior, the trees being usually small.—*Wight.* Dr. Wight gives in his Icones, Cordia cuneata, 1379; domestica, 1378; fulvosa, 1380; Leschenaultii, 1380; Myxa, 1378; obliqua, 1378; Perrottettii, 1381; Rothii, 1379; serrata, 469; tomentosa, 1378; trichostemon, 1380; and Wallichii, 1378.

(2870) CORDIA ANGUSTIFOLIA.

Goondnee, Hind.

This tree is from 30 to 40 feet high, the wood is very tough, used for carriage poles, &c., fruit the size of a large pea, round and smooth, the pulp yellow, and gelatinous, the tree is common throughout the Deccan.—*Riddell.* Dr. Buchanan, in his 'Journey through Mysore,' mentions that ropes are made of the *Narweli*. Naravali Fibre, which is the *Cordia angustifolia*, and which he found common near Severndroog. Its fruit is esculent, but tasteless. The plant belongs to the same family as the Sebestens, formerly famous in medicine; but which, when ripe, seems only remarkable for containing much mawkish mucilaginous pulp. It is possible that the bark of some of the species, when young, may yield a useful fibre.—*Royle. Fib. Pl. page* 11.

(2871) CORDIA LATIFOLIA. Roxb. Fl. Ind. i. p. 588.

Buhooari, Beng. | Burra Icsoora, Hind.—*O'Sh. p.* 497.

Broad-leaved Cordia. The tree is common at Ajmeer, is found in Hindostan, but mostly confined to the southern parts of India.—*Royle. C. latifolia* has numerous spreading and drooping branches; the young shoots angular and smooth. The general height of trees ten or twelve years old about 20 feet.—*Eng. Cyc. p.* 146. The fruit is eaten: "phaleetas" or slow matches are made of the bark. This tree is hardy and ornamental, and would do well in compounds along with other trees.—*Gen. Med. Top.* The wood is very inferior, and of small size. Under the name Sebesten Plums, Sebestans, or sepistans, two sorts of Indian fruit have been employed as pectoral medicines, for which their mucilaginous qualities, combined with some astringency, have recommended them. They are believed to have been the *Persea* of Dioscorides. Linnæus has erroneously applied the name of Sebesten to an American species of this genus which is not known in medicine.—*Eng. Cyc. page* 146.

(2872) CORDIA MYXA. Roxb. Fl. Ind. i. p. 500. *Syn* Sebestena officinalis.

Vidi marum, Tam.	Buhooarie Beng.
Kendal, Jav.	Lesura, Hind.
Lebuck, Avicenna.	Nekra, Tel.
Mochayet, Forskal,	Bukampadáruk a. Sans.
Lolu, Cyng.	

A native of many parts of India, Persia, Arabia, and Egypt, and common throughout the Concan. The trunk is generally crooked, from 8 to 12 feet high, and as thick or thicker than a man's body. The bark gray, cracked in various directions. Branches numerous, spreading, and bent in every possible direction, forming a dense shady head. The flowers are numerous, white and small.—*Eng. Cyc. page* 146. The fruit of *Cordia Myxa* has been long used as a medicine under the name of Sebistans or Lobestens. *C. latifolia* is supposed to produce the larger, *C. Myxa* the smaller variety of this article. The bark is deemed a mild tonic. That of *C. angustifolia*, Roxb. (Goondnee) is much used for making astringent gargles. The dried fruits are very glutinous in the fresh state. They are slightly laxative, but it is especially as a pectoral that they are esteemed in India. In Java the fruit is used in gonorrhœa and ardor urinæ; 12 drachms of the pulp are said to be equal in aperient effect to the same quantity of cassia pulp. The seeds of Cordia Myxa, are called *Chakoon ke beenge*, and deemed an infallible remedy in ringworm, the powder mixed with oil being applied to the eruption.—*O'Shaughuessy, p.* 498. The smell of the nut when cut is heavy and disagreeable; the taste of the kernels is like that of filberts. It is the true Sebesten of the European Materia Medica. The fruits according to Roxburgh, are not used in the Circars medicinally, but when ripe are eaten by the natives, and also most greedily by several sorts of birds, being of a sweetish taste. The wood is soft, and of little use except for fuel. It is reckoned one of the best kinds for kindling fire by friction and is thought to have furnished the wood from which the Egyptians constructed their mummy cases. The wood is said by Dr. Royle to be accounted a mild tonic.—*Engl. Cyc. page* 146.

(2873) CORDIA OBLIQUA. Willd.

Narroovallay pullum, Tam.	Lasora. Hindooee.
Goudnee, Duk.	Seloo, Sans.

This is a large handsome tree, common in the lower provinces of India, with a small, round, reddish colored, pleasant tasted, but glutinous, fruit—*Ainslie page* 228.

(2874) CORDIA SERRATA. Saw-leaved Cordia. Gab, Gad, Gondori, Hind.

This species is common in hedges at Ajmeer.

The small gummy berries are eaten as a fruit by the poor.—*Genl. Med. Top. page* 184.

(2875) COREOPSIS. The bright yellow flowered coreopsis, which derives its name from the resemblance of its seeds to an insect, is uncommon in Tenasserim gardens.—*Mason.*

(2876) COREOPSIS, Varieties. Are annuals well worth cultivating in India either in pots or the flower garden: raised from seeds, should be sown at various times during the cold months for the purpose of obtaining a succession of bloom, sown in February; they may be had in flower during the hot months, if attended to with water, at which season any flower is acceptable.—*Jaffrey.*

(2877) COREOPSIS TINCTORIA. *Compositæ.* There are several varieties of this elegant flower. The leaves have a strong scent of fennel. The colour of the flower is a deep orange yellow striped with red. The seed may be sown at the commencement of the rains, or at any time after. It requires no particular care beyond other border flowers.

(2878) CORGE. Twenty pieces of Cloth.

(2879) CORIANDER SEED.

Kezeerah. Arab.	Dhunnia, Guz. & Hind.
Dhunia, Beng.	Coriandri semina, Lat.
Cotum-barroo, Cyng.	Mety, Mal.
Cottimbiry, Can.	Kushneez, Pers.
Coriander, Dut.	Coentro, Port.
Coriandre, Fr.	Dhanyaka. Sans.
Koriander Saamen, Ger.	Cottamillie, Tam. & Tel.

The fruit or seed of an annual plant (*Coriandrum sativum*), cultivated in Suffolk, Essex, Kent, in Great Britain, and the Levant, Tartary, South of Europe, and in parts of India. When fresh, their smell is strong and disagreeable, but by drying it becomes sufficiently grateful. They are used as an ingredient in curries in India, and medicinally as a stimulant and stomachic. The seeds are procurable in all Indian bazars. In Europe, Coriander seed is chiefly used by distillers to produce an aromatic oil. The quantity imported annually into Britain does not exceed 50 tons, and it is brought principally to the port of Hull. —*Simmonds.* At the Madras Exhibition of 1855, *Coriander*, *Aniseed* and *Cummin* were largely exhibited from several collectorates.—*M. E. Juries Reports.*

(2880) CORIARIA NIPALENSIS. (Vern. *Mussooree*) from its abundance, has bestowed its name on that well known hill station in the Himalayas. It is also common in Nipal. The fruit formed by the junction of several pistils is eaten in the hills, although that of the European species is poisonous, inducing narcotism and tetanus. The leaves of *Coriaria myrtifolia* have been used in France for the adulteration of senna, and have occasioned some fatal accidents. All parts of these plants are very rich in the astringent acids, and are consequently much employed by dyers.—*O'Shaughnessy, page* 270.

(2881) CORIARIACEÆ a vey small natural order of Gynobasic Polypetalous Exogenous Plants. The two genera, of which alone the order consists, are nearly allied to *Rutaceæ*, but their leaves are not dotted.—*Eng. Cyc. p.* 148.

(2882) CORIANDRUM, a genus of Plants belonging to the natural order *Umbelliferæ.*—*Eng. Cyc. p.* 147.

(2883) CORIANDRUM SATIVUM, Coriander plant.

Duniya, Beng.	Duniah, Duk. Hind. & Can
Kushneez, Pers.	Coriander, Coriandrum sativum, Lin.
Kuzeereh. Arab.	Damaka, Sans.
Cottamillie, Tam.	*Ainslie's Mat. Med. p.* 263.
Dhana, Guz.	

C. sativum is found in the corn-fields of Tartary, the Levant, Greece, Italy, and south of Europe.—*Eng. Cyc. p.* 147. It is grown in every part of Southern Asia, where the leaves are used by the natives for chatnies and curries, the seeds in decoction, sweetmeats; of easy culture; raised from seed: will grow in any good soil. The fruit is carminative and aromatic. Cullen considered it more powerfully corrective of the odour and taste of senna than any other aromatic. (Lindley, 'Flora Medica.')—*Engl. Cyc. page* 147. During the unripe state, the odour resembles that of bugs, but this changes rapidly as ripening proceeds. Fée derives coriandrum from χορις, *a bug*, on account of the factor of the young seeds.—*O'Shaughnessy, page* 371. Coriander Fruit, or seeds as they are incorrectly called, are used in sweetmeats, in certain stomachic liqueurs, and in some countries in cookery: they are little esteemed in England.—*Engl. Cyc. page* 147.

(2884) CORK.

Kork, Kurk, Vlothout, Dut.	Sughero, Suvero, It.
Liege, Fr.	Suber, Lat.
Kork, Ger.	Cortica, Port.
Bhooj Guz. Hind.	Korkowoe derewo, Rus.
	Corcho, Sp.

The outer bark of a species of evergreen oak (*Quercus suber*), abundant in Portugal, Spain, Italy, the south of France, Corsica, and other countries. It is light, porous, compressible, and elastic. Corks, floats for nets, and other articles are cut and shaped out of the bark. Cork, botanically considered, is a soft and elastic layer of bark which becomes remarkably developed in the kind of oak inhabiting Spain and Portugal. This substance is developed in other plants, but in none in so large quantity as in the *Quercus suber.* As soon as the bark dies it ceases to grow, and then, not distending as it is pressed upon from within, it falls off in flakes which correspond to the layers that are formed annually. These flakes are the layers of cork which the Spaniards collect under the name of the outer bark, while the inner living bark is or rather should be spared. We are told

however by Captain Cook that the Spaniards have been in the habit of stripping off the inner bark also, although it is of no value except for tanning, and although its removal destroys the trees. The same intelligent observer states that the cork-tree occurs in Spain throughout the whole extent of the Tierra Caliente, but it is most abundant in Catalonia and Valencia, whence the principal exports have been made.—*Engl. Cyc. page* 148. At the Madras Exhibition of 1855, two specimens of cork were exhibited, one good, from the "Western Coast Jungles," and another inferior from Coimbatore, the trees producing the samples were not mentioned. The deeply cracked spongy bark of the "*Bignonia suberosa*" (country-cork tree) yields an inferior kind of cork.—*M. E. J. R.*

(2885) CORN.

Korn, Dan.	Frumentum, Lat.
Graanen, Dut.	Zboze, Pol.
Bleds, Grains, Fr.	Graos, Port.
Korn Getreide Ger.	Chljeb, Rus.
Dhan, Guz. Hind.	Granos, Sp.
Biade Grani, It.	Sad, Spannmal, Sw.

The grain or seed of plants separated from the spica or ear, and used for making bread, &c. Such as wheat, rye, barley, oats, &c. *Faulk:*

(2886) CORNELIAN, Agate, Carnelian.

Achaat, Dut.	Agata, It.
Agate, Fr.	Achates, Lat.
Achat, Ger	Agat, Rus.
Akeek, Guz. & Hind.	

A genus of semi-pellucid gems. It takes a very high polish, and its opaque parts usually present the appearance of dots, eyes, veins, clouds, zones, or bands. Its colours are yellowish, reddish, blueish, milk-white, honey-orange, or ochre-yellow, flesh-blood, or brick-red, reddish-brown, violet-blue, and brownish-green. The most beautiful agates found in Great Britain are the *Scotch Pebble*, which are met with in the mountains of Cairngorm, by which term they are distinguished. Cornelians are also obtained in Germany, Siberia, Ceylon, some parts of the Cape of Good Hope, but the principal agate mines are situated in the province of Guzerat. From the latter place they are brought to Bombay in the form of beads of various shapes and sizes, small square cut pieces, (which are chiefly re-exported to China), rings, brooches, studs, cups, and a variety of other ornaments.—*Faulkner.* Cornelians, agates, and other stones of greater or less value are purchased by the Chinese for manufacturing into official insignia, rings, beads, and other articles of ornament; they are brought to China chiefly from India or Central Asia.—*Williams.*

(2887) CORNUS CAPITATA. Caprifoliaceæ.

Bhumowra, Hind.

This genus of plants consists of large trees and shrubs, the bark of the C. florida and sericea are said to be most excellent tonics.—*Riddell.*

(2888) CORNUS. Several species of this genus have been found in the Himalayas, in Sylhet, and Nipal, by Drs. Wallich and Royle; these are the Cornus oblonga, in the Deyra Doon; C. macrophylla, and C. nervosa, Mussoorie; and Cornus capitata, Wall., (Benthamia fragifera, Lind.) at a still higher elevation.—*O'Shaughnessy, p.* 375. The fruit of *Benthamia* is eaten in the hills, and from the seeds of some species an oil is expressed.—*O'Shaughnessy, p.* 375. Wight, in Icones, gives figure of Cornus altera, 1211, sylvestris, 1211, and Zeylanica, 1210-11.

(2889) COROMANDEL or CALAMANDER WOOD. This is the produce of a Ceylon tree of great size, having a dingy ground, and sometimes running into white streaks. It is used in cabinet work, like zebra and rose wood, to which it has some resemblance.—*Faulkner.* Tredgold mentions that the figure is between that of rose-wood and zebra-wood; the colour of the ground is usually of a red hazel brown, described also as chocolate brown, with black stripes and marks. It is said to be so hard as almost to require grinding rather than cutting, this is not exactly true, as the veneer saws cut it without particular difficulty: it is a very handsome furniture wood and turns well; it is considered to be a variety of ebony. Mr. Laird says there are three varieties of Coromandel; the Calamander or Coromandel, which is the darkest, and the most commonly seen in England; the Calemberri, which is lighter coloured and striped, and the Omander, the ground of which is as light as English yew, but of a redder cast, with a few slight veins and marks of darker tints. He says, the wood is scarce and almost or quite limited to Ceylon; that it grows between the clefts of rocks, this renders it difficult to extract the roots, which are the most beautiful parts of the trees. The Calamander wood tree is Diospyros hirsuta, and Kadum Beriya is D. Ebenaster, according to Moore's Catalogue of Ceylon Plants, and therefore of the same genus as the true Ebony.—*Holtzappfel.*

(2890) CORONILLA. Two species are described, having cathartic leaves and juice.

(2891) CORONILLA GRANDIFLORA. Willd.

Its greens.

Aghaty kai, Tam.	Avisic kaia, Tel.
Aghaty ke pullie, Duk.	Aghastia, Sans.

The slender long legume of this plant is eaten by the natives who dress it in various ways. The tree in Malay is called Turi.—*Ainslie page* 236.

Its leaves.

Aghaty keeray, Tam.	Coronilla grandiflora,
Aghaty ke baujie, Duk.	Lin.
Avisee koora, Tel.	Aghastia, Sans.

This tree is commonly planted to support the Betel vine. Rheede tells us in his Hortus Mala-

baricus that an infusion of its leaves is given on the Malabar coast, in cases of catarrh. *Vide Hort. Mal. par.* 1. *page* 96 —*Ainslie, p.* 252.

(2892) CORONILLA PICTA (Flore purpureo.)

The plant.

Carin Chembie, TAM.	Purple Flowered Coronilla ENG.
Nulla Somuttie, TEL,	Kristnah Rajum, SANS.

This is a plant held in high estimation by the Tamools as well on account of the great beauty of its delicate purple flowers as from the virtues, the leaves are said to possess : these are invariably employed when they can be obtained in such cases as require poultices to hasten suppuration which they form by being made warm and mixed with a little castor oil. The leaves smell like fresh clover, and are food for cattle.—*Ain's. Mat. Med page* 75. Poultice of Nutceya Leaf prepared as Nim leaf poultices, are favourite external emollients among the native practitioners.—*Beng. Phar. page* 390.

(2893) COROSOS, OR IVORY-NUTS, are produced by Phytelephas macrocarpa, growing in central America and Columbia, (Humboldt.) They are described as seeds with osseous albumen ; the tree is a genus allied to the Pandaneæ, or screw Pines, and also to the Palms. The nuts are of irregular shapes, from one to two inches diameter, and when enclosed in their thin husks, they resemble small potatoes covered with light brown earth : the coat of the nut itself is of a darker brown, with a few loose filaments folded upon it. The internal substance of the ivory-nut resembles white wax rather than ivory ; it has, when dried, a faint and somewhat transparent tint between yellow and blue, but when opened it is often almost grey from the quantity of moisture it contains, and in losing which it contracts considerably. Each nut has a hole, which leads into a small, central, angular cavity ; this, joined to the irregularity of the external form, limits the purposes to which they are applied, principally the knobs of walking sticks, and a few other small works.—*Holtzappfel.*

(2894) CORRÆA. RUTACEÆ. The species of this genus are mostly shrubs, the flowers white and scarlet, each plant requires a tolerable space to grow in, as it attains the height of six or more feet, and should be placed in a shrubbery where the soil is good.—*Riddell.*

(2895) CORROSIVE SUBLIMATE, BI-CHLORIDE OF MERCURY,

Ruscapoor, GUZ. HIND.	Doppelt chlorquecksilber, GER.
Bi-chlorure de Mercure,	Hydrargiri Bi-chloridum, LAT.
Sublime corrosif, FR.	

Is white, with an acrid metallic and persistent taste, without smell. It is met with in small crystals, on in semi-transparent masses. Corrosive sublimate is made in Surat, and seems to have been long known to, and prepared by the natives of India.—*Faulkner.*

(2896) CORTINARIUS EMODENSIS, of the Rev. M. J. Berkeley, who has named and described it from Dr. Hooker's specimens and drawings.—*Hooker Him. Jour. Vol.* ii. *page* 47. It is a large mushroom, the "Onglau" of Thibet : it forms a favorite article of food.

(2897) CORUNDUM. ADAMANTINE SPAR.

Samada, GUZ. HIND.

Several substances differing considerably in colour, and sometimes in form, but nearly agreeing in composition are classed together under the name of *Corundum*, which is that given to the common variety by the natives of India.—*Engl. Cyc. p.* 151. This stone is, with the exception of the diamond, the hardest substance known. It is generally of a pale-gray or greenish colour, but sometimes of red and brown tints. It is found in India, China, and in some parts of Europe. The Indian variety is whiter than the Chinese, and is considered the purest. In India it is used for polishing steel, and cutting precious stones ; it is always procurable in the bazars.

Common Corundum. This variety, usually called *Adamantine* spar, occurs, like the sapphire and Ruby, commonly in the secondary form of 6-sided prisms, but usually much larger. It is sometimes nearly colourless, and rather translucent ; it presents great variety of colour, but is most commonly greenish or grayish ; occasionally brown or red, rarely blue. Although its most common form is the 6-sided prism, it occurs, though rarely, also in acute and obtuse double 6-sided pyramids. On account of its extreme hardness it received the name of Adamantine spar. It occurs in China, Bengal, Malabar, Tibet, the Carnatic, &c. It is used in the East Indies for cutting and polishing precious stones, and also granite and other hard rocks that are employed in the temples and other public monuments. According to Chenevix the Carnatic Corundum contains silica, but this does not appear to be constant.—*Engl. Cyc. page* 151.

Emery. This substance which, when reduced to powder, is much used for polishing hard bodies, though very different in appearance from the preceding, is on account of its hardness and an analysis, regarded as Amorphous Corundum. Its colour is usually gray ; its lustre is somewhat glistening. Its specific gravity is about 3·66 to 4 ; it occurs massive, and is granular. It is principally imported from the island of Naxos in the Grecian Archipelago, and was found by Mr. Smithson Tennant to consist of,

Alumina, ...	86
Silica, ...	3
Oxide of Iron, ...	4
	— 93

It occurs also in Italy, Spain, and Saxony; in Asia minor, India and America, and it is said, in small quantities, also in Wicklow, Ireland.—*Eng. Cyc. page* 152.

Ruby. Colour blood-red or rose-red, sometimes a tinge of violet; primary form as above, and generally occurs in 6-sided prisms. It is not so hard as the Sapphire, and is more readily cleaved. Like the Sapphire, it consists of pure alumina. "The largest oriental ruby known was brought from China to Prince Gargarin, governor of Siberia; it afterwards came into the possession of Prince Menzikoff, and constitutes now a jewel in the Imperial Crown of Russia." (Dana.)—*Engl. Cyc. page* 151.

Sapphire, of which there are several varieties, the names of which are dependant chiefly upon their colour: the *White Sapphire,* which is transparent or translucent; the Oriental Sapphire, which is blue; *Oriental Amethyst,* which is purple; the *Oriental Topaz,* yellow; the *Oriental Emerald,* green: and some other varieties occur, as the *Chatoyant* and the *Opalescent Sapphire.* —*Engl. Cyc. page* 151.

Prismatic corundum or chrysoberyl, is found among the Tora hills near Rajmahal on the Bunas, in irregular rolled pieces, small and generally of a light green colour: these stones are considered by the natives as emeralds, and pass under the name of "punna," but the natives are aware that they are still softer than the real emerald of India (which is generally green-coloured sapphire). —*Gen. Med. Top. page* 160. *Corundum pebbles* are found in "the gem-sand of Ava river;" and they probably exist in the sands of some of the rivers in the Tenasserim provinces. The common emery is a variety of this species.—*Mason.* In Coimbatore two very different minerals pass under the common name of corundum, the one is true corundum of lameller structure, the other softer and amorphous, but chrystature in its composition, apparently some form of hornblend. The mineral is abundant in the district and easily procured at a small cost. The corundums in the Madras Presidency are not unworthy of notice. Their applications, as grinding and polishing materials, are well known to the people who use them in mass or mixed in lac. The implements prepared by the latter process are in the form of discs for laps, or wheel grindstones; used by cutlers, &c., also in the form of whets and hones and ragstones for sharpening the finer and coarser cutting implements used by farriers, &c. The Native workmen, cutlers, &c., often do not distinguish garnets from corundums calling both of these emery, though the differences between the three minerals are so marked, it is difficult to understand how they can be confounded. The corundums of Southern India are the more deserving of notice, because they seem to replace the emery of other countries; at least I am aware of only one author who has alluded to the occurrence of emery in Southern India, and the Madras Museum does not contain any substance that Merchants would regard as identical with the Turkish or Grecian emery of commerce. The meaning or origin of the word is not very apparent: the Mahomedans call it "corund" or "corunj" stone, and the Hindoos know it by a somewhat similar name. The first specimens sent to Europe were forwarded by the late Mr. Anderson to Mr. Berry, a lapidary in Edinburgh, as the substance used by the people of India to polish masses of stone, crystal and all other gems, except the diamond, and it was then examined by the celebrated Dr. Black, who from its hardness named it adamantine spar.—*Vide Adamantine Spar.* Corundum and its varieties, viz., Sapphire, Corundum and Emery are only surpassed in hardness by the diamond. They belong to the same class of minerals, and the emery of commerce which is so extensively used in Europe and imported into England for grinding and polishing metals, glass. &c,, is supposed to be a mere variety of corundum, a mixed granular corundum; a mechanical mixture of corundum and oxide of iron, the iron in some of the varieties amounting to 33 per cent.

No	Localities	Effective Hardness Sapphire 100.	Specific Gravity.	Chemical Composition.					
				Water.	Alumina.	Oxide of Iron.	Lime.	Silica.	Total.
1	Kulah ...	57	4.28	1.90	63.50	33.25	0 92	1 61	101.18
2	Samos ...	56	3.98	2.10	70.10	22.21	0.62	4.00	99.03
3	Nicaria .	56	3.75	2.53	71.06	20.32	1.40	4.12	99.43
4	Kulah ...	53	4 02	2.36	63.00	30.12	0.50	2.36	98.34
5	Gumuch.	47	3.82	3.11	77.82	8.62	1.80	8.13	99.48
6	Naxos....	46	3.75	4.72	68.53	24.10	0.86	3.10	101.31
7	Nicaria .,	46	3.74	3.10	75.12	13 06	0.72	6.88	98.88
8	Naxos....	44	3.87	5.47	69.46	19.08	2.81	2,41	99.23
9	Gumuch.	42	4.31	5.62	60.10	33.20	0.48	1.80	101.20
10	Kulah ...	40	3.89	2.03	61.05	27.15	1.30	9.63	101.13

In the mixed corundums of Greece and Turkey the iron seems equably diffused through the mass imparting to it a bluish grey colour; but in the specimens which have reached the Madras Museum from Southern India the corundum and ore of iron, though occurring together, are not mixed, but remain apart, segregated, the corundum forming one side of a mineral and the oxide of iron, in a lump or lumps on the other side; and all such masses are magnetic and possess polarity.

Emery. Of the different varieties of emery used in the arts that of Naxos is still preferred, as it is more uniform in its quality than that from Pulah and Gumuch: but it is believed that if the best qualities of Nicarian emery be found in abundance and such only sent to the market, they prove equal, if not superior, to the emery of Naxos. That from Naxos is of a dark grey colour with a mottled surface and with small

points of a micaceous mineral disseminated in the mass. It frequently contains bluish specks or streaks, which are easily recognised as being pure corundum. When reduced to powder it varies in colour from dark grey to black, but the colour of its powder affords no indication of its commercial value. The powder of emery examined under the microscope shows the distinct existence of the two minerals, corundum and oxide of iron. The specific gravity of emery is about 4, but its hardness is its most important property in its application to the arts; and those emeries which contain the least water, everything else being alike, are the hardest. The silica is usually in combination with alumina, or the oxide of iron, or both, so that the quantity of alumina must not be regarded as an indication of the quantity of corundum in the emery. In addition to the component substances of emery, others, as titanic acid, oxide of manganese, oxide of zirconium, and sulphur, occur in some of the emeries, but in very minute quantities. These remarks have been made with the hope that the corundums of India may be found suitable for all the purposes to which emery is now applied. The only difference in corundum seems to be the absence of oxide of iron, but there does not seem to be any quality given to the mineral by its presence in emery, essential to its value in the arts. This is a point however that I write with diffidence on. In Europe, where machinery is so available, there could be no difficulty in preparing corundum powders of the requisite degrees of fineness, and its preparation in this country would perhaps be the only difficulty to be overcome. There can be no question of the great cheapness of corundum. Emery at the end of the last century was selling at from £7 to £8-10 per ton, and between the year 1820 and 1835, it fell to even less than this: but a monopoly being allowed, it rose in 1846 and 1847 to £40 a ton. The discovery of other mines however at Gumuchdagh near Ephesus has caused a great reduction since then, and the selling price in London has been from £10 to £25 a ton. What prices the several corundums of India might bring in the London market it is difficult to say. There is no reason why the picked corundums should sell for less than the finest emeries, and Captain Newbold mentions that the corundums near Gram, when sorted into the three sorts known in commerce, viz. the *red*, the *white*, and the *scraps* of these two, are sold to the Arab merchants at Mangalore and Tellicherry at prices from twelve to fifteen or thirty rupees the candy equal to £4, £6, and £12 a ton. Corundum seems to occur in abundance in several parts of the peninsula of India, in North Arcot, Cuttack, Coimbatore, Guntoor, Mysore, Salem and Hyderabad. The authority for its existence in North Arcot, is a specimen in the Museum of the clove-brown variety, labelled from Naggery, and for its occuring in Cuttack and Coimbatore, the statement of the late Captain Newbold, who mentions Gudjelhutty and Chennimully as the places where it is found in Coimbatore, but does not specify the locality in Cuttack. The occurrence of corundum in the Guntoor Collectorate, was first made known to the community generally by the Madras Exhibition of 1855, and Mr. Rohde, who exhibited the specimens, remarked on them as follows:—"I am "desirous that the attention of the Agency "Houses should be called to the specimens of "red corundum, I send. If I mistake not, ex- "perienced jewellers would pick out stones "suited for common jewellery from it, and "the refuse cannot be worth less than £15 "and £20 a ton at home." The other district which the Madras Exhibition of 1855 showed to be producing corundum was the kingdom of Hyderabad, from which was received a very excellent sample of picked stones, possessing an irregularly chrystalline structure. Salem and the Mysore country, however, have been the longest known as containing corundum sites, some of which were described at some length by the late Captain Newbold, who mentions its occurrence in the neighbourhood of Gram, a village and fort in the Mysore country about ninety-eight miles westerly from Bangalore, and lying between the latter place and the Western Ghauts. The mines which Captain Newbold named, being about forty-five miles north by west from Seringapatam and about seven or eight east by north from the fort of Gram. But judging from the specimens in the Madras Museum there have been some other sites discovered since then, and the following places may be named as sites in Mysore where corundum occurs:—

French Rocks, Captain Loudon, in Madras Museum.
Golhushully, in the division of Nooghully, Newbold.
Kulkairi, in the division of Chinrayapatam.
Burkunhull, in the division of Chinrayapatam, Newbold.
Kundeo, in the division of Chinrayapatam, Newbold.
Erdgunkul, in the division of Chinrayapatam, Newbold.
Norhik, in the division of Narsipur, Newbold.
Deysani Carbonhully, in the division of Banawaram, Newbold.
Appianhully, in the division of Harnally, Newbold.
Nullapardy, on the road to Bangalore, Madras Museum.
Mundium, in the Astagram division, Madras Museum.
Cuddoor, in the Nuggur division, Madras Museum.
Nuggur, in the Nuggur division, Madras Museum.

Professor Thomson is quoted by Captain Newbold as mentioning (Outlines of Mineralogy, volume 1, p. 213) that "the corundum occurs in imbedded crystals in a rock which consists, according to Count Bournon, of indianite, and contains felspar, fibrolite, several varieties of augite, and also octohedral iron ore; the hair brown or reddish brown varieties are called adamantine spar. They occur with fibrolite and octohedral iron ore in a sort of granite containing no quartz." And again (p. 256) he states, that "fibrolite is a mineral found accompanying crystals of corundum in the Carnatic, and that it is a component part of the granite, which is the matrix of the corundum of China." Professor

Jameson, in his Geognosy of Peninsular India (Ed. Cab. Lib. No. VIII, pp. 349-50) gives a summary of what is known regarding the corundum of Southern India, and states that it occurs embedded in granite, and sienite in the district of Salem, in the Madras Presidency, associated with cleavelandite, indianite, and fibrolite; but near Gram at Golhushully and Kulkairi, at which the best corundum is said to be obtained, the mineral was found to occur in decomposed beds of a talcose slate, to which gneiss is subordinate, associated with nodules of indurated talc, and of a poor quartzy iron ore; asbestus, chlorite, actinolite, and schorl were found in the talcose slate. In the Salem district also Newbold mentions that this mineral occurs embedded in gneiss and a greyish earth resulting in part from the disintegration of that rock. The places named by that inquirer and the sites from which the specimens in the Museum have been received, are as follows:—

Nammaul Viralmodos.—On the north bank of the Cauvery, in the Permutty talook.—Newbold.

Sholasigamany, (probably *Scholaserameny*). Trichingode talook, near the village in a low hill in great abundace.—Newbold.

Caronel, Aupore, Mallapollye and at various localities up the river Cauvery as far as *Corcoambodi*, where it is dug by the natives in the fields, and there are remains of many ancient excavations still to be tracted.—Newbold.

Gopaulchetty pollium, 50 miles north of Salem.

Talaneegerry, Madras Museum.

Coundapady, Madras Museum.

Rubies. Captain Newbold also mentions that fine rubies have from time to time been discovered in many of the corundum localities just enumerated, associated with this gem, particularly in the gneiss at Viralimodos and Sholasiramany, and the natives informed him that it occurs in the Trichingode talook and at Mallapollaye, though comparatively speaking rare. Passing, says Captain Newbold, last year through Gram, a village and fort in the Mysore country, about ninety-eight miles westerly from Bangalore, between it and the Western Ghauts, I was informed by the Natives of the place that corundum (corund ka pathar) was found in this vicinity; at Golhushully, in the division of Noogyhully; at Kulkairi, Burkunhulli, Kundeo, and Yedgunkul, in that of Chinrayapatam; at Norhik, in Narsipur; at Deysani Curbonhully, in Banawaram, and at Apyianhully in that of Harnhully. The localities I visited were Golhushully and Kulkairi, at which places the best corundum is said to be obtained. The mines lie about forty-five miles north by west from Seringapatam, and about seven or eight east by north from the fort of Gram. The formation around Gram is gneiss, associated with protogene. Proceeding from it in a westerly direction, the northern shoulder of the insulated range, south of the village of Belladaira, running nearly north and south, is crossed, and the soil suddenly changes from a light sandy colour to a deep red. The surface of this swell is covered with fragments of a ferro-siliceous schist, with quartz in alternate layers. As night was coming on, I was not able to examine this mountain-range; but from its singularly sharp outline, the elevation and shape of its highest peak, and its direction conformable with that of the primary schist, I should say it was, probably, a large ferruginous quartzose bed, in the gneiss, associated with quartzy iron ore, fragments of which are seen at its base. The Natives have a tradition that gold was formerly got from this hill, which is not at all improbable, as it is found in similar gangue near Baitmungalum, sixty-one and a half miles east from Bangalore, and at Malliyalum, near the south west border of Mysore in Coimbatore. Minute grains occur in the sandy bed of a brook there. A little farther west, where the talus of the mountain subsides into the plain, the gneiss reappears, alternating with talc slate in nearly vertical strata. The dip, as observed in an adjoining nullah between the mountain and the village of Belladaira, is to the east by north, and the direction of the strata N. 22° east. The corundum mines of Golhushully lie four or five miles north-east of this place, and those of Kulkairi about a mile farther. The surrounding country is a succession of smooth slightly convex plains, except to the south-east, where the gneiss rises above the soil in a rocky ridge, terminating in a knoll about 700 yards to the east by south of the mines to which it descends, rising again into a slope to west northwest of the mines, on which lie fragments of a light brown compact quartzy iron ore. Nearly at the bottom of this slope are the mines, from which the ground descends on both sides, to the north-west to a tank, and towards the south-east to the village of Golhushully, about a mile distant. Between the mines and this village, near the bottom of the ascent on which they are situated, runs a nullah, the bed of which gives a tolerable section of the strata resting on the gneiss. The first (No. 1) commencing from the surface is a thin sandy alluvial soil; next (No. 2) succeeds a dark brown gritty soil, apparently decomposed ferruginous quartz, but sometimes sandy, from two to three feet thick. Below this we see the detritus (No. 3) of the subjacent gneiss; the quartz veins of which, remaining undecomposed, are observed penetrating into the substance of the soil from below. Some of the veins are broken by the superincumbent weight, aided by their own approach to decomposition. The quartz and felspar veins contain nests of a disintegrating blackish mica. The direction of the beds of gneiss is S. 10° E. with a dip of 60° a little to the N. of E. The surface of the ascent from Golhushully to the mines, except where the blocks of the brown ore above described, and a few edges of talc slate crop out,

is covered with dark brown soil (No. 1, Sec. 2) containing small particles of iron ore, and the broken up veins of the subjacent rock to the depth of about three feet: below this lies a bed (No. 2) varying from one to two feet in thickness, of chert, angular and rounded fragments of a poor quartzy iron ore, nodules of a whitish, highly indurated talc, talcose quartz, and felspar. A variety of schorl occurs imbedded in an indurated brownish talc, generally in three-sided prisms: it fuses into a lighter coloured enamel than the European specimen in my cabinet. This schorl has a shining lustre; fracture uneven breaks easily across the axis of its prisms; opaque, streak grey, scratches glass and quartz, the latter with difficulty. In this bed the best kinds of corundum are found. Below this is a bed (No. 8) of greenish earth, evidently of decomposed talcose slate: it is slightly greasy to touch, and falls to pieces with a hissing noise when put into water. Before the blowpipe in the platinum forceps it melts partially into a brownish slag, covered with minute globules of a white enamel, streak slightly coherent, shining, approaching earthy; adheres slightly to the tongue, and emits an argillaceous odour when breathed on. It is traversed by veins of a compact talc in laminæ which in some places bear traces of dislocation. The red earth and a quartzy ferruginous paste in small reniform and pisiform nodules, resembling those of hæmatite, are found intermixed with the more decayed portions of the schist. Beds and veins of white earth are also found in it, occupying the bottom of some of the excavations, as at Kulkairi. These are composed of talc, quartz, and minute particles of the corundum of which the vein is the gangue; streak and fracture earthy; feels gritty, and slightly greasy; adheres slightly to the tongue; does not emit so strong an argillaceous odour as the green earth; falls to pieces when put into water with a hissing noise. Before the blowpipe, fuses partially and with difficulty into a whitish enamel. The corundum is imbedded both in this earth and that arising from the decomposed talcose schist; the whiter fragments occur sometimes as hexagonal prisms tapering off to the extremity. The locality can be easily distinguished by the external appearance of the crystals, those found embedded with the iron ore having a ferruginous covering, whilst those found in the white talcose earth present a white or greyish appearance. Microsopic particles of corundum occur disseminated in this earth, more numerous in some parts than others, as if coverging to certain central foci of molecular aggregation. In fact, the whole of the component parts of the surrounding talcose slate appear to be separating from their combined state, and about to enter into some new form. Disintegration in the interior of certain rocks, whether from heat, cold, moisture, electricity, or other cause, seems to be, in some cases, a preparatory stage in Nature's mystic laboratory to matter assuming new forms; and under certain relative conditions we find the same agents that caused their decomposition, actively operating in their re-aggregation. Heat and electricity are powerful dispersive and aggregative agents. For familiar illustration, I need scarcely point to the flame produced by the blowpipe reducing at one point a metal to dust, and at another restoring the dust to its metallic state. By the judicious application of heat nearly solid particles can be made to move through and converge in the centre of a nearly solid mass, as exemplified by the experiment of Breislak, who succeeded in forming a nucleus of a variegated copper in the centre of a mass of pure copper pyrites, by subjecting it to a heat below that of fusion. Decomposition, however, is not an absolutely necessary condition for the production of adamantine spar, as I have seen it in canular nests in gneiss but little disintegrated. The talc schist is sometimes hardened and consolidated by contact with the iron ore, as seen in blocks thrown out of a mine near the foot of the ascent. Both the chert and a dark red ferruginous jasper are used by the Natives as flints. Salt springs occur in the vicinity. The wells about Gram were, I am told, both sweet and brackish within a short distance, and I picked up a fragment of a rock-salt in the green earth of the mine. This is to be accounted for by the nearly vertical position of the strata between which they find their way towards the surface. A little to the east of Kulkairi I crossed a low plain nearly covered with a white travertine, partly compact, partly cellular, resembling that found in the bed of the Cavery at Seringapatam.

Mines of Kulkairi.—The corundum mines at Kulkairi are situated both near the summit, and at the foot of the rising ground there. There are a series of excavations, vaying from two to twelve feet in depth, sunk perpendicularly through similar strata to those just described. The corundum is thrown out, cleared, and separated by the miners into four classes, viz., the red, the white, the scraps of both, and the refuse. The three first form the article of commerce, which is carried to Mangalore and Tellicherry; and, according to my Native informants, there sold by the contractor to the Bombay and Arab merchants, at prices from twelve and fifteen to thirty rupees the candy, according to its quality. A very large quantity (2,000 bags) is now (January 1837) lying at Tellicherry unsold, owing to a disagreement about the price between the contractor and the merchant. The present contractor for corundum in Mysore is a Lingayet, named Bussetti, an inhabitant of Bowenhulli, in the talook of Arculgode; his contract has almost expired, and, in consequence, no miners are at work. He took the mines for two years, for which he was to pay

the sum of 530 Canteray pagodas. The former contractors paid 500 for two, or 250 for one year; consequently it may be supposed that the produce has risen in value. These mines were only opened about seven or eight years ago by a native, named Hari Ram. I need scarcely add, the corundum is used by natives, pounded as emery, to polish precious and other stones, particularly granite and basalt. It is also mixed for this, and other purposes, with melted lac, in fine and coarse powders, as we use a mixture of glue and sand. It is said to be found at Mundium in Mysore, at Gudjelhutty in Coimbatore, at the Tapoor Ghat in Salem, at Chennimully in Coimbatore, and in Cuttack. At Namaul and at Viralimodes, on the north bank of the Cauvery, in the Perinutty talook, Salem district, it occurs embedded in gneiss, and a greyish earth, resulting in part from the disintegration of that rock. It is found in this vicinity in great abundance, in a low hill near the village of Sholasigamany, Trichingode talook, Caranel, Anpore, Mallapollaye, and at various localities up the river Cavery, as far as Cocarambadi, where it is dug for by the Natives in the fields; and there are the remains of many ancient excavations still to be traced. The corundum was formerly sent as an article of traffic to Palghatcherry, and thence to the Western Coast and various other parts of India. It can still be procured at the rate of from fifteen to thirty measures the rupee, each measure weighing fifty-seven ounces, avoirdupois. The caste usually employed in collecting it is the Vittaver.

Ruby localities.—Fine rubies have, from time to time, been discovered in many of the corundum localities just enumerated, associated with this gem, particularly in the gneiss at Viralimodos and Sholasigamany. The natives inform me that it occurs also in the Trichingode talook and at Mallapollaye, but it is rare, comparatively speaking.

Garnet.—This gem, the red variety, is very generally diffused over India. Its geognostic position, the hypogene or metamorphic schists, more particularly near their line of junction with the plutonic rocks, or trap dykes; for instance, in the crystalline and metalliferous areas of Salem and Nellore, already described, whence the finest crystals are procured, and sold by the Native merchants at an insignificant price. Colophonite is not uncommon in these tracts, as also in Mysore, the Neilgherries, the Carnatic, and other provinces of Southern India. It usually occurs in the granite, associated with the hypogene schists. That beautiful variety of dodecahedral garnet, called cinnamon-stone or essonite, has been discovered in the Neilgherries in the hypogene hornblende rock, near the seven Cairns Hill, by Dr. Benza, where their number is such, he informs us, that entire portions of the rock are formed almost exclusively of them. The essonite and hornblende are in large separate crystals, imbedded in a paste of compact felspar and hornblende; the former is very liable to disintegrate, leaving, in falling out, small cavities in the rock. *Green garnet* is of rare occurrence: the only locality where I discovered this gem was in the Salem district at Sankerydroog, lat. 11°29' N., long. 77° 58' E., associated with other green crystals in quartz veins, penetrating hornblende schist. The latter is associated with gneiss, garnet rock, actinolitic schist, and altered limestone, thrown into disorder by the intrusion of a porphyritic granite. The green garnet is not found in considerable quantities. A mine of precious garnet occurs at Gharilpit, about eight miles south of Palumshah, in the Hyderabad country, in the detritus of a granitic rock, penetrated by trap dykes, and composed of mica, garnets, kyanite, quartz, and felspar. Dr. Voysey, who gives a description of this mine *July* 18, states that the precious garnets are found at the depth of eight or ten feet in the alluvium at the foot of the rock. The surface of the rock and soil were strewed with garnets in great profusion, but these were generally of a very coarse kind. The garnets when collected are gently pounded, and the bad ones broken: those which survive the blows are reckoned of good quality. It occurs in great abundance near the Munzerabad-ghat, in Mysore.

Corundum.—Bournon considered indianite and fibrolite to be the matrix of corundum in Southern India, and Phillips states, on what authority is not mentioned, that its gangue in the Carnatic is a coarse grained white marble. I have always found it, both in Mysore and Salem, in talc, mica, or hornblende schist, associated with iron ore, asbestus, and sometimes indianite and fibrolite. It occurs imbedded in the rock in grains and crystals. Viralimodos and Sholasigamany are its principal localities in the valley of the Cauvery; Golashully and Kulkairy in Mysore, where it also occurs at Mundium near Seringapatam, Tippaty, Beygoor, Bannercota, Baugoopilly, and other places. It is also said to be found in the hypogene schists of Nellore and Guntoor. The spinel ruby (dodecahedral corundum) and sapphire (the corindon hyalin of Haüy) are occasionally found with the common corundum in the Salem district, and in the valley of the Cauvery. Emery, or granular corundum, is found at Bombardipadu, about twenty four miles northerly from Tripaty in North Arcot, in hornblende rock, in pieces varying from the size of a pea to that of a hen's egg, or even larger. Common corundum is also found where the Godavery escapes through the eastern ghauts, east of Papconda, from the Nizam's territories to the plains of Rajahmundry and the sea. Beryl occurs at Paddioor in Coimbatore; and, according to the Natives, at Vaniambaddi, at the north base of the Neilgherries.

Fibrolite occurs but rarely with indianite and corundum, as has been before alluded to, in speaking of the last two minerals. Kyanite I found associated with adularia, asbestiform tremolite, and magnetic iron ore, at Adipuram, in the Nellore district, in gneiss: it occurs in the same rock near Gharibpett, in the Nizam's territories; also in Mysore, and in the maritime districts of the Godavery and Kistna with tremolite, pearl spar, bitter spar, almandine and staurolite.—*Editor's report on Govt. Museum for* 1856.

(2898) CORVIDÆ, Crows, a family of Birds belonging to the division *Conirostres*. The bill is strong, slightly cultrirostral, or more or less compressed; the gape or commissure straight. The nostrils are covered with stiff, bristle-like feathers directed forwards.—*Eng. Cyc. page* 152. Every large black Crow, in whatever region, is sure to be denominated "the Raven:" and hence the Raven (*Corvus corax*) came to be considered as a bird of almost universal distribution. "It is one of those birds," writes Mr. Mudie (in his 'Feathered Tribes of the British Islands'), "which inhabit almost all latitudes, and have there plumage unchanged by varieties of season or of climate. The genus *Corvus* has no representative in all South America, nor in New Zealand and the numerous archipelagos of the Pacific, and there is one species only in Australia. Levaillant's Raven of South Africa, described by him as identical with that of Europe, has been sought in vain by subsequent observers in that region. The true Raven is pre-eminently a bird of the coldest climates: though a few occur so far southward as in the Barbary States, in America so low as in the Carolinas, and in India proper within the Punjab only. "The Raven," remarks Sir John Ross, "is one of the few birds that are capable of braving the severity of an arctic winter." But the finest account of this bird is by Von Wrangell, in his most impressive description of the fearful cold of a Northern Siberian winter; when—"even the Rein Deer seeks the forests to protect himself from its intensity: in the *tundras* [equivalent to the 'barren-grounds' of Arctic America], where there is no shelter to be found, the whole herd crowd together as closely as possible to gain a little warmth from each other, and may be seen standing in this way, quite motionless. Only the dark bird of winter, the Raven still cleaves the icy air with slow and heavy wing, leaving behind him a long line of thin vapour, marking the track of his solitary flight." The true Rook (*Corvus frugilegus*) is known to inhabit or visit the Peshawur valley, Afghanistan, Kashmir (the Rook of China and Japan being considered a distinct species, *C. pastinator* of Gould;) and the Jackdaw (*C. monedula*) accompanies it in those countries, while the true northern Raven is met with not only there, but also over a great portion of the Punjab. In other parts of India the comparatively small *C. culminatus* is popularly known to Europeans as "the Raven:" but the northern Raven would make a meal of one and not feel much the worse for it!

Fregilus.—Bill longer than the head, slender, entire, arched, pointed. *Fregilus Enca*, of Horsfield, from Java, for instance.—*Eng. Cyc. p.* 163.

(2899) CORYDALIS CASHMERIANA. Of this nothing is known.

(2900) CORYDALIS, Fumariaceæ. *C. Glauca*. These plants are of a rapid growth and well adapted for covering trellis work.

(2901) CORYDALIS GOVANIANA, Wall., (*Vern.* Bhootkes) is common in the Choor mountains, above 8000 feet of elevation, where it is regarded as a charm against evil spirits. The roots sent by Dr. Falconer, were long, fibrous, tough, and exceedingly bitter; dark brown externally, yellow within.—*O'Shaughnessy, page* 185.

(2902) CORYLUS, a genus of Plants after which the natural order *Corylaceæ* receives its name. The *C. lacera* and *C. ferox* are two species found in the Himalaya Mountains. Of these, the former, gathered in Kumaon, is hardly different from *C. colurna*; the other, from Mount Sheopore, has narrow taper-pointed leaves, and excessively hard nuts inclosed in a husk, with divaricating narrow spiny divisions.—*Engl. Cyc. p.* 166.

(2903) CORYLUS AVELLANA, (Hazel). Abundant in the Himalayas, nuts called *Bindick* and *Finduck* in bazars. Fruits (nuts) grouped in clusters together. Inodorous, taste sweet and agreeable. The almond becomes rancid very quickly. By expression the kernel yields a very agreeable oil, nearly in the proportion of half its weight. The wood of the hazel was the material of the divining rods of the magicians and snake enchanters, who even in modern times have had their believers in Europe.—*O'Shaughnessy, page* 609.

(2904) CORYPHA, a genus of Plants belonging to the natural order *Palmaceæ*. It has gigantic fan shaped leaves, flowers with a 3-toothed calyx, 3 petals, 6 stamens, and a 3-celled ovary. The fruit is composed of round 1-seeded berries.—*Engl. Cyc. page* 167. Among other Palms which are valued for different products and employed to supply the place of cordage plants, we may instance the species of this genus Corypha. Of these, *C. Gebanga* has its young leaves plaited into baskets and bags, affording much employment to the people in Java. The leaves are also employed for thatching, and for making broad-brimmed hats, So, *C. Taliera*, the *Tara* of Bengal and the *Talipat* of the Peninsula, is much employed for making leaf hats and leaf umbrellas. The leaves, moreover, when smoothed, are much used for writing on, and also for tying the rafters of their houses, as they are strong and durable. Thus, also, *C. umbraculi-*

fera, the *Codda-panna* of Madras and the *Talipat* of Ceylon, and very like the former, is common in Ceylon, and found also on the Malabar coast. Of this the leaf, being dried, is very strong and limber—and, according to Knox, "most wonderfully made for men's convenience to carry along with them; for though this leaf be thus broad enough to cover fifteen or twenty men when it is open, yet it will fold close like a lady's fan, and then it is no bigger than a man's arm; it is wonderfully light." "This tree is within, a pith only; they beat it in mortars to flour, and bake cakes of it, which taste much like to white bread; it serves them instead of corn before their harvest is ripe." (Knox's 'Ceylon.')—*Royle Fib. Pl.* The Burmese books are all made of the leaf of a species of Corypha.—*Seeman.*

(2905) CORYPHA ELATA, according to Mr. Mason, grows in the Tenasserim Provinces.

(2906) CORYPHA GEBANGA is one of the most useful of all the palms of Eastern Asia. Its pith furnishes a sort of sago; its leaves are plaited into bags and baskets and used for thatch and broad-brimmed hats; fishing-nets and linen shirts are woven from its fibres, and ropes from its twisted leaf-stalks; the root is both emollient and slightly astringent; sliced, it is used in slight diarrhæas, and Waitz says that it is a most valuable remedy for the periodical diarrhæas which in the East Indies attack Europeans.—*Eng. Cyc. page* 167.

(2907) CORYPHA TALLIERA, the *Tara* of Bengal, and *Talipat* of the peninsula of India, is an elegant stately species inhabiting Bengal. Its trunk is about 30 feet high, and as nearly as possible of equal thickness throughout. The leaves are in about 80 divisions, each 6 feet long by 4 inches broad, radiating from the point of a leaf-stalk from 5 to 10 feet long, and covered with strong spines at its edge. Roxburgh describes the spadix as decompound, issuing in the month of February from the apex of the tree and centre of the leaves, forming an immense diffuse ovate panicle of about 20 or more feet in height. The fruit is the size of a crab-apple, wrinkled, dark-olive, or greenish-yellow. The leaves are used by the natives of India to write upon with their steel styles, and for other purposes.—*Eng. Cyc. page* 167. In Tenasserim, it is known as the book palm and specimens of this palm, the leaves of which are commonly used to write on instead of paper, are not infrequent in the neighbourhood of religious edifices.—*Mason.* The leaves of Corypha talliera are said to be greatly employed in the Tenasserim Provinces,

(2908) CORYPHA UMBRACULIFERA, Lin. KODA PANEI.

Kodda panei marm, TAM.

The Tala, or Talipat Palm, is a native of Ceylon, and similar in appearance; but its leaves are not so round as those of the Talliera, the divisions in the centre being shorter than those at the sides. The trunk grows 60 or 70 feet high; the leaves are 14 feet broad and 18 feet long, exclusive of the stalk, and they form a head about 40 feet in diameter. Fans of enormous size are manufactured from this plant in Ceylon; the boll of this palm is wholly pith which furnishes a sort of flour from which bread is made; the leaves make excellent thatch, and are also used for writing on, like those of the Talliera.—*Engl. Cyc. page* 167. Griffith met with trees in flower at Mergui, which he thought belonged to this species, but "not having access to a complete copy of Martius' Palms," he could not speak with certainty. For the same reason, other trees that Mr. Mason saw in Tavoy, must be stated as probably talipat palms. The dark coloured roundish seeds of these trees are used as beads by the Taders, (religious fanatics of the sect of Vishnoo) which people the Telingas call Dasaries. —*Ains. Mat. Med. page* 143.

(2909) CORYPHÆNA, (Linnæus), a genus of fishes belonging to the section Acanthopterygii and family *Scomberidæ*. The group of fishes formerly included under the head Coryphæna is now sub-divided, and the sub divisions may be either termed subgenera of the genus Coryphæna, or the group may be looked upon as a sub-family and the sub divisions as genera.—*Engl. Cyc. page* 168.

(2910) CORYSTES, a genus of brachyurous or short tailed Crustacea.—*Engl. Cyc. page* 169.

(2911) COSMEA BIPINNATA. *Compositæ.* The species of this genus are mostly annuals and ornamental flowers, colours purple, white and yellow, the roots are tuberous, and may be cultivated by dividing the same or by seed.—*Riddell.*

(2912) COSMETIC BARK. *Murraya paniculata.* The fragrant bark of a tree which is indigenous in Burmah above Rangoon, is more universally used for a cosmetic than sandal wood. —*Mason.* A single specimen has been shown in Maulmain, which is a very ornamental fragrant flowering shrub of the citron tribe.—*Mason.*

(2913) COSMETIC TUBERCLES. *Toddalia aculeata* and *Toddalia floribunda.* An inferior cosmetic wood is seen in market, which is the tubercle of some plant. The Burmese appear, from their name, to regard them as produced by a species of erythrina, for they call them "erythrina thorns" but Mr. Mason knows the plant to be a creeper, and suspects that it is of the above genus.—*Mason.*

(2914) COSMETIC WOOD OF MERGUI. *Xanthoxylaceæ?* There is a fragrant cosmetic wood sold in the bazar, which is said to come from Mergui, but Mr. Mason never saw the tree.—*Mason.*

(2915) COSSYAH or KHASSIA COUNTRY. The Cossyah Country on the N. E. frontier of

India has iron of great purity, smelted at Pundua; Cassia Lignea is one of its principal articles of export; and a variety of parti-coloured cloths, generally known by the name of Sylhet cloths. Some of them are dyed of rich colours, and being of a strong durable texture, are well adapted for table covers, to which purpose they are usually applied in the Eastern part of Bengal.

(2916) COSTUS OR PUTCHUK. The substance called costus was highly prized by the ancients, and specimens may be met with at a few of the London drug-houses. It has been shown by Dr. Falconer to be the produce of a genus of the thistle tribe, to which he has given the name of *Aucklandia*. Dr. Falconer found it growing in great abundance all round the elevated summits of Cashmere. From the plants with which it was associated, and the circumstances under which the Koot grows, being one of the Compositæ,or Thistle tribe,with feathered seed,of which, when once established, the dissemination becomes easy; Dr. F. has no hesitation in thinking that it could be produced to an unlimited extent, of the best quality, in the Himalayas at elevations of from seven thousand five hundred to nine thousand feet above the sea, and that the Choor mountain alone might be brought in a few years to produce thousands of maunds of it. Preparatory to diffusing the Koot, or Costus, he has introduced it into the Mussooree nursery.—*Royle Pro. Res.* The root of *A. Costus* is supposed to be the *Costus Arabicus*, on the following grounds:—It corresponds with the descriptions given by the ancient authors, and is used at the present day for the same purposes in China, as costus was formerly applied to by the Greeks. The coincidence of the names—in Cashmere the root is called koot, and the Arabic synonym is said to be *koost*. It grows in immense abundance on the mountains which surround Cashmere. It is a gregarious herb, about six or seven feet high, with a perennial thick branched root, with an annual round smooth stem, large leaves and dark purple flowers. The roots are dug up in the months of September and October, when the plant begins to be torpid; they are chopped up into pieces, from two to six inches long, and are exported without further preparation. The quantity collected, according to Dr. Falconer, is very large, amounting to about two million pounds per annum. The cost of its collection and transport to a mercantile depot in Cashmere, is about 2s. 4d. the cwt. The commodity is laden on bullocks and exported to the Punjaub, whence the larger portion goes down to Bombay, where it is shipped for the Red Sea, the Persian Gulf, and China; a portion of it finds its way across the Sutlej and Jumna into Hindostan Proper, whence it is taken to Calcutta, and bought up there with avidity under the name of putchuk. The value is enhanced at Jugadree, on the Jumna, to about 16s. 9d. or 23s. 4d. per cwt. In the Chinese ports it fetches nearly double that price per cwt. The Chinese burn the roots as an incense in the temples of their gods and regard it as aphrodisiac. The import into Canton

In 1848 were 414 piculs and
„ 1850 „ 854 „ Valued at 5,150 dollars.

In Cashmere it is chiefly used for the protection of bales of shawls from insects. The Exports from Calcutta, were

In 1841 1842 ... 12,847
„ 1847 1848 ... 2,050½
„ 1848 1849 ... } 2,110½ worth about £1,500 annually.—*Sim.*

It will thus be seen that this root forms a rather important export from Calcutta. It is brought from Lahore, where it is called *koot*, and is sold in the Bengal bazars under the name of kooth, kust, and koshta; one kind is called *koosht tulkh*, or the bitter; another, *koosht shereen*, the sweet or mild; the latter is of light yellow colour and pleasant smell. Mr. Royle supposes it to be identical with the Indian orris root, but this is called *beg banopsha*, and is imported from the Red Sea. It appears to us to be in every respect identical with the true orris root. According to Dr O'Shaughnessy writing in 1842, *Putchuk* is of unknown origin; though usually referred to *Costus arabicus* or *speciosus*; the roots of the latter are quite insipid and inodorous. The putchuk is chiefly exported to China, where it is used as incense. Mr. Royle inclines to the opinion that it is in reality the produce of an umbelliferous plant; specimens have been seen by Mr. Beckett of Allyghur having hollow stems.—(*Royle p.* 360.)—*O'Shaughnessy, page* 652.

(2917) COSTUS ARGYROPHYLLUS. An indigenous species of the spirical costus is very abundant in Tenasserim, but not described in the books to which I can refer.—*Mason.*

(2918) COSTUS. Dr. Wight has given figures of Costus page 15, Vol. VI. 2015, *Nepaulensis*, 3014, speciosus. 2014.

(2919) COTTIE KALUNG TAM.—APONOGETON MONOSTACHYON. THUNB. It is commonly found growing in the beds of tanks. Thunberg in his "Travels," tells us, that this root is eaten in Caffraria, as a great delicacy; It does not appear to be less relished by the natives of India.—*Ainslie, page* 248.

(2920) COTTON,

Kutun, ARAB.	Kapas, MAL.
Bomuld, DAN.	Pumba, PER.
Boomwol, Katoen, DUT.	Bawelna, POL.
Coton, FR.	Algodao, PORT.
Baumwollee, GER.	Chlobts-chataja bumaga.
Kapoos, Ruhie, GUZ.	Kapasa, SANS. [RUS.
Ruhie, HIND.	Algodon, SP.
Bambagia, Cotone, IT.	Bomull, SW.
Gossypium, Bombax, LAT.	*Faulkner.*

The hairs attached to the seeds of *Gossypium herbaceum* and other species of the genus Gossy-

pium or Cotton. Cotton has been characteristic of India from the earliest times. The first distinct notice of it is in the Book of Esther, i. v. 6, where its Sanscrit name *Karpas* is translated *green* in the English Bible. Herodotus and Ctesias notice it, but it was not till the invasion of India by Alexander, that the Greeks were acquainted with the plant, as may be seen in Theophrastus and also in Pliny. Europe is now supplied chiefly from America, where two distinct species are indigenous; *G. Barbadense;* yielding the Cotton from the United States, and *G. peruvianum* or *acuminatum*, that which is produced in South America. India also has two distinct species, *G. herbaceum*, or the common Cotton of India, which has spread to the south of Europe. and *G. arboreum*, or Tree Cotton, which yields little if any of the cotton of commerce (very distinct from the species of Bombax often called Cotton-tree and Silk Cotton-tree). The species consist of large or small shrubs, and one forms a tree. All have alternate leaves, which are more or less palmate or lobed, and usually covered, as well as the young branches, with little black dots, and the nerves below have one or more glands. The calyx is double, the exterior (involucel) is larger than the interior, divided into three large leaflets, cordate at the base, entire, toothed, or deeply cut along the margin. The interior or true calyx is one-leafed, cup-shaped, and with an obtusely quinquifid margin. The flowers are large and showy, more or less yellow or red, consisting of five petals united at their base, subcordate, flat and spreading. Stamens numerous, filaments united below and adhering to the petals, free above, with small kidney-shaped anthers. Ovary superior, oval, roundish or pointed, terminated by a style, which passes through the cylinder formed by the stamens, marked with three or five furrows towards its apex, and dividing into three, sometimes into five stigmas. The capsule is roundish, oval or pointed, three to five celled, and three to five valved at the apex, with loculicidal dehiscence. Each cell contains from 3 to 7 ovoid seeds, from the seed-coats of which arises the filamentous substance, which by its twisting envelopes the seeds. Along with this Cotton there is often a shorter covering, called *fuzz* by planters. Cotton wool is formed of tubular hairs, which in drying become flattened, and are transparent, without joints, and twisted like a corkscrew. Under water, they appear like distinct, flat, narrow ribands, with occasionally a transverse line, which indicates the end of cells. This twisted nature of the Cotton fibre is probably the reason why Cotton cloth is not so well fitted as linen for surgical dressings. But being a worse conductor of heat than linen, it is well suited for inner clothing, where the object is to preserve uniformity of temperature, as it will retain heat, and prevent the body being so readily affected by external heat or cold. At the same time that it condenses less freely than linen the vapour of perspiration, but absorbs it readily when it has been condensed into the form of sweat. For these reasons probably, thick calico shirts, &c. have been introduced into the army for the use of soldiers.—*Royle, page* 289. The cotton plant or shrub (*Gossipium herbaceum*), of which there are many varieties, is indigenous in the tropical regions of Asia, Africa, and America. It flourishes also in the southern provinces of the United States; and, although an exotic there, has been cultivated with such success, that its produce is at the present time an all-important article of commerce. Cotton may be described in its unmanufactured state as a sort of vegetable wool, which bears value according to its color, length, strength, and fineness of fibre. Pure whiteness is generally held to denote a secondary quality; whilst a yellowish tinge, provided it be not the result of casual exposure to damp, or the natural effect of an unfavourable season, is indicative of superior fineness. Many varieties of raw cotton figure in the market, each sort being usually distinguished by the name of the locality where it is produced; but the main distinction recognised is that between the long and short *stapled* qualities; though of these, again, there are different degrees of excellence. The "sea-island" cotton of Georgia (so named from its being raised on certain narrow sandy islets lying along the coast of that province) is esteemed the best of the long-stapled kind; and the "upland" produce of the same state excels amongst the short-stapled classes. The indigenous Asiatic cotton is exclusively of the latter species. The manufacture of cotton—a business in Europe of growth so recent as the end of the sixteenth or beginning of the seventeenth century—has been carried on in India from very remote antiquity. As noticed above Herodotus and, at a latter period, Arrian, speak of certain wild trees in that country, producing a kind of wool superior to that of the sheep in their day, and state that a cloth woven from this substance was in universal wear amongst the inhabitants in their day. The natives had, indeed, attained such a perfection in the arts of spinning and weaving, that the lightness and delicacy of their finest cloths emulated the gossamer's web, and seemed to set competition at defiance. Yet neither the extreme cheapness of his labor, nor his acknowledged manual skill, has enabled the Indian artisan to withstand the triumphs of mechanical genius. And the striped and figured muslins of Dacca, so long celebrated throughout the world for the beauty and delicacy of their fabric, are now almost entirely displaced by the productions of Manchester and Paisley. But cotton is nevertheless, even now, one of the leading features of Indian agriculture. It forms part of an established

course in most village lands throughout the plain country; and except upon swampy, desert, or absolutely sterile ground, there is no situation in which it cannot readily be grown. Thus within the vast confines of the English Empire in the East, no particular limits can be assigned as constituting the "home" of the cotton shrub. In the lower provinces of Bengal, where the cultivation of the plant is almost entirely limited to the requirements of the local population, there are five districts—viz., Chittagong, Cuttack, Maunbhoom, Loharnuggur, and Assam—in each of which upwards of 10,000 acres of soil are so appropriated. And in some of these, as well as in several other districts where the present acreage is considerably less, it is known that the cultivation might be widely extended. In the North Western Provinces, a late return informs us that cotton is, more or less, grown in every pergunnah or district—from Kumaon, with 260 acres, to Banda, which exhibits 230,557 acres under cultivation. The eastern shores of the Bay of Bengal are no less favorable to the production of cotton. It is found, too, in the more arid climates of Scinde and the Punjab; whilst it grows luxuriantly on the sea-board of Cutch, and in the fertile peninsula of Guzerat. But the grand cotton field of India lies partly within the dominions of the Nizam, and partly in the province of Nagpore. The extent of cotton cultivation throughout this vast tract cannot be estimated with any near approach to accuracy. But this region is, beyond doubt, the part of India from which Great Britain might, in case of need, draw the raw material in inexhaustible abundance. In addition to the immense resources which here only await development, the Bombay Presidency (including some native states that lie within its limits,) exhibits a grand total of 2,890,279 acres, now or lately under cotton cultivation. Exclusively, in fine, of what may be raised in the newly acquired territories of Burmah and Pegue, it is on official record that, throughout the length and breadth of British India, the aggregate extent of cotton growth was very recently no less than 5,147,223 acres; and this already vast area is universally allowed to be capable of being almost indefinitely enlarged. In the face, then, of India's admitted ability to furnish not only Great Britain, but, were it requisite, the whole world besides, with an ample and unfailing supply of the raw material—let us see how the facts of the case stand in practice. The Board of Trade returns show that the total imports into Great Britain of Indian cotton, during five years (from 1849-50 to 1853-54,) were as follows, viz;—

	lbs.
From Bengal, ...	10,573,653
" Madras, ...	43,093,473
" Bombay,...	598,218,675
Total from India...	652,785,801
From other countries, ...	3,368,282,031
Total imported by Great Britain, ...	4,021,067,832

From which statement it will be seen that India contributes no more than about one-sixth, or nearly sixteen per cent., of the whole amount of cotton consumed by Great Britain. Last year, indeed, an increased demand in the home market raised the per-centage for 1856 to 26⅓: but half a century since, in 1806, the ratio of Indian imports was as high as forty per cent. During the period that has intervened, the supply of cotton from the United States of America has increased fourteenfold, whilst that furnished to us from India has augmented only ninefold. To the Manchester Commercial Association and Chamber of Commerce, we are mainly indebted for the efforts which have from time to time been made by the East India Company, to improve the cotton staple by introducing a better system of cultivation, and to create additional facilities for transporting and shipping the raw material. Yet up to the present time comparatively little has been done in either respect. But something at all events, has been proved; since, at the meeting already referred to, Mr. Bazley informed his auditors that, in August last, he had seen some very beautiful specimens of cotton from India, which were worth 15d. per pound. These specimens were, no doubt, raised from foreign seed. The indigenous plant of India is an annual, and succeeds best in the rich black soil that characterises various districts. The American plant, though in reality perennial, is practically an annual in India; for in that country neither native nor foreign cotton is cultivated on the same ground more than one year in three, its properties being found to exhaust the productive powers of the soil. The American cotton grows well on the black soil, but thrives still better on the light red lands. Each species possesses advantages peculiar to itself. The Indian variety is capable of being manufactured into fabrics of extraordinary durability and wonderful fineness; its color, too, is superior, but the staple short. The American species, on the other hand, excels in length of staple; the plant yields more flowers, and each flower a larger pod, whilst the quantity of seed contained in the pod is smaller and more readily separated from the fibre. It is now close upon seventy years since the rulers of British India made a first attempt to extend cotton culti-

vation, to improve the staple, and to establish better methods of cleaning and packing the produce. Those who are at all acquainted with the Asiatic mode of conducting business, will be at no loss to imagine (should they never have witnessed it) the unsatisfactory manner in which the last-named important operations would, in all likelihood, be performed. The distribution of seed of a superior quality commenced so far back as the year 1788. Rewards were next instituted to stimulate exertion, and instruments both agricultural and mechanical, superior to those in use among the natives, have since been extensively introduced. In 1813, the services of an experienced American cultivator were obtained, and trans-Atlantic gins were at the same time first imported with a view to expedite the cleaning process. In 1818, again, some further activity was manifested; and in 1831, experimental farms were sanctioned in the Southern Mahratta country and in Guzerat. But these, after much expense had been incurred, were abolished, apparently as failures, by the local government, in 1836. Still, the Court of Directors expressed great anxiety "that no means should be left untried which might be likely to assist the desirable object of improving and extending the cotton cultivation on the Bombay side of India." The local government then proposed granting farms upon advantageous terms, and even making pecuniary advances to respectable parties who might be desirous of cultivating cotton, and to this suggestion the Directors partially acceded. But ere their qualified consent could reach Bombay, the authorities on the spot had already determined upon a far more extensive measure of encouragement—viz., the exemption from the land revenue, for five years, of all lands sown with cotton in the collectorates of Poona and Ahmednuggur. This scheme, however, was disapproved of by the supreme government of India, and eventually disallowed by the Court of Directors. Again, in 1839, it was resolved upon to obtain further practical information in the cotton-producing districts of the United States: and to engage on the spot the services of competent persons, who should proceed to India for the purpose of instructing the native growers in the best modes of culture and cleaning. This determination was shortly after carried out. Ten Americans of approved experience in the management of cotton plantations were despatched to India, their services being distributed as was deemed most advantageous among the different presidencies. Some experimental gardens were established at Rutnagherry on the western coast—a district (strange to say) in which the cultivation of cotton was not generally prevalent. Under such circumstances, we are not much surprised to learn that the experiment in question was abandoned after a short and unsatisfactory trial. At the same period, the government farms were again established in Broach, Dharwar, and Candeish. But in the first named district (where the culture of New Orleans cotton was more especially aimed at) no good results were achieved beyond the limits of the farm; and notwithstanding a lavish expenditure, no improvement was effected in the staple of the country. In 1846, the other farms were abolished, and at this time the contract system of cultivation was introduced both in Dharwar and in Candeish. Upon this plan, the native cultivator merely undertakes to grow a certain description of cotton, and the government, without any further interference, engages to receive the produce. The soil and climate of Candeish are described as well suited to the growth and culture of New Orleans, Egyptian, Bourbon, and other foreign varieties of cotton. The farms established by government in Coimbatoor, Tinnevelly, and other districts of the Madras presidency have been also discontinued; it being alleged that the object for which these establishments were formed has been fully attained in demonstrating that the soil and climate are capable of producing cotton suitable to the British market. The general results of American management under the Bombay Presidency, up to the year 1844, have been embodied in a report from Mr. W. R. Mercer, one of the cultivators engaged. Considering how little had been effected, and how large an expenditure incurred, Mr. Mercer's statements appear more favorable, upon the whole, than we should have anticipated. But before referring to these in detail, let us take occasion to enquire what opinions have been placed on record by other parties, whom long residence in India, knowledge of its people and their habits, and a tolerably intimate acquaintance with the subject under discussion, combine to designate as trustworthy witnesses and competent judges. It must be borne in mind that the introduction of improvements in India is a task of no small difficulty, and requires very delicate management. "The indigenous cotton of India is naturally inferior; and besides, the staple is ruined by bad cultivation, bad cleaning, bad packing, carelessness in transport, and wilful adulteration." Now, reverting to Mr. Mercer's report already mentioned, the American cultivators express their opinion of the article produced in anything but disparaging terms. Mr. Mercer and his colleagues aver that Indian cotton has long been known to possess two very remarkably good qualities. It "gills" or swells in bleaching, thereby yielding a more substantial fabric; it takes and retains color better than American cotton, and it would command a good market if sent in regular supply and of uniform cleanness. On the same authority, we learn that the natives of large cotton tracts in India already employ a mode of cultivating the plant in principle nearly the same as the American, but better suited in some re-

spects to local circumstances. Mr. Mercer's ultimate conclusions were, that it is erroneous to suppose that the cultivation of varieties of American cotton would be very beneficial to India; that the staple of Western India was as long, as strong, and equally as good as the new Orleans, and, in respect of the qualities above specified, more valuable. In fact, nothing was required but better cleaning to make the cotton of India equal, if not superior, to New Orleans. The latter portion of this flattering judgment was pronounced in December, 1846, and was not without its effect in the local markets. For when, in the following year, the Bombay government exposed for sale a quantity of Dharwar New Orleans seed cotton, and at the same time a lot of the best native Candeish (both cleaned, prepared, and saw-ginned for the English market by government servants) the native cotton was sold on the spot at fifteen to twenty per cent. higher than the Dharwar New Orleans seed. But on the arrival of the consignment at Manchester, the previous judgment was something more than reversed—the Candeish best native selling there for 3½d., the Dharwar New Orleans for 6¼d. per lb. The verdict of Manchester was necessarily decisive; and subsequently to this occurrence, the Bombay price-lists for several years show, that the Dharwar American seed cotton has realised an average of ten to twelve per cent. higher than the best native produce of Western India; and about twenty-five per cent more than any other cotton grown in the Southern Mahratta country, or in the neighbouring districts of Mysore and the Nizam's dominions. The entire Southern Mahratta territory, embracing the two collectorates of Belgaum and Dharwar and a few independent states, was formerly entrusted to the superintendence of a single civil functionary under the Presidency of Bombay. But the charge being justly deemed too onerous for an individual, the existing division was made within the last twenty years. Reference to the map of India will show that Belgaum is by about one-third the larger of the two collectorates. But their climate is one and the same—one dialect prevails throughout both; the people and country are, in short, identical. Yet of these contiguous, and as we may say, twin districts, there are printed returns which inform us that the area of indigenous cotton cultivation is much less considerable in the larger province of Belgaum; whilst, as regards the exotic species, Dharwar has been lately represented as exhibiting 63,000 acres under cultivation, against only 1,300 or 1,400 in Belgaum. Upon these premises it is alleged that, although the American cotton may have succeeded in Dharwar—even to the extent of needing no further external encouragement or assistance—yet it has failed everywhere else. Now it may be true that no greater progress has been made in Belgaum than in other parts of the same presidency; but who shall venture to affirm that what has been effected in Dharwar cannot be equally effected in Belgaum, under precisely similar circumstances? The successful agent in the Dharwar experiments was a gentleman whose name is well known in connexion with the subject under discussion—Mr. A. N. Shaw, late of the Bombay Civil Service; and it is a mere accident that Belgaum was not the scene of his exertions, instead of Dharwar. Mr. Shaw, being at the time collector and political chief at the former station, was transferred to the latter post in 1842, at the very period when he was about to commence his subsequent operations. The success of the Dharwar experiments was not immediate. Mr Shaw had his failures and disappointments to encounter as others had; but he met both manfully, and his unflinching perseverance at last commanded favorable results. Thus the failures in Surat, Broach, Candeish, and other localities—classed, as they have been, together with Belgaum—may be said to prove nothing at all, in the absence of some distinct and special grounds assignable as the cause of failure in Belgaum. It may readily be conceded, that in the instances of Surat, Broach, and some other parts of the country, slightly varying modes of treatment might be desirable, and earlier or later planting, or even the introduction of a different class of cotton, would possibly prove advantageous. The long extent of sea-coast about Surat and Broach, embracing many hundred miles, would seem particularly well adapted to the culture of the more valuable staples—such as Sea-island, Pernambuco, Egyptian, and Bourbon. The scene of Mr. Shaw's labors was laid in a district where the soil and climate have long since been recognised as eminently suitable to the growth of cotton. But that gentleman's testimony and general experience are abundantly confirmed by evidence from less favored quarters. A distinguished member of the Bengal Civil Service, located in the North Western Provinces, has within the last few months made public the results of many years' close attention to the practice of cotton cultivation. This valuable witness has always been of opinion that the government experiments, the event of which he watched with great interest, had the elements of failure inseparably connected with them; whilst, by repeated experiments upon his own grounds, he had become fully satisfied of India's capacity to supply the home-market with any amount, even of exotic cotton. The Bengal civilian justly observes that, in order to improve the Indian staple by the introduction of exotic varieties, we must demonstrate that a given area can be made to produce a certain quantity, which will sell higher than the produce of the same area grown from indigenous seed. He himself during ten years cultivated Mexican cotton, and the acclimated produce was pronounced excellent in

Lancashire. The average yield per acre was from 200 to 250 lbs. of *clean* cotton. Here is enough to show what can be done, even in Upper India. But the assistance of irrigation is sometimes necessary; and the government experiments were made on land not irrigated, their success being thus dependent upon the periodical rains. These in Bengal and the North Western Provinces do not ordinarily set in before the middle or latter end of June; whereas foreign cotton for the English market should be sown by the middle of March. The Ganges canal is capable of irrigating and trebling the productive powers of millions of acres. Our Bengal civilian would establish experimental cultivation at various points on the canal, under the supervision of its officers, and afterwards distribute seed; taking care that the villagers should sow at the proper season, and be careful about picking the crop *clean*. Encouragement might be offered to the cultivators in remission of land or water tax, or by buying up the produce at the highest rates affordable. Desultory attempts have already been made, but a systematised introduction of acclimated seed is required, together with strict supervision both of culture and gathering. It were needless to multiply evidence of the foregoing description. But whether we accept the testimony of the American planters, or adopt the conclusions of Mr. Shaw and the Bengal civilian, practical experience may be safely represented as establishing the fact that India *can* produce excellent cotton, and her capability of producing the same in any quantity depends only upon an increase of the necessary facilities. The objections as to cleansing, packing, and adulteration, whether accidental or wilful, bear reference to matters of detail, which we cannot afford to discuss at present. But there can surely be no insuperable obstacle to the redress of these imperfections and abuses. Under a better system, it is to be hoped that diligence and honesty will prove more remunerative than indolence and roguery are at present. An effective remedy has moreover been already suggested in the proposed establishment of direct relations between the cultivator and the manufacturer. It has been said that "India cannot compete with the United States." Perhaps not, as regards the very finest descriptions of cotton, though even upon this point there may be room for question. But as regards such sorts as would rank in the home-market under the denominations of "fair" and "good fair," it is already on record that India is able to compete with the States most successfully. Dr. Wight of the Madras Medical Service, who for eleven years superintended the Coimbatore experiments, informs the Committee of the House of Commons [Indian Territories, Fourth Report, Quest. 5,952, et. seq.] that Coimbatore cotton selling in Liverpool at 4d. per lb., would "barely remunerate" the grower. But prices vary with the fluctuations of American cotton; and "ours," says Dr. Wight, "has always borne nearly the same prices in Liverpool as American-grown cotton, under the same denomination, bore there." Thus the Coimbatore produce was generally ranked as "fair" and "good fair," and on the very day (6th June, 1853) when the Doctor gave his evidence, cotton under that denomination was fetching in Liverpool from 5d. to 5½d. per lb.—a price that would leave a very large profit. If such, then, were the result, when there was a weary transit of nine or ten days' duration, over bad and broken roads, to be accomplished ere the Coimbatore produce reached the port of Cochin—still more favorable to India will be the terms of competition when a railway unites the cotton-field and port. American-grown cotton is already selling at a *minimum* price—the Indian by no means necessarily so. In India, countless acres await the fuller development of cotton growth; but America is by no means possessed of the same indefinite power of extending cultivation upon anything like advantageous terms. The American crop occasionally is deficient: this may be an accident, but should still be regarded as a warning. It has also become evident that the demand for cotton wool is increasing beyond the amount that America will eventually be able to supply. Such a contingency had, indeed, been foreseen, inasmuch as the most able men engaged in the cotton trade had for years predicted its occurrence at no very distant period. Yet little has as yet been done to counteract the impending evil. The late Mr. Mackay's mission to India was a step in the right direction, and now or never is the time to reap the benefit of that lamented gentleman's advance and experience. No man better knew the appalling embarrassments which would accrue to England from the stoppage of even one year's supply of cotton; no man better knew that the extension and improvement of cotton in India is no chimera, and that the time may come when we shall find therein our safety.—*Dublin University Magazine, June* 1857. Mr. Bonynge, an American gentleman long resident in India, is of opinion that America has reached her utmost limit of producing cotton, and India must be depended on in future. He states that in America there has been a falling off in progressive increase of 54$\frac{10}{13}$ per cent., —but probably in the next ten years there will be no increase over the last ten. So it may be said, he adds, that the production of cotton in America has not increased materially for twelve years—there has been only an increase of 160,000 bales yearly, for the last six years, over the former six. Since the year 1839, the cotton crop in America is comparatively stationary in quantity; and it is seen that the cotton crop realized more in dollars for five years—from 1835 to 1840—than it has in the two following periods,

that is from 1840 to 1845, and from 1845 to 1850. He concludes, that this all-important staple—cotton—admits of no further increase for the employment of additional hands. And though cotton has done wonders for America; after a time, every thing gets old, and the Cotton States themselves complain that the land yields them nearly one-third less produce, and it sells for one-third less price. He is of opinion that it is not the want of suitable soil, climate, and cheap labor, that has left the cotton trade so largely in the hands of America. The cultivation in America, he considers, is in its senile years; while in other countries it is in its infancy, that is, in some, and in others in their lately renewed efforts; and they are even now formidable rivals, and America will have to struggle hard. But as far as the East Indies are concerned, it would not be the least surprising if that country monopolized altogether the cotton markets in a few years hence. That she can do so there is no doubt; that she has not done so under the half-dozen planters whom the East India Company have taken out there from Georgia, is no evidence to the contrary. The cause of the failure is one to be accounted for; the planting in the East is below 20 degrees of N. latitude. All Southern Americans know that it will not even do well low down in Florida, and that the cultivation is northwards of the 27 deg. to 36 deg. N. latitude. Probably India produces twice the quantity that America does. There is no over production for the world. The world would find people to wear twice the quantities of cotton clothing, but the lowness of prices must be tempting to the world for them to do so. For instance, Americans consume 11½ lbs. per head; it has been calculated that the East Indians consume 20 lbs. per head; Great Britain only 4½ lbs. per head. There is room, if returns be correct, for an increase in the consumption to take place in Great Britain of 7 lbs. per head, or say, some 210,0 00,000 lbs. The East Indian cotton contains 25 per cent of waste and dirt, while the American contains only 12½ per cent. It is somewhat difficult to spin the Indian, from its often breaking, and requiring more turns of the spindle, from its shortness of fibre, than that of America. But the yarn made from a pound of East Indian cotton, which cost 3½ pence sterling will sell for 7 pence, while from the American, which cost 4½ pence the lb., the yarn sells for 7¾ pence only, making up somewhat of the difference in value of the yarn. *Bonynge's America, p.* 36. The capabilities of India to produce cotton is seen from the following evidence. Mr. Chapman, manager of the Great Peninsular Railway Company, stated to Mr. Bazley, "That cotton of good quality for English use is always to be had in Berar at about 1½ pence per lb., ranging of late years from 1¼ to 7¼ pence per lb. The quality of this cotton is such, that at a certain relative difference of price (averaging about 15 per cent. less for Indian than American), it can be used instead of American for more than 50 per cent. of our manufactures; that is, will afford material for all yarns under No. 20." (Royle on cotton in India.) Mr. Mercer and Mr. Finnie, American planters, state that an inferior and dirty cotton is the most profitable article to the native trader, and even to the European merchants; and Mr. Petrie, stated before the cotton committee, that "Cotton, which would be sold in England at 4½ pence per lb., and cotton that would only bring 3 pence, will sell in India within 3 to 4 per cent of the same value. The cultivators know this, and therefore they have no object in bestowing more care and labor." Mr. Read, Commissioner of Benares division, wrote 16th August, 1848: "In this division, the cultivation of cotton is little more than nominal, it is most commonly mixed up with other crops, it is nowhere carefully attended to; in many places it is an object of superstitious aversion, and often when the plant contrives to struggle to maturity, it is left, after being stripped of a portion of the bolls, enough to supply domestic purposes, to be devoured by cattle." Mr. Bruce, in a letter dated 15th March, 1848, says: "that if the associations and manufacturers who have been memorializing and soliciting the authorities in England, regarding the increase of cultivation of cotton in India, actually wish for it, and will guarantee that all which may be produced through his exertions in this country will be taken by them, and paid for here, and will sent out responsible agents to receive charge of the cotton, either here or at Calcutta, he will engage and undertake to produce for them as much real good marketable cotton as they may require, and not cost them, when landed in England, more than about 3½ pence per lb., which he thinks very moderate, considering that Indian cotton generally realizes from 4½ to 5½ pence per lb. in England. "The Doab, as well as Bundlecund, has always grown considerable quantities of cotton, and will be able to grow a better quality as soon as the Ganges Canal, that most magnificent of works for irrigation, is completed."—*Royle. Bonynge America, page* 38. "The cotton of Jaloun and Jahnsi (writes Mr. Bell) was formerly much celebrated. Koonch is now the great mart in that direction, and it is surrounded by the Jaloun Territory. Mr. Bell, after making careful enquiries, ascertained that the cotton of Baugchenee was that which then was in most in repute with the natives of those parts, who gave about 7½ per cent more for it than for the other best kinds. The district is on the south of the Chumbul, near Dholpore, and therefore probably very similar in soil and climate to that of Jaloun and Jhansi, which are not very far distant. Mr. Bell further thought that it might be landed at Liverpool

in a clean and desirable condition for about 3½ pence per lb. As these districts, as well as Bundlecund, lie to the westward of the Jumna, and have always been famous among the natives for their cotton, it is probably owing to some physical pecularities of soil, or of climate, that the cotton is produced of a better quality, for we cannot discover that it has the advantage of any more careful culture or cleaning."—*Royle.* Mr. Mercer, the American planter, says, "Dharwar is more like the Mississippi climate than any other he has met with in India. The elevation modifies the climate, which also feels the influence of both monsoons or rains, so that it never becomes extremely dry, and is never inundated with excessive rains." Mr. Mercer finds the seed returning to it soriginal Mexican character, instead of deteriorating as in other parts of India. Government farming with American cotton, have themselves adopted and are rapidly increasing it, as they find it yields a larger quantity per acre, and they get a better price, even from the native weavers." The culture of American cotton has been greatly increasing in quantity; from 600 acres the first year (1842) to 15,000 acres in 1845. Mr. Mercer thought that not less than 1,000,000 lbs., of American cotton would be produced. This crop has now been ginned, and 40,000 rupees (20,000 dollars) worth, at 66¼ Rupees per 784 lbs. (*i. e.* 33 dollars in round numbers) has been bought from the ryots (farmers), for transmission to this country." The further expense of this cotton amounted to 17½ rupees, (exchange value of a rupee is 1*s.* 10*d.* or say 45 cts.) Some of this cotton (100 bales) was sold at Bombay for 113 rupees a candy, and the 500 which were sent to Manchester for 6½ pence a pound, having cost 3¾ pence a pound.—*Bonynge America, pages* 16 *to* 40. It only remains to state the mode of improving the Indian staple, which seems to hold forth the surest promise of eventual success. There can, we think, be no doubt that the safest and wisest course open is to bestow all possible attention upon the culture of New Orleans, Mobile, Upland, or Mexican cotton: which (in India) are practically one and the same article, the denomination only varying according to the locality from whence imported. This is the sort of cotton for which there would always be an unlimited demand at Manchester; and the cultivation of this species, besides bringing us into direct competition with the cottons most largely grown in America, and most extensively used in our own manufactures, involves other advantages. For the proportion of its seed being considerably less than that of most other cotton, an equal area sown with New Orleans is more valuable than if sown with other exotic or indigenous (Indian) seed, in the following respects:—Firstly, It gives a larger yield. Secondly, It yields more wool in proportion. Thirdly, It commands a higher price in the market. Fourthly, It requires no peculiar mode of culture or treatment, other than is applicable to the indigenous species. When this class of cotton has gained a firm footing in India, it must rest entirely with the discretion of cultivators and dealers, whether they will attempt introducing the finer staples in particular localities. But the New Orleans seed must be relied upon as the most generally remunerative, and the most universally suitable to Indian soils and climates. Irrigation must not be forgotten. In the Southern Mahratta country, one cwt. of *clean* cotton per acre may be accounted a fair yield; but by means of irrigation, the Bengal civilian, whose experiences we have cited, obtained double that yield in the North Western Provinces.—*Dublin University Magazine, June* 1857. Few subjects have occupied so much of public attention of late years,—have been so frequently discussed in books, in newspapers, and in parliamentary debates, as that of the production of cotton within the territories of the East India Company. None will be disposed to question the great importance of the subject. Whether we regard cotton in its broadest aspect, as affording ample employment to vast numbers of persons in its growth, transport, and shipment; whether we look at it as furnishing food for gigantic manufacturing establishments in the parent country, scattering wealth and happiness in its path; or whether we view it as an article of social moment, ministering to the health and comfort of the entire human race; whether we consider it as a source of revenue, as a staple of trade and manufacture, or as a great help to civilisation and progress,—we cannot but feel that we have to deal with a most important subject. India was unquestionably the birth-place of cotton cultivation and cotton manufacture. It is mentioned in the institutes of *Menu*, a work composed eight centuries before the Christian era, with many details relative to its manufacture and uses; and although not named in the *Rig Veda*, of still higher antiquity, there is no doubt that in more than one place the thread alluded to was composed of cotton. Possessing, therefore, so much antiquity, we need not feel astonished that, until the last half century, the culture, trade, and manufacture of cotton in India should have occupied a most important position in the commercial annals of the world. That the production of cotton goods in India would still have stood forward pre-eminently as a branch of industry, had not the modern improvements of machinery in Europe snatched from it all its ancient prestige, there can be but little doubt; although, as regards the cultivation of the raw material, other causes have been at work to spread it elsewhere, to an extent unprecedented in the history of the world's industry. It was a remarkable coincidence that at the precise time when Arkwright and Watt were

elaborating and perfecting their magnificent improvements of the spinning-machine and steam-engine, the British arms were subjecting vast empires in the East to our dominion, countries which possessed within themselves the germs of an almost boundless production; lands which, from their suitability and fertile nature, might well be expected to furnish illimitable food for the new leviathans of steam and iron which they of Lancashire were creating. The varieties of cotton known in the commercial world may be referred to three distinct species, each having several varieties. The *Gossypium barbadense* is the species cultivated in the West Indies, North America, and in one or two parts of the peninsula of India. *Gossypium peruvianum* yields the cotton of Brazil, Pernambuco, Peru, &c. This also has been introduced into some districts of India. *Gossypium indicum* is the species which, in a number of varieties, produces the great bulk of the cotton of India and China. There is a fourth species also, the *Gossypium arboreum*, or Tree-cotton of India, unknown to commerce, though yielding a beautifully soft and silky fibre, admirably adapted for padding cushions, pillows, &c. The Indian species is that which now calls for our remarks. Of this there are many varieties, each possessing some distinguishing character of its own, arising from mode of treatment, soil, climate, &c. It usually attains a height of four to six feet, is bi-triennial, but may be equally cultivated as an annual, germinating and ripening its seed within a period of from four to eight months. The leaves are five-lobed; the flowers are usually found blossoming singly at the extremity of the branches; the petals being of a lively yellow colour, with a small purple spot near the claw. The seeds are five in number, and are clothed with a firmly-adhering greyish down, beneath the short white wool of the capsule. The qualities by which the value of cottons are determined may be confined to three; viz. length of staple, strength of fibre, and cleanness of sample. Colour, which was at one time thought much of, is no longer looked upon as a matter of moment. Inferior as the cotton of India is allowed to be, as regards its staple and purity, there is every reason to believe that in durability it at least equals the produce of any part of America; and of this fact the Hindoos are themselves perfectly aware. In spite of its comparative inferiority, the Chinese have become large consumers of the cotton of India; and from taking a few hundred bales in the early part of the present century, they now consume as much as 50,000,000 lbs. annually. Some quantity is also exported into the neighbouring countries on the north-west of India; and if we add to these outlets the home-demand for the manufacture of a variety of dresses, furniture-trappings, &c. in daily use amongst all classes of the natives, it will be seen that the yearly production of cotton within the Indian territories must be on an enormous scale. It has been stated by Dr. Wight, allowed to be a competent authority on all matters connected with the natives of India, that the average consumption of cotton by the inhabitants of Hindostan amounts to not less than twenty pounds for each person. This will give a local annual consumption of 3,000,000,000 lbs.; and, with the quantities taken by Great Britain and China, a total yearly crop of 3,110,000,000 lbs. As early as the year 1788, the Court of Directors urged the Indian authorities to give every possible encouragement to the growth and improvement of Indian cotton, at the same time ordering a shipment of 500,000 lbs. to be made. Shortly afterwards, screws for the embalement of the article were erected, and a variety of imported seed was distributed throughout the peninsula. From this time until the beginning of the present century the shipments of Indian cotton to England fluctuated between 700,000 lbs. and 3,300 lbs., the price of Surat kinds at Liverpool varying from 2*s.* 5*d.* to 8*d.* per lb. In 1801, samples of the produce of Mauritius and Nankin seeds were received in England: and between that period and 1812 bounties were offered for improved samples, reports were received on the cotton resources of the various districts from the collectors, and quantities of West Indian and American seeds were sent out and distributed through various cotton districts, with copies of instructions carefully compiled. The shipments of cotton to England during this period varied from 27,783,000 lbs. to 694,000 lbs., with prices ranging between 3*s.* and 8*d.* In 1813 and 1814 the war with America broke out: and strange to say, that although our supplies from the United States entirely ceased while hostilities lasted, the receipts of cotton from British India only amounted in those two years to 5,200,000 lbs., or 2,600,000 lbs. per annum. It was at this time that the first American planter was dispatched to India, with the view of aiding in the improved culture and preparation of cotton, taking with him a number of New Orleans sawgins. In 1840, Captain Bayles of the Madras army, having returned from a mission to the southern states of America, brought with him ten planters skilled in the growth and preparation of cotton, a great quantity of the best cotton-seed, as well as a large assortment of agricultural and mechanical implements employed in the States. Experimental culture on a liberal scale was now commenced in the districts of Broach, within the Bombay presidency; in Coimbatore and Tinnevelly, to the south of Madras; and in the Doab and Bundelcund, within the Bengal presidency. These were followed up by similar attempts at various other points within the three presidencies; the American planters were shifted from one locality to another, with a view of testing the comparative qualities of soil; in some instances model plantations were established and worked under the immedi-

ate supervision of these planters; in others, efforts were made to induce the native growers to cultivate some of the American varieties, with the seed of which they were supplied. In all these efforts little expense was spared; yet in spite of the lavish and continued outlay, nothing appears to have been arrived at beyond the conviction that, with but one or two exceptions, much time, labour, and money had been expended without any encouraging results. How far these continued efforts, which have, on the whole, been spread over a period of nearly seventy years, have been attended with success, may be judged from the facts, that in 1848 the shipments of Indian cotton to Great Britain amounted to 84,101,000 lbs., being 4,500,000 lbs. less than in 1844, 13,200,000 lbs. less than in 1841, and 2,400,000 lbs. below the exports of 1818. Taking the average of a number of years, the export of Indian cotton to England shews a sensible increase since the pacification of Europe. Thus the average shipments to Liverpool from the Indian ports during the five years immediately following the peace were 44,000,000 lbs.; whilst in the five years ending 1848 they amounted to 69,000,000 lbs.; in other words, they have averaged an increase of rather more than fifty per cent in thirty-three years. This augmentation, however, sinks into utter insignificance when compared with the progress of the cotton shipments from the United States to England during the same period, which was, in round numbers, from 45,000,000 lbs. to 600,000,000 lbs., shewing an increase of more than thirteen hundred per cent. By far the greater portion of the English supplies of Indian cotton are shipped from the port of Bombay, as may be seen by reference to the following figures:—

From Bombay.. ...	55,201,231	representing an average of 13 years ending 1846.
„ Calcutta.....	1,293,080	
„ Madras.....	3,973,074	
„ Tinnevelly...	1,110,084	

Having thus seen that, at the end of labours spread over seventy years, after a large outlay of money and labour, after the importation of seeds, tools, and superintendence, the quantity of Indian cotton obtained for England amounts to but one sixteenth in value of her total requirements: that in but few respects does the bulk of this excel in quality that which was exported fifty years since; and that the culture of the plant has been very partially extended or improved in the chief cotton-growing districts, scarcely at all in provinces to which that cultivation is less known, —it behoves us to examine into the causes of this wholesale failure. It must be borne in mind that the question of improvement of Indian cotton should be considered under three distinct heads: the introduction of better varieties, the amelioration of the quality and condition of the indigenous produce already grown, and the increased culture of the plant. The opinions of the American planters who were engaged by the East India Company appear to have been that the soils selected for trial of new seed were adverse to the chances of success. That this has been so in several instances, and with some shew of reasoning, there can be little doubt; the black cotton soil has been, in not a few cases, supplanted by the red soil, especially of Southern India, where some success has attended the trials thus made. There does not seem, however, to have been much, if any, attention paid to the peculiarities of climate, the degree of moisture, the temperature, nor of these points taken in connexion with varieties of soil. It will require no argument to shew that conditions affecting the vegetable economy of sugar, coffee, or rice, must be not altogether without their value in regard to the development of the cotton-plant, whether in India or elsewhere. Yet it does not appear that this consideration has entered into the calculations of the many practical men engaged inthe long labours of the cotton experiments of India. It cannot be that, as has been said, any portion of these failures is attributable to the supineness of the agency employed. If the bulk of the experimentalists have been in the employ of government, and therefore not so likely to have taken a lively interest in the matter, what is to be said of the want of success attending private enterprise? All appear to have shared in the common disappointment; and it is clear that we must look elsewhere for causes of failure. Whilst climate and soil, separately or together, have been at work in retardment of new culture or the introduction of new varieties, there are antagonisms to be found in other quarters, affecting not only these, but the improvement of the indigenous cotton by culture, and by care in picking, equally with the increase in the amount of crop produced.—*Capper's Three Presidencies, page* 344.

Indian Cottons.—The species peculiar to the Indian continent in common with other parts of Asia, as distinguishable from the American and West Indian descriptions, is, according to Dr. Royle, the *Gossypium Indicum* or *herbaceum*; the *Gossypium arboreum*, peculiar to India alone, is unfitted for manufacturing purposes, and employed solely as a padding for cushions, pillows, &c., for which, from its silky softness, it is especially adapted. It appears to have been produced in and exported from India since the most remote periods, and during the present century to have assumed a very important position amongst the articles shipped from each of the three Presidencies. Great Britain at the present time takes on an average 90,000,000 lbs. annually. China consumes nearly as much; whilst the native manufacture for local use cannot be less than 600,000,000 lbs. yearly. This vast quantity will cease to cause astonishment, when

re remember that the hundred million of inhabitants of India are accustomed to use cotton or all those purposes for which hemp, flax, wool, nd hair, are employed in European countries. n commerce Indian cotton is known under the ames of Surat, Tinnevelly, Bengal, Broach, &c., ccording to the locality of its growth or place of hipment. Dr. Royle gives three distinct varieies of cotton, all indigenous to Hindostan. The ommon description is found scattered more or ess throughout India, reared either as a triennial r annual. It reaches the height of five or six eet in warm, moist climates; the seeds are five n number, clothed with a short greyish down. n the peninsula there are two distinct species of his sort, known amongst the natives as *Oopum* nd *Nadum*. The first thrives only on the richest lack oil, and is an annual, producing a fine taple; the latter is a triennial plant, and grows n the poorer red soil, yielding small crops of nferior quality. Next to these we have the Dacca cotton, as a distinct variety of the *Gossypium Indicum*. It differs from the previous in he plant being more erect, with fewer branches, nd tinged with a reddish hue, whilst the cotton s finer, softer, and longer. This variety is reared nore or less extensively throughout Bengal especially in the Dacca district, where it is employed n the manufacture of the exquisitely fine muslin loths known over a great part of the world as Dacca muslins, and whose delicacy of texture so ong defied the imitation of the art-manufacturrs of the West. A third variety is the Berar otton, grown also in the Berar country, in the norhern provinces of the Madras Presidency, and n Surat and Broach. This plant attains a greatr size than the preceding, bears for a longer eriod, and produces a fibre of a finer quality han the former. It appears to thrive best n a light black soil of vegetable composition. Amongst commercial men the term *Surat* includes he produce of Surat, Berar, and Broach, with ccasionally some from Dacca; it comes mostly rom Bombay. The Madras cottons are those hipped from Tinnevelly, Coimbatore, and other arts of that Presidency, whilst the Bengals ake in the Bundelcund, Nagpore, and the far orthern provinces. Examined under a microsope the staple of these sorts appears to range rom seventeen-twentieths to one and one-tenth f an inch in length; the staple of the celerated Sea-Island cotton being usually an inch nd a half in length. The soil in which all hese Indian varieties thrive may be classed under two distinct heads, the black and the red cotton soil. The former, as its name indicates, s of a black or deep brown colour, of a layey nature, forming in the rains a heavy enacious mass, and drying into solid lumps in he hot months. An analysis of this gives 4 per cent of silex, 12 of carbonate of lime, 3 protoxide of iron, 3 of alumina, 2 of vegetable matter, and ½ salts, with a trace of magnesia. The red soil of India has been found in some localities better suited to the growth of cotton than the black earth. It is a rather coarse yellowish-red soil, commingled with particles of kunker, silex, felspar, and aluminous earth. It mainly differs in composition from the preceding in the iron existing in the state of peroxide or red oxide, whilst the carbonate of lime is found present in greater abundance. Analyses of the best cotton-soils of America, prove that they differ from those of India chiefly in the large portions of peaty matter contained in them. —*Capper's Three Presidencies, page* 26.

China Cottons. The *yellow Cotton* from which the beautiful Nankin cloth is manufactured is called Tze mie wha by the Chinese. Although the yellow variety has a more stunted habit than the other it has no characters which constitute a distinct species. It is merely an accidental variety, and although its seeds may generally produce the same kind, they doubtless frequently yield the white variety, and vice versa. Hence, specimens of the yellow cotton are frequently found growing amongst the white in the immediate vicinity of Shanghae; and again a few miles northward, in fields near the city of Poushan on the Banks of the yang-tse-kiang; where the yellow Cotton abounds. Fortune often gathered specimens of the white variety.

The *Nankin Cotton* is chiefly cultivated in the level ground around Shanghae, where it forms the staple summer production of the country. This district which is part of the great plain of the Yang-tze-kiang, although flat, is yet several feet above the level of the water in the rivers and canals, and is consequently much better fitted for cotton cultivation than those flat rice districts in various parts of the country,—such for example as the plain of Ningpo, where the ground is either wet and marshy, or liable at times to be completely overflowed. Some fields in this district are of course, low and marshy, and these are cultivated with rice instead of cotton, and regularly flooded by the water wheel during the period of growth. Although the cotton land is generally flat, so much so, indeed, that no hills can be seen from the tops of the houses in the city of Shanghae, it has nevertheless a pleasing and undulating appearance, and taken as a whole it is perhaps the most fertile agricultural district in the world. The soil is a strong rich loam capable of yielding immense crops year after year, although it receives but a small portion of manure. The manure applied to the cotton lands of the Chinese is doubtless peculiarly well fitted for this kind of crop. It is obtained from the canals, ponds, and ditches which intersect the country in every direction and consists of mud which has been formed partly by the decay of long grass, reeds, and succulent water plants, and partly by the surface soil which has been washed

down from the higher ground by the heavy rains. Every agricultural operation in China seems to be done with the greatest regularity, at certain stated times, which experience has proved the best, and in nothing is this more apparent than in the manuring of the Cotton lands. Early in April the agricultural labourers, all over the country, are seen busily employed in cleaning these ponds and ditches. The water is first of all partly drawn off, and then the mud is thrown upon the adjoining land to dry, where it remains for a few days until all the superfluous water is drained out of it, and is then conveyed away and spread over the cotton fields. Previous to this, the land has been prepared for its reception, having been either ploughed up with the small buffalo plough in common use in the country, and then broken and pulverised by the three-pronged hoe, or in those instances where the farms are small and cannot boast of a buffalo and plough, it is loosened and broken up entirely by manual labour. When the mud is first spread over the land, it is, of course, hard or cloggy, but the first showers soon mix it with the surface soil, and the whole becomes pulverised, and it is then ready for the reception of the cotton seed. Road scrapings and burnt rubbish are saved up with care, and used for the same purpose and in the same manner. A considerable portion of the cotton lands either lie fallow during the winter months, or are planted with those crops which are ready for gathering prior to the sowing of the cotton seed. Frequently, however, two crops are found growing in the field at the same time. Wheat, for example, which is a winter crop, is reaped in the Shanghae district generally about the end of May, while the proper time for putting in the cotton seed is the beginning of that month or the end of April. In order, therefore, to have cotton on the wheat lands the Chinese sow its seeds at the usual time amongst the wheat, and when the latter is reaped, the former is several inches above ground, and ready to grow with vigour when it is more fully exposed to the influence of sun and air. The Shanghae season—that is, from the late spring frosts to those in autumn—is barely long enough for the production and ripening of the Cotton, as it is easily injured by frost, and the Chinese farmer is thus obliged, in order to gain time and obtain two crops from this ground in one year, to sow its seeds before the winter crop is ready to be removed from the ground. When it is possible to have the first crop entirely removed before the cotton is sown it is much preferred, as the land can then be well worked and properly manured, neither of which can otherwise be done. The method of sowing one crop before the preceding one is ripe and removed from the land is very common in this part of the country; and even in autumn, before the cotton stalks are taken out of the ground other seeds are frequently seen germinating and ready to take the place of the more tender crop. In the end of April and beginning of May—the land having been prepared in the manner just described the cotton seeds are carried in baskets to the fields and the sowing commences. They are generally sown broad cast, that is, scattered regularly over the surface of the ground, and then the labourers go over the whole surface with their feet and tread them carefully in. This not only embeds the seeds, but also acts like a roller to break and pulverise the soil. Germination soon commences, the seeds rooting first in the manure which had been scattered over the surface of the land. In some cases the seed, instead of being sown broadcast, is sown in drills or patches, but this mode is less common than the other. The rains, which always fall copiously at the change of the monsoon which takes place at this season of the year, warm and moisten the earth, and the seeds swell, and vegetation progresses with wonderful rapidity. Many of the operations in Chinese agriculture are regulated by the change of the monsoon. The farmer knows from experience, that, when the winds, which have been blowing from the north and east for the last seven months, change to the south and west, the atmosphere will be highly charged with electric fluid, and the clouds will daily rain and refresh his crops. The cotton fields are carefully tended during the summer months. The plants are thinned where they have been sown too thickly, the earth is loosened amongst the roots, and the ground hoed and kept free from weeds. If the season is favourable, immense crops are obtained owing to the fertility of the soil, but if the weather happens to be usually dry from June to August, the crop receives a check which it never entirely recovers, even although the ground after that period, should be moistened by frequent showers. 1845 was a season of this kind, and the crop was a very deficient one, compared with that of the previous year. The spring was highly favourable, and the plants looked well up to the month of June, when the dry weather set in, and gave them a check which they never recovered. Abundance of rain fell later in the season, but it was then too late, and only caused the plants to grow tall and run to leaf, without producing those secretions which ultimately go to the formation of flowers and seed. The cotton plant produces its flowers in succession from August to the end of October, but sometimes, when the autumn is mild, blooms are produced even up to November, when the cold nights generally nip the buds, and prevent them from forming seed. In the autumn of 1844 this happened on the night of the 28th of October, when the thermometer sunk to the freezing point, and the ice was found on the sides of the canals and ponds. As the pods are bursting every day, it is necessary to have them gathered with

great regularity, otherwise they fall upon the ground and the Cotton gets dirty, which of course reduces its value in the market. Little bands of the Chinese are now seen in the afternoon in every field, gathering the ripe cotton and carrying it home to the houses of the farmers, As the farms are generally small, they are worked almost entirely by the farmer and his family, consisting sometimes of three or even four generations, including the old grey-haired grandfather or great grandfather, who has seen the crops of four-score years gathered into his barns. Every member of these family groups has a certain degree of interest in his employment; the harvest is their own, and the more productive it is, the greater number of comforts they will be able to afford. Of course there are many cotton farms of larger size, where labourers are employed in addition to the farmer's family, but by far the greater number are small and worked in the way I have just described. It is no unusual sight to see the family goats too, doing their share of the work. Several of these animals are kept on almost every farm, where they are, of course, great favourites with the children, and often follow them to the cotton fields. Although the children with their little hands can gather the cotton as well as their elders, they are not strong enough to carry it about with them, and it is amusing to see their favourites the goats, with bags slung across their backs, receiving the deposits of cotton, and bearing it home to the houses, evidently aware that they too are working for the general good. However fine the crop may be, the Chinese are never sure of it until it is actually gathered in; much depends upon a dry autumn, for, if the weather is wet after the pods begin to burst, they drop amongst the muddy soil, and are consequently much injured, if not completely destroyed. When the cotton reaches the farmyard, it is daily spread out on hurdles raised about four feet from the ground, and fully exposed to the sun. As the object is to get rid of all the moisture, it is of course only put out in fine weather, and is always taken into the house or barn in the evening. When perfectly dry, the process of separating it from the seeds commences. This is done by the well known wheel with two rollers, which, when turned round, draws or sucks in the cotton, and rejects the seeds. It is a simple and beautiful contrivance, and answers well the end for which it is designed. The cotton is now sent to market, and a portion of the seeds are reserved for the next year's crop. Early in the fine autumnal mornings, the roads leading into Shanghae are crowded with bands of coolies from the cotton farms, each with his bamboo across his shoulders and a large sack of cotton swung from each end. With these they hurry into the town, for the purpose of disposing of them to the merchants, who have numerous warehouses from which they send the cotton to the other provinces of the empire. These coolies or small farmers, for many of them bring their own produce to market themselves, are very independent in their dealings. Having reached the first warehouse, the cotton is exposed to the view of the merchant, who is asked what price he intends to give for that particular quality and should the sum offered be below the owner's expectations, he immediately shoulders his load and walks away to another merchant. At this season it is almost impossible to get along the streets near the sides of the river where the cotton ware-houses are, owing to the large quantities of this commodity which are daily brought in from the country. It is bought up by the large cotton merchants, who empty it out in their warehouses, and then repack it in a neat and compact manner before it is conveyed on board the junks. Before the cotton is converted into thread for the purpose of weaving, it is cleaned and freed from knots by the well known process common in our possessions in India. This is done by an elastic bow, the string of which being passed under a portion of the cotton placed on a table, throws it in the air by the vibration which is kept up by the workman, and separates the fibre without at all breaking or injuring it. At the same time the wind caused by the sudden vibrations carries off the dust and other impurities. After this process the Chinese cotton is particularly pure and soft, and is considered by good judges not to be surpassed by any in the world. It is much superior to that imported into China from Hindustan, and always commands a higher price in the Chinese Market. When the last crops are gathered from the cotton fields, the stalks are carried home for fuel. Thus every part of the crop is turned to account: the cotton itself clothes them, and affords them the means of supplying themselves with all the necessaries of life, the stalks boil their frugal meals, and the ashes even—the remains of all—are strewed over their fields for the purposes of manure. But even before this takes place the system I have already noticed of sowing and planting fresh crops before the removal of those which occupy the land—is already in progress. Clover, beans, and other vegetables, are frequently above ground in the cotton fields before the stalks of the latter are removed. Thus, the Chinese in the northern provinces lengthen by every means in their power the period of growth; and gain as much as they possibly can from the fertility of their land. The reader must bear in mind, however, that the soil of this district is a rich deep loam, which is capable of yielding many crops in succession without the aid of a particle of manure. Nature has showered her bounties on the inhabitants of this part of the Chinese empire with no sparing hand; the soil is not only the most fertile in China,

but the climate is capable of rearing and bringing to perfection many of the productions of the tropics, as well as the whole of those found in all the temperate regions of the globe. —*Fortune's Wanderings, from page 264 to p. 273.* The annual importation into China is placed rather too low in the Table, for in 1842, there were 650,000 peculs delivered; and in 1843 there were 817,668 peculs, of which 578,775 were Bombay, 89,201 Bengal, 141,860 Madras, and 8,832 American. The average is about 750,000 peculs of all kinds at $9½ per pecul, giving a total of $7,125,000. The Bombay and Madras cotton trade has increased of late years, and the Bengal decreased; the imports of American are likely to increase. The importation of raw cotton into China is however, on the whole, not likely to increase much under the new system; for the cheapness of the manufactured goods will lead the Chinese to take them, instead of working up the raw material. Cotton is always quoted in taels and mace in China Prices Current.—*Morrison.*

Bengal Presidency.—The muslins of Dacca, so long celebrated, have always been manufactured from a cotton grown to the eastward and south-east of the city of Dacca, and a few miles inland from the banks of the Burrampooter; the plant has been figured by Dr. Roxburgh in vol. 3, t. 269, of his Coromandel Plants. It has often been doubted whether the superiority of the manufacture was dependent on the skill of the workmen or the goodness of the cotton; but from Mr. Lamb's account it appears to be carefully cultivated. It will probably be found that both have some influence, and it is certain that the workmen prefer the Dacca cotton, because, as Mr. Bebb long ago explained, its thread does not swell in bleaching, as is the case with the cotton grown in North Western and Central India. (Vide Reports of East-India Company on Cotton, p. 350.)

Cotton of N. W. India.—Of the cotton which is grown further north, Mr. Duncan, as early as 1789, relates, that the greatest part of the cotton produced in Benares (N. lat. 25°) is spun into thread, as the spinners there prefer such cotton to the generality of that imported from foreign countries. Of this, the cotton imported from Nagpore was held in the highest estimation, and considered nearly equal to that from Surat, though that grown near Benares is described as being very little inferior to it.

Cotton of the Doab and of Bundlecund, 1832. —Dr. Royle in proceeding down the Jumna in January 1832, observed that the cotton plants on its banks, especially below Agra, though smaller, were very prolific bearers, the bolls were larger, and the cotton better than he had seen either higher up or lower down the river. Subsequently, he was informed, that the best cotton was grown in Bundlecund, in the neighbourhood of Jalown, not far inland from Calpee; that the next best was that of Raja-Khera, below Agra. Good cotton is produced all along the banks of the Jumna, as far north as 30°. Mr. Vincent, of Nudjuffghur, stating that, in the tract of country lying to the north of Allahabad, "the produce of a begah (one-third of an acre) is on an average, about a maund of cotton, and two maunds of seed, which is as readily sold as the cotton itself, being an excellent food for cattle."

Cotton of Central India.—The cotton of the interior or Central India, whether we consider the opinions of the native manufacturers on the Madras coast, or those of Benares or Bengal, or the exporters at Bombay, has always been highly esteemed. It was bought also at Dacca, and they paid 19 rupees a maund for the cotton of Sironje in Malwa at the time that their own cotton was selling for about six rupees, which was about the same price, as the former was cleaned and the latter uncleaned cotton. The soil of Central India is peculiar, consisting in many places of the black cotton soil; the climate also differs from that of the Lower Provinces. It is more than probable, therefore, that the causes are physical and may be discovered, which will account for the superiority as well as the facility of culture of cotton in these districts. In such a case, the Delhi Canal affords great facilities and eligible situations. Colonel Colvin introduced the culture of the Upland Georgia cotton into upwards of one hundred villages along its banks.

Bengal.—The Garrow, Tipperah, and Chittagong Hills produce a large quantity of inferior Cotton called Bhoga. It is the principal article of traffic which the hill people bring down to the plains. The quantity annually sold or bartered by the Garrow tribe is estimated at 50,000 maunds; that by the Tipperah Kookees at 1,00,000; and that by the Chittagong people at 50,000 maunds, making a total quantity equal to *two millions* of pounds (15 millions), *vide* Mr. Taylor's letter, 20th November 1849. It is used in the manufacture of the inferior kinds of *hummums*, *baftas*, *boonees*, *sarees*, *jore*, *&c.*, also for making ropes and tapes, and the coarsest of all fabrics, viz. *garhas* and *guzeehs*, which are commonly used for packing other cloths, and for covering dead bodies, for which purpose a large quantity of them is consumed annually both by Hindoos and Mahomedans. This branch of industry has not yet been touched by the rivalry of British manufactures, the thread of which these fabrics are made, being far below the lowest number of English yarn imported into Bengal. A piece of Guzeeh cloth, measuring 10 yards, can be purchased for 12 annas (18 pence) which is the one hundred and twenty-fifth part of the price paid for a piece of *mulmul-i-khas* of the same dimensions.—*Dr. Taylor.*

Tenasserim Provinces.—Mr. Blundell introdu-

ced the Pernambuco cotton plant, *Gossypium acuminatum*, which produces the Pernambuco, Peruvian, Bahia, or South Sea Island cotton; and Capt. Macfarquhar raised such a fine article at Tavoy from it, that the Committee of the Agricultural and Horticultural Society of Calcutta were unwilling to believe it the production of that species. They reported: "The sample sent by Capt. Macfarquhar appears to be of a quality resembling the *Sea Island*, but finer and more silky, and the fibre not so strong, its value is not so easy to determine, but the Committee are of opinion that it would sell for a high price. The Pernambuco cotton, which, it is believed, is the same as the *South* Sea Island cotton, is an inferior staple to that of the North American Sea Island, and they have a sample of cotton submitted which in point of *fineness* surpasses the genuine Sea Island cotton of North America. This improvement on the general staple of Pernambuco cotton might be reconciled, had it been produced *at a distance from the sea*, since it has been ascertained, that this description of cotton deteriorates by proximity to the sea; whence your Committee are disposed to think that Capt. Macfarquhar has been led into error in calling it *South sea* Island instead of Sea Island." Admitting that Captain Macfarquhar was in error, which it is believed he was not, the report proves that an article "finer and more silky," than the best American cotton has been raised in these Provinces. The principal difficulty to the introduction of this species into general cultivation was, as Mr. Blundell told me, that the trees did not produce abundantly.—*Mason.*

Sea Island Cotton.—Sea Island cotton has been raised in these Provinces by amateur cultivators, but Mr. Mason has never seen any report on the article obtained. "Bourbon cotton of Indian growth," says Wight, "has sold in the London markets for the highest prices going;" and, as the Bourbon plant is the original Sea Island acclimatized to the East, the cultivator would have a stronger probability of success by obtaining his seed from Bourbon, than from America. Much attention should also be given to the selection of a proper soil. Analysis has shown that all the lands on which cotton is grown in India, differ widely in their constituent parts from the best cotton land of America. The subject is still in its infancy, more extensive analysis being required; "but it seems *at present*," observes Mr. Piddington, "that the abundance and fineness of good cotton depend on the quantity of carbon in the soil, *and the solubility of that carbon*. If, therefore, you can obtain a soil approaching the American soils, that is, containing peaty matter, lignite, and colouring cold water, this will no doubt be the best; because it contains carbon, and probably hydrogen combined with it, suitable for the food of the plant. And the next best soil is one containing carbonate of lime." The varieties are

Gossypium barbadense. Var. (a) Barbadoes, or Bourbon cotton. (b) Sea Island, or long stapled. (c) Upland Georgia, or short stapled.—Mason.

Native Cotton.—The Karens usually grow cotton enough to make their own fabrics, and on the Salwen and Tenasserim, it is sometimes raised in considerable quantities; but its market price is little more than a fourth of the best American cotton; yet with improved modes of culture, and frequent changes of seed, its value would undoubtedly be greatly increased.

Bombay Presidency.—The Bombay Presidency has long exported large quantities of cotton both to Europe and China. The best cotton districts are widely separated from each other, and at opposite points of the Bombay territory. These are the southern Mahratta country, about 16° N. lat., where the experimental farms were established, because presenting tracts considered by Dr. Lush well suited for the purpose. Guzerat and Cattywar are the districts where the well known superior cottons are already grown by the native; in consequence of which, these were selected as the sites of the northern experimental farms, and much favourable land for the purpose is found between the latitudes of 21° and 24° North. This part of the country was the site of the experiment of Mr. Assistant Surgeon Gilders in 1816-17, who, having observed the causes which led to the failure in the attempt to introduce the cultivation of Bourbon cotton into the western districts, considered the obstacles to have been exclusively of a physical nature. He at the same time stated, that both the soil and climate of the districts lying between the Subermuttee and the Myhee promised a favourable result. The cotton grown, at that time, by Mr. Gilders was considered at Bombay fully equal to any produced in Bourbon, and in London, as the best specimen that had been imported from Bombay raised from Bourbon seed. It sold for 15*d.* per lb. With so much sagacity had Mr. Gilders selected the site of his experiments, that fifteen years afterwards Dr. Burns collected seed from trees growing apparently wild. These being sown, produced plants of which the cotton was pronounced equal to the best from New Orleans. The cotton grown at Laberkowa, within two miles of Mongrole, though confined to a space of 200 beegahs, or thereabouts, was so highly valued, that on the spot it would fetch six-sevenths of a rupee per maund more than any other kind in that part of the country; yet the natives say they frequently used seed from Guzerat, or any part of the country. The superiority must therefore depend either upon peculiarity of soil and climate or excellency of culture. One point only of the latter is related, but that is one of great consequence. For instance, the people are in the habit of carefully extracting the cotton alone from the pod in the field; and this is, probably, of considerable importance, as some of the Ame-

rican planters are of opinion, that the staple of Indian cotton is much injured after it is collected by being allowed to heat when piled up, often for a long time, before it is cleaned.

Madras Presedency.—As early as 1790, Dr. Anderson was employed in sending Mauritius cotton seeds, as well as "Brown Cotton Seeds," imported from Malta, to different parts of the peninsula; and Dr. Roxburgh, who left Samulcotta in the Northern Circars and took charge of the Calcutta Botanic Garden in 1793, had already ascertained that the elevated, dry, and less fertile soil of Coromandel was better suited than that of Bengal to the Bourbon cotton. He obtained them from Mr. Hughes, who had for some time been engaged in the culture of cotton in the Tinnevelly district, and whose success was so considerable with the Bourbon cotton, that for twenty years "Hughes's Tinnevelly Cotton" continued to be quoted in the Liverpool market as the best from India, and sold at higher prices than the American sort staple cottons, and 3*d.* per lb. above the best Surats. The fact is important, on account of the latitude of Tinnevelly being only $8\frac{1}{2}°$, and because the success was evidently the result of skill applied to the culture. The produce, only 100 lbs. per acre, was fine in quality and much esteemed. It would also seem that in Vizagapatam, about north latitude 17°, the return is much greater than in any other district, as the produce is said to amount to "forty-six maunds, or 115 lbs., of seed cotton per acre, nearly equal to the best, and exceeding the ordinary American crops." The culture here is peculiar, as very liberal pruning is practised. In Trichinopoly, with a fertile soil, 83 lbs., which is the next highest, is the greatest return, which, though so much less than the above, is still more than double the average return from other districts. But no reports had then been received from North Arcot, Bellary, and Cuddapah; the two last are stated by Dr. Wight to be the principal cotton districts of the peninsula. The cotton of Central India finds its way on the west to Surat, and on the east to Mirzapore, which has long been the great Cotton mart of that side of India. The causes which favour the growth of Cotton, esteemed both in India and England, in the tract of country extending from Surat and Ahmedabad, or from about lat. 21° and 23°, in a broad band across Malwa to Banda and Rajakhaira, in about 25° and 27°, near the banks of the Jumna, are no doubt physical. The black cotton soil which is spread over a great portion of this tract has undoubtedly a considerable share in producing the effect; but good crops of cotton are produced in some parts where there is no black soil, as immediately on the banks of the Jumna and in the Doab. It will therefore probably be found, that the comparative dryness of the climate after the plant has got well established in the ground, checks the vegetative vigour, and favours the production of prolific fruit.—*Royle's Productive Resources of India.* Cotton plants are mucilaginous, and have been used as Demulcents. The seeds yield Oil, which is sometimes expressed for burning in lamps. Cattle are, however, often fed on the seeds, which are also sometimes employed as manure for Cotton plants. Cotton wool is largely employed, throughout the world, in the manufacture of Cloths. Cotton has been long a popular application to burns. Dr. Anderson (Ed. M. and S. Journ. 1828) directs it to be applied in thin layers, one over the other, and retained by the moderate pressure of a bandage. Pain is allayed, local irritation and blistering diminished or prevented, and constitutional disturbance proportionally obviated. M. Reynaud adopted its application in case of Erysipelas, and M. Mayor employs it as a topical application with Calomel in cases of Ophthalmia. (B. and F. Med. Rev. xx. 463) Cotton, though used chiefly for clothing, is, in India, also employed to a considerable extent for cordage, as, for instance, for tent-ropes, of which so many are required for the use of the army, and made entirely of Cotton, as are the tents themselves. So, Cotton ropes are also employed for many domestic purposes. Specimens were sent to the Exhibition of 1851, both from Calcutta and Madras, and have considerable strength. Some of the native shipping, also, and even a few American ships, are rigged with Cotton ropes; while Cotton canvas is also employed for sails, especially on the coast of Cutch, where some very good is made, and sells for about three and a half annas per yard.—*Royle Fib. Pl. p.* 264.

(2921) COTTON-GRASS. ERIOPHORUM CANNABINUM. Its seeds are clothed at their base with a silky or Cotton like substance with which pillows are stuffed and wicks of candles, as well as paper made. Its name is bhabhur and bhabhuree, and is made into ropes by the mountaineers.

(2922) COTTON MANUFACTURES. A notice of the industry of the Hindoos would be manifestly imperfect without some account of their progress in the manufacture of textile and other fabrics, especially since, in at any rate one of these arts, that of Cotton-weaving, they had arrived at a high state of perfection long prior to any extensive manufacture of the article in Europe. If it be also considered, in reference to this branch of industry, that the natives of India, whilst they so far, and for so long, excelled the skilled craftsmen of the West in the production of exquisitely fine muslins, richly worked and highly ornamented, possessed a raw material confessedly of great inferiority to the cotton imported into England from all other parts of the world, we cannot fail to award them a considerable meed of praise. It required the science of a century, the combined efforts of a

Watt and an Arkwright, to compete successfully with the simple handicraft of the Indian village-weaver; whilst in some of the finer goods, it is still questionable whether the British capitalist can equal the patient productions of the simple Hindoo. The actual date of the birth of cotton-weaving in India cannot be arrived at, though there is little doubt of its high antiquity. The cotton plant being indigenous to the country, we have every right to presume that the uses and value of this admirable production of nature would not have been long hidden from the early Hindoos, especially as the art of weaving flax and cotton was well understood by the Assyrians, Egyptians, and other nations of antiquity. The earliest records which we possess bearing upon the people and produce of India, inform us of the existence in those remote days of woven cloths of great excellence. One of the oldest Greek authors, in speaking of the land of the Hindoos, says; "The wild trees of that country bear fleeces as their fruit, surpassing those of sheep in beauty and excellence; and the Indians use cloth made from those trees." Amongst the goods which appear to have been brought to Europe from the Indian seas, in the days when Arab traders were the only medium of intercourse between the eastern and western worlds, we find mentioned cloths of silk and cotton of various colours and devices. It does not appear however, that there existed any great demand for cotton, the consumption of the Roman people, who were then the customers for all luxuries, being chiefly confined to cloths of silk and wool. During the early trade of Europeans with India by the long sea route, the calicoes and fine muslins of that country came first into general notice; and from that date until the production of machine-made fabrics in England, they continued to rise in public estimation. It was deemed a great thing with the Lancashire manufacturers, when, by the aid of mechanical and artistic skill, combined with the potent agency of steam, they found themselves able to produce an article which was considered equal to that which the unlettered Hindoo had manipulated in his little mud hut on the remote banks of the Ganges, and which had been produced of like excellence by their ancestors, when the "father of history" penned his observations upon their country. That the Hindoos paid considerable attention to the details of this manufacture, in the most remote ages, there remains sufficient proof on record. In the Indian work of highest antiquity, the *Rig Veda*, believed to have been written fifteen centuries previous to our era, occurs the following passage, "Cares consume me, Satakralu, although thy worshipper, as a rat gnaws a weaver's threads:"—the temptation to the rat was evidently the starch employed by the spinner to impart tenacity to the thread; nor can there be any doubt that cotton was the thread alluded to.

Again, in *Menu*, we find it directed as follows: "Let the weaver who has received ten palas of cotton-thread, give them back increased to eleven by the rice-water (starch), and the like used in weaving; he who does otherwise shall pay a fine of twelve panas." The cotton fabrics of India formed a considerable item in the exports from the East to this country during the early days of British Indian commerce; the delicacy of their fabric, the elegance of their design, and the brilliancy of their colours, rendered them as attractive to the better classes of consumers in England, as are, in the present day, the shawls of Cashmere or the silks of Lyons. So much superior indeed were the productions of the Indian spinning-wheel and hand-loom, to those turned out by the manufacturers of Lancashire in the middle of the last century, that not only were Indian calicoes and Indian prints preferred to the home-made articles, but the Manchester and Blackburn weavers actually imported Indian yarns in large quantities for employment in their factories. It was about the year 1771-2 that the Blackburn weavers, taking advantage of the recent discoveries and improvements of Arkwright, Hargreaves and others, found themselves in a position to produce plain cotton goods, which, if they did not quite equal the fabrics of the East, at any rate found their way very rapidly into general consumption in Europe. The invention of the mule-jenny, in 1779, was the commencement of a new era in the history of the cotton manufacture of Great Britain; and when, six years later, Arkwright's machines were thrown open to the public, a revolution was effected in the production of all kinds of yarns; England found herself able, not only to supply all her own wants with cotton goods of every variety of quality, but also to carry the produce of her looms ten thousand miles across the seas, and placing them at the doors of the Indian consumer, undersell the goods made by his own hands from cotton grown in his own garden. Nor is it only in the heavier goods that the West are able to beat out of their own markets the weavers of the East. There have long been masters in their craft who can and do produce fabrics more exquisitely delicate and light in texture than those beautiful muslins of Dacca, so long and justly celebrated with a world-wide fame; and although in some particulars these latter fabrics still claim a certain degree of superiority, and although many of the Hindoos prefer their own woven goods to those of Manchester and Glasgow, the cotton manufacture of British India, in spite of its supply of the raw material growing often close to its door, in spite of labour absurdly cheap, may truly be said to have ceased in favour of the far-off industry of Lancashire and Scotland. The actual result of this revolution of half a century has been that, in place of England importing cotton goods and

yarns from the East to the yearly value of about 300,000*l.*, that country is able, in the present day, to ship to the various ports of India cotton fabrics to the value of upwards of three millions sterling. The decay of this branch of our Indian exports has been steady and certain. In 1827,8, Bengal shipped but to the value of 275,000*l.*; in 1837-8, not more than 69,000*l.*; and at the present moment our supplies from the East are limited to about five thousand bales from Madras, solely for re-shipment to our western colonies, and various parts of northern and western Africa. Dacca was the seat of manufacture of the muslins known by that name, and spoken of by the ancients as "woven webs of hair." The most delicately worked and highly ornamented scarfs and dresses are wrought at Delhi, Benares, and Ahmedabad. Fine goods were also produced at Allahabad, Harripaul and Santipore; whilst the more substantial and useful fabrics were wrought chiefly at Patna, Luckpore, Lucknow, Balasore, Masulipatam, Cuddalore, and Surat.—*Royle, Arts of India.* Of the Arts practised at Dacca, the first that claims attention is the Cotton Manufacture. In a commercial point of view, this is no longer the important branch of industry that it formerly was; but, regarded as an Art which furnishes exquisite specimens of textile fabrics, it is still unrivalled. The implement used in spinning and weaving indeed, is rude, but the simplicity of its construction contrasts with the delicate Gossamer texture of the fabrics made by means of it, and shew that the skill displayed in this Manufacture is less the result of artistic ingenuity or complicated mechanical appliances than of that dexterous use of the hand and foot, and delicacy of touch which are possessed, in so remarkable a degree, by the Hindoo Artisans of Bengal. With their rude implements, the Hindoos of Dacca succeed in manufacturing Muslins, "to which," as Dr. Ure observe, "European ingenuity can afford no parallel, such indeed as has led a competent judge to say, it is beyond his conception how this yarn, greatly finer than the highest number made in England, can be spun by the distaff and spindle, or woven by *any* Machinery." (Ure's Cotton Manufacture of Great Britain, Vol. I, p. 54.) There is the primitive instrument used for carding the fibres of the Cotton, likewise the instruments employed for separating the Wool from the seeds, and for bowing or teazing the former. The first is simply the jaw-bone of the Boalee fish (Silurus Boalis), the teeth of which being fine, recurved and closely set, act as a fine comb in removing minute particles of earthy and vegetable matter from the Cotton. The Hindoo Spinner, with that inexhaustible patience that characterizes her race, sits down to the laborious task of cleaning with this instrument the fibres of each seed of cotton. Having accomplished this, she then separates the wool from the seeds by means of a small iron roller (dullun kathee) which is worked with the hands, backward and forward, on a small quantity of the cotton seeds placed upon a flat board. The Cotton is next bowed with a small bow of bamboo strung with a double row of catgut, muga silk, or the fibres of the plantain tree twisted together; and having been reduced by this instrument to a state of light downy fleece, it is made up into a small cylindrical roll (puni) which is held in the hand during the process of spinning. The spinning apparatus is contained in a small basket or tray not unlike the catheters of the ancient Greeks. It consists of a delicate iron spindle (tukooa), having a small ball of clay attached to it, in order to give it sufficient weight in turning; and of a piece of hard shell imbedded in a little clay on which the point of the spindle revolves during the process of spinning. With this instrument the Hindoo women almost rival Arachne's fabled skill in spinning. The thread which they make with it is exquisitely fine, and doubtless it is to their delicate organization and the sensibility with which they are endowed by nature, that their inimitable skill in their art is to be ascribed. The finest thread is spun early in the morning before the rising sun dissipates the dew on the grass, for such is the tenuity of its fibre that it would break, if an attempt were made to manufacture it during a drier and warmer portion of the day. The cohesive property of the filaments of Cotton is impaired by high temperature accompanied with dryness of the air, and hence, when there is no dew on the ground in the morning to indicate the presence of moisture in the atmosphere, the spinners impart the requisite degree of humidity to the cotton, by making the thread over a shallow vessel of water. Skeins of fine thread of different qualities, with a memorandum of the length, weight, and time occupied in spinning, attached to each skein, should be submitted for exhibition. A specimen which Dr. Taylor examined at Dacca in 1846, measured 1,349 yards and weighed only 22 grains, which is in the proportion, of upwards of 250 miles to a pound weight of staple. During the process of preparing the thread and before it is warped, it is steeped for a couple of days in fine charcoal powder soot, or lampblack mixed with water, and after being well rinsed in clear water, wrung out, and dried in the shade, it is rubbed with a sizing made of parched rice, (the husk of which has been removed by heated sand) fine lime and water. The loom is light and portable and could easily be erected for exhibition. It should have for this object, a piece of half finished fine Muslin wound upon its cloth and yarn beams, and be provided with batten, templet, and shuttle, and all the appurtenances requisite to illustrate the process of weaving. The principal varieties of plain Muslins now manufactured at Dacca, are Mulmul Khas, Abru-

wan, Shub-num, Khasu, Jhuna Circar Ali, Tunzeb, Alabullee, Nyanzook, Buddun Khas, Turundum, Surbutees and Surbund—names which either denote fineness, beauty or transparency of texture, or refer to the origin of the manufacture of the fabrics, or the uses to which they are applied as articles of dress. The finest of all is the Mulmul Khas, (literally Muslin made for the special use of a Prince or great personage). It is woven in half pieces, measuring 10 yards in length, and 1 yard in breadth, having 1,900 threads in the warp, and weighing 10 Siccas, (about 3¾ ounces Avoirdupois.) The finest half piece that I have seen weighed 9 Siccas. The price is 100 Rupees. Some of the other Muslins are also beautiful productions of the loom, as *ab-rawan*, compared by the Natives from its clear pellucid texture to "running water." Shub-num, so named from its resemblance when it is wetted and spread upon the bleaching field to the "evening dew" on the grass. Jhuna a light, transparent net-like fabric, usually made to order, and chiefly for natives of rank and wealth, worn by the inmates of zenanas and dancers, and apparently the cloth referred to in the Classics under the figurative names of *Tela Arenarum*, *Ventus Textilis*. All these Muslins are made in full pieces of 20 yards in length by 1 in breadth, but varying considerably in the number of threads in the warp, and consequently in their weight. Of figured fabrics, as striped (*Doorea*), chequered (*Charkanee*), and flowered (*Jamdanee*), there exists a considerable variety, both in regard to quality and pattern. The flowered Muslin was formerly in great demand both in India and Europe, and was the most expensive manufacture of the Decca Urungs. There was a monopoly of the finer fabrics for the Court of Delhi: those made for the Emperor Aurungzebe cost 250 Rupees per piece. This Muslin is still much admired, but is now seldom manufactured of a quality of higher value than 80 Rupees per piece. Omitting the second rate kinds of Cloth, as *Sarees*, *Boonees*, *Baftas*, *Joru*, *Ekpattus*, *Gamchas*, &c., now entirely made of English yarn, imported into the District, and which constitute the great bulk of the Dacca Cotton manufacture. The next class worthy of attention is that of fabrics of a mixed texture of cotton and silk. They are designated by various names, as *Nowbuttee*, *Kutan*, *Roomee Apjoola* and *Lucka*, and when embroidered with the needle, as many of them frequently are, they are called Kusheedu. The silk used in their manufacture is the indigenous Muga Silk of Assam and Sylhet, but the Cotton thread employed is now almost entirely English yarn, of qualities varying from No. 30 to 80. These Cloths are made exclusively for the Jedda and Bussora Market, and a considerable stock is yearly imported in the Arab vessels that trade between Calcutta and these ports. Pilgrims too, from the vicinity of Dacca, not unfrequently take an investment of them, which they dispose of at the great annual fair held at Meena, near Mecca. They are used by the Arabs chiefly for turbans and gowns. The golden color of the Muga silk gives to some of these a rich lustrous appearance. Pieces, made of Native spun cotton thread, and of the best kind of Muga silk, would, I have no doubt, be admired in England.—*Dr. Taylor*. The Export-trade of the Madras Presidency in Madapollams and Long Cloths has been annhilated by the British Manufacturer, and the goods are laid down by him in all the bazars of India. The export-trade of what were denominated Madapollams and Punjums for the 10 years from 1815-16 to 1824-25 was as follows.

	Bales.	Pieces.	Value Rs.
1815-16	11,925		37,82,859
1816-17	10,243		33,53,243
1817-18	9,905		32,78,330
1818-19	7,715		24,00,543
1819-20	5,903		19,64,006
1820-21	5,149		16,81,551
1821-22	2,915		12,53,383
1822-23	541	53,220	409,337
1823-24	„	142,470	793,208
1824-25	„	128,400	802,600

This description of Goods is not now made, and pieces of Punjum are only interesting as specimens of that important manufacture which formerly was to be found in bales in the bazar and in the Custom House for shipment. The same causes which have contributed to so great a falling off in the Cotton Manufacture of the Madras Presidency produce alike upon they arns spun by hand, the change may be perceived by referring to cotton twist imported from the United Kingdom in the years from 1826 to 1830 compared with the last 10 years.

1826-27	13,296
1827-28	17,573
1828-29	96,517
1829-30	49,110
1830-31	10,549
Total	187,045
1844-45	1,178,648
1845-46	755,464
1846-47	953,477
1847-48	517,067
1848-49	375,250
1849-50	673,387
1850-51	786,544
1851-52	10,62,223
1852-53	10,16,703
1853-54	11,05,181
Total	84,23,944

It is however worthy of remark that even the skill and capital of England has not been able to compete in a certain class of fabrics with the manufactures of this Presidency in the home

market, or even to exclude them from the Foreign. This does not arise from any distaste upon the part of natives to wear articles of European manufacture, but consequent upon Europe not being able to supply a white or dyed article, usually worn by natives, as cheap as it can be manufactured in the country; proving that there are bounds even to the power loom, and that fabrics coarse in quality can still be made by the hand at a profit, for, after a fair trial, the weavers of Europe have given up competition in this description (Native Cloths) of fabrics finding their exportation to India not remunerative. It is generally supposed that the power looms of England have destroyed the export Trade of Madras, but the annexed Table demonstrates that such is not really the case; for though a certain description of Goods have ceased to be exported, yet on the whole there is no very extraordinary difference in value between the Export of Cotton Piece Goods, in what were considered the palmy days of the Export Trade, compared with those of the last ten years.

1844-45	3,841,982
1845-46	3.926,438
1846-47	4,286,921
1847-48	3,736,055
1848-49	2,843,425
1849-50	3,097,558
1850-51	2,942,874
1851-52	2.908,934
1852-53	3,521,516
1853-54	3,141,024

TheCotton Twist imported from the UnitedKingdom may in round numbers be taken at 400 bales per annum, each bale will make about 3000 yards of the native cloths usually worn, which would give 12,000,000 (twelve million) yards annually manufactured, irrespective of goods made by yarn spun by the hand. The amount thus given is an estimate that approximates to the truth with sufficient accuracy to exhibit the great extent to which handloom weaving is still carried on in this Presidency. The Cotton Piece Goods submitted for the consideration to the jury comprised only a portion of the varieties of this staple of the Madras Presidency.—*M. Ex Jur. R.* In Ganjam is fabricated a Cotton cloth, each side of a different colour. This effect is produced not by dyeing the cloth after it is woven, but by a dexterous manner of throwing the woof across the warp on either side. Maddapollum and Ingeram used to be famous for Cotton cloths, but since the abolition of the Company's trade, the finer Punjums have not been made, Palumpores, as bed coverings, of the former place deserve attention:—very fine Muslins are made at Copada, North of Cocanada, and handsome Turbans, with gold thread interwoven—but all these things are far surpassed by the Bengal fabrics. The Chicacole Muslins would be however worth attention and are much prized by ladies. Cotton Cloths from Nellore consist of manufactured articles which find a ready sale in the markets of this Presidency.—*M. E. J. R.*

(2923) COTTON SEEDS.

Cuppasia, Guz. Hind.

Are chiefly used in India for feeding cattle, and also sometimes as manure for cotton plants. An oil is expressed from the seed which is used for burning in lamps, and is also considered to have, in a peculiar manner, the virtue, when externally applied, of clearing the skin of spots and freckles.—*Faulkner.*

(2924)COTTON, SILK.The Silk Cotton. The naturalfamily of *Byttneriaceæ*, includes such genera as *Bombax*, *Sterculia*, *Abroma*, *Guzuma*, &c., and like that of the Mallow-worts, inhabits hot parts of the globe chiefly, and also, like it, contains a number of plants remarkable for abounding in mucilage and in fibrous bark. Of these, some are employed for cordage in different parts of the world, and of them a few, as *Abroma augusta*, might probably be grown with greater profit, and yield a better product, than some of those which are now in cultivation. Thus the species of Bombax, which are remarkable for their gigantic stature and their splendid inflorescence, are also so on account of their capsules, which, on bursting, display a flocculent substance, often mistaken by travellers for cotton, and the tree is hence called *Cotton tree*. But as this substance is more silky than cotton, it has been distinguished by the name of *Silk Cotton*. It differs also in not spinning like cotton. Some difficulty, therefore, isexperienced in making use of this very abundant cotton-like produce; but Mr. Williams, of Jubbulpore, has succeeded in spinning and weaving some of it, so as to form a very good coverlet. It might be easily made use of for stuffing pillows, muffs, or coverlets, for wadding, or for conversion into half-stuff for paper-makers, perhaps for making gun-cotton. In the 'Trans. of the Agri-Hortic. Soc.,' iii, p. 274, there is a report from the Society of Arts on two pieces of cloth made from the Simool or Silk Cotton tree; and it is observed that, from the shortness of the staple of the down, and its elasticity, it could not be spun by cotton-spinning machinery.—*Royle's Fib. Plants.*

(2925) COTTUS (Linnæus), a genus of Fishes belonging to the section *Acanthopterygii* and family *Loricati* (Jenyns).—*Eng. Cyc. p.* 174.

(2926) COTULA. *Compositæ.* Cotula Aurea.—This is a common plant with little golden-ball like flowers, and is cultivated in any garden soil, by seed.—*Riddell.*

(2927) COW-DUNG AND BRATTIES.

Peda also Gomayam, Tel. | Shanie, Tam.

Bratties are dried cowding cakes. With water, cowdung forms a useful wash for walls, floors, and

it enters into the composition of the farriers' fomentations: it hides bad joinery, its chief use is in forming *bratties*. The ground cropped by cattle and which supplies straw, ought to receive it back before it is reduced to ashes: till this is done, lands must be unduly exhausted. Bratties ,(piddacalu *Tel.*) are the cowdung cakes dried in the sun: occasionally the cowdung is mixed with the husk of paddy and frequently with earth. This fuel is much used in Southern India for burning bricks and chunam, also for heating iron tyres for tyring wheels, for which purpose it answers better than any other. It is in general use among natives of that part of the East as fuel, being more economical than any other they are accustomed to: it has disagreeable smoke but when thoroughly ignited, the heat they give out is very intense.—*Rhode M.S.S.*

(2928) COW BEZOAR, and bezoars from all ruminating animals, always find a ready market in China, where the doctors lay it up as a rare medicine, and are not unfrequently deceived by an artificial preparation of pipe-clay and ox-gall mixed with a little hair.—*Williams' Middle Kingdom, Vol.* II. *page* 406.—*See* BEZOAR *and* CALCULUS.

(2929) COWHAGE, COWITCH,

Kosambiliwail, CYNG.	Rawe, JAV.
Kaunchkoori, DUK.	Atmagupta, SANS.
Cowage, FR.	Poonaykalie, TAM.
Kuhkratze, GER.	Peelia-dugookaila, TEL.
Kiwach, HIND.	

The short, bristly, brown hairs, which covers the pod or bean found growing on the *Mucuna pruriens*. The plant is a native of India, as well as of several other countries. The hairs are administered in the treatment of worm cases. Cowhage is occasionally exported from Bombay to London in small quantities.—*Faulkner.* Cowhage, probably a corruption of Alkooshee, the Arabic, or Kiwach the Hindustanee and Bengali name of one of the plants that produces it, consists of the hairs found upon the pods of different species of *Mucuna*. They are exceedingly slender, brittle, and easily detached, and the fragments readily stick into the skin and produce an intolerable itching; hence they are frequently employed for mischievous purposes. Cowitch is also used medicinally as a vermifuge, by being mixed with syrup till of the consistence of honey, and given in doses of two or three tea spoonfuls. The plants that bear these pods are large twining annuals or perennials, with leaves like those of kidney-beans, being dark purple papilionaceous flowers, with a short standard lying close upon the wings and keel, and diadelphous stamens, half of which have round and half arrow-headed anthers. The pods contain from one to six seeds, and are covered by a very wrinkled, shriveled skin, which even stands up in little plates. Before they are ripe and their hairs hardened, the pods are employed as a vegetable, like kidney-beans, and are described as being delicious. The species are found in hedges, thickets, on the banks of rivers, and about watercourses in both the East and West Indies, and America within the tropics. *Mucuna urens* and *M. pruriens* usually furnish the substance; but that from *M. monosperma*, called by the Telingas Enooga dola Gunda, or Elephant's Scratch-Wort, is said to exceed the others in the irritating burning property of its hairs. Dr. Roxburgh states that *M. pruriens* was one of the plants formerly used in India to poison wells; "it has turned out, however, not to be the poison it was taken for, and it is more than likely that the other plants employed for the same base ends are fortunately much less dangerous than those who employ them imagine."—*Engl. Cyc. p.* 177.

(2930) COW-TREE, a Plant belonging to the natural order *Urticaceæ*, and apparently to the genus *Brosimum*, from which, when wounded, a milky nutritious juice is discharged in such abundance as to render it an important object to the poor natives in whose country it grows. It is described by Humboldt as being peculiar to the Cordilleras of the coast of Caracas, particularly from Barbula to the lake of Maracaybo, near the village of San Mateo, and in the valley of Caucagua, three days' journey east of Caracas. In these places it bears the name of Palo de Vaca, or Arbol de Leche, and forms a fine tree resembling the Star-Apple of the West Indies. "Its oblong pointed leaves, rough and alterante, are marked by lateral ribs, prominent at the lower surface, and parallel; they are, some of them, ten inches long." Its flowers and fruit have not been seen by any botanist. From incisions in its trunk flows a glutinous milk, similar in consistence to the first milk yielded by a cow after calving. It has an agreeable balsamic smell, is eaten by the negroes, who fatten upon it, and has been found by Europeans, perfectly innocuous. In chemical characters it is remarkably similar to the milk of animals, throwing down a cheesy matter, and undergoing the same phenomena of putrefaction as gelatine. Humboldt supposed the Cow-tree to belong to the Saponaceous order; but, though little has been added to our knowledge of it since his visit to the Caracas, it is at least certain that it is either a species of *Erosimum*, or very nearly related to it, and consequently a member of the Urticaceous order. The latter circumstance renders the Cow-tree still more interesting; for the milky juice of Urticaceous plants is in other cases highly poisonous. But botanists are now acquainted with many instances of innocuous plants in poisonous order; thus the Hya-Hya Tree of Demerara, for instance, belonging to the deadly Apocynaceous Family, yields a thick rich milky fluid destitute of acrimony; and the Kiriaghuna plant of Ceylon is a sort of East

Indian Cow-Plant, notwithstanding it belongs to the Asclepiadaceous Order, which is acrid and dangerous. In the absence of precise information as to the circumstances under which the Cow-trees are milked, it is impossible to say what is the cause of their harmlessness; but every physiologist will see that it is capable of being explained without difficulty in more ways than one.—*Engl. Cyc. page* 178.

(2931) COWRIES

Kauris, Dut.	Bucios Zimbos, Sp.
Coris, Cauris, Bouges, Fr.	Beya, Sans. Jav. Mal. Beng.
Kauris, Ger.	
Cowrie, Guz. Hind.	
Cori, Porcellanne, It.	

Are small, white, or yellow glossy shells, found in abundance on the shores of the Laccadive and Maldive Islands, African Coast, Zanzibar, &c. There are several varieties; the commoner kinds pass current as coin in payment of fractional parts of a *pice* in Hindustan, and some parts of Africa. They are brought to Bombay in large quantities from the above named places, and are re-exported to England, where they are used in inlaying and ornamenting toys, work-boxes, &c. and in the manufacture of the superior kinds of porcelain-ware. Cowries are brought, in exchange for rice, from the Maldive Islands to Bengal, and thence shipped to England: they were, during the slave trade, exported from Bombay to Africa, where they are also employed as coin.—*Compend. Desc.* The Cypræa moneta of naturalists, is found in the Asiatic Archipelago, but in considerable quantity only on the shores of the Sula group of islands; but the cowry seems never to have been used for money among the Indian islanders as it has immemorially been by the Hindus. The Malay and Javanese name however is Sanscrit, beya, and is also one of the synonyms which express duty, impost, or toll.—*Crawfurd's Dictionary, p.* 117.

(2932) CRAB, SEA CRAB.

Kaddil Nundoo. Tam.	Punjpaiyeh, Pers.
Duryakakekra, Duk.	Katan, Malay.
Kevnkera, Hind.	Samoodrapoo Nundrakaia, Tel.
Khirchung, Arab.	

Cancer Pagurus.—*Ains. Mat. Med. p,* 12.

(2933) CRACKERS, &c. The largest proportion of Chinese fire crackers go to the United States; some are shipped to India and South America. They are made up in strings, and then in papers, and lastly in boxes, five of which are estimated to weigh one pecul. The market of Canton is chiefly supplied with fireworks from Fatshan.—*Compendious Descrip.*

(2934) CRANE. The ridge or keel of the breast-bone, common to all birds that fly, is in the Cranes, belonging to the restricted genus *Grus*, and in the Trumpeter Swans, expanded so as to form a cavity, which the windpipe is prolonged to enter and reproceed from, after describing a vertical convolution therein. Mr. Yarrells's figure of this curious structure, as it exists in the Hooper Swan (*Cygnus musicus*) is, in a general way, illustrative of it, as observed in the *buccinator*; the trachea even performs a second vertical convolution: while in the second wild Swan of North America (*C. americana*) and in the nearly affined Bewick's Swan (*C. Bewickii*), it is prolonged to form a horizontal loop in the body of the sternum, posterior to the vertical convolution within the keel,—that is, in general, for several of Bewick's Swans do not differ in this respect from the Hooper Swan, albeit of full age and development, to all appearance. In a newly hatched Hooper Swan examined, not even an indication of the peculiar structure described could be detected: nor does it occur in the two species of Crowned Crane (*Balearica*), nor in the Mute Swans (*Cygnus olor, C. immutabilis, C. atratus, C. nigricollis*), nor probably in the *C. coscoroba* of South America; but the Crowned Cranes exhibit one curious anomaly in the organ of voice, which is that the long tendinous muscles, the office of which is to contract the windpipe, and which are known as the *sterno-tracheales*, from their ordinary mode of attachment, are not fixed, as usual, at their lower extremities to the sides of the breast-bone, but to the middle of the first pair of ribs! The *sterno-tracheal* muscles are wanting to the 'Adjutant' and most other Storks, and in a very few other birds, such as the Condors (*Sarcorhamphus*) of the Vulture family; indeed the Vultures generally are among the most silent of the feathered creation, emitting no sound beyond a feeble cackling and snorting in their eagerness over their prey.

(2935) CRANGONIDÆ, a family of *Crustacea* belonging to the division *Decapoda Macroura*. The type of this family is the Common Shrimp (*Crangon vulgaris*), and no other genera are included in it. *C. vulgaris, the Common Shrimp*, has the Carapace and abdomen almost entirely smooth, with the exception of one small median spine on the stomachal region.—*Engl. Cyc. page* 188.

(2936) CRAPE.

Crepe, Fr.	Espumilla, It.	Flior, Rus.
Flohr, Ger.	Sendal, Port.	Crespon, Sp.

A light transparent stuff made of silk, gummed and twisted on the mill, and woven without crossing.—*Faulkner.*

(2937) CRATÆGUS, a genus of Plants belonging to the natural order *Rosaceæ* and the sub-order *Pomeæ.—Engl. Cyc. p.* 190.

(2938) CRATÆVA, a genus of Plants belonging to the natural order *Capparidaceæ.—Engl. Cyc. p.* 191. Of the genus Crataeva we may notice the *C. gynandra*, a native of the West Indies. The bark of the root is said to blister like cantharides. The *C. tapia* (*vern.* Birmike chawl

Tapia and Varana, *Sans.*, Garlic Pear, *English*,) is a native of Ceylon, also common in Malabar. The juice of the astringent bark is used as a tonic, and febrifuge. The *C. religiosa* is common in India. The leaves are called Bel-ka-pat, and are slightly bitter and aromatic, and much used by native practitioners. The *C. marmelos* (Bilva or Mahura) formerly considered a species of this genus, is now referred to the order Aurantiaceæ, and call *Ægle marmelos.—O' Shaughnessy, p.* 296.

(2939) CRATÆVA RELIGIOSA. Vahl.

Veelvei elley, TAM.	Bilva akoo, TEL.
Bel ka paat, DUK.	Beelva, SANS.—*Ainslie.*

Leaf of the Religious Cratæva. In the Deckan, this tree is generally found near tombs and temples, the leaves are somewhat aromatic.—*Riddell.* The leaves are somewhat aromatic, in a slight degree bitter, and are considered by the native practitioners as stomachic. The root, as it appears in the bazars, has a singular sub-aromatic and bitterish taste, and is supposed to possess alterative properties.—*Ains. Mat. Med. p.* 124. An infusion of Bel is slightly bitter and aromatic, and much used by the natives of Bengal. Its dose is two to four ounces thrice daily. —*Beng. Phar. p.* 298.

(2940) CRATÆVA ROXBURGHII. *Capparideæ.*

Mavilinghum puttay, TAM.	Tellavoolemara chettoo. T.
Birmike chawl, DUK.	Varoona, SANS.
Maredoo puttay, TEL.	Cratæva tapia, *Ainslie.*
Mavoolinga marum, TAM.	

Bark of the smooth Cratæva. This is the Cratæva tapia of Ainslie, not of Linnæus; Dr. Wight is unacquainted with the timber which Ainslie states to be used for many common purposes.—*Wight.* The Vyteans prescribe the juice of the astringent bark of this large tree, as a tonic in Intermittent Fever, and in Typhus, a decoction of the bark itself is also used for similar purposes. The tree is the Nurvala of the Hort. Mal.—*Ains. Mat. Med. p.* 89.

(2941) CRAYON. A material composed of shell-lac, naptha, and some colouring matter, used for drawing.—*Faulkner.*

(2942) CRESS, GARDEN.

Reshad, ARAB.	Huleem, Chunser, GUZ.
Huleem, BENG.	HIND.
Cresson, FR.	Turehtezak, PERS.

The leaves of the water cress (*Vern* Lootputiah), are gently stimulant and diuretic. As a salad, they are wholesome and palatable, and eminently serviceable to persons affected by scorbutic diseases. Cress should be sown thick in very narrow drills, about one inch deep and a few inches apart. It requires to be well watered, and is in season all the year round. It is only used for salad. The seed is sold in the bazars, and known by the name of Hallim: it should be cut for use when two inches high.—*Riddell.*

(2943) CRESS, AMERICAN OR BELLEISLE. Has a harsh flavour; but owing to its being of a more robust nature than the garden cress, might be easier cultivated on the plains. It is raised from seed, the young leaves cut when young are used for salads; requires plenty of water.—*Jaffrey.*

(2944) CRESS, LEPIDIUM SATIVUM, GARDEN CRESS. Should be sown broad cast in a bed raised above the level, does little good at Madras, though an excellent ingredient in salads.—*Jaffrey.*

(2945) CRESS, NASTURTIUM OFFICINALE, WATER CRESS. This is of easy culture, and should be in every garden, requires to be irrigated night and morning direct from a well; a small bed 2 or 3 yards square, so formed as to be easily irrigated, will produce sufficient for any family during the cold months, the soil near the surface should be somewhat sandy: propagated by seed and division of the plants.

(2946) CRESS SEED.

Hurcef, ARAB. BENG. GUZ. HIND.	Aliverie, Saliverie, TAM.
Rohitasarashupa, SANS.	Adala-Vittiloo TEL.

The seed is of a reddish colour, and agreeable, warm taste; and is used by native practitioners as a gentle stimulant; also as a warm aperient when bruised and mixed with lime juice. The seeds are procurable in most Indian bazars.

(2947) CRINUM, a genus of Plants belonging to the natural order *Amarillidaceæ.—Eng. Cyc. p.* 195.

(2948) CRINUM ASIATICUM, Lin.

Veshei Moonghe elley, TAM.	Veshamandalum, SANS,
Veshamangalapakoo, TEL.	

The succulent leaves of this plant are about two inches broad and two or three feet long. The Natives bruise and mix them with a little warm Castor oil, and consider them extremely useful for repelling whitlows, and other inflammations, on the ends of the fingers and toes.—*Ainslie's Mat. Med. p.* 301. The bulbs of this plant are powerfully emetic, and are used in Hindustan for the purpose of producing vomiting after poison has been taken, especially that of the Antiaris. It is a native of the East Indies.—*Eng. Cyc. p.* 195.

(2949) CRINUM AMABILE, has a very large bulb with a long red neck, the leaves broad, glaucous; smooth at the edge. This plant is a native of the East Indies, but is now common in our greenhouses. Many of the species have been lately introduced.—*Eng. Cyc. p.* 195.

(2950) CRINUM. WATER CRINUM. Many of the clear mountain streams of Tenasserim, where they rest their waters in little crystal lakes, are covered with a fragrant and beautiful species of crinum with long narrow leaves.—*Mason.*

(2951) CRINUM. CRINUM BULBS. A dried fragrant substance is seen in Tenasserim among the native drugs, which is imported. No one seems able to tell what it is, but on tracing its Burman name through the Pali into the Sanscrit, I find Prof. Wilson defines it, with some doubt, as the bulb of a species of crinum.—*Mason.*

(2952) CRINUM LATIFOLIUM, is figured by Wight, No. 2019 and 2020.

(2953) CRINUM MACROCARPON. Large fruited crinum. There are two gigantic species of crinum indigenous in the low grounds near the sea coast of Tenasserim, one of which is the large fruited crinum, and the other, which is nearly related to it, bears a large bunch of fragrant flowers and has been recently introduced into gardens.—*Mason.*

(2954) CRINUM ORNATUM. ORNAMENTAL CRINUM. There are no lilies in the Tenasserim country, but they are well represented by the crinums, which Europeans usually denominate lilies. A very large petalled species, of which there are two varieties, is much cultivated in gardens, and is quite an interesting plant.—*Mason.*

(2955) CRINUM ASIATICUM, variety *toxicarium.* Sookh durson, Burra kanoor, *Beng.* Poisonbulb. Sookh-dursun, (interview of ease), *Hind.*—*O'Shaughnessy, page* 655. A certain and mild emetic: from two to four drams of the recent root. Dr. Irvine says it is cultivated as a lily in gardens; the flowers are fragrant and ornamental; the juice of the leaves is applied to the meatus auditorius externus in ear-ache; its juice is also emetic, but is very irregular in its action.—*Genl. Med. Top. p.* 138. Syrup of Kanoor is nauseant and emetic for children. Dose, a desert spoonful repeated as required.—*Beng Phar. p.* 411. An Infusion of Kanoor, *Crinum Asiaticum or toxicarium,* is a mild and certain emetic. In doses of two drachms, given every twenty minutes, this solution occasions nausea and perspiration. It does not cause griping, purging, or any other distressing symptoms.—*Beng. Phar. p.* 301.

(2956) CRINUM ZEYLANICUM. CINGALESE CRINUM.

Sookhdursun, HIND.

Grows wild in low grounds near the Chumbul river.—*Gen. Med. Top. p.* 188.

(2957) CROCODILIDÆ, CROCODILE-TRIBE, Crocodiles, a family of Saurians, comprising the largest living forms of that order of Reptiles. Dumeril and others distinguish the family by the appellation of Aspidiot (shielded) saurians, while many modern zoologists have considered them as forming a particular order. They form the *Loricata* of Merrem and Fitzinger, and the *Emydosaurians* of De Blainville.—*Engl. Cyc. page* 916. The Crocodile, Buwaya, *Malay,* Baya, *Javanese,* is found in all the rivers of the Malay and Philippine Archipelagos. The Malays of the peninsula reckon three species, the *labu* or *gourd,* the *kutak* or *frog,* and the *tambaga,* or Copper Crocodile. That found in Sumatra and Java, is the Crocodilus biporcatus of naturalists, which is found also in Celebes and Borneo, and the Moluccas; but in addition to this there is another in the rivers of Borneo, formidable by its size and rapacity, partaking of the character of the biporcatus and the gavial of the Ganges.—*Crawfurd, page* 10.

Gavialis.—The Gavial. Jaws very long, subcylindrical, slender, rather dilated and convex at the end. Teeth, canines two, quite anterior, small; lower canines shutting into a notch in the edge of the upper jaw. Feet fringed; toes webbed to the tip. The cervical plates united to and forming a disc with the dorsal ones. Males with a large swelling in front of the nostrils. Native of Asia.—*Engl. Cyc. p.* 198.

Crocodilus.—Jaws oblong, depressed, tapering, rather dilated at the end. Teeth unequal, lower canines fitting into a notch in the side of the upper jaw. Feet fringed; toes webbed to the tip. Nuchal and cervical plates forming a disc separated from the dorsal one by small granular scales. The head of the newly hatched specimens is short, but it gradually elongates, and after a short time attains the form proper to the species, and, through the bones becoming more solid by increasing age, they only slightly alter the relative proportions of the different parts, so that the form of the head, taken with the shielding of the back, affords good characters for the determination of the species.—*Engl. Cyc. page* 199.

Crocodilus porosus, the Indian Crocodile.

Crocodilus bombifrons, the Large-Headed Indian Crocodile.—*Engl. Cyc. page* 199.

Gavialis Gangeticus, the Narrow-Beaked Crocodile of the Ganges, Edw., 'Phil. Trans.'—*Engl. Cyc. p.* 202. Naturl. Syst. Amph.; *Gavialis Gangeticus,* Gray, 'Syrops Rept.;' the Gavial of the Ganges, Griff., 'Anim. Kingd.'—*Engl. Cyc. p.* 293. The Gavial of the Ganges is supposed to be the largest of the living Saurians. The measurement of the largest mentioned by Messrs. Dumeril and Bibron is given at 5 metres, 40 centimetres (17 feet 8 inches).—*Engl. Cyc. page* 205.

(2958) CROCUS SATIVUS, SAFFRON.

Zaffron, HIND. ARAB. | Kurkoom, PERS.

A native of Asia Minor, naturalized in England, France, and many other parts of Europe, and cultivated in Persia and Cashmere. The saffron of commerce consists of the dried stigmata of the flower. These are picked out, dried on paper either in a kiln or by the sun. If

compressed into cakes it is accordingly called *cake* saffron; *hay* saffron is what is usually met with. The *hay* saffron consists of the stigmas, each about an inch and a half long, brown-red, the upper part flattened, widened, and cleft; the lower, hair-like and yellowish. The odour is fragrant, taste bitter but agreeable. Saffron tinges the saliva yellow. Mr. Pereira informs us that one grain of good saffron contains the stigmata and styles of nine flowers, so that one ounce of saffron is equal to 4,320 flowers. *Cake* saffron as now met with contains none of the real article, being prepared from the florets of the safflower (see *Carthamus*) made into a paste with gum water.—*O'Shaughnessy, p.* 654. Dr. Honigberger, p. 263, mentions that Crocus sativus is monopolized by the Cashmerean government and that the Hakims of the Punjab use saffron in melancholy, typhus fever, enlargement of the liver, and retention of urine.

(2959) CROCUS VERNUS.—This plant never flowers in the Western part of India, the roots when planted only produce leaves, wither and die.—*Riddell.*

(2960) CROSSBILL. There are many who consider the Parrot Crossbill (*Loxia pityopsittacus*) to be merely a larger and more robust variety of the Common Crossbill (*L. curvirostra*). By the same rule, the Himalayan Crossbill (*L. himalayana*) should be regarded as a smaller and considerably less robust variety of the same species; in which case, the amount of variation would indeed be extraordinary, and we should expect to find every intermediate gradation. The Crossbills, in a general way and with unimportant exceptions, may be said to inhabit wherever there are pine-forests; however rare, comparatively, in those of the Himalaya: and they are birds of remarkably vagrant habits, which therefore should not be particularly subject to climatal or local influences, whatever these may be, to induce permanent variation, as manifested by a series of distinct races.

(2961) CROTALARIA. A genus of plants of the family of Leguminosæ, containing several species, all employed for cordage materials. The C. juncea, yields the Sunn of Commerce: the C. tenuifolia, furnishes the Jubbulpore hemp, and C. retusa in Madras and C. Burrhia in Sind, are employed for cordage and canvass, and in fabricating the coarse gunny cloth. Dr. Wight figures fifteen species Crotalaria barbata, 980; bifaria, 30; bracteata, 273; evolvuloides, 31; formosa, 981; lunulata, 480; Notonii, 752; obtecta, 208-383; pulcherrima, 481; rubiginosa, 885; semperflorens, 982; speciosa, 29; trifoliastrum, 421; verrucosa, 200: Wallichiana, 982.

(2962) CROTALARIA ELEGANS. The seeds are contained in inflated pods, which rattle when shaken, grow readily in any tolerably good soil, and abound in this country.—*Riddell.*

(2963) CROTALARIA JUNCEA, Sunn Hemp, called also—Sunnub, Vuckoonar, Shanal or Jute gramee. In the Madras Presidency this plant is largely cultivated for the manufacture of Rope, string and gunny bags. At the Madras Exhibition of 1855, it was exhibited from a great many districts, but every specimen had been more or less discoloured, and its strength impaired by steeping too long. The best sample was exhibited by the Masulipatam Local Committee. This fibre is not so strong as many others, but it is well suited for the manufacture of gunny bags and paper, and is sometimes sold as Jute; The exports from Madras in the year 1850-51 were

Sunn Hemp, ...	cwt. 2,095
Twine from Do., ...	cwt. 1,372
Gunny bags, ...	58,950

Near the Burmese villages large fields of *Crotalaria juncea*, as tall as wheat, may be often seen. Although the stems of the plant produce a substance analagous to flax or hemp, it bears no relation to those plants, but is a species of crotalaria, a leguminous plant. The true hemp, though occasionally grown to a small extent, is never fabricated into cloth.—*Mason.* Its commercial products is the Sana, *Sans.* Sunn, *Hindee.* Ghore Sunn and Meesta pat, *Bengalese.* Kenna, *Cing.* Hemp and Sunn Hemp in Calcutta; Janapa, Shanapum, also Madras Hemp; Taag or Conkanee Hemp, Salsette, and Bombay Hemp. Some of the *Brown Hemp* of commerce. The Sunn is probably the earliest of the distinctly named fibres, inasmuch as we find in the Hindoo 'Institutes of Menu,' that the sacrificial thread of the Kshatriya or Rajpoot is directed to be made of *Sana*; cotton being reserved for the Brahmins. Its name, *Shanapam* or *Janapa*, on the Madras side, is not very unlike *Canapa*, *Hampa*, *Hennip*, and *Hanf.* From these we derive our own name of *Hemp.* Under the name *Sana* it is mentioned in many Sanscrit works; and by that of *Sunn* it is known in most parts of India. The first notices in European works is, by Rheede ('Hort. Mal.,' v. ix, t. 26); by Ironside, in the 'Phil. Trans. of London,' lxiv, p. 99; and it is mentioned by Roxburgh in the early volumes of the Society of Arts' 'Transactions.' Towards the close of the last, and the beginning of this century, it attracted much attention both in India and in England; and much information respecting it is contained in Dr Roxburgh's several works, as well as in Wisset's 'Treatise on Hemp and on the Sunn Plant,' 1804 and 1808. Dr. Buchanan in his 'Journey through Mysore,' mentions that Goni cloth for sacks is made of the fibre of *Crotalaria juncea.* The annual stem is straight, smooth, striated, from four to eight (varieties even ten and twelve) feet high, branching towards the top, but more so when the plant stands single. Leaves scatter-

ed, short petioled, lanceolate, obtuse, with a small bristle-like point, from two to six inches long, both sides covered with soft, silver-coloured hairs. Stipules subulate, small. Flowers in terminal racemes, papilionaceous, of a beautiful bright yellow colour, each supported by an oval bract. Calyx two-lipped; the upper lip two-cleft; the under one two-parted in the middle. Of the yellow petals, the banner is obtuse, erect; the two wings oblong, obtuse; the keel much pointed, slightly twisted at the apex, and closely shut. Filaments ten, their lower half united into one body, with a fissure down the upper side, which has a circular gape at the base; extremities free, and the alternate ones shorter than the others. Anthers on these linear; on the larger filaments ovate and two-lobed. Legumes sessile, club-shaped, turgid, from one to two inches long. Seeds numerous, kidney-shaped. (Roxb., 'Flora Indica,' iii, p 261; 'Corom Pl.,'t. 192.) The seeds when ripe and loosened rattle within the pods, as in the other species, whence the genus has been named from the Greek word *krotalos*. It is an annual plant, very generally cultivated in the Southern parts of Asia, and everywhere in India, on account of the fibres of its bark, so well known as *Sunn* and *Sunn Hemp*, often erroneously called Hemp, though the true hemp plant is also most common in India, but valued in the plains only for its intoxicating properties. The Sunn is exported from different parts of India, as from Calcutta, by the name of Sunn; that from Madras is known in England as Madras Hemp; that from Bombay as Brown Hemp, being known there as *Taag* or Conkanee Hemp; it being a common practice to name it from the province where it has been grown. The late Dr. Stocks informed Dr. Royle that it was cultivated in Sindh, and that the species named *Crotalaria Burrhia*, which grows wild in the most arid places, is also employed in Sindh as a cordage plant. Dr. Royle also mentions that he has seen it thickly sown and carefully cultivated in the most northern provinces in India. The time of flowering and ripening its seed, as stated by Dr. Roxburgh, depend on the season it is sown; though in most parts it is raised during the rainy season, in others it is not sown until their cessation.

Culture.—The general time of cultivation is during the rains; and in Bengal a rather elevated rich soil is required, which ought to be well ploughed, or otherwise dressed to free it of weeds, and bring it into good tilth. In Wisset's treatise, pp. 38 and 39, it is stated that clayey soils are injurious, and that in a rich soil the fibre produced is of a coarser quality than that from high, dry situations. The quantity of seed, Dr. Roxburgh states, should be from eighty to a hundred pounds weight to the acre. In some districts less, in others a larger quantity is sown (*v.* Wisset.) The natives say, the thicker the Sunn grows the better, and so thick as to prevent the air from passing through it. (l. c., p. 73.) At Commercolly it is stated that there are two kinds of Sunn; one being sown in June, the other in October, though they are nearly similar in quality. That sown in June is generally cut about August or September, and the other about April; but it is also sown in October in parts of the Dacca district (*v.* Wisset, pp. 59 and 82. The cause of the difference in the time of cultivation, is supposed by some to be that during the periodical rains the face of the country is under water. In most places the seed is sown when the first showers fall, in May or June, and covered in by the harrow, or by any other mode. Little more is required, as the plant grows so rapidly as to keep down the weeds itself; otherwise it requires to be freed from weeds, when about nine inches high. By August the plant will be in flower, and from five to eight or more feet high. When the fibre is required of a fine and soft quality, it is pulled in this stage of its growth; if greater strength is the object, it must stand till in seed, or even till the seed is ripe. A portion of the crop always requires to be left for the sake of ripening some seed. The natives make use also of the fibres of such plants, and consider them strong. When ready for the purposes intended, the plant is cut or pulled up by the roots. At Hurriaul it is cut down as close to the ground as possible, and laid in ridges, care being taken to place the plants so that the leafy parts be one upon another. In this state they continue five, six, or ten to twelve days, or until the leaves begin to rot and fall from the stalks on being shaken about (l. c., p. 113.)

Produce, &c., per acre.—The produce of the cultivation of this plant per acre is most fully detailed in the abstracts of reports given by Mr. Wisset, and varies from 3 cwt. to 10 cwt. per acre; or on a medium probably about 700 lb. an acre. But there is difficulty in determining the point with exactness, from the difference in the begah as well as in the maund. The cultivation was said to yield tolerable profit, inasmuch as the plant requires scarce any attention, and consequently little labour or expense; and it may be off the ground in time to allow this to be prepared for any cold-season crop. But the expenses and the profit are as variously stated as the produce. The price is also given as varying from R. 1 8, and R. 1 12, to Rs. 3 per maund, at the same time; which it is difficult to account for, except from the habitual carelessness of the natives of India in all such statements. (*v* 'Wisset,' pp. 146—155.)

Steeping.—Having grown and cut the plant, as well as removed its leaves, it is ready for the next process, that of committing to water, or other operation for separating its fibre. The length of time required for steeping depends on the season of the year, the heat of the weather, and consequently of the water. In

August and September, from two to three days is generally sufficient. When the required effect has been attained, which will generally be known by the bark separating freely from the stalk, the people employed in the work stand in the water in which the plant has been steeped; each takes a handful thereof, which he breaks in one or more places, after having washed off any mud or filth; then grasps it by one end between both hands, and beats it against the surface of the water, which quickly removes the reed from the fibres; after which the parcel is turned, and the other end treated in the same manner. Care must be taken not to over-steep, as this much weakens the fibre. (Wisset and Roxburgh.) With respect to the proper time for steeping, and the period during which the stems should be steeped, great differences of opinion prevailed during the experiments at the beginning of this century. Mr. Fleming, disapproving of the native method of steeping the plants immediately after they were cut, and for three or four days, recommended that the plants, after pulling, be *first dried in the sun for two days*; after which, they should not be let to remain in the water more than *forty* hours. Mr. Frushard objected, first, to the drying the article before watering; secondly, to the insufficiency of the time for watering; and lastly, to the manner of separating the fibre from the reed after watering. The general practice, he observes, is to set the plant upright in the water, immersed about one third only from the bottom, for one day before the complete immersion, in order that the thicker may be immersed longer than the thinner parts. Of the natives one said, "to dry before steeping was doing to undo." Another observed that it seemed to be "wanted to make difficult what was easy." Others exclaimed: "You may imprison our persons; you may strike our necks; but never will we make Sunn according to the advertisement." (*v.* Wisset, pp. 162, 195, and 202.) The whole forms an interesting commentary on attempts to improve native processes, before principles are thoroughly understood, or the superiority of European practices carefully established. At Commercolly, when the plants of *Phool Sun* have been pulled and tied in bundles, they are for a day or two kept standing on their roots in an inch or two of water, which allows the fibre to obtain a proper degree of firmness, without suffering it to be parched by the heat of the sun. Dr. Roxburgh observes, "all that seems necessary is to caution the cultivators against oversteeping the plant, which they are apt to do, because it renders the separation of the bark from the stalks easier, but weakens its fibres. Small pools of clear water, well exposed to the sun's beams, seem best suited for steeping in, because heat hastens maceration, consequently preserves the strength of the fibres, while the clean water preserves their colour. Deep water, being cooler, requires more time for the operation." He further states, that the result of many experiments leads him to think that steeping immediately after the plant is pulled is the best, at least in Bengal during the rains, for then it is very difficult to dry it, and the fibre becomes weakened and the colour injured. He found no advantage, but the reverse, by drying the plant, after maceration, and before the bark was removed, as often practised with Hemp and Flax in Europe. But in his 'Fl. Ind.,' iii, p. 262, he says: "Others, and I believe with good reason, recommend its being dried for some time previous to its being steeped." When the seed is ripe the fibre is stronger, but requires a much longer time for steeping. If the Sunn be dressed before it is shipped for England, the commodity will be rendered more valuable; but considerable loss of weight (probably about one third) having ensued from the combing or heckling removing much short fibre or tow, it is of course increased in price. The Sunn of Bengal is always whiter than that of Bombay, owing to the mode in which it is prepared.

Drying.—When the Sunn has been thoroughly washed, it is usually hung up on lines or bamboos to dry. When dry, it is combed, if intended for fishing nets or small lines; but if for common use, they merely separate the fibres a little with their fingers, and make it up into bundles for market. The use of the Hemp-brake is unknown in India, but the Sunn might in many cases, after watering, be bruised with a brake and then scutched. It is in cleaning the fibres Mr. Frushard considers that the natives are most liable to fail. He thinks it ought to be strongly insisted that they beat the plant (by handfuls at a time) on the surface of river water, in order to get rid more readily of the filth and mucus with which it abounds after steeping. But when the fibre is separated it must be thoroughly washed, by repeatedly squeezing the water out of it, and ultimately well wrung, to accelerate the essential process of careful drying. The cylinders for pressing Flax when moist would be useful, as also scutching mills properly suited to the fibres to be separated and prepared. After the fibrous parts are well separated and well washed, they are in some places in Bengal laid in the sun to dry, before stripping them. At Jungypore, after washing and beating in the water, the *Sunn* is exposed to the rays of the sun for an hour or two, and the stalks are separated when half dried. Mr. Fleming recommended that, after watering the plants forty hours, they should be taken out and dried gently in the sun for three or four hours, before the fibres are separated. The natives, say, that to dry the plant on taking it out of the water before separating the fibre from the seed, will occasion a much greater loss in tow; so

that they never practise this method except when distressed for time, and under the dread of leaving it too long in the water, when any parcel proves too much for the labourers employed in one day. Mr. Frushard also objected, that such drying must be insufficient, saying that in Europe, generally, the plant is most thoroughly dried before it is put under the brakes, and that in Livonia the Hemp is heaped up, and covered up with straw, &c., in order to make it *sweat*, and that the Livonians say, it is in this operation of *sweating* that the good or bad quality of their Hemp depends. Mr. Frushard observes, that "the natives get through the whole business with so much celerity that their mode of practice is highly in favour of the fibre retaining its strength; and should *sweating* be found to answer, it will be found much more congenial to its execution than the doing it while the fibre is still on the reed." The measures adopted were successful to a great extent. Though the natives did not adopt all the innovations which had been proposed to them, yet from the supervision practised, they prepared the Sunn carefully, according to their own methods, and that of itself was a great advantage; as only the good specimens were purchased by the commercial agents.

Strength of sunn fibre.—In an anonymous pamphlet entitled, 'Observations on the Sunn Hemp of Bengal,' 1806, it is stated, that "the Court of Directors having sent orders to Bengal for the cultivation of Sunn with increased attention, tolerable success was attained in most places, but a superiority has certainly been manifested in particular spots, such as Dacca, Luckipore, Chittagong, Hurriall, Malda, Budaul, Rungpore, Radnagore, and Soonamooky;"—but Commercolly and Cuttorah are not particularised, though good Sunn was no doubt produced at both places. These places have been mentioned now, to show that the experiments were carried on chiefly in Bengal, though it is by no means proved that the soil and climate of that province are better suited than those of many other parts of India for the production of good fibre. Indeed, there is little doubt that, whether owing to differences of soil and climate, or of preparation, the fibre of the same plant as grown in the West of India is stronger than as grown in Bengal. In the anonymous "Observations" it is further stated that "the culture has not only been attended to by the most scientific men in India, but the means of dressing it so as to preserve the greatest strength to the fibre, &c.; and it is satisfactory to state, that some of the Sunn has exhibited a very considerable proportion of strength beyond the common expectation." The above pamphlet is however chiefly valuable for giving the results of various "Experiments, made from 1802 to 1806, to ascertain the comparative strength of Sunn with Russian Hemp," made at Messrs. Huddart's rope-manufactory. But in order to ascertain its comparative merit therewith, it is necessary first to state, that the difference in strength between the best and ordinary Russian Hemp is in the proportion of 5 to 4, sometimes as 6 to 4: that the strength of the best Russian Hemp to the best Sunn bears a proportion as 6 to 4." (p. 5.) "From hence it must be admitted, the Sunn, manufactured in the usual mode for the cordage, cannot be put in competition for strength with Russian Hemp;" but when prepared by Huddart's Warm Register, "the proportion between Sunn so manufactured and the best cordage made in the common mode, when above six-inch, is in favor of the Sunn cordage, progressively as the size is increased." Instances are then given of "a sixteen-inch cable made from Sunn in 1802, laid down as a mooring cable at Gravesend the whole winter; and after various examinations, by cutting off the clinches, upon different ships taking it in as moorings, for five months in succession, it was found so fresh and good, that it went by the last ship that rode by it, to India, as a working cable." (p. 6.) It was also made into canvas and other cloth with success. "This has been manifested in a topsail made for one of the Indiamen, put on board here without any intimation of its difference; and the sail is returned not worse than the other sails of the ship." (p. 7.) Its weft only was Sunn, the warp Flax. But it must be remembered that these experiments were made with the Sunn which had been grown and carefully prepared under the supervision of the East India Company's commercial agents. A specimen of one of these *Sunns* is stillin the India House, marked per *David Scott*, 1802; which, though having the light colour and showing the appearance of ordinary Sunn, is from four to five feet in length, much cleaner, both strong and flexible, and also divisible into fine fibrils. A salvage of it bore 175 lb., when some Sunn sent to the Exhibition of 1851 bore only 150 lb. There is a specimen also of the heckled Sunn, per *Wellesley*, 1802, about three feet long, a bright-looking fibre, but with a good deal of the cellular part still adhering to the fibres. Ordinary Sunn is, moreover, only about three feet in length, rather dirty; fibres entangled and intermixed with portions of the boon, as well as with many short fibres; hence much loss is sustained in heckling, and the men complain of the irritating particles which are given off during this process. The want of strength is not surprising, for, though three days is thought sufficient for the steeping, we learn that the natives, from the press of other work or from indolence, sometimes allow the stems to remain in steep for fifteen days. (*v.* Wisset, p. 195.) It has already been mentioned that Dr. Roxburgh, in heckling, found it lost about one third; though the tow is of course of use for some purposes. But that some good Sunn is also prepared in the present day is evident from

the difference in price which it brings in the English market. Mr. Dickson also having passed some of it through his machine, the Sunn has become light-coloured and clean, with the fibres lying parallel to one another, and showing them as well fitted for spinning. Parties who have seen it have pronounced it well worth £35 a ton. That good Sunn may also be produced in some of the old localities is evident, for Mr. Seonce, when Collector of Chittagong, having grown some Hemp and Flax in this district, grew also some Sunn, which was thus reported on by the Hemp and Flax Committee of the Agri-Horticultural Society, 1843. "G. *Sample of Sunn* (*Crotalaria juncea*) *or Indian Hemp.*—Quality in every respect superior; clean, strong, of even fibre; would meet with an extensive and ready sale in Europe; it would pay better if not heckled" but merely scutched. "In addition to the above, your Committee would beg to call the attention of the Society to the memorandum appended to this Report, obligingly furnished by Mr. Deneef." "G. This is also a good-quality sample; but, like samples B and E (dressed Hemp and dressed Flax), it has been prepared in too expensive a manner to admit of its being profitable. It is much better than my sample of Sunn, and perhaps would fetch £20 per ton in the English market." The sample of true Hemp grown at Chittagong, Mr. Deneef says, would have fetched £18, but if better prepared, £25 per ton.

Culture in Madras Territories.—Dr. Roxburgh, in describing the culture about Rajahmundry, and in the Northern Circars, states that the seed is sown towards the close of the rains, in October or November. A strong clayey soil suits it best, the farmers say. About 120 lb. of seed to the acre is the usual allowance. It requires no further care than being covered with the soil, which is done with the common Hindoo harrow. In February or March soon after the flowers drop, and before the seeds are ripe (when the Telinga people consider the fibre to be in the greatest perfection), it is pulled up by the roots, like Hemp in Europe; half dried in the sun, then tied up in bundles, and committed to the water, where it is steeped, &c. This plant, he further mentions—it is the only one—is also cultivated there by some natives to feed their milch cows with during the dry season. It is very nourishing, and causes them to give more milk than most other food. It only bears two or three cuttings; after that, the plants perish. ('Corom. Plants,' v. ii, t. 193.) Sunn is also cultivated in Rajahmundry as a second crop, on wet lands, with profit to the ryot; and is even exported from that and other Northern districts in some quantity. Dr. Buchanan, in his 'Journey through Mysore,' mentions that, at Bangalore, Goni is a considerable article of manufacture, and that it is a coarse, but very strong sackcloth, from eighteen

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to twenty-two cubits in length, and from a half to a quarter of a cubit broad, and that it is made from the *Janupa*, or *Crotalaria juncea*. The *Goni* maker hires from some farmer as much high ground as he thinks will raise a quantity of *Janupa* sufficient to employ his family in manufacturing for the year. The soil may be red or black, but is not manured. The seed is sown broadcast when the rains become heavy. But it is also cultivated on rice-ground in the dry season, with the aid of irrigation. It requires four months to ripen. When cut down it is spread out to the sun and dried. The seed is then beaten out by striking the pods with a stick. The stems are then tied up in large bundles, and preserved in stacks or under sheds. The bundles are taken out as wanted, and put in the water, at which time their bands are cut, and the stems, being opened out, are kept down to the bottom by stones or mud. According to circumstances, they require to be kept in the water from six to eight days. When the bark separates easily from the stems they are taken out of the water, and a man taking them by handfuls beats them on the ground, and occasionally washes them, until they are clean, and at the same time picks out with his hand the remainder of the boon, until nothing except the bark be left. This is then dried, and, being taken up by handfuls, is beaten with a stick to separate and clean the fibres. ('Journ..' i, p. 226.) But when at Bhawani Kudal, in the Coimbatore district, he found a great deal of the *Shanapu*. This was grown by the farmers, who, when it is fit for steeping, sell it to the people called Telinga Chitties, who make the Hemp, and work it up into *goni* or sackcloth. There it thrives best on a poor, sandy soil, which, however, is manured any day between the 12th of July and the same day of August. The seed is sown broadcast after rain, and very thick—rather more than two bushels for an acre. The stems are sold by the thousand handfuls. Tall plants sell at two rupees for the thousand handfuls; short ones for a rupee and a half. But the same plant is also cultivated on fields that have produced a crop of rice, between the 12th of January and the 12th of February. In the following month the field is watered, the seed sown, and covered with the plough. Once a month it requires to be watered, and it takes four months to ripen. This is more valuable than the Hemp cultivated on dry field. An acre requires $4\frac{8}{10}$ bushels of seed, and its produce was in those days worth about £1 2*s*. $10\frac{1}{2}$*d*. Of these two notices the first is interesting, as showing that the natives of Mysore adopt a practice, that of drying their Sunn stems, which is objected to by those of Bengal: the second showing a separation of the occupations of growing and of preparing the fibre; and this may, perhaps, with a congenial climate, account for the goodness of the fibre of

the Western coast. Dr. Wight states that on the Madras side of India, not only the bark of this species, but of *Crotalaria retusa* is employed as Hemp in the manufacture of cordage and canvas. He further found the Janapa or Sunn plant cultivated at Coimbatore. The stems, cut and dried, were afterwards steeped. This loosens the bark, which is then easily stripped off, and undergoes but little further preparation. He found its fibres were next in strength to the *yerkum* or *mudar*, sustaining 407 lb., when the latter bore 552 lb., and has since observed to Dr. Royle that the *Sunn*, grown in the Pass of Poonany, open to both monsoons, is stronger than that grown in the interior. Dr. Hunter has given the following account of the preparation of such fibres near Madras: "The native process of cleaning plants having bark and woody fibres"—of which kind are many of the cordage plants--" is very similar to that followed in cleaning fleshy and pulpy plants, viz., by burying in sand or mud at the edge of a tank or in a river, and leaving them to rot. There is this difference, however, that the plants are steeped longer, and are never exposed to the sun to dry, or stacked and covered with matting to be cleaned by dry beating. If this were done, the woody fibre would get hard and brittle, and would again adhere to the other fibre, which being partially rotten would break in the cleaning. To obviate this the rotted plant is taken up in large handfuls, and beaten on flat stones, first at one end and then at the other, in the same way as clothes are washed by the Dhobee; they are next well rubbed and washed to separate the impurities, and are spread out on the ground to dry. We can hardly wonder that most of the string and rope made from fibres prepared in this rude, coarse way, should be dark in colour, possessed of no strength, and of little value. As a general rule, every day's steeping of a fibre takes from its strength and imparts more or less colour. To obviate this, woody plants should be first well beaten with a mallet; then the bark should be separated from the stalk, for it is on the inner part of the bark that the fibres for cordage usually occur. When the bark is brought to a pulpy state, it must be well washed in clean water to remove as much of the sap as possible; for this is the distructive agent which soon causes putrefaction."

Culture in the West of India.—On the Bombay side *Sunn* is also extensively cultivated, and attracted some attention at the beginning of this century in the island of Salsette, whence it was called Salsette Hemp, which is probably the same substance now called Brown Hemp. On that side of India, Dr. Roxburgh says, as in some other parts of India, the seed is sown towards the close of the rains, when a stronger soil is said to be required. We have seen that Colonel Sykes enumerates the Sunn among the spring crops; that is, among those sown in autumn and reaped in spring. This Bombay Hemp or Sunn has always been highly esteemed. Dr. Roxburgh says it is reckoned particularly good—not inferior to the best Russian Hemp ('Fl. Ind.,' iii, p. 263); which he conceives is due to the mode of preparation, which we shall immediately notice. But something must also be owing to climate. So long ago as the year 1802, some fibre was imported by Capt. Isaacke, of the *Skelton Castle*, which was at first considered to be the real Hemp, and called *Malabar Hemp*. Capt. Eastwick, one of the Directors of the East India Company has informed Dr. Royle that Major J. D. Watson also paid great attention at this period to Malabar Hemp. Dr. H. Scott writes of it, that he does not know whether it be the same plant as the *Sunn* of Bengal, but where very great strength is necessary, the substance obtained from it is preferred to the Bengal Sunn, and is very superior to anything of the kind he has seen in the Guzerat. This, he thinks, may depend more on the steeping of the plant and the preparation, than on any difference in the vegetables that produce it; and this opinion was proved to be correct, for Dr. Roxburgh, having obtained some of the seed, found it to be *Crotalaria juncea*. It was about the time that Dr. Roxburgh was employed in the culture of fibres in Bengal, he learnt that in the island of Salsette, where the best Sunn is said to be prepared, little or no maceration is employed; that the plant while moist, is peeled by the hand, and immediately dried in the open air or under cover, according to the state of the weather. By peeling, the fibres are better kept in their natural state of arrangement, and give support and strength to each other; whereas, by the process of the Bengalese, they get so materially entangled, that a great loss is always sustained. If they are restored to their natural situation by the heckle, there is a loss of nearly one half of the original quantity, which renders the heckled Sunn of Bengal of a high price. Dr. Roxburgh further says, in 'Fl. Ind.,' p. 283: "Numerous experiments made by me induce a belief that the superiority of the Hemp depends upon the peeling; but it is probable that the climate of the West of India may be more favourable than that of Bengal for the production of a stronger fibre. For no great attention seems to be paid to the culture, according to recent accounts." More recently, Capt. Thompson, of the firm of Thompson and Co., rope-makers, of Calcutta, in sending three samples of fibre from the Malabar coast, writes: "Allow me also to hand you three specimens of Hemp and rope made of them that I had brought from the west side of India, grown at the places named on the labels (Calicut, Ghote, and the Concan). These have been tested both at the Arsenal and Government Dockyards, and proved perfectly equal to any and

CROTALARIA JUNCEA : SUNN.

all purposes that cordage made of Russian Hemp has hitherto been used for. From the encouraging reports upon this cordage from the heads of both the Naval and Military Departments, there seems no reason to doubt that this Hemp, and others that are being daily discovered, will completely supersede the importation of Europe-made cordage." Capt. Thompson adds, in a note: "This Hemp is no new discovery. I saw it in England, which led me to try it here (*i. e.*, Calcutta), 31st Dec., 1847." Dr. Gibson, in a Report on the Agriculture and Horticulture of the districts near Bombay, states, that both the *taag* and *umbaree*, or *Crotalaria juncea* and *Hibiscus cannabinus*, are both reaped in the month of November, and both are stored to await the advent and leisure of the warm weather for stripping. The Tag is most usually pulled up, instead of being cut off; as in the latter way it leaves a strong and dangerous stubble. It is in the Deccan, he adds, reckoned a species of cultivation unworthy of a thorough-bred husbandman, and only to be grown by the Ghaut people and the wilder tribes. The Wunjaras not unfrequently hire land to grow it on, as it is essential for affording them twine and materials for their gunnies. The seeds are beaten out with a stick, a part is reserved for future sowing, and the overplus is used to feed buffaloes. Its cultivation is more attended to in the Concan and Ghat districts than in the Deccan. It appears to suit any soil, and clears the ground of weeds. Having cultivated the plant to some extent in 1841, he found that it gave a return quite equal, if not superior, to that of the common grains of the country. Its chief expense consists in stripping the fibre. He had tried to separate the fibre by beating, after a slight immersion, but found the interior pith too soft to admit the separation of the fibre by that means. It is first steeped in water for five days —in running water—and the fibre is afterwards separated by the fingers. It is used by the natives for articles requiring much strength, as fishing nets, &c. (Agric. and Hortic. Soc. of Western Indian, 1842.) Some specimens of the fibre of the *taag*, or *Crotalaria juncea*, having been sent to England to be reported on, were spoken of in the following terms, though the name of the reporter at Hull is not given (1840): "This sample, No. 2 (*Crotalaria juncea* or *tag*), appears to me of the same quality as the Baltic. I return a part of it, made ready for spinning. You will see the great similarity of the two. My wine-spinner assures me that by taking it sooner, and by using more care in the steeping and exposure, it will be *fully equal to the Baltic*. Surely, by attention, this may be accomplished. It may require Englishmen to direct, and our implements (which are truly simple) to be used —when I have no doubt of the successful result, alike to the grower, the merchant, and our country. Your Hemp is very clean—a material point,—but it wants more beating and dressing; and I think the natives have not proper implements to do it with. You cannot improve in your mode of packing; it is decidedly superior to the Baltic. I do not despair of seeing the produce of the Baltic supplanted by that of India; as the defect appears to me solely to arise in the management of it: it stands too long before it is pulled or cut, or is too much steeped or exposed, to get the fibre to separate from the stalk." (Agric. and Hortic. Soc. of Western India, 1842.)

Wuckoo nar (or fibre), or *Travancore Flax*, as it has been proposed to be called, is another instance of the effects of locality and of climate, combined with variations in the mode of preparation, in making it impossible, from the appearance of fibres, to know the plants producing them. To the Exhibition of 1851, some specimens of strong canvas were sent from Travancore, which have been much approved of by competent judges, from the compactness and strength of the manufacture. On trial, it was found that a piece of this canvas, containing *eleven* threads, was equal in strength to canvas containing *fourteen* threads of Polish rein. Along with the canvas, a few small heads of the fibre were sent, and labelled *Wuckoo* and *Wucknoo nar*, or fibre, from Travancore. The appearance of this fibre is totally different from any other which comes from India; as it is in the state as if prepared for spinning into thread, and must have been combed or heckled. The fibres are brownish in colour, about 3 to 4 feet in length, clean, and shining, not so fine as Flax, but still resembling some of the coarser kinds. A very competent judge informed the Author that it might be sold for the purposes of Flax, or as a kind of flax, and was worth £35 a ton. So, some specimens sent to Dundee were valued at the same sum, and it was said could be used for the same purposes as Flax, though rather too dry. As the Wuckoo nar was so highly thought of, and the Author was unable to form any opinion respecting the plant which produced it, he requested his friend, Dr. Wight, so well acquainted with the Botany of the Peninsula, to ascertain the botanical name of the Wuckoo plant. The more so, as Travancore, with Cochin as a harbour which large ships can enter, is a favourable locality for the export of an article which seems a very desirable object of commerce. Dr. Wight having written to friends in the locality to ascertain this point, was surprised on hearing, as was the Author on being informed, that the Wuckoo plant of Travancore was nothing but the Tagg of the Western ghauts, and which further north yields the so well-known Brown Hemp of Bombay. Dr. Royle mentions as a curious confirmation of the result obtained, that specimens of the Brown Hemp, passed

through Mr. Dickson's machine, are exactly like the fibres of the Wuckoo nar, as sent from Travancore. The whole subject forms a striking confirmation of the importance of what Dr. Royle has frequently endeavoured to impress upon planters and experimentalists, that is, the effects of climate and of physical agents on the products of plants. As these will be found to be quite as important as seed from particular localities, or the adoption of methods of culture which may be suitable to one and not to another locality where it is attempted to introduce them.

Sunn of N. W. Provinces of India.—Besides Bengal, Madras, and the West of India, Sunn, that is, *Crotalaria juncea*, is also extensively cultivated in North-West India, for ordinary use. The cultivation may be much increased, and it is probable with considerable addition to the strength and flexibility of the fibre, by the aid of irrigation; and this is easily managed in some, and will be so in most places, when the great Ganges Canal is in active operation. It will be found there, as elsewhere, that, as stated by Mr. Deneef as his declared opinion, nothing is wanted but an improved preparation to make it a desirable article for the English market. Enough has been said respecting the value of common Sunn for most of the ordinary purposes of cordage, and also of the invaluable properties of the fibre of the same plant as grown in the Western ghauts, and where its culture may be indefinitely extended, and easily exported by sea. Though some recent Sunn broke with 150 lb., and some old Sunn bore 170 lb., when Petersburgh broke with 160 lb., the two former may not be able to bear the same degree of twisting as the latter, but Brown Hemp has, by competent judges, been considered equal to many of the purposes of Petersburgh Hemp; and the Wuckoo nar bore 175 lb. in the same experiments. Dr. Roxburgh made and published a very valuable set of experiments on Sunn, as grown in Bengal. In Dr. Wight's recent experiments, the Janapa or Sunn bore 407 lb., and Cotton ropes 346 lb.; but the Ambaree or *Hibiscus cannabinus*, 290 lb., and Coir, 224 lb. The Janapa, or Madras Hemp, as it is called in the markets here, is thus mentioned by Mr. Dickson, as already quoted. *Prices* "Madras Hemp, valued when imported at £24 per ton, 2 cwt. 3 qrs. 3. lb.

Produced by the machines.

	cwt.	qr.	lb.			
Clean, long fibre, good, valued at £45 per ton	1	1	7½			
Clean tow, valued at £30 per ton	1	1	9			
Waste	0	0	14½			
				2	3	3

Cost of preparation, 6*s.* 1½*d.*

"This Hemp, when prepared with the Patent Liquid, became soft, white, and so fine when heckled, as to bear the closest comparison with the Flax at £80 per ton. It is better than any Russian Flax for fine spinning. "Bombay Hemp, rough and dark, and valued at £20 per ton: "This article, being similarly prepared, was considered equal in value with the Madras Hemp." Though the importation of Sunn into England, for a time diminished, it has again, during the last ten or twelve years, been imported in increasing quantities; and though there it is avowedly used only for ordinary purposes, Mr. J. Kyd, ship-builder, of Kidderpore, near Calcutta, maintained that the Sunn, if properly cured and dressed, would prove equal to Russian Hemp, and even as it was then produced, it was little inferior to it. All that he considered was required to bring this Hemp to a state of perfection, was European superintendence in the growth and manufacture of the material. The natives, moreover, who have many good fibres within their reach, usually make use of Sunn twine, well tanned with the bark of a species of Rhizophora. The prices of these fibres in the interior, are stated to be from R. 1 8 to Rs. 2 8 per bazar maund; that is, from 3*s.* to 5*s.* for a maund of 84 lb., which is just three fourths of a hundred-weight. So, in the Madras territories, it is stated that these fibres may be obtained at 2*s.* a maund in the interior. In Calcutta, Sunn is quoted at about Rs. 5 per maund; and in Bombay at Rs. 4 8 to Rs. 5½ per cwt. in Oct., to Rs. 8 per cwt. in June, but at Rs. 11 in June, 1854. In the year 1844, when Petersburgh Hemp was selling in England, for £38 per ton, Indian Brown Hemp was sold for £20, Sunn from £16 to £18, and Jute from £10 to £12. In Dec., 1854, Bombay Hemp was quoted at £35 to £48, Sunn £27 to £33, Jute £21 to £25, in the same 'Price Current,' when Petersburgh Hemp was selling at £58 to £64.

Comparative Strength between Sunn Cordage, when first made, and three years after, to ascertain the deterioration by Age, and the supposed effects of Tar.

Species of Rope.	Growth of Sunn.	When made.	Where made.	When tried.	Size.	Weight to break. 1803.	Weight to break. 1806.	The average of five trials.
					Inches.	Tons. cwt. qrs. lb.	Tons. cwt. qrs. lb.	per cent.
Hawser-laid Whaleline, ...	Malda, ...	1803, ...	London,	1803, ...	6½	6 0 3 11	5 17 0 0	2½
Common Yarn, ...	Ditto, ...	Ditto, ...	Ditto, ...	Ditto, ...	4	2 6 3 0	2 2 2 0	11
	Ditto, ...	Ditto, ...	Ditto, ...	Ditto, ...	3	1 14 2 0	1 9 2 0	14
	Ditto, ...	Ditto, ...	Ditto, ...	Ditto, ...	2½	1 4 1 14	0 19 0 0	20
	Ditto, ...	Ditto, ...	Ditto, ...	Ditto, ...	2	0 17 3 14	0 14 1 0	16

Comparative Strength between Cordage made in the common way, from the best Petersburgh clean and ordinary Hemp, and the Sunn Cordage made by Huddart's Warm Register.

Size.	COMMON MAKE.								Cuttorah Sunn in 1802.				
	Best Petersburgh.				Ordinary.								
Inches.	Tons.	cwt	qrs.	lb.	Tons.	cwt.	qrs.	lb	Tons.	cwt.	qrs.	lb	
8	14	8	1	20	12	4	0	0	15	7	1	24	Warm Registered.
7	12	17	1	8	10	16	3	20	10	18	1	8	
6½	9	17	0	0	9	10	2	0	8	2	2	0	
5	6	7	1	8	5	17	0	0	5	17	2	8	
4½	5	19	2	10	4	17	0	0	4	10	1	20	
4	4	13	1	20	3	7	0	0	3	3	1	14	
3	2	15	0	14	2	6	3	7	2	2	2	24	
2½	1	19	1	14	1	10	0	0	No warm Registered of these size.				
2	1	7	2	14	1	6	0	14					

Comparative Strength of the above best Petersburgh clean Hemp Cordage, in December, 1802, *and May*, 1856.

8	14	8	1	20	12	19	2	0	The depreciation of strength would be in greater proportion with ordinary Hemp.
7	12	17	1	8	11	13	2	0	
5	6	7	1	8	5	16	0	0	

Royle's Fibrous Plants, pages 270 *to* 289.

(2964) CROTALARIA OCCULTA. The Pea-violet grows very common by the road-side between Churra and the Eastern Khassia hills and smelt deliciously of violets: the English name suggests the appearance of the flower, for which and for its fragrance it is well worth cultivation. Hooker.—*Him. Jour. Vol.* II. *page* 309.

(2965) CROTALARIA TENUIFOLIA, Roxb. JUBBULPORE HEMP.—*Crotalaria tenuifolia* is a native of Coromandel: perennial, ramous, straight, furrowed, hoary. Leaves linear, sericeous underneath. Stipules minute, subulate. Racemes terminal. Legumes sessile, clavate, many-seeded. In the Botanic Garden (Calcutta) it is perennial, growing to the height of nine feet, with numerous, slender, furrowed, straight branches, which are again more ramous at the top. During the cool season, each twig ends in a long raceme of large, yellow flowers, and seed ripens in two months. Among the cordage sent to the Great Exhibition of 1851, there were some specimens sent by Messrs. Harton and Co., ropemakers, of Calcutta. These appeared to be of excellent quality, and were said to be made of Jubbulpore Hemp. The first notice which we have of this substance is in the 'Proceedings of the Agri-Horticultural Society,' where some Hemp grown in the Jubbulpore Garden from country seed sown at the end of June, 1840, and cut in October, and of canvas woven from the fibre in the School of Industry at Jubbulpore were presented to the Society by Dr. F. M'Leod. When Mr. Williams, Superintendent of the

above School, and by whom the plant had been grown and the fibre prepared, visited England in the summer of 1853, he presented Dr. Royle with a specimen of this fibre. This was long, that is, upwards of five feet in length, of the colour of Petersburgh Hemp, rather roughly prepared, inasmuch as some of the bast is still in the form of narrow ribands, but most of it separated into fine and strong fibres. In the experiments which Dr. Royle had made with it, its strength was proved to be at least equal, if not superior, to that of Russian Hemp, inasmuch as when a selvage of Petersburgh Hemp broke with 160lb., one of Jubbulpore Hemp did not break with less than 190lb. When examined by experienced brokers and manufacturers, it was considered an excellent substitute for Russian Hemp, and if a little more carefully prepared would leave hardly anything more to be desired, and was valued as worth at from £30 to £35 a ton, that is before any rise took place in the price of fibres. The plant yielding this fibre having been discovered, we have given above a description by Dr. Roxburgh, and though some botanists unite it with *Crotalaria juncea*, we keep it separate, until its identity has been determined by experiment. We also add the first notice of this fibre, and of rope made from it. In the 'Proceedings of the Agri-Horticultural Society' for April, 1851, we find Captain Thompson presenting some dressed samples of the fibre from Jubbulpore, and a piece of rope made of it, part of the rigging made for some ships that were dismantled in the Bay of Bengal the year before, and which has proved equal to any Europe-made rope. A good account of this fibre and its uses having appeared in the 'Journ. of the Agri-Hortic. Society,' and referring to the plant producing it, we here subjoin extracts from the paper. At a meeting of the Agricultural and Horticultural Society of India, held on the 12th June, 1852, Messrs. Harton and Co. submitted specimens of the Jubbulpore Hemp fibre in a raw state; as also of fishing lines and tarred rigging made from it. A quantity of this raw material, procured from Jubbulpore by Messrs. Harton and Co. and the late Capt. Thompson about three years ago, was considered so well adapted for cordage purposes, owing to its excellent quality and great strength, that they have been willing to pay a high price for it, to meet the heavy cost entailed by the transport of so bulky an article from Jubbulpore to Calcutta. In consequence of an impression on their part, that the fibre in question was the produce of *Cannabis sativa*—it being so similar in many respects to Russian Hemp—the subject was deemed by the Society deserving of further inquiry. An application was accordingly made to Mr. Williams, Superintendent of the School of Industry at Jubbulpore, for a small quantity of seed, which was sown immediately on its receipt on the 23rd of June,

1852, in the Society's garden. In the course of nine weeks the seedlings had attained the height of 8½ feet, *without branching*—an important point in a fibrous-yielding plant—and commenced flowering in three months from the date of sowing. Dr. Falconer, to whom a specimen was referred, has pronounced it to be the *Crotalaria tenuifolia* of Roxburgh, which Wight and Arnott, and some other botanists, regard as merely a variety of *C. juncea*, the plant affording the well-known "Sunn Hemp" of commerce. But their opinion, it may be observed, is founded on dried specimens. The habit differs very much from that of *C. juncea*. Messrs. W. H. Harton and Co. have been kind enough to furnish the following memorandum regarding the above fibre: "This material has been tested several times in the Government Service, both Military and Marine, and some ropes have been found equal to the staple cordage of Europe. A coil of bolt rope, manufactured by us from Jubbulpore Hemp, tested last year in the Marine Department, broke with a strain of 57 cwt. A coil of the same size, taken from one of H.M.'s vessels, was tested shortly after, and broke with a strain of 59 cwt. It may be observed, that the Hemp used in the Naval yards of the British Government, is all selected from the fleet of hemp-laden vessels, before any is permitted to be delivered to private parties. This Jubbulpore Hemp can no doubt be considerably improved, were the preparing process in the hands of Europeans, manufactured according to the Russian method, instead of being left, as at present, so entirely to the careless and ignorant natives." The following extract from Mr. Williams's letter, dated Jubbulpore, the 19th Nov., 1852, will close this brief notice of a fibre, which, no doubt, will be better appreciated when its merits become more generally known: "I am pleased to learn that the seed of the 'Jubbulpore Hemp,' sent down by me in June last, has germinated so well in Calcutta. I can only grow it to advantage here along the ridges of the neighbouring hills (where it attains the height of from six to seven feet); that grown in the plains turning out weak in fibre when made into Hemp. I have lost considerably by sending this Hemp down to Calcutta for sale, having had the misfortune to have had several boats burnt while going down the river; and the steamers decline taking a cargo of it, in consequence of its combustible nature. The native insurance offices at Mirzapore also object to insure it, except at such high rates as to prevent all chance of profit; so that if it could be cultivated along the banks of the river, I have no doubt but that in a few years it would turn out a profitable source of export." A copy of the official Report on the Experiments made in the Arsenal of Fort William having been subsequently published, is here subjoined.

Report of several kinds of Rope, the manufacture of Messrs. W. H. Harton and Co., of Calcutta, tested in the Arsenal of Fort William, 3d June, 1853.

Kind and quality of Rope.	Size.	Government proof.	Breaking weight.
	Inches.	cwt. qr. lb.	cwt. qr. lb
Oiled Jubbulpore Hemp (*Crotalaria tenuifolia*), Artillery Traces,	3	36 0 0	43 2 0
Untarred do., superior four-strand, plain laid,	3½	42 0 0	83 0 0
Untarred Dunchee (*Æschynomene cannabina*), do.	3½	49 0 0	75 0 0
Pine-apple Fibre, do.	3½	42 0 0	57 0 0

(Sd.) J. Wilkins, *Offig. Prin. Conductor*, Rear Godowns. Some of the properties of this fibre may no doubt be due to the peculiar characteristics of the plant; but a good deal is no doubt also due to the soil and climate in which it is grown, and something probably to its having been grown and prepared under Mr. Williams's personal superintendence. This is obvious from the fact, stated by Mr. Williams, that he was only able to grow it on the sides of the hills; that grown in the plains below, he observes, was weaker in the fibre. Mr. Henley having grown some of this plant from the seed sent from Jubbulpore, has observed to the Author, that, when grown in the lower provinces, although it attains a great height and grows luxuriantly, it is weaker in fibre and the produce smaller in quantity than when grown higher up the country. The following reports have been made of this fibre by practical men: "The Jubbulpore Hemp is a very strong article, and would take well if it could be sold cheap enough. A considerable quantity could be sold in Dundee." In another note it is stated to be "of considerable value, and that a good price could be got both for it and for good Sunn, valued at £30 and £35 a ton." Some of it sold, in the summer of 1853, for £27 a ton; when it was said to be worth £30 a ton, if a little better prepared.—*Royle's Fibrous plants, p.* 290.

(2966) CROTON, a genus of Plants belonging to the natural order *Euphorbiaceæ*.—*Eng. Cyc. p.* 211. Dr. Wight figures Croton Aromaticum, 1915; lacciferum, 1915; muricatum, 1886; polyandrum, 1885; Tiglium, 1914; and umbellatum, 1874.

(2967) CROTON. WILD CROTON. A species of croton, whose roots are used by the natives for a cathartic, abounds in some parts, especially on the Maulmein hills. This species is not described in Roxburgh.—*Mason.*

(2968) CROTON. RANGOON CROTON. The natives describe another species of croton, common in the neighbourhood of Rangoon, and occasionally found in the Provinces, which is a shrub, three or four feet high, with properties similar to the preceding—*Mason.*

(2969) CROTON CASCARILLA. CASCARILLA BARK. Cortex eleutherii. This plant grows in Bahama, Saint Domingo, Brazil. Aromatic Peruvian bark is met with in short, solid fragments, thin, very hard, brittle, of resinous brown fracture, with an ash-gray, or whitish epidermis; odour aromatic and agreeable; taste aromatic, hot, acrid, and bitter. It is an important tonic and febrifuge, and is used with much advantage in intermittent fevers. It is procured from America.—*Faulkner*. The cascarilla bark is used with decided benefit in intermittents, and in all fevers during the collapse or typhoid state—*dose* 10 grs. to 1 dr. It is burned as a perfume. Cascarilla is imported from America, especially from Paraguay,—*O'Shaughnessy*, *p.* 552 and 553.

(2970) CROTON LACCIFERUM. Aleuritis laccifera, Willd. Trunk arborescent, with rude and angular branches.—*O'Shaughnessy*, *p.* 553. Leaves ovate, downy, serrulated, stalked; calyxes downy; flowers in terminal spikes; fruits small and velvety. This species is native of the East Indies, and is said to furnish the finest of all the sorts of lac, but scarcely ever to find its way to England. It is very pure, of a bright red, and furnishes a brilliant varnish in Ceylon.—*Eng. Cyc. p.* 212.

(2971) CROTON OIL: NAPAULAH OIL. Oil of CROTON TIGLIUM.

Neervalum yennai, TAM.	Jumalgotay-ka-Tel, HIND.
Naypalum vittiloo, TEL.	Tiglii oleum, LAT.

Is prepared by grinding Croton seed, placing the powder in bags, and pressing between plates of iron; the oil thus expressed should be allowed to stand about a fortnight, and then filtered. It is of an orange yellow colour, is soluble in alcohol, and reddens litmus paper powerfully. It is an exceedingly powerful cathartic; Croton oil is procurable in most Indian bazars.—*M. E. J. R. Faulkner*.

(2972) CROTON PAVANA. AVA CROTON. Lindley says that there is an indigenous species at Ava, which is decandrous, while *C. Tiglium* has fifteen stamens.—*Mason*.

(2973) CROTON ROXBURGHII, Wall. Croton polyandrum. *Roxb.* iii. p. 682.

Hakoon, HIND,	Konda amadum, TEL.

Perennial, native of Circar hills, seeds exactly like those of the castor oil plant, but much smaller. Esteemed by the natives of India to be a good purgative, one seed bruised with water being given for each evacuation desired.—(*Roxb.*) —The Burmese cultivate this species of croton, which grows into a thick bush, and whose seeds are also a strong purgative.—*Mason*. It is very common on the banks of the Jumna, where it is called Jumalghota.—(*Royle.*) *O'Sh.* page 555.

(2974) CROTON SANGUIFLUUM furnishes a product strongly resembling Dragon's blood (Damulukwain).—*O'Shaughnessy*, *page* 555.

(2975) CROTON SEBIFERUM. Pippalyang, *Hind.* Syn (Stillingia sebifera, Michaux: Sapium sebiferum, Roxb. vol. iii. p. 693), seeds covered with a waxy substance, used in China for making candles, now common in gardens round Calcutta.—*O'Shaughnessy*, *p.* 555. In the Dekhan this tree is only to be met with in a few gardens. It is ornamental and bears flowers and fruit for a great part of the year together. The fruit is of a pear shape, yellow and red, which when ripe opens and displays two or three black seeds enveloped partially with a fatty-looking substance. It is this from which the Chinese extract the tallow and make into candles.—*Riddell*.

(2976) CROTON SEED.

Batoo, Dund, ARAB.	Bori, MAL.
Jayapala. CAN.	Dund, PERS.
Nepalam, CYNG,	Nepala, SANS.
Croton, FR.	Nervallum Cottay, TAM.
Jumalgotta, GUZ, HIND.	Naypalum Vittiloo, TEL.
Cheraken, JAV.	

These seeds are about the size of a small marble, of a convex shape on one side, and bluntly angular on the other, enveloped in a thin shell. The Croton tiglium is a native of China, Cochin-China, and India. Many species of Croton have been discovered, all of which are considered as medicinal. Croton seeds are always procurable in the India markets.—*Faulkner*.

(2977) CROTON TIGLIUM. Croton oil tree. *Roxb.* iii. p. 583.

Jamalghota, HIND.	Dund, PERS. ARAB.
Jayapala, SANS.	

The seeds, called *Jamalgota*, were given to Dr. Royle when in India as the *dund* of the Arabs. They were, no doubt, employed at those times, as well as subsequently in Europe, under various names, as *Grana Tilli*, also *Tiglia*, &c., and its wood *Lignum Moluccense*. Having passed out of practice, they were re-introduced by the notices of Dr. White and of Mr. Marshall, published in Ainslie's Materia Medica of India, and by a publication of Mr. Conwell. *Croton tiglium* forms a small tree, of 15 to 20 feet in height, with the young branches smooth and roundish. Leaves oval-oblong, acuminate, 3—5-nerved, with shallow glandular serratures, thin, membranous, with 2 glands at their base, the younger leaves covered with minute stellate scattered hairs. Petioles short, somewhat angular, with a few stellate hairs when young. Stipules 2, subulate, minute. Racemes terminal, erect, simple male at apex, female single, below. Flowers downy. *Male*, Calyx 5-cleft. Petals 5, lanceolate, and woolly. Stamens 15 (15 to 20, woolly at base, *Roxb.*), distinct. *Female*, Calyx 5-cleft, permanent. Styles long, bifid. Capsules oblong, obtusely triangular, the size of a hazel nut, closely covered with

minute stellate hairs; the cells completely filled with the solitary seeds. Skin of the seeds pale dull-brown, overlying a harder, dark, and smooth integument.—*Hamilton* and *Roxburgh*, *C. Jamalgota*, Ham. Linn. Trans. xiv. 258.—Indigenous everywhere in Bengal; found also in the Indian Peninsula and in Ceylon; *Lindley*, Fl. Med. p. 181.

Croton parana (Ham. *l. c.* p. 258), having ten stamens, and the seeds much smaller than their cells, is another species, which yields what Dr. Hamilton considers the original Tiglium seeds. It is a native of Burma, Assam, and Silhet, perhaps also of Amboyna.

Croton Roxburghii. Wall. (C. polyandrum, *Roxb.*) is a native of the Circar mountains; bears seeds to which the name *Jamalgota* is also applied.

Croton tiglium, has a disagreeable smell, and the taste of the leaves is exceedingly nauseous and permanent. (*Roxb.*) All parts of the plant seem provided with an acrid purgative principle, but the seeds are alone now officinal. These are about the size of a grain of Coffee, oblong, rounded at the extremities, with two faces, the external more convex than the internal, separated from each other by longitudinal ridges, and each divided by a similar longitudinal ridge, forming altogether an irregular quadrangular figure. Sometimes when there are only two seeds in the capsule, the internal surface is flat, with a grove formed by the central axis. The shelly covering of the seeds being sometimes partially removed, they have a mottled appearance; but if entirely so, they are blackish. The kernel is oily, of a yellowish-white colour when fresh, but becoming brownish by age. It has a large embryo, with leafy cotyledons. In India the seeds with their covering are subjected to torrefaction, and the embryo usually separated before they are prescribed medicinally. In Europe their effects are obtained by prescribing the Oil, commonly called *croton Oil.* This is obtained by bruising the kernels, and subjecting them to pressure, when about 50 per cent. of Oil may be obtained. But some Oil is also imported from Ceylon. According to Dr. Nimmo, the seed consists of 64 parts of kernel and 26 of covering, and the kernels yield 60 per cent. of Oil. Croton seeds are powerfully Cathartic, and in very common use in India as Purgative Pills, commonly called *Jamalgota Pills.* The natives usually separate the embryo, and combine the albumen of the seed (which, however, is sufficiently active) with Catechu or Pepper. About a grain, or half a seed, is sufficient for a dose, though they do take larger doses. Croton Oil, is expressed from the seeds, and usually imported from India, chiefly from Madras and Bombay, but also from Ceylon. Croton Oil, when quite pure and fresh, is nearly colourless, but as usually met with, it is rather viscid, yellowish, and even of an orange colour, from over-roasting of the seed. It has a faint but peculiar smell, and a permanent acrid taste, which is most felt in the throat. It is a Drastic Purgative in obstinate Costiveness and torpid state of the Intestinal canal, or when a Hydragogue, or the speedy action of a Cathartic, is required.—*Royle, p.* 553.

(2978) CROTON VARIEGATUM,—An ornamental shrub commonly called the laurel, the leaves are variegated; there is also a willow leaf variety equally ornamental and handsome; the plants thrive best in large pots or tubs, and are easily propagated by cuttings. The willow leaf variety thrives best in a situation shaded from the noon day sun.—*Jaffrey.*

(2979) CRUCIANELLA STYLOSA. RUBIACEÆ. This is a pretty little pink coloured flower, native of mountains in Persia and therefore not likely to grow in the southern parts of India.—*Riddell.*

(2980) CRUCIBLES, Musa. Tel.

In India these are made by brass smiths &c. for their own use, of pipe clay or other suitable clay, beaten up for a considerable time on the anvil with burnt paddy husk, being formed they are left to dry and are then ready for use, Mr. Rohde has seen a crucible formed for melting silver simply by spreading wet clay on a bit of rag; which was immediately placed on the fire, which again, was urged by the breath through a bamboo tube.—*Rohde M. S S.*

(2981) CRUSTACEA, Crustacés of the French, Krustenthiere of the Germans. The Common Crab, the Lobster, and Crayfish, the Common Shrimp and the Water-Fleas, may be taken as types of different sections of this family.—*Eng. Cyc. p.* 217.

(2982) CRYPTOGAMIC PLANTS. Not only from the Lichen tribe, but also from the Algæ, fungi, mosses and ferns, man derives nutriment and valuable products. Some of the Cryptogamic plants form considerable articles of commerce, particularly as food plants, affording gelatinous and amylaceous matter, and being useful in medicine and the arts.—*Simmonds.*

(2983) CRYPTOMERIA JAPONICA. The Japan cedar is a tree which has been introduced into England, from China, and which, even in a young state, had been greatly admired there.—*Fortune's Tea District, page* 212. At another place the same author observes "most conspicuous, was the beautiful *Cryptomeria*, or Japan cedar, to which I have more than once alluded in these pages. It is evidently in high favour with the priests of Buddha, and well deserves to be so.—*Fortune's Tea Districts, page* 304. And at another place he says, "among these, I met

for the first time with the beautiful Cryptomeria Japonica, a species of pine not unlike the Araucarias of Norfolk Islands and Brazil. When growing luxuriantly, it is highly ornamental, rising from the ground as straight as a larch, and sending out numerous side branches almost horizontally from the main stem, which again droop towards the ground in a graceful and "weeping" manner. The wood of the tree has a kind of twisted grain, and possesses great strength and durability. It is highly valued by the Chinese and from its beauty and straightness is often used by the Mandarins and priests for those long poles which are generally seen in front of their houses and temples. It is also well known and highly prized by the natives of Japan.—*Fortune's Wanderings, page* 128.

(2984) CRYPTOSTEGIA GRANDIFLORA. The Palay is a climbing plant, belonging to the family Asclepiadaceæ. It yields a very fine strong white fibre, which resembles flax, and is susceptible of being spun into the finest yarn. At the Madras Exhibition of 1855, Mr. Underwood exhibited this fibre in the clean state, and spun into yarn of different qualities, and it appears to be deserving of attention, as the plant is common, and yields a considerable per centage of Fibre. At another place it is mentioned that Mr. Underwood also exhibited a variety of yarns of different qualities made from the Palay or Cryptostegia grandiflora, suited to the weaving of different qualities of cloths. The Palay seems to be a good substitute for flax as it is soft, pliant and susceptible of being split into the finest threads. The stalk contains a large per centage of fibre, besides yielding a milky juice which solidifies into a gum elastic of the nature of India rubber. This appears to be one of the most promising fibres brought to the notice of the Jury. Samples of the concrete juice of this handsome climber were sent to the Madras Exhibition from Nellore, from Masulipatam, from Cuddapah, and from Madras. This strong climbing plant is found in abundance along the Eastern Coast, and in some places is a standard. The milky juice has long been known to contain caoutchouc, but it has not as yet been collected for the purposes of commerce, and it is doubtful, if a sufficient quantity could be obtained to render it an article of trade. The small samples forwarded appeared to be of excellent quality and answered well for rubbing out pencil marks from paper. Mr Underwood made a fair attempt at producing water proof cloth by simply running the juice over the cloth which received Honorable Mention.—*M. E. J. R.*

(2985) CTENOID FISHES, a great division of Fishes, thus named by Agasaiz, from the pectinated appearance of the rectral edges of the scales.—*Engl. Cyc. page* 241.

(2986) CUBEBS, CUBEB PEPPER. See article Cubebs; in Catalogue 1st, Section 1st.

Kebabeh, ARAB.	Komoonkoos, MAL.
Walgummeris, CYNG.	Cabab-cheenee, PERS.
Cubebes, FR.	Cobebas, PORT.
Kubeben. GER.	Kubebn RUS.
Cabab-cheenee, Doomkee mirchee, GUZ. HIND.	Sughunda-marichu, SANS.
Cubebi, IT.	Cubebas, SP.
Kumakus, JAV.	Valmellagho, TAM.
Piper-cubeba, LAT.	Salavamirriaiob, TEL.
	Cubab Chine.

Cubeb pepper, as it appears in commerce, is stated to be the fruit of two different species of pepper, the Piper cubeba, and Piper caricum, both natives of Java, to which island their cultivation appears to be confined. In the Javanese language its name is kumukus, and this is its only specific one, for the Malay name lada barekor, meaning "tailed pepper," is a factitious one derived from the appearance of the dried fruit, which has always the foot-stalk adhering to it.—*Crawfurd's Dict. page* 117. The fruit of Piper cubeba, when ground, should afford 10 per 100 of essential oil, on distillation with water.—*Irvine.*

(2987) CUCULIDÆ, the *Cuckoo-Tribe*, or Cuckoos, a family of Scansorial Birds, placed by Cuvier and Lesson next to the Wrynecks, Yunx. —*Eng. Cyc. p.* 242.

(2988) CUCUMBER, GREEN AND WHITE. —This vegetable is grown from seed at all seasons. The plants should never be too close. It thrives in all parts of India, and grows with much or little water; and if allowed to climb over sticks, or trellis work, is out of the way of jackals and porcupines, who are fond of the fruit. The natives grow them in their fields, in the cold season, amongst grain of various sorts, and in the sandy beds of rivers during the hot weather.—*Jaffrey.*

(2989) CUCUMBER SEED OIL. CUCURBITA PEPO.

Valerikai yennai, TAM. | Thosa noona, TEL.

A clear edible oil. The seeds of the plants of the cucumber family frequently supply a bland oil, which is used in the East as a lamp oil and for cooking. Among the vegetable oils imported into Ningpo, and other Chinese ports, from Shantong, Leatong, and Teisin, are "*oil of teuss*," obtained from green and dried peas, black oil of the fruit of the tree kin (?) and oil from the pea of Suchau.—*Fortune.*

(2990) CUCUMIS, a genus of Plants belonging to the natural order *Cucurbitaceæ*, comprehending the Melon, the Cucumber, and some sorts of Gourd. It is distinguished from the neighbouring genera by its three thick split stigmas, and by the seeds having a thin margin.—*Engl. Cyc. page* 252.

(2991) CUCUMIS ACUTANGULUS. Acute Angled cucumber.

Peekunkai, TAM.	Djingi, MALAY.
Toorai, DUK.	Dumargava, SANS.
Beerakaia, TEL.	

This angular shaped species of Cucumber is a favourite pot vegetable of the Natives of India, who consider it very wholesome, and dress it in various ways. The plant appears to be the Picinna of the Hortus Malabaricus.—*Ainslie, p.* 243.

(2992) CUCUMIS COLOCYNTHIS. Colocynth, or bitter apple. Colocynth Gourd. (Κολοχυνθις, Dioscorid.)

Indrain, HIND.	Hinzil, PERS. & ARAB.
Vishala, SANS.	

The plant grows on sandy lands of Coromandel, Kaira in Guzerat, Tirhoot, and the Doab, especially near Dehlee. Pereira describes two varieties of seeds, one white, the other black, or brownish: the latter very bitter, but he states that both have this flavour. Duncan, however, on the authority of Captain Lyon, describes the seeds as constituting an important article of food in northern Africa. The seeds of the Bengal colocynth are certainly bitter, and when given in half drachm doses produce decided cathartic effects. According to Vauquelin's analysis, Colocynth contains a resinous matter insoluble in ether, a peculiar bitter principle (colocynthine), fat, oil, extractive, gum, and salts. The pulp and seeds of the colocynth produce exceedingly powerful cathartic and emetic effects; from large doses amounting to acrid poisoning. The alcoholic or watery extract however when given in proper doses, and combined with milder purgatives, constitutes one of the most valuable of our medicinal resources. The compound extract of our Pharmacopœia contains, besides the alcoholic extract of colocynth—aloes, scammony, cardamums and soap. It is an excellent purgative, especially when given with blue pill or calomel. The dose is 5 to 10 grains. Numerous formulæ for its administration will be found in our Pharmacopœia. Dr. Burn, of Kaira in Guzerat, sent specimens of the colocynth of that district, and of an extract of his preparation. These articles were identical in action with the colocynth of the Doab, and both were quite equal to the best imported from Europe. These facts are of much importance, especially to the native practitioner, inasmuch as the compound extract of colocynth costs at least 1*l.* 1*s.* the pound avoirdupois. The extract made in Calcutta costs but four rupees per lb. The colocynth of India is moreover likely to become a profitable export, either in the state of fruit or extract. In 1839, 10,417 lbs. were imported into England from Mogadore or the Levant.—*O'Shaughnessy, page* 344. The colocynth Gourd plant, which furnishes the drug Colocynth, is also found wild in the Grecian Archipelago, Egypt, and the north-eastern parts of Africa generally. Burckhardt saw it covering large tracts in Nubia, and Roxburgh speaks of it as common on the coast of Coromandel. It is doubtful however whether the plant of the latter botanist is not rather *C. Pseudo-Colocynthis.* This species grows like a cucumber, but has cordate-ovate many-cut and lobed leaves, white beneath with hairs. Its fruit is small, round, deep yellow, smooth, hard externally, with an intensely bitter pulp. The gourds are gathered in autumn, when they are beginning to turn yellow; they are then peeled and dried rapidly in stoves. —*Eng. Cyc. page* 252. Dr. Irvine tells us, that it is a common wild fruit in November, all over Ajmeer and Jaipore. Buffaloes eat the bitter fruit with apparent zest, and uninjured.—*Irvine. Med. Top. page* 209.

(2993) CUCUMIS MELO.

Melon, TEL.	Beteekh, ARAB.
Melam pullum, TAM.	Bakacoy, MAL.
Khirbooza, HIND and DUK.	Sabo frangee, MALAY.
Khirboozeh, PERS.	

The native country of this valuable plant is unknown. Linnæus says Tartary, but his authority is not given, and in all probability is erroneous; De Candolle says Asia; Roxburgh only knew it in a cultivated state in tropical India; and Professor Royle seems unacquainted with any wild station for it in the Himalaya regions. Cashmere is the most likely to be the country whence it sprang; for it seems to be the mother of many of our other cultivated fruits, and has from time immemorial been famous for the excellence and abundance of its melons, which form a staple article of the food of the inhabitants.—*Eng. Cyc. p.* 252. In Ajmeer, two delicious small varieties of Melon grow wild in Marwar, Beekaneer and Jassulmeer: they are very small and high flavored, and are exported as delicacies. They probably are the Cucumis madraspatanus (*Hind.* Bungunuk) and the Cucumis turbinatus (*Hind.* Kackari).—*Irvine. Med. Top. p.* 209.

(2994) CUCMIS MOMORDICA.

Phoont, Tooti, HIND.

Cultivated and wild at Ajmere in the rains.—*Gen. Med. Top. p.* 210.

(2995) CUCUMIS MURICATUS. Klein.

Cacary kai, TAM.	Kurkotakie, SANS.
Mooloo Dosa Kaia, TEL,	

The natives make this species of Cucumber into curries and other dishes.—*Ainslie p.* 236.

(2996) CUCUMIS PSEUDO-COLOCYNTHIS, Royle. Plains of northern India, where it is called "Indrayun," and "Bisloombhee." The fruit is similar in quality to colocynth, and is substituted in northern India for the true article. On application to Dehlee for specimens of the Bislombhee, Dr. O'Shaughnessy was favoured by

Dr. Macintosh, and subsequently by Dr. Ranken, with fruits which corresponded in every respect with the description and characters of the real colocynth. Dr. Burn's specimens were also identical with the true article, though called "Indrayun" and "Bislombhee." There can be no doubt then, and taking into account moreover the extreme cheapness of the dried fruit in the Bazars, that the real colocynth exists in the Doab and Guzerat, and is called by the names applied by Dr. Royle, to his *Pseudo-colocynthis*. But it is also equally evident that Dr. Royle's article is a peculiar species, perhaps more abundant than the genuine kind.—*O'Shaughnessy, p.* 345.

(2997) CUCUMIS SATIVUS. Linn. CUCUMBER.

Vullerikai, TAM.	Caukreecoy, MAL.
Kunkurie, DUK.	Timmoon, MALAY.
Dosakaia TEL.	Mootrulla, SANS.

The Cucumber, has rough stems bearing tendrils ;—*Eng. Cyc. page* 252. Cucumis sativus, and its varieties are said to be an unwholesome vegetable for delicate constitutions : raised from seed which should be two or three years old, sown where intended to fruit, requires a free rich soil. English varieties should be trained on trellises ; when the shoots are 2 feet in length the points should be pinched off to cause them to branch, used in salads and pickles ; sown after the rains are over at Madras, in January, Feb. and March.—*Jaffrey.* Cucumbers, Cucumis sativus and utilissimus, are consumed in immense quantities, by the Karens and Burmans, who seem to prefer them when large and yellow, rather than pluck them when green and tender.—*Mason.*

(2998) CUCUMIS TUBEROSUS, Heyne.

Adulaykai, also Nellay peekoo. TAM, | Casarakaia, TEL.

This is a pot vegetable not much in request. it is eaten by the common people, who make it into curry.—*Ainslie, p.* 336.

(2999) CUCUMIS USITATA.

Vellaree-kai, TAM.

Cucumber is commonly cultivated by the natives and eaten when ripe as a desert. Cucumis sativus and utillissimus are also cultivated to a great extent and generally eaten green, without any preparation whatever : the country cucumber is very bitter at both ends, these should be cut off before preparing for salad : probably the above are only varieties of each other.—*Jaffrey.*

(3000) CUCUMIS UTILISSIMUS.

Kaukoor, kurktee, BENG. | Kakui, kakri. HIND.

The powder of the toasted seeds is described as a powerful diuretic, and serviceable in promoting the passage of sand or gravel.—*O'Shaughnessy, page* 343. *C. utilissimus*, is an annual and native of the higher cultivated lands of India, but generally found in a cultivated state.—*Eng. Cyc. page* 252.

(3001) CUCURBITACEÆ or GOURDS. This natural order of the Vegetable Kingdom, are herbaceous, annual, very rarely perennial plants. The fruit varies much in size, form, and external characters, but is generally fleshy within, and its pulp is often so saturated with water that it cannot be dried. The roots of most of the order contain starch, often associated with an acrid poisonous matter, which can be separated by washing the powdered root with water, in which the acrid matter dissolves, while the starch is left. The seeds of most of the order are of a mild sweet taste, give good emulsions with water, and yield a fixed oil by expression. Few of the plants of this order are indigenous in Europe. In tropical countries this order gives the inhabitants a large portion of their food, which it often affords of the finest quality in the most arid deserts or on barren swamps and islands. In Persia, China and Cashmere they are cultivated on the lakes, on the floating collections of weeds common in these localities ; in India, they are everywhere abundant, either in the wild or cultivated state. In the East we find the genera Lagenaria, cucumis ; Luffa ; Bryonia ; Momordica ; Trichosanthes, and muricia, and the following is a list of the chief *Dietetical species*, (Royle, p. 219.)

Cucurbita Pepo. (pumpkin,)	Meetha kuddoo. The seeds of these yield oil by expression, and are considered "cooling medicine."
——— Citrullus, ...	Turbooz. A variety, Tentsee.
Benincasa cerifera, ...	Peetha.
Cucumis Melo (melon.) ...	Kurbooza, Seeds oily, and readily become rancid.
C. madaraspatensis,... ...	Roxb. Fl Ind. iii. p. 723.
C. patescens,...	Wild, common near Saharunpore, becomes aromatic on ripening.
C. momordica,...	Phoot.
C. sativus : cucumber,... ...	Kheera. Fruits contain sugar, seed yields a mild oil.
C. utilissimus, ...	Kukree.
Luffa pentandra, ...	Ghia.
——acutangula, ...	Kaleetori.
Momordica charantia,... ...	Kurella, fruit slightly bitter and tonic.
Trichosanthes anguina, ...	Chuchinga.
——— dioica, ...	Palwal.
——— cucumerina,	Junglee-chuchinga.

—*O'Shaughnessy, p.* 351.

According to Dr. Hunter, the *Cucurbitaceæ*, or the Cucumber and Melon tribe, which are so extensively cultivated in all tropical countries as food for the natives, abound in fibres of great length. Indeed, many of the plants which are cultivated in fields or gardens would yield fibre in considerable quantities, which would be useful to the paper-maker, instead of being wasted or burnt. Of these we may instance, among the large family called *Compositæ*, the plant called Jerusalem artichoke, the stems of which abound in fibres. So probably does also the extensively cultivated *Carthamus* or Safflower.—*Royle's Fib. Plants, page* 301.

(3002) CUCURBITA AURANTIA, the Orange-Gourd, is rather more tender than the other species.—*Engl. Cyc. page* 253.

(3003) CUCURBITA CITRULLUS. Lin. WATER MELON.

Pitchee pullum, TAM.	Hindooanch, PERS.
Turbooze, HIND. & DUK.	Darbojee, TEL.
Beleekhzickee, ARAB.	Mandekee, MALAY.

Its deeply-lobed and gashed leaves, and its round fruit, with a spotted rind and a cold watery pink or white flesh in which lie a number of black seeds, sufficiently mark this species, which is most extensively cultivated all over India and the tropics of Africa and America, and generally in hot countries, but which is of no value in the north of Europe, where high flavour is required more than cooling properties. This plant serves both for food, drink, and physic to the Egyptians. It is eaten in abundance during the season, which is from May to July. It is the only medicine the common people use in ardent fevers; it is gathered when ripe or almost decaying; the juice is expressed, and mixed with sugar and rose-water. It is generally considered to be the Melon of the Jews mentioned in many parts of the Bible.—*Engl. Cyc. page* 253. In India, the water melon is cultivated in river beds, and in alluvial deposits of lakes, tanks, &c. where abundance of water can be had; used as a dessert.—*Jaffrey.*

(3004) CUCURBITA HISPIDA, Thunb. RED PUMPKIN.

Poosnikai, TAM.	Goomadikaia, TEL.
Mitta kuddoo, DUK.	

This grows in great abundance in the Tenasserim province and is a pot vegetable much and justly esteemed both by Europeans and Natives. There is a variety of the Poosnikai, called by the Tamools, Kaliana Poosnikai, which is white and which, from old custom and religious rite, must make a dish at every Malabar marriage dinner: it is supposed to ensure prosperity to the wedded pair.—*Ainslie, p.* 244.

(3005) CUCURBITA LAGENARIA. Lin. WHITE PUMPKIN.

Chooray kai, TAM.	Anapakaia, TEL.
Kurreakuddoo, DUK.	Labo ambon, MALAY.
Tomra kudoo, HIND.	Belaschora, HORT. MAL.

There are several varieties of this which are eaten by the natives dressed in different ways.—*Ainslie, p.* 238. Long, white gourds are hollowed out and made into rafts for passing rivers on. The large round kind are used for making a kind of stringed intrument called in Tamools Kinnayrie; and are hence termed Kinnayrie Chooraykai. A longer and narrow sort are employed in making the wind instruments called in Tamool Maghadie with which the snake-men (Pamoo Poodarer, *Tam.*) entice snakes from their holes.—*Ainslie's Materia Medica, p.* 172. In China the dried bottle-gourd are tied to the backs of children on board the boats to assist them in floating if they should unluckily fall overboard.

(3006) CUCURBITA MAXIMA.

Poosheeny-kai and keeray, TAM.

Cucurbita maxima, the common large Gourd, red Gourd, or Squash Gourd, has cordate leaves, very rugged hispid petioles.—*Engl. Cyc. page* 253. Fruit roundish, generally cultivated, the leaves make excellent greens, and the fruit is used for various culinary purposes; require good soil and abundance of water. In Tenasserim this species of large pumpkin or gourd, is a common vegetable seen on the tables of Europeans. "When boiled," says Wight, "it resembles in taste a fine, tender carrot."

(3007) CUCURBITA MELOPEPO.

Khukoor, HIND.

Squash Gourd, has cordate obtuse leaves, somewhat 5-lobed.—*Engl. Cyc. page* 253. This is cultivated over the houses in the rains. In Bengal it is called Suphura-koomra.—*Genl. Med. Top. page* 209.

(3008) CUCURBITA OVIFERA, Egg-Bearing Gourd, or Vegetable Marrow, Sheeray-poosheeny-kai, *Tam.* Probably introduced, said to be indigenous at Astrachan; an excellent vegetable; of easy culture in good rich soil. One of the most wholesome of the cucumber tribe,—*Jaffery.*

(3009) CUCURBITA PEPO. PUMPKIN.

Koomroo, Kudima, HIND.

Large and small varieties much cultivated: the Kudima is a sweet kind, Petha is the long white variety.—*Genl. Med. Top. p.* 209. *C. Pepo*, the Pumpkin, has cordate obtuse leaves. —*Engl. Cyc. page* 258.

(3010) CUDBEAR, is a powder used in dyeing violet, purple, or crimson; it is procured from the *Lichen tartaricus*, a plant found in Iceland. Its colors are not durable when it is employed alone, and it is therefore used as a body to other expensive dyes, as indigo, cochineal, &c. making them more lively. It is used but little by the Chinese, and the demand in that market is not great.—*Compendious Description.*

(3011) CULLENEA EXCELSA. BOMBACEÆ, 1761.

Malay konjie marum, TAM.

A very large and tall tree, trunk straight, from 60 to 80 feet high. Wood white, rather open grained, apparently not very good, but the outside sap-wood only was examined. Under the microscope its longitudinal section is very peculiar; altogether such as I have not elsewhere observed.—*Wight.*

(3012) CUMBI: GARDENIA LUCIDA.

Dikamillie, DUK. GUZ.	Cumbi-pisin, HIND.

A strong disagreeable smelling gum-resin;

procurable in most Indian bazars. It is much used by native doctors as an external application, when dissolved in spirits, for cleaning foul ulcers. It is now used by some European practitioners in cases of worms in children.—*Faulkner.*

(3013) CUMBLY. Gongali, Tel.

Cumblies are woven in almost every district of India, of the wool of the country which is spun by hand. The yarn is sized with the juice of the common squill; the woof is beaten with a hand batten (in the way that sailors adopt in forming mats for defending the rigging) no reed being used: A finer description of cumbly of which the Sepoy cloaks were made is manufactured at Bellary or in its neighbourhood.—*Rohde M.S.S.* Cumblies are manufactured chiefly in Mysore and the Bellary district. The former are of superior qualities, in black and white colours and are sold at from Rupees 25 to 100 each; ordinary sizes 4 to 20 Rs each. Bellary cumblies are well made but are not of so high value as those of the Mysore District, they are 6 cubits long by 3.

(3014) CUMINUM CYMINUM, (Cumin) Κυμινον ημερον, Doiscor. Kumoon, Zeera suffed —Upper Egypt, Ethiopia. Cyminum or Cuminum, a genus of plants belonging to the natural order *Umbelliferæ. C. Cyminum*, the Cumin, is a plant of annual duration, found wild in Egypt and Syria, and cultivated from time immemorial for the sake of its agreeable, aromatic fruit, which, like that of Caraway, Dill, Anise, &c. possess well-marked stimulating and carminative properties.—*Eng. Cyc. page* 274. Its fruits resemble others of the order in stimulant and stomachic properties, and are used in a stimulating plaster. They yield a large quantity of essential oil, of a yellow colour, lighter than water.—*O'Shaughnessy, p.* 367. Cumin is said to be employed in flavouring Dutch cheese. The fruits are carminative, but the smell is disagreeable. They are chiefly used in veterinary surgery. Combined with resin they make a warm stimulating plaster.—*Eng. Cyc. p.* 275.

(3015) CUMIN SEED.

Kemun, Arab.	Cumino, It.
Jeera-Suffeid, Beng.	Jintan, Mal.
Jeeraga, Can.	Zeera suffeid, Pers.
Dooroo, Cyng.	Cominho Port.
Kummen, Dan.	Jiraka, Ajaji, Sans.
Komyn, Dut.	Comino, Sp.
Cumin, Fr.	Siragum, Tam.
Kumin, Ger.	Gilakara, Tel.
Jeera-Suffeid, Guz. Hind.	

Are of an ash-gray colour, oval, linear, flat on one side, convex and striated on the other; having a strong peculiar smell, and a bitter, acrid, aromatic taste. They are used as an ingredient in curries, and also in medicines.—*Faulkner.* Cuminum Cyminum, *Linn.* Common Cumin. Cumin (*kumoon* of the Arabs) is probably a native of Asia, and was made known to the Greeks from Egypt. It is extensively cultivated in the East, but has long been introduced into the south of Europe. England is chiefly supplied from Sicily and Malta. Cumin seeds, or rather fruits, are of a light-brown colour. The odour is aromatic, dependent on the volatile oil which is stored up in the seed-coat. Taste warm, bitterish, and aromatic, but not so agreeable as anise. The albumen is insipid. 16 cwts. of the fruit yield about 44 lbs. of the oil, which has a Sp. Gr. 0·945, pale yellow colour and is limpid, of a disagreeable smell and acrid taste. It is a stimulant Carminative used as a Condiment in India. Seldom used in medicine. Dose gr. xv.—oz. ½. Dr. Formerly much employed as an external application in Emplastrum and Cataplasma Cumini, and by Jews in the process of circumcision.—*Royle.* This pleasant tasted aromatic seed is particularly prized by the Mahometans, who season their cakes with it. Dr. Ainslie thought that much of what is used in this province was brought from China, it also comes occasionally to India from the Gulph of Persia.—*Ainslie, Mat. Med. p.* 266.

(3016) CUNG-QUA. The Cungqua, is a resting place for travellers, or rather for officers of Government in Lew Chew. The Cung-qua corresponds very nearly to the Turkish Khan, except that, being used only by persons of some consideration it is far more neat and elegant in every respect. The house resembled a private dwelling of the better class.—*American Expedition to Japan, page* 189.

(3017) CUNNINGHAMIA LANCEOLATA. In this region I met with no plants which I had not seen before in other parts of the country. I observed this, the lance leaved pine, in great abundance; indeed, this species and the more common Pinus sinensis are almost the only trees of any size which grow in this mountainous district. The natives amongst these hills were much surprised at the sight of a foreigner, and came crowding from all quarters to see me; they were however much more civil and respectful than their countrymen in the low-lands and at Foo-Chow.—*Fortune's Wanderings, p.* 38.

(3018) CUPHEA, Lythraceæ. This genus of plants is rather pretty; the flowers being purple, scarlet and red, are grown from seed and by cuttings in tolerable light soil.—*Riddell.*

(3019) CUPRESSUS, a genus of Plants belonging to the natural order Coniferæ.—*Engl. Cyc. p.* 257.

(3020) CUPRESSUS FUNEBRIS. The funereal cypress. But the most beautiful tree, says Fortune, found in this district of China is a species of weeping cypress, which I had never met with in any other part of China, and which was quite new to me. It was during one of my daily rambles that I saw the first specimen. About half a mile distant from where I was, I observed a noble-looking fir-tree, about sixty feet in height,

having a stem as straight as the Norfolk Island pine, and weeping branches like the willow of St. Helena. Its branches grew at first at right angles to the main stem, then described a graceful curve upwards, and bent again at their points. From these main branches others long and slender hung down perpendicularly, and gave the whole tree a weeping and graceful form. It reminded me of some of those large and gorgeous chandeliers, sometimes seen in theatres and public halls in Europe. Its stem was perfectly straight, like *Cryptomeria*, and its leaves were formed like those of the well-known arbor-vitæ, only much more slender and graceful.—*Fortune's Tea District, p.* 61 and 62.

(3021) CUPRESSUS GLAUCA.

Surus, Duk.

This is a tall, elegant, and graceful tree, well adapted for border walks in a garden, being always green, and a favorite with the Natives. It grows easily, and is generally planted alternately with Areca. Slips, if taken off before the commencement of the rains, and planted in beds shaded from the sun, take root; each slip should be six inches apart, and if common care is used, one-fourth of the plants will strike and grow. After that they may be put out in nursery beds, at the distance of one foot from each other, until required for transplanting, to where they are to remain.—*Riddell.*

(3022) CUPRESSUS HORIZONTALIS, the Spreading Cypress, is a handsome species.—*Engl. Cyc. p.* 258.

(3023) CUPRESSUS LUSITANICA, the Cedar of Goa, differs from the two preceding in its much freer mode of growth, and in its leaves having a singularly glaucous colour.—*Engl. Cyc. page* 258.

(3024) CUPRESSUS PENDULA, Drooping cypress, *Goa cedar.* South of Europe, fruits formerly deemed astringent, and much used in medicine, now obsolete. The oriental physicians used to send their patients labouring under lung diseases to breathe the air of Candia, where the cypress was abundant, in the persuasion that the emanations were particularly wholesome.—*O'Shaughnessy, page* 621.

(3025) CUPRESSUS SEMPERVIRENS, Evergreen cypress, *Suroo* and *Shujr-ul-hueyat,* or the tree of life, *Hind.* Sarass, Its berries and leaves are popularly deemed a panacea for all diseases.—*O'Sh. page* 621. Cupressus Sempervirens is found in gardens at Ajmeer and Kotah. —*Gen. Med. Top. p.* 208. The Cypress is a native of the warmer parts of Europe, but has long since been transferred to gardens for the sake of its deep evergreen branches and leaves. —*Eng. Cyc. page* 258.

(3026) CUPRESSUS TORULOSA, which stood prominently out from amongst the other trees, and a distinct variety of the same species, was said to be from Cashmere.—*Fortunes' Tea Districts, page* 364.

(3027) CURCULIGO ORCHIOIDES: *Roxb.* NELEPANNAY ROOT.

Nelepanay kelung, Tam. | Nelatatie gudda, Tel.
Siah Mooslie, Duk. | Moossalie, Sans.

This tuberous and wrinkled root is in a slight degree bitter and mucilaginous to the taste, it is prescribed in electuary.—*Ains. Mat. Med. p.* 94.

(3028) CURCUMA, a genus of Plants belonging to the natural order *Zingiberaceæ.* It has the tube of the corolla gradually enlarged upwards; the limb 2-lipped, each lip 3-parted; the single filament broad; the anther incumbent, with two spurs at the base; the style capillary; the capsule 3-celled; the seeds numerous, arillate. The species are stemless plants with tuberous roots; the flowers are of a dull yellow colour, surrounded by bracteolæ.—*Engl. Cyc. p.* 261.

(3029) CURCUMA AMADA, "Mango ginger." *Vern.* Amada, *Beng.* Roxb. i. p. 53. A native of Bengal. The name of mango-ginger is given to this root from its peculiar smell while fresh. It is a gentle stimulant, but now only used as an article for seasoning food.—*O'Shaughnessy, page* 649. Mango-Ginger, has few-flowered central spikes; the tubers horizontal, palmate, of a deep orange colour inside; leaves radical bifarious, petioled above their sheaths, lanceolate, cuspidate, smooth on both sides, from 6 to 18 inches long by 3 to 6 inches broad. This plant is a native of Bengal, and is called in Bengalee, Amada.—*Engl. Cyc. page* 261.

(3030) CURCUMA ANGUSTIFOLIA.

Tikor, Hind. | Curcuma angustifolia var. Roxb.
Kooay kalung, Mal.

C. angustifolia, with stalked, narrow, lanceolate leaves, is a native of the forests of India, from the banks of the Sone to Nagpore. Its tubers, which are found at the end of fleshy fibres which meet together, forming a crown, yield an excellent arrow-root, which is that met with in the markets of Benares.—*Eng. Cyc. page* 261. Kooay, or Cooa kalung is the name given to this valuable root, on the Malabar coast, where the natives prepare from it a substance so like their arrow-root, both in appearance and virtues that it is difficult to distinguish the one from the other.—*Ainslie, p.* 249. *Curcuma angustifolia* grows wild in all the hilly parts of the Deccan, and is used by the natives for food. The tubers should be planted in a good rich soil, about one foot apart, just before the rainy season; and taken up as soon as the leaves are dry. Rats, porcupines, and wild hogs, are very destructive to it, both when first planted, and also when ripe. Such tubers as are required for seed should be kept in a dry place in sand. It is very common in India; the roots are used in the Benares district for the manufac-

ture of arrow root.—*O'Shaughnessy, page* 649. East India arrowroot is procured in part from Curcuma angustifolia, known locally as Tikoor in the East, and a similar kind of starch is yielded by C. Zerumbet, C. rubescens, C. leucorrhiza and Alpinia Galanga, the Galangale root of commerce. C. angustifolia grows abundantly on the Malabar coast, and is cultivated about the district of Patna, Sagur and the south-west frontier, Mysore, Vizagapatam and Ganjam, Cochin and Tellicherry. It was discovered but a few years ago growing wild in the forests, extending from the banks of the Sone to Nagpore. The particles of East India arrowroot are very unequal in size, but on the average are larger than those of West India arrowroot.—*Simmonds' Comml. Products, page* 351. Arrowroot (East Indian) from the Curcuma Montana and Angustifolia from Travancore, Cochin and Canara, is a starch which has been prepared in large quantities on the Western Coast for many years, where the farina is extracted from the pendulous tubers of these and other species of Curcuma, and this excellent substitute for the West Indian article, might be produced in large quantities all over the Peninsula. The method of preparing the arrowroot is substantially the same from whichever plant it is extracted. The commercial value of the East Indian farina, is very much below that of the Maranta arrowroot. It is less used as an article of diet, but is largely bought by the starch makers of London. Roots of *kutchoora*, a general name given to the genus Curcuma were sent by Dr. Lovell, Sholapore, to the Madras Exhibition of 1855, as well as arrowroot manufactured from them by the Chinese prisoners at Mahableshwur Hills under the superintendance of Dr. Winchester—the article is sold at 4 annas per pound, giving a good profit—it is of good quality, and is a staple food of the Hill people. The roots appear to be those of Curcuma montana. "Roxburgh." The jury awarded Honorable Mention for this interesting contribution.—*M. E. J. R.*

(3031) CURCUMA LEUCORRHIZA. Roxb. i. p. 30.

Tikor, HIND. and BENG.

Common in Behar; horizontal tubers long and straight, colour very pale yellow—the tubers yield abundance of fine nutritious fecula.—*O'Sh. p.* 649. *C. leucorrhiza* grows in the forests of Behar, where it is called Tikor. It has remarkably long tubers, often a foot in length, of a pale yellow inside, and they produce an excellent arrow-root.—*Eng. Cyc. p.* 261.

(3032) CURCUMA LONGA. Lin. Willd. TURMERIC. Roxb. Fl. Ind. i. p. 33.

Huldi, BENG.	Coonhet, MALAY.
Munjil, TAM.	Passoopoo, TEL.
Huldie, DUK. and HIND.	Manjella cua, HORT. MAL.
Zirsood, ARAB.	Haradul, GUZ.
Zirdchoobeh, PERS.	Haridra, SANS.

Tubers deep orange inside, bitter and aromatic. The colouring matter of the dried root is bright yellow, soluble in alcohol and water, and changed to a deep red by alkalies. White paper dyed by an alcoholic tincture of turmeric is a very sensitive test for alkalies.—*O'Shaughnessy, p.* 649. This is used by the Dyers in dyeing yellow and green. With it in conjunction with lime juice, the Hindoos of the sect of Vishnoo prepare their yellow Tiroochoornum, with which they make the perpendicular mark on their foreheads.—*Ain's. Mat. Med. p.* 203. *C. longa*, the common Turmeric, is cultivated all over India, and is used as a condiment and for dyeing. The root is divided into several fleshy fingers, of an oblong form, and as thick as the thumb. The leaves spring at once from the crown of the root, have a lanceolate figure, sheathe each other at the base, are about a foot long, and produce from their centre a short thick leafy spike, in the axil of whose bracts are seated the inconspicuous, pale, cream-coloured flowers. Dr. Roxburgh gives the following account of the manner in which the plant is cultivated. "The ground must be rich, friable, and so high as not to be drowned in the rainy seasons, such as the Bengalees about Calcutta call Danga. It is often planted on land where sugar-cane grew the preceding year, and is deemed a meliorating crop. The soil must be well ploughed and cleared of weeds, &c. It is then raised in April and May, according as the rains begin to fall, into ridges, nine or ten inches high, and eighteen or twenty broad, with intervening trenches, nine or ten inches broad. The cuttings or sets, namely, small portions of the fresh root, are planted on the tops of the ridges, at about eighteen inches or two feet asunder. One acre requires about nine hundred such sets, and yields in December and January about two thousand pounds weight of the fresh root."—*Eng. Cyc. page* 261.

(3033) CURCUMA RUBESCENS. Roxb. i. p. 28. Tikor, BENG.

A native of Bengal: the root is highly aromatic, but its chief use is for the preparation of *Tikor*—a very fine fecula, like arrow root. This, in Travancore, constitutes an important article of food.—*O'Shaughnessy, page* 649. *C. rubescens* has lateral spikes, the tubers pearl-coloured inside; the leaves bifarious, broad-lanceolate, cuspidate, smooth, strongly marked with parallel veins, of a uniform dark green, with the nerves or ribs red; 12 to 24 inches long, 5 or 6 inches broad; the scapes invested with several dark reddish sheaths. It is a native of Bengal; All the parts of the plant have a pleasant, aromatic smell when the plant is bruised. The pendulous tubers of this and several other species of *Curcuma* yield starch, and are employed by the natives for preparing arrow root. In Travancore it forms the principal diet of the natives.—*Eng. Cyc. page* 261.

(3034) CURCUMA ZEDOARIA. Roxb. i. p. 23.

Bun-huldie, BENG. | Judwar, ARAB.

A native of Bengal and China. This is the *round zedoary*, all kinds of which resemble gingers in their medicinal qualities, but are inferior to it in strength and agreeableness of flavour.—*O'Shaughnessy, page* 649. *C. zedoaria*, Broad-leaved Turmeric, has the spikes lateral; biennial tubers, which are yellow internally; the leaves petioled, broad-lanceolate, entire, underneath covered with soft sericeous down. This is the *Zedoaria rotunda* of the shops. Fee has confounded this plant with *Kæmpferia rotunda*, which has no sensible properties resembling the plant in question. The tubers of this plant are aromatic, and are used by the Hindoos not only as a stimulating condiment and a medicine, but as a perfume. Its sensible properties are very like those of ginger but not so powerful. It is employed in the East in cases of disease, as colic, cramp, torpor, &c. where stimulants are indicated. The Zedoary is used under same circumstances. The roots of both these plants are imported into Europe, but are not used extensively. *C. Zedoaria* is a native of Bengal, China, and various other parts of Asia, and of the Asiatic Islands.—*Eng. Cyc. page* 261.

(3035) CURCUMA ZERUMBET. (Roxb. Fl. Ind. i. p. 20.)

Kuchoora. Shoothee, HIND. & BENG.

A native of the East Indies, found at Chittagong, stemless, roots palmate and tuberous, pale yellow internally, smell pleasant and camphor-like, taste aromatic and bitterish. This is the *long zedoary* of pharmacy.—*O'Shaughnessy, page* 648. *C. zerumbet*, zedoary, has lateral spikes, the tubers palmate pale straw-coloured; the leaves from 4 to 6 together, with a long somewhat winged petiole, with a dark purple cloud running down the centre; the flowers shorter than the bracteolæ; the embroyo truncate, nearly as long as the seed, the upper half lodged in the vitellus, the lower half in the perisperm. This plant is the *zedoaria longa* of the shops, and a native of the East Indies and Java.—*Eng. Cyc. page* 261.

(3036) CURIOSITIES. Under this general term are included a great variety of articles purchased by those who visit China as articles peculiar to the country. It is impossible to particularize them, as they consist chiefly of such things as please the fancy, and are for the most part procured for ornament's sake. Vases, pots, jars, cups, ornamental screens, plates, boxes, &c. made of copper, iron, silver, porcelain, stone, lackered ware or wood, of every shape, size, and variety of workmanship, rings, stands and pedestals, lanterns, scrolls, &c. &c. constitute most of the articles sent abroad as curiosities. The number of shops in Canton where they are sold offers the purchaser an extensive choice. It is impossible to ascertain the amount, but it is probably over $20,000 annually.

(3037) CURRYING OF LEATHER. This is an art but little practiced among Natives of India. The Chucklers by whom every operation is conducted, from the skinning of the beast to the binding of a pair of shoes, shaves the hide or skin down with his knife; beats it and rubs it with his maul and blackens it with iron liquor to which plantain root and conjee water are sometimes added: sometimes a little lamp oil is used.—*Rohde M.S.S.*

(3038) CURRY POWDER. Take of powdered turmeric 22 tea spoonfuls; red dried chillies or Cayenne pepper, 8 Ditto, Coriander seed, Cummin seed, dried cassia leaves (tejpat), each twelve tea-spoonfuls and mix together. The curry powders of India are articles of considerable commercial traffic; 32,550 cwt. of curry stuff was imported into Ceylon, chiefly from India, in 1851.—*Simmonds.*

INGREDIENTS FOR CURRY STUFF.

Native Name.	*English.*	*Botanical.*
Sonf.	Anise seed.	Pimpinella Anisum.
Seetul cheenee gach.	Allspice.	Myrtus Pimenta.
Eelachie	Cardamom.	Elettaria Cardamomum.
Laoong.	Cloves	Eugenia Caryophyllata.
Jawatrie.	Mace.	Myristica Moschata.
Jauphull.	Nutmeg.	Do. Do.
Kulmie darchinie.	Cinnamom.	Laurus Cinnamomum.
Dhunnia or Kotimear.	Coriander.	Coriandrum Sativum.
Zeera	Cummin seed.	Cuminum Cyminum.
Kali mirchie.	Black pepper.	Piper Nigrum.
Rai.	Mustard seed.	Sinapis Chinensis.
Lal mirchie.	Chillies.	Capsicum Frutescens.
Huldie.	Turmeric.	Curcuma longa.
Maytie.	Fenugreek.	Trigonella Fœnum.—Græcum.
Lassun.	Garlic.	Alium Sativum.
Sont	Ginger, dry.	Amomum Zingiber.
Udruck.	Ginger, green.	
Khush-khush.	Poppy seed.	Papaver Somniferum.
Pipel.	Long pepper.	Piper longum.
Hing.	Assafœtida.	Ferula Assafœtida.
Chironjii.	Chironjie nut.	Buchanania Latifolia.
Badam.	Almond.	Amygdalis Communis.
Narel.	Cocoanut.	Cocos Nucifera
Nemuck.	Salt.	

INGREDIENTS FOR MAKING A CURRY WITH MEAT, FOWL, OR FISH.

Mirchie.	Chillies, dry or green, from six to twelve or more.	
Huldie.	Turmeric,	one Tolah.
Dhunnia.	Coriander seed,	one ,,
Zeera.	Cummin seed,	three Mashas.
Elachie.	Cardamom seed,	two ,,
Myatie.	Fenugreek,	three ,,
Sont.	Dry ginger,	three ,,
Kali Mirchie.	Black pepper,	one Tolah.
Nemuck.	Salt,	two ,,
Laoong	Cloves,	twelve,,
Jawatrie.	Mace,	one Masha.
Kulmie Darchinie.	Cinnamom,	one Tolah.
Narel.	Cocoanut,	eight ,,
Chironjie.	Chironjie nuts,	six ,,
Badam.	Almonds,	five ,,
Khush-khush.	Poppy seed,	five ,,
Peaz.	Onions, a table-spoonful, sliced.	
Lussun.	Garlic, from one to three cloves.	
Am.	Mangoe, dried or green, a few slices.	
Emlee.	Tamarinds, fresh or salted, a small quantity.	
Leemboo.	Lime juice, one dessert-spoonful.	
Tyre.	Curds, three table-spoonsful.	
Ghee or Butter, three table spoonsful.		

These are the quantities of the various articles to be used in the preparation of a curry, bearing in mind it is unnecessary to use the whole of the spices together; or the mangoes, tamarinds, or

lime juice, neither the cocoanut with the almonds, and the ginger may be omitted when dry ripe chillies are used, as likewise the cummin seeds with the coriander, both of which are better for being roasted. Cocoanut milk is much used on the coast in forming the gravy to many curries, especially fish and prawns, as well as the oil fresh expressed from the nut when grated. If the curry is to be dry, the onions must be fried brown in ghee or butter, and the ingredients ground to a paste with water, mixed in the same, the meat, and fowl added, stirring the whole until the gravy and butter are absorbed. For a gravy curry, cut the meat or fowl into slices, put the ghee into a stewpan over the fire with the sliced onions and dress them, then add the meat with the ground ingredients, and some water or broth, mix well together and let the whole simmer gently until the meat is properly done. Chundoo is made with meat or fowl that has been previously dressed, it is to be minced up and added to chopped onions fried in ghee, with whole red chillies, and the other curry ingredients well mixed together; the frying is continued until the meat is perfectly brown, and the gravy quite absorbed.

INGREDIENTS FOR CURRY POWDER.

Four Receipts.

	No. 1. lbs.	No. 1. 20 lbs.	No. 2. 12 lbs.	No. 3. 3 lbs.	No. 4.	
Coriander seeds,	"	4	2	1	1	To be well roasted.
Turmeric,	"	1	1	"	2oz	Pounded.
Cummin seeds,	"	1	"	"	"	Dried and ground.
Fenugreek,	"	1	1	"	0	4oz.
Mustard seed,	"	1	"	"	"	
Ginger, dried,	"	2	2	"	1	
Black pepper,	"	2	1	1	1	
Dried Chillies,	"	1	2	1	0	12oz
Poppy seed,	"	2	2	"	"	
Garlic,	"	2	1	"	"	
Cardamoms,	"	"	"	"	0	8oz
Cinnamono,	"	"	"	"	0	8oz

} Dried and cleaned of husks.

Salt in proportion to be added when using the curry stuff. The whole to be cleaned, dried, pounded, and sifted; then properly mixed together and put into bottles, well corked. A tablespoonful is sufficient for a chicken or fowl curry. —*Riddell's Domestic Economy, p.* 404.

(3039) CUSCUS ROOT.

Bala, Duk. | Viratara, Sans.
Cuscus, Useer, Guz. Hind. | Vittie vyr, Tam.
Khus, Pers. | Cooroo vayroo, Tel.

This fragrant smelling root consists of many perennial, long, spongy, brown fibres, which are made into fans, ornamental baskets, mats for palkee tops, &c. Thirty-five species of this grass (*Andropogon*) are distinguished, and which are common in the low rich soils of most parts of India. It is chiefly brought to Bombay from the Malabar Coast.—*Faulkner.*

(3040) CUSCUTA REFLEXA, Convolvulaceæ. Huldi-algusi-luta, Duk.

A parasite with filiform twining succulent stems, leafless, smooth, yellow; flowers white.—*Riddell.*

(3041) CUSTARD APPLE. Anona squamosa.—*Faulkner.*

(3042) CUSTOMS.

Zakhat, Guz. | Gumruk, Mahsool, Pers.

Duties levied on commodities of importance.—*Faulkner.*

(3043) CUSTOM HOUSE.

Gumruck, Guz. Hind. Pers.

A term applied to the establishment by means of which the customs revenue is collected, and also to the building within which the business is conducted.—*Faulkner.*

(3044) CUTTACK forests are composed of teak, sal, Sissoo, ebony, *Pentaptera*, *Buchanania*, and other trees of a dry soil, and that require a dry season alternating with a wet one. These are unknown in the Chittagong forests, which have Jarool, *Lagerstræmia Mesua*, *Dipterocarpi*, nutmegs, oaks of several kinds, and many other trees not known in the Cuttack forests, and all typical of a perennially humid atmosphere.—*Hooker's Him. Jour. Vol.* II. *page* 340.

(3045) CUTTLE FISH, BONE OF. Sepia: Octopoda.

Kaddelnooray, Tam. | Samoodra nooroogoo,
Dirya ka kuff, Duk. | Tel.

This is found on the coasts and used for rubbing down paint &c. by the moochies (*Rohde's M.S.S.*); also for the purpose of cleaning and polishing the surface of silver and other metals.—*Ains. Mat. Med. p.* 152. In *Sepia officinalis* the soft parts are supported by a firm calcareous bone, the well-known cuttle-bone of the shops, and in all the naked Cephalopods (not including *Ocythoe*) now existing it would appear that some rudiment at least of a bony, horny, or cartilaginous support is to be found.—*Engl. Cyc. p.* 820.

(3046) CUTTY, the term applied in Southern India to the Iron-bloom of native manufacture.

(3047) CUTTEAMUNDOO, is the juice of the plant Akoo Chenroodoo or Euphorbia Cuttimundoo, and is used in cementing iron. The "Cutteamundoo" the juice of this plant is used in cementing iron with other substances (the blade and handle of a knife for instance), It is common in the Northern Circars and is called Akoo Chenroodoo—which is described in Campbell's dictionary as "Euphorbia Neriifolia." It is also

called Bramha Chemoodoo. At the Madras Exhibition of 1855, Mr. Elliot exhibited 7 articles (basin, ewer, tumbler, &c.) made of *Cutteamundoo gum*, moulded with the hand, without any preparation. The fresh juice is used as a vesicant, and also as a cement for fastening knife handles, &c. For the introduction of this interesting substance, a medal was awarded to Mr. Elliot at the London Exhibition of 1851, and for the further application of it to useful purposes, the Madras Jury awarded Honorable Mention. Several consignments have been made by Messrs. Healy and Lutrell, of Vizagapatam, and 2 cwts. were sent by request to Professor Solly, Society of Arts, London. The samples exhibited, illustrate the variety of uses to which this gum elastic may be applied. At the same Exhibition, Major General Clarke forwarded from Jaulnah a Hydrocarbon, closely resembling Cutteamundoo gum, obtained from the "*Euphorbia tirucalli*," which is however considerably different from Caoutchouc or Gutta Percha in its physical qualities, for this the Jury awarded Honorable Mention. Also Nursinga Row of Masulipatam forwarded two lumps of a similar substance obtained from "Euphorbia neriifolia" to which the same remarks apply: the Jury awarded Honorable Mention.—*M. E.J. R.*

(3048) CYCADACEÆ, Cycads, the Cycas Tribe, one of the natural orders of Gymnospermous Plants. It is essentially characterised by its trunk growing in a cylindrical unbranched manner, in consequence of the development of one terminal bud only, and by its diœcious flowers, of which the males at least grow in cones composed of pellate scales. In one genus, *Zamia*, the female flowers also are disposed in the same manner. All the species contain starch, and from many it is separated and employed as an article of diet. The species of *Encephalartos* are called Kaffir-Bread. The seeds of *Dion edule* yield starch in Mexico. The same substance, under the name of sago, is obtained from species of *Zamia* in the Bahamas and other West India Islands; in Japan from *Cycas revoluta;* and in the Moluccas and Southern India, the *Cycas circinalis* yields a coarse kind of flour. This species also yields a transpareut gum. The order contains about fifty species. A fine collection of Cycadaceous Plants exists in the Royal Gardens at Kew. A unique collection of these plants has also been recently made by the Rev. J. Yates of Lauderdale House, Highgate.—*Engl. Cyc. paye* 265.

(3049) CYCAS ANGULATA. The fruit forms the principal food of the Australian aborigines during a portion of the year. They cut it into thin slices, which are first dried, afterwards soaked in water, and finally packed up in sheets of tea-tree bark. In this condition it undergoes a species of fermentation; the deleterious properties of the fruit are destroyed, and a mealy substance with a musty flavor remains, which the blacks probably bake into cakes. They appear also to like the fruit of the *Pandanus*, of which large quantities were found by Dr. Leichardt in their camps, soaking in water, contained in vessels formed of stringy bark.—*Simmonds.*

(3050) CYCAS CIRCINALIS. Chiefly occurs in India and the Moluccas; said to yield a sago, also a gum like tragacanth.—*O'Sh. page* 622. It is a very handsome tree, in appearance resembling thePalm tribe,and is common from Tellicherry to the foot of the Ghauts. It is also common, in the Karen forests of Tenasserim.—*Mason.*

(3051) CYCAS PECTINATA, is a Sago palm which grows in Sikkim, on the flats by the streams. Its stem is ten feet high, with a beautiful crown of foliage.—*Hooker, Vol.i.p.*151.

(3052) CYCAS REVOLUTA. A native of Japan; a kind of sago is said to be obtained from the cellular substance. The whole plant yields a copious mucilage, which hardens into a transparent gum.—*O'Shaughnessy, page* 622.

(3053) CYCLAMEN PERSICUM. Primulaceæ. This is a bulbous species of flowering plants thriving in a light vegetable mould and may be cultivated by its seed or tubers.—*Riddell.*

(3054) CYCLANTHERA PEDATA. Liliaceæ. This species of flowering plants is grown, and cultivated as the *Cyclamen.—Riddell.*

(3055) CYAMOPSIS PSORALOIDES. Dolichos Fabæformis.

Coothah Varay-kai, Tam.

An erect annual; cultivated during the cold months in gardens for the little flat pods, which are used in curries, and as a substitute for French beans: grows from 2 to 3 feet high; the pods are seldom very tender.—*Jaffrey.* The natives of Tenasserim cultivate this, which resembles the common European bean, and is esteemed by them a good vegetable.—*Mason.*

(3056) CYATHEA ARBOREA, Tree Fern. A section of this tree fern displays well the structure of an Acrogenous stem, hollow in the centre, marked on the outside by the scars of the fallen leaves, and showing the elongation of the axis by the junction of the petioles. Wood quite worthless as timber.—*Madras Hort. Garden* 87. —*M. E. J. R.*

(3057) CYDONIA, a genus of plants belonging to the natural order *Pomaceæ.—Eng. Cyc. page* 269.

(3058) CYDONIA TOMENTOSA. Woolly Quince. *Hind.* Velaitee Behee. Cultivated in some gardens.—*Gen. Med. Top. p.* 195.

(3059) CYDONIA VULGARIS. (Quince.) Asia Minor, Cabul, Bokhara. *Off* Seeds.

Behedana, Behdana, Hind.

Cydonia, L. Semina. Cydonia vulgaris, *Pers.*

Seeds of common Quince. (*Pyrus Cydonia*, Linn.) *Icosandria Pentagynia*, Linn. Seeds oval, acute, plain at one side, convex at the other, often triangular, truncated at one end, of iron colour, internally white and brilliant. The coriaceous episperm contains a quantity of mucilage which is readily given out to water. The kernel is emulsive. The Beheedana constitutes an important article of commerce, being highly valued as a demulcent tonic, and restorative remedy by the Mahomedans all over the East. In 1838-39, 106⅓ maunds were imported into Calcutta from the Persian Gulf; into Northern India they are brought from Cabul and Cashmere.—*O'Shaughnessy, page* 330. The Quince (χυδονια) was known to the ancients and Arabs; the seeds (*bihee danu*) are employed medicinally in India, being imported from Caubul and Cashmere, where the tree is cultivated. This is a moderately sized, much branched but crooked tree. Leaves ovate, obtuse at the base, quite entire, with their lower surface, as well as the calyxes and pedicels tomentose. Flowers few, of a white or rose-colour in a kind of umbel. The pomes closed, globose or oblong, 5-celled; *cells many seeded*, cartilaginous Seeds enveloped in condensed mucilage.—Nees von E. 305; St. and Ch. ii. 114. The fruit of the Quince is of a yellow colour, downy, and remarkable for a fine odour. The ancients used it as a medicine, but it is now chiefly employed for flavouring other fruits, or as a preserve. It contains some astringent matter, with Malic acid, Sugar, and azotised matter. (*Soubeiran.*) The seeds are oblong, pointed, convex on the outside, and with one or two flat sides, according to the pressure of neighbouring seeds. Their testa, or thick seed-coat, is covered with condensed mucilage, which, according to Bischoff, as quoted by Dr. Percira, is lodged in very fine cells, and becomes easily dissolved out when submitted to the action of boiling water.—*Royle.*

(3060) CYGNINÆ, a sub-family of Web-Footed Birds, belonging to the family *Anatidæ*, order *Anseres* of Linnæus, including the Swans. Only two true Swans are recorded by Linnæus, and those as varieties of *Anas Cygnus* namely, variety A, *C. ferus*, and variety B, *C. mansuetus.* Since his time the researches of zoologists have added considerably to the catalogue.—*Eng. Cyc. page* 169.

(3061) CYGNIA FERUS. (Ray.) Male. Pure white, with occasionally a buff tinge on the top of the head. Bill black, and depressed anteriorly, quadrangular at the base, and yellow, which tint extends forward along each lateral margin of the upper mandible beyond the aperture of the nostrils.—*Eng. Cyc. p.* 270.

(3062) CYMBIDIUM ALOIFOLIUM. *Orchidaceæ.* This is a beautiful plant, when in flower, of a purple and yellow colour, and blossoms in April, native of India. Wight also gives Cymbidium erectum, 1753; tenuifolium, 911, 1689; tesseloides, 916; and triste, 911-1689.

(3063) CYNANCHUM, (from κύων, a dog, and ἄγχω, to strangle), a genus of a Plants belonging to the natural order *Asclepiadaceæ.* It has a 5-parted somewhat rotate corolla; a coronet of appendages consolidated, 5-20-lobed, when 5-lobed with the segments opposite the anthers; the pollen-masses ventricose, pendulous; the stigma usually apiculate, sometimes blunt, very rarely with a beak inclosed below the summit; the follicles smooth. The species are herbs or undershrubs, with opposite leaves and mostly twining stems.—*Eng. Cyc.* Dr. Wight gives Cynanchum alatum, 1280 Callialata, 1270 pauciflorum 354.

(3064) CYNANCHUM ARGEL, has erect, pale, round stems.—*Eng. Cyc. p.* 275. It is a native of Upper Egypt. The leaves and the whole plant act as a powerful drastic purgative. This plant appears to be a native of the same districts as those from which the Alexandrian Senna is obtained, and all the samples of that senna contain these leaves. They do not, however, appear to be added for the purposes of adulteration, but are collected with the leaves of the senna through the ignorance of the persons employed in their collection. The leaves of Tinnevelly senna are not found to contain those of the *C. Argel* mixed with them. Much of the unpleasant griping effect of the Alexandrian senna is attributed by some writers on Materia Medica to the mixture of the leaves of the Argel. Senna leaves are also mixed with those of the *Gouphocarpus fruticosus*, which are in Syria also called Argel, or Arghel.—*Eng. Cyc. page* 275. In small doses the leaves are purgative, and they are much used in Egypt for adulterating senna. (See that article.) The Indian, or Tinnevelly sennas is not liable to this adulteration, to which many practitioners attribute the severe griping which senna often occasions.—*O'Shaughnessy, p.* 450.

(3065) CYNANCHUM EXTENSUM. Iaco.

Vaylie parta, Tam.	Zootoopakoo, Tel.
Utrun, Duk.	Vooghapala, Sans.

The leaves of this herbaceous plant have a disagreeable and somewhat nauseous taste and smell. The juice of them is supposed to possess an emitic, as well as purgative, quality, and is said to be particularly useful in cases of Jaundice: it is generally administered in Cow's milk.—*Ains. Mat. Med. p.* 122.

(3066) CYNANCHUM IPECACHUANA, Mauritius Ipecachuana. A root procured from the Mauritius, and subjected to analysis by Pelletier. Its emetic properties are well established, but it requires to be given in double the dose of the true ipecachuana; great difference of opinion exists as to the plant by which it is supplied.

The article does not occur in commerce, though it may probably be identical with the root of C. Vincetoxicum.—*O'Shaughnessy, page* 451.

(3067) CYNANCHUM OVALIFOLIUM is a smooth twining plant, with oblong oval acuminate leaves: many-flowered cymes; peduncles not longer than the petiole; the coronet 10 cleft about as long as the corolla; the stigma pointed, emarginate. This plant is a native of Penang, where according to Dr. Wallich, it is used for the purpose of procuring from its sap, caoutchouc, which is of an excellent quality.—*Engl. Cyc. p.* 275. *Cynanchum ovalifolium* of Penang, yields abundance of very fine caoutchouc.—*O'Shaughnessy, page* 451.

(3068) CYNANCHUM VIMINALE, Lin.

Kodiculla, Tam.

The young shoots and tender stalks of this creeper are eaten by the Natives. It must not be confounded with the Kallie (or Kodicallie, as it is sometimes called) which is the Tamool name of the milk hedge.—*Ainslie, p.* 254.

(3069) CYNARA CARDUNCULUS: Cardoons. This is similar to the garden artichoke; indeed plants of the latter, which grow to a large size might be used as cardoons; in order to prepare this vegetable the leaves of the artichoke should be cut down, not destroying the heart, at the commencement of the rains, after the young leaves grow to the length of 2 feet, they should be tied together in a bundle, and earthed up like celery, at least one foot of earth should be raised round the plant, they will be fit for use in three weeks or a month, raised from seed. The plants when a good size require to be planted 2 or 3 feet apart in good soil; probably this is the only use to which the garden artichoke could be turned to at Madras.—*Jaffrey.* Cardoon resembles the artichoke, but grows much higher. The tender stalks and leaves when blanched are used for soups and salads, and are cultivated in the same manner as the artichoke.—*Riddell.*

(3070) CYNODON DACTYLON.

Hurrum Pilloo, Tam. | Hurryalee-grass, Eng.

The young and tender leaves of this grass are used in chatnies, a rather curious use, but considered very pleasant, the roots make a cooling drink.—*Jaffrey.* It is one of the most abundant grasses on the Tenasserim Coast, but it is much less conspicuous than many others.—*Mason.* The Cynodon Dactylon or Hurryallee Grass of India, is considered the best for cattle. Root creeping through the loose sand with strong fibres at the nodes. Stem rarely exceeding six inches in height, creeping to a considerable extent, matted, very smooth. Florets all on one side of the spike-stalk awnless, purplish, and ranged in two close alternate rows. All the stems which lie near the ground take root, and by this means, though an annual plant, it increases and spreads very wide. It yields abundance of seed, of which small birds are very fond. It has been very successful to allow the seed to ripen before the hay is cut, as it then propagates itself by seeds, in addition to the runners. This Grass is also found in Great Britain, but in that country its produce and nutritive properties are comparatively insignificant, while here it constitutes $\frac{3}{4}$ of the pasture. Respecting this Grass, Sir W. Jones observes (As. Res. Vol. 4. P. 242) "that it is the sweetest and most nutritious pasture for cattle; and its usefulness, added to its beauty, induced the Hindoos, in their earliest ages, to believe that it was the mansion of a benevolent nymph. Even the Veda celebrates it, as in the following text of A't'harvana: "My Durva, which rose from the water of life, which has a hundred roots and a hundred stems efface a hundred of my sins, and prolong my existence on earth a hundred years."—*Cleghorn, Grasses.*

(3071) CYNOGLOSSUM. Boragineæ. These are pretty little annuals, natives of Europe, the colour of the flowers mostly blue, purple, white and purple, grow in any common soil.—*Riddell.*

(3072) CYNOMORIUM. Dr. Wallich says there is a species of this fungus-like genus, which is parasitical on the roots of trees in the Tenasserim provinces, and valuable as a styptic; but I have not observed it.—*Mason.*

(3073) CYPERACEÆ, Sedges. May be called the Grasses of moist situations, and very closely resemble them in appearance; but they may readily be distinguished by their stems being solid, often triangular, and their leaves with entire, not split sheaths. They are much less useful than the plants of that family. The famed Papyrus belongs to the Cyperaceæ. Though a few do secrete fecula in their tuberous rootstocks, as the Water Chesnut of the Chinese, &c., others secrete a little Volatile Oil, as *Cyperus longus* and *rotundus*. They are mentioned here because the creeping rhizomes of *Carex arenaria*, and of a few allied species, are sometimes used medicinally, under the name of German Sarsaparilla. Sedges nearly resemble grasses in appearance, but grow usually in moist situations, and are distinguished from them by their angular stems. There are few of them useful for any purpose—not even for fodder. One of them, however, is famous as having yielded the Papyrus of the Egyptians, employed by them for making paper, ropes, and even boats; and of which the plant is so frequently represented in their sculpture and painting. An Indian species of Cyperus (*C. tegetum*, Roxb.; called *Papyrus Pangorei* by Nees von Esenbeck), the *Madaorkati* of the Bengalees, which is extremely common about Calcutta and in Bengal, is very extensively employed for making the elegant, shining and useful mats for which the capital of India is famous,

and which are frequently imported into Europe. Dr. Roxburgh states that the culms or stalks of the plant when green are split into three or four pieces, which in drying, contract so much as to bring the margins in contact, in which state they are woven into mats, and thus show a nearly similar surface on both sides. Specimens of the strips of this sedge were sent to the Exhibition of 1851, as well as mats made of them. These strips are tied up in bundles about four inches in diameter and four feet in length; and seem, besides their extensive use for mat-making to be well adapted for platting. The cotton grass (*Eriophorum*) of Europe is a conspicuous ornament of turf-bogs and marshy moors, from having its seeds clothed at the base with a silky or cotton like substance. With this, pillows are sometimes stuffed, and wicks of candles as well as paper, made. There is a species of the genus very common in the Himalayas, both in low valleys and at considerable elevations. This, Dr. Royle named *Eriophorum cannabinum*, in consequence of his finding it everywhere employed in making ropes for all ordinary purposes by the mountaineers. Its name, *bhabhur* and *bhabhuree* has a considerable resemblance to that of the papyrus, considering that the *b* and *p* are letters so frequently interchanged for each other. All who have scrambled up the steeps of the Himalayas are sensible of the great support they have received from the toughness of the tufts of the bhabhur. Specimens of the dried leaves, made up into bundles about three feet in length, were sent to the Exhibition of 1851, from Beerbhoom. Also twine made from it: this, though rough, is strong and well fitted for ordinary purposes. Capt. Huddleston, in a paper on the Hemp and other fibres of Gurhwal, in the Himalayas ('Trans. Agric. Soc. of India,' viii, p. 272), mentions the Bhabhur as holding a conspicuous place, "from its extensive use and most abundant supply throughout the whole of the hills, affording a most economical substitute as an article of cordage, in lieu of others of a more costly and durable nature. All the jhoolas or rope bridges, which are erected over the large rivers, where sanghas or wooden-planked bridges cannot be made, on all the principal thoroughfares of this district, are constructed of this silky species of grass, the cables of which are of considerable thickness. These rope bridges are a very safe means of communication over the large and rapid rivers intersecting different parts of the country, both for travellers and men with loads; and, where the footway and sides are properly laced with brushwood, afford an easy enough roadway for loaded sheep—but neither ponies nor cattle can travel over them. This grass grows abundantly in all the ravines up the sides of the mountains, and is to be had only for the cutting—but it is not of a very durable nature, though pretty strong when fresh made into ropes. It lasts about a twelvemonth only, or a little more, and the people in charge of the rope bridges are constantly employed in repairing and annually renewing the ropes and stays. The 'chinkas,' or temporary bridges of a single cable, upon which traverses a seat in the shape of an ox-yoke, are also sometimes made of this grass."—*Royle, Ind. Fib. Pl. p.* 33.

(3074) CYPERUS ESCULENTUS, Esculent cyperus. The toasted roots have been used as a substitute for coffee, and yield a preparation resembling chocolate. The cultivation of the plant deserves attention for its considerable alimentary value.—*O'Shaughnessy, page* 628.

(3075) CYPERUS GEMINATUS, (twin) Ainslie. Sp. Nov.

Sheelandei arisee, TAM.

Bulbous roots eaten in India, flavour resembles that of sago.—*O'Shaughnessy, p.* 628. This was first brought to the notice of Europeans by the late Dr. James Anderson, who, in an excursion he made to the southern part of the Peninsula some years ago discovered that the Sheelandie arisee, from growing in sandy situations by the sea side and requiring but little water, was the common food of the natives during the famine and when other grains are scarce. It is nutritious, pleasant to the taste and makes a pudding somewhat resembling that made of sago. Dr. Anderson, with that kindness and benevolence which ever distinguished him, disseminated the bulbous roots of this curious plant wherever he thought from their particular qualities they could be beneficial.—*Ainslie, p.* 250.

(3076) CYPERUS JUNCIFOLIUS. Root of the Rush Leaved. *Cyperus.*

Koray kalung, TAM.	Sadcoofie, ARAB.
Nagur mootha, BENG. & DUK.	Toongudda, TEL.
	Moosta, SANS.

Is employed as a diaphoretic and diuretic in India. Its roots are fibrous.—*O'Shaughnessy, page* 627. This fibrous root with its small bulbous extremities is prescribed in decoction in Fever cases: it is supposed to be gently diaphoretic and diuretic, and is reckoned a valuable remedy when there appears to be a tendency to dropsy in the habit.—*Ains. Mat. Med. page* 84.

(3077) CYPERUS PAPYRUS, of the Egyptians, belongs to this genus, and is still called *babier* in Syria. It is about 15 feet high; the exterior tunic of the stems cut in bands, and pressed, formed the paper of ancient Egypt and Europe; the leaves, which are several feet long, served for the same purpose, but were of inferior quality. This paper is but little liable to decay. Pliny, for instance, relates that the book of laws of Numa Pompilius was found in Rome in a high state of perservation, after having been buried nearly six centuries in the earth.—*O'Shaughnessy, page* 628.

(3078) CYPERUS ROTUNDUS. ROUND-STEMMED CYPERUS. Mootha, HIND.

Very common in low grounds: the small fragrant tubers are used in washing the hair. There are several other varieties: one of the most common is "naga-mootha," the root of which is used in the same way.—*Genl. Med. Top. p.* 174.

(3079) CYPERUS ROTUNDUS, (round).
Mootha, BENG.

Roots (rhizomes) in ovoid bulbs, the size of a pigeon's egg, united by a long woody tracing radicle, of leafy texture. Its properties are the same as those of C. Juncifolius.—*O'Shaughnessy, p.* 628.

(3080) CYPERUS, SEDGE ROOT. The roots of a species of sedge are found among the vegetables, though they taste like filberts.—*Mason.*

(3081) CYPERUS TEGETUM, is used in India for mat making.—*Royle, p.* 389.

(3082) CYPRÆIDÆ, the *Cowry Family*, Cowries, or sometimes Gowries—Porcellanen of the Germans; Porcelaines (Porcelain shells), of the French, family of Marine Gasteropodus *Mollusca*, well known in commerce from one of the species (*C. Moneta*) being used in some parts of the East as a circulating medium.—*Engl. Cyc. page* 281.

(3083) CYPRESS. A forest tree, a native of the south-eastern parts of Europe, particularly of Italy; Mexico, and the southern parts of N. America. The wood is hard, elastic, strong, resists worms, and its odour repels insects from whatever may be contained in a cabinet or chest made of it. Its duration is very considerable, but the precise period to which the tree lives has not been clearly ascertained. In some countries this tree is planted over the graves of the dead as an emblem of immortality. There are several species of this class of evergreen trees.

(3084) CYPRINIDÆ, a family of Fishes of the section *Malacopterygii Abdominales*, the species of which are distinguished by their having the mouth small.—*Engl. Cyc. page* 219.

(3085) CYPRINUS VAR.
Sayl kunde, TAM. | Sayl Duk Tambara, MALAY. | *Ain's Mat. Med. p.* 156.

(3086) CYPRUS VINE. Ipomea quamoclit.

(3087) CYTISUS ARGENTEUS, LEGUMINOSÆ.—These species are mostly hardy trees or shrubs found all over Europe, the trees mostly bearing flowers of a yellow colour, with a few exceptions of white and purple, they are readily increased by seed, layers, or buds.

(3088) CYTISUS CAJAN. Syn. Cajanus indicus.
Urbur, HIND.

One of the woods employed in the Bengal powder works at Eshapore, in the manufacture of Charcoal. It might be probably employed in the manufacture of Pyroligneous Acetic acid.—*Beng. Phar. p.* 235.

D

(3089) DAB OR KOOSHA, Poa Cynosuroides, is the sacred grass of the Hindoos, and is made into rope in north Western India.

(3090) DACCA, possesses a variety of articles of Agricultural produce, as Rice, Pulse, Millet, Maize, Cotton, Safflower, Indigo, Sugar, Ginger, Coffee and Capsicum, but only two of these, viz., Cotton and Safflower are raised in greater perfection there than elsewhere; and may therefore be considered as staples peculiar to the district. The indigenous Cotton of Dacca has long been celebrated for its superior quality. It is cultivated along the banks of the Megna from Feringybazar to Edilpore in Backergunge, a distance of about forty miles; on the banks of the Brahmaputra Creek (the ancient channel of the river of the same name) and along the Luckia and Banar. It presents different shades of quality, the finest of which is named *photee*, and is the material of which the delicate Muslins are made. It is described by Roxburgh, as differing from the common Herbaceous Cotton Plant of Bengal in several particulars, but chiefly in having a longer, finer and softer fibre than it. Safflower (Carthamus tinctorius) now so extensively used for dyeing silks in England and France, is one of the most valuable agricultural products of the district. Next to fine muslins, and embroidered fabrics, silver filigree work is that for which Dacca is most celebrated. This art is also practised in great perfection at Cuttack, and in Sumatra, and China. The articles usually made at Dacca are Ladies' Ornaments, such as Bracelets, Ear-rings, Brooches, Chains, Necklaces, &c. and *Attar-dans* and small boxes for natives. A specimen on a large scale could be made, such as a vase for flowers, a stand for writing materials. The design best adapted for displaying the delicate work of filigree is that of a leaf. It should be drawn on stout paper, and of the exact size of the article intended to be made. The apparatus used in the art is exceedingly simple, consisting merely of a few small crucibles, a piece of bamboo for a blow pipe, small hammers for flattening the wire, and sets of a forceps for inter-twisting it. The drawing of silver and gold (*i. e.* silver covered with gold) wire, used as thread in embroidery, is extensively carried on here. Benares is also celebrated for this art. There are several varieties of silver and gold thread (*badla*) made at Dacca,

as *goolabutoon* for the embroidery of muslins and silks; *goshoo* for caps and covering the handles of chowries; *subnah* for turbans, slippers, and hookah snakes; and *boolun* for gold lace and brocades. Some of it is drawn almost as fine as a hair. In the time of Aurungzebe a quantity of this article was made yearly for the Court at Delhi. A hundred sticks covered with it, and plain gold, and silver *badla* to the amount of £2,000 in value, appear among the items composing the Mulboos Khas *Nuzr*, which was annually sent to the Emperor.—*Dr. Taylor.*

(3091) DACTYLOPTERUS (Lacépède), a genus of Fishes belonging to the order *Acanthopterygii* and family *Loricati*. It has the following characters:—Head flattened, large, and long and rising suddenly from the muzzle, which is very short; inferior angle of the pre-operculum furnished with an elongated strong spine; operculum without spines; mouth small; jaws furnished with masses of minute conical teeth; branchiostegous rays six in number; some of the anterior rays of the dorsal fin free; subpectoral rays numerous, very long, and connected by a membrane; ventral fins with four rays; body covered with hard carinated scales. This genus contains but two species, one of which has been long known: it inhabits the Mediterranean, and is the *Trigla volitans* of Linnæus. It is commonly called the Flying-Gurnard and Flying-Fish; but there are other species of fish which have obtained this name, on account of their power of sustaining themselves for a few seconds out of the water. The other species inhabits the Indian Seas, and is the *Dactylopterus orientalis* of Cuvier.—*Eng. Cyc. p.* 297.

(3092) DÆMIA EXTENSA. The Ootrum fibre, is a promising substitute for Flax, which, in the Madras Exhibition of 1855, was exhibited by Captain Meadows Taylor. The Ootrum fibre of the Nizam's Territories is soft, white, silky, and strong: it can be procured in considerable quantities in Southern India, the Dæmia extensa being a common creeper belonging to the Asclepiadaceæ. Capt. Meadows Taylor exhibited good specimens of this and of six other fibres suited for cordage and weaving, and the Jury awarded a 2nd Class Medal for these specimens. —*M. E. Jur. Rep.*

(3093) DAHLIA VARIABILIS. COMPOSITÆ. This flower is a native of Mexico, and grows there in a sandy soil. It was first introduced into England in the year 1789, and into India about 20 years ago. It is now very common in all parts, and, from its great diversity of colour, is generally cultivated with much care, especially by Europeans. The leading varieties of the fertile rayed are—purple, rose, pale white, yellow, yellow and orange, pale yellow, light blue, dark red, &c. Flowers single. Of the barren rayed species, there are the scarlet, bright scarlet, orange, saffron and yellow flowered, single, semi-double, and double, and several sub-varieties. It is propagated by dividing the roots and cuttings for ordinary purposes, and by seed for new varieties. If the tubers are cut, be careful to preserve an eye in the part, otherwise it will throw out root fibres but no shoots. If seed is to be preserved, remove all the tubers carefully so that the nourishment may be given to the flower: and if to produce tubers for the following season, remove the flowers when early in bud, after having ascertained the colour. The finest double species are grown in this manner, though you may occasionally get a double flower from seed. The method by which favorite sorts may be increased is as follows. The old tubers are to be placed in a large flower pot of good leaf mould and old manure, leaving the crowns only exposed. The shoots which quickly rise from the tubers are cut or clipped off, when about two or three inches in length, and put into fresh pots, or in a bed, where they must be carefully watered, and shaded until they have struck and taken root, when they will grow vigorously. Tubers that have no eyes near the crown should be rejected. If grown from seed, the plant should be removed when about four or six inches high, and if placed in the ground, a space of two feet at least between each plant allowed; and as the plant arrives at maturity, it must be supported by strong sticks. When the stalk has become dry, the tubers may be removed and kept in a room, either upon sand or pounded charcoal. The plants should have all the lower straggling branches removed with a sharp knife, and so trained that, when in blossom, the flowers may appear to the greatest advantage. The soil should be a light rich loam, mixed with sand. The tubers may be left in the ground, but it is not safe to do so, rats and other vermin being destructive to them.—*Riddell.* The original species were single, the double flowers owe their origin to cultivation. They require a free soil, not too rich, and owing to the rapid degeneration of the flowers on the plains, they would require to be yearly introduced from England. The culture ought to be regulated so as to get them in flower after the heavy rains are past, and they require to be shaded from the mid-day sun. After flowering, they should be cut down and the roots preserved in pots of sand in a dry place as cool as possible. When they start to grow the following season, if preserved, they should be gently watered for a few days, retaining them in the pots of sand. When the shoots are about half an inch long, the roots should be divided with a sharp knife leaving one or two eyes to each division, in a week they may be transplanted into separate pots about 4½ inches wide, after the pots are filled with roots they should be repotted into pots in which they are intended to flower; after growing some size

let them be neatly staked, taking care not to injure the roots.—*Jaffrey.*

(3094) DAISY, OR DAY'S EYE, the little perennial plant called *Bellis perennis* by botanists. Like most composite flowers, it has proved productive of varieties when domesticated; but they have almost disappeared, except from old-fashioned or cottage gardens.—*Eng. Cyc. p.* 298. In India, this plant and its varieties seldom live through the hot season, and do not remunerate for the trouble taken to raise them, unless required as a "Souvenir" of home. They are easily raised from seeds sown during the rains. Natives of Britain and Italy.—*Jaffrey.*

(3095) DALBERGIA, a genus of Plants belonging to the natural order *Fabaceæ*, named in honour of Nicholas Dalberg, a Swedish botanist. It has a campanulate calyx, 5-toothed; a papilionaceous corolla, the petals of the keel connected to the apex; 8-10 stamens, sometimes all monadelphous, with the tube or sheath cleft in front, sometimes divided into two equal opposite bundles. It has a stipitate membranous compressed legume, which is flat, oblong, and tapers to both ends. The seeds, which vary from 1 to 3, are compressed and remote. The species are sometimes trees, but usually climbing shrubs, with impari-pinnate leaves. There are about 22 species of this genus, none of which are of any known use except those mentioned.—*Engl. Cyc. p.* 298. Dr. Wight gives Dalbergia frondosa, 266; latifolia, 1156; marginata, 87; Oogeinensis, 391; reniformis, 261; rimosa, 262; robusta, 244; scandens, 275; stipulata, 243; tamarindifolia, 242; Dr. McClelland mentions that in Tenasserim, there are four kinds of *Dalbergia Black woods*, Yindike, *Burm.* all yielding a heavy timber, which will not float, similar to Sissoo. These trees are very plentiful in the Tharawaddy and Hlaine districts, also in the lower parts of the Toungboo district. The timber seldom attains a very large size and is generally found of a girth of three or four feet. Wood, black.—*McClelland.* One of the genus Dalbergia, is known in Tenasserim as the Chisel-Handle Tree. It is a common forest tree produces a hard, fine-grained wood which the Karens call the egg tree, and the Burmese the chisel-handle tree, its wood being much used for chisel handles. Mr. Mason has not seen the flower, but the fruit identifies it with Roxburgh's genus.—*Mason.* There is another large timber tree of the genus Dalbergia found throughout the Provinces, sometimes wrought into canoes, which he thinks is a species of dalbergia, but he has never seen it in flower. It is the tree of which, according to Burman geography, there is an immense specimen growing on the Great Eastern Island.—*Mason.*

(3096) DALBERGIA ACUMINATA, Rottl.

Sessoo tree Sesso, HIND. | Sissa, CAN.

Sissoo is the Hindoostani name of a very valuable wood which grows in Bahar, Oude, and Canara, and is employed for making the knees and frames of ships. In Canarese the name of the Dalbergia acuminata is Sissa.—*Ains. Mat. Med. p.* 210.

(3097) DALBERGIA ARBOREA. WOODY DALBERGIA. Willd.

Poongamarum, TAM | Kuring jhar, HIND.
Kurrunje Ka jar, DUK. | Poongum tree, ENG.
Canaga, CAN. | Kurrunjie, SANS.
Kanoogamanoo, TEL.

The Vytians use the juice of the fresh root of this beautiful tree for the purpose of cleaning foul ulcers. A fixed oil is prepared from the seed of the legume used for burning in lamps and which is also said to possess virtues as an external application in Rheumatic affections. The poongamarum is the Caju Galedupa of Rumphius. See Vol. ii. page 59.—*Ains. Mat. Med. p.* 103. Dalbergia arborea, is a large tree with light green foliage, deciduous at the end of the cold season, the wood is light and firm and serves for common purposes, the seeds yield an useful oil.

(3098) DALBERGIA LATIFOLIA. *Leguminosæ*, Icon. 1156. Black wood.

Erooppoottoo marum, TAM. | Todigate, Vriksha, CAN.
Verugoodoocheva, TEL. | Bitti, CAN.
Sit Sal, BENG. | Sweta-shala, DUK.

This is a large tree with a thick stem, the centre and large branches of which furnish to the manufacturer, the timber generally called blackwood, it is close grained and admits of a fine polish and is therefore particularly adapted for furniture.—*Riddell.* It is from this magnificent tree, that the well known Malabar black wood is obtained, planks 4 feet broad are often procurable, after all the external white wood has been removed: it is heavy and close grained, admitting of high polish, and is very much used for furniture. It is one of the most valuable woods of the Madras Presidency.—*M. E. J. R.* This tree seems less abundant in Coimbatore than the catty marum, perhaps from being more sought after as yielding more valuable timber; it is very dark, heavy and strong, sustaining a weight of 515 lbs.—*Wight.* Mr. Rohde mentions it as one of our largest mountain trees: flowering during the wet season, seeds ripening in February and March. The wood of the centre of the trunk and large branches is what is commonly called black wood, and is used for making furniture. It is rather heavy, sinking in water, close grained and admitting the finest polish. On the Malabar Coast the tree grows to an immense size. Dr. Roxburgh has mentioned another wood, the Diospyros Ebenaster with the same Telingu name, on the Malabar Coast. Planks of three feet of black wood are obtained in the Northern Circars. It seldom exceeds 14 inches in breadth though occasionally it is met with of greater diameter.—*Rhode M.S.S.*

(3099) DALBERGIA MONETARIA, another of the species, yields a resin very similar to Dragon's Blood.—*Eng. Cyc.*

(3100) DALBERGIA PANICULATA. *Leguminosæ*, Roxb. c. 114.

Putchally wood, ENG. | Putchalai marum, TAM.

This tree attains a considerable size, but Dr. Wight is as yet unacquainted with the timber. It is said to be strong and being of considerable size, is fit for many purposes.—*Wight.*

(3101) DALBERGIA SISSOO.

Sissoo wood, ENG. | Seessoo, HIND.
Yekerecchava kurra, TEL. |

D. Sissoo, has five alternate leaflets, glabrous above, pubescent beneath. It is a native of Bengal and the adjoining provinces to the northward where the timber is much prized, and is known by the name of Sissoo.—*Eng. Cyc.* Flowering time, the beginning of the hot season; the seed ripens about the close of the year. This tree yields the Bengal ship-builders their crooked timbers and knees, it is remarkably strong, but not so durable as could be wished, it answers well for various other economical purposes, the color is a light greyish brown, with darker colored veins. Upon the whole there is scarcely a tree which deserves more attention, for when its rapid growth in almost every soil, its beauty and uses are taken into account, few trees can be compared with it. Major Campbell's estimate of the value of Sissoo in practice, of this wood, is 96, being higher than that of the best specimen of Teak. This tree attains perfection in 28 years. Many young trees are thriving well at Masulipatam, and from their appearance, Mr. Rohde should say it would thrive well in our provinces. Its rapid growth recommends it for avenues. Dr. Wallich and others have recommended it for plantations, shewing the probable return.—*Rohde M.S S.* Dalbergia sissoo was introduced into the Madras Presidency from Bengal at the recommendation of Dr. Wallich, and has been planted on the banks of the Toomboodra, where it is thriving wonderfully; it is growing extensively in the cantonment of Masulipatam, as an avenue tree, and has been planted in some places on the banks of the Kistnah Annicut. There are few trees which so much deserve attention, considering its rapid growth, its beauty and its usefulness. Wood hard, strong, tenacious, and compact, whilst its great durability combines to render it one of the most valuable timbers known. The tree grows rapidly, is propagated and reared with facility, and it early attains a good working condition of timber. It is used in Bengal for Gun Carriages. Hort. Garden 39, Bengal 84.—*M. E. J. R.* Sissoo is scarce in the hills of Ajmeer, but more abundant in Kotah. The wood of the Ajmeer tree is very dark and beautifully veined, like rose wood.—*Gen. Med. Top. p.* 203. The wood is used principally, from its strength and natural bend, for native hackeries: when it can be procured long and straight, it makes good shafts for buggies.—*Riddell.*

(3102) DALBERGIA SISSOIDES. *Leguminosæ.*

Rose wood, ENG. | Eatty or vitty marum, TAM.

This is perhaps the best known in our jungles of the trees yielding black wood, but there are several others as good or perhaps better. It abounds in the Palghaut forests, but is rarely met with now of great size; when it and its congener Dalbergia latifolia are carried to Madras it becomes one of the rose woods of the furniture shops.—*Wight.* Dalbergia sissoides, Bitty marum, kar Itty or Blackwood, is a smaller tree than D. latifolia, but more common in the forests. Both yield a black wood, and in Madras are indiscriminately called "Rose wood." The wood contains much oil, which unfits it for receiving paint.—*M. E. J. R.* Mr. Rohde says that this, the blackwood or East India Rosewood, is one of our best woods for plain furniture, though at Madras it is said to cast about a good deal; by experiment he found it to be one of the strongest timbers we have in the Circars, he is inclined to believe that the wood imported from the Western Coast is not equal in strength to the smaller but closer grained wood of the Circars, and the appearance of the latter is more veined and he thinks closer in the grain than that of the Western Coast—the wood contains much oil which renders it unfit for receiving paint—logs are almost invariably faulty in the centre: as a tough strong wood it will be found useful whether curved or straight.—*Rohde.*

(3103) DALECHAMPIA POMIFERA.

Douk-ya-mah, BURM.

Scarce, only met with on the banks of streams in the Pegu Valley, particularly in the Pymmah Choung. Wood, dark-brown.—*McClelland.* Wight gives Dalechampia. Capensis, 1881; Indica, 1882; velutina, 1881. At another place, Dr. McClelland says that *Dalichampia pomifera*, Doukyamah, *Burm.* has been found on the Pymmah Choung in the Pegu Valley. The trees are from three to four feet in girth. Wood red, adapted to cabinet making.—*McClelland.*

(3104) DAL-SHIKARA, DALCHIKARA. A crystallized salt, brought to Ajmere from Bombay; it is white and transparent, in small grains: it is very poisonous: is sometimes used in medicine; but, chiefly in "rasan" or transmutation of metals: is true bichloride of mercury, or corrosive sublimate: costs one rupee per tola.—*Gen. Med. Top. p.* 134.

(3105) DAMASK.

Damaskwerk, DUT. | Tela damaschina, IT.
Venise, FR. | Tela adamascada, SP.
Damasten Tafelzeng, GER. | Kamtschatnua salfitki, RUS.

A description of silk or linen cloth, of thick

texture, but fine quality, with figures or flowers raised on the surface. It is a twilled fabric, and is extensively manufactured at Dunfermline in Scoland, also in some parts of England and Ireland, and is used chiefly for table cloths and napkins. China damask, which is a rich flowered fabric on a crimson foundation, is composed entirely of silk, and is used in India for lining carriages, chairs, sofas, &c.—*Faulkner*. According to Mr. Tomlinson, Damask is a textile fabric, woven in a loom, variegated with figures of flowers &c. The manufacture is said to have originated at Damascus, whence the name.—*Tomlinson, p.* 488.

(3106) DAMASCUS BLADES present on their surface a variegated appearance of watering. The blade is formed by mixture in nearly equal proportions of the celebrated Wootz and soft iron which being welded together and repeatedly doubled gives the desired appearance. Daggers and sword blades thus formed are common among the retainers of the Hill Zemindars in the Northern Circars of the Peninsula of India, the handles of which, formed of iron, are frequently damascened in silver.—*Rohde M. S. S.*

(3107) DAMMER.

Dammar, ARAB.	Yakshadupha, SANS.
Dummula, CYNG.	Coongkilium, TAM.
Dummur, GUZ. & HIND.	Googhilum, TEL.
Dammar, MAL.	

A hard, chiefly dark coloured, brittle, resinous substance, which exudes from different trees growing in India, the Eastern Islands and Malayan Peninsula, from whence it is exported to India. In Bombay it is used, when melted, for spreading over packages, gutters or water courses, eaves of houses, the bottoms of sailing vessels, &c, to render them water-proof.—*Faulkner*. As it is a substance in very general use, throughout Eastern and Southern Asia, it may be well to notice the several sources from which it is obtained.

a. Country Rosin or Dammer, Coongilium, *Tam.* Raul, *Duk.* and *Hind.* Googilum, *Tel.* Damar batoo, *Malay*. Chloroxylon Dupada, Buch. Ainsie says, that of the substance usually termed Dammer by the English in India, there are three orts to be met with in the bazars called, in Tanool, vullay Coongillium; carpoo Coongillium and oray Coongillium in other words white, black, nd coarse Dammer. It much resembles the osin obtained from the pine both in appearance nd natural qualities and would seem to be ommon in many Asiatic countries, being found n great abundance in Sumatra, and in Java, on everal of the Sooloo islands and in the Malayan eninsula. There are no doubt different kinds f it some of which may be the produce of a speies of pinus. But what is usually exposed for ale in the lower provinces of Hindoostan, is ot amongst the mountains which separate ravancore from the Madras district. Dr. Buchanan first bestowed upon the tree the scientific appellation of Chloroxylon dupada an account of which may be seen in his Journey through Mysore, Canara and Malabar. Whether this tree bears any resemblance to that which produces Dammer on Amboyna, I cannot say. The reader may find a minute description of the last mentioned by referring to Rumphius, Tom, 2nd Lib. 3rd cap. 9. I shall only further observe that the Tamool name of the Indian Dammer tree is chaducula. The Malayalum appellation is payana. The black and white both grow in the district of Coimbatore, at a short distance from the town, i. e about 15 miles, at a place called Motamanspettaimulay.—*Ainslie*.

(*b*) This substance, in conjunction with wood oil, makes a useful coarse varnish for doors, windows &c. It is also sometimes employed as a pitch in Dock yards; and by the Farriers in the preparation of certain plasters. When melted with Gingilee oil, it is used for the domestic purpose of covering corks in bottles, to preserve them from the white ants.—*Ains. Mat. Med. page* 152.

c. Dammer is produced largely all along the Eastern range of Ghats from a species of Saul (Shorea Dammer, or Vatica), which affords a useful and much prized timber.

d. Dammer Googgelum, *Tel.* Goonglium, *Tam.* is also the produce of the Shorea Tambagaia Roxb. and of others of the same species. The different trees yield different species of rosin, which are designated according to their colour and consistence. One is called *damar batu* in Malay, or damar *Selo in* Java, which is a hard or strong rosin, and another in common use, *damar puteh* or white rosin, which is softer. The trees which produce the dammer yield it in amazing quantity and generally without the necessity of making incisions. It exudes through the bark, and is either found adhering to the trunk and branches in large lumps, or in masses on the ground under the trees. As these often grow near the sea side or on the banks of rivers the dammer is frequently floated away and collected in distant places as drift: It is exported in large quantities to Bengal and China, and is used for all the purposes to which we apply pitch but principally in paying the bottoms of ships.—*McCulloch's Com. Dict. Roxb.* It is prepared by boiling with oil and in the neighbourhood of the ports of peninsular India, is sold in this form under the name of *keel* in Teloogoo. It is also used boiled with wood oil as a varnish for house beams, doors &c., and by painters to render oil drying.—*Rohde M.S.S.*

e. Dammar of Bengal is the Resin of Shorea Robusta.—*Ben. Phar.* 204.

f. Damnar—White, occurs in fragments of variable size, marked with reddish streaks, transparent, amber-like, brittle, with brilliant fracture,

very inflammable, inodorous, and tasteless. This resin flows from the *Pinus dammara*, which grows on the lofty mountains of Amboyna. It hangs from the branches, and resembles stalactites, the pieces being sometimes as large as the hand, and 4 to 8 inches long; some pieces are like *animi* resin. The dammar of the Bengal bazars is usually the produce of the *Shorea robusta*.—*O'Shaughnessy, p.* 617.

g. Dammer in India supplies the place of pitch and rosin, and in the Tenasserim Provinces is the product of three different genera, belonging to the wood oil tree family—the shorea, the hopea, and the dipterocarpus.—*Mason.*

h. Dammer, Pwai-ngyet, *Burm.* is found in the bazars throughout Pegu. It is yielded by the *Shorea robusta*, or the Saul-tree of India, which occurs plentifully in the Forests on the Shan side of the Sitang, east of Tounghoo, and also, but to less extent, in the forests of the Prome district. I have not found however that the dammer is obtained from these forests, as none of the trees appear to have been perforated for it, so that the supplies of this article are probably brought down to Pegu from forests beyond the frontier.—*McClelland.*

i. Dammer or Dammar of China and Eastern Archipelago, is a kind of indurated pitch flowing spontaneously from several species of pine in the Indian islands; there is a hard sort, and a white, softer kind. It is found in large lumps, both under the trees and on their trunks, and in large quantities. It is mixed with a softer kind which makes it less brittle; and is then used for closing seams in boats, and other wooden vessels. As it is seldom brought to China except in native vessels, there is no means of ascertaining the amount, but it is probably not very large. It can be obtained in Borneo for 50 cents per pecul.—*Compendious Description.* The meaning of this word in Malay and Javanese is "resin." The substance usually known under this name is the produce of several forest trees, and is the sap which exudes spontaneously, and being exposed to the air acquires a flinty hardness from which the epithet batu, or stone, is given to it to distinguish it from a softer substance, kruin or wood oil. The damar is found either in larger masses at the foot of the trees which yield it, or floating in rivers, drifted to them by the floods of the rainy season. It is produced in such abundance, and gathered with so little labour, that its market price seldom exceeds four or five shillings a hundred weight. The natives of the country apply it to most of the uses to which we put tar, pitch, and resin, and it forms an article of exportation to Continental India. Most of the family of Dipterocarpeæ yield resinous balsamic juices, those of the genus Dipterocarpus, the wood-oil, and of Vateria, indurated damar. The natural order abounds in Sumatra, Java, and Borneo, which are the chief sources of the dammar of commerce.—*Crawfurd Dictionary, page* 118.

(3108) DAOUD MURDAN, LEAVES OF, are the Leaves of Cassia alata.

(3109) DAPHNE, a genus of Plants belonging to the natural order *Thymelaceæ*, containing many species, inhabiting the more temperate parts of Europe and Asia. Among them some are cultivated in gardens for their beauty or fragrance, others are of medicinal importance, and a few are employed in the manufacture of hemp and paper. We shall briefly notice the more remarkable of these. The genus *Daphne* is distinguished in its natural order by having 8 or 10 stamens inclosed within the calyx, a simple stigma, a succulent fruit, and a calyx, the orifice of whose tube is destitute of appendages. In addition to the acrid and dangerous properties which appear to be common to them all, some species are remarkable for the toughness of their fibre, and for the economical purposes to which they are applied. From *D. Cannabina* is prepared the best kind of writing-paper in China, according to Loureiro; but it must be observed that this statement, if true, is at variance with what is observed in Nepaul, where the daphne-paper is very brittle and bad.—*Eng. Cyc. p.* 309.

(3110) DAPHNE CANNABINA (THYMELÆE), NEPAL PAPER PLANT. At the Great Exhibition of 1851, many were much interested about a huge sheet of Nepal paper exhibited by Col. Sykes. This was curious, not only on account of its size, but also on account of the plant from which it was made. This belongs to a genus and family containing plants remarkable for their fibrous bark. Thus the Lace-bark tree (*Daphne Lagetta*, now *Lagetta lintearia*) of the West Indies is "remarkable for the beautiful net-like appearance of its several easily separable layers of bark, whence it has received its English name. As the fibres of other species possess considerable tenacity, they have been employed in making cordage; and the toughness, as well as fineness of the inner bark of these plants, may be seen in a plant common in English gardens, and used in medicine on account of its acridity, that is, the Mezereon, *Daphne Mezereum* of botanists. It is from the inner bark of one of these plants, the *D. Bholua* (*D. cannabina* of Loureiro, and which is supposed to be identical with the *D. odora* of Thumberg), which is extremely abundant in the Himalayas, that this Nepal paper is made, as from other species in other countries. Another plant of the same, or of an allied genus, as it is called both *Daphne* and *Gnidia eriocephala*, is very common on the ghauts of the West of India, and in the hilly parts of the Southern Mahratta country and of the Dukhun. Several specimens

from various localities, are in Col. Sykes's collection. It is probable that it might be turned to the same use as the Nepal plant. Of the uses of this plant good accounts have been given by Mr. Hodgson ('Journ. As. Soc.,' i, p. 8, 1832) and Dr. Campbell. The former describes the process as consisting, first, in boiling slips of the inner bark of the paper plant in a lay of wood-ashes for about half an hour, by which time the slips will be quite soft. These are then beaten in a mortar with a wooden mallet till they are reduced to a homogeneous pulp. This is then diffused through water, and taken up in sieves and paper frames, as in the ordinary process for making paper by hand. When dry, the sheet of paper is folded up; sometimes it is smoothed and polished by being rubbed on wood with the convex side of a conch shell: but Mr. Hodgson does not explain how the very large sheets of several yards square are made. Though called Nepalese, the paper is not manufactured in Nepal, but in Cis-Himalayan Bhote, in the midst of its immense forests, where there is an abundant supply of the plant, of wood for ashes and for firewood, as well as a constant supply of clean water. This paper is remarkable for its toughness, as well as its smoothness. Some of it, in the form of bricks of half-stuff, was sent to England previous to the year 1829. As the quantity sent was not sufficient to the complete experiment, a small portion of it was made into paper by hand. An engraver, to whom it was given for trial, stated that "it affords finer impressions than any English-made paper, and nearly as good as the fine Chinese paper which is employed for what are called India paper proofs." ('Gleanings in Science,' i, p. 210.) Dr. Campbell describes the paper, as made by the Bhoteahs, "as strong, and durable as leather almost, and quite smooth enough to write on; and for office records, incomparably better than any India paper. It is occasionally poisoned by being washed with preparations of arsenic, in order to prevent the destruction caused by insects. Many of the books in Nepal, written on this paper, are said to be of considerable age, and the art of making paper seems to have been introduced about 500 years ago from China, and not from India." He states that this paper may easily be procured at Patna, Purneah, and other places in the plains of both Southern and North-Western India.—*Royle, Fib. Plants, p.* 311. The dried bark, of the Nepaul paper plant, may be substituted for the Mezereon (D. Mezereum) of the London Pharmacopeia. The bazar mezereon is almost always inert from age.—*Beng. Phar. page* 279.

(3111) DAPHNE GNIDIUM, the Garou-Bush, an evergreen with narrow sharp-pointed erect light-green leaves, and branching clusters of white fragrant flowers, is a common plant in dry waste places in the south of Europe. It will not live in the open air in England, except in the warmest counties. Both the berries and leaves are employed by the French as purgatives. The plant also affords a good yellow dye.—*Eng. Cyc. p.* 399. Honigberger says that the bark of the Spurge-Flax (Daphne Gnidium) introduced into the ears produces a serous discharge, macerated (steeped) in vinegar for about an hour before using it and afterwards applied (renewing it in winter once, in summer twice a day) is said to produce a local serous exudation without excessive irritation or blistering and is recommended chiefly in chronic rheumatism, gouty affections, paralysis, &c. In France and Russia it is used, in Ophthalmia. May not Sunnerkat from Cashmere have similar properties?

(3112) DAPHNE LAGETTA, the Lace-Bark-Tree of Jamaica, is most remarkable for the tenacity of the fibre of which its bark consists, and for the facility with which it may first be separated into thin layers and then into distinct meshes. If the inner bark of this plant be macerated in water it may be readily separated into layers no thicker than the finest lace, and which, after having been pulled a little sideways, resembles in some measure that fabric. King Charles II. is said to have had a cravat, frill, and ruffles of Lace-Bark presented to him by his governor of Jamaica.—*Engl. Cyc. page* 300.

(3113) DAPHNE MEZEREUM. MEZEREON.

Mazrioon. PERS. | Kameela, GREEK.

The effects of daphnine on the animal economy are not ascertained, but deserve accurate trial. It has been found in every species of Daphne yet analysed. The berries of Mezereon are brisk but unsafe cathartics. Fresh Mezereon bark is much used as a counter-irritant and external stimulant; the dried bark is given internally in small doses as a stimulant alterative in syphilitic, rheumatic, and scrofulous maladies. The usual dose is 10 grs. infused in 2 oz. of water. It is more frequently combined with sarsaparilla, as in the Lisbon diet drink.—*O'Shaughnessy, page* 530. A Daphne grows in the Cashmerian mountains. The specimen from Cashmere, not having the flower, the botanists of Vienna could not decide upon it further than that it is allied to Daphne gnidium and Daphne oleoides. It is essentially different from Daphne cannabina, from which, in Nepaul, a paper is manufactured, according to the Chinese manner. (V. B. Disp. p. 531.)—*Honigberger, p.* 268.

(3114) DARCHEENEE. LAURUS CINNAMOMUM.

(3115) DARJELING RIDGE varies in height from 6500 to 7500 feet above the level of the sea; 8000 feet being the elevation at which the mean temperature most nearly coincides with that of London, viz., 50°.—*Hooker Him. Jour. Vol.* i. *p.* 115. To the north-west, towards Nepal, the snowy peaks of Kubra and Junnoo (res-

pectively 24,005 feet and 25,312 feet) rise over the shoulder of Singalelah; whilst eastward the snowy mountains appear to form an unbroken range, trending north-east to the great mass of Donkia (23,176 feet) and thence south-east by the fingered peaks of Tunkola and the silver cone of Chola, (17,320 feet) gradually sinking into the Bhotan mountains at Gipmoochi (14,509 feet.)—*Hooker Him. Jour. Vol.* i. *p.* 123.

(3116) DAROO. The general term for ardent spirits. The spirit called Daroo distilled from the flower of the Mawa is produced in great quantities in all the jungles of the upper Godavery. It resembles whiskey in taste.

(3117) DARNEL, BEARDED OR POISONOUS DARNEL, Lolium temulentum, occasionally becomes mixed in Europe with the flour of wheat or some other cereal farina and has occasioned many painful symptoms.—*Hassell.*

(3118) DARNING (*rufu-gari*) is a branch of the sewing art which, though in Europe applied to the most homely purposes, requires the greatest skill in the East, where a defect in a costly shawl is to be made good, or a coarse thread is to be picked out of a piece of a muslin into which it has been accidentally introduced. So skilful are some of the *rafugars*, that they can extract a thread twenty yards long from a piece of the finest muslin, and replace it with one of the finest quality. They are principally employed in repairing the muslins and calicoes that are injured during bleaching, in removing knots and joining broken threads; also in forming the gold and silver headings on cloths."—*Taylor. Royle Arts &c. of India, page* 505.

(3119) DARUN-AJ-AKARBI. A kind of fern: the root and leaves of which come to Ajmeer from Arabia via Bombay: considered as a tonic: four to six massee are a dose: one tola costs two rupees.—*Gen. Med. Top. p.* 133.

(3120) DATE TREE. PHŒNIX DACTYLIFERA.

(3121) DATES, DRIED.

Kharack, GUZ. HIND. | Kharack, PERS.

As the name implies, are simply fresh dates dried in the sun. They have a shrivelled appearance, and a pleasant subacid taste. They are brought to Bombay from the Arabian Gulf. —*Faulkner.*

(3122) DATES, WET.

Dattes, FR.	Datteri, IT.
Datteln, GER.	Khurma, PERS.
Kajoor, GUZ. & HIND.	Dattiles, SP.

The fruit of the date-palm of which there are upwards of a hundred varieties, but in general the date may be described as acorn shaped, composed of a thin glossy membrane, which contains a fine, soft, and pulpy fruit, that is firm, sweet, and rather vinous to the taste; within this is enclosed a solid, tough, kernel. A considerable part of the inhabitants of Egypt, Arabia, and Persia, subsist almost entirely on this fruit. Dates are largely imported into Bombay, from the Arabian Gulf, a large portion of which is re-exported to Calcutta, the Mauritius, and other places.—*Faulkner.*

(3123) DATISCA CANNABINA. IKL-BEER, grows in Cashmere, Kouawur, Nepal, and in the Himalayas, is much esteemed in the Punjab for dyeing silk of a yellow colour.

(3124) DATUNI. This is the root of the "junalgota" plant Croton tiglium, and is brought to Ajmere from Delhi and Pali: it is a very powerful purge much used in prescriptions: one seer costs four rupees.—*Gen. Med. Top p.* 133.

(3125) DATURA, a genus of Solanaceous Plants, with a funnel-shaped angular 5-lobed calyx, a corolla of a similar form, but much larger, and a 4-celled capsule, which is either smooth or muricated externally; the base of the calyx moreover adheres to the seed-vessel in the form of a circular disc. Several species of this genus are known in cultivation, the very large size of their funnel-shaped flowers rendering them conspicuous objects; they have however a nauseous odour, and are only handsome when in flower, for which reason they are not general favorites. —*Eng. Cyc. p.* 299. The Datura is cultivated in gardens, the colours of the flowers are white, yellow, purple and blue. They are easily cultivated from seed, common all over India. Wight figures Datura alba, 852; fastuosa, 1396; metel, 852; stramonium, 1396.

(3126) DATURA FASTUOSA (Kala dhatoora) and *alba* (Sada dhatoora) are very common over the peninsula of India, and are also called *Jouz mazil*, or methel, (Royle) the seeds being frequently used as a poison. For the purpose of facilitating theft, and other criminal designs, the seeds are given in Bengal with sweetmeats to stupify merely, but not with the intention of killing; intoxication or delirium is seldom produced, the individual sinks into profound lethargy resembling coma, with dilated pupils, but natural respiration. These symptoms have been known to continue even for two days, and still recovery take place; cold affusion and strong stimulant emetics constitute the most effectual treatment. The vision often continues obscured long after the general recovery takes place. This state is best remedied by blisters to the temples or nape of the neck, and by cold affusion. If given while the stomach is empty a much smaller dose may induce all the preceding symptoms, and prove fatal. This is well known to the Indian poisoners, who suit the time of administration according to the purpose they mean to serve. *Purple flowered thorn apple.* Both the single and double flowered varieties of this species may be often seen near Burman houses, and children

not knowing its poisonous character, sometimes eat the fruit with very serious effects.—*Masson.*

(3127) DATURA METEL. DATURA ALBA. The white thorn apple. The white datura has little to recommend it in point of beauty, or pleasantness of association, yet we find it celebrated by Heber in his "Walk in Bengal."

> "While to the cooler air confest
> The broad datura bares her breast,
> Of fragrant scent, and virgin white,
> A pearl around the locks of night."

It is often seen blooming around native dwellings, and may possibly be used in Tenasserim for the same bloody purposes as in India. The common stramonium of Europe and America "is perhaps only a variety."—*Mason.*

(3128) DATURA PONTICA. One of the plants which is reputed to have contributed to the poisonous quality of the honey that was eaten by Xenophon's soldiers, is very like this species, and is often cultivated as a hardy evergreen.—*Engl. Cyc. page* 299.

(3129) DATURA STRAMONIUM. Thorn apple. Datoora, *Beng.* (applied to other species.) A native of waste places all over Europe. A bushy, smooth, fœtid annual, 2 to 3 feet high, stem much branched. The narcotic properties of stramonium have been proved by Lindberger and others to correspond exactly with those of the belladonna and hyoscyamus; an alkaline principle has been separated from the seeds by Runge and other chemists, which so closely agrees with atropia in all its proprieties that the general opinion regards them as identical.—*O'Shaughnessy, p.* 468. *Medicinal uses.* The alcoholic extract of the seeds of the stramonium is a perfect substitute for belladonna for many of the purposes described under that head.—*O'Sh., p.* 469.

(3130) DATURA TATULA. A native of North America, very nearly the same as D. Stramonium, but is a larger plant with purple stems, and the corolla similarly stained at its edges.—*O'Shaughnessy, p.* 469.

(3131) DATURIA. Dr. O'Shaughnessy introduced this preparation which can be readily and cheaply made in Bengal, as a substitute for the Extract of Belladonna of the European Pharmacopeia. One grain of neutral sulphate of daturia dissolved in one ounce of water affords a solution, two drops of which introduced into the eye will occasion immediate dilation of the pupil. It seems to be a perfect substitute for the Belladonna.—*Ben. Phar. page* 266.

(3132) DAUBENTONIA. *Leguminosæ.*—DAUBENTONIA PUNICEA.—Handsome plants brought from South America, closely allied to the Piscidia. Grow well in a sandy loam.

(3133) DAUCUS CAROTA. Lin.

Carrot kalung, TAM.	Canjara, SANS.
Gajur, DUK. and HIND.	Carrot, ENG.

This is cultivated in great abundance in Mysore, and in some of the Mahratta countries where it grows of a superior quality.—*Ainslie, p.* 237.

Daucus Carota (Gajra, *Hind.*) is now cultivated all over India; fruit fleshy; smell feebly aromatic, taste sugary and mucilaginous. Poultices of the rasped root are much used for correcting fœtid discharges from sloughing sores. The seeds are stimulating, and reputed to be diuretic: like the fruits of most of this order, they yield essential oil.—*O'Sh., page* 368.

(3134) DEALS.

Dœler, DAN.	Tavole, Piane, IT.
Deelen, DUT.	Tarcice, POL.
Planches minces, FR.	Doski, RUS.
Dielen, GER.	Tiljor, SW.

A thin kind of fir plank, much used in carpentry. They are formed by sawing the trunk of a fir tree into longitudinal divisions of greater or less thickness, according to the purposes they are intended to serve. They are obtained from Dantzic, Petersburgh, Narva, North America, &c. Those procurable in Bombay are chiefly imported from America.—*Faulkner.*

(3135) DECAISNEA. This is a very remarkable plant, which Dr. Hooker had seen in flower in the Lachen valley, called "Loodooma" by the Bhoteeas, and "Nomorchi" by Lepchas. It grew on the ridge near Tumloong and the Ryott valley at 7000 feet; it bears a yellow fruit like short cucumbers, full of a soft, sweet, milky pulp, and large black seeds; it belongs to a new genus, allied to *Stauntonia*, of which two Himalayan kinds produce similar, but less agreeable edible fruits ("Kole-pot" Lepcha.) Dr. Thomson and Dr. Hooker in their "Flora Indica" have proposed the name Decaisnea for the genus (in honor of Professor J. Decaisne, the eminent French botanist). It has several straight, stick-like, erect branches from the root which bear spreading pinnated leaves, two feet long, standing out horizontally. The flowers are unisexual, green, and in racemes, and the fruits, of which two or three grow together, are about four inches long, and one in diameter. All the other plants of the natural order to which it belongs, are climbers.—*Hooker Him. Jour. Vol.* ii. *page* 198.

(3136) DECASCHISTIA CROTONIFOLIA, exhibited by Mr. Jaffrey at the Madras Exhibition of 1855, appears to yield a good fibre. It is to be regretted that no samples of Nettle fibre, Urtica or Boehmeria, have been contributed, as it is known that these abound on the Neilgherries, and other localities, and that they yield a long and silky fibre like the true Rheea or China grass. The *Girardinia Leschenaultiana* figured by Wight (Icon. t. 1976), is

frequent all over the higher range of the Neilgherries, the bark yields a fine strong white flax-like fibre, which the Hill people obtain by plunging the plant in hot water to deprive it of its virulently stinging properties, and then peeling the stalks. The textile material so prepared is of great strength, and the Todawars use it as thread.—*M. E. J. R.*

(3137) DELFT, DELF.

Delfs porcelyn, DUT.	Fayence Unachtes Porzellan, GER.
Faience, FR.	

A term applied to a coarse kind of porcelain, originally manufactured at Delft, whence its name. Since the improvements introduced into the English potteries by Wedgewood, it is no longer a place of any note.—*Faulkner.*

(3138) DELIMA SARMENTOSA. DILLENIACEÆ. A shrub with small white flowers in panicles.—*Riddell.*

(3139) DELPHINIUM. Several species of Delphinium occur in the Himalayas, and have been described by Prof. Royle in his work on the Botany of these regions.—*O'Shaughnessy.*

(3140) DELPHINIUM AJACIS, LARKSPUR. (Na-furman, *Hind*), is cultivated in gardens in India during the cold season (Royle). The properties of the seeds doubtless agree with those of the stavesacre kind.—*O'Shaughnessy, page* 169. The Larkspur is grown very commonly by the natives after the rains, colour a deep blue on a spiral stem. There are many species, all of which are easily grown from seed, the natives are in the habit of sowing the seed under peach and orange trees. When grown in beds, and the flowers of one colour, they have a showy and pretty appearance: a space of six inches should be allowed between each plant.

(3141) DELPHINIUM GLACIALE, of East Nepaul, smells strongly and disagreably, of musk, It is one of the most alpine plants in the world, growing at an elevation of 17000 feet.—*Hooker Him Jour. p.* 269. *Delphinium glaciale* was found abundant in the valley of the Chomiochoo near Tungu, in Thibet, and exhaling a rank smell of musk. This is a new species and has been described for the "Flora Indica" of Drs. Thomson and Hooker: it is a remarkable plant, very closely resembling, and as it were representing, the *D. Brunonianum* of the Western Himalaya. The latter plant smells powerfully of musk, but not so disagreeably as this does.—*Hooker Him. Jour. Vol.* ii. *page* 95.

(3142) DELPHINIUM PAUCIFLORUM. Nirbisi is a tuberous root, without poisonous properties. The name is applied in Sirmoor to the Delphinium pauciflorum. The best article however comes from Lahore.—*O'Shaughnessy, p.* 167 *and* 168.

(3143) DELPHINIUM STAPHISAGRIA. Stavesacre or Louse-wort. This is a biennial plant, a native of the Levant, Teneriffe, and Asia Minor. The seeds are irregularly triangular, blackish on the outside, yellowish within, of a very nauseous, bitter, and acrid taste, and heavy smell. Reduced to powder and taken internally in small doses, they act as a violent cathartic and emetic, and so uncertainly, that they are now never administered. Reduced to powder and made into an ointment in the usual way, this seed is still used as an external application, especially for destroying vermin in the hair. The seeds are also used in the Levant for intoxicating fish.—*O'Shaughnessy, page* 168.

(3144) DENDENG. The Malay name for the jerked beef of commerce, that is, of animal muscular fibre, preserved by drying in the sun, nearly the only mode of curing flesh in the Archipelago. Dendeng is made of the flesh of deer, oxen, and buffalos, and by the Chinese of that of the wild hog. It is a considerable article of native trade.—*Crawfurd Dict. page* 120.

(3145) DENDROBIUM, an extensive genus of East Indian Epiphytical Plants, found in the whole of the damp tropical parts of Asia, and a little beyond the tropics in Japan and Australia, but unknown in the rest of the world. Above a hundred species are enumerated by systematic writers: *D. Pierardi, D. cucullatum, D. chrysanthum, D. aureum, D. fimbriatum, D. moschatum, D. densiflorum, D. pulchellum, D nobile,* and a few more, are known in the collections of England.—*Eng. Cyc. p.* 304. Dr. Wight, in Icones, gives Dendrobium album, 1645; alpestre, 1643; aureum, 1646; barbatulum, 910; denudans, 1643; filiforme, 1642; graminifolium, 1649; Heyneanum, 909; humilis, 1643; Jerdonianum, 1644; macrostachyum, 1647; Pierardi, 908, and ramosissimum, 1648.

(3146) DENDROBIUM AGGREGATUM. YELLOW DENDROBIUM. Two pretty yellow flowered species of dendrobium are more rare than the purple, but they are not uncommon in the Karen jungles.—*Mason.*

(3147) DENDROBIUM ALBUM. A parasitic flower in white racemes.—*Riddell.*

(3148) DENDROBIUM CRETACEUM. WHITE DENDROBIUM. A species with a small snowy flower is very abundant, but has less to recommend it than either of the preceding.—*Mason.*

(3149) DENDROBIUM FORMOSUM. CHARMING DENDROBIUM. The genus dendrobium furnishes fifteen or more known species of air plants on the Tenasserim Coast. The one considered most interesting, botanists have named the "charming dendrobium," the flowers of which are white, with a yellow lip, three or four inches in diameter, and exquisitely fragrant. It is a choice flower with the Burmese, and grows naturally and luxuriantly in the environs of

Maulmain. Roxburgh mentions April and May as the time of flowering, but the plant blossoms in March, and the flowers are brought into town throughout the whole rains down to the close of October. Indeed it may be seen whitening under the emerald foliage of the groves nearly six months of the year. The Burmese call it the "silver flower."—*Mason.*

(3150) DENDROBIUM [illegible]ERARDI. A parasite; caulescent, st[illegible]less, from six to twelve inches long; round jointed; flowers, several towards the top of the stem, of a light rose colour.—*Riddell.* This species grows in the Tenasserim Provinces.—*Mason.*

(3151) DENDROBIUM SECUNDEM. PURPLE DENDROBIUM. A species of dendrobium with small purple flowers, the lip tinged with orange, is seen garnishing the mango trees in the neighbourhood of Maulmain. The flowers are peculiar, being in long racemes all on one side of the stalk. Lindley was not aware of its existence in these Provinces, and only quotes it as found in the straits of Malacca and the neighbouring islands. He also says, that it flowers in June and July; but on Tenasserim Coast, March and April are the months in which it is in full bloom.—*Mason.*

(3152) DENDROBIUM TERETIFOLIUM. TAPER-LEAVED DENDROBIUM. An orchid with a filiform tapering leaf is frequent in the suburbs of Maulmain, and though I have never met it in blossom, an English botanist says it is the taper-leaved dendrobium, which Lindley knew only as a New Holland plant.—*Mason.*

(3153) DENDROPHIS (Fitzinger), a genus of Serpents placed by Cuvier under the great genus *Coluber*, and stated by him to be the *Ahaetulla* of Gray. The species of this genus have, like the *Dipsas* of Laurenti, a line of wider scales along the back, and narrower scales along the flanks, but their head is not larger than their body, which is very slender and elongated. Their muzzle is not elongated, and they are not venomous. They inhabit India and Africa.—*Eng. Cyc.*

(3154) DEODAR. CEDRUS DEODAR. The Deodar Cedar or Indian Cedar. Cedar is a name given to several distinct kinds of forest trees. The timber is resinous, has a fragrant odour, a rich yellowish-brown colour, and a bitter taste, owing to which it is not subject to worms—a circumstance which accounts for its great durability. The cedar of Lebanon so famous in Scripture, was in ancient times much employed in the construction of temples, and other religious buildings; in the formation of statues of the heathen deities, &c.—*Faulkner.* The cedar of Lebanon is usually called Pinus Cedrus, but sometimes Cedrus Libanus. The lofty Deodara, a native of the Himalayas, with fragrant and almost imperishable wood, and often called the Indian cedar, is sometimes referred to the genus Pinus, and sometimes to that of Cedrus or Larix, with the specific name of Deodara. Dr. Hooker is of opinion that the Deodar and the cedar of Lebanon are identical. The wood of several of the Conifera however is called cedar. The wood of Juniperus virginiana is called Red or Pencil Cedar, and that of J. bermudiana is called Bermuda Cedar. That of J. barbadensis, is called Barbadoes Cedar; while the Juniper of the North of Spain, and South of France, and of the Levant, is called J. oxycedrus: the White Cedar of North America, a less valuable wood than the red cedar, is yielded by Cupressus thyoides, and the cedar-wood of Japan, according to Thunberg, is a species of cypress. The name Cedar is thus applied to a number of woods in our different colonies, which are in no way related to the Conifera: thus the cedar of Guiana is the wood of Icica altissima. The white wood or white cedar of Jamaica is Bignonia leucoxylon, and the bastard cedar of India is Guazuma ulmifolia. In New South Wales again the term white cedar is applied to Melia Azaderach, and red cedar to that of Flindersia australis, as well as to the wood of the Toon tree, or Cedrela Toona.—*Holtz.* In China, a kind of cedar, probably a cypress, called nan mah, or southern wood, which resists time and insects, is considered peculiarly valuable and especially reserved for imperial use and buildings.—*Williams' Middle Kingdom, page* 275.

(3155) DEODAR OR SHEMANATHU OIL. ERYTHROXYLON ARÆOLATUM. An empyreumatic medicinal oil.—*M. E. J. R.*

(3156) DESMANTHUS NATANS.

Soonday keeray, TAM.

The floating sensitive plant is generally found floating in tanks; the leaflets are used by the natives, though not generally.—*Jaffrey.*

(3157) DESMODIUM. Of this genus of plants, Dr. Wight in Icones gives figures of Desmodium cephalotes, 373; collinum, 272; congestum, 209; diffusum, 298, 409; Gangeticum, 271; gyrans, 294; latifolium, 270; patens, 407; polycarpum, 406; quinqueangulatum, 293; recurvatum, 374; rufescens, 984; strangulatum, 985; triflorum, 291; and β 292.

(3158) DESMODIUM GYRANS. Flowers pale yellow tinged with blue, the lateral leaflets have the power of singular motions.—*Riddell.*

(3159) DESMODIUM LATIFOLIUM. A shrubby plant, bearing handsome purple flowers.—*Riddell.*

(3160) DESMODIUM RECURVATUM.—JUNGLY GANGA. Flowers in the rains, color purple and white.—*Riddell.*

(3161) DESMODIUM TRIQUETRUM. The root of this species of desmodium is valued for its medicinal properties.—*Mason.*

(3162) DEUTZIA, a genus of plants belonging to the natural order *Philadelphaceæ*, inhabit-

ing to the North of India, China, and Japan. The tube of the calyx is campanulate, tomentose, the limb 5 or 6-cleft. The petals 5 or 6, and oblong. The leaves are opposite, petiolate, ovate, acuminated, serrated, wrinkled, and veined. *Deutzia scabra* has its leaves covered with stellate siliceous hairs, which makes them very rough, and renders them of use to cabinet-makers as polishing agents. The siliceous bodies are beautiful objects viewed by reflected light under the miscroscope.—*Eng. Cyc. p.* 320.

(3163) DHAK, or PULAS FIBRE, is obtained from the *Butea frondosa*, also *B. superba* (*Leguminosæ*). One of the most generally diffused plants in Northern India, is the *Dhak* or *Pulas*, as it may be found near many villages, forming their tracts of apparently useless because jungle-like land, but which, in fact, is a place of pasturage for their cattle. The Dhak, which is the most usual shrub thereon, yields firewood, and its bark and roots a fibrous matter, which is used as cordage, or beaten to a kind of oakum and used for caulking boats. Though such fibre is unimportant as an object of commerce, it is of great use to the natives themselves, for agricultural and domestic purposes, as it is possessed of a good deal of strength. Some Pulas fibre was sent to the Exhibition of 1851, from Beerbhoom. A ruby-coloured gum, which has been called *Butea kino*, exudes from incisions into the bark, which, though it abounds in astringent matter, Mr. Teil, of Calcutta, has found difficult to apply to the tanning of leather, but its colouring matter is powerful and permanent. In the jungles, where the Dhak is allowed to grow into a small tree, it is highly ornamental from the splendour of its inflorescence, and is further useful from its large flowers, called *teesoo* and *keesoo*, yielding a beautiful dye, which is likely to come into extensive use. This plant is further interesting, as that from which the name of the Pelasgi has been supposed to be derived by Mr. Peacock, in his 'Greece in India.'—*Royle, Fib. Pl. p.* 297.

(3164) DHAURA KA PHOOL, Grislea tomentosa. These scarlet flowers generally come to Ajmere, from Kotah and Harowtie: are considered stimulating and given to women in labour: are also used in dyeing. One seer costs four annas. The gum of this tree, called *dhaura* or *dhau ka gond*, is brought from Mewar and Harowtee, and is abundant, white in colour, like the katira and tragacanth gums, swells in water: in dying cloth it is applied to those parts that the dye is not wished to touch; it is eaten in "luddoo"; one maund costs ten rupees.—*Gen. Med. Top. p.* 133.

(3165) DHOBIES EARTH; CARBONATE OF SODA. Washermans or Dhobies Earth. Saji mati is a mineral which exists in immense quantities in many parts of India, in Bengal, especially, in the districts of Monghyr, Purnea, and Cawnpore. It contains from 40 to 50 per 100 of carbonate of soda, traces of sulphate of soda, organic matter, clay, sand, and oxide of iron. The salt can be extracted by washing the mineral without incineration, but the organic matter is dissolved at the same time, and gives a deep brown solution from which pure crystals cannot be obtained. The firing destroys the substance, and then the solution is colorless. But care must be taken not to push the heat beyond low redness, for the alkali at a higher temperature combines with the sand and clay, and the whole runs into green glass, insoluble in water. In Europe this salt is prepared either by burning sea weeds and lixiviating the ashes, the product being termed kelp and barilla, or by decomposing common salt by sulphuric acid and then roasting the resulting sulphate with chalk, saw dust, and fragments of iron. The mass when washed gives the carbonate of soda.—*Beng. Phar. page* 360. Southern India is particularly rich in alkaline and earthy minerals, the origin of which seems to be the decaying granites of the country. The most common form of Alkali, is the Dhobee's Earth, a whitish grey sandy efflorescence which often covers miles of country where decayed white granite forms the surface soil; the earth contains from 13 to 25 per cent of crude carbonate of soda and begins to accumulate in the dry weather, immediately after the rains. It can be scraped off the surface to the depth of two or three inches, and by repeated boiling and the addition of a little quick lime, the alkali is obtained of considerable strength; with a little care very clean Carbonate of Soda can be obtained, fit for the manufacture of toilet soap, white glass and glazes for pottery.—Bauloo Moodelly, who has frequently furnished the prepared earth in large quantities for manufacturing purposes. The Nellore, Cuddapah, Masulipatam and Chingleput districts yield this earth in great quantities, and repeated attempts have been made to prepare from it Barilla for exportation and very fair specimens have been exported at different times, but the moderate price of the Carbonate of Soda of England prepared from Sea salt will always prevent this from being a remunerative article of export.—*M. E. of* 1857. The richest in alkali is from the territories of the Nizam, a report of its chemical examination by Mr. R. Reynolds is contained in the Pharmaceutical Journal 1853, Vol. xii. p. 517, shewing the quantity of anhydrous sesquicarbonate to be 67 per cent.—*M. E. of* 1855.

(3166) DHUNCHEE, *Sesbania aculeata* (formerly *Æschynomene cannabina*, Roxb., 'Fl. Ind.,' iii, p. 335, and *Æ. spinulosa*, do., p. 333; *Leguminosæ*). The natives of Bengal familiarly employ and highly esteem a fibre which is known to them by the name of *Dhunchee*, *Dhuncha*, and *Dhunsha*. It is produced by a plant which

Dr. Roxburgh thought was the same as the *Æschynomene cannabina* of Konig. This was described by Retz, and stated to be a native of the Malabar coast, and that its stems yielded a strong and useful fibre, as a substitute for Hemp. Messrs. Wight and Arnott, in their 'Flora of the Indian Peninsula,' consider it to be identical with *Sesbania aculeata-chinensis*, which they have from China. Dr. Roxburgh states that he had not found this plant in a wild state, but that, in various parts of Bengal, it was cultivated for the fibres of its bark, which form a coarse substitute for Hemp. Messrs. Wight and Arnott (l. c.) unite the plant described by Dr. Roxburgh with one which is very common in all parts of India in the rainy season, the *Sesbania aculeata* of Persoon, and which is called Juyunti in Bengal, and *dhundain* in North-West India. It springs up in rice-fields, and other wet cultivation, during the rainy season. These two varieties are thus described by Messrs. Wight and Arnott, under the name of—*Sesbania aculeata*, herbaceous, annual, erect, sparingly branched, glabrous; stem and petioles usually sprinkled with minute cartilaginous points; leaves eight to ten times longer than broad; leaflets twenty to forty pairs, linear, obtuse, mucronate; racemes axillary, peduncled, erect, lax, often about [illegible] the length of the leaves; few-flowered; flowers pretty large (more than half an inch long), on slender pedicels; corolla about four times the length of the calyx; legumes erect, nearly terete, sharp-pointed. Dr. Roxburgh gives the following general directions for its culture. The soil is generally low and wet, and not requiring much preparation, as the plant is hardy, growing from six to ten feet, and rapid in growth. This renders it advantageous to cultivate, especially as it is considered a meliorating crop. The time of sowing is when the soil has been moistened by the first showers of April or May. About thirty pounds of seed are allowed to the acre, and less weeding is required than for *Jute*. The crop is ready to cut in September and October, though the fibre does not differ, if left standing till the seed is ripe, in November. The process of steeping and cleaning the fibre is similar to that required for *Sunn*, that is, *Crotalaria juncea*. The general produce of an acre is from one hundred to one thousand of ill-cleaned fibre, the current price somewhat less than that of *Paut*, viz., *Corchorus olitorius* and *capsularis*. The expense of cultivation, including land rent, is about nine rupees. This plant, generally cultivated about Calcutta during the rains, grows to the height of from six to ten feet, the fibres are long (six to seven feet), but coarser and more harsh than those of Hemp, unless cut at a very early period. From its great strength it is well calculated for the manufacture of cordage and cables. In Bengal, the fishermen make drag-ropes to their nets of this substance, on account of its strength, and durability in water. Indeed, by the Bengalese it is considered more durable in water than either *Sunn* or *Paut*. It has been observed to Dr. Royle by one gentleman well acquainted with this fibre in India, that he was at a loss to know why the Dunchee remained so much neglected in this country, as it is really a very excellent fibre for common cord and twine purposes, and certainly very much superior in strength and durability to Jute. It is also a much hardier plant than Jute; the latter, indeed being rather an uncertain crop, for the production of the fine, long, silky fibre, so much called for in England. Another gentleman observed, that though rather wiry it was strong, and chiefly remarkable for its contraction when wetted, so much so, that it would even carry away the mainmast of a ship by mere contraction. Mr. Deneef, the Belgian farmer, employed in India, presented samples of the Bengal Hemp, called *Dhuncha*, to the Agri-Horticultural Society, in November, 1840, and stated that they had been dressed after the Belgian mode. A begah, he says, will yield 173lb. of cleaned fibre, and 92lb. of seed. A woman can dress about 4lb. a day. In April, 1851, Captain Thompson presented a dressed sample of the fibre of the *Dhuncha* of Bengal, and a piece of rope made of it. This rope, he stated, had been used in various ways for nearly two years, and from various reports upon it, he thought it likely to come into extensive use. Specimens of the fibre and rope were also sent to the Exhibition of 1851, and we have already given the result of the trial made with this rope in the Arsenal of Fort William, whence it appears that a three and a half inch rope of Dhunchee broke with not less than 75 cwt., though the Government Proof, required for such rope, was only 49 cwt. The price of the Dhunchee, in the interior, has long been about R. 1 8 per maund. The following are reports upon this fibre: "The Dhunchee is very suitable for ropes, and if it will take in tar, is of considerable value. It would probably fetch from £30 to £35 a ton, and after being introduced and known, perhaps £5 more." It was also valued by others at £35 in 1853. These fibres, in fact all the fibres from the East, would be much more valuable if properly scutched: and if scutching mills were sent out, these fibres could be brought in a greatly improved state to market. —*Royle. Fib. Pl. page* 293.

(3167) DIACOPE, a genus of Fishes belonging to the section *Acanthopterygii* and family *Percidæ*, and belonging to that section of the family in which the species have less than seven branchiostegous rays, and an interrupted lateral line. This genus is allied to *Servanus*, but may be distinguished by there being a notch or emargination in the lower part of the preoperculum, into which is fitted a projecting tubercle.

Many large and beautiful species of this genus inhabit the Indian seas. *Diacope octolineata*, a very beautiful species, caught off the coast of the Mauritius, is of a brilliant reddish-yellow colour, shaded into white on the belly, and is adorned with four longitudinal blue stripes on each side of the body; these stripes are margined with black. It is about 10 inches in length. Some of the species are known to have attained the length of 3 feet and upwards.—*Eng. Cyc. p.* 323.

(3168) DIACAENA TERMINALIS. Some twenty varieties of this the Ti-plant are cultivated in the Polynesian islands. There is, however, but one which is considered farinaceous and edible. In Java the root is considered a valuable medicine in dysentery.—*Simmonds' Commer. Product, p.* 355.

(3169) DIAMOND.

Almas, Arab.
Diamant, Dan. Dut. Fr. and Ger.
Heera, Guz. and Hind.
Diamante, It.
Adamas, Lat.
Dyamont, Pol.
Almas, Pers.
Diamante, Port.
Almas, Rus.
Diamond, Sp
Viram also Vachira Kulloo, Tam.
Mass, Pers.
Intan, Malay.
Faulkner, Ainslie.

A crystallised mineral, which, on account of its lustre and hardness, is reckoned the most valuable of all gems. It occurs generally in single or unattached crystals, sometimes with plain, but more frequently with rounded surfaces. The colours are commonly white or gray, sometimes, however, red, brown, yellow, green, blue, and black, but the two last are rare. Lustre splendent, and internally perfect adamantine. Diamonds are chiefly found disseminated in gravel, or embedded in sand-stone in India, Brazil, and the Ural mountains.—*Faulkner.* Carbon, is an elementary substance of first-rate importance in chemistry both organic and inorganic, and also in the Useful Arts. It is very widely diffused throughout the kingdoms of nature, and exists under an immense variety of forms. The purest form of carbon is the *diamond*, which is found in the Ceded Districts, in Golconda, Punna in Bundelcund, in India, in Borneo and also in Brazil. All the largest diamonds were from Golconda, (*Tomlinson, page* 306) but the site is supposed to be now built over and lost. The combustibility of the diamond was ascertained by the Tuscan Philosophers and the Hon. Mr. Boyle, who, by exposing a diamond in the focus of a large lens, consumed and dissipated it. The art of cutting and polishing diamonds is supposed to have originated in Asia at some unknown period. Diamonds are cut into various forms, called the *Brilliant*, the *Rose*, and the *Table*. The first form shows the gem to the best advantage and is always set with the table upwards. In the rose the entire surface is covered with equilateral triangles terminating in a sharp point at the summit. This form is used when the spread of surface is too great for its depth, and it could not be cut into the brilliant form without great loss. The table is applied to such diamonds as may be regarded as plates, laminæ, or slabs, of small depth compared to their superficial extent. The brilliant and the rose lose in cutting and polishing somewhat less than half the weight.

The *Pitt* or *Regent diamond* has been valued at 400,000*l.*

The *Pigot diamond*, weighs 49 carats, and is valued at 40,000*l.*

The *Austrian diamond*, weighs above 139½ carats.

The grand *Russian diamond*, is said to have been the eye of an Indian idol. It fell into the hands of a merchant, who sold it to Prince Orloff for Catherine, Empress of Russia, for 90,000*l.* in cash, an annuity of 4,000*l.*, and a patent of nobility. It weighs scarcely 200 carats.

The *Koh-i-noor*, or "*Mountain of Light*," the largest known diamond in the world, excepting the Brazilian stone among the crown jewels of Portugal, has lately been added to the trophies of the British sovereign. It was in the year 1550 before the Mogul dynasty had been established by the prowess of the great Akbar, that this marvellous stone was discovered in the mines of Golconda. It passed in the train of conquest and as the emblem of dominion, but always carrying misfortune in its train, from Golconda to Delhi, from Delhi to Mushed, from Mushed to Cabul, from Cabul to Lahore and from Lahore to London. When first given to Shah Jehaun, it was still uncut, weighing, it is said, in the rough state, nearly 800 carats, which were reduced by the unskilfulness of the artist to 279, its present weight. It was cut by Hortensio Borgio, a Venetian, who, instead of receiving any remuneration for his labour, was fined 10,000 rupees by the enraged Mogul. Small diamonds and fragments made up in small sealed bags are sold in the East by the diamond merchants. According to Jaffries, the value of diamonds is in the duplicate ratio of their weights. Thus, if an uncut diamond of one carat be worth 2*l.*, that of one cut and polished would be valued at 8*l.* sterling in the brilliant. A carat weighs four nominal grains, or 3·166 grains troy. At this rate a cut diamond of two carats would be $2\times8\times2=32l.$; one of three, $3\times8\times3=72l.$; one of four, $4\times8\times4=128l.$; and one of five, $5\times8\times5=200l.$ The rose diamond is of inferior value but has been rated at 4*l.* the carat when polished. For the purpose of estimating diamonds of inconsiderable size, the jeweller employs a gauge, in the handle of which are embedded small crystals of various relative sizes, from $\frac{1}{16}$th to $\frac{1}{4}$th of a carat, and a comparison is therewith made when there are numbers of various minute sizes. The rough diamond is called *bort*, and *points* are those small fragments

which are set in glaziers' cutting diamonds. The chief application of the diamond is for ornamental jewellery, but there are other interesting applications of this gem in the useful arts. It has been employed in common with the sapphire and ruby in some descriptions of wiredrawing.—*Tomlinson, p.* 309. According to the English Cyclopedia, for ornamental purposes diamonds are cut into two shapes: namely, Rose-Diamonds and Brilliants, the former being, for the most part, made out of the octahedral crystals, and the latter from those with curvilinear faces. The weight and consequently the value of diamonds are estimated in carats, each of which is equal to 3·166 grains. In the formation of either a brilliant or a rose-diamond so much is cut away that the weight of the polished gem is not more than half that of the rough crystal out of which it was formed. Diamonds occur in India in the district between Golconda and Masulipatam, near Punna, in Bundelcund, also on the Mahanuddy, and in Ellore. They have been obtained in Borneo, on the west side of the Ratoos Mountain, with gold and platina. The Brazillian mines were first discovered in 1728, in the district of Serra de Frio, to the north of Rio de Janeiro. The largest diamonds are procured on the river Jequitinhonha, which is called the Diamond River, also Rio Pardo. In the Ural Mountains diamonds were detected in 1829, by Humboldt and Rose, in their journey into Siberia. In the United States the diamond has been met with in Rutherford country, North Carolina, and Hale country, Georgia. They have been found on the river Ginul, in the province of Constantine, in Africa. They have also been discovered in Australia, and of such size as to render it probable they may add yet more to the mineral treasures of that country. The rocks in which the diamond occurs in Brazil are either a ferruginous quartzose conglomerate, or a laminated granular quartz called *Itacolumite*. The latter rock occurs in the Urals, and Diamonds have been found in it; and it is also abundant in Georgia and North Carolina. In India the rock is a quartzose conglomerate. In most instances diamonds are obtained from alluvial washings. In Brazil the sands and pebbles of the diamond streams are collected and washed under a shed by a stream of water passing through a succession of boxes. A negro washer is stationed at each box. When a diamond is found weighing 17½ carats the negro is entitled to his liberty. "The largest diamond of which we have any knowledge is mentioned by Tavernier as in the possession of the Great Mogul. It weighed originally 900 carats, or 279·63 grains, but was reduced by cutting to 861 grains. It has the form and size of half a hen's egg. It was found in 1560, in the mine of Colone. The diamond which formed the eye of a Brahminical idol, and

was purchased by the empress Catharine II. of Russia from a French grenadier, who had stolen it, weighs 193 carats, and is as large as a pigeon's egg. The Pitt, or Regent Diamond, is of less size, weighing but 236·5 carats, or 419½ grains; but on account of its unblemished transparency and colour it is considered the most splendid of Indian diamonds. It was sold to the Duke of Orleans by Mr. Pitt, an English gentleman, who was governor of Bencoolen, in Sumatra, for 130,000*l*. It is cut to the form of a brilliant, and is estimated at 125,000*l*. Napoleon placed it in the hilt of his sword of state. The Raja of Mattan has in his possession a diamond from Borneo weighing 367 carats." (Dana.) The great diamond mentioned in the above extract as in the possession of the Great Mogul appears to be the identical diamond which, under the name of Koh-i-Noor, excited so much attention at the Great Exhibition in 1851. Some doubt is thrown on Tavernier's statement of its being cut. This precious gem has seen a variety of fortunes. Its early history is mythical. From the Great Mogul it passed into the possession of the reigning family of Cabul. When Shah Suja was driven from Cabul he became the nominal guest and actual prisoner of Runjeet Sing, who spared no means to obtain possession of the precious gem. In this he succeeded in 1813. After the death of Runjeet the diamond was preserved for a while by his successors. It was occasionally worn by Khurruk Sing and Shere Sing. After the murder of the latter it remained in the Lahore treasury until the supercession of Dhuleep Sing and the annexation of the Punjab by the British government, when the civil authorities took possession of the Lahore treasury, under the stipulation previously made that all the property of the state should be confiscated to the East India Company, in part payment of the debt due by the Lahore government and of the expenses of the war. It was at the same time stipulated that the Koh-i-Noor should be surrendered to the Queen of England. It arrived in England on the 30th June, 1850, and on the 3rd of July was presented to her Majesty. Since its public exhibition in 1851 it has been submitted to the process of cutting, which has much enhanced its beauty and value. The diamond is cut by taking advantage of its cleavage, and also by abrasion with its own powder, and by friction with another diamond. It is a process of great labour, and many hours are spent in producing a single facet. Diamonds were first cut in Europe in 1456 by Louis Berquen, a citizen of Bruges. The diamond is used for cutting glass. It is also employed for the lenses of microscopes. It has but little chromatic aberration, but the frequent irregularity of its structure is a drawback to its employment for this purpose. (Dana, *Manual of Mineralogy; Catalogue of Great Exhibition of* 1851, Class xxiii.)—*Eng. Cyc.* 328.

The Diamond, in Malay and Javanese is called intan, and sometimes kumala. The Diamond has been found in no part of the Asiatic Archipelago except Borneo, and even in that island only in a comparatively small part of it, a portion of its western coast. The principal diamond mines are in the district of Landak, in the territory of Pontiyanak, in the longitude of 109° east, about forty miles north of the equator, and they occur from thence as far as Banjarmasin, in south latitude between three and four degrees and longitude between 114° and 115° east. The mines are worked by the wild Dayaks and the Malays, but with far superior skill by the Chinese. The gems are found in a yellow-coloured rubble or gravel, which occurs at various depths, the greatest to which a shaft has been known to be sunk being between fifty and sixty feet. When a shaft of such a depth is sunk, six different alluvial strata occur before reaching the diamond-yielding one, which the Malays call the Areng. These strata are, a black mould, a yellow sandy clay, a red clay, a blue clay, a blue clay intermixed with gravel, called by the Malays "ampir" or "near at hand," and lastly, a stiff yellow clay, in which the diamonds are imbedded. The largest diamond found in the Bornean mines of late years was only of thirty-two carats. The prince of Matan, however, has long had in his possession, a rough diamond of 367 carats, but its genuineness has been suspected. At present the Dutch Government are the owners of the diamond mines, and make advances to the miners, who are bound to deliver all stones at twenty per cent below their market value, which is equivalent to a seignorage of twenty-five per cent. Under this management there were delivered in 1824 no more than 900 carats, and the quantity in the two subsequent years was still less.—*Crawfurd Dic. p.* 120. According to Ainslie the diamonds which are offered for sale in India were generally brought from Visiapour, Gana Purtual (Golconda), Bundlecund, the Island of Borneo, or Sumbhulpoor in Orissa and were reckoned superior in transparency and purity to those of Brazil. What is sometimes called the Maturese Diamond of Ceylon, or yellow Tourmalin (Kanefie Turmali), Thunberg tells us is no other than a Topaz of a greenish yellow colour, no Diamonds are found in the Dominions.—*Ains. Mat. Med. page* 165. As to the diamonds of Musulipatam, the mines from which these stones were formerly dug, are reserved by the Hyderabad State, and still belong to the Nizam, and small patches coloured yellow on the map, mark the Villages where the mines are situated. They have not been touched for many years, they might now, even, be as profitably worked, as they once were, not much more than a few feet from the surface, but they are so choked that it would be impossible to do any thing in a limited time, the diamond is not found in Burmah, yet it forms one of the nine gems, which, worn together in a ring, are supposed to protect the wearer from evil. They are the diamond, emerald, coral, sapphire, topaz, pyrope, cat's-eye, pearl, ruby.—*Mason.*

(3170) DIANTHUS, a beautiful genus of Silenaceous Dicotyledonous Plants, with a calyx closely covered at the base by two, three, or four opposite pairs of decussating rigid sharp-pointed bracts. The petals are always more or less lacerated at the end, and in some species are divided into fine capillary segments. There are 10 stamens, 2 styles, and the capsule is 1-celled, with numerous black seeds containing a straight embryo. In all cases the leaves are long, narrow, 1-ribbed, sharp-pointed, and destitute of all lateral reticulated veining. De Candolle enumerates 113 species, of which some must undoubtedly be reduced to simple varieties. They are found in all the temperate parts of Europe and Asia, from Ireland to the eastern coast of China and Japan; two have been met with in the United States of America, and four at the Cape of Good Hope. Most of them are perennial herbaceous plants with permanent leaves and stems, and hence they ought perhaps to be considered undershrubs; a few become woody and form genuine bushes.—*Eng. Cyc. page* 235. All these plants are herbaceous, with opposite leaves and terminal flowers. Of upwards of a hundred species scarcely any possess the least activity. The *Dianthus caryophyllus*, or clove flower, is fragrant and aromatic; and the petals being of a lovely pink tint are used in some parts of Europe for preparing a syrup and conserve. The Dianthus chinensis is of analogous qualities, and is cultivated in Indian gardens under the name of *Kurunphul.*—*O'Shaughnessy.*

(3171) DIANTHUS CARYOPHYLLUS.—The Clove Pink or Carnation has long been a favorite flower and is now almost acclimated. It seldom ripens its seed, and two varieties are only to be met with in the Deccan. The dark crimson is not so full a flower as the variegated crimson and white; they both possess equal perfume and fragrance, but the latter, when carefully grown, is certainly the most beautiful. A full grown carnation should neither have its petals too crowded nor too thin, but regularly disposed, so that all its beauties may be observed at once. The stem or foot stalk seldom exceeds eighteen inches, and this should be carefully supported. It is propagated by layers and pipings; also by seed when procurable. The plant must always be sheltered from heavy rains, and also from the hot winds; yet kept in an airy situation. If placed under cover for any length of time, they run up to thin stalks, seldom throwing out blossoms. The time for taking cuttings is when the plant is in blossom; and this may be done either at the commencement of the rains, or in the cold weather. When the plants appear to be about

to blossom, all the buds save a couple should be carefully removed, as well as any small shoots on the foot stalk between the leaves. When layers are required, they must be removed from the stem with a knife or scissors, and should not be longer than two or three joints. Cut off all the lower superfluous leaves smooth, then throw the layers into water for a couple of hours. Plant them in baskets, at about six inches apart, which have been filled with old rich vegetable loam: water so as to settle the earth round the stems, and place in a shady spot, not under trees, if in the rainy season. In about six weeks they will have struck, and may be removed into pots. Do this carefully, not disturbing the earth round the young roots, which are very tender, and replace in the shade again until sufficiently strong to bear exposure to the sun. The variegated have only two colours, and when stripped are called Flakes, but if spotted, Picotees. Ants (black, red and white) are very destructive to the roots. An old plant of Flakes or Picotees, will occasionally lose both stripes and spots during the hot season, and become quite white when in flower, but resume during the rains their original colours of deep red and white. The colour thus changing may be justly attributed to the dry hot weather, as it has been remarked in England, that sometimes fine double running flowers have returned to their whole or original colour during very dry or warm summers.—*Riddell.*

(3172) DIANTHUS CHINENSIS. Common in all gardens—of various colours, and some mixed—they flower all the year round, and give seed immediately as it fades, and which will spring up again if sown. The double flowered varieties are much esteemed: the colours are white, red, crimson, red and white.—*Riddell.*

(3173) DIAPER.

Drel, Dut.	Tela tessuta a opere, It.
Linge ouvre, Fr.	Salfetotsschnoe, Rus.
Drell, Ger.	Manteles alemaniscas, Sp.

A sort of fine flowered linen, commonly used for table cloths, napkins, and other domestic purposes. It is manufactured in the north of Ireland, Germany, and Scotland. Diapers are also made of cotton, in imitation of the linen goods bearing the same name. Shot Diaper from Masulipatam (CXLII-455) so made that it was difficult to ascertain whether it was not shot with silk. After a most rigid examination it was ascertained to be a Cotton Fabric, excellent in quality and color, and being the only piece in the Exhibition the Jury considered it entitled to a 2d Class Medal.

(3174) DIDYMOCARPUS, a genus of plants of which Dr. Wight gives 10 species, Didymocarpus Humboldtiana, 1851; lyrata, 1350; ovalifolia, 1351; Rottleriana, 1348; and tomentosa, 1349.

(3175) DIDYMOCARPUS AROMATICUS, is stated by Dr. Wallich to be used as a perfume and aromatic drug, called by the natives *Kumkuma* and *Ranigovindi* (*Royle*, p. 294.)—*O'Shaughnessy, page* 448.

(3176) DIDISCUS CÆRULEUS. Umbelliferæ. These plants are from Australia, and are grown from seed in a light loamy soil, and the plants either reared in pots or in flower-beds.—*Riddell.*

(3177) DIKAMALLEE, is the gum of Gardenia lucida; it exudes in amber colored transparent drops, at the ends of young shoots, and from thence it is collected. It is most useful in preventing vermin feeding in wounds. At the Madras Exhibition of 1855, this product by the Gardenia lucida of Roxburgh, was shown from Canara, Mysore and Guntoor—this fragrant resin is useful in Hospitals, keeping away flies from sores, on account of its strong aroma, and is an article in the materia of the village farrier. It deserves more attention.—*M. E. J. R.* Dikamali, from Gardenia gummifera, is stated by Dr. Gibson to be produced within the Bombay Presidency, its effects in preventing the access of flies to festering wounds and running sores, is remarkable.—*Spry's Suggest, page* 67.

(3178) DICE,

Taarlingen, Dut.	Dadi, It.
Des (a jouer), Fr.	Kosti, Rus,
Wurfel, Ger.	Dados, Sp.

Are cubical pieces of ivory, bone, or ebony, marked with dots on each of their sides from 1 to 6, according to the number of the face; and used for playing games of chance.—*Faulkner.*

(8179) DICHROSTACHYS CINEREA. *Mimoseæ*, Roxb. c. 174.

Vadatala marum, Tam.

A small tree or rather large shrub, wood very hard and strong, but too small for any except common purposes.

(3180) DILL SEED,

Buzralshibet, Shubil, Arab.	Anethi Semina, Lat.
Satta-copa, Cyng.	Misreya, Sitasiva, Seleya, Sans.
Soie, Duk.	Saddacuppei, Tam.
Sowa, Guz. & Hind.	Suddapu, Tel.
Mungsi, Jav.	

Are flattened elliptical seeds with brown and slightly convex backs, and pale membranous margin. Both the fruit and the plant are much used in the East as condiments and articles of diet. The carpels have a bitter aromatic taste, making them useful as carminatives. The plant is a native of the South of Europe, and some parts of India; the seeds are procurable in all Indian bazars.—*Faulkner.* The Indian species is Anethum sowa. *Dill* leaves are used to flavour pickles, the seed as a carminative, and is supposed to be used in the manufacture of gin: raised from seed.—*Jaffrey.*

(3181) DILLENIACEÆ, a natural order of Plants belonging to Polypetalous Albuminous Exogens, and related on the one hand to *Magnoliaceæ*, on the other to *Ranunculaceæ* and to *Anonaceæ*. They are briefly characterised by having 5 sepals in a broken whorl; 5 petals; an indefinite number of stamens; a definite number of ovaries, which are either quite distinct or more or less consolidated; berried or capsular and 2-valved fruits; seeds surrounded by a pulpy aril; and, finally, a minute embryo lying in solid flesh albumen. Differentially considered, Dilleniaceous Plants are distinguished from *Anonaceæ* by their flowers being arranged upon a quinary, not ternary, type, by their albumen being solid, and not ruminated, and by their want of aromatic properties; from *Magnoliaceæ* by their want of stipules, and the presence of a pulpy aril round the seeds. The plants of this order are chiefly Asiatic trees or shrubs, and usually yellow-flowered. A few occur in America. The trees are found in the woods of tropical India; the bushes inhabit Australia, especially in the more temperate parts, and in China; the woods of Brazil contain several kinds, usually climbers or having a trailing habit. They appear to possess astringent properties, but nothing further of importance. The species in cultivation in England are almost all Australasian, and have something the appearance of yellow-flowered *Cistuses*. Among these occur species of the curious genus *Pleurandra*, in which the stamens are developed on one side only of the flower, all those on the opposite side being abortive. There are few analogies to this in the vegetable kingdom. *Hibbertia volubilis* is a showy twiner, but its flowers are intolerably offensive in their smell. The Indian species are in almost all cases plants of great beauty. They are remarkable both for the grandeur of their foliage and the magnificence of their flowers. Several species of *Dilleniaceæ* are large trees, and afford valuable timber.—*Eng. Cyc. page* 342.

(3182) DILLENIA, a genus of Plants, the type of the natural order *Dilleniaceæ*. The young calyces of *D. scabrella* and *D. speciosa* have a pleasant taste and are used in curries by the inhabitants of Chittagong and Bengal. Several species of *Dillenia* are large trees, and afford hard, durable and valuable timber.—*Eng. Cyc. p.* 342.

(3183) DILLENIA. The flowers of one of this genus, as it occurs in the Terai, are as large as two fists.—*Hooker, Him. Jour. page* 395. Dr. Wight gives figures of Dillenia bracteata, 358; *retusa*, 358; speciosa, 823.

(3184) DILLENIA, Water Dillenia. A species of dillenia always found on the borders of streams, hence called water dillenia by the Arabs, produces a large fruit, which is brought to bazar green, and considered a favorite vegetable with the natives.—*Mason.*

(3185) DILLENIA. 1. *Dillenia augusta*, 2. *D. scabra* and 3. *D. speciosa*. The Burmese names of which are 1. Zinbyewn, 2. Byew, 3. Thabyew. The two first are plentiful in the forests of the Pegu district, but become scarce to the north of it, and the third species is scarce even there. They all three afford large and good timber for house-building. Light brown wood.—*McClelland.*

(3186) DILLENIA ORNATA. Ornamental Dillenia. When a stranger debarks at Maulmain in February, his attention is arrested by a tree without a leaf, but covered with large gaudy yellow flowers: it is the ornamental dillenia. Several other species of the genus are indigenous in the Provinces.—*Mason.*

(3187) DILLENIA PENTAGYNA. Dilleniaceæ.

Rowadan, Tel.

This is a large timber tree a native of the Northern Circars, and flowers in March and April. *Roxb.—Rohde M.S.S.* The similarity of native names between this and Calophyllum inophyllum led Dr. Wight to suspect some mistake. The wood of Dillenia pentagyna is said to be exceedingly strong and very durable, even when buried under ground. A stately forest tree, common on the face of the W. Ghauts. Dr. Wight is satisfied that this is the tree which furnishes the Poon spars. D. pentagynia is a tall and Calophyllum inophyllum a short stunted tree.—*Wight.*

(3188) DILLENIA SPECIOSA. Dilleniaceæ.

Girnar, Hind.	Chalta, Beng.
Moota Kurmul, Dur.	Uvachettoo, Tel.

A large tree; flowers white and yellow, nine inches in diameter; fruit size of a cocoanut.—*Riddell.* It is a most beautiful tree when in flower. It is a native of vallies far up among the Circar mountains: it is also found cultivated in some gardens on account of its elegant appearance. It flowers during the hot season and beginning of the rains, the seed ripens in February. The fleshy leaflets of the calyx, when the fruit is full-grown have an agreeably acid taste, and are much used by the Natives, where the tree grows, in their curries. They make a tolerably pleasant jelly, the wood is both hard and tough, and is used to make gun stocks. Roxb.—*Ovai-kai*, Tam. is the fruit of this large and handsome tree, and is used by the lower class of natives in their curries, having an agreeable acid flavour; and also in chatnies.—*Jaffrey.* It is abundant in the Kotah jungles, the very large bright yellow blossoms are most magnificent. This tree would be exceedingly ornamental in compounds and would thrive well, being very hardy.—*Gen. Med. Top. page* 199.

(3189) DIMITY.

Basin, Fr.	Doblet, It.	Dimite, Sp.

A cotton stuff, similar in fabric to fustian,

from which it differs chiefly in having ornaments woven on it, and in not being dyed. Its colour should be delicately white.—*Faulk.* According to Tomlinson, dimity is a stout cotton cloth ornamented either with raised stripes or figures, and employed white for bed and bed-room furniture. —*Tomlinson, page* 490.

(3190) DINDUGA TREE. ANDERSONIA. Roxb.

Bayla Nava marum, TAM. | Dinduga, CAN.

This large and valuable tree grows in Wynaad. —*Ains. Mat. Med. p.* 213.

(3191) DIOMEDEINÆ, a family of Birds to which the Albatrosses belong. The characters of the genus *Diomedea* are given under ALBATROSS. In that article three species of this genus are referred to. We now give a complete list of the species of this important genus :—

Diomedea exulans.—Linn. This bird is abundant between 30° and 60° S. lat., and equally numerous in all parts of the ocean bounded by those degrees ; its range however extends much farther south, even to within the antarctic circle.

Diomedea melanophrys.—Temm. It is the most abundant species of the southern seas ; equally numerous in every part between the 30th and 60th degrees.

Diomedea cauta.—Gould. This species was procured by Mr. Gould off the south coast of Van Diemen's Land.

Diomedea chlororhynchos.—Lath. It occurs between 30° and 60° S. lat., in both the Atlantic and Pacific Oceans.

Diomedea culminata.—Gould. This bird is rather abundant both in the Pacific and Atlantic Oceans, between 30° and 50° S. lat.

Diomedea fuliginosa.—Gmel. It occurs in all parts of the ocean between 30° and 60° S. lat. : equally common off Van Diemen's Land, Cape Horn, and the Cape of Good Hope.

Diomedea brachyura.—Temm. Found in the North Pacific Ocean.

Diomedea gibbosa.—Gould. An inhabitant of the North Pacific Ocean.

Diomedea olivaceorhyncha.—Gould. China seas (?). Mr. Gray, in his ' Genera of Birds,' also gives *D. spadicea* as a species. He also makes *D. gibbosa* (Gould) synonymous with *D. nigripes*, Audubon, ' Biog.,' vol. v. p. 327, and adopts the latter name as having the priority.—*Eng. Cyc. p.* 353.

(3192) DIOSCOREACEÆ, *Yams*, the Yam Tribe, a natural order of Plants belonging to the class Dictyogens. They are particularly distinguished by the following characters :—Flowers diœcious ; calyx and corolla superior ; stamens 6; ovary 3-celled, with 1 or 2-seed cells; style deeply trifid ; fruit leafy, compressed, occasionally succulent ; embryo small, near the hilum, in a large cavity of cartilaginous albumen. The affinities of this order are with *Smilaceæ* and *Aristolochiaceæ*. It contains 6 genera and 100 species. All the species are twining shrubs, with alternate or spuriously opposite leaves. They consist, with the exception of *Tamus*, Black Bryony, of tropical plants, or at least of such as require a mild forestless climate. Some of them produce eatable farinaceous tubers, or yams, as the various species of *Dioscorea* and *Testudinaria* ; but there is a dangerous acrid principle prevalent among them, which renders the order upon the whole suspicious. It exists in a perceptible degree in *Tamus*, and is still more manifest in the 3-leaved *Dioscorea.*—*Eng. Cyc. p.* 355.

(3193) DIOSCOREA, a genus of Plants which furnish the tropical esculents called Yams. It is the type of the natural order *Dioscoreaceæ*. The genus consists of perennial fleshy-rooted or tuberous diœcious plants, with annual twining stems, broad alternate leaves having a somewhat netted arrangement of their veins, and loose clusters of small green flowers. The corolla and the calyx taken together consist of 6 small, equal segments, which, in the females, stand upon the top of the ovary. The male flowers have 6 stamens ; the females 3 styles. The seed-vessel is a thin compressed 3-winged capsule, containing one or two membranous seeds. The best account of the species is that of Dr. Roxburgh, who cultivated seventeen sorts in the Botanic Garden, Calcutta ; others are known to botanists, but far from perfectly.—*Eng. Cyc. p.* 355. Wight figures Dioscorea aculeata, 2060 ; alata, 810 ; *amœna*, 811 ; bulbifera, 878 ; dœmona, 811 ; globosa, 812 ; oppositifolia, 813-2060 ; pentaphylla, 814 ; and tomentosa, 815. It is not a little remarkable that while so many species are nutritious in this genus, some should be highly dangerous ; but such is unquestionably the fact. *D. Dæmonum* and *D. triphylla*, both ternate-leaved species, have very nauseous and dangerous tubers. Eatable sorts are numerous. In Otaheite the *D. bulbifera*, which bears small fleshy angular tubers along the stem in the axils of the leaves, is the favorite species.—*Eng. Cyc. page* 355.

(3194) DIOSCOREA. In the Eastern Archipelago the dioscorea yam plant is universally cultivated among all the tribes, and generally most so where rice is least abundant, but it no where forms the chief bread of the people, as rice, maize, or sago do. The batata, indeed, and Crawfurd thinks justly, is preferred to it. The Malay and Javanese name, rubi or uwi, extends not only to the languages of the Malay and Philippine Islands, but to those of the Pacific, and to Madagascar. In the Philippine languages the name is identical with that in Malay ; in the Tonga it is ufi ; in the Tahiti eui ; in the New Zealand the same as in Javanese, namely, uwi ; in the languge of New Ireland u, and in the

Madagascar uwi. With all these varieties of pronunciation there can be no doubt of the virtual identity of the name. It is probable that several species of Dioscorea are natives of the Malayan Archipelago, but that the culture originated with one people, and was directly or indirectly disseminated by them, seems likely from the universality of the name. It may be remarked, that in the language of Madagascar, a wild yam is called uvi-ala, which is, without doubt, the Uwi-alas—the wild or forest yam of the Javanese, with the elision of the final consonant, conformably to the genius of Malagasi pronunciation. The word ubi, besides being applied specifically to the yam, is used as a generic for farinaceous roots. Thus the batata, or Convolvulus batatas, is called by the Malays Uvi-jawa, or the Javanese yam, to distinguish it from the Dioscorea.—*Crawfurd Dict. page* 448.

(3195) DIOSCORIA. ELEPHANT-FOOT YAM. A yam with a tuber about the size and shape of an elephant's foot, is white, and often as light and agreeable as a potatoe. It abounds in Karen gardens but is rarely seen among the Burmese, or in the market.—*Mason.*

(3196) DIOSCOREA ACULEATA. BENDALOO. Lin.

Sirroo vullie Kalung, TAM. | Poodiekelengu, MAL.
Chota Pendaloo, DUK. |

The small yam. This is a very valuable and delicate root, somewhat resembling the sweet potatoe in appearance; tubers of an oval form and very white, generally weighing about two pounds. The taste is more like that of a fine dry yam.—*Ainslie, page* 251. Mr. Jaffrey describes Dioscorea aculeata, as Kantoo Kelangoo, *Tam.*, and the Goa potatoe; but is not aware if this yam be much cultivated in Madras. There are many species of the yam cultivated for various purposes, Dioscorea triphylla is used to render the Cocoanut tree toddy more intoxicating. D. pentaphylla, the flowers are used as greens, and the tubers as an esculent. D. bulbifera for a similar purpose. The genus is very extensive; and some of the species are poisonous.—*Jaffrey.*

(3197) DIOSCOREA ALATA. Lin.

Cachay kalung, TAM.

This root appeared to Dr. Ainslie to be the Katsje Kelenghse of the Hortus Malabaricus, and the plant the Ubi of the Malays and Javanese, who eat the root when dressed. Vide Rumphius, Tom.—*V. p.* 348. *D. alata*, the common West India Yam, is a native of the West Indies, although met with in the East Indies also, but only in a cultivated state. A figure of it is given in Rheede's 'Hortus Malabaricus,' vol. vii. t. 38, under the name of Katsji-kelengu. Its tubers are oblong, brown externally, white internally, and often of great size, weighing sometimes as much as 30lbs.; they perish after the first year, if left in the ground, having first produced the young ones that are to replace them. "Besides the tubers, the proper roots of all these plants are fibrous, springing from and chiefly about the union of the stems with the tubers, and spreading in every direction." The stems are furnished with four crested leafy wings, and spread to a great extent, twining round trees and bushes; they often bear prickles near the ground. The first leaves that appear on the stem are alternate, the succeeding are opposite, seated on long stalks, deeply heart-shaped at the base, sharp-pointed, smooth, with from five to seven ribs. The flowers are small and green, and appear in compound panicles. The remainder of the species are very similar to this in general characters: a few short notes will sufficiently indicate their differences.—*Eng. Cyc.*

(3198) DIOSCOREA ATROPURPUREA. DARK PURPLE YAM. A yam with a dark purple root is one of our best yams, and is extensively cultivated both by Karens and Burmese. —*Mason.* This purple-rooted sort, the *D. atropurpurea*, is cultivated at Malacca, tubers are large and irregular, and grow so near the surface of the ground as to appear in dry weather through the cracks that they make in the soil by raising the earth over them.—*Eng. Cyc.*

(3199) DIOSCOREA BATATAS, the Chinese Yam, was introduced into Europe about the year 1849, having been sent from Shanghai, by M. de Montigy, the French Consul. It is every where cultivated in China and bears the names of *Chow-yu*; *Ton tchow*; *Chan-chow*; *Chan-yo and Chan-yu*, which signifies the "Arum of the Mountain." At Nankin, it is very large and of excellent *flavour*; *that of the* chou district is still better, but for medicinal purposes, the Chinese prefer that of the Hoai-king district, where the Chou-yu root is laxative and sweet. It is particularly worthy of a place in the kitchen garden, as well as in field culture, on account of its perfectly feculent flavour, and the absence of any after-taste of sweetness, acidity, or spiciness, such as is often found in other plants; as also on account of the ease with which it may be cultivated and the facility of preserving it from decay. Agricultural Rep. to Commissioners of Patents to House of Assembly for 1854.

(3200) DIOSCOREA DÆMONA. WILD YAM. There are several indigenous species of yams, which are eaten by the Karens in times of scarcity, though very acrid. One is remarkable for its large ternate leaves, of which the leaflets are sometimes nearly a foot long, and six inches wide.—*Mason.*

(3201) DIOSCOREA FASCICULATA. KAREN POTATOE. This is a small yam not much larger than a kidney potatoe, which it much resembles both in appearance and taste. It is cultivated extensively by the Karens, and being

more like a potatoe than a yam, has acquired the name of the Karen potatoe, and is sometimes called the Tavoy potatoe. It is the best vegetable they have, but unfortunately it can be obtained during a few months only in the year. Mr. Mason is not aware that it is ever found wild on the Tenasserim Coast; and it appears to him to be either identical, with or nearly related to Roxburgh's D. fasciculata.—*Mason.*

(3202) DIOSCOREA GLOBOSA, cultivated in Bengal under the name of Choo-puree-Aloo, is the most esteemed of the Indian Yams. Its flowers are highly fragrant; the tubers are white internally; the leaves arrow-headed.—*Eng. Cyc.* In Tenasserim, though there are several different species and varieties of white yams in cultivation, *Dioscorea globosa*, the large white yam, is the one most in repute; it has arrow-headed cordate leaves. —*Mason.*

(3203) DIOSCOREA PENTAPHYLLA. Lin.

Noorang kalung, Tam.

The root, in some parts of Southern India, is called kaat vulli kalung or Wild Yam. It appears to be the Nooren keelengu of the Hortus Malabaricus and the On do of the Malays. Rumphius tells us that previous to preparation it contains much acrimony, adding, "Creator sapienter hanc impraegnavit radicem hoc succo, ut "ab ipris intacta hominibus cibo inserviret."—*Ainslie*, v. 249.

(3204) DIOSCOREA PURPUREA, called Kal-Guranya-Aloo in Bengal. The tubers are permanently stained purple throughout.

(3205) DIOSCOREA RUBELLA, the Guranya-Aloo, is another Indian sort, with large tubers stained with red immediately below the cuticle; it is much esteemed; its tubers are sometimes three feet long; its flowers are fragrant.

(3206) DIOSCOREA SATIVA. Yam. Lin.

Yamkalum, Tam. | Perinvullie kelengu, Tel.

This most valuable root is too well known to require any description here: it is eaten all over India by both Europeans and Natives and is by some, preferred to the potatoe.—*Ainslie, p.* 251.

(3207) DIOSCOREA PURPUREA.

Poothooschary valle Kelangoo, Tam.

Pondicherry sweet potatoe. A yam not much used in Madras, the roots are boiled and eaten as a potatoe.—*Jaffrey.*

(3208) DIOSPYROS (from δios and πυρὸς, which may be translated 'celestial food'), a genus of Plants belonging to the natural order *benaceæ*. They all form large trees, with alternate thick, often coriaceous leaves. The flowers are usually single and axillary, the male and female flowers separate or united. Calyx and corolla 4-cleft, rarely 5-cleft. Stamina often 16, but varying in different species. Germen superior, often 8-celled; cells 1-seeded; attachment superior. Styles 3 or 4 rarely 5, or 1, and variously divided. Berry from 1-to 12-seeded, often 8-seeded. Embryo inverse, and furnished with albumen. Male flower frequently with twin anthers. The species are found chiefly in the tropical parts both of Asia and America, as in the Malayan Archipelago and Peninsula, and in almost every part of India. One species extends southward to Australia; one, *D. Lotus*, to Switzerland; and *D. Virginiana* into the United States of America. As some are remarkable for the wood which they afford, and others on account of their fruit, it is necessary only to notice a few of each, though the whole require the labours of a monographist.—*Eng. Cyc.* Wight gives Diospyros Candolleana, 1221-22; capitulata, 1224-1558; chloroxylon, 1224; dubia, 1223; ebenum, 188; glutinosa, 843; Kaki, 415; montana, 1225; obovata, 1226; orixensis, 1225; ovalifolia, 1227; racemosa, 416; ramiflora, 189; tomentosa, fem. 183; tomentosa, mas. 182; and tetrasperma, 1221-22.

(3209) DIOSPYROS. Ebony. The Karens have distinctive names for four different species of ebony trees. The salt water swamp ebony, the water ebony, the yellow ebony, and the true ebony. Mr. Mason never met with the trees in flower, so as to be able to distinguish the species; but had seen specimens of the wood in the southern provinces, not inferior to the ebony of commerce.—*Mason.*

(3210) DIOSPYROS. Maulmain Ebony. An inferior kind of ebony is often seen at Maulmain, which the natives do not call by the same name that they do the trees which produce the good ebony, though evidently a product of the same genus. A similar wood at Tavoy is often denominated iron wood.—*Mason.*

(3211) DIOSPYROS CHLOROXYLON.

Nullaroolemara wood, Eng. | Nullaroolemara kurra, Tel.

(3212) DIOSPYROS DISCOLOR of the Philippine Islands also bears a fruit which is esteemed, and called *M*abolo.—*Eng. Cyc.*

(3213) DIOSPYROS CORDIFOLIA.

Vuckana Marum, Tam.

A hard heavy wood, colored dark brown; it is difficult to work. Wight No. 121.

(3214) DIOSPYROS EMBRYOPTERIS. Syn. Embryopteris glutinifera. D. glutinosoa, *Kon.*

Sindica. Sans. | Jumika. Tel.
Gaub. Hind. Beng. | Toombikai, Tam.

Fruit about two inches in diameter, green when ripe, and farinaceous externally. On being pressed, an excessively astringent juice exudes. This is so powerful that it generally yields on analysis 60 per 100 of pure tannic acid. It is used in medicine as a valuable astringent and styptic, and is employed in Bengal for paying the bottoms of boats. The bark has been

given with doubtful results in the treatment of intermittent fevers. See "*Extracts*" Pharmacopœia.—*O'Shaughnessy, page* 428. The fruit of the Diospyros embryopteris, the gab fruit, contains, when ripe, a great quanity of mucilage and tannic acid. The extract is reddish-brown in flexible plates, and if properly prepared, soluble in water. It is an excellent astringent, and very useful in diarrhœa and chronic dysentry. One to five grains of the Extract of Gab thrice daily. A solution 2 drams. in a pint of water is a valuable vaginal injection in leucorrhea.—*Beng. Phar. page* 290.

(3215) DIOSPYROS EBENASTER. Ainsl. Ebenaceæ, Icon. 188. Ebony.

Tookee, Tel.	Kakatatee, Tam.
Abnoos, Hind.	Acha Marum, Tam.

D. Ebenaster is a tree of considerable magnitude, a native of Ceylon, of which the leaves are coriaceous and smooth on both sides, and the buds smooth. This name is copied from Ainslie and there is still uncertainty whether this is the species that yields the ebony of the Palghaut jungles, as there is reason to believe that more than one species contributes wood black enough to pass current for ebony. The plant produced is Bauhinia tomentosa under that tamool name Acha marum, a widely different tree but having a very dark or black heart-wood.—*Wight.* Mr. Rhode mentions that Ebony of very superior quality is procurable in the hill Zemindaries of the Northern Circars particularly in the Ganjam District, he had received it from Goomsur furnishing 14 inch planks and of a fine uniform black. Inland from Ellore in the Masulipatam District he had likewise procured some of good size and quality; several logs of apparently younger wood yielded an ebony richly variegated with bright brown stripes and mottle—He knows not the tree from which the ebony of the Northern Circars is procured but has every reason to believe that it is procured from several varieties. Ebony is a wood much affected by the weather, a table of solid ebony exposed to the great heat of the land winds in the dry climate of Rajahmundry would have spaces of more than $\frac{1}{8}$ inch between the planks while in the subsequent monsoon the interstices would completely disappear. European cabinet makers seldom use ebony in plank solid, as after long seasoning it is liable to be affected by change of weather, this appears singular when it is remembered how much it is employed for instruments in which precision of extreme accuracy under great exposure is requisite, it is probable that it is only affected in the direction of its breadth. Too much weight however must not be allowed to the fact of its continued use by nautical and mathematical instrument makers, who largely use ivory, for scales, which is affected not only in its breadth but in length by change of temperature. The veined ebony is, he believes, the wood denominated "Coromandel" or "false Calamander." The Teloogoo term for Ebony is *Nalla Toomi* or *Toombi Kara, Toomi chava kara, Toombika* &c., the denomination varying in every district.—*Rohde.*

(3215) DIOSPYROS EBENUS.

Tendua, Hind.

The Ebony Tree, yielding a heavy black wood, grows abundantly in Ceylon and many parts of the Deccan.—*Riddell.* Dr. Irvine mentions that the tree, *Abnous*, the black heart, and *Tendua*, the white and spotted wood, is common in the Kotah jungles, especially near Gerdherpoora. The young trees yield a fine grained tough very hard wood: excellent for making hackeries &c. &c.: the ebony is not used: the very inferior fruit is eaten when rotted like the medlar.—*Gen. Med. Top. p.* 196. *D. Ebenus*, the True Ebony, and that which is considered to be of the best quality, is a large tree, a native of Mauritius, Ceylon, and apparently also of Madagascar; for *D. lanceolata*, Poir., collected by Commerson in that Island, is considered the same. The leaves are very smooth, short, petioled, alternate, bifarious, oblong in shape, the buds very hairy; male flowers sub-raceined, with about twenty anthers, the hermaphrodite solitary, obtandrous. Large quantities of the ebony of this species have been sometimes imported into Europe. Ebony is well known as a hard black-coloured wood, brought from the hot parts of the world. The Greek name is ἔβενος, from which the Latin *Ebenus* and our word Ebony have been immediately derived. It is first mentioned by Ezekiel, xxvii. 15, but in the plural, hobnem, where the men of Dedan are described as bringing to Tyre horns of ivory and of ebony. The Persian name, abnoos, is that by which it is commonly known all over India; it is probable therefore that the name, like the wood itself, had an eastern origin. From its hardness, durability, susceptibily of a fine polish, and colour, which has almost become another name for blackness, ebony has always been in high estimation, and in the present day is much used for mosaic work and ornamental inlayings, though cheaper woods dyed black or frequently substituted. Herodotus (iii. 97) mentions ebony as part of the presents brought in considerable quantities to the king of Persia by the people of Ethiopia. Dioscorides describes two kinds—one Ethiopian, which was considered the best; and the other Indian, which was intermixed with whitish stripes and spotted; and hence commentators have disputed whether there were one or two kinds of ebony. But the fact is that several trees yield this kind of wood, and all belong to the genus *Diospyros*. Owing to the known geographical distribution of this genus, the ancients must have derived their ebony either from the peninsula of

India, and the island of Ceylon, or by the coasting trade from Madagascar; for no species of *Diospyros* has yet been discovered by botanists in the upper parts of Egypt or in Abyssinia, though it is not improbable that some may be found, as the climate is well suited to their existence.—*Eng. Cyc. page* 356. The ebony of Mauritius is yielded by Diospyros ebenus, that of Ceylon is D. Ebenaster, while the ebony tree of the Coromandel coast is D. melanoxylon; other species, as D. tomentosa and D. Roylei, yield ebony on the continent of India. The tree yielding the African ebony is not ascertained. A kind of ebony, Amerimnum Ebenus, is produced in the West Indies, and called Jamaica ebony.—Mountain Ebony. The different species of Bauhinia are so called; B. porrecta grows on the hills in Jamaica, and has wood which is hard and veined with black.—*Tredgold. Holt.*

(3217) DIOSPYROS GLUTINOSA. TINDOOCA.

Gunb, SANS.	Pauniche marum, TAM.
Tumika, HIND. BENG.	

Diospyros glutinosa affords a fruit which, though edible, is far from palatable, but more valuable as an article of commerce. The tree is middle-sized, a native of the moist valleys amongst the mountains of the Circars, and all along the foot of the Himalayas to 30° N. lat. Sir William Jones first mentioned what is well known throughout Bengal, that the astringent viscid mucus of the fruit is used for paying the bottoms of boats. The unripe fruit contains a large proportion of tannin, and its infusion is employed to steep fishing-nets in to make them more durable.—*Eng. Cyc.* The wood is but of an indifferent quality and not much used, the ripe fruit is eaten by the Natives: it is strongly astringent; the unripe fruit contains a large proportion of tannin. An infusion is used to steep fishing nets to make them more durable. Roxb.—*Lokde, M.S S.*

(3218) DIOSPYROS KAKI, CHINESE DATES. *D. Kaki* is celebrated in China and Japan: specimens introduced into the Botanic Garden of Calcutta were found to be identical with others from Nepaul. The fruit is described by Dr. Roxburgh as being tolerably pleasant. It is esteemed in China, where it attains the size of an orange, and is frequently sent to Europe in a dried state, and called the Date-Plum of China, and also Keg-Fig of Japan.—*Eng. Cyc.* "The Burmese," says a correspondent who resided several years in Ava, "call the Chinese fig, which is brought in great quantities overland to Ava, *pe-thee* or *tay thee.*" This is the same fruit which in England is called Chinese date; but is neither fig nor a date, but the fruit of a species of ebony; and a more appropriate name would be the Chinese persimon, the persimon tree being also a species of ebony, and there is a considerable resemblance in the fruit. The tree which produces this "Chinese date," is occasionally cultivated by the Burmese, but it bears fruit very sparingly, and I think with Roxburgh, that it is "by no means equal to a good apple."—*Mason.*

(3219) DIOSPYROS MABOLA, (often called "mangosteen") under which name it is cultivated extensively in gardens at Vizagapatam.—*M. E. J. R.*

(3220) DIOSPYROS MELANOXYLON. *Ebenaceæ*, Roxb. c. 46.

Toombie marum, (ebony) TAM.	Ebony tree, ENG.
	Kendoo. BENG.

This plant grows in Coromandel, Malabar, Ceylon, and Midnapore Jungles. The bark is astringent, given by the native doctors with pepper in dysentery.—*O'Shaughnessy, page* 428. It is a very large tree, only the very heart of which is black, all the rest white. The white wood is however used for common purposes. The species of Diospyros have this peculiarity that the black heart wood is surrounded by white sapwood. There are several fine specimens of the genus.—*M. E. J. R. D. melanoxylon*, is described and figured by Rumph, iii., 'Corom. Plants,' 1 to 46, by Dr. Roxburgh, and is the Ebony-Tree of the Coromandel coast. It is found on the mountains of that coast as well as of Malabar and Ceylon. It grows to be very large, particularly the male tree of which the wood is also most esteemed. The leaves, which are sub-opposite, oval, oblong, obtuse, and villous, are deciduous in the cold season, the new ones appearing with the flowers in April and May; as in other species, it is only the centre of large trees that is black and valuable, and this varies in quantity according to the age of the tree. The outside wood, which is white and soft, time and insects soon destroy, leaving the black untouched. The ripe fruit is eaten by the natives, though rather astringent, as is also the bark. *D. tomentosa* and *D. Roylei* are other Indian species which yield ebony. Several species of the genus bear fruit, which, though clammy and sub-astringent, is eaten by the natives of the countries where the trees are indigenous. We need name only the most celebrated, as *D. lotus*, a native of Africa, and now common in the south of Europe, which bears a small yellow sweetish fruit about the size of a cherry, and which has by some been supposed to be the famous Lotus of the Lotophagi; but this is more likely to have been the Jujube, called by botanists *Zizyphus Lotus.—Eng. Cyc.* Diospyros Melanoxylon, or Ebony, Oukchiuya, *Burmese*, is found throughout the Pegu forests, seldom however of greater girth than three or four feet. It is very plentiful.—*McClelland.* The fruit of Diospyros Melanoxylon, Roxb. 46, is called Toombiee pullum Tam., Seneer Colbr. 86, and is eaten by the poor people.—*Ainslie, p.* 283.

(3221) DIOSPYROS MOLLIS, BLACK-DYE PLANTS.

Ma-klea, Burm.

The blossoms of the shoe-flower plant are used by the Chinese to dye leather black, the juice of the cashew-tree gives a black to linen, and the fruit of the melastoma affords a black dye. The celebrated vegetable dye the Shan black dye, is made from the fruit of this species of ebony, which is said to grow on the mountains that separate the Province of Tavoy from the Siamese territories. Isolated plants may be seen in the gardens of Tavoy, and Maulmain, but Mr. Mason has never seen one in flower, or fruit.—*Mason.*

(3222) DIOSPYROS MONTANA. Roxb. Yerragada is the Teloogoo name of a middle sized tree the timber of which Dr. Roxburgh informs us, is hard and durable and is variegated with dark and white coloured veins. —*Ains. Mat. Med. p.* 212.

(3223) DIOSPYROS RETICULATA, (*Tesselaria*, Poir.) is another elevated tree, a native of Mauritius, of which the heart-wood forms Ebony.

(3224) DIOSPYROS SAPOTA. Achras Sapota.

(3225) DIOPSIS, a genus of Dipterous Insects of the family Sepsidæ. The insects of this genus are remarkable for the immense prolongation of the sides of the head. The head itself is small, and appears as if it were furnished with two long horns, each having a knob at its apex; these horn-like processes however are not analogous to the parts usually termed antennæ, but are in fact prolongations of the sides of the head, the knob at the apex of each being the eye of the insect.—*Diopsis Sykesii*, of G. R. Gray, is one of the largest species of the genus, and possesses, the longest eye-stalks; these processes in this insect are of a pitchy red colour, and the body is the same tint. The head and thorax are ck, and the wings are coloured with brown. t little is known of the habits of these insects. onel Sykes, who collected great numbers of above species during his residence in India, nished Mr. Westwood with the following no- respecting their habitat and habits :—" Ha- at,—the hill fort of Hurreechunderghur, in western ghauts of the Deccan at an elevation 3900 feet above the level of the sea, 19° 23' lat, 70° 40' E. long."—*Eng. Cyc. Vol.* ii. *p.* 4.

(3226) DIPSACUS FULLONUM, TEASLE, FULLER'S THISTLE, is, according to yle, the *Dunsakoos* of the Indian Materia Me- a.—*O'Sh. page* 404.

(3227) DIPSAS (Laurenti), Bungarus (Op-), a genus of Serpents, placed by Cuvier un- the great genus Coluber. Body compressed, much less than the head; scales of the spinal row of the back larger than the others.

(3228) DIPSAS INDICA, Cuvier; Coluber Bucephalus, Shaw. Black, annulated with white. —*Eng. Cyc. Vol.* ii. *page* 430.

(3229) DIPTERACEÆ, OR DIPTEROCARPEÆ, *Dipterads*, an important order of East Indian Exogenous Polypetalous Trees. They have a tubular unequal permanent calyx, with five lobes, which after flowering become leafy and very much enlarged, surmounting the fruit without adhering to it. There are five petals, with a contorted æstivation, an indefinite number of awl-pointed narrow anthers, and a few-celled superior ovary, with two pendulous ovules in each cell; of these all are eventually abortive, except one, which forms the interior of a hard dry leathery pericarp. The seed is solitary, contains no albumen, and has an embryo with two large twisted and crumpled cotyledons, and a superior radicle. The leaves are long, broad, alternate, rolled inwards before they unfold, with strong straight veins running obliquely from the midrib to the margin, and oblong deciduous stipules rolled up like those of a *Magnolia*. The affinities of this order are with *Tiliaceæ* and *Corylaceæ* on the one side, and *Clusiaceæ* and *Ternstromiaceæ* on the other. The different species produce a number of resinous, oily, and other substances; one a sort of camphor [DRYOBALANOPS]; another a fragrant resin used in temples; a third, Gum Animi; while some of the commonest pitches and varnishes of India are procured from others. Ral, or Dhoona, a resin burned in the temples of India, is produced by *Shorea robusta*. Saul, the best timber in India, is furnished by the same tree. It contains 7 genera and 47 species.—*Eng. Cyc. p.* 353.

(3230) DIPTERIX ODORATA. TONKIN BEAN. Coumarouna odorata. A native of the woods of Guiana, used as a perfume for snuff.—*O'Shaughnessy, page* 304.

(3231) DIPTEROCARPUS, a genus of East Indian, and chiefly insular Trees, the type of the natural order *Dipteraceæ*. Blume gives the following essential characters :—" Calyx irregularly 5-lobed at the mouth; the two opposite segments very long and legulate; petals five, convolute when unexpanded; stamens numerous; anthers long, linear, terminating in an awl-shaped point; nut rather woody, and 1-celled and 1-seeded by abortion, inclosed in the enlarged calyx." The species are described as enormous trees, abounding in resinous juice, with erect trunks, an ash-coloured bark, strong spreading limbs, and oval leathery entire leaves, with pinnated veins. The flowers are large, white or pink, and deliciously fragrant. The pubescence is always stellate when present. The resinous juice of *Dipterocarpus trinervis*, a tree from 150 to 200 feet high, inhabiting the forests of Java, is made into

plaisters for ulcers and foul soles; and when dissolved in spirit of wine, or formed into an emulsion with white of egg, acts upon the mucous membranes in the same way as balsam of copaiva. *Dryobalanops Camphora*, the Camphor-Tree of Sumatra, is by some referred to this genus; but, according to Blume, is really a distinct genus.—*Eng. Cyc. page* 353. *Dipterocarpus lævis* and *turbinatus*. Dr. Helfer says that the oil of wood from these two species of dipterocarpus, or wood oil trees "laid upon paintings covers them with a transparent fine coating, not liable to turn yellow, and dries quickly." A few years ago Mr. Laidlay, the Secretary of the Bengal Asiatic Society, discovered that the oil of wood will dissolve caoutchouc. "The process adopted was simply to cut the caoutchouc into small pieces, and then drop a sufficiency into a bottle of the oil. In the course of a few hours the caoutchouc swells, and must then be frequently stirred to facilitate the process. If heat be applied, complete solution is speedily effected, but several days are required at the ordinary temperature of the atmosphere. The solution thus prepared may be spread on cloth, which is thereby rendered water-proof." Wood oil has been found to answer as a good substitute for fish oil in currying leather; and it is used for house varnish. Large quantities of this oil are used in the Tenasserim Provinces in the manufacture of torches, which emit a brilliant and durable light. A half dozen of these torches planted on an eminence make a splendid cresset, illuminating far over the plains. Speaking of these wood-oil trees, Dr. Wight remarks. "In this neighbourhood, Madras, several species are found, but all natives of hilly tracts forming the Balaghaut. In Pegu, where they abound, they occupy the plains."—*Mason.*

(3232) DIPTEROCARPUS. Sgau, *Burm.* Sour Wood Oil Tree. This is the name which the Karens give a large tree that grows on their mountains, but which produces comparatively very little wood oil.—*Mason.*

(3233) DIPTEROCARPUS ALATUS.

Aing, Burm.

This timber is called in Bengal "Battee Sal." It is excellent for every purpose of house-building, especially for posts. It is found chiefly to grow on laterite in the Tounghoo and Prome districts. Light-brown wood.—*McClelland.*

(3234) DIPTEROCARPUS GRANDIFLORUS, large flowered dipterocarpus. This is a species of wood oil tree which grows on the sandy plains near the sea-shore, and on a similar soil in the interior.—*Mason.*

(3235) DIPTEROCARPUS LÆVIS, *Hamilton. Syn.* D. turbinatus, Roxb.

Tilea gurjun, Beng.

A native of Chittagong, Pegu, Assam, Tippera, &c. The trunk grows to an immense size. This tree yields in abundance the thin balsam well known in all the Indian bazars, and called the gurjun or wood oil. To procure the balsam, Dr. Roxburgh informs us a large notch is cut in the trunk of the tree near the earth, where a fire is kept up till the wound is charred, soon after which the liquid begins to ooze out; a small gutter is cut in the wood to conduct the liquid to a receiver. The average produce is said to be 40 gallons in each season, during which it is necessary to cut off the charred surface from time to time, and burn it afresh. The process is performed during the cold season. The gurjun balsam varies in consistence from that of thick honey to a light oily liquid. The colour of a fine specimen of thick gurjun, obtained from Captain Jenkins of Assam, was a pale grey; specimens sent from Rangoon by Mr. Speir were a light brown. As found in the bazar this substance generally occurs as a brown, oily looking, semi-transparent liquid, in odour strongly resembling a mixture of balsam of copaiba with a small portion of naphtha. The essential oil, when freed from water by prolonged contact with dry chloride of calcium, and distilled a second time, is transparent and nearly colourless, of specific gravity 934, boils at 240°; it is soluble in alcohol, ether, naphtha, and the essential and fixed oils. It dissolves caoutchouc, copal, vateria resin, and solid gluten. Potassium and sodium retain their lustre in it, and undergo no change; the taste is acrid, sweetish, and heavy, its odour closely resembles that of the essential oil of copaiba. The close resemblance in the physical and chemical properties of this gurjun and copaiba balsam led to the institution of an extensive set of experiments by Dr. O'Shaughnessy on the medicinal effects of the former in the treatment of gonorrhœa. The results, which have been laid before the profession, and which have been confirmed by trials made by other practitioners, seem perfectly conclusive that, in the treatment of gonorrhœa, gleet, and similar affections of the urinary organs, the essential oil of gurjun is nearly equal in efficacy to the South American drug. The essential oil may be given in 10 to 30 drop doses in mucilage, milk, rice-water, or thin gruel, and repeated thrice, or still more frequently daily. It generally causes a sensation of warmth at the epigastrium, eructations, and sometimes slight purging. It communicates a strong smell of turpentine to the urine, which it increases remarkably in quantity. Some obstinate cases of chronic gonorrhœa and gleet, which had long resisted copaiba and cubebs, have been cured by this remedy in the course of the experiments alluded to. In the Pharmacopœia is given a formula for a solution of the essential oils of gurjun and cubebs in sulphuric ether, which affords a cheap, but perfectly efficacious substitute for the celebrated "Frank's Specific." Besides the above

species, the D. angustifolius of Wight and Arn. (D. costatus of Roxb. but not of Gaertn.), D. costatus, Gaertn. (D. incanus, Roxb.) and D. alatus, Roxb. of Pegu, afford this fluid in great abundance. Its price in the bazar ranges from 3 to 5 rupees the maund. Besides its use in medicine, it is likely to be found a perfect substitute in the arts for the expensive balsam of copaiba, now much used in the preparation of colourless varnishes and drying paints. In the coarser kinds of house and ship painting, gurjun balsum is used as an excellent substitute for linseed oil. Dr Wight and other writers speak confidently of the good effect of the gurjun oil mixed with dammar in preserving wood from the ravages of the white ant.—*O'Shaughnessy, pages* 222-224. *Dipterocarpus lævis*, the common wood oil tree produces a very useful timber, which is sawn into boards at Tavoy and Mergui, and used in house building. Where not exposed to the wet, they answer as well as teak, and are sold at half the price ; but they are not impervious to white ants.—*Mason.* Wood-oil, copaiva, of the *Dipterocarpus lævis*, is one of the most valuable products of the Tenasserim Provinces ; and the tree which produces the best quality is one of the most widely diffused of their forest trees. It yields too, very abundantly. Dr. Helfer wrote, that one trunk would produce thirty or forty gallons each season without injury to the tree. In the reports of the Agricultural and Horticultural Societies of India, it is said : "The wood-oil, properly speaking, is a balsam, obtained from several species of dipterocarpus common in many parts of India. By distillation this balsam yields volatile oil, a resin being left behind. This oil, Dr. O'Shaughnessy found to be identical in chemical composition with that of the balsam of copaiva, and he had accordingly used it extensively in his hospital, with exactly the same medicinal effects." "Nor is this article," continues the report, "likely to become of importance in medicine only ; but also in the arts, in many of which copaiva is now used. Copaiva, by the latest 'day price current,' was at five shillings and six pence the pound, while twenty pounds of the essential oil of wood may be obtained, of the very best quality, for about ten shillings."—*Mason.*

(3236) DIPTEROCARPUS TURBINATUS,

Sitgurjun, Beng. | Kauyeen, Burm.

A native of Chittagong, Tipperah, Pegu &c., to the eastward of Bengal where it grows to be an immense tree. This tree is famous all over the Eastern parts of India and the Malay islands, on account of its yielding a thin liquid balsam, commonly called wood oil. To procure the balsam a large notch is cut into the trunk of the tree about thirty inches from the ground, where a fire is kept up until the wood is charred, soon after which the liquid begins to ooze out : a small gutter is cut in the wood to conduct the liquid into a vessel placed to receive it. The average produce of the best trees during the season is said to be sometimes forty gallons. It is found necessary every week to cut off the old charred surfaces and burn it afresh. In large healthy trees abounding in balsam they even cut a second notch in some other part of the tree and clear it as at first : these operations are performed during the months of November, December, January, and February ; should any of the trees appear sickly the following season, one or more years respite is given them. Roxb. The D. costatus, a native of the coast South of Chittagong where it is called Tileyagurjum, the 'Dincanus gurjun' of Chittagong, "Dalatus" of Pegu and Mascal island, also yield the oil. Roxb.—*Rohde M.S.S.* At Hazaree ke hath, in Chittagong, 100 feet above the level of the sea, large myrtaceous trees are common, and show a tendency to the Malayan flora, which is further demonstrated by the abundance of Gurjun (*Dipterocarpus turbinatus*). This is the most superb tree we met with in the Indian forests : we saw several species, but this is the only common one here ; it is conspicuous for its gigantic size, and for the straightness and graceful form of its tall unbranched pale grey trunk, and small symmetrical crown : many individuals were upwards of 200 feet high, and fifteen in girth. Its leaves are broad, glossy and beautiful, the flowers (then falling) are not conspicuous ; the wood is hard, close-grained, and durable, and a fragrant oil exudes from the trunk, which is extremely valuable as pitch and varnish, &c., besides being a good medicine. The natives procure it by cutting transverse holes in the trunk, pointing downwards, and lighting fires in them, which causes the oil to flow.—*Hooker, Him. Jour. Vol.* II. *p.* 348. This tree furnishes timber of great size and strength. It is fit for any purpose for which Saul is employed, being of the same family. It is chiefly employed for canoe and boat building. It is found in all the forest districts, except Prome, where it is scarce. Wood, light-brown—*McClelland. Wood Oil* Kauyinsee is afforded by, and largely extracted from, *Dipterocarpus turbinatus*. It is one of the largest trees known. It is found throughout the southern as well as all the Sitang forests, disappearing curiously enough wherever the *Acacia Catechu* appears. Thus, where the latter is in perfection, in the northern part of the Tharawaddy and Prome distrcts, the wood-oil tree is rarely seen, and where the latter is found in perfection, as in the Southern forests and throughout the forests of Tounghoo, west of the Sitang, there is no *Acacia Catechu*. The wood-oil tree grows in light sandy soil, near the banks of streams, and in dense forests ; frequently attaining 18 feet in girth, with a proportionate height. The oil is extracted by cutting a large notch in the tree, a few feet from the ground,

ınd occasionally stimulating the secretion by corching the surface of the scar, which is gene- ally converted into charcoal and gives the oil a lirty black appearance.—*McClelland.*

(3237) DIRISANA GUM. The *Acacia si-issa* yields a large quantity of this clear gum. —*M. E. J. R.*

(3238) DIVI DIVI. See Cæsalpinia Co- ıiaria.

(3239) DIVI LADNER, the forbidden fruit ıf the Ceylonese. It is produced by a species of *Tabernæmontana.*—*Eng. Cyc. Vol.* ii. *p.* 365.

(3240) DISTILLED WATERS. Contain a ittle of the volatile principles of plants, and may ıe distilled either off the plants, or by distilling ome Essential Oil with water.—*Eng. Cyc.* The ıllowing waters may be made by using 2 lbs. of ıesh or 4 lbs. dried leaves to two gallons of vater; of the seeds, one pound.

Latin Names.		Native Names.
ıjwain water, ...	From seeds, Ptycho- tis Ajwain, ...	Ajouain, Javanee Beng. Hind. Nan- khoah Pers. Am- oos Arab. .....
ınise, ...	Seeds, ...	Sonf.
Iarjoram, ...	Dried leaves, ...	Murva.
;ajeput, ...	Fresh leaves, ...	Kyapooti.
;elery, ...	Seeds, ...	Hurufs.
;oriander, ...	Seeds, ...	Duniya.
ndian dill, ...	Seeds, ...	Soya.
Iemidesmus, ...	Roots, 2 lbs.	Ununtamul.
uniper, ...	Berries, ...	Hoober.
Iusk hibiscus, ...	Seeds, ...	Hub ul-musk.
;andal, ...	Wood, bruised 1 lb. ...	Sufed sandal.
;assafras, camphora glandulifera Nipal.	Bark, 1 lb.	———
;ulsi, white, ...	Fresh leaves, ...	Sufed tulsi.
;ejpata, Cinnamo- mum Tamala, Folia malabathri, ...	Leaves, ...	———

(3241) DOCKS. Docking of vessels. Along ;he greater part of the Eastern coast, of the Peninsula of India, wherever the rivers can be entered by coasting craft, docks are formed by digging a channel from the river sufficiently large to allow the vessel to be floated into it at high water: a dam is thrown across the channel and the earth being thrown into the dock thus formed the vessel is floated up above the water mark. By draining off the water the vessel is left high ınd dry imbedded in earth. This is removed to ıllow of access to the bottom of the vessel which s propped up by stones, it is usual also to place ogs under the keel. A dry dock is thus formed .bout the vessel at a small expense. The repairs ıaving been executed, it becomes necessary to ower the vessel down to that point when, the lam being removed and the water let in, she can ıe floated out. For this purpose cables are coil- ;d under her and these coils filled in with earth, ;he earth under the vessel and logs which were ılaced under her keel removed, the dock is dug ıut to its former depth, the vessel is left sus- ıended resting on the keel, by uncoiling the ables gradually the vessel is let down and is hen floated out. Ships of 400 tons are thus locked at Coringa.—*Rohde, M.S.S.*

(3242) DOCKET. This term has various meanings. In trade it is often applied to a short certificate, summary, or memorandum; and in English Law it signifies a brief in writing.—*Faulkner.*

(3243) DODDERS, Cuscuta, covered even tall trees, in the Soane valley with a golden web. —*Hooker, Him. Jour. page* 38.

(3244) DODECATHEON MEADIA, Primulaceæ. Ornamental plants, when in flower, colours, lilac, purple and white, grown in a light soil and cultivated by dividing the roots.—*Riddell.*

(3245) DODONEA VISCOSA, common on the Neilgherries: wood elastic and useful for tool handles.—*McIvor.*

(3246) DOGBANES (*Apocynaceæ*). Among this division of plants there are some which are most conspicuous for the strength of their fibres. These belong to two families of plants which are so nearly allied to each other, that they were united together by the celebrated Jussieu. Both are remarkable for abounding in milky juice; and some of them in caoutchouc, or some analogous products. Of these, the Apocynaceæ or Dogbanes are composed chiefly of trees and shrubs, of which the Oleander is a conspicuous example. But some are herbaceous, as in the case of the Vinca, or Periwinkle as it is called, which shows another characteristic, that is, the climbing habit of many of these plants, as well as the toughness of their fibre, as may easily be ascertained by trying to break any of the long, trailing twigs of this plant, so common in gardens and shrubberies. Among these, is a plant called *Nerium piscidium*, by Dr. Roxburgh, ' Fl. Ind.,' ii, p. 7, common in the Khasya or Silhet Mountains, and there called *Echalat.* It there forms an extensive perennial climber. Its bark contains a large quantity of fibre, which the natives use for the same purposes as Hemp. Dr. Roxburgh, in steeping some of the young shoots in a fish-pond, in order to facilitate the removal of the bark and to clean the fibres, found that many, if not all the fishes, were killed. Hence the specific name which he applied. Dr. Wight has formed the plant into a new genus, Echaltum. It is probable that there are many other fibre-yielding plants in this and the next family among the climbing species.—*Royle, Fib. Pl. page* 302. The *Asclepiads* (*Aclepiadeæ*).—Closely allied to the *Apocynaceæ* is the family of plants which has been named *Asclepiaceæ* and *Asclepiadeæ*, from the genus *Asclepias*, to which most of the species formerly belonged. Among these, there are several remarkable for their fibrous properties, and many more probably remain to be discovered. Though many of this family of plants abound in the hottest and moistest parts of the world, others are also found in the driest and most barren parts of Asia, with a few species ex-

tending even to the North of Africa and to the South of Europe, Siberia, North America, and Japan; and southwards, to the Cape of Good Hope and New Holland. The great majority are distinguished by their twining habit; though their flowers are often inconspicuous, their seed-vessels are remarkable for being in pairs, and which, on bursting, display a quantity of thistle-like down attached to each seed, which floats them about as those of thistles and dandelions. This down may no doubt be turned to some useful purposes, and therefore makes the plants abounding in fibre more valuable, as thus yielding a double product; though it is probably only in dry and barren parts of a couutry, that it would be desirable to attend to these, instead of to the numerous other fibrous plants which may either be more easily cultivated, or the fibre separated with greater facility.—*Royle, Fib. Pl. p.* 303.

Syrian Dogbane, Asclepias syriaca (*Asclepiadeæ*). *Syrian Dogbane—Jetee Fibre.* Of the plants of this family, useful both for its down and for its fibrous stem, we may first mention that called Syrian Dogbane, which, although a native of the burning plains of Syria, will grow in colder climes, and is indeed cultivated as far north as Upper Silesia. It is easily propagated either by seed, or by parting the roots. The plants thrive luxuriantly in light soil, but will flourish on any poor land. The silk-like down which surmounts the seed of this plant, is not more than an inch or two in length; but it has, nevertheless, been usefully applied for articles of dress manufactured of it both in France and in Russia. The fibres of the stem, prepared in the same manner as those of Hemp and Flax, furnish a very long fine thread of a glossy whiteness.—*Royle, Fib. Pl. p.* 709.

(3247) DOMBE. A soft, coarse, open-grained, light Ceylon wood, bearing a strong resemblance to inferior Honduras mahogany, takes a good polish, and presents a pretty, curled pattern; but judging from this specimen, which is much worm-eaten, it cannot be a very durable wood, at all events in its native country.—*Ex. p.* 1851.

(3248) DOMBEYA, a genus of Plants belonging to the natural order *Byttneriaceæ*, inhabiting the East Indies and the isles of France, Bourbon, and Madagascar. They have a 5-parted persistent calyx, surrounded by a 3-leaved unilateral involucel. The petals are 5. The stamens are from 15 to 20, scarcely monadelphous, five of them being sterile, with from 2 to 3 fertile ones between each sterile stamen. The name *Dombeya* was also applied to the plant now called *Araucaria excelsa*. The bark of *D. spectabilis* is made into ropes in Madagascar.—*Engl. Cyc. p.* 885.

(3249) DOMBEYA ANGULATA. A shrub; leaves cordate, acuminate, and serrate; old ones three or five-angled; flowers in corymbs, of a pretty rose colour.—*Riddell.*

(3250) DOMBEYA PALMATA, BYTTNERIACEÆ. A shrub; leaves palmate, resembling the common castor oil plant; flowers, in large terminal corymbs, rose coloured, appear in September and October.—*Riddell.*

(3251) DOMBEYA SPECTABILIS. In Madgascar, the bark of *Dombeya spectabilis* is made into ropes.—*Engl. Cyc. page* 708. In its more extended relations, the natural family of *Byttneriaceæ*, includes such genera as *Bombax, Sterculia, Abroma, Guazuma*, &c., and like that of the Mallow-worts, inhabits hot parts of the globe chiefly, and also, like it, contains a number of plants remarkable for abounding in mucilage and in fibrous bark. Of these some are employed for cordage in different parts of the world, and of them a few, as *Abroma augusta*, might probably be grown with greater profit, and yield a better product, than some of those which are now in cultivation.

(3252) DOMBEYA TOMENTOSA. A small tree with rose-coloured flowers, but smaller than the above two species.—*Riddell.*

(3253) DOMETT. A thin kind of flannel, of which the weft only is wool, the warp being composed of cotton.—*Faulkner.*

(3254) DOOM, OR DOUM, a remarkable Palm-Tree exclusively inhabiting Upper Egypt, especially the neighbourhood of Thebes, whence it is named *Cucifera Thebaica.* Its stem, instead of growing without branches like other palms, forks two or three times, thus assuming the appearance of a Pandanus. Clumps of it occur near Thebes. The fruit is about the size of an orange, angular, irregularly formed, of a reddish colour, and has a spongy, tasteless, but nutritious rind. The albumen of the seed is hard and semi-transparent, and is turned into beads and other little ornaments. Gærtner described it under the name of *Hyphæne coriacea.* It is known in Egypt as the Gingerbread-Tree, because of the resemblance of its brown mealy rind to that cake.—*Eng. Cyc. page* 385.

(3255) DOOPADA RESIN, exudes from the *Vateria Indica*, and constitutes the piney varnish. The resin is used as a fragrant incense in temples, the quantity procurable is very considerable.—*M. E. J. R.*

(3256) DOOPUTTAHS. These cloths are manufactured at various places and of different qualities and colours. Those brought from Benares are always with gold and plain lace borders of different sorts, are sold at from 25 to 350 Rupees each. Those of Arnee in the Collectorate of Chingleput, with borders of yellow cotton, are priced at from Rupees 2 to 7 each and those of Ooppada in Rajahmundry are woven with white borders and are sold at from 1½ to 3 Rupees each.

(3257) DOREMA, a genus of Plants belonging to the natural order *Umbelliferæ*. It has an epigynous cup-shaped disc; the fruit slightly compressed from the back, and edged; 3 distinct filiform primary ridges near the middle, and, alternating with them, 4 obtuse secondary ridges, the whole enveloped in wool; vittæ 1 to each secondary ridge, 1 to each primary marginal ridge, and 4 to the commissure, of which 2 are very small.—*Eng. Cyc. page* 385.

(3258) DOREMA AMMONIACUM. (Don.) *Linn. Trans.* xvi. 601.

Oshak, Pers.

Is a glaucous green plant with a perennial root, large leaves 2 feet long, somewhat bipinnate, the pinnæ in three pairs, the leaflets incisо pinnatifid, with oblong mucronulate entire or slightly-lobed segments from 1 to 5 inches long and half an inch to 2 inches broad: the petiole very large, downy, and sheathing at the base; the teeth of the calyx acute, membranous, minute; the petals ovate, reflexed at the point; the fruit elliptical, compressed, surrounded by a broad flat edge. This plant is a native of Persia, in the plains of Yerdekhast and Kumisha in the province of Irac; and near the town of Jezud Khast in very dry plains and gravelly soil, exposed to an ardent sun. This plant is one of those which yields gum ammoniacum, but it is probable that there are several species of plants which yield this as well as the other gum-resins of the order *Umbelliferæ*. (Lindley, *Flora Medica.*)—*Eng. Cyc. page* 355. The stem and fruits yield abundance of Ammoniacum resin.—*O'Sh. page* 364. This gum resin is imported into Bombay from the Persian Gulf, and re-exported to different countries. —*Faulkner*. It is obtained by incisions in the plant, and occurs in two forms,—first in voluminous masses of yellowish colour, enclosing white almond-like tears, the whole being of plastic consistence, and very impure;—secondly, in tears of irregular form, white or yellowish, opaque, rather solid, agglutinated or distinct, compact, brittle, of glassy fracture, and free from impurities. Its odour is faint and peculiar, taste sweetish and then bitter. It is partially soluble in water, ether, alcohol, alkaline solutions and acetic acid. Its *Medical effects*, are similar to, but less powerful than asafœtida. It is principally employed as an expectorant in the chronic catarrhs and asthmas of old persons. It is also applied externally as a warm and stimulating plaster.—*O'Shaughnessy, page* 365.

(3259) DOLICHOS. Under this name Linnæus included the greater part of those tropical twining Leguminous Plants which bear eatable fruit like the kidney-beans cultivated in Europe. A large number of species, ill distinguished from each other, and differing materially in the structure of their fructification, were for so long a time collected under this name that, although they are now broken up into several genera, we shall briefly notice the more remarkable in this place.

a. Dolichos itself is confined to the species with a compressed linear pod, having incomplete cellular dissepiments, and ovate seeds with a small oval hilum. Of these *D. Catiang*, the pulse of which is called Boberloo in India, is an annual, and has somewhat deltoid leaves, angular at the back, few-flowered peduncles, and erect pods. It is cultivated in the fields in many parts of India during the dry season, and its seeds are extensively consumed by the poorer natives. *D. lignosus*, a perennial, with long racemes of flowers, broad heart-shaped leaflets, and linear sharp-pointed pods, is extremely common all over India, where it is cultivated "during the cold season in gardens and about the doors of the natives, forming not only cool shady harbours, but furnishing them with an excellent pulse for their curries," &c. There are several varieties of it, constituting the commonest kidney-beans of India. *D. biflorus*, an annual, with oblong pointed leaflets and scimitar-shaped hairy pods, furnishes the pulse called in India Horse-Gram; and *D. sphærospermus* produces the Calavana or Black-Eyed Peas of Jamaica.

b. Lablab has a compressed scimitar-shaped pod, rough, with tubercles at the sutures, and furnished with transverse imperfect cellular partitions, and ovate seeds with a fungous callous linear scar. *Lablab vulgaris*, the old *Dolichos Lablab*, is a common plant in the hedges in many parts of India, whence it has travelled into the tropical parts of America. It is a smooth perennial, with showy white or purple flowers, and large horizontal pods, containing from three to four seeds. It has a heavy disagreeable bug-like smell, prefers a rich black soil that cannot be flooded by rains, and produces a coarse but wholesome pulse, much eaten by the lower classes in India.

c. Pachyrhizus has a long compressed pod, with kidney-shaped seeds and no dissepiments, and is remarkable for its principal species, *P. angulatus* (formerly *Dolichos bulbosus*), producing a root of the size and substance of a turnip. It is reported to have been carried to the Philippines from South America, and thence to have been introduced into the west of Asia. The side leaflets are nearly triangular, that in the middle lozenge-shaped, slightly toothed, and shaggy on both sides. The flowers are very beautiful, of a violet-blue colour, and arranged in axillary, nearly erect racemes, from one to two feet long. Its root is a common article of food in the Malay Archipelago, but no other part of the plant is eaten.

d. Psophocarpus. The pods are oblong, and have four longitudinal wings; the seeds are roundish. It comprehends the *Dolichos tetragonolobus*, a twining annual, the pods or tuberous roots of which are a common Indian esculent.

e. Canavalia, with long straightish compressed pods, having three short wings at the lower suture, cellular dissepiments, and oblong seeds with a narrow hilum, comprehends the South American Lima Beans and the Sword Beans of India. The species have a handsomer and firmer foliage than the other genera, and the flowers are usually large and showy. *C. gladiata* the common cultivated species, has often pods two feet long, and varies with red, gray, and white seeds. Finally, the genus,

f. Mucuna, known by its oblong, puckered, compressed, hispid pods, includes all the species from which Cowage is obtained.—*Eng. Cyc.*

(3260) DOLICHOS BIFLORUS.

Hurali, CAN.	Ulavalu, TEL.
Kulthi, HIND. and MAH.	Horse Gram, ENG.
Kollu, TAM.	

Is largely grown every where in Mysore; and much of it is exported to the Neilgherries.

Its Oil.

Moneela gram oil, ENG.	Varcadalai yennai, TAM.
Varoosanigaloo nuna, TEL.	

A pale yellow clear oil is obtained from the seed of Dolichos biflorus (?). Oil is also expressed in India from the seed of the Argemone mexicana, which is used for lamps and in medicine; and from the seeds of the cashew nut (Anacardium occidentale), from Sapindus marginatus, and the country walnut (Aleurites triloba). The fruit of the Chirongia sapida, (or Buchanania latifolia,) yields oil.

(3261) DOLICHOS BULBOSUS, Roxb. INGOMAAS. (*Manill.*) Pachyrhizus.

Ingomaas is the Manilla name of a plant which appears in Rumphius under the appellation of Cacara Bulbosa, and to which Roxburgh has given the Botanical term of Dolichos Bulbosus. It is now cultivated in Bengal, for its edible root, and was formerly introduced into the Missionary Garden at Tranquebar, by that excellent Botanist Doctor Klein, who believes that it is the plant which has been called by the English on the island of Nevis, the Turnip-tree. Rumphius says of it that its root, properly prepared, has been considered, in Amboyna, as a great delicacy.—*Ainslie, page* 249.

(3262) DOLICHOS CATIANY. Lin.

Caramunny keeray, TAM.	Lasunda, SANS.
Lobeh ke baujee, DUK.	Lobeah, HIND.
Caramunny pyre, TAM.	Alasendi, MALAY.
Chora, GUZ.	Tadagunny, CAN.
Lobeh, DUK.	Lasunda, SANS.
Duntoo Pesaloo, TEL.	

This also is a valuable pulse, much prized by the Indians. It would appear by Link's Travels, that it is cultivated in Portugal.—*Ainslie, page* 237.

(3263) DOLICHOS CULTRATUS. Thunb. Huzar Bean.

Tambatangai, TAM.	Bara mareca HORT. MAL.
Kursambul ke pullie, DUK.	Kosopulla, SANS.
Tammakaia, TEL.	

This very large hanger shaped legume when young, is eaten entire: when full grown the seeds only are used.—*Ainslie, page* 245.

(3264) DOLICHOS ENSIFORMIS.

Tbumbatun-koy, TAM.

A species of bean which climbs to a great distance. The pods are used as a substitute for French beans; before cooking, they are cut into thin slices. It is commonly cultivated; require very strong stakes. D. uniflorus and D. sinensis are cultivated for the same purpose.—*Jaffrey.*

(3265) DOLICHOS FABAEFORMIS. Lin.

Cott Averaykai, TAM.	Mutkeke pullie, DUK.
Guvarphalli, GUZ.	Goroochikoodikaia, TEL.

This legume, which is about three or four inches long, is the produce of a plant of the class Diadelphia and order Decandria, and is much prized by the natives.—*Ainslie, p.* 239.

(3266) DOLICHOS, LEGUMINOSÆ. DOLICHOS LIGNOSUS. These are twining plants. Natives of India and grow in any good soil.

(3267) DOLICHOS PILOSUS. WILD DOLICHOS. An indigenous species of dolichos with downy leaves and pods, abounds in some sections of Tenasserim.—*Mason.* In Japan a kind of butter, called mijo, is obtained from a species of the dolichos bean (Dolichos soja).—*Simmonds.*

(3268) DOLICHOS SINENSIS. LOOBEA. Asparagus Bean. This bean is sown at the commencement of the rains; it has a very long and slender pod, and is boiled and eaten as French beans; the bean itself is small.

(3269) DOLICHOS SPICATUS.

Avere, CAN.	Anumula, TEL.
Bullar, HIND.	Motche, TAM.
Val, MAH.	

This grain as above explained, is grown along with Ragi, and is used in food along with Ragi. It does not keep well, unless great care is taken in packing it in parcels, or in fact as some of the Ryots do, in placing Avere in the heart of the Ragi in caves, when it will keep good for some years. This pulse, when green, is used as a vegetable, and cattle are generally fed on the grain when dry. It is not largely exported beyond Mysore.

(3270) DOLICHOS TRANQUEBARICUS. Lin.

Pytungai, TAM.	Pesalakaia, TEL.
Lobeh ke pullie, DUK.	Rajamasha, SANS.

This is a long, slender, pleasant tasted legume, not unlike our French bean both in appearance and natural qualities. There is a larger variety of it called in Tamool, Perumpytungai; in Dukhanie, Suffaid Lobeh ka pullie; in Telingu, Duntoo

Pesalakaia, and in Sanscrit, Sveta Rajamasha.—*Ainslie p.* 244.

(3271) DOLICHOS UNIFLORUS. Lin. Variety Black Gram, Madras Horse Gram, Glycine tomentosa.

Cooloo, TAM.	Huruli, CAN.
Kulti, GUZ.	Maediree, MAL.
Kooltie, DUK.	Coolootu, SANS.
Woolavoolu, TEL.	

This is the common food of horses on the coast of Coromandel. It is a very pleasant tasted pulse, and is used by the lower classes as an article of diet.—*Ainslie, p.* 238.

(3272) DOSIA POWDER, The Japanese have a method of interment peculiar to themselves. Instead of enclosing corpses in coffins of a length and breadth proportionate to the stature and bulk of the deceased, they place the body in a tub, three feet high, two feet and a half in diameter at the top, and two feet at the bottom. It is difficult to conceive how the body of a grown person can be compressed into such a space, when the limbs, rendered rigid by death, cannot be bent in any way. The Japanese, to whom Fitsingh made this observation, told him, that they produced this result by means of a particular powder called dosia, which they introduced into the ears, nostrils, and mouth of the deceased, after which the limbs all at once acquired astonishing flexibility. As they promised to perform this experiment in his presence, he remarks, "I could do no other than suspend my judgment, lest I should condemn as an absurd fiction a fact which, indeed, surpasses our conceptions, but may yet be susceptible of a plausible explanation. The experiment accordingly took place in the month of October, 1783, when the cold was already pretty severe. A young Dutchman having died in the island of Desima, I directed the physican to cause the body to be washed and left all night, exposed to the air, on a table placed before an open window, that it might become completely stiff. Next morning, several Japanese, some of the officers of the factory, and myself, went to examine the corpse, which was as hard as a piece of wood. One of the interpreters, named Zenby, drew from his bosom a santook, or pocket-book, and took out of it an oblong paper full of a coarse powder resembling sand: this was the famous dosia powder. He put a pinch into the ears, another into the nostrils, and a third into the mouth, and presently, whether from the effects of this drug, or of some trick which I could not detect, the arms, which had before been crossed over the breast, dropped of themselves, and in less than twenty minutes, by the watch, the body recovered all its flexibility. I attributed this phenomenon to the action of some subtle poison, but was assured that the dosia powder, so far from being poisonous was an excellent medicine in difficult labours. In such cases, a cup of hot water, in which a little of the dosia powder, tied in a bit of white rag, has been infused, is adminstered to the patient, who is then sure to obtain a safe and speedy delivery. The dosia powder is likewise recommended as the most efficacious remedy for diseases of the eyes. An infusion of this powder, taken even in perfect health, is said to have virtues which cause it to be in great request among the Japanese of all classes. It cheers the spirits and refreshes the body. It is carefully tied up in a piece of white cloth and dried, after being used, as it will serve a great number of times. The same infusion is given to people of quality when at the point of death: if it does not prolong life, it prevents rigidity of the limbs; and the body is not exposed to the rude handling of professional persons—a circumstance of some consequence in a country where respect for the dead is carried to excess. I had the curiosity to procure some of this powder, for which I was obliged to send to Kidjo, or the nine provinces, to all the temples of the Singous, which enjoy the exclusive sale of it, because they practise the doctrine of Kobou-Daysi, its inventor. It was after the death of this Kobou-Daysi, in the second year of the nengo-zio-wa (A. D. 825), that this sand came into general use in Japan. The quantity obtained in consequence of this first application was very small, and even this was a special favour of the priests, who otherwise never part with more than a single pinch at a time. At my departure in 1784, however, I carried with me a considerable quantity of the dosia powder. Part was put up in lots of twenty small packets each, with the name written on the outside in red characters, the rest was in small bags: this was only a coarse powder, in which were to be seen here and there particles of gold, and which probably was not yet possessed of the requisite virtues. One small packet only had undergone the chemical operation which ensures its efficacy, and this was a powder as white as snow. The discovery of the dosia powder is ascribed to a priest named Kobou-Daysi: he became acquainted with the properties of this valuable mineral on the mountain of Kongosen, or Kimbensen, in the province of Yamotto, where there are many mines of gold and silver, and carried a considerable quantity of it to the temple to which he belonged, on the mountain of Kojas-an. The priests of this temple continue to chant hymns of thanksgiving to the gods who led Kobou-Daysi to this important discovery. When their stock is exhausted, they fetch a fresh supply from the mountain of Kongosen, and carry it away in varnished bowls. In all ages the common people are apt to attribute phonomena surpassing human comprehension to the agency of celestial spirits; and, accordingly, the priests do not fail to pretend that the dosia powder owes all its efficacy to the

favour of their prayers. As soon as the new supply arrives, it is put into a basin, varnished and gilt, and set before the image of the god, Day-nitsi or Biron-sanna. The priests, ranged in a circle before the altar, and turning between their fingers the beads of a kind of rosary, repeat for seven times twenty-four hours a hymn called Onomio-Singo, the words of which are:—

> Or o bokja Biron sanna nomaka fodora mani
> Fando ma, zimbara fara, fare taja won.

The priests assert, that, after this long exercise, a kind of rustling is heard in the sand; all the impure particles fly out of the vessel of themselves, and nothing is left but the purified dosia powder, which is then divided among all the temples of the Singous.—*Titsingh's Illustrations of Japan, p.* 283. Instead of enclosing the bodies of the dead in coffins of a length and breadth proportionate to the stature and bulk of the deceased, they place the body in a tub, three feet high, two feet and a half in diameter at the top, and two feet at bottom. It is difficult to conceive how the body of a grown person can be compressed into so small a space, when the limbs, rendered rigid by death, cannot be bent in any way. The Japanese, to whom I made this observation, told me that they produced the result by means of a particular powder called Dosia, which they introduce into the ears, nostrils, and mouth of the deceased, after which the limbs all at once, acquire astonishing flexibility. I attributed this phenomenon to the action of some subtle poison, but was assured that the Dosia powder, so far from being poisonous, was a most excellent medicine in child bearing, for diseases of the eyes, and for other maladies. An infusion of this powder, taken even in perfect health, is said to have virtues which cause it to be in great request among the Japanese of all classes. It cheers the spirits and refreshes the body. It is carefully tied up in a white cloth and dried, after being used, as it will serve a great number of times before losing its virtues. "The same infusion is given to people of quality when at the point of death; if it does not prolong life, it prevents rigidity of the limbs; and the body is not exposed to the rude handling of professional persons, a circumstance of some consequence in a country where respect for the dead is carried to excess. Titsingh, however, obtained a considerable quantity afterwards, which he carried home with him in 1784. It has the appearance of sand, and when it is fully perfected for use is as white as snow. It is obtained on the mountain of Kongosen or Kinbeusen in the province of Yamatto, where there are many mines of gold and silver. The process by which it is prepared is the secret of the priests. Their knowledge is doubtless the result of accidental experience, for their acquaintance with chemistry is so light that we may safely conclude they do not understand the rationale of its preparation.—*American Expedition to Japan, page* 72.

(3273) DRACÆNA, a genus of Endogenous Plants of the natural family *Asparageæ* of Jussieu, now arranged as a section of *Liliaceæ* by Dr. Lindley. The genus was established by Linnæus, and named from one of its species yielding the resinous exudation, familiarly known by the name of Dragon's Blood, a translation of the Arabic name Dum al Akhwain, met with in Avicenna and other Arabian authors. *Dracæna* is characterised by having an inferior 6-partite perianth, of which the segments are nearly erect, and have inserted on them the 6 stamens, with filaments thickened towards the middle and linear anthers. The style is single, with a trifid stigma. The berry 2 or 3-celled, with its cells 1 or 2-seeded. The species of *Dracaena* are now about 30 in number, and found in the warm parts of the Old World, and in many of both Asiatic and African islands, whence they extend southward to the Cape of Good Hope and Australia, and northward into China; and to the eastern parts of India, as the districts of Silhet and Chittagong. Species are also found in Socotra, and the Canary and Cape Verd Islands, as well as at Sierra Leone. From this distribution it is evident that the species require artificial heat for their cultivation in England. They are found to thrive in a light loam, and may be grown from cuttings sunk in a bark bed. The species of *Dracaena* are evergreens, either of a shrubby or arboreous nature; and having long, slender, often columnar stems, they emulate palms in habit. Their trunks are marked with the cicatrices of fallen leaves; the centre is soft and cellular, having externally a circle of stringy fibres. The leaves are simple, usually crowded together towards the end of the branches, or terminal like the inflorescence; whence we might suppose that the name *terminalis* had been applied to some of the species, if Rumphius had not stated that it was in consequence of their being planted along the boundaries of fields. The structure of the stem and leaves is particularly interesting, as the fossil genera *Clathraria* and *Sternbergia* have been assimilated to *Dracaena*, the former by M. Adolphe Brongniart, and the latter by Dr. Lindley; and as Rumphius compares the leaves of a *Dracaena* with those of *Galanga*, it is as probable that the fossil leaves called *Cannophyllites* may be those of a plant allied to *Dracaena*, as that they belong to one of the *Cann*. Of the several species of *Dracaena* which have been described by botanists, there are few which are of much importance either for their useful or ornamental properties. Among them however may be mentioned *D. terminalis*, a species rather extensively diffused. The root is said by Rumphius to be employed as a demulcent in cases of diarrhœa, and the plant as a signal of truth and of peace in the Eastern

Archipelago. In the islands of the Pacific Ocean a sweetish juice is expressed from its roots, and afterwards reduced by evaporation to a sugar, of which specimens were brought to Paris by Captain D'Urville from the island of Tahiti (Otaheite). The root is there called Ti or Tii, and thence no doubt corrupted into Tea-Root by the English and Americans. M. Gaudichaud mentions that in the Sandwich Islands generally an intoxicating drink is prepared from this root, to which the name Ava is often applied, as well as to that made with the roots of *Piper methysticum*. —*Eng. Cyc.*

(3274) DRACÆNA. The singular red leaved Chinese iron-wood is a member of the Liliaceæ; it is chiefly noticeable for its long red leaves.—*William's Middle Kingdom, p.* 279.

(3275) DRACÆNA ATROPURPUREA. DRAGON TREE. Two or more species of the dragon tree, resembling small areca palms are seen in Burmese compounds, but the most common is the one with dark purple leaves.—*Mason.*

(3276) DRACÆNA DRACO is the best known species, not only from its producing Dragon's Blood, but also from one specimen having so frequently been described or noticed in the works of visiters to the Canary Islands. The erect trunk of the Dragon-Tree is usually from 8 to 12 feet high, and divided above into numerous short branches, which terminate in tufts of spreading sword-shaped leaves, pointed at the extremity. The most celebrated specimen of this tree grows near the town of Orotava, in the island of Teneriffe, and was found by Humboldt in 1799 to be about 45 feet in circumference. Sir G. Staunton had previously stated it to be 12 feet in diameter at the height of 10 feet; and Ledru gave even larger dimensions. It annually bears flowers and fruit; and though continuing thus to grow, does not appear much increased in size, in consequence of some of its branches being constantly blown down, as in the storm of July 1819, when it lost a great part of its top. The great size of this enormous vegetable is mentioned in many of the older authors; indeed as early as the time of Bethencourt, or in 1402, it is described as large and as hollow as it is now; whence, from the slowness of growth of Dracænas, has been referred the great antiquity of a tree which four centuries have so little changed. Humboldt indeed remarks that there can be no doubt of the *Dracaena* of Orotava being, with the Baobab (*Adansonia digitata*), one of the oldest inhabitants of our planet; and as tradition relates that it was revered by the Guanches, he considers it as singular that it should have been cultivated from the most distant ages in the Canaries, in Madeira, and Porto Santo, although it comes originally from India. This fact he adduces as contradicting the assertion of those who represent the Guanches as a race of men completely insulated from the other races of either Asia or Africa. To this it may be replied that we know too little of the botany of the interior of Africa to be able to draw from it any inferences; while the Dragon-Tree on the other hand is not known to exist farther to the eastward than the island of Socotra.—*Eng. Cyc.*

(3277) DRACOCEPHALUM ALTAIENSE. LABIATÆ. Many of these species are well known, amongst which is the D. Canariense, the balm of Gilead, with pretty blue flowers: the scent only lies in the leaves, and the plant seldom exceeds eighteen inches in height, the other species have large splendid blue flowers, and easily reared from seed; the plants are best grown in pots.—*Riddell.*

(3278) DRACONINA, a sub-family of Saurians belonging to the family Agamidæ, the tribe Strobilosaura, and the sub-order Pachyglossæ of Dr. J. E. Gray's arrangement.—*Eng. Cyc. Vol.* ii. *p.* 388.

(3279) DRACONTIUM POLYPHYLLUM. Lin. Wild carway Root.

Caat Carnaukalung, TAM	Adivie cunda gudda, TEL.
Junglie kunda ka gudda, DUK.	Kanana cunda, SANS.

This root after having undergone certain preparations, to subdue a little its acrimony, is supposed to possess anti-spasmodic qualities, and is considered as a valuable remedy in asthmatic affections, given to the quantity of twelve or fifteen grains in the course of the day. It is also one of the many remedies the Natives use in cases of Hemorrhois (Piles). In the dry condition in which we find it in the bazars, it has, though faint, a smell not unlike that of musk.—*Ains. Mat. Med. page* 73.

(3280) DRAGONS BLOOD.

Damulakhwain, ARAB.	Jaranang, PALEMB.
Indarume, DUK.	Khun-i-shavan, PERS.
Sangdragon, FR.	Catukamrigarakta, SANS.
Drachenbluth, GER.	Kandamoor-garittum, TAM.
Heeraduckkun, GUZ. HIND.	Catgamurgum, nitooru, TEL.
Sanguis Draconis, LAT.	

A dark-red, inodorous, insipid, resinous, colouring principle, mixed with benzoic acid, and other substances, and obtained from the surface of the ripe fruit of several species of palm indigenous to Hindustan, Cochin-China, and the Eastern Islands, especially Sumatra, at the towns of Jambi and Palembang, in which, and also in some parts of Borneo, this resin is chiefly procured. It is met with variously modified, sometimes in the form of drops or tears; of reeds or rods from 12 to 18 inches long, about the thickness of the finger, with the fronds of the palm wrapt round them; in masses or small pieces of a violet colour; while a spurious sort, composed of olibanum, turpentine, gum-senegal, &c. is not unfrequently substituted for the genuine article. Dragons Blood is employed as a colouring matter, as an ingredient in varnishes, and in the composition of tooth-powder: it is now seldom used as a medicine. It is imported into Bombay from Singapore, and is occasionally re-exported to England.—*Faulkner.* Dragons blood or Djamang,

is the produce of species of Calamus. Those which chiefly yield it are the *C. petmeus* (Lour.) *C. rudentum* (Lour.), *C. verus* (Lour.) and *C. draco* (Willd.), of which the last three were by Linnæus reckoned mere varieties of the *C. rotan* (Linn.) They are natives only of Hindustan, Cochin China, and the Moluccas. The ripe fruits are covered with a reddish-brown dry resinous substance, which is the Dragon's Blood. In this state they are collected, and allowed to remain in rice-mills till the resin drops off. The resin is afterwards melted, either by the natural warmth of the air or by artificial heat, and then moulded into the different forms in which it occurs in commerce. Another mode of obtaining it is as follows:—The ripe fruits are shaken in bags, and the resin so obtained is formed into pieces about the size of a bean, which are then wrapped up in leaves; this kind is much prized in the East Indies, A second sort is procured by throwing together the fruits after they have been treated in the foregoing manner, melting them in the sun or with a slow fire, and collecting what exudes, which is then formed into small four-cornered cakes. A third sort is obtained from what remains after the two foregoing processes, being run out and formed into round cakes, which contain hard portions of the fruit. According to other accounts, the finest sort is procured by exposing the fruits to the vapour of boiling water, and scraping off the soft resin as it exudes—*Eng. Cyc page* 713. Dragon blood, is the product of a palm, *Calamus Draco*, a native of Sumatra and the Malay Islands. The natural secretion of the fruit constitutes the best "*D'jurnang*," or Dragon's blood. A second and rather inferior kind is produced, by heat and bruising, the fruit, from which the natural secretion has been removed: the third, and most inferior, seems to be the refuse of the last process: it is perhaps doubtful whether it is ever procured from the plant by incisions. Large quantities of this drug are annually sent from Borneo to Singapore and Batavia, and thence to China, where it is much prized. In Europe, it is a constituent of some tooth-powders, and tinctures, and is also, and chiefly, used for colouring spirit and turpentine varnishes.—*Seeman*. This resinous gum has been long known; it received its present singular name from the ancient Greeks, who used it extensively. It is the concrete juice of the *Calamus rotang*, or rattan which grows wild in Borneo and Sumatra. It is found in the market either in oval drops, or in large and impure masses composed of several tears. That which is good is of a bright crimson when powdered, and if held up to the light in masses, is semi-transparent. The tears are usually the firmest, and the most resinous and pure. If it is black when made fine, or very friable in the lump, it is inferior. It is often adulterated with other gums; but that which is genuine melts readily and burns wholly away, scarcely soluble in water, but fluent in alcohol; while the simulated crackles instead of burning, and dissolves in water. Its uses are various in painting, medicine, varnishing, and other arts. The best is procured at Banjermassing Borneo, from whence it is carried to Singapore, and thence to the Chinese market in reeds, at $15 a $35 per pecul; the importation is principally in native vessels. The price in China varies from $80 to $100 a pecul after purifying and refining. The Chinese hold this gum in much estimation, and are the principal consumers of it in the East.—*Compendious Description*. This colouring substance is a granular matter adhering to the ripe fruit of a species of ratan, Calamus draco, and obtained by beating or thrashing the fruit in little baskets, Within the Archipelago, the principal place of production is Jambi on the north-eastern side of Sumatra. The plant is the wild produce of the forest, and not cultivated, although some care is taken to preserve it from destruction. The collectors of dragon's-blood are the wild people called Kubu, who dispose of it to the Malays, at a price not much exceeding a shilling a pound. The whole quantity produced in Jambi is said to be about 1000 hundredweights. The article is often adulterated by a mixture of damar. The best kind imported into Europe in reeds, is manipulated by the Chinese. The canes of the male plant used in former times to be exported to Batavia, and very probably formed the "true Jambees," commemorated in the Spectator as the most fashionable walking-sticks in the reign of Queen Anne.—*Crawfurd Dictionary, page* 123.

(3281) DRAGON CANE, is a kind of rattan, strong, springy and much valued. They occur both light and dark coloured: a variety with a soft bark is called Manilla Dragon Cane.—*Seeman*.

(3282) DRAPORE, a hard, fine, rather close-grained, somewhat heavy, Ceylon wood.

(3283) DRESSES, MUSLIN, WORKED. The Mahomedans of Madras are famed for the excellence of the flowered work on the Muslin dresses of ladies. They are sold at from Rs. 7 to Rs. 70 each.

(3284) DROGUE AMERE, a compound of mastic, frankincense, myrrh, aloes, and kreat.

(3285) DROSERA INDICA AND D. PELTATA. SUNDEW. In Tenasserim, there is frequently seen a delicate flower, so small that it is passed unnoticed by most observers, which is a species of drosera, that curious genus of the sundew tribe, which produces Venus' fly-trap. There are two different species at Tavoy.—*Mason*.

(3286) DRYOBALANOPS, a genus of Plants belonging to the natural order *Dipterace*æ, established by the younger Gærtner from specimens of the fruit found in the Banksian collection, supposed by him to belong to the tree which yielded the best cinnamon; but Mr. Colebrook,

from specimens sent to Dr. Roxburgh, which in the absence of the latter he received, ascertained that the fruit belonged to the Camphor-Tree of Sumatra, which he accordingly named *Dryobalanops camphora*, "until its identity with *D. aromatica* (of Gærtner) be established." ('Asiat. Researches,' xii.) Dr. Roxburgh had, in his manuscript 'Flora Indica,' already named it *Shorea camphorifera*. Some botanists are of opinion that the genus is not sufficiently distinguished from *Dipterocarpus*; but Blume, the latest author, and one who has had the fullest opportunity of examining the subject, has, in the article on *Dipterocarpeæ* in his 'Flora Javæ,' given it as his opinion that *Dryobalanops* should be kept distinct; as, like *Shorea*, it has all five instead of only two of its sepals prolonged into long foliaceous wings, while its cotyledons are unequal and rumpled. According to Blume the existence of this camphor-yielding tree was first indicated by Grimm in 'Ephem. Nat. Cur.' Kæmpfer was so well acquainted with its distinctness that in describing the Camphor-Tree of Japan (*Laurus camphora*) he says, "that natural camphor of crystal-like appearance, which is scarce and of great value, is furnished by a tree of Borneo and Sumatra, which is not of the Laurel genus." The first notice of the tree is in the 4th volume of the 'Asiatic Researches,' where we learn that a tree named Tappanooly on the west coast of Sumatra yielded about three pounds of camphor, and at the same time nearly two gallons of camphor-oil; that the tree resembles the bay in leaves, is fond of a rich red loam tending to a blackish clay, and that it grows principally on the north-west coast of Sumatra, from the Line to 3° N. lat. The fullest account is given by Mr. Prince, resident of Tappanooly, who describes the tree as growing spontaneously in the forests, and as being found in abundance from the back of Ayer Bongey as far north as Bacongan, a distance of 250 miles: he says that it may be classed among the tallest and largest trees that grow on this coast, several within daily view measuring 6 or 7 feet in diameter; but it will produce camphor when only 2½ feet in diameter. The same tree which yields the oil would produce camphor if unmolested, the oil being supposed to be the first state of the secretion, which ultimately changes into concrete camphor, as it occupies the same cavities in the trunk which the camphor afterwards fills; consequently it is found in young trees. The produce of camphor of a middling-sized tree is about eleven pounds, and of a large one double that quantity. ('Fl. Ind.' ii., p. 616.) This kind of camphor is very highly esteemed by the Chinese. It is commonly called Malay Camphor, or Camphor of Barus, from the port of Sumatra, whence it is mostly shipped. Its price in China is one hundred times greater than that of the common camphor of commerce.

(M'Culloch, 'Com. Dict.') In the same work it is mentioned that camphor-oil being nearly as cheap as spirits of turpentine, might perhaps be profitably imported into England as a substitute for the article, or for medicinal use. Camphor, which in many respects resembles the essential oils, has been shown by Dumas to be an oxide of hydrocarbon, indentical in composition with pure oil of turpentine; hence the term Camphene has been applied to it. But Dr. Thomson informs us that its camphor oil differs in some respects from camphene, as he was not able to produce camphor with the same facility or in equal quantity by driving a stream of oxygen gas through highly-rectified oil of turpentine, which Dumas regards as pure camphene.—*Eng. Cyc.* The *Dryobalanops camphora*, Colebrook; *D. aromatica*, Gaertner, is a large forest tree, and as far as is known, confined to a few parts of the islands of Sumatra and Borneo, but in these abundant. Its camphor is secreted in crystalline masses naturally, into cavities of the wood. It supplies this camphor only after attaining a considerable age. In its young state it yields, however, by incision, a pale yellow liquid, called the liquid camphor of Borneo and Sumatra, which consists of resin and a volatile oil having a camphorated odor. An account of this tree, and of the mode of procuring the peculiar and high-priced camphor which it yields, is given by Dr. Junghuhn, who has travelled lately in Sumatra, and Prof. De Vriese, of Leyden, in the "Nederlandsch Kruidkundig Archief" for 1851. An abstract of the memoir, translated into English by Miss De Vriese, is published in "Hooker's Journal of Botany" for February and March 1852:—The Dryobalanops is a gigantic tree, rising for fifty or even a hundred feet above those which compose the chief mass of the forests where they grow, just as the steeples of the churches appear above the roofs of the houses in a town. The trunks of the full-grown tree are from 7 to 10 feet in diameter at the very base, and from 5 to 8 feet higher up; they rise to the height of 100 or 130 feet, and their ample crown is from 50 to 70 feet in diameter. The tree has a limited range, being confined to the seaward slope of the mountains of south-western Sumatra, most abundant on the lower slopes and the outlying hills of the alluvial plain, and extending in latitude from 1 deg. 10m. to 2 deg. 20m. N., and perhaps further to the north. Camphor oil occurs in all the trees, and is most abundant in the younger branches and leaves. The solid camphor is found only on the trunks of older trees, especially in fissures of the wood, and in smaller quantity than is generally supposed. Colebrooke, and authors who have copied from him, assert that camphor is found in the heart of the tree in such a quantity as to fill a cavity of the thickness of a man's arm, and that a single tree yields about eleven pounds. The price of this camphor, which at

Padang sells for about 340 dollars per hundredweight, suffices to show that the account is much exaggerated. The camphor occurs only in small fissures, from which the natives, having felled the trees and split up the wood, scrape it off with small splinters or with their nails. From the oldest and richest trees they rarely collect more than two ounces. After a long stay in the woods, frequently of three months, during which they may fell a hundred trees, a party of thirty persons rarely bring away more than 15 or 20 pounds of solid camphor, worth from 200 to 250 dollars. The variety and price of this costly substance are enhanced by a custom which has immemorially prevailed among the Battas, of delaying the burial of every person who, during his life, had a claim to the title of Rajah (of which each village has one) until some rice, sown on the day of his death, has sprung up, grown and borne fruit. The corpse, till then kept above ground among the living, is now, with these ears of rice, committed to the earth, like the grain six months before, and thus the hope is emblematically expressed that, as a new life arises from the seed, so another life shall begin for man after his death. During this time the corpse is kept in the house, enclosed in a coffin made of the hollowed trunk of a Durion, and the whole space between the coffin and the body is filled with pounded camphor, for the purchase of which the family of the deceased Rajah frequently impoverish themselves. The camphor oil is collected by incisions at the base of the trunk, from which the clear balsamic juice is very slowly discharged. In Sumatra the best camphor is obtained in a district called Barus, and all good camphor bears that local name, being known in commerce as Brass Camphire, Borneo Camphor, Camphor of Baras, Malay Camphor. (Bruss-capoor, *Guz. Hind*.) It appears that the tree is cut down to obtain the gum and that not in one tenth of the trees is it found. Barus camphor is getting scarce, as the tree must be destroyed before it is ascertained whether it is productive or not. About 800 piculs are annually sent to China. The proportion between Malay and Chinese camphor is as eighteen to one; the former is more fragrant and not so pungent as the latter. Nine hundred and eighty-three tubs of camphor were exported from Java in 1843; 625 bales were imported in 1843, the produce of the Japanese empire, and 559 piculs exported from Canton in 1844. The price of unrefined camphor in the Liverpool market in July, 1853, was £4 to £4 10s, the cwt. There have been no imports there direct in the last two years.—*Simmonds*. Borneo camphor, as found in the wood of the Dryobalanops camphora, is in white crystalline fragments. Sp. G. 1·009. Its odour is not of so diffusable a nature, otherwise it closely resembles the camphor from the Camphora officinarum.—*Royle, page* 536. The wood of the camphor tree is good timber, suited for house and ship-building.—*Crawfurd's Dictionary, page* 81. The liquid camphor of the same tree appears of the nature of Camphogen. Dr. A. T. Thomson, by passing a current of oxygen gas through it, converted it into camphor.—*Royle*. The oil, both in a fluid and solid state, is found in the body of the tree where the sap should be, but not in all trees. The liquid oil is abundant, and little appreciated, but the concrete bears a very high price, which depends wholly on its scarcity and the fancy of the Chinese and Japanese, who ascribe high medicinal virtues to it which it probably possesses in no higher degree than the cheap article which they themselves obtain by the distillation of the wood of the Cinnamomum camphora, and which may be had in the same markets for about one hundredth part of the price. The Malay name is a slight corruption of the Sanscrit one, karpura. To distinguish it from the camphor of China and Japan, the wood Barus is annexed, being the name of the sea-port of the western coast of Sumatra, from which the article was principally exported from that island. From what Barbosa says, it is to be presumed that both the Malay and Chinese camphor were in use by the Hindus before the arrival of Europeans. The prices of the different sorts reduced to present Indian weights and moneys will be as they existed in Malabar and Calicut in the beginning of the sixteenth century, as follows: coarse camphor, in cakes (canfore grossa in pani), from 40 to 45 Spanish dollars, the picul of 133⅓ pounds, which is about double the present price at Singapore; camphor, to use internally, and for the eyes (canfora da mangiar, e per gl' occhi) 1360 dollars the picul, which is probably no more than 35 per cent. above existing prices in Singapore. There was also a sort used for anointing the idols (per ugner gl' idoli) at half the price of the last. These two must have been Malay camphor, while the first, from its low price, must have been Chinese or Japanese.—*Crawfurd Dictionary, page* 81.

(3287) DRY ROT, a well-known disease affecting timber, and particularly the oak employed for naval purposes. When dry rot is produced by the attacks of fungi, the first sign of it consists in the appearance of small white points, from which a filamentous substance radiates parallel with the surface of the timber. This is the first stage of growth of the spores of the fungus, and the filamentous matter is their thallus or spawn. As the thallus gathers strength it insinuates its filaments into any crevice of the wood, and they, being of excessive fineness, readily pass down and between the tubes from which the wood is organised, forcing them asunder, and completely destroying the cohesion of the tissue. When the thalli of many fungi interlace, the radiating appearance can no longer be remarked; but a

thick tough leathery white stratum is formed wherever there is room for its development, and from this a fresh supply of the destructive filamentous thallus is emitted with such constantly increasing rapidity and force, that the total ruin of timber speedily ensues where circumstances are favourable for the growth of the fungi. It is generally stated that dry rot consists of the thallus of *Merulius lacrymans*, or *Polyporus destructor*, two highly-organised fungi, whose fructification is sometimes found upon rotten timber. But it is a great mistake to suppose that dry rot belongs exclusively to those two species, or that they are even the common origin of it: on the contrary, there is reason to believe that any of the fungi that are commonly found upon decaying trees in woods are capable of producing dry rot, and it is quite certain that one of the most rapidly-spreading and dangerous kinds is caused by the ravages of different species of *Sporotrichum*. The latter throw up from their thallus whole forests of microscopic branches loaded with reproductive spores, of such excessive smallness that they may insinuate themselves into the most minute crevices or flaws even in the sides of the tubes of which timber consists, and they are infinitely more dangerous than *Merulii* or *Polypori*, which seldom fructify. The circumstances that are most favourable to the development of the dry rot fungi are damp, unventilated situations, and a subacid state of the wood. The latter condition, especially in oak, is easily produced by a slight fermentation of the sap which remains in the timber, especially if the latter has not been well-seasoned before being employed. It has been proved experimentally that fluids which, in their ordinary state, will not produce fungi, generate them abundantly if ever so slightly acidulated. Dutrochet found that distilled water holding in solution a small quantity of white of egg will not generate fungi in a twelvemonth, but upon the addition of the minutest quantity of nitric, sulphuric, muriatic, phosphoric, oxalic, or acetic acid, it generated them in eight days' time in abundance. Alkalescent infusions possess the same property. This observer states that the only poisons which will prevent the appearance of fungi are the oxides or salts of mercury. A solution of fish-glue yields fungi rapidly and in great abundance; but a small quantity of red precipitate or corrosive sublimate destroys this power entirely. It is moreover an important fact that no other mineral preparation has any such properties. Dutrochet ascertained that other metallic oxides acted differently. Oxides of lead and tin hastened the development of fungi; those of iron, antimony, and zinc, were inert; and oxides of copper, nickel, and cobalt, although they retarded the appearance of fungi, yet did not prevent their growth in the end. These facts are confirmed by the experience of the use of Kyan's process for preparing timber, which consists in submitting the wood to the action of corrosive sublimate. Immersing the wood in chloride of zinc also prevents the attack of fungi, and also submitting it to the action of the vapour of creasote. Dry rot also occurs in animals. Specimens of hymenopterous insects resembling wasps have been brought from the West Indies with a fungus allied to *Sphæria militaris* growing from between their anterior coxæ, and it is positively asserted by travellers that the insects fly about while burdened with the plant. Upon opening the bodies of the wasps they are found filled with the thallus of the fungus up to the orbits of the eyes and the points of the tarsi: the whole of the intestines being obliterated. In such cases it is to be supposed that the thallus of the Sphœria first kills the wasp by compressing and drying up the body, and then, continuing to grow, occupies the whole of the cavity of the shell of the insect. A more common instance of animal dry rot is the disease in silkworms called La Muscadine. Silkworms of all ages are occasionally liable to become sickly and to die, soon after death becoming stiff, and acquiring such a degree of firmness as to be readily broken. They then throw out from their surface a sort of white efflorescence, which is the fructification of the fungus called *Botrytis Bassiana*, their inside being filled by the thallus of the same plant. If some healthy caterpillars are placed beneath a bell-glass, along with a small portion of worm killed by the *Botrytis*, they soon catch the disease, exhibit the same symptoms as those already mentioned, and eventually perish; having, no doubt, been infected either by rubbing themselves against the dead worm, or, which is more probable, having received upon their skins the infinitely minute seeds dispersed by the *Botrytis*. If healthy crysalids are inoculated by the introduction below their shell of a little of the *Botrytis* matter upon the point of a needle, they also sicken and die. In these cases effects are produced upon insects similar to those upon timber; that is to say, vitality in the one case and cohesion in the other is destroyed by the growth of the thallus of certain fungi, which spread with great and irresistible rapidity, and fructify where occasion offers.—*Eng. Cyc.*

(3288) DRYANDRA CORDATA of Thunberg, the tung-eu of the Chinese, is valuable on account of the quantity of oil found in its seeds, and the tallow-tree, Stillingia sebifera, which furnishes both tallow and oil. Here and there were plantations of the common Chinese pine, and the lance-leaved one known to botanists as *Cunninghamia lanceolata.*—*Fortune's Tea Districts, page* 57. The tallow-tree (*Stillingia sebifera*) and the "Tung-eu" (*Dryandra cordata*, Thunberg) both produce articles of export. The former is well known to produce the tallow and oil so

much in use in China: the latter furnishes a valuable oil which is used in mixing with the celebrated varnish of the country, and hence this tree is often called the varnish-tree.—*Fortune's Tea Districts, page* 119. Dryandra cordata, or wu-tung of the family Proteaceæ, is one of the favourite trees of the Chinese, for its beauty, the hard wood it furnishes, and the oil extracted from its seeds.—*William's Middle Kingdom, p.* 281.

(3289) DUBBER.

Dubber, or Dupper, Guz. Hind. | Sidde, Tel.

Are vessels of various capacities, generally from 5 to 15 gallons, formed of thin untanned goat-skin. They are manufactured in many parts of India, where they are employed to contain chiefly oils and ghee.—*Faulkner.* Dubbers are bottles formed of skins, and used for holding and conveying spirits, oil, ghee &c. They are made of all sizes, from a quart to 10 or 20 gallons, they are formed of untanned goat skins by stretching them when wet over unburned hollow clay-forms, the edges being well rubbed down on the lower skin to cause adhesion. The clay core is readily removed after the bottle is dried in the sun.—*Rohde M.S.S.*

(3290) DUGONG, Malay. The Dugong is an inhabitant of the narrow seas of the Eastern Archipelago. Professor Owen has denominated the Dugong of the archipelago, *Halicore indicus*, in distinction from that of the northern coast of Australia, at a time when the former had not been ascertained to frequent (as a Dugong of some kind is now known to do) the Malabar coast and Gulf of Calpentyn in Ceylon; but it still remains to be proved that this is the true Malayan Dugong, however little reason there may seem to doubt it,—as there might equally have seemed little cause to suspect the distinctness of the *Halicore australis!*

(3291) DUKU. The Malay and Javanese name of a tree and fruit of the genus Lansium, and natural order Meliaceæ of botanists. To the same genus belong the langseh, langsat or langsab, for in all these forms the word is written, the rambeh and the ayar-ayar, probably all four but varieties of the same species. The duku is the most esteemed of them, and to the European palate is the best of the native fruits of the Archipelago, after the mangostin. The natives class it after the durian and mangostin. It is of the size of a pigeon's egg, of globular form, and covered with a coriaceous skin of the colour of parchment. The species seems to be indigenous in the western portion of the Archipelago, but to have been introduced into the Philippines, where one variety of it, the langseh, is cultivated.—*Crawfurd Dict. page* 125.

(3292) DULCAMARA. The Dulcamara contains an active narcotic alkali, Solanine. This preparation is narcotic and diuretic: dose dr. ½ to oz. 1, thrice daily. It is very desirable to ascertain whether the Indian species, solanum nigrum, Arrub-ul-saleb, possesses similar virtues. (See Dispensatory, p. 462.)—*Beng. Phar. p.* 277.

(3293) DUMREE, a small copper coin (formerly) current in the Carnatic; now rarely seen.

(4294) DUNGAREE.

Dungaree, Guz. & Hind. | Datta, Tam.
Dungaree, Tel.

The Indian name of a coarse cotton fabric, manufactured in various parts of India, and used by the poorer classes of natives. The stouter kinds are much employed in the making of sails for native sailing vessels. On the Malabar Coast, and in Guzerat, dungaree is largely manufactured.—*Faulkner.* Dungaree is a kind of cloth woven with two or more threads together in the web and woof; it is generally used for sails of country ships, and would no doubt be advantageously employed for the occasional light sails for larger ships, being more easily handled than European canvas. Superior descriptions are made with the web and woof, or web only, twisted either wet or dry, but this becomes as expensive as the best English canvas: the present price of the ordinary dungarees, 30 cubits, that is 15 yards long and 2 feet wide, is 1 rupee 12 annas the piece at Masulipatam, being brought from Raylungy, a village and Talook to the northward, where a finer description, well adapted for tents, is made at 7 Rupees the piece of [illegible] yards, 1 yard wide. About Vizagapatam the ordinary Dungaree is usually sold by weight. The best Bengal tents appear to be made of an open textured dungaree, the threads of which are finer than is usual in dungarees. Like all other cotton goods, dungaree should not be exposed to the weather in sails, tents &c., till the weavers dressing and filth has been thoroughly removed by washing and partial bleaching.—*Rohde M.S.S.*

(3295) DUNGING OF CLOTHS, is a process resorted to by dyers both in this country and Europe, the object being to impregnate cotton cloths with animal matter for which many dyes have a strong affinity.—*Rhode M.S.S.*

(3296) DURANTA ELLISIA. Verbenaceæ. This is a beautiful large shrub with light blue pendulous flowers, it blossoms almost throughout the year, readily grown from cuttings, the flowers are scentless.—*Riddell.*

(3297) DURANTA PLUMIERI.—This is a large shrub like the former, with handsome drooping blue flowers having the scent of almonds: the clusters of seed berries which are numerous, when ripe, have a very pretty appearance from their dark orange colour, they do not appear to germinate readily.—*Riddell.*

(3298) DURIO, a genus of Plants of which the name has been derived from Durion, a well-known fruit of the Malayan Archipelago. The

specific name of *Zibethinus* has been applied to the tree which forms this genus, from the fondness of the Malayan Zibet (*Viverra Rasse*, Hors.) for this fruit. The genus *Durio* belongs to the natural family of *Bombaceæ*, considered by some botanists to be only a tribe of *Sterculiaceæ*. It is characterized by having its five petals smaller than the five lobes of the calyx. The stamens, long and numerous, are arranged in five bundles, and have twisted anthers; the free germen is surmounted by a long filiform style and capitate stigma; the fruit, roundish and muricated, is divided internally into five cells, and easily separates when ripe into five parts; each cell contains from two to four or five seeds enveloped in soft pulp.—*Eng. Cyc.*

(3299) DURIO ZIBETHINUS is a large and lofty tree, with alternate leaves, which are small in proportion to its size; in form they resemble those of the cherry, or are oblong-pointed, small and green above, like nutmeg-tree leaves, but on the under surface are covered with orbicular reddish-coloured scales, as some species of *Capparis*; the petioles are tumid, and furnished with a pit towards their base; the flowers are arranged in clusters on the trunk and older branches, where of course is also borne the fruit, as in the Jack and Cocoa trees. The Durion is a favourite food of the natives during the time (May and June) when it is in season; but there is usually also a second crop in November. It is as remarkable for the delicacy combined with richness of its flavour, as for the intolerable offensiveness of its odour, which is compared by Rumph to that of onions in a state of putrefaction, on which account it is seldom relished by strangers, though highly esteemed by many European residents. In size it is equal to a melon, or a man's head, and sometimes compared to a rolled-up hedgehog (hence it has been called *Echinus arboreus*) in consequence of its hard and thick rind, which is yellow-coloured when ripe, being covered with firm and angular projections. From this appearance has likewise been derived its Malayan name, 'dury', in that language signifying a thorn or prickle. (Rumph.) The seed, with its edible enveloping pulp, is about the size of a hen's egg; the latter is as white as milk, and as delicate in taste as the finest cream, and should be eaten fresh, as it soon becomes discoloured, and undergoes decomposition. Excessive indulgence in this, as in other fruits, is apt to create sickness, and therefore to its abundance has been sometimes ascribed the unhealthiness of some years; but as the crop of fruit is most abundant when the rains are very heavy and follow great heats, the sickness is probably due as much to the peculiarities of the season as to the too free use of this fruit. The seeds of the Durion are likewise eaten when roasted, and have something of the flavour of chestnuts. The wood of the tree is valued for many economical purposes, especially when protected from moisture. The rind of this fruit is likewise turned to account by the industrious Chinese, as its ashes, when burnt, probably from containing potash, are used by them in the preparation of some dyes. Marsden, in his account of Sumatra, quotes a celebrated writer as saying that "Nature seems to have taken a pleasure in assembling in the Malay Islands her most favourite productions." Among these may be enumerated the Mangosteen, the Jack and Bread-Fruit trees, the Lanseh, and Durion, with others which are common in other tropical parts. These, it has not been possible to cultivate in the hothouses of England, even with all the skill of its horticulturists; a circumstance which must be ascribed partly to the great size of the trees, and partly to the peculiarity in climate of 'India aquosa,' as this part of the world was called by old writers. But as it is only within a few years that moisture has been combined with heat in the present successful cultivation of Orchideous Plants, it might perhaps be possible to make some of the above fruits grow in a similar artificial climate; and, by grafting, to make them bear when only a few feet high, as has been done with the Mango in India.—*Eng. Cyc.* The dorian holds an important place among the fruits of Tenasserim, being regarded by the voluptuous natives as second to none. It is probably the most fœtid fruit in existence. Wight speaks of "the dorian so celebrated on account of its fine flavored but excessively fœtid fruit;" and adds: "it is said by Rumphius to be of a very heating quality, liable to excite inflammatory derangements of the system."—*Mason.* The *Durio zibethinus*, or Dorian fruit (Doowin, *Burm.*) can scarcely be said to belong to Pegu, although there are a few trees about Rangoon, which bear fruit, yet the King of Burmah has always obtained the supplies for the royal table from Moulmein.—*McClelland.* The tree has lately been introduced into the Company's gardens on the Madras side. According to Crawfurd, the Durio zibethinus of botanists, is the only plant of the genus. This famed fruit is about the size and form of a large melon, and contains esculent seeds resembling chestnuts, which are enveloped in a large quantity of a pale yellow pulp, which is the esteemed part of the fruit. This is of the consistence of clotted cream, and has the taste of fresh cream and filberts. Although possessing an offensive odour, resembling that of over-ripe apples, so powerful and diffusive as to taint the air of a whole town when it is in season, the pulp is rich without being cloying. The natives of the countries yielding the durian, prize it beyond all other fruits. In countries with a suitable climate, it flourishes without care or culture. It is most abundant in the western portion of the Archipelago, and extends east as far as the island of Mindano, the only one of the Philippine group in which it is

known. It is abundant in Siam, however, up to the 13th and 14th degrees of north latitude; and again it is found on the coast of Tenasserim, in about the 14th degree of latitude, which is the furthest distance from the equator to which it has been successfully propagated. All attempts to cultivate it in any part of Hindustan have failed; nor has it, like some other Asiatic fruits, been transferred to tropical America. Crawfurd did not find that it was grown in Cochin-China, although he thinks it most likely that it is so in some parts of Kamboja. A hot, moist, and equable climate would seem to be indispensable to the durian, but soil seems to be indifferent to it, for it thrives in the granitic, in the sandstone, and in the calcareous ones of the Peninsula and Sumatra, in the volcanic soil of Java, and in the rich alluvium of the valley of the Menam in Siam. The name, which is perhaps most correctly written durian, is pure Malay, and is a derivative from the word duri, a thorn or prickle, in reference to the sharp tubercles with which the rind is covered. This name, with trifling variations, is that of the fruit in every country in which it is found from Java to Siam, and it has no other. From this, therefore, I think it may be inferred that the tree is a native of the country of the Malays, viz., Sumatra, the Peninsula, and their adjacent islands, and that through the Malays it was more widely disseminated. It may even be stated to grow wild in some, at least, of the countries named. An intelligent writer in the Journal of the Indian Archipelago thus incidentally refers to the subject, in a paper rendering an account of the wild inhabitants of the interior of the Malay peninsula. "In several places in the interior of the forest are found durian trees, always in a body together, to the number of about ten or twelve trees. Such places are for the Jakuns an object of great attention, and matter of work. They cut with the great axe all the other trees which surround the durians, that these, by receiving more air, may grow up more easily, and give finer, and a greater quantity of fruit. They build there a small house, of which I will hereafter speak; and they then return to their ordinary habitations, which are sometimes distant from such places one or two day's journey." Another writer in the same publication, writes to the same effect respecting the durian, as it is seen to grow spontaneously in one of the small islands off the eastern coast of the peninsula, and which is nearly one entire forest down to the margin of the sea. "At Pulo tingi," says he, "we found orang-lant, or sea-gypsies, assembled. A large crop of durians this season, had attracted tribes of them from the coasts of the peninsula, as well as from the islands of the Jehore Archipelago. Six boats from Moro, an island of that group, we found on their way to Pulo tingi; they had travelled by sea a distance of 180 miles, to partake of the fascinating fruit.—*Crawfurd Dictionary page* 126.

(3300) DUTCH RUSH, Horse Tail. A hollow-stemmed, leafless plant (*Equisetum hyemale*); with a cuticle composed of pure silex, which gives it a hard surface that makes it useful for polishing wood and metals, a purpose to which it is extensively employed in England. It is generally obtained from Holland.—*Waterston. Faulkner.*

(3301) DYSOPHYLLA QUADRIFOLIA. *Mentha quadrifolia. Wild Mint.* There is a species of wild mint in Tavoy, of which Roxburgh wrote: "This plant is very fragrant, not less so than our garden mint in Europe."—*Mason.*

(3302) DYES, DYEING, and COLOURING STUFFS.—Dyeing is the art of imparting to wool, silk, cotton, linen, leather, &c., colours which resist the operation of washing and the wear to which they are subject when made up into articles of furniture or clothing. This art was known at a very early period. Jacob made for Joseph a coat of many colours, (Gen. xxxvii. 3;) and in Exodus frequent mention is made of the ornaments for the Tabernacle as being composed of blue, purple, scarlet, and fine linen. We read also in 2 Chron. ii. that Solomon having sent to Tyre for coloured linens, the king of that country answered his request by sending him a man skilful to work "in purple, in blue, and in fine linen, and in crimson." Ezekiel, (593 B.C.) in his prophecy against Tyre (xxvii. 7), speaks of "blue and purple from the isles of *Elishah*," which has been supposed to refer to Elis on the west side of the Greek Peloponnesus, and hence it has been inferred that the Tyrians in the time of Ezekiel drew their supply of shell-fish used for dyeing purple from the coast of Greece. The Tyrian purple was greatly prized among the nations of antiquity. It is supposed to have been obtained from two different kinds of shell-fish, described by Pliny under the names *purpura* and *buccinum*; it was extracted from a small vessel or sac in their throats, one drop only being obtained from each animal, but an inferior colour was obtained by crushing the whole substance of the buccinum. A quantity of the juice having been collected, sea salt was added, and it was allowed to stand three days; after this, it was diluted with five times its bulk of water, kept at a moderate heat for six days more, and occasionally skimmed, and when thus clarified it was used for dyeing white wool previously prepared by the action of lime-water or of a species of lichen. For the finest Tyrian purple, the wool was first plunged into the juice of the purpura, and then into that of the buccinum; by exposure to air and light the wool passed through various shades of citron yellow, green, azure, and red, and after 48 hours a

fine purple was produced. In some cases the wool was first dyed with a cheap dye, and the woven cloth was finished with the precious juice. The colours were durable, but very costly: Pliny states that a pound weight of the double dipped Tyrian purple was sold in Rome in the time of Augustus for 100 crowns, (equal to about 30*l.* of our money.) This enormous price did not prevent many of the citizens of Rome from wearing purple attire until the time of the emperors, when the use of purple was limited to them. This exclusiveness proved fatal to the manufacture: it languished until the eleventh century, and then became extinct. In the seventeenth century the art of dyeing purple was revived by Mr. Cole, of Bristol, and in the eighteenth century by M. Reaumur, of France; but by this time finer colours had been discovered, and cheaper processes invented. The ancient Greeks do not seem to have attended much to the art of dyeing: the people of Athens wore woollen garments of the natural colour, and although the more luxurious Romans patronised those who cultivated the art, yet the processes of a trade or manufacture were thought to be beneath the notice of any writer capable of describing them. We learn incidentally from Pliny that the competitors in the circus were clothed in dresses of green, orange, grey, and white. The art was lost at Rome after the invasion of the northern barbarians in the fifth century; but it was practised in the East and revived in Europe about the end of the twelfth century. Florence became celebrated in the art, and in the early part of the fourteenth century numbered not less than 200 dyeing establishments. The discovery of America supplied Europe with a variety of new colouring-matters, such as indigo, logwood, quercitron, Brazil-wood, cochineal, arnotto, &c. Before the introduction of indigo, woad was used for dyeing blue, and the cultivators of this plant in England and on the Continent endeavoured to prevent the use of indigo, which, by a decree of the German Diet in 1577, was declared to be "a pernicious, deceitful, eating, and corrosive dye." The introduction of logwood was opposed from similarly interested motives: its use was prohibited by a statute of Elizabeth, under heavy penalties, and all that which was found in the country was ordered to be destroyed: it was not until the reign of Charles II. that its use was permitted. Such narrow prejudices as these of course interfered with the progress of the art in this country; but by degrees, valuable improvements were made, and new processes introduced from abroad, such as the method of dyeing Turkey-red,—one of the most durable of colours. It was discovered in India, and afterwards practised in other parts of Asia and in Greece. About the middle of the last century some Greek dyers established dye-works for this colour in France; and in 1765 an account of the method of producing it was published, by order of the French government. About the end of the last century the method was practised in England, when a Turkey-red dye-house was established in Manchester, by a Frenchman, who obtained a grant from Government for the disclosure of his process, which however, was not very successful. A better process was introduced into Glasgow by a Frenchman named Papilon; but before this, Mr. Wilson of Ainsworth, near Manchester, had obtained the secret from the Greeks of Smyrna, which he made public. The methods of imparting a permanent colour to textile fabrics are almost as numerous as the colouring matters employed. Most of the colours used in dyeing are vegetable: a few are animal and mineral. The most vivid and brilliant vegetable colours, such as those of flowers and other parts of plants exposed to the light, are small in quantity, very fugitive, and difficult to separate. The colouring matters of plants capable of being isolated, are mostly yellow, brown, and red; the only blue dyes furnished by plants are indigo and litmus; no black vegetable dye has been isolated. Most vegetable colours are soluble in water; and those which are not so can be dissolved in alcohol, ether, or the fixed oils. Vegetable colours are permanent in dry air; but they gradually fade in moist air, especially under the influence of light. The blue of most flowers is converted into red by an acid, and into green by an alkali. Not only do the methods of dyeing vary with the nature of the dye-stuff, but also with that of the material to be dyed; different methods being adopted for cotton, silk, and wool.—*Tomlinson, page* 527. In Southern Asia, the art of dyeing is no doubt of very ancient date, and one with which the Hindoos and Chinese have long been well acquainted. Their country furnished all the raw materials for producing a great variety of colours; some of these are of so conspicuous a nature, such as the large flowers of plants, that the desire must early have occurred to transfer these colours to the person in savage nations, or to the clothes of so early civilized a people as the Hindoos. This could easily have been done with the fugitive colours, but as they know how to make a colour like that of indigo, which undergoes a considerable degree of chemical change during its formation as well as while applied to the dyeing of its blue colour, it is evident, even if we had no other information on the subject, that they must have paid attention to some chemical subjects. But we know that they have long possessed, and knew how to manufacture, the several salts which have long been employed as mordaunts. That the art of dyeing was early practised we have the proof in the fact mentioned by Pliny, that flags of various colours were displayed by the Indians. It has been supposed that the Hin-

doos may have learned this art from the Egyptians, but the probability is as great that the latter learned the art from the former, from whom also they probably obtained the alum which was celebrated by the name of Egyptian alum. Alum is still manufactured in Cutch; the natives of India have long known the use of sulphate of iron and of acetate of iron. The latter they prepare by macerating iron in sour palm-wine, or in water in which rice has been boiled. The alkalis and acids with which they are acquainted may have assisted them in changing the shades of colours, many of the details of the dyeing processes, are well known, and seem to have been the original of many of those followed in Europe until very recent times. The Exhibition of 1851 has shown the people of Europe that they can dye every colour, and of a great variety of shades, and that, in a complicated pattern, they know the value and power of each in contrasting the effect of others, so as to produce an harmonious whole.—*Royle, Arts &c. of India page* 481. Though the methods of dyeing practised in India are generally tedious and complicated, the natives have long possessed the Art of giving beautiful and permanent colours to cotton goods. The country supplies all the raw materials for producing a variety of colours, and the Hindoos have long been acquainted with Alum and the salts of Iron. &c. which are still employed as mordants. But in a country where chemical science may be said to be unknown, we naturally cannot look for any of those signs of progress, which in Europe, have marked the application of that science to the art of dyeing. The process is as rude as it was ages ago, and any improvement in colour, or production of a new one, has been rather the result of a happy accident, or an elaborate painstaking experiment, than a skilful combination upon understood principles. Yet the field is one that well merits labour and research, for, whatever be the external influence that operates in this country, the colours produced in dyeing are unquestionably brilliant, and the best test of their superiority is understood to have been afforded some years past, when Manchester cloths were sent out to the country to be dyed, and returned home to enter the market as the "Blue cloths of Commerce." It is almost entirely cloth of Cotton that the natives of Southern India treat, and they are able to impart durable colours to this in reds, blacks and blues, and the various modifications of these; but their deep greens, yellows and other colours appear to be very fugitive. Dr. Heyne has published an accurate account of the mode of dyeing cotton yarn, as practised on this Coast, in his Tracts, (P. 204,) and below is a statement furnished by a Native working dyer at Madras, of the manipulation and materials employed by him for producing various colours. It is very evident from these documents, that the Native dyers have at this

day much to learn, and that their processes may be very materially improved. From the great diversity of substances used in dyeing, including metals, woods, flowers, roots, barks, leaves, fruits, lichens, insects, &c., all of which require essentially different treatment; there is considerable variation in the methods practised, —and this variety is further increased by the different nature of the materials submitted to the dyes, *viz.*, *Animal substances*, Wool, Silk and leather; *or Vegetable materials*, as Cotton, flax and wood. Experience shows that the colouring matter, which takes upon animal substances, will not suit vegetable matter, a piece of wool will bear an acid, which would corrode and destroy a cotton fabric, and the dyeing of mixed fabrics, where animal and vegetable matters are combined, and where several brilliant colours are blended together, requires the manufacturer to practise all the nicety of his Art. Dyeing is indeed a purely *Chemical* process, and it is owing to the progress of that *Science* in Europe, that such great improvement has been made of late years, and that many colouring matters, which were formerly considered of but little value, are now rising in importance, (such as Munjeet, Chayroot, Logwood, Annotto,) and being more extensively brought into use, with a few little known substances as Puply Chuckay, Ratinara, (Lichen), and extract of Casuarina, &c. Amongst some of these little known dyes, there are several well deserving a careful examination. It is to be hoped, that some method may be devised of rendering them available, as well as of applying more economically, those long in use, and which may be procured in large quantities and at low prices.—*M. E. J. R.* The following lists comprise the principal part of the colouring materials of Southern Asia.

Redwood,	Adenanthera pavonina.
Barberry Wood and Root, (Berberis Lycium, Aristata, &c.)	
Black Vegetable Dye, of,	Nepal and Burmah, Shan..
Annotto,	Bixa orellana.
Pulas flowers,	Butea frondosa.
Safflower (kusoombha,)	Carthamus tinctorius.
Beef Wood,	Casuarina.
Sappanwood (bookum, putung,).	Cæsalpinia sappan.
Chirunge (red dye,)	Chirongia sapida.
Chulchuliera, Lichen, of	Himalayas.
Lichen, of	Scinde.
Turmeric. (huldee,)	Curcuma longa.
Logwood	Hæmatoxylon campechianum.
Indigo,	Indigofera tinctoria.
Malapoo (dye,)	
Aliakoo,	Memecylon tinctorium.
Aal (aal, ach,)	Morinda citrifolia.
Chay root,	Oldenlandia umbellata.
Red saunders,	Pterocarpus santalinus.
Turkey Berries,	(Rhamnus Sp.)
Capala-rung,	Rottlera tinctoria.
Madder, Indian (munjeeth,)	Rubia munjistha.
Roum v. Room, a blue dye, (Ruellia Sp.,)	Assam. China.
Lodh,	(Symplocos racemosa,) Himala-
Myrobolans (hur and behara,)	Terminalia Sp. [yas.
Papli chuckay (orange dye,)	Ventilago (?)
Palay Indigo,	Wrightia tinctoria.—*M.E.*

Other plants are used as dyes, as the flower of the Nyctanthes, and Toon. Also Pomegranate rind, Marking Nut, and Acacia bark.—*Royle, Pr. Res.* Though, as mentioned above, the methods of

dyeing in use in India are generally very tedious and complicated, yet they have long possessed the art of giving beautiful and permanent colors to cotton goods. Dr. Heyne suggested the advantage that might accrue to European dyers from a knowledge of their methods, and the process by which the beautiful Turkey red dyes are at present, owing to a late invention, given to cotton goods in Europe, very much resembles in many of its features the process of dyeing yarn red practised on the Coromandel coast, with substitution of madder for chay root. Mr. Rohde does not think that any durable colours are communicated by natives to cotton cloth, except reds and blacks and modifications of the one or the other, their deep blues, yellows and other colours seem very fugitive. Their dye stuffs consist chiefly of alum, anatto, Bole armenian, Capalapodie (the dust shaken from the root of the dry fruit of the Rottleria tinctoria, a product of Malabar) Indigo, the prepared, and also the wild weed, cassia leaves, seeds of the oval leaved cassia, Catechu, chay-root, Galls, Iron rust, karam, (anim, pure carbonate of soda or alkaline earth) Lime, Limes, Lowd or Loder bark, Madder or Munjeet of Bengal, the bark of the Marudum, of the many flowered Phyllanthus, milk hedge, Morinda, Mirobolan chebulic, flowers of the Nyctanthes arbortristis, of the Butea (Poorsha) frondosa; of the sering; of the shoe flower, (sa-pa-ri) red and yellow ochre, gingilie oil, over munnoo, (Natron) the blue dyeing Rose-bay (Nerium tinctorium) saffower, sal ammoniac, Sappan wood, Tamarind leaves and fruit, Teena flowers, Turmeric; Ver digris, Red wood, Asclepias gigantea, milk hedge sap: Vattany cuttay (Pattengi chucka,). Impure carbonate of Potass, Plantain skins, Poonhuran, an alkaline earth, Pappilia, *Tam.*—The process of dyeing cloth practised by Bala Chetty at Madras is as follows:

Red Colour.—Dissolve small quantities of ashes, procured by burning the milk hedge tree, in water, filter and add an equal quantity of sheep's droppings and Gingelcy oil to the solution. Soak the yarn in the mixture twice a day for 20 days, drying the yarn in the sun during the intervals. Wash the yarn white in pure water and dry. Steep it in a mixture of chay root powder, and causa leaf, coarsely powdered, for three successive days, both morning and evening, drying the yarn during the day; steep the yarn again for 5 days (morning and evening) in a mixture of chayroot powder and drying it for 5 successive days, and on the 6th night, boil the yarn in a closely covered vessel for 12 hours, and wash it in pure water, on the following morning, when a fast red colour will be found.

Purple.—If the yarns dyed by the above process be steeped for some time in a solution of Indigo, a deep purple colour will be produced.

Light Purple.—If white yarn prepared as above detailed, be soaked for 5 successive days, both morning and evening, in a solution of *Soorool Puttay*, dry the yarn in the sun and boil it as prescribed for the red colour, a shade of purple colour will be produced.

Shade of Purple Red.—If the yarn prepared, as for the light purple, be soaked in a solution of Puplichuckay powder, a different shade is produced.

Blue Black.—Indigo. If a mixture made of powdered chunam and extract of Thakaravaray (cassia auriculata) be put into an earthen vessel, partly burnt in the earth and the yarn steeped in it for 8 days, will produce different shades of black. The mixture must be constantly stirred during the process of dyeing.

Sky Blue.—When a light preparation of the mixture, above prescribed is made and the yarn soaked in it 3 times a day, will produce the sky blue colour.

Black.—If white yarn be soaked in a paste made of Kadukay powder (Terminalia chebula) and green vitriol and again steeped in a bath of tank mud, the yarn will have various shades of black colour—and this will depend upon the intensity of the dye used.

Pink or Rose Colour.—If powdered Coosumba flower (carthamus tinctorius) be well washed with water and mixed with Applacarum—it is then to be trodden under feet, strain and add lime juice to it—bleached yarn to be soaked in this mixture and a beautiful rose colour will be produced.

Orange Colour.—Mix Turmeric powder in water, soak the bleached yarn in this mixture, and dry, soak the yarn again in the Coosumba mixture and an orange colour will be produced.

Yellow Colour.—Mix a quantity of Turmeric powder in water, soak the yarn for 24 hours, squeeze and let it dry, repeat the operation for 4 successive days, then soak the yarn again in a solution of Turmeric powder with Alum, morning and evening, squeeze the yarn and let it dry, when a bright yellow colour will be produced.

Straw Colour.—Soak the yarn in a solution of Turmeric powder and water, 4 or 5 times, squeeze and steep the yarn again in a solution of lime juice and fresh water for about an hour—squeeze it well, and dry, when a straw colour will be produced.

Green Colour.—Soak the bleached yarn in a solution of Indigo, dry and then steep it in a solution of Turmeric powder and water for 48 hours, wash the yarn in a mixture of lime juice and water and dry it in the shade when a green colour will be produced.

Orange Colour.—Tie a quantity of Annato seeds in a piece of cloth, soak it in water for 12 hours, squeeze the colouring matter out in a basin of fresh water, add cocoanut water, lime juice

and alum powder, steep the yarn in the mixture for 4 hours and then boil it for an hour—squeeze and let it dry, when a deep orange colour will be produced.

Bleaching silk.—Steep the silk in a solution of chunam and Dhobys' earth for 24 hours, wash the yarn in fine water and then soak it in Alum for an hour (which is a mordant) and again for 2 hours in a mixture of soap and Indigo, when the yarn will be bleached to a white colour; wash and let it dry.

Red Colour.—Tie a quantity of stick lac, coarsely powdered, in a strong cloth and macerate it in warm water, bruising it occasionally with a wooden hammer, till it ceases to yield any colouring matter: add to the liquor a small quantity of Tamarind pulp and Alum powder, boil the silk in this mixture for 2 hours, and wash, when a deep red colour will be produced.

Crimson Colour.—Make a mixture of Chironjee seeds, Buchanania latifolia, add a small quantity of Alum and boil the silk (which has been previously bleached and dyed deep red) for an hour, squeeze and dry, when a crimson colour will be produced.

Orange Colour.—Make a mixture of Fuller's Earth and Cupla powder, add a small quantity of Alum and boil the silk (which has been previously bleached and dyed red) for 2 hours, when cold, squeeze and dry, when an orange colour will be produced.—*M. E. J. R.*

Coloring substances for staining and dyeing are obtained indifferently from the animal, mineral, and vegetable kingdoms; and the importance of a careful consideration of this subject will be admitted, if we consider how much the prosperity and extent of the cotton, silk, woollen, and leather manufactures depends on a liberal and cheap supply of dyes and tannin, to give beauty and color to the fabrics, and substance and utility to the skins. Even oil colors, for painters' purposes, form an item in the yearly exports from Britain, of the value of £250,000, and when we calculate the large amount of cotton, silk and wool worked up, most of which requires various coloring agents, gums, starches, and mordants;—that nearly 30,000 tons of hides are annually imported, exclusive of those obtained from English slaughter-houses, besides goat, seal, and other skins—and that the English exports of the various manufactures of cotton, linen, silk, wool and leather in 1852, setting aside home consumption, amounted to nearly fifty millions sterling, we shall be able to form a better estimate of the importance of the various subjects we are now to notice. Great Britain does not pay less than £600,000 annually for the dried carcasses of the tiny cochineal insect, while the produce of another small insect, that which produces the lac dye, is scarcely less valuable. Then there are the gall nuts used for dyeing and making black ink. Upwards of £3,000,000 is paid for barks of various kinds for tanners' purposes, about one million for other tanning substances and heavy dye woods, besides about £200,000 for various extracts of tannin, such as Gambier, Cutch, Divi-divi, and Kino. The aggregate value of the dye stuffs and gum it is difficult to estimate. The beautiful specimens of materials imported from China, India, New Zealand, the Continent, and other countries, and exhibited at the Crystal Palace, proved to England that she has yet much to learn from other nations in the art of fixing colors and obtaining brilliant dyes. The French are much superior in dyeing and the production of fast and beautiful colors. Their chemical researches and investigations are carried out more systematically and effectively than those of Britain. Russia imports dyewoods and dyestuffs to the value of five millions and a half of silver roubles annually. It was well observed by the Jury Reporters at the Great Exhibition, that "a vast number of new coloring materials have been discovered or made available, and improved modes have been devised of economically applying those already in use; so that the dyer of the present time employs many substances of the very existence of which his practical predecessors were wholly ignorant. From the increased use of many of the vegetable colors, and from the improved modes of applying the coloring matters, a demand has naturally sprung up for various dye stuffs: and at the present time, many of the dyeing materials of distant countries are beginning to excite the attention of practical men; for though they have been acquainted with many of these substances, it is only recently that the progress of the art has rendered their use desirable or even practicable." It would be quite impossible, within due limits to make even a bare enumeration of the various plants and trees from which coloring substances and dye stuffs can be obtained: we must, therefore, be content to specify only a few. The roots of some species of Lithospermum afford a lac for dyeing and painting. Dried pomegranates are said to be used in Tunis for dyeing yellow; the rind is also a tanning substance. In the "Comptes Rendus," xxxv., p. 558, there is an account by M. J. Persoz, of a green coloring matter from China, of great stability, from which it appears that the Chinese possess a coloring substance having the appearance of indigo, which communicates a beautiful and permanent sea green color to mordants of alumina and iron, and which is not a preparation of indigo, or any derivative of this dyeing principle. As furnished to M. Persoz by Mr. Forbes, the American Consul at Canton, it was in thin plates of a blue color, resembling Japanese indigo, but of a finer grain, differing also from indigo in its composition and chemical properties. On infusing a very small quantity of it in water, this fluid soon

acquired a deep blue color with a greenish tinge; upon boiling and immersing a piece of calico on which the mordants of iron and alumina had been printed, it was dyed a sea green color of greater or less intensity according to the strength of the mordant—the portions not coated remaining white. This dye as investigated by Mr. Fortune will be further noticed below. A berry called *Makleua* grows on a large forest tree at Bankok, which is used most extensively by the Siamese as a vegetable black dye. It is merely bruised in water, when a fermentation takes place, and the article to be dyed is steeped in the liquid and then spread out in the sun to dry. The berry, when fresh, is of a fine green color, but after being gathered for two or three days it becomes quite black and shrivelled like pepper. It must be used fresh, and whilst its mixture with water produces fermentation. See DIOSPYROS MOLLIS. The bark of *Datisca cannabina* also dyes yellow. It contains a bitter principle, like quassia. A coloring matter is prepared from the dried fruit of the *Rottlera tinctoria*, by the natives of the East, to dye orange, which is a brilliant and tolerably permanent dye. It is apparently of a resinous nature. Turmeric is now imported to the extent of upwards of 800 tons, a portion of this is used in dyeing. The bark and roots of the berberry are used in the East to dye yellow; the color is best when boiled in ley. Some of the species of Symplocos, as *S. racemosa*, known as lodh about the Himalaya mountains, and *S. tinctoria*, a native of Carolina, are used for dyeing. The scarlet flowers of *Butea frondosa* (the Dhak tree), and *B. superba*, natives of the Indian jungles, yield a beautiful dye, and furnishing a species of kino (*Pulas kino*), are also used for tanning. *Althea rosea*, the parent of the many beautiful varieties of hollyhock, a native of China, yields a blue coloring matter equal to indigo. Indigo of an excellent quality has been obtained in the East from a twining plant, *Gymnema tingens* or *Asclepias tingens*. The juice of the unripe fruit of *Rhamnus infectorius*, *catharticus* and *virigatius*, known as Turkey or French berries, is used for dyeing leather yellow. When mixed with lime and evaporated to dryness, it forms the color called sap-green. A great quantity of yellow berries are annually shipped from Constantinople; 115 tons were imported into Liverpool in 1853. The average annual imports into the United Kingdom are about 450 tons. They come from the Levant in hair bales weighing three and a quarter cwt., or in tierces of four to five cwt., and are used by calico printers for dyeing a yellow color. They are sometimes called Persian berries. It is a subject of surprise that the common betel-nut of the East has never been introduced for dyeing purposes. The roots of the awl tree of Malabar and other parts of India, *Morinda citrifolia*, and of *M. tinctoria*, found abundantly in all the Asiatic islands, are extensively used as a dye stuff for giving a red color. It is usually grown as a prop and shade for the pepper vine and coffee tree. The coloring matter resides principally in the bark of the roots, which are long and slender, and the small pieces are the best, fetching 8s. to 10s. a maund. It is exported in large quantities from Malabar to Guzerat, and the northern parts of Hindostan, but seldom finds its way to Europe. The wood and roots of another species, *M. umbellata*, known in the eastern islands as "Mangkudu," are used extensively for their red dye, in Celebes and Java. Specimens of all these, and of the Lopisip bark, bunchong bulu wood, and the gaju gum (from undescribed plants), have been introduced into England. They are said to furnish excellent dyes in the Asiatic islands. Native dyes from Arracan have also been imported, viz., thittel and the-dan yielding red dyes, ting-nget and reros, affording dark purple dyes; and thit-nan-weng, a chocolate dye. These would be worth enquiry, and particulars of the plants yielding them, the quantities available, and the prices might be procured. Dyes and colors from the following plants are obtained in India: several species of *Terminalia*, *Semecarpus anarcardium*, *Myrica sapida*, *Nelumbium speciosum*, *Butea frondosa*, and *Nyctanthes arbortristis* The bunkita barring, obtained from an undescribed plant in Borneo, produces a dark purple or black dye. A species of Ruellia, under the name of "room," is employed in its raw state by the Khamptis and Lingphos to dye their clothes of a deep blue. It is described by the late Dr. Griffiths as "a valuable dye, and highly worthy of attention." It might, perhaps, be usefully employed as the ground for a black dye. In Nepaul they use the bark of *Photinia dubia* or *Mespilus bengalensis* for dyeing scarlet. The bark of the black oak, *Quercus tinctoria* and its varieties, natives of North America, are used by dyers under the name of quercitron. In the south of Europe, *Daphne gnidium* is used to dye yellow. The root of reilbon, a sort of madder in Chili, dyes red. A purple tint or dye is obtained from the bark of an undescribed tree, known under the name of "*Grana ponciana*," growing about Quito, and Stevenson (Travels in South America) says, "if known in Europe, it would undoubtedly become an article of commerce." Another much more expensive species of coloring matter (red) is obtained in various parts of South America from the leaves of the *Bigonia chica*, a climbing evergreen shrub, native of the Orinoco country, with large handsome panicles of flowers. The coloring substance is obtained by decoction, which deposits, when cool, a red matter; this is formed into cakes and dried. Dr. Ure thinks it might probably be turned to account in the arts of civilization. The order of plants to which it belongs, contains a vast number of species, all natives of tropical regions, and their value for the

production of coloring substances may be worth investigation. It is met with in British Guiana, and the Indian tribes of that district prepare the pigment with which they stain their skin from it; it is called by them "Caraveru." The coloring matter is used as a dye in the United States, and for artistical purposes would rival madder. Sir Robert Schomburgk thinks it might form an article of export if it were sufficiently known, as its preparation is extremely simple. The leaves are dried in the sun, and at the first exposure, after having been plucked from the vine which produces them, they show the abundant feculent substance which they contain.

Lana Dye.—A beautiful bluish-black color, known as "Caruta," is procured in Demerara and Berbice from the juice of the fruit of the *Genipa americana*, Linn.—a tree very common in the colony. The Indians use it for staining their face and persons. The Lana dye was honorably mentioned by the jurors at the Great Exhibition in 1851. The bluish-black color obtained from it is remarkably permanent, a fact which has very long been known, though hardly any attempt appears to have been made to introduce it to the notice of European dyers. Another pigment is prepared by them from arnotto, mixed with turtle oil, or carap oil, obtained from the seeds of the *Carapa guianensis* (Aubl.) The wild plantain (*Urania guianensis*) and the cultivated plantain (*Musa paridisiaca*), the Mahoe (*Thespesia populnea*), and the pear seed of the Avocado (*Persea gratissima*), furnish dyes in various parts of the West Indies; specimens of many of these have been imported from British Guiana and Trinidad. Russia produces good specimens of the wood of *Statice coriaria*, the leaves and bark of sumach, the bark of the wild pomegranate, yellow berries, *Madia sativa*, saffron, safflower and madder roots for dyeing purposes. *Avicenna tomentosa*, a species of mangrove, is very common about the creeks of Antigua, Jamaica, and other West India islands, where it is used for dyeing and tanning. In New Zealand, the natives produce a most brilliant blue-black dye from the bark of the Eno, which is in great abundance. Some of the borders of the native mats, of a most magnificent black, are dyed with this substance. It has been tried in New South Wales; but, as with other local dyes, although found well suited for flax, hemp, linen, or other vegetable productions, it could not be fixed on wools or animal matter. Dr. Holroyd, of Sydney, some time since, imported a ton of it for a friend near Bathurst. It is of great importance that chemical science should be applied to devise some means of fixing this valuable dye on wool. As the tree is so common, the bark could be had in any quantity at about £3 10s. a ton; and our tweed manufacturers are in great want of a black dye for their check and other cloths. The principal heavy woods used for dyeing are fustic, logwood, Nicaragua wood, barwood, camwood, red Sanders wood, Brazil wood, and sappan wood.

Red Sanders wood. (*Pterocarpus santalinus*), which is hard and of a bright garnet red color, is employed to dye a lasting reddish brown on wool. It only yields its color to ether or alcohol. The tree, which is a lofty one, is common in the Madras Presidency and other parts of India; it is also indigenous to Ceylon, Timor, and other Eastern islands. The exports of this wood from Madras in one year have been nearly 2,000 tons. The imports of red Sanders wood from Calcutta and Bombay, chiefly into London, are to the extent of 700 or 800 tons a year, worth £6 to £9 per ton. Of FUSTIC, England imports from 1,500 to 2,000 tons annually, and derives its supplies from Brazil, Tampico, Puerto Cabello, Cuba, and Jamaica. The best is obtained from Cuba; for while the common white fustic from Jamaica and the Spanish Main fetches only £5 10s. to £6 10s. the ton, that of Cuba realizes from £8 to £9 10s. the ton. *Sappan Wood* (*Cæsalpinia sappan*) is an article of considerable commerce in the East. It is the bukkum wood of Scinde, and is procured in Mergui, Bengal, the Tenasserim Provinces, Malabar and Ceylon. In 1842 as much 78,000 cwts. were shipped from Ceylon, but the export from thence has decreased. This island, however, ships dyewoods annually to the amount of £2,000. A large quantity is exported from Siam and the Philippine Islands; as much as 200,000 piculs annually from the former, and 23,000 piculs from Manila. 3,524 piculs were shipped from Singapore in 1851, and 4,074 piculs in 1852. The picul is about one cwt. and a quarter. Sappan wood yields a yellowish color, like that of Brazil wood (*C. brasiliensis*) but it does not afford of dye matter so much in quantity or so good in quality. It forms a large export from Ceylon; the shipments from thence were, in 1842, 77,694 cwt.; in 1843, 1,692; in 1844, 2,592; in 1845, 2,854. In 1837, 23,695 piculs of sappan wood, and 2,266 piculs of roots of ditto were shipped, and in the first six months of 1843, 22,326 piculs were exported from Manila; a large portion of this comes to Europe, but some goes to China, the United States, Singapore, &c. 15,500 piculs were shipped from Manila in 1844, 5,250 ditto in 1845: and 1,210 tons in 1850. About 3,000 piculs of sappan wood and the same quantity of other dyestuffs are annually imported into Shanghae. The price of straight sappan wood at Shanghae in July last year, was thirty dollars per picul. In Calcutta, in June 1853, 4,000 piculs of the root of Manila sappan wood sold freely at about 7s. 6d. per factory maund; Siam ditto 6s. 75 tons were imported into Liverpool in 1849: and 120 tons in 1850, from Calcutta. The imports of sappan wood into the United Kingdom, in 1850

amounted to 3,670 tons, worth £8 to £12 the ton, and this continued the price in January 1853. Camwood, red sanders wood, barwood, and other dye woods, are found in great quantities in many parts of Africa. The dyes of Africa are found to resist both acids and light, properties which no other dyes seem to possess in the same degree. About thirty miles east of Bassia Cove, in the republic of Liberia, is the commencement of a region of unknown extent, where scarcely any tree is seen except the camwood. This boundless forest of wealth, as yet untouched, is easily accessible from that settlement; roads can be opened to it with little expense, and the neighbouring kings would probably give their co-operation to a measure so vastly beneficial to themselves. It is impossible to ascertain the exact amount of export of these commodities to Europe and the United States, but it is very great, and employs a large amount of vessels. One Liverpool house imported 690 tons in a single year, worth £9,000.

Dyewoods imported in 1850.	Tons.	Re-exported. Tons.
Logwood,	32,930	4,332
Fustic,	9,808	1,771
Nicaragua	7,909	112
Barwood,	1,896	1,229
Sappan	3 670	—
Green Ebony, and Cocuswood,	1,457	—
Red Sanders,	656	—
Camwood,	416	—
Brazil and Brazillito	309	—
	59,051	7,444

Thus we perceive the annual consumption of heavy dyewoods in Britain, in dyeing cotton, linen, woollen and silk goods, &c., exceeds in weight 51,000 tons.

Arnotto.—The plants of this family are chiefly natives of the warmest parts of South America, the East and West Indies, and Africa. In America, the seeds are called achote or roucou. From the port of Barcelona, in Venezuela, about 2,000 quintals are annually exported. The species grown for its dye is the *Bixa orellana*. It is used to impart a bright orange color to silk goods, and to afford a deeper shade to simple yellows. The dry hard paste is also found to be the best of all ingredients for giving a golden tint to cheese or butter. A convenient liquid preparation is now sold to dairymen. The Spanish Americans mix it with their chocolate, to which it gives a beautiful rich hue.

Safflower was shown in the Great Exhibition from Celebes, Assam, the vicinity of Calcutta, Dacca, the states of Rajpootana, and other places. There are two species: *Carthamus tinctorius*, which has small leaves and an orange flower; and *C. oxyacantha*, with larger leaves and a yellow flower, a native of Caucasus. The former is cultivated in Egypt, the Levant, &c., where it forms a considerable article of commerce. 6,633 cwts. of safflower were imported into the United Kingdom in 1835, of which about one-half was retained for home consumption. Of 5,352 cwts. imported in 1840, nearly the whole came from British possessions in the East. In 1847, about 405 tons were imported; in 1848, 506 tons; in 1849, 407 tons; in 1850, 522 tons. The price of safflower varies from £1 to £8 per cwt., according to quantity. That from Bombay is least esteemed, fetching only 20s. to 30s. The annual quantity of safflower, according to Dr. Taylor, exported from the district of Dacca for eight years ending with 1839, amounted to 4,000 maunds, or about 149 tons. The exports through the Calcutta Custom House are occasionally large: in 1824-25 there were about 316 tons; 8,500 Indian maunds were shipped from Calcutta in each of the years 1841 and 1842. The prices in the Liverpool market, in January 1853, were for Bengal, good and fine, £6 to £7 10s. per cwt.; middling, £4 to £4 10s.; inferior and ordinary, £2 10s. to £3.

Gamboge is extensively used as a pigment, from its bright yellow color. There are two kinds known in commerce, the Ceylon and the Siam. The former is procured from the *Hebradendron Cambogoides*, Graham; a tree which grows wild on the Malabar and Ceylon coasts, and affords the coarsest kind. The pipe gamboge of Siam is said to be obtained from the bruised leaves and young branches of *Stalagmites cambogoides*. The resinous sap is received into calabashes, and allowed to thicken, after which it is formed into rolls. Several other plants, as the *Mangostana gambogia*, Gaertner, and the *Hypericum baccifer-um* and *Cayanense*, yield similar yellow viscid exudations, hardly distinguishable from gamboge and used for the same purpose by painters. The *Garcinia elliptica*, Wallich, of Tavoy and Moulmein, affords gamboge, and approaches very closely in its characters to Graham's *Hebradendron*. In like manner the Mysore tree bears an exceedingly close resemblance to that species. It is common in the forests of Wynaad in the western part of Mysore, and has been named by Dr. Christison *Hebradendron pictorium*. Another gamboge tree has recently been found inhabiting the western Burmese territories. Both these seem to furnish an equally fine pigment. As it can be obtained in unlimited quantity, it might be introduced into European trade, if the natives learn how to collect it in a state of purity, and make it up in homogenous masses in imitation of pipe gamboge, the finest Siam variety. It seems to possess more colouring matter, more resin and less gum than the ordinary gamboge of commerce. Gamboge owes its color to the fatty acid. The resin must be regarded as the chief constituent, and is most abundant in that imported from Ceylon, which contains about 76 per cent., and is therefore best adapted for painting. Gamboge also has its medicinal uses.

DYES, DYEING.

Lichens.—Various species of *Lecanora*, particularly *L. tarterea*, known as cudbear, are used in dyeing woollen yarn. The *Rocella tinctoria* and *fusiformis* furnish the orchil, or orchilla weed of commerce, which is sometimes sold as a moist pulp, but usually in the form of dry cakes, known under the name of *litmus*; it produces a fine purple color. Our imports, which have amounted to 6,000 or 7,000 cwts. annually, are derived chiefly from the Canary, Azores, and Cape Verd Islands. Rock orchilla was shown at the Exhibition of 1851; from the Berlingen Isles, from Angola, Madeira and the Cape de Verds. Orchilla weed is very plentiful about the shores of the islands of New Zealand, some being sent from thence to the Exhibition; but from a want of knowledge as to the time at which it should be gathered, and the mode of preparing it for the market, it has not yet become a saleable commodity. The rich varieties of lichens on the rocks and plains of Australia have not been tested, as they ought to be, with Helot's lichen test. Various lichens, and *Rocella tinctoria*, from Tenasserim and other parts of India, have been introduced by the East India Company. In the Admiralty instructions given to Capt. Sir James C. Ross, on his Antarctic voyage, a few years ago, his attention was specially called to the search and enquiry for substitutes for the *Rocella*, which is now becoming scarce. A prize medal was awarded, in 1851, to an exhibitor from the Elbe for specimens of the weed, and an extract of red and violet orchil. Specimens of varieties of the lichens used in the manufacture of cudbear, orchil and litmus, and of the substance obtained, were also shown in the British department, which were awarded prize medals.

Indigo.—The plants which afford Indigo dye grow chiefly in the East and West Indies, in the middle regions of America, in Africa and Europe. They are all species of the genera *Indigofera*, *Isatis* and *Nerium*. *Indigofera tinctoria* or *cærulea*, furnishes the chief indigo of commerce, and affords in Bengal, Malabar, Madagascar, the Isle of France, and St. Domingo, an article of middling quality, but not in large quantity. The *Indigofera disperma*, a plant cultivated in the East Indies and America, grows higher than the preceding, is woody, and furnishes a superior dye-stuff. The Guatemala indigo comes from this species. *Indigofera Anil* grows in the same countries, and also in the West Indies. The *Indigofera argentea*, which flourishes in Africa, yields little indigo, but it is of an excellent quality. *I. pseudo-tinctoria*, cultivated in the East Indies, furnishes the best of all. *I. glauca* is the Egyptian and Arabian species. There are also the *cinerea*, *erecta* (a native of Guinea), *hirsuta*, *glabra*, with red flowers, species common to the East, and several others. The *Wrightia tinctoria*, of the East Indies, an evergreen, with white blossoms, affords some indigo, as does the *Isatis tinctoria*, or Woad, in Europe, and the *Polygonum tinctorium*, with red flowers, a native of China. *Baptista tinctoria* furnishes a blue dye, and is the wild indigo of the United States.

Sources of supply.—Indigo is at present grown for commercial purposes in Bengal, and the other provinces of that Presidency, from the 20th to the 30th deg. of north latitude; in the province of Tinnevelly and others in the Madras Presidency; in Java, in the largest of the Philippine islands, in Guatemala, Caraccas, Central America and Brazil. Bengal is, however, the chief mart for indigo, and the quantity produced in other places is comparatively inconsiderable. It is also still cultivated in some of the West India islands, especially St. Domingo, but not in large quantities. Indigo grows wild in several parts of Palestine, but attention seems not to have been given to its cultivation or collection. On most parts of the eastern and western coasts of Africa, it is indigenous; at Sierra Leone, Natal, and other places it is found abundant.

Madder.—This substance, which is so extensively used in dyeing red, is the product of the long slender roots of the *Rubia tinctorium*, a plant of which there are several varieties. The principal supplies of this important article of commerce are obtained from Holland, Belgium, France, Turkey, Spain, and the Balearic Isles, the Italian States, India, and Ceylon. The plant is generally raised from seed, and requires three years to come to maturity. It is, however, often pulled in eighteen months without injury to the quality; the quantity only is smaller. A rich soil is necessary for its successful cultivation, and when the soil is impregnated with alkaline matter, the root acquires a red color; in other cases it is yellow. The latter is preferred in England, from the long habit of using Dutch madder, which is of this color, but in France the red sells at two francs per cwt. higher, being used for the Turkey-red dye. Madder does not deteriorate by keeping, provided it be kept dry. It contains three volatile coloring matters, madder purple, orange, and red. The latter is in the form of crystals, having a fine orange red color, and called Alizaine. This is the substance which yields the Turkey-red dye. The chay root is employed in the East Indies as a substitute for madder, and so is the root of *Morinda citrifolia*, under the name of Sooranjee. Turkey madder roots realise about 33s. per cwt. About 1,100 tons are annually shipped from Naples, worth about £30 per ton. Madder has become an article of great request, on account of the fine scarlet color produced from its roots, and is so essential to dyers and calico printers that without it they cannot carry on their manufactures. It is cultivated extensively in Holland, from whence it is imported in large quantities into both England and France, though it is cultivated to some extent in both countries. Madder is extensively grown on the central table land of Affgha-

DYES, DYEING.

nistan, forming one of the leading products of Beloochistan; and, according to Mr. Pottinger, it sells in the Kelat bazar at about 10 lbs. for 2s. The cultivation there pursued is as follows:—The ground is repeatedly ploughed, and laid out finally in small trenches, in which the seed is sown, covered slightly with earth, and then the whole is flooded. Whilst thus irrigated, the trenches are filled with a mixture of rich manure and earth. The plants appear in about ten days, and attain a height of three or four feet during the first summer. They are cut down in September and used as fodder for cattle. Subsequently, and until spring arrives, the ground is manured and repeatedly flooded. During the second year's growth, the plants which are intended to produce seed are set apart, but the stems of the remainder are cut every four or six weeks, in order to increase the size and goodness of the roots.

Indian madder.—*Rubia cordifolia*, or *munjestha*, a variety with white flowers, a native of Siberia, is cultivated largely in the East, particularly about Assam, Nepaul, Bombay, Scinde, Quetta, China, &c., for its dye-stuff, and is known as Munjeet. A small quantity is exported from China and India; about 338 Indian maunds were shipped from Calcutta in 1840, and 2,328 in 1841. It fetches in the London and Liverpool markets from 20s. to 25s. and 30s. per cwt., duty free; 405 tons were imported into Liverpool from Bombay and Calcutta, in 1849, and 525 tons in 1850, but none was imported in 1851 and 1852. It was remarked by the Jury in 1851, at the Great Exhibition, that this is a valuable dye-stuff, and hitherto not so well appreciated as it deserves, for some of the colors dyed with it are quite as permanent as those dyed with madder, and even more brilliant. Its use however is gradually increasing, and it is unquestionably well worthy the attention of dyers.

Logwood.—The logwood of commerce is the red heart wood, or duramen, of a fine lofty growing tree (*Haematoxylon campechianum*), growing in Campeachy and the bay of Honduras, and which is also now common in the woods of Jamaica and St. Domingo. It has been introduced into India. It is principally imported as a dye wood, cut into short lengths. We chip, grind, and pack it into casks and bags, ready for the dyers, hatters, and printers' use, who esteem it as affording the most durable deep red and black dyes. It is sometimes used in medicine as an astringent. That grown in Jamaica is least valued; that of Honduras, Tobasco, and St. Domingo, fetches a somewhat higher price; but that imported from Campeachy direct, is the most esteemed. The annual imports into Liverpool are about 1,300 tons from Honduras, 100 from Tobasco, and 1,800 from Campeachy.

Fustic.—This is the common name of a species of dye wood in extensive use, which is obtained from *Maclura tinctoria*, or *Broussonetia tinctoria*, Kunth, a large and handsome evergreen tree, growing in South America and the West Indies. The wood is extensively used as an ingredient in the dyeing of yellow, and is largely imported for that purpose. The quantity entered for home consumption in the united Kingdom was 1,731 tons in 1847, 1,653 in 1848, and 1,842 tons in 1849. Ninety-one tons were shipped from Montego Bay, Jamaica, in the first six months of 1851.

Brazil wood.—This very ponderous wood is obtained in Brazil from the *Caesalpinia braziliensis*, which yields a red or crimson dye, when united with alum or tartar, and is used by silk dyers. It is imported principally from Pernambuco, 1,200 quintals having been shipped to London in 1835, but about 500 tons, worth about £4 a ton, were imported from Costa Rica 1845. The tree is large crooked, and knotty, and the bark is thick, and equal the third or fourth of its diameter. The imports may be stated at about 600 tons annually, the average price being £50 per ton. Brazil wood is found in the greatest abundance and of the best quality in the Province of Pernambuco, but being a government monopoly it has been cut down in so improvident a manner, that it is now seldom seen within several leagues of the coast. It might be introduced into India with advantage.

Lichens.—The chief lichens employed in the manufacture of orchil and cudbear are the following:—Angola weed (*Ramalina furfuracea*). Mauritius weed (*Rocella fusiformis*), which comes also from Madagascar, Lima, and Valparaiso, and then bears the distinctive commercial name of the port of shipment.

Henna (*Lawsonia inermis*), is an important dye-stuff, and the distilled water of the flowers is used as a perfume. The Mahomedan women in Asia use the shoots for dyeing their nails red, and the same practice prevails in Arabia. In these countries the manes and tails of the horses are stained red in the same manner. The *Genista tomentosa* yields red petals used in dyeing, and containing much tannic acid.

Burmese Dyeing. Green-dye plants.—Turmeric, and the leaves of the soap-acacia *Acacia rugata*, afford a beautiful green dye.—*Mason.*

Various red-dye plants.—The rose-coloured fruit of the tamarind "yields a beautiful deep red-colour, approaching purple"; the wood of the *Adenanthera pavonina* dyes red, and the wood of the black varnish tree affords a red dye.—*Mason.*

Various yellow-dye plants.—The wood of the jack, the root of the pyschotria, the bark of the gamboge trees, the flowers of the buteas, the rind of the Bengal quince, and the leaves of the memecylon and the touk-yat, all produce bright yellow dyes.—*Mason.*

Diospyros mollis is the *Black-Dye plant.*—The blossoms of the shoe-flower plant are used by the Chinese to dye leather black, the juice of the cashewtree gives a black to linen, and the fruit of the melas toma affords a black dye.—*Mason.*

The Shan black dye.—This celebrated vegetable dye is made from the fruit of a species of ebony, *Diospyros mollis*, which is said to grow on the mountains that separate the Province of Tavoy from the Siamese territories. Isolated plants may be seen in the gardens of Tavoy, and Maulmain, but I have never seen one in flower,or fruit.—*Mason.*

Javanese Dyeing.—The Javanese, who, of all the Malayan race, have certainly made the highest progress in all the useful arts, have a specific term for dyeing or tinting,—"madal;" but the Malays express it only by the word for dipping, "*chalup.*" Yet the only generic words which either of them possesses for "colour," are the Sanscrit, warna; and the Portuguese, tinta. Their colours are usually sombre,—little varied, but generally fast. Blues are always produced from indigo, yielded for the most part by the Indigofera tinctoria, as in other parts of India, but in Sumatra, occasionally, from the Marsdenia tinctoria, a plant of the natural order of the Asclepiadeæ. Yellows are produced from the woods of two species of Artocarpus, the jack and champadah, and from turmeric; and reds from the bark of the root of the "*mangkudu*," the Morinda umbellata,—from the "*kusumba-java*," safflower or Carthamus tinctorius, from the "*kusumba-kling*," which is the annotto, or Bixa orellana, from the sapang, or sapan-wood, Cæsalpinia sappan, and from the nidus of the lac insect. Black is produced from the rinds of the mangostin fruit, and of the "*Kata-pang*," Terminalia catappa, with sulphate of iron. Sails and nets are dyed, and perhaps also tanned with a wood called in Sumatra "*ubar*" which is the Ricinus tanarius of botanists. The mordants used are rice-bran, alkalis from the combustion of some vegetable matters, as the fruit stalks and mid-ribs of the cocoanut palm and alum brought from China.

Chinese Dyes.—In China, coloring matter used for dyeing blue is derived from two species of plants, the *Polygonum tinctorium* at the South, and the *tien tsing* or *Isatis indigotica*, cultivated at Shanghai and Chusan.—*Williams' Middle Kingdom, vol.* ii. *p.* 106. The Shanghae indigo (Isatis indigotica) is largely cultivated in the Ke-wang-meow district, a few miles to the south. The "Kong-wha," a variety of safflower (carthamus tinctorius), was found for the first time in fields near Cading. This dye, is held in high esteem by the Chinese, and is used in dyeing the red and scarlet silks and crapes which are so common in the country,and so much and justly admired by foreigners of every nation. Large quantities are annually produced in the Che-kiang province near Ningpo. At this season (June 10th) the crop of flowers had been gathered, and all the plants, removed from the land, except some few here and there on the different farms which had been left for seed. The seed was not yet ripe, so that I could not get a supply, but I determined to return that way and secure a portion to send to the Agricultural and Horticultural Society of India, in order to compare the Chinese with the Indian safflower. I believe they have turned out to be alike, or nearly so.—*Fortune.* When Mr. Fortune prepared to take up his late residence in China, his intention was directed, by the Calcutta Agricultural Society, to the Chinese varnish tree, *Rhus* species, the wax-insect tree, *Fraxinus* species, and to the soap-bean tree, *Cæsalpinia* species: to the various trees valuable for their fruit or timber and ornamental plants; but above all to the green indigo (so called), *Rhamnus* species, which yielded a dye that was at that time attracting much attention in France.

Rhamnus—The green-indigo (so called) has been discovered and introduced both to England and to India.—*Fortune's Res. among the Chi. page* 146.

Ruellia indigotica.—In China, in one part of the Chekiang province, and also amongst the Fung-hwa mountains to the westward of Ningpo, there are large quantities of a blue dye produced, which is in fact the indigo of that part of the country. Those who have read my 'Wanderings in China,' published in 1846, may remember the account given there of a valuable kind of Indigo, made from a species of wood (Isatis indigotica) which is cultivated extensively in the level country a few miles to the westward of Shanghae. The kind which attracted Mr. Fortune's attention in Chekiang is equally valuable, if not more so. It is made from a species of Ruellia, which, until it gets a better name, may be called Ruellia indigotica. It is a curious circumstance that the same plant, apparently, has lately been discovered in the Assam country in India, where it is also cultivated for the blue dye it affords. I had an opportunity of examining it in the garden of the Agricultural and Horticultural Society at Calcutta, by whom it had been introduced, and where it was standing alongside of the Chinese kind, to which it certainly bears a most striking resemblance: the point of identity will easily be determined when the plants come into flower. Strange it will be, if it is ultimately found that this species, which produces a dye unknown to commerce, is in cultivation all the way across from the eastern shores of China to the borders of Bengal, and this is far from being improbable. This Ruellia seem to be easily cultivated; it grows most luxuriantly, and is no doubt very productive. Having evidently been found indigenous a little further to the south, in a warmer latitude, it is not hardy in the province of Chekiang, any more than cotton is

about Shanghae; but nevertheless it succeeds admirably as a summer crop. It is planted in the end of April or beginning of May, after the spring frosts are over, and is cleared from the ground in October, before those of autumn make their appearance. During this period it attains a height of a foot or a foot and a half, becomes very bushy, and is densely covered with large green leaves. It is cut down before any flowers are formed. The Chinese method of preserving plants for next year's crop is most ingenious and well worth notice. Being somewhat tender, as I have already remarked, the roots which are left in the ground after the gathering season are all destroyed by the first frosts of winter. But the Chinese cultivator does not depend upon these for the crop of the following year, nor does he take them up or cover them in any way. They have done their duty for one year, and are now left to their fate. Cuttings are found to be much more vigorous and productive than the old roots and to the formation and preservation of these cutting the Chinese cultivator directs his attention. When the stems are cut down for the manufacture of indigo, a sufficient quantity have their leaves stripped off, and are afterwards taken into a house-shed to be properly prepared. The leaves thus stripped from the cuttings are thrown into the tanks with the other stems and leaves, so that nothing is lost, except what is actually required for the purposes of propagation. The stems are now tied up firmly in large bundles, each containing upwards of 1000, and the ends of each bundle are cut across, so as to leave them perfectly neat and even both at top and bottom. These bundles are each about a foot long, and, of course, nearly round. Having been thus prepared they are carried to a dry shed or outhouse, where, in some snug corner, they are packed closely and firmly together, and banked round with very dry loam. A portion of the dry soil is also shaken in between the bundles, and this being done the operation is complete. Should the winter prove unusually severe, a little dry straw or litter is thrown over the surface of the cuttings, but nothing else is required. During the winter months the cuttings remain green and plump; and although no leaves are produced, a few roots are generally found formed, or in the act of forming, when the winter has passed, and the season for planting has come round. In this state they are taken to the fields and planted. The weather during the planting season is generally showery, as this happens about the change of the monsoon, when the air is charged with moisture. A few days of this warm showery weather is sufficient to establish the new crop, which now goes on growing with luxuriance, and requries little attention during the summer, indeed none, except keeping the land free from weeds. In the country where this dye is grown there are numerous pits or tanks on the edges of the fields. These are usually circular in form; and one which I measured was eleven feet in diameter, and two feet in depth. About 400 catties of stems and leaves are thrown into a tank of this size, which is then filled to the brim with clear water. In five days the plant is partially decomposed, and the water has become lightish-green in colour. At this period the whole of the stems and leaves are removed from the tank with a flat-headed broom made of bamboo twigs, an admirable instrument for the purpose. When every particle has been removed, the workmen employed give the water a circular and rapid motion with the brooms just noticed, which is continued for some time. During this part of the operation another man has employed himself in mixing about thirty catties of lime with water, which water has been taken out of the tank for the purpose This is now thrown into the tank, and the rapid circular motion of the water is kept up for a few minutes longer. When the lime and water have been well mixed in this way the circular motion is allowed to cease. Four men now station themselves round the tank and commence beating the water with bamboo rakes made for this purpose. The beating process is a very gentle one; as it goes on the water gradually changes from a greenish hue to a dingy yellow, while the froth becomes of a beautiful bright blue. During the process the head workman takes a paleful of the liquid out of the tank and beats it rapidly with his hand. Under this operation it changes colour at once, and its value is judged of by the hue it presents. The beating process generally lasts for about half an hour. At the end of this time the whole of the surface of the tank is covered with a thick coating of froth of the most brilliant colours, in which blue predominates, particularly near the edges. At this stage, it being desirable to incorporate the froth with the liquid below it, I witnessed a most beautiful chemical operation which took me completely by surprise, and showed how universally must be the knowledge of the effect of throwing "oil upon the waters." A very small portion of cabbage oil only a few drops—was thrown on the surface of the froth, the workmen then stirred and beat it gently with their flat brooms for a second, or two, and the whole disappeared as if by some enchanters wand. And so small a quantity of oil was necessary for this purpose that even when the cup had been emptied, and had only the oil that was necessarily adhering to its edges, it was thrown into another tank, and produced the desired effect. The liquid, which is now darker in colour is allowed to stand quiet for some hours, until the coloring matter has sunk to the lower stratum, when about two-thirds of the surface is drawn off and thrown away. The remaining third part is then drawn into a small square tank on a lower level, which is thatched over

with straw and here it remains for three or four days. By this time the colouring matter has separated itself from the water, which is now entirely drained off—the dye occupying three or four inches of the bottom in the form of a thick paste, and of a beautiful blue colour. In this state it is packed in baskets, and exposed for sale in all the country towns in this part of China. What its intrinsic value may be when compared with the indigo of commerce, I have no means of ascertaining, but it is largely used in this part of the world, where blue is the most fashionable colour, judging from the dresses of the people, and it is possible that with our knowledge of chemistry a colour of this kind might be greatly improved. After being grown and manufactured as I have described, it is sold at rates varying from 50 to 100 cash a catty, say from 2d to 4d per lb. Some is sold as low as 30 cash, but this is very inferior, the greater part produced is sold at from 60 to 80 cash a catty, and it must be of a very superior quality if 100 cash is paid. Like the Shanghae indigo made from Isatis indigotica, it is called "Tien-ching" by the Chinese.

Rhamnus. While upon the subject of Chinese dyes, I shall now give some account of the "green indigo," which has been attracting much notice lately both in India and in Europe. A portion of cotton cloth obtained in China by the French manufacturers being greatly admired on account of the peculiar green of its dye, was submitted to the celebrated chemist M. Persoz with a request that he would endeavour to ascertain the composition of the green colour. The following is a translation of this report upon this subject to the Academy of Sciences:—Every attempt that I made upon the specimen to detect evidence of the presence of a blue or yellow failed, and I was led to the conviction, by isolating the coloring principle, that the green was produced by a dyeing material of a peculiar nature and sui generis. It further was evident,

1st.—That the coloring matter was an organic product of vegetable origin.

2nd.—That the fabric on which it was fixed was charged with a strong dose of alum and a little oxide of iron and lime, bodies the presence of which necessarily implied that mordants had been used in dyeing the calico.

These results were so positive, and at the same time so opposed not only to everything known in Europe regarding the composition of green colour, but also to all that is recorded by writers regarding the dyeing processes employed in China for the production of green, that I was induced to go into a more detailed investigation of the subject; and about the end of last November I applied to Mr. Forbes, the American Consul at Canton, for some of this valuable material. I am indebted to his kindness for a specimen weighing about one gramme (15½ grains). The substance is met with in thin plates, of a blue colour, having a strong analogy with that of Java indigo, but of a finer cake and differing besides from indigo both in its composition and in all its chemical properties. On infusing a small fragment of the substance in water, the liquid speedily became coloured of a deep blue with a shade of green. After the temperature had been raised to the boiling point, a piece of calico, prepared for printing with mordants of alum and oxide of iron, was dipped in it and a true dye was the result. The following appearances were observed. The portion of the fabric to which alum had been applied showed a deep green, of more or less intensity, according to the strength of the mordant. The portions charged with both alum and oxide of iron yielded a deep green, with a shade of olive. The portions charged with oxide of iron alone yielded a deep olive. The parts of the cloth where no mordant had been applied remained sensibly paler. The colours thus obtained were treated with all the re-agents to which the Chinese calico had in the first instance been subjected, and they behaved in precisely the same manner. From these experiments it may be inferred,

1st. That the Chinese possess a dye-stuff presenting the physical aspect of indigo, which dyes green with mordants of alum and iron.

2nd. That this dye stuff contains neither indigo nor any thing derived from that dyeing principle. Mons. Legentil, President of the Chamber of Commerce of Paris, having perceived the importance of France being speedily put in possession of this valuable material, with a view to the interests of science and of industry, took the necessary steps, several months ago, for procuring a suitable quantity with the least possible delay, and at the same time to have inquiries made as to its origin and mode of preparation. Mr. Fortune here adds, that the investigation of the green dye-plant, exhibit as many amusing blunders as used to be made about the Chinese rice-paper plant in former days. By some the flowers of the Whi-mei (Sophora japonica) were sent home as the "green indigo," but this plant yields a yellow dye and even when mixed with blue to make a green, the green is not that kind noticed by the French manufacturers. At another place he says, here I found fields under cultivation with a kind of Rhamnus apparently. The Chinese farmer called it "Loh-zah, or "Soh-loh-shoo," and showed me samples of the cloth which had been dyed with it. To my delight these samples corresponded exactly with those sent back from France one of which was in my possession, but he told me that two kinds were necessary—namely the variety they cultivated in their fields and one which grew wild on the hills—in order to produce the dye in question. The former they called the yellow kind and the latter the

white kind. The dye itself was not extracted by them; they were merely the growers, and therefore I could get no information as to its manufacture. I however secured a good supply of plants and seeds of both kinds, which were afterwards sent to India and England. My further inquiries on the subject of the manufacture of the "green indigo" were conducted in connexion with Dr. Lockhart and the Rev. J. Edkins, of Shanghae. We found that a considerable portion of this dye was made near a city called Kia-hing-foo, situated a few miles west from Shanghae and Mr. Edkins procured a bundle of chips there, which exhibited the state in which the article is sold in the market. Since I left China I have received the following interesting letter from Dr. Lockhart, which throws much light on the subject. The information was procured by Mr. Edkins and may therefore be fully relied upon. "The bark of two kinds of the tree known as the 'green shrub' (Luk-char), one wild, which is called the white and another cultivated, which is called the yellow, are used to obtain the dye. The white bark tree grows abundantly in the neighbourhoods of Kea-hing and Ningpo; the yellow is produced at Tsah-kou-pang, where the dye is manufactured. This place is two or three miles west from Wang-steen, a market-town situated a little to the south of Kea-hing. "The two kinds are placed together in iron pans and thoroughly boiled. The residuum is left undisturbed for three days, after which it is placed in large earthenware vessels, and cotton cloth, prepared with lime, is dyed with it several times. After five or six immersions the colouring matter is washed from the cloth with water, and placed in iron pans to be again boiled. It is then taken up on cotton yarn several times in succession, and when absorbed in this way it is next washed off and sprinkled on thin paper. When half dry the paper is pasted on light screens and strongly exposed to the sun. The product is called Lukkaou. In dyeing cotton cloth with it, ten parts are mixed with three parts of subcarbonate of potash in boiling water. "The dye made at Tsah-kou-pang is not used to dye silk fabrics, because it is only a rough surface which takes it readily. To colour silk with it, so much of the material must be used that it will not pay. All cotton fabrics, also grass-cloths, take the colour readily. The dye does not fade with washing, which gives it a superiority over other greens. "It is sent from Kea-hing as far as Shanting. It is also made in the province of Hoonan and at Ningpo, but the dye at these places is said to be of an inferior quality. It has long been used by painters in water-colours, but the application of it to dye cloth was first made only about twenty years ago. If some method could be discovered of applying it to silk fabrics it would become still more useful." The information obtained by Mr. Edkins on this subject is, no doubt, perfectly correct. It agrees in the most important particulars with what I had gleaned from time to time amongst the Chinese in various parts of the country. The chips he brought with him from Kea-hing were identical with the "Soh-loh," or "Loh-zah" (Rhamnus sp.), which I have already mentioned, and his statement that two varieties of the plant are used to produce the dye agrees with my own observations. The mode of extracting the dye from the bark or wood (for both seem to be used), as practised by the Chinese, appears to be slow and tedious, but with our superior knowledge of chemistry this might possibly be improved. From these investigations it would appear that two colouring principles are necessary to the production of this dye. This however, will not affect the value of it as a rich and permanent green, a quality which has been appreciated by the French manufacturers, and which is also well known to the Chinese.—*Fortune's Res. among the Chinese, page* 167.

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(3303) EAGLE-WOOD.

Eagle-wood; ENG; Aloe-wood.
Agila, Gahru, Kayu gahru, MALAY.
Kalambak, MALAY and JAVANESE.
Agarhu, SANSCRIT.

One of those substances of which the name, from similarity of sound in a foreign language, has been converted into another having no reference to its original signification. It is a highly fragrant wood, much esteemed by Asiatics for burning as incense, and known in Europe by its present designation ever since the Portuguese visited and imported the substance direct from the Malayan islands and the kingdom of Siam, where it has always been abundant, and long established as an article of commerce. The Malayan name is Agila, whence the wood was called Pao-d' Agila, by the Portuguese, and has since been converted into Pao-d' Aguila and Pao-d' Aquila, Bois-d'Aigle, Eagle-Wood, and Agel-Hout. From the Malayan Agila has probably been derived the Sanscrit Agara, whence we have the Hindoo Aggur, if not from the more familiar appellation of Garoo, by which Eagle-Wood is also known in the Malayan Archipelago. In Persian works on Materia Medica in use in India, we learn from Dr. Royle ('Illustr. of

Himal. Bot.' &c.) that several kinds of fragrant wood are described under the Arabic name Aod (Haud and Ud of Garcias), and that he himself obtained three kinds in the bazars of India, called Aod-i-Hindee, Aod-i-Chinee, and Aod-i-Kimaree (evidently the Al-Cemericum of Arabian authors); and that with the above Hindoo, a Greek synonym, Agallochee, is also given, and more especially applied to Aod-i-Kimaree, which is also called Aod-i-Bukhoor, Incense-Wood. As Agallochee is no doubt a corruption of the Agallochum of Dioscorides, described by him as a fragrant wood from India and Arabia, it is interesting to find that the translators from the Greek into the Arabic of the school of Baghdad settled these synonyms at a time when they must have been well acquainted, from their profession and position, with the substances to which both the Greek and Arabic names were applied. Serapion and Avicenna describe several kinds of this fragrant wood, and the latter under both Agalugen or Aghaloojee, and Aod, which in the Latin version is translated Xyloaloe, a name that was applied by the latter Greek medical writers to Agallochum, whence we have lignum aloes, lign-aloe, and aloes-wood, the origin of which it is difficult, if not impossible, to ascertain, unless we suppose it to be a corruption of Agila: for the bitter, scentless, spongy-textured stems of the genus Aloe could not afford any substitute for this fragrant wood, or be thought to yield it, at least by the Arabs, who were well acquainted with and accurately describe aloes, and the place, Socotra, where the best kind is found. Though Dioscorides notices only one, which some suppose to be the Tarum of Pliny, several kinds of Agallochum are described by Serapion and Avicenna, which, as it is not possible at present to identify, it is unnecessary to notice, and therefore we shall refer only to the three kinds which have been traced to the trees yielding them, by naturalists who have visited the countries where these are indigenous.

An *Aguila brava* (wild) is mentioned by Garcias, as produced near Cape Cormorin, in the southern part of the Indian peninsula, and in the island of Ceylon; but the tree yielding this wood has not been ascertained. Rumphius ('Herb. Amb.' ii. p. 40,) describes two kinds of *Agallochum spurium*, found in Borneo and Sumatra, one of which he calls Garo Tsjampica, which is described as having leaves and flowers resembling those of the celebrated champa (Michelia champaca), and may be a species of the same genus. A third kind of spurious Agallochum, he describes in another part of his work, as the produce of his Arbor excæcans, so called from the acridity of its juice blinding people, and which is the Excæcaria agallocha of Linnæus. Considering that Rumphius, in originally describing this tree, has said "Lignum hoc tantam cum agallocha similitudinem," and as affording a substitute for that substance, it is not surprising that it should be frequently quoted as the tree which yields the genuine agallochum or aloes wood. Fee (Hist. Nat. Pharm.) states that he had seen a genuine specimen of the wood of this tree, and that its fragrance cannot be compared with the Agallochum of Loureiro and Dr. Roxburgh mentions that the wood-cutters of the delta of the Ganges, though well acquainted with the highly acrid and very dangerous milky juice of this tree (there called geria), do not mention agallochum, of any kind, being found in it. Of the two kinds of Agallochum which are most valued, and both considered genuine, one is distinguished by the name of Calambac, and the other as the Garo of Malacca.

The first, called Calambac, and Agallochum Primarium by Rumphius, appears, as far as hitherto known, to be a native of Cochin-China only, growing on the mountains of that country in about 13° N. lat., near the great river Lavum, which may be the Meikeng flowing between Cochin-China and the Laos. This tree was named *Aloexylum agallochum* by Loureiro, 'Fl. Cochin-Chinensis,' p. 327, and placed by him in *Decandria Monogynia*, and described as a lofty tree with erect stem and branches, long lanceolate shining leaves, terminal bunches of flowers, with a woody falcate 1-seeded pod for its fruit, whence it is referred by De Candolle to the natural family of *Leguminosæ*. Loureiro states that the wood of this tree is white and inodorous, and that its fragrance is the result of disease, when the oily portions thicken into resin in the central parts of the tree, and that no part of the tree is milky or poisonous, but that paper is made from its bark in Cochin-China, as in Japan from that of the mulberry.

The next kind of Agallochum is that commonly called Garos, and to which the name of Eagle-Wood is more frequently applied, and which has long been an article of export from Malacca and the kingdom of Siam. Specimens of the tree which yields this were first obtained by M. Sonnerat in his second voyage to India, from which probably have been given the figure and description by Lamarck. ('Enc. Meth.,' i. p. 49, Illustr. t. 376.) The plant he named *Aquilaria malaccensis*. This, the Garo de Malacca, was introduced by Dr. Roxburgh into the botanic garden of Calcutta, and was not to be distinguished from specimens of a tree called Ugoon, which is a native of the mountainous tracts east and south-east from Silhet, between 24° and 25° of N. lat., which flowers in April, and ripens its seed in August, and which he says there can be little or no doubt furnishes the real Calambac or Agallochum of the ancients; adding, that there seems more reason to think that it was carried to China from our eastern frontier, than to suppose it was carried from Cochin-China, or any other country in the vicinity of China, where it has always been

in great demand. Small quantities are sometimes imported into Calcutta by sea, from the eastward; but such is always deemed inferior to that of Silhet. ('Fl. Ind.' ii. p. 423.) As the Malacca plant had not flowered, Dr. Roxburgh was unable to decide that they were positively the same with those from Silhet, and therefore named these *Aquilaria agallocha*, as another species of the same genus. By this name it has been figured in Royle's 'Illustr.' i. 36, f. 1, from a drawing by Dr. Hamilton of a plant which he called *Agallochum officinarum*, and which he found near Goalpara, on the eastern frontier of Bengal. This drawing is illustrated with dissections by Dr. Lindley. The fragrant nature of genuine Agila or Eagle-Wood is well known, and that it has from very early periods been employed both by the natives of India and of China as incense. Mr. Finlayson, in his visit to Siam, says that the consumption of this highly odoriferous wood is very considerable in Siam, but that the greatest part is exported to China, where it is used in a very economical manner. The wood being reduced to a fine powder, and mixed with a gummy substance, is laid over a small slip of wood, about the size of a bull-rush, so as to form a pretty thick coating. This is lighted, and gives out a feeble but grateful perfume. French authors inform us that the Eagle-Wood was burned as a perfume by Napoleon in the imperial palace. We cannot conclude this subject without inquiring whether the substances of which we have been treating are the Lign-Aloes of Scripture, Ahaloth, masc. Ahel, whose plural is Ahalim. It would be impossible to do justice to the subject in a small compass, or without referring to the numerous dissertations which have been written on it; but it may be observed, that these might have been much shortened, if the authors had been naturalists, or intimately acquainted with the natural history and usages of eastern countries. Such information would at least have prevented any species of aloe being considered or figured as the far-famed and fragrant Lign-Aloe from a mere similarity in sound. In the present instance, the difficulty is increased by the supposed necessity of reconciling the different passages in which Lign-Aloes are mentioned, as in Numbers, xxiv. 6, where it is mentioned as a tree planted; but in the three other passages, Proverbs, vii. 17, Psalms, xiv. 9, and Canticles, iv. 14, it is enumerated with the most fragrant products of the east as cinnamon, cassia, calamus, camphor, frankincense, myrrh, spikenard, and saffron. Here we may observe, that a substance which was indigenous in a country was not likely to have been an article also of commerce from a far country in those early times; and that therefore, as it is disputed whether the word shall be translated Tents or Lign-Aloes, the word may perhaps be used in a poetical sense, as it is thought to be by some commentators. In the three passages above referred to, it may be noted that, except sandal-wood, there is no other substance which could be so well enumerated with those with which it is found in connection as the Agila-Wood of the East; whether we consider its high price, delicate perfume, or the long time in which it has been held in high estimation, while the similarity of its name is at the same time remarkable.—*Eng. Cyc. Vol.* ii. There can be no doubt but that the perfumed wood under notice is the result of disease in the tree that yields it, produced by the thickening of its sap into a gum or resin. The perfumed wood is found in greatest perfection in the mountainous country to the east of the Gulf of Siam, including Camboja and Cochin-China, between 8° and 14° of North latitude. It is found however, although of inferior quality, as far north as Sylhet in Bengal, and as far south as the Malay peninsula and Sumatra and in all this wide extent the tree, a tall forest one, is probably either the same or of the same natural family. Crawfurd saw it growing, in the healthy and diseased state, in the Mission to Siam and Cochin-China in 1821 and 1822. Crawfurd states it belongs to the Leguminosæ, but that the genus has not been ascertained.—*Crawfurd, p.* 6. Aquillaria malaccensis (the A. ovata of botanists) produces a whitish yellow-wood, also sold under the above name.

(3304) EAGRE, the Eagre, or as it is called in India, the "*Bore*" of the Tsien-tang river, is famous in Chinese history. It is one of the three wonders of the world, according to a Chinese proverb, the other two being the demons at Tang-chan and the thunder at Lung-chan. As in other countries the Eagre or Bore makes its appearance generally on the second or third day after the full or change of the moon or at what are called spring tides and particularly in spring and autumn, about the time the sun is crossing the line. Should it so happen that strong easterly gales blow at these times the Eagre rolls along in all its grandeur and carries everything before it. Dr. Macgowan, the well known medical missionary at Ningpo, gives the following graphic account of it which he witnessed during a visit to Hang-chow-foo. Between the river and the city walls, which are a mile distant, dense suburbs extend for several miles along the banks. As the hour of flood-tide approached, crowds gathered in the streets running at right angles with the Tsien-tang, but at safe distances. On one occurrence the position of Mr. Fortune was a terrace in front of the Tri-wave temple, which afforded a good view of the entire scene. On a sudden all traffic in the thronged mart was suspended; porters cleared the front street of every description of merchandise; boatmen ceased lading and unlading their vessels and put out into the middle of the stream, so that a few minutes

sufficed to give a deserted appearance to the busiest part of one of the busiest cities in Asia: the centre of the river teemed with craft from small boats to large barges, including the gay flower-boats, loud shouting from the fleet announced the appearance of the flood which seemed like a glistening white cable stretched athwart the river at its mouth as far down as the eye could reach. Its noise, compared by Chinese poets to that of thunder, speedily drowned that of the boatmen, and as it advanced with prodigious velocity—at the rate, of twenty-five miles an hour—it assumed the appearance of an alabaster wall or rather of a catract four or five miles, across and about thirty feet high, moving bodily onward. Soon it reached the advanced guard of the immense assemblage of vessels awaiting its approach. Knowing that the Bore of the Hoogly, which scarce deserved mention in connection with the one before me, invariably overturned boats which were not skilfully managed, he could not but feel apprehensive for the lives of the floating multitude. As the foaming wall of water dashed impetuously onwards they were silenced, all being intently occupied in keeping their prows towards the wave which threatened to submerge everything afloat: but they all vaulted, as it were, to the summit with perfect safety. The spectacle was of greatest interest when the eagre had passed about half-way among the craft. On one side they were quietly reposing on the surface of the unruffled stream, while those on the nether portion were pitching and heaving in tumultuous confusion on the flood. Others were scaling with the agility of salmon the formidable cascade. This grand and exciting scene was but of a moments duration; it passed up the river in an instant, but from this point with gradually diminishing force, size and velocity, until it ceased to be perceptible, which Chinese accounts represent to be eighty miles distant from the city. From ebb to flood-tide the change was almost instantaneous. A slight flood continued after the passage of the wave, but it soon began to ebb. The Chinese say that the rise and fall of the tide is sometimes forty feet at Hang-chow. The maximum rise and fall at spring tides is probably at the mouth of the river, or upper part of the bay, where the Eagre is hardly discoverable. In the Bay of Fundy, where the tides rush in with amazing velocity, there is at one place a rise of seventy feet, but there the magnificient phenomenon in question does not appear to be known at all. It is not, therefore, where tides attain their greatest rapidity, or maximum rise and fall, that the wave is met with, but where a river and its estuary both present a peculiar configuration.—*A Res. among the Chi. p.* 317.

(3305) EAR-GULIE, the Tamil name of a Ceylon tree which is about fourteen inches in diameter, and eight feet in height. It is not a useful wood.—*Edye's Ceylon.*

(3306) EARTH NUT. Arachis Hypogea. Ground-nut.

(3307) EARTHENWARE, CROCKERY.

Aardegoed, Dut.	Stoviglie, Terraglie, It.
Vaisselle de terre, Poterie Fr.	Gliniane naczynia, Pol.
Irdene Warren, Ger.	Gorschetschnue possodu, Rus.
Chenecekam, Guz. Hind.	Loza de barro, Sp.

A term generally applied to all utensils composed of earthen materials, known by the distinctive names of porcelain, stone-ware, flint-ware, delft, iron-stone, China ware, &c.—*Faulkner.*

(3308) EAU DE COLOGNE. A celebrated preparation for the toilet, consisting of aromatized alcohol. It is extensively manufactured in France and other parts of the Continent, from silent brandy, mixed with sage, thyme, camphor, cloves, and other herbs and spices, the whole being macerated together, and then distilled.—*Faulkner.*

(3309) EBONY,

Kaya-arang, Malay and Javanese	Abnoos, Guz. Hind.
Kendoo, Beng.	Ebeno, It.
Ebbenout, Dut.	Ebenus, Lat.
Ebene, Fr.	Ebenowoedcrewo, Rus.
Ebenholz, Ger.	Atcha-marum, Tam.

An exceedingly hard and heavy wood, of great durability, and susceptible of a fine polish. There are many varieties of ebony; the best is that which is jet black, free from veins, and close grained; besides the black there are red, green and yellow ebonies, but these are not much esteemed. Ebony is chiefly used in the manufacture of chairs, couches, &c, and in mosaic and other inlaid work. It is procured in Ceylon, Malabar, Zanzibar, Mauritius, and Madagascar.—*Faulkner.* Ebony so called, is found in most of the countries of the Asiatic Archipelago, from the Peninsula and Sumatra to the Philippine Islands. It is there probably the produce of several species of Diospyros, but chiefly of Diospyros melanoxylon. It is greatly inferior in quality to the ebony of Ceylon and the Mauritius, the produce of Diospyros ebenum.—*Crawfurd Dict. page* 135. *See* DIOSPYROS.

(3310) ECHITES, a genus of twining Plants, inhabiting tropical countries, and belonging to the natural order *Apocynaceæ*. They have handsome yellow or white corollas, and are moreover remarkable for their singular fruit, which consists of two divaricating woody pod-like follicles containing a large number of silky seeds. There are above 60 species of this genus. They are dangerous lactescent plants, of no known use.—*Eng. Cyc. p.* 487. Dr. Wight, in Icones, gives Echites acuminata, 424; antidysenterica, 439; caryophyllata, 440; cymosa, 395; dichotoma,

438 ; frutescens, 430 ; hircosa, 429 ; macrophylla, 432 ; marginata, 425 ; paniculata, 596 ; parviflora, 423 ; scholaris, 422 ; venenata, 436.

(3311) ECHITES ACUMINATA, a climbing shrub with white flowers and habit as the next.—*Riddell.*

(3312) ECHITES PANICULATA, a climbing shrub with large yellow showy flowers.—*Riddell.*

(3313) ECHINOPS ECHINATUS, Camel Thistle. *Hind.* Oont-katara. Very common in Rajwarra : camels consume it readily.—*Gen. Med. Top. p.* 206.

(3314) ECHIUM GRANDIFLORUM, BORAGINACEÆ.

(3315) ECLIPTA PROSTRATA, Trailling Eclipta. *Hind.* Bhaugi Key sute. In Ajmeer, this is a common weed in the rains.—*Gen. Med. Top. p.* 200.

(3316) EDGWORTHIA CHRYSANTHA. The curious and much-prized *Edgworthia chrysantha* grows in great abundance in China, as also Reeves's Spiræa and *Spiræa prunifolia* in great profusion. Several species of the *Chimonanthus* or Japan allspice, *Forsythia viridissima*, *Buddlea Lindleyana*, and numerous Daphnes, Gardenias, and Azaleas, were also met with. Many kinds of mosses and Lycopods were growing out of the crevices of the moist rock ; amongst the latter, and very abundant, was a fine species, named *Lycopodium Willdenovii.—Fortune's Tea Districts, page* 57.

(3317) EDGEWORTHIA GARDNERI, is a beautiful shrub, with globes of waxy cowslip-coloured, deliciously scented flowers. This plant is allied to *Daphne*, from whose bark the Nepal paper is manufactured. It was named after the eminent Indian botanist, brother of the late Miss Edgeworth.—*Hooker. Him. Jour. Vol.* 1. *page* 205.

(3318) EDIBLE SEA-WEED. Plocaria Candida. Fucus amylaceus.

Kyouk-pwen, BUR.

A sea weed, abundant on the Tenasserim coast, and exceedingly valuable for its nutritious and medicinal properties for invalids. It was first brought to public notice by Dr. O'Shaughnessy as the Edible moss of the Eastern Archipelago, and referred by him to the genus fucus. The fructifications however being in small tubercles, the Rev., Mr. Mason considers it as a species of Agardhs genus, Sphœrococcus, which now constitutes a member of the genus plocaria. It is an allied genus with the Ceylon moss (Gigartina lichenoides) first described as fucus amylaceus by Dr. O'Shaughnessy, the Plocaria lichenoides of Mr. Mason ; also with a species found on the coast of Devonshire in England ; Pl. compressa : with the Corsican moss of the Mediterranean, P. Helminthochorton : also with the Agar-agar Pl : tenax : but differs from the Irish moss or Chondrus crispus : and is not of the same natural family as the Iceland moss which, indeed, is a lichen, the Cetraria islandica. The Tenasserim moss is said to be superior to all others, as it is wholly free from the bitter principle which renders other fuci so objectionable ; but Mr. Mason seems to consider it almost identical with the Ceylon moss, for he gives the same account of it as Dr. O'Shaughnessy gives of that from Ceylon. It contains he says a considerable proportion of starch, and was hence named by Dr. O'Shaughnessy, the starch fucus, Familaceus, but his specific name has been since changed to *candida*, white, probably from a mistaken idea that the substance is naturally white, whereas it becomes so only by bleaching in the sun ; its natural tint, is a shade between olive and purple, such as the natives designate red. Burmese Kyouk-pwen. According to Dr. O'Shaughnessy's analysis it contains as follows :

Vegetable jelly,.....	54 5
True starch,.....	15.0
Wax, a trace,.....	0.5 ?
Ligneous fibre,.....	18.0
Gum,.....	4.0
Sulphate and muriate of soda,.....	6.5
Sulphate and phosphate of lime,.....	1.0
Iron, a trace,.....	0.4 ?
	100.0

On the best mode of preparing it for use he adds : " In the first place, from the tendency of *pectin* or vegetable jelly to form insoluble compounds with saline and earthy bases, it is necessary to steep this fucus for a few hours in *cold rain water* as the first step in its preparation. This removes a large portion, if not the entire, of the sulphate of soda, leaving all the gelatine, and starch. It should next be dried by the sun's rays, and *ground to a fine powder* ; I say *ground*, for cutting or pounding, however diligently or minutely performed. still leaves the amylaceous globules so mechanically protected, and so closely involved in an external sheath of tough ligneous fibre, that scarcely a particle of the starch can be extracted by boiling, even though the decoction is prolonged for several hours. When *ground*, boiling for 25 minutes or half an hour dissolves all the starch and gelatine. The solution while hot should be passed through muslin or calico, and thus the ligneous fibre is removed : lastly, the strained fluid should be boiled down till a drop placed on a cold surface gelatinizes sufficiently. " With milk and sugar, and flavoured with lemon juice or sherry, this substance, when prepared as I direct, would afford the invalid a pleasant article of diet, especially at sea, where other jellies or their materials cannot be so easily preserved. As I am informed that this fucus is found abundantly on the eastern coast of Bengal, I entertain considerable

hopes of its being hereafter found available also in several processes of art and various manufactures."—*Mason.*

(3319) EDDOES, the name by which the esculent *Caladium* is known by the blacks of the Gold Coast.

(3320) EEE-GYWOT-SHA, a bast of Arracan, strips five to six feet in length, composed of several layers, of which one side is smooth and compact, and the layers on the other side thin but cancellar: all having a considerable degree of toughness.

(3321) EERPILAKAI, Tam. ARTOCARPUS PUBESCENS. Wild.

Angelie marum kai, Tam.

This fruit somewhat resembles the Datura and is the produce of the tree called by Rheede Ansjeli (See Hort Mat. Part 3d table 32d), who tells us that when eaten much it is apt to produce diarrhœa which however is cured by the root and bark of the same tree.—*Ainslie, p.* 240.

(3322) EGERIA, a genus of Brachyurous Decapod Crustaceans established by Leach, and thus characterised:—External antennæ short, inserted on the sides of the rostrum, having their second joint much shorter than the first. External jaw-feet having their third articulation straight on the internal border, and terminated by a point. Claws delicate, linear, double the length of the body in the males, nearly equalling it in the females, much shorter in both sexes than the rest of the feet, which are very slender, those of the fifth pair being five times the length of the body. Carapace triangular, tuberculated, and spinous, terminated by a rather short rostrum, which is bifid, with diverging points. Eyes much larger than their peduncle. Orbits having a double fissure on their superior border. *E. Indica*, in size, general form of the body, and length of the feet, bears a great resemblance to *Inachus Scorpio*; but besides generic differences, it is still further removed from it in having a larger rostrum, which is deeper incised in the middle, and in having the points with which the elevated and distinct regions of the carapace above are beset disposed in the following order: 3, 2, 1 and 1. A rather long sharp post-ocular point is directed forwards. The arms are rather short and slender. It inhabits the Indian seas. —*Eng. Cyc.*

(3323) EGRET, the common name of several species of Heron. In Australia, what in India we call 'White Paddy-birds,' and in Britain are the much prized Egrets, have come to be denominated 'Cranes;' and the real Crane of that country is known as the 'Native Companion.'

(3324) EGYPTIAN BEAN, a name sometimes given to the bean-like fruits of *Nelumbium speciosum*, from the notion that they were the beans which the disciples of Pythagoras were forbidden to eat.

(3325) EHRETIACEÆ, *Ehretiads*, a small natural order of Exogenous Plants, consisting of shrubs or trees inhabiting the warmer countries of the world, and having rough leaves, monopetalous regular flowers, a definite number of stamens, a superior ovary, a 2-lobed style whose divisions are capitate, and a nucamentaceous undivided fruit. The flowers are more or less gyrate, and the order itself, which contains no species of economical value, is so near *Boraginaceæ* as to render it doubtful whether it ought to be separated. The common Heliotrope is the most generally known representative of *Ehretiaceæ*, forming however the type of a sectional division characterised by the fruit being dry, not succulent. There are 14 genera and 297 species of this order. Wight gives Ehretia aspera, 1383-84; (X.) cuneata, 1385; lævis, 1382; ovalifolia, 1383; umbellulata, 1384; viminea, 1385; Wightiana, 1384; The root of *Ehretia buxifolia* is used in medicine, in India. Some of the species of the genus *Ehretia* bear eatable drupes.—*Eng. Cyc.*

(3326) EHRETIA BUXIFOLIA. Roxb.

Visser pullum, Tam.

This fruit I have never seen, but by what I can learn, it is of an inferior order, and is eaten by the poor people.—*Ainslie, p.* 234.

(3327) EHRETIA LÆVIS. Seregada, Tel.

The species grows to a pretty large tree. It is a native of the Circar mountains. The wood of this tree is good and used by the hill people for many purposes. Roxb.—*Rohde M.S.S.*

(3328) EHRETIA OVALIFOLIA.

Naraga marum, Tam.

A common but generally small tree in the Coimbatore district. I am still unacqnainted with the quality of the timber, said to be useless.—*Wight.*

(3329) EGGS, ARTIFICIAL HATCHING OF.—One of the greatest Lions in Chusan is an old Chinaman who every spring hatches thousands of ducks' eggs by artificial heat. His establishment is situated in the valley on the north side of the City of Tinghae, and is much resorted to by the officers of the troops and strangers who visit the island. The first question put to a sight-seer who comes here is, whether he has seen the hatching process, and if he has not, he is always recommended to pay a visit to the old Chinaman and his ducks. The hatching-house was built at the side of the cottage, and was a kind of long shed, with mud walls, and thickly-thatched with straw. Along the ends and down one side of the building are a number of round straw baskets well plastered with mud, to prevent them from taking fire. In the bottom of each basket there is a tile placed, or rather the

tile forms the bottom of the basket; upon this the fire acts,—a small fire-place being below each basket. Upon the top of the basket there is a straw cover, which fits closely, and which is kept shut whilst the process is going on. In the centre of the shed are a number of large shelves placed one above another, upon which the eggs are laid at a certain stage of the process. When the eggs are brought, they are put into the baskets, the fire is lighted below them, and a uniform heat kept up, ranging, as nearly as I could ascertain by some observations which I made with a thermometer, from 95° to 102°, but the Chinamen regulate the heat by their own feelings, and therefore it will of course vary considerably. In four or five days after the eggs have been subject to this temperature, they are taken carefully out, one by one, to a door, in which a number of holes have been bored, nearly the size of the eggs; they are then held against these holes, and the Chinamen look through them and are able to tell whether they are good or not. If good, they are taken back, and replaced in their former quarters; if bad, they are of course excluded. In nine or ten days after this, that is, about fourteen days from the commencement, the eggs are taken from the baskets, and spread out on the shelves. Here no fire heat is applied, but they are covered over with cotton, and a kind of blanket under which they remain about fourteen days more, when the young ducks burst their shells, and the shed teems with life. These shelves are large, and capable of holding many thousands of eggs; and when the hatching takes place, the sight is not a little curious. The natives who rear the young ducks in the surrounding country know exactly the day when they will be ready for removal, and in two days after the shell is burst, the whole of the little creatures are sold, and conveyed to their new quarters. —*Fortune's Wanderings, pages* 76 to 81.

(3330) ELÆAGNACEÆ, *Oleasters*, a small natural order of Apetalous Exogenous Plants, consisting of trees or shrubs whose leaves are either opposite or alternate, destitute of stipules, and always protected more or less by scurfy scales, which usually give the plants a leprous aspect. The genera of this order have a tubular 4-lobed calyx, the inside of which is lined with a fleshy disc, that sometimes almost closes up the tube; there are 3, 4, or 8 stamens, and a superior ovary containing a single erect ovule. The fruit is soft, succulent, and would be eatable if it were not for its dryness and insipidity. In a few cases, when it is more than usually juicy and acidulated, it is actually considered an excellent fruit. *Elaeagnus hortensis* and *E. orientalis* bear a brown fruit about the size of an olive, which is brought to market in Persia under the name of Zinzeyed: in quality it is like a jujube. The red drupes of *E. conferta*, the large olive-shaped ones of *E. arborea*, and the pale orange-colored ones of *E triflora* are in like manner eaten in India; another occurs among the drawings of Chinese fruits. It is not a little curious, nearly as *Elaeagnaceæ* are related to *Thymeleaceæ*, that they do not seem to participate in any degree in the acridity of that deleterious order. The only species found wild in Great Britain is the *Hippophae rhamnoides*, a spiny shrub with diœcious flowers, small round orange-coloured acid berries, and narrow leaves, like those of rosemary, found growing on cliffs near the sea; its fruit, when the acidity is sufficiently covered by sugar, becomes a rather pleasant preserve. *Elaeagnus angustifolia*, called in the gardens the Olivier de Boheme, a native of the eastern parts of Europe, is one of the most fragrant of all plants. Its dull yellow flowers, hardly remarked among the leaves, fill the atmosphere with a delicious perfume, the source of which is not readily discovered by the the passer-by. The genera comprising this order are *Elaeagnus*, *Hippophae*, *Conulemm*, and *Shepherdia*. They embrace about 30 species.—*Eng. Cyc*,

(3331) ELÆAGNUS was common in the Bhooteea country in East Nepaul—*Hooker's Him. Journ., page* 265.

(3332) ELÆAGNUS ANGUSTIFOLIUS E. SINJED, Royle,—is a tree which grows in the mountains as well as in the valley of Cashmere, but medicinally, it is little used by the natives. The ripe berries are eaten by the mountaineers. I administered the leaves and the unripe fruit together. The oil from the seeds with syrup as a linctus has been recommended in catarrhal and bronchial affections.—*Honigberger, page* 273.

(3333) ELÆAGNUS CONFERTA. Hind. Amgoolee. A scandent shrub, with silver coloured leaves beneath. The fruit is red when ripe, and eaten by the natives.—*Riddell.*

(3334) ELÆAGNUS DULCIS. ELAEAGNACEÆ. Hind. Shooshuna. This tree or shrub is usually covered with leprous scales; leaves alternate or opposite, entire, without stipules. Flowers axillary—often fragrant. The fruit is about the size of a small olive, oblong. It is eaten by the Persians.—*Riddell.*

(3335) ELÆOCARPACEÆ, *Eleocarpus*, a natural order of chiefly Indian Trees, having a strong botanical resemblance to our European Lindens, but differing in having fringed petals, and anthers opening by two pores at the apex. In the Indian genera, the nuts, cleared of the soft pulp or flesh that covers them, are curiously sculptured, and being bony and taking a fine polish they are frequently set in gold and strung into necklaces. The nuts of *Ganitrus sphæricus*, a middle-sized tree, common in various parts of India, as well as the Malay Archipelago, and those of *Menocera tuberculata*, from the forests

of Travancore, are what are principally used for this purpose. The fruits of *Elæocarpus serratus*, which are very much like olives when ripe, are said by Roxburgh to be pickled or dried and used in their curries by the natives of India. *E. cyaneus* has pure white, beautifully-fringed petals, and is one of the most ornamental plants of Australia. Lindley, in his 'Vegetable Kingdom,' places this order as a sub-order or division of *Tiliaceæ*.—*Eng. Cyc.*

(3336) ELÆOCARPUS. A hard valuable timber tree is very abundant in the neighbourhood of Rangoon, and not uncommon in some parts of these Provinces, belong to the genus elæocarpus. Carts are sometimes constructed of it, and it is used in house and boat building. —*Mason.*

(3337) ELÆOCARPUS.

Salwen, Burmese.

The river Salwen derives its name from a tree that grows on its banks of that name. I have never seen it, but from the fruit that has been brought to me, I am enabled to state that it is a species of elæocarpus, and from the character of the genus, would probably yield useful wood.—*Mason.*

(3338) ELÆOCARPUS GANITRUS.

Roodrakya, Duk.

This tree is a native of Java, the seeds are about the size of common marbles, and are worn as necklaces by Brahmins and Faqueers, they are commonly called *Utrasum* beads. —*Riddell.*

(3339) ELÆOCARPUS LANCEOLATUS. Bead. Rottl.

Utrasum, Tam. | Ootradge ke munkeh, Duk.

The Utrasum beads, which are very rough, and about the size of small nutmegs are the seeds of the Eliæocarpus lanceolatus. They are brought to India from Java, of which country that tree is a native. The Sheva Brahmins and Pundarums wear them round their heads and necks and also form them into a kind of rosary.—*Ain.'s Mat. Med. page* 142. At Maulmain there is seen this small tree whose handsome summit is whitened over with a profusion of white flowers, it is a species of elæocarpus the genus which furnishes by its tuberculed seed, beads for the Hindoo Fakeers.—*Mason.*

(3340) ELÆOCARPUS OBLONGUS.

Kassow, Duk.

This is a handsome tree, flowers in May, petals beautifully fringed, the foliage is frequently tinged with red, giving an autumnal appearance to the tree.—*Riddell.*

(3341) ELÆOCARPUS TUBERCALATUS.

Roodracha or Badracha, Tam.

This tree is a native of the forests of Travancore, the nuts are worn by the Vishnoo worshipping bramins as rosaries either plain or mounted in gold and silver. Roxb.—*Rohde M.S.S.*

(3342) ELÆODENDRON, (from ἐλαία, an olive, and δένδρον, a tree),a genus of Plants belonging to the natural order *Celastraceæ*. It has a 5-parted calyx; 5 expanding linear-oblong petals; a 5-angled very thick fleshy disc; 5 anthers inserted into the margin of the disc; the filaments at length recurved; anthers with a thick connective, roundish, opening longitudinally; the ovary immersed in the disc, 2-celled; the ovules 2 in each cell; the style short, conical; the stigma simple, obtuse; fruit drupaceous, dry, or pulpy; the nut 1-2-celled; the seeds usually solitary, with a membranaceous or spongy integument erect. The species are small trees with opposite entire glabrous leaves. *E. glaucum* elliptical serrated leaves, hardly three times longer than the petioles; the cymes loose, nearly the length of the leaves; the flowers pentandrous. It is a small tree, about 14 feet in height and is a native of Ceylon and Coromandel. The tree has been introduced into Great Britain from Ceylon under the name of Ceylon-Tea. It has leaves like those of the tea-plant, but it does not appear to be used as a substitute for that plant.

(3343) ELÆODENDRON INTEGRIFOLIA.

Jouk-bin, Burm.

This is a very plentiful, strong, fine timber tree, found throughout the forests of the Tounghoo and Pegu districts, as well as about Rangoon. Wood, white colored, adapted for fancy work and cabinet making.—*McClelland.*

(3344) ELÆODENDRON ROXBURGHII. *Celastrineæ*, Ill. 71. *Syn.* Neerija dichotoma (Roxb, Fl. Ind. i. 646.)

Seloopa marum, Tam.

E. Roxburghii has oblong serrato-crenate, opposite and alternate, hard, smooth, shining leaves, about 4 inches long and 2 inches broad, with the petioles three-quarters of an inch long; the cymes globular, and three times the length of the petioles. It is a native of the mountainous parts of India. It possesses powerful astringent properties, but is not used as an internal medicine.—*Eng. Cyclopædia.* The fresh bark of the root rubbed with plain water is applied by the natives to almost every kind of swelling; it is a very strong astringent, possessing scarcely any other sensible quality. Roxb.—*O'Shaughnessy, page* 271. This tree is more remarkable for its fine form than the length and thickness of its bole, I do not know the wood, but if good, can only be fit for cabinet making and small sized objects.—*Rohde.*

(3345) ELÆIS, a genus of Palms, so named from *Elaia*, the Olive-Tree, because an oil is yielded by the fruit of its principal, if not only species. This is *Elaeis guineensis*, or Oil-Palm, Maba of the natives of the Congo. It is common

all along the western coast of Africa. The tree is monœcious, as we are informed that both male and female spadices were obtained from a single plant cut down by Professor Smith. (Brown, in Tuckey's 'Congo.') The stem is tall, about ten inches in diameter, rough, and bristling with the persistent bases of the petioles, of which the margins, as in recent leaves, are fringed with spines. The leaves are pinnate, about 15 feet in length, with two rows of sword-shaped leaflets, each 18 inches long. The fruit is ovoid, about the size of a pigeon's egg, with its outer fleshy covering of a golden yellow colour; and like that of the section *Cocoinæ*, to which it belongs, and analogous to the cocoa-nut, has the foramina of its putamen at the apex, and not at the base, as represented by Gærtner and others. Mr. Brown has observed it as remarkable that *Cocos indica* and this palm, which is universally, and he believes justly, considered as having been imported into the West India colonies from the west coast of Africa, should be the only two species of an extensive and very natural section of palms that are not confined to America. The *Elæis occidentalis* of Swartz, the Thatch-Tree of Brown's 'Jamaica,' and the Avoira of Aublet, are probably all identical with the Maba, or Oil-Palm, of the African coast. The oil is obtained by bruising the fleshy part of the fruit (and not the kernel as sometimes stated), and subjecting the bruised paste to boiling water in wooden mortars; an oil of an orange-yellow colour separates, which concretes when cool to the consistence of butter, and has when fresh the smell of violets or of the root of Florentine iris, with a very slightly sweetish taste. The oil is used by the Africans in cookery and for anointing the body. It forms a considerable article of commerce to Europe, where it is chiefly employed in perfumery and medicine. *Cocos butyracea* (which is referred by Kunth to the genus *Elæis*) is considered by the Edinburgh College to be the plant which yields palm-oil. Mr. Brown (Tuckey's 'Congo,' Appendix, p. 456) states, "It is probable that *Alfonsia oleifera* of Humboldt, Bonpland, and Kunth belong to *Elæis* and possibly may not even differ from the African species. To this the above authors in the 'Synopsis Plant. Æquinoct.' reply, that in *Elæis*, according to the description of Jacquin, both the floral envelopes are sexifid, while in *Alfonsia* they are trifid. Humboldt and Bonpland found Alfonsia oleifera always growing wild, while Elæis guineensis is never found out of Africa, except in a cultivated state —*Eng. Cyc.*

(3346) ELANET, a form of Hawk (*Falco melanopterus*, Daudin) inhabiting Africa, and also India and America. [FALCONIDÆ.]—*Eng. Cyc.*

(3347) ELATE SYLVESTRIS. PALMACEÆ. Nat. Kajooree. Wild Date. Phoenix Sylvestris.

Eetchum Khulloo. TAM.	Eeinta Khulloo, TEL.
Saundie ka jhar, DUK.	Eajata, CAN.

Wild date toddy.—*Ainslie, Mat. Med. p.* 263.

Eetchum elley, TAM.	Eeintaakoo, TEL.
Sundoolay ka paat, DUK.	

Date tree, wild, stalk and leaf of,

Eatchum pullum, TAM.	Eeinta pundoo, TEL.
Sundooloy ka pull, DUK.	Parooshaka, SANS.

Wild date common throughout the Deccan. Has the general characteristics of the family, but is inferior to the Palmyrah, Cocoanut, &c. This when ripe is a small, oval shaped, dark color fruit. It is sweetish, but is not held in much estimation.—*Ainslie, p.* 224. With the stalks of the Wild Date tree, which are in Tamul called Cassungoo, the Indians make baskets and boxes; with the leaves, hats and coarse baskets are made. In Egypt, it would appear, by Sonnini's account, that baskets are made with the stalks of the Payr Eetchum, or great Date tree, (Phœnix dactylifera): so they are in India, in situations where the Payr Eetchum (Tam.) is found.—*Ains. Mat. Med. p.* 153.

(3348) ELATE, or wild Date. At the Madras Exhibition of 1251 there were only three exhibitors of the leaves of this plant, and these were in a crude unprepared state, or simply split and twisted into rope, its chief uses are for thatching and making light mats, for building huts. The fibres of the leaf stalk are used for cables in the Red Sea. The natives of the East chew the fruit of Elate sylvestris, (which is something like a wild plum) in the same manner as the areca nut, with the leaf of the betel pepper and quick lime. The inner wood furnishes a kind of catechu or Cutch, which contains much tannin and is a powerful astringent. It is obtained by the simple process of boiling the heart of the wood for a few hours, when it assumes the appearance and consistency of tar. It hardens by cooling, and when formed into small squares and dried in the sun is fit for the market. The produce of Bombay is of uniform texture and of a dark red color. That of Concan and other parts of India is of a chocolate color, and marked inside with red streaks.

The analysis of Sir H. Davy gave the following result.

	Bombay.	Concan.
Tannin,.....	54·5	48·5
Extractive,.....	34·0	36·5
Mucilage,.....	6·5	8·0
Insoluble matters, sand, lime &c.	5·0	7·0
	100	100

Simmonds' Commercial Products, page 579.

(3349) ELCAJA, an Arabian Plant, whose fruit is said to possess emetic properties. Botanists call it *Trichilia emetica*. Forskahl describes it as a large tree, with villous shoots, pinnated leaves, with entire oval-oblong pedicellate leaflets, clustered flowers with 5 greenish-yellow petals, 10 monadelphous stamens, and a downy capsular

fruit about an inch long, with 3 valves, 3 angles, and 3 cells, having 2 plano-convex seeds in each cell. The tree is said to be called Roka, and to be common on the mountains of Yemen. The fruit is sold at Beit el fakih, for mixing with fragrant materials with which the Arab women wash their hair. The fruit called 'Djour elkai' is reputed an emetic. The ripe seeds mixed with Sesemum oil are formed into an ointment as a cure for the itch.—*Eng. Cyc.*

(3350) ELECAMPANE.

Ussul ur-rasun, ARAB.	Alantwurzel, GER.
Inuleaulnee, FR.	Beikh-i-zanjabilishami, PERS

Elecampane-root has an aromatic and slightly fetid odour; when chewed, the taste is at first disagreeable, glutinous, and somewhat resembling rancid soap, and then aromatic, bitter and hot. Formerly it used to be prescribed in dyspepsia, pulmonary complaints, and palsy; of late years it is nearly discarded from the *materia medica*.—*Faulkner.*

(3351) ELEMI GUM, of commerce, is said to be yielded by several species of Amyris. It is a resinous substance, which is met with in yellow, tender, transparent masses; it readily softens by the heat of the hand, has a strong aromatic odour, and a hot spicy taste. It is used in making lacquer to give toughness to the varnish —*Waterston. Faulkner.*

(3352) ELEMI, American, comes from Icica icicariba, and the Resin of Courina from I. ambrosica.

(3353) ELEOTRIS, a genus of Acanthopterygious Fishes belonging to the family *Gobiodæ*. Like the Gobies the species have flexible spines in the first dorsal fin, and an appendage behind the vent, but they have the ventral fins separate and six gill-rays. The species are inhabitants of the fresh waters of warm countries, and conceal themselves in the mud. *E. dormatrix*, the Sleeper, is a large fish. It is found in the West Indian marshes. Other species have been found in Africa, India, and the Mediterranean.

(3354) ELEPHANT.

Elephas and Elephantus, LAT.	Elephant, GER.
	Olyphant, DUT.
Ἐλέφας, GREEK.	Hathee, HIND.
Elephante, SP.	Fel, PERS.
Elephantes, IT.	Ani, TAM.
Elephant, FR.	Yeni, TEL.

The name of the well-known genus which forms the only living type of the family of true Proboscidians, or Pachydermatous Mammilifers with a Proboscis and Tusks. It is the largest of existing terrestrial animals. There are two living species of the genus, the African and Indian.—*E. Indicus*, the Asiatic Elephant, differs from the African species, not only in its greater size and in the characters of the teeth and skull, but also in the comparative smallness of the ears, the paler brown colour of the skin, and in having four nails on the hind feet instead of three. The sagacity of this species is also supposed to be greater than that of the African Elephant. But though many wonderful stories are told, and some of them are as true as they are wonderful, of the grateful remembrance which it long retains of benefits conferred, or of the tenacity with which it "treasures up a wrong," and though the instances of its docility, both ancient and modern, are very extraordinary, we agree upon the whole with Baron Cuvier, who observes, that after having studied these animals a long time, he never found their intelligence surpass that of a dog nor of many other carnivorous animals. It is imposing to see such a mountain of vitality obedient to the voice of its keeper, and performing feats at his dictation; and the massive gravity of its physiognomy assists the impression. The following is Mr. Corse's description of a perfect Asiatic Elephant:—An elephant is said to be perfect when his ears are large and rounded, not ragged or indented at the margin; his eyes of a dark hazel-colour, free from specks; the roof of his mouth and his tongue without dark or black spots of any considerable size; his trunk large, and his tail long, with a tuft of hair reaching nearly to the ground. There must be five nails on each of his fore feet, and four on each of the hind ones, making eighteen in all; his head well set on, and carried rather high; the arch or curve of his back rising gradually from the shoulder to the middle, and thence descending to the insertion of the tail, and all his joints firm and strong. The following are the castes (Zat) or varieties of the Asiatic Elephant noticed by Mr. Corse. Both males and females are divided into two castes by the natives of Bengal, namely, the Koomareah (of a princely race) and the Merghee (hunting elephant, from 'mrigah,' a deer, or hunting, or from its slender make), and this without any regard to the appearance, shape, or size of the tusks in the male, as these serve merely to characterise some varieties in the species. The Koomareah is deep-bodied, strong, and compact, with a large trunk and short but thick legs. The Merghee is generally taller but is not so compact nor so strong: he travels faster, has a lighter body, and his trunk is both short and slender, in proportion to his height. As a large trunk is considered a great beauty in an elephant, the Koomareah, is preferred, not only for this, but for its superior strength, and greater capability of sustaining fatigue. The mixed breed is held in greater or less estimation in proportion as it partakes of the qualities of the Koomareah or Merghee. A breed from a pure Koomareah and Merghee is termed Sunkareah (from 'sunkarah,' a mixture,) or Merghabauliah (for the most part Merghee); but a farther mixture or crossing of the breed renders it extremely difficult for the hunters to ascertain the variety. Besides the K-

marcah, Merghee, and Sunkareah breeds, several varieties are generally to be found in the same herd; but the nearer an elephant approaches to the true Koomareah the more he is preferred, especially by the natives, and the higher will be his price; though Europeans are not so particular, and will sometimes prefer a female Merghee for hunting and riding, when she has good paces, and is mild and tractable. The variety of male termed Dauntelah (toothy, having large fine teeth,) produces the largest tusks and the finest ivory; his head is strongly contrasted with that of the Mooknah (probably from 'mookh,' the mouth or face), which can hardly be distinguished in this respect from a female elephant; and the tusks of some of the females are so small as not to appear beyond the lip, while in others they are almost as large as in the variety of male called Mooknah. The Dauntelah is generally more daring and less manageable than the Mooknah; and for this reason, until the temper and disposition are ascertained, the Europeans prefer the Mooknah; but the natives, who are fond of show, generally take their chance, and prefer the Dauntelah: and though there is a material difference in their appearance as well as in the value of their tusks, yet, if they are of the same caste, size, and disposition, and perfect, there is scarcely any difference in their price. There are many varieties between the Mooknah and Dauntelah, and these are varied according to the variation of the form of the tusks, from the projecting horizontal but rather elevated curve of the Pullung-Daunt of the true Dauntelah, to the nearly straight tusks of the Mooknah, which point directly downwards. 'Pullung' signifies a bed or cot, and 'daunt' teeth; and, from the tusks projecting so regularly, and being a little curved and elevated at the extremities, the natives suppose a man might lie on them at his ease, as on a bed. (Corse.) Thus the Goneish or Ganesa, which is a Dauntelah that has never had but one tusk and this of the Pullung sort, and which is so called from Ganesa, the Hindoo god of wisdom, who is represented with a head like an elephant's with only one tooth, was sold in Mr. Corse's time to the Hindoo princes for a very high price, to be kept in state and worshipped as a divinity. Another variety of the Dauntelah has the large tusks pointing downwards and projecting only a little beyond the trunk: he is then said to have Soor or Choor-Daunt (Hog's teeth). A third is the Puttel-Dauntee, whose tusks are straight like those of the Mooknah, only much longer and thicker. The Ankoos-Dauntee is a fourth, and has one tusk growing nearly horizontal, like the Pullung-Daunt, and the other like the Puttel-Daunt, and there or other less distinct varieties. The term Goondah seems to be used to designate those wandering male elephants which are much larger and stronger than the male generally taken with the herd, the Goondah departing from it or returning to it according to its desire. The Goondahs are supposed to be rarely taken with the herd: when they are so taken, their violence and ferocity render them most destructive. Mr. Corse relates an instance of the ungovernable passions and terrible havoc occasioned by the savage disposition of one, or at least a large male that was supposed to be one, when in the Keddah which is the name of the inclosure into which the wild elephants are driven and then captured. He was at length tied and led out, but his untameable spirit could not brook restraint, and after languishing about forty days he died. Mr. Hodgson, in his paper 'On the Mammalia of Nepaul' ('Zool. Proc,' 1834, suggests that there are two varieties, or perhaps rather species of the Indian Elephant, *Elephas indicus*, namely, the Ceylonese, and that of the Saul Forest. The Ceylonese has a smaller and lighter head, which is carried more elevated; it has also higher fore quarters. The elephant of the Saul Forest has sometimes nails on its hinder feet. The height to which the Asiatic Elephant will attain has been variously stated: but upon a strict examination of alleged great heights, the natural disposition among men to exaggerate has generally been detected. A male elephant recorded by Mr. Corse was at its birth 35 inches high.

In one year he grew	11	inches,	and was	3	feet	10	inches high.
In the 2d year	8	"	"	4	"	6	"	"
In the 3rd year	6	"	"	5	"	0	"	"
In the 4th year	5	"	"	5	"	5	"	"
In the 5th year	5	"	"	5	"	10	"	"
In the 6th year	3½	"	"	6	"	1¼	"	"
In the 7th year	2¾	"	"	6	"	4	"	"

A female Elephant was 6 feet 9 inches high at the time she came into Mr. Corse's possession, and was supposed to be 14 years old according to the hunters; but, according to the belief of Mr. Corse, she was only 11 years of age. During the next 5 years, before she was covered, she grew only six inches, but, while, pregnant, she grew 5 inches in 21 months, and in the following 17 months, though again pregnant, she grew only half an inch. Mr. Corse then lost sight of her. She was at this time about 19 years old, and had perhaps attained her full growth. Her young one was then not 20 months old, yet he was 4 feet 5½ inches high, having grown 18 inches since his birth. It thus appears that no certain standard of growth, for captive elephants at least, can be depended on; nor do there seem to be any satisfactory data for defining the age at which the animal ceases to grow. Mr. Corse conjectures that elephants attain their full growth between the ages of 18 and 24. With regard to the height, the East India Company's standard for serviceable elephants was, in Mr. Corse's time, 7 feet and upwards, measured at the shoulder in the same manner as horses are. At the middle of the back they are considerably higher; and the curve or arch, particularly in young elephants, makes a difference of several inches. The

lessening of this curve is a sign of old age when not brought on by disease or violence. During the war with Tippoo Sultaun, of the 150 elephants under the management of Captain Sandys, not one was 10 feet high, and only a few males 9½ feet high. Mr. Corse was very particular in ascertaining the height of the elephants employed at Madras, and with the army under Marquis Cornwallis, where there were both Ceylon and Bengal elephants, and he was assured that those of Ceylon were neither higher nor superior, in any respect, to those of Bengal: nay, some officers asserted that they were considerably inferior in point of utility. The only elephant ever heard of by Mr. Corse as exceeding 10 feet, on good authority, was a male belonging to Asaph ul Dowlah, formerly vizier of Oude. The following were his dimensions:—

	Feet.	Inches.
From foot to foot over the shoulder,.....	22	10½
From the top of the shoulder, perpendicular height,.....	10	6
From the top of the head when set up as he ought to march in state, ...	12	2
From the front to the face of the insertion of the tail,.....	15	11

And yet the Madras elephants have been said to be from 17 to 20 feet high. Now let us see how dimensions shrink before the severity of measurement. Mr. Corse heard from several gentlemen who had been at Dacca, that the Nabob there had an elephant about 14 feet high. Mr. Corse was desirous to measure him, especially as he had seen the elephant often at a former period, and then supposed him to be 12 feet high. He accordingly went to Dacca. At first he sent for the mahote, or driver, who without hesitation assured him that the elephant was from 10 to 12 cubits, that is, from 15 to 18 feet high; but added that he could not bring the elephant for Mr. Corse's examination without the Nabob's permission. Permission was asked and granted. Mr. Corse measured the elephant exactly, and was rather surprised to find that the animal did not exceed 10 feet in height. The elephant is subject to albinism, and the white elephants so much esteemed by the Indian sovereigns are merely Albinos. The Asiatic Elephant inhabits the greater part of the warm countries of Asia, and the large islands of the Indian Archipelago. Mr. Corse states that the elephants for the service of the East India Company are generally taken in the provinces of Chittagong and Tiperah; but from what he had heard, those to the southward of Chittagong, in the Burmah territories and kingdom of Pegu, are of a superior breed. In confirmation of this opinion, he observes that the elephants taken to the south of the Goomty River, which divides the province of Tiperah from the east to west, were generally better than those taken to the north of that river; and though elephants were taken at Pilibet as far north as 29° N. lat. in the vizier of Oude's territories, yet the vizier, and also the officers of his court, gave those taken in Chittagong and Tiperah a decided preference, they being much larger and stronger than the Pilibet elephant. Till the year 1790 Tiperah was a part of the Chittagong province; and so sensible was the Bengal government of the superiority of the southern elephants for carrying burdens, enduring fatigue, and being less liable to casualties, that in the then late contracts for supplying the army, the contractor was bound not to send any elephant to the military stations taken north of the Chittagong province. Hence Mr. Corse concludes the torrid zone to be the natural clime, and the most favourable for producing the largest, the best, and the hardiest elephant; and that when this animal migrates beyond the tropics the species degenerates. He speaks of the elephants taken on the coast of Malabar as far north as the territories of the Coorgh Raja; as much inferior to the Ceylon elephant, and that from this circumstance the report of the superiority of the Ceylon elephant to all others probably originated. He remarks that most of the previous accounts respecting the Asiatic Elephant had been given by gentlemen who resided many years ago on the coast of Malabar or Coromandel, where, at that time, they had but few opportunities of seeing the Chittagong or the Pegu elephant. Mr. Hodgson, in the paper above noticed, states that *Elephas indicus* and *Rhinoceros unicornis* are both abundant in the forests and hills of the lower region of Nepaul, whence, in the rainy season, they issue into the cultivated parts of the Tarai to feed upon the rice crops. In a state of nature the Asiatic Elephant lives in great herds, which are generally said to be under the conduct of the old males, or bulls, as they are sometimes termed. From time immemorial the species has been brought under the dominion of man, and trained to swell the pomp of pageants, and add to the terrors of war, as well as to perform the more useful offices of a beast of burden and draught, and the more dreadful one of executing the sentence of death on criminals. It has been long made the companion of the sports of the orientalist in the great hunting parties; and from the same early period has been made to minister to the wanton and cruel pleasures of Eastern princes, by being stimulated to combat not only with other elephants but with various wild animals. The reader will find in the second volume of the 'Menageries' in the 'Library of Entertaining Knowledge,' an abundant and amusing collection of anecdotes connected with this subject, as well as a complete History of the Elephant both in the wild state and as the servant of man. The tusks of both species still form, as they did from the earliest periods, a valuable article of commerce. The ivory, which is now sought for useful purposes and ornaments of minor importance, was in great request with the ancient Greeks and Romans for various domestic uses, as well

as for the chrys-elephantine statuary rendered so famous by Phidias. Of these rich statues the Minerva of the Parthenon, and especially the Olympian Jupiter, appear to have been the masterpieces.—*Eng. Cyc.* Within the forests and in the jungles of Ceylon are found a great variety of wild animals—the elephant, the hyena, tiger-cat, the bear, the deer and the monkey, are among the most abundant. The number of elephants is incredibly great, and, issuing in troops from their lairs, they come crushing down the cultivated fields and plantations and devouring the crops, with great loss to the proprietors. They are found in all the uncultivated parts of the island but their favorite haunts are near to the farms, to which they prove so destructive that the colonial government pays a reward of 7s. 6d. (about 1 Dollar, 85 cents) for every tail of the animal which is brought to the authorities. Mr. Talbot the Government agent at Galle, stated, surprising as it may seem, that he had paid during the preceding year two hundred pounds sterling for tails, which would give six hundred as the number of elephants destroyed. An army officer, as was stated to the Commodore, actually killed during his residence on the island, no less than six hundred of these gigantic animals. Within a few months of the arrival of the Mississippi, two officers of the garrison one of whom (Lieutenant Lennox) became personally known to the Commodore, destroyed no less than forty elephants in the course of a sporting visit of six weeks to the jungle. They are ordinarily shot with a rifle, the sportsman approaches his game in front, or perhaps, as the sailors would say, on the quarter that he may aim at either of the only two vital parts upon which a rifle ball will have any effect, one being directly in the forehead through which the brain is penetrated and the other behind the ear. If the hunter chance to come up to his elephant in the rear, he raises a shout or makes a noise, by which the animal is attracted and turning its head, or throwing forward its ears exposes the vital spot, at which its ruthless enemy aims the deadly ball, and brings down his huge victim. The elephants of Ceylon are not so large as those of other parts of India, and but a small proportion of them have tusks.—*American Expedition to Japan, p.* 143. Amongst the remarkable remains brought from the Sewalik Hills, in Hindustan, by Captain Cautley and Dr. Falconer are the remains of several species of the genus *Elephas* and other proboscidean animals. Dr. Falconer, speaking of the group of animals thus revealed by his researches, says;—"this fossil Fauna is composed of representative types of *Mammalia* of all geological ages, from the oldest of the tertiary periods down to the most modern; and of all the geographical divisions of the old continent, grouped together into one comprehensive assemblage. Among the forms contained in it there are—of the *Pachydermata* several species of *Mastodon*, Elephant, Hippopotamus, Rhinoceros, *Anoplotherium*, and three species of *Equus*; of the *Ruminantia* the colossal genus *Sivatherium*, which is peculiar to India, with species of *Camelus*, *Bos*, *Cervus*, and *Antilope*; of the *Carnivora*, species of most of the great types, together with several undescribed genera; of the *Rodentia* and *Quadrumana* several species; of the *Reptilia*, a gigantic tortoise (*Colossochelys*), with species of *Emys* and *Trionyx*, and several forms of Gavials and Crocodiles. To these may be added the remains of Struthiones and other birds, and Fishes, *Crustacea*, and *Mollusca*."

The genus *Elephas* in the collection which has been deposited in the British Museum includes six species.

E. planifrons, distinguished by the flatness of the forehead and the intermediate character of its molar teeth.

E. Namadicus, with a great development of the cranium, and teeth closely allied to those of the Indian species.

E. Hysudricus, with a turban-like vortex of the skull and teeth, whose structure approaches that of the African Elephant.

E. Ganesa is the most remarkable of the Sewalik species. A skull exists with remains of the other species in the British Museum. The total length of the cranium and tusks is 14 feet; length of the skull 4 feet 2 inches; width of the muzzle 2 feet; length of the tusks 10 feet; circumference of the tusk at the base 26 inches. The other two species are named *E. insignis* and *E. bombifrons*. The species of *Mastodon*, in the collection from the Sewalik Hills, are *M. Perimensis*, *M. Sivalensis*, and *M. latidens*. Professor Owen states that a species of *Mastodon*, nearly allied to *M. angustidens*, has left its remains in the ossiferous caves and post-tertiary or newer tertiary deposits of Australia. From the conformity of the molar teeth Cuvier regarded a *Mastodon* whose remains have been discovered in Peru as identical in species with the *M. Angustidens* of Europe. Professor Owen regards the *M. longirostris* of Kaup, found in Germany, and the *M. Arvernensis of* Croizet and Jobert, dug up in Auvergne, as identical with his *M. angustidens*. In the collection of the British Museum, in addition to the species which we have mentioned above, will be found remains of *Elephas priscus* and *E. meridionalis*, found in Europe. There is also the remains of a species of *Mastodon*, *M. Andium*, from Buenos Ayres. (Owen, *British Fossil Mammals and Birds*; Falconer and Cautley, *Fauna Antiqua Sivalensis*; Mantell, *Petrefactions and their Teachings.*)—*Eng. Cyc. pages* 504 *to* 519.

(3355) ELEPHANT'S TAIL, HAIR OF.

ıay val myre, TAM. | Yeanugha toka ventroocaloo,
ateeke doom ke bal, DUK. | TEL.

Of this article, rings, bracelets and other female ornaments, are made in India.—*Ains. Met. Ind. page* 154.

(3356) ELEPHANT'S TEETH. These are obtained in South Africa, Ceylon, Burmah, &c. Much of that which comes to China is brought from Siam in junks; the northern parts of Siam, Cambodia, and the confines of Burmah supply that market. A good deal finds its way into China direct from Burmah. They should be chosen without flaws, solid, straight, and white; for if cracked or broken at the point, or decayed inside, they are less valuable; every specimen, however, is useful to a greater or less degree, and can be entirely used. The largest and best weigh from 5 to 8 to a pecul, and decrease in size to 25 in a pecul. The cuttings and fragments are also of value sufficient to make them an article of trade. The number of articles which the Chinese make of it, and the demand for them on account of their exquisite workmanship, render the consumption very great. The circular balls which the Chinese make of ivory, as was well as their miniature boats, fans, chessmen, boxes, and fancy articles of all descriptions, are specimens of carved work unequalled in any other part of the world. From a quantity of ivory not weighing over three pounds, they will make a toy worth a hundred dollars. The largest teeth are sometimes valued at $120 a pecul, but the article usually ranges from $50 to $80 per pecul. This trade is likely to increase at the north. A large proportion of the ivory brought to China is re-exported in fancy carved ware.—*Morrison.*

(3357) ELEPHANTOPUS from ἐλέφας, an elephant, and πούς, a foot, on account of the shape of its radical leaves), a genus of plants belonging to the natural order *Compositae*, the sub-order *Corymbiferae*, the tribe *Vernoniaceae*, the sub-tribe *Vernonieae*, and the division *Elephantopeae*. It has heads containing 3-4-5 florets, closely collected into a cluster, surrounded by leaves; the involucre compressed in two rows, the leaflets dry, oblong, alternately flat and folded, the inner usually 3-nerved; the receptacle naked; the corolla palmate, with a 5-cleft limb, which has acuminate segments and one recess deeper than the others; the filaments smooth, the branches of the style half subulate; the achenium rather compressed, many ribbed, oblong, hairy; the pappus in one row consisting of several straight paleæ, dilated at the base, but otherwise very narrow, acuminate, equal, and serrated. *E. scaber* has a hairy dichotomous stem, the radical leaves scabrous, cuneate, and very much narrowed at the base, those of the stem lanceolate. This plant is common in almost all parts of India, in dry elevated positions. It has a stem a foot high, with the heads of pale-red flowers on long stalks. The roots are fibrous. Both the roots and the leaves are reputed to have active medical properties. The natives on the Malabar coast use a decoction of them in cases of dysuria. There are other species natives of South America and the West Indies. (Lindley, *Flora Medica;* Loudon, *Eng. Cyclopædia of plants.*—*Eng. Cyc.*

(3358) ELETTARIA, a genus of Plants belonging to the natural order *Zingiberaceæ*. The characters of this genus are the same as *Amomum*, but the tube of the corolla is filiform and the anther naked. *E. Cardamomum*, True Cardamom, is a native of the mountainous districts of the coast of Malabar, especially above Calicut, in the Wynaad district, between 11° and 12° N. lat., where the best are produced. Cardamoms formed a portion of the early commerce, which subsisted between this part of India and Arabia, whence they must have been made known to the Greeks, as they are described by Dioscorides, and mentioned as early as the time of Hippocrates. The Cardamom plant delights in moist and shady places on the declivities of the hills. It is cultivated from partings of the root in the districts of Soonda Balaghaut, but the fruit is very inferior; the best grows in a wild state, at least where no other measures are adopted than clearing away the weeds from under the largest trees, which are felled close to the roots. The earth being loosened by the force of the fallen tree, young Cardamom plants shoot forth in a month's time, and are sheltered by the shade of the branches. The tree-like herbaceous plants attain a height of from 9 to 13 feet. The root is as tortuous and tuberous as that of the ginger, and the leaves, with long sheathing foot-stalks, are from one to two feet in length, placed in two rows, and lanceolate in shape, like those of the Indian Shot (*Canna indica*) common in English gardens. The scapes, or flower and fruit-bearing stalks, make their appearance in February of the fourth year, from the base of the stems, are three to four in number, and from one to two feet long, lax, and resting on the ground. The fruit is ripe in November, and requires nothing but drying in the sun to be fit for commerce. The seeds are gratefully aromatic and pungent with a flavour of camphor, and are regarded as a necessary article of diet by the inhabitants of Asia. They are used in medicine, and enter into a number of pharmaceutical preparations.—*Eng. Cyc.*

(3359) ELETTARIA CARDAMOMUM. True, or Malabar, or lesser cardamom. *Syn.* Alpinia Cardamomum. *Roscoe*, and *Roxb. Fl. Ind.* i. 70. *Vern.* Chotee-elachee, and Guzeratee-elachee, *Hind.* A native of the mountains of Malabar and Canara.—*O'Shaughnessy, page* 651. Plantations are in the North-East districts of Travancore. The cardamoms are collected in November and December. They are only of the

government monopoly, as the cultivators chiefly come from Madura and Dindigul and receive about two hundred Rs. for each candy delivered to the sircar. The average annual produce is 300 candies.—*M. E. of* 1857.

(3360) ELETTARIA CARDAMOMUM MEDIUM. *Syn.* Alpinia card. med. *Roxb.* i. 74. Dokeswa of Sylhet. Burra-elachee, *Hind.* Lindley supposes this to be the *Cardamomum medium* of writers on pharmacy. Pereira considers it likely that the *wild cardamoms* of Calcutta are identical with these fruits. One hundred parts of the fruit yielded 70 of seeds and 30 of tunics. One pound gives four scruples of volatile oil, of whitish colour, and thick consistence. *O'Shaughnessy, p.* 651.

(3361) ELETTARIA CARDAMOMUM ZEYLANICUM. Pereira. The produce of Quilon and Matura, the fruits are analogous to the Malabar cardamon in all their properties.—*O'Shaughnessy, page* 651.

(3362) ELEUSINE, a genus of Plants belonging to the natural order of the Grasses. *E. coracana* is cultivated as a corn-plant by the inhabitants of the Coromandel Coast, and is known by the name of Natchnee. According to Schomburg a decoction of another species, *E. Indica*, is employed in Demerara in the convulsions of infants. *E. Tocusso* is an Abyssinian corn-plant belonging to this genus.—*Eng. Cyc.*

(3363) ELEUSINE CORACANA, CYNOSURUS CORACANUS, Lin.

Kaywur, TAM.	Munrivee, HINDOOEE.
Raggi, DUK. and CAN.	Tsjetti pullu, HORT. MAL.
Tamidaloo, TEL.	Natchenny Rajika, SANS.
Moatauny, MAL.	Cynosurus Coracanus. LIN.

This very useful grain is called, in Tinnevelly Capa, and, in some parts of the higher provinces of Hindoostan, Murha and Maud. It is much eaten by the common people.—*Ainslie, p.* 219. *Eleusine* (*Cynosurus*) *coracana.*—Ragi (Canarese), kevaru (Tamil), is extensively grown by the Ryots, and is the staple food of the inhabitants of Mysore; and though coarse in appearance, is a wholesome and nutritious grain. It possesses also the very valuable quality of being very indestructable; and may be preserved for about sixty years if carefully deposited in grain caves or pits. These pits are generally placed in hard dry ground. The pit is formed by digging a small hole of the size to admit a man, and as the hole descends, it is enlarged into a moderate sized circular room. After the pit is dug out, a large fire is lit in it to harden the sides. These stores of Ragi are of inestimable value in moderating dearths, as the grain remains sound for very many years. Ragi straw is a very good fodder for cattle, and it too keeps well. Owing to failure of rain, Ragi may be high priced in Mysore; but there is no scarcity of that grain, large stocks of it being kept in the granaries of wealthy farmers. Ragi is exported in large quantities, to Neilgherries, Salem, Bellary, Chittore, Madras, Trichinopoly, &c. When cheap, Ragi sells in Bangalore at seven Marcals or eighty-four seers for a Rupee; or if dear, 2½ Marcals or thirty Seers. Ragi is usually sown in fields mixed with *Buller, Togari, Hutchellu, Iave, kari Jola, Sasara*, and *Haralu;* and the sowing Machine, which is, a kind of drill, consists of many reeds with holes, so that the whole of the seeds are sown through their respective holes in parallel lines. The principal supply of Ragi is grown in the Bangalore and Ashtagram Divisions, the other two Divisions from local causes producing scarcely enough for their own consumption.—*Madras Exhibition of* 1857. A fermented liquor is prepared from it called Bojah, chiefly drunk in the Mahratta countries.—*Ainslie, page* 219. MURWA, The intoxicating drink prepared from Ragi, is used in the Sikkim Himalaya, and seems more to excite than to debauch the mind. It is made from partially fermented Murwa grain (*Eleusine coracana.*) *Hooker, Him: Jour: Vol:* I. *p:* 133. The millet seed is moistened, and allowed to ferment for two days. Sufficient for a day's allowance is then put into a vessel of wicker work, lined with India Rubber to make it water tight, and boiling water is poured on it with a ladle of gourd, from a large iron cauldron that stands all day over the fire. This fluid when quite fresh tastes like negus of Cape Sherry, rather sour.—*Hooker, Him. Jour. Vol.* I. *page*, 291.

(3364) ELEUSINE INDICA. Tufts of eleusine are conspicuous every where among other grasses of Tenasserim.—*Mason.*

(3365) ELOOPEI POO, TAM.

Mohe ka pool, DUK.	Madooka, SANS.
Ippa poo, TEL.	

Flower of the long leaved bassia—Bassia longifolia Lin. These singular looking sweet flowers are collected in great quantities in some parts of the Circars as well as in Bahar, and after having been dried in the sun, are sent all over the Maharatta countries like dried grapes, in Europe, which they somewhat resemble in taste. The Reverend Doctor John of Tranquebar in an account of the same flowers, which may be found in the 8th Volume of the Asiatic Researches, informs us, that, after being bruised and boiled to jelly, the Natives form them into balls, which they exchange for fish and rice. At Chatra in Ramgur and in some other provinces of upper India, a spirituous liquor (2) is distilled from the flowers, which are there called Mahwah flowers and there is also in some districts of lower Hindostan, a spirituous liquor distilled from the flowers of another species of the same tree, called in Tamul Caat Eloopei, (Bassia latifolia). The fruit of it is a drupe, egg-shaped and

pointed, containing from three to five seeds.—*Ains. Mat. Med. page* 259.

(3366) EMBELIA PETRANDRA, Myrsinaceæ.

Ambut, Duk.

A scandent shrub with alternate polished leaves; flowers in the cold season: fruit red, size of a currant.—*Riddell.*

(3367) EMBELIA RIBES.—Another of the species; a scandent shrub like the former, only with rough tuberous knobs on the stem; both are confined to the higher ranges of mountains.—*Riddell.*

(3368) EMBLICA, a genus of Plants belonging to the natural order *Euphorbiaceæ.* It has monœcious flowers; the calyx 6-parted; 5 stamens combined; 3 styles dichotomous; the fruit fleshy, tricoccous, 6-seeded.—*Eng. Cyc.*

(3369) EMBLICA OFFICINALIS, Gaertner. Syn. Phyllanthus Emblica, *Linn.* Μυραβαλανος εμβλικα. Arctuar, 1. 24 Nilicamaram, *Rheede.*

Amlaki, Umriti, Sans.	Nelliekai. Tam.
Amla, Anola, Beng. and Hind.	Userekee. Tel.
	Nelly marum. Tam.

Tree crooked, thick as a man's body, leaves pinnate, flower bearing, flowers minute, greenish yellow. *E. officinalis* a tree having a crooked trunk, with branches thinly scattered in every direction; the male branches spreading and drooping. The leaves are alternate, spreading, one or two feet long, and about one and a half or two inches broad: the stipules small, withering; the flowers minute, of a greenish colour: the fruit a drupe, fleshy, globular, smooth, 6-straited: the nut obovate, obtusely triangular, 3-celled; the seeds two in each cell. The bark of this tree is astringent, and is used in India as a remedy for diarrhœa. The fruit is acid, and tastes astringent, and when eaten acts as a mild purgative. This plant is the *Phyllanthus emblica* of Linnæus; and *Myrobalanus emblica* of Bauhin (Lindley, *Flora Medica.*)—*Eng. Cyc.* This tree is found cultivated in most parts of India and also wild in forests, It flowers during the beginning of the hot season, and its fruit ripens in eight or nine months after. The wood of this tree is hard and durable, particularly under water. The bark is strongly astringent; the natives employ it to cure diarrhœas and to tan leather. The fruit is at all times full of exceedingly sharp juice, it is eaten raw by the Natives although to an European the taste is disagreeably acrid they are pickled and made into preserves, and also baked in tarts, by these means they are more reconcilable to our taste. Roxb.—*Rohde M.S.S.* A fruit tree, the wood of which would appear to be of service, for making boxes, &c. Bark strongly astringent, used for tanning, and in diarrhœa. Fruits while fresh, round, the size of a gall nut, with six valves projecting externally, pulp fleshy enveloping white and angular seeds. When dry, roundish, blackish grey, very wrinkled, subhexagonal; the dried pericarp is applied to a trilocular nut, and each cell contains two red shining seeds. Odour slightly aromatic; taste acidulous, acid, astringent; in the recent state, this myrobalon is very acid and somewhat purgative; when dry chiefly astringent. It is used for tanning leather, and as a remedy in diarrhœas. An interesting account of its efficacy in the treatment of the Nusseerabad scurvy is given by Dr. McNab, in the quarterly Journal of the Medical Society of Calcutta.—*O'Shaughnessy, page* 551.

(3370) EMBLIC MYROBALON.

Amalaca, Sans.	Anola, Hind.

This is the fruit of the *Emblica officinalis,* natural order *Euphorbiaceae.*—*O'Shaughnessy, page* 341.

(3371) EMBROIDERY.—The art of embroidery was known to, and practised with great skill in ancient times in Egypt, Assyria, and Persia. The Israelites learnt the art before their exodus, the Babylonians were famed for their rich tapestries, and the Assyrian monuments display richly embroidered robes and trappings. Many parts of India are famous for this art (*Zur dozi*). "From Dacca" says the Abbe de Guyon, in 1744, as quoted by Mr. Taylor, "come the finest and best Indian embroideries in gold, silver or silk; and those embroideried neckcloths and fine muslins which are seen in France." There has always been a demand for such scarves for the markets of Bussora and Java. In the present day we have silks and woollens, muslins and nets, Cashmere shawls, European velvets embroidered with silk or *tussur,* that is, wild silk of either floss or common twisted silk thread: or with gold and silver thread and wire in great variety. Mr. Taylor describes the cloth to be embroidered as stretched out on a horizontal bamboo frame, raised about a couple of feet from the ground, and the figures intended to be worked or embroidered are drawn upon it by designers, who are generally Hindoo painters. On woollen cloths the outlines are traced with chalk and on muslin with pencil, and the body of the design copied from coloured drawings. The embroiderers, seated upon the floor around the frame, ply the needle by pushing it from, instead of towards, them. In place of scissors they commonly use a piece of glass or China ware to cut the thread.—*Royle, Arts &c. of India, page* 506. Among the embroidered articles those from Dacca and from Delhi are probably the best known. In the latter, small shawls and scarves are chiefly embroidered both with floss and twisted silk; in the former both nets and muslins, with floss silk of various colours, But Dacca is also famous

for its embroidery of muslins with cotton, which is called *chikankari* or *chikan-dozee*, and of which specimens of different articles of clothing have been sent from Calcutta; also an infant's robe of grass-cloth, worked at Serampore, and a scarf and handkerchief, pine-apple fibre from Madras. One kind is "formed by breaking down the texture of the cloth with the needle, and converting it into open meshes." Mr. Taylor states that *Kashida* is the name given to cloths embroidered with *muga* silk or coloured cotton thread; and though generally of a coarse description, gives occupation to a number of the Mahomedan females of Dacca. Though the scarves of both Delhi and of Dacca, are much admired, it has been suggested by a lady, "that muslins or nets, worked so as to be suitable for making ball-dresses, would probably be in great demand, as those which are now sold here for such purposes are very inferior in taste and elegance to the Indian embroidery. The beetle-wing embroidery from Madras was particularly elegant: and the velvet awnings, musnud covers, hookah carpets, and elephant strappings, embroidered with gold and silver, chiefly at Moorshedabad and Benares, were admired as well for richness as for the skill with which the ground-work was allowed to relieve the ornaments. The embroidered saddles and saddle-cloths, and floor-coverings from Pattiala, Mooltan, and Lahore, were of the usual style of what are called the works of that famed valley, and which was conspicuously shown in the dresses, caps, and slippers from Cashmere itself. But that the skill and taste are not confined to one part of India was also to be seen in the table-covers from Tatta in Scinde, and in the embroidered boots from Khyrpoor, which have been immortalized by Mr. Digby Wyatt.—*Royle, Arts of India, page* 507. The skill of the Chinese in embroidery is well known, and the demand for such work to adorn the dresses of officers and ladies of every rank, for embellishing purses, shoes, caps, fans, and other appendages of the dress of both sexes, and in working shawls, table covers, &c. for exportation, furnishes employment to myriads of men and women. The frame is placed on pivots, and the pattern is marked out upon the plain surface. All the work is done by the needle without any aid from machinery; there are many styles of work, with thread, braid, or floss, and in one of the most elegant, the design appears the same on both sides, the ends of the threads being neatly concealed. This mode of embroidery seems also to have been known among the Hebrews, from the expression in Deborah's song (Judges v. 30), "Of divers colors of needle work on both sides," which Sisera's mother vainly looked for him to bring home as spoil. Books are prepared for the use of embroiderers, containing patterns for them to imitate. The silk used in this art is of the finest kind and colors; gold and silver thread is occasionally added to impart a lustre to the figures on caps, purses, and ladies' shoes. A branch of the embroiderer's art consists in the formation of tassels and twisted cords for sedans, lanterns, &c.; and in the knobs or corded buttons worn on the winter caps, made of cord entertwisted into the shape of a ball. Spangles are made from brass leaves by cutting out a small ring, by means of a double edged stamp, which at one drive detaches from the sheet a wheel-shaped circle; these are flattened by a single stroke of the hammer upon an anvil, leaving a minute hole in the centre. Another way of making them is to bend a copper wire into a circle and flatten it. The needles are very slender, but of good metal; in sewing, the tailor holds it between the forefinger and thumb, pressing against the thimble on the thumb, to push it into the cloth.—*Williams' Middle Kingdom, Vol.* II. *p.* 123.

(3372) EMBRYOPTERIS GLUTINIFERA,

Coosharatha mara Toomei, TEL.

A middling sized tree, the wood is of indifferent quality. The viscid juice of the fruit is used for paying boats, and strengthening fishing nets and lines.—*Bangalore* 34.

(3373) EMERALD.

Emerande, FR.	Patchie kulloo, TAM.
Smaragd, GER.	Zamurud, ARAB.
Smeraldo, IT.	Punna, HIND.
Smaragdus, LAT.	Zimurrood, also Perma taeju, MALAY.
Esmeralda, SP.	

A precious stone, held in great estimation, and distinguished from all other gems by its peculiar *emerald green* lustre, which varies in intensity from the palest possible tinge, to a full and deep hue. The Emeralds met with in modern times do not often exceed the size of a walnut; some, however, of a larger size have been found—but such instances are rare. Localities, Egypt, New Granada, Hindustan, and Germany. The name of the *Emerald.*—(in Italian, is *Smeraldo*, from the Greek, σμαράσσειν, to shine, to be bright.) This precious stone, which ranks next to the diamond, and is equal to oriental ruby and sapphire, is of a beautiful green colour. It occurs in prisms, with a regular hexagonal base; sp. gr. 2·7; it scratches quartz with difficulty, and is scratched by topaz, and fuses before the blowpipe into a frothy bead. Its analysis has been differently stated by different chemists; but it appears to contain about 14 per cent. of glucina, (which is its characteristic constituent,) 68 of silica, 16 of alumina, and a very small portion of lime and iron: it also contains less than 1 per cent. of oxide of chromium, to which it owes its colour. The paler varieties of this stone are known under the name of BERYL: they are coloured by oxide of iron. *Aquamarine* includes clear beryls of a sea-green, or pale bluish, or bluish green tint. The

finest emeralds come from Grenada, where they occur in dolomite. A crystal from this locality, in the cabinet of the Duke of Devonshire, measures in its greatest diameter 2⅛ths inches nearly; its lesser diameter barely 2 in.; its third diameter 2⅛th in.; the extreme length of the prism is 2 inches. It contains several flaws, and is therefore only partially fit for jewellery; it has been valued at more than 500 guineas. A more splendid specimen, weighing 6 ounces, belonging to Mr. Hope, cost 500l. Both these specimens were exhibited in the Great Exhibition. Emeralds of less beauty, but of very large size, occur in Siberia. One specimen in the imperial collection of Russia measures 4½ inches in length and 12 in breadth. Another is 7 inches long and 4 broad, and weighs 6 lbs. The finest beryls (*aquamarines*) come from Siberia, Hindostan, Brazil. In the United States very large beryls have been obtained, but seldom transparent crystals: they occur in granite or gneiss. A reputed beryl of large size mentioned in most books on mineralogy has recently been discovered to be a lump of quartz.—*Tomlinson, Eng. Cyclopædia.* Prismatic corundum or chrysoberyl, is found among the Tora hills near Rajmahal on the Bunas, in irregular rolled pieces, small and generally of a light green colour: these stones are considered by the natives as emeralds, and pass under the name of "punna," but the natives are aware that they are still softer than the real emerald of India (which is generally green-coloured sapphire). See BERYL.—*Gen. Med. Top. page* 160.

(3374) EMERY.

Emeril, Emeri, FR.	Smiris, LAT.
Smirgel, GER.	Nashdak, RUS.
Smerglio, Smeregio, IT.	Esmeril, SP.

A granular variety of Corundum (*Guz. Hind.* Samada), usually mixed with iron ore. Its colour is intermediate between grayish-black, and bluish-gray. Lustre glistening and adamantine. It is used for grinding and polishing hard minerals and metals. Localities, Smyrna, Germany, Italy, Spain, &c.—*Waterston. Faulk.* This substance which, when reduced to powder, is much used for polishing hard bodies, though very different in appearance from Corundum, is on account of its hardness and analysis, regarded as Amorphous Corundum. Its colour is usually gray; its lustre is somewhat glistening. Its specific gravity is about 3·66 to 4; it occurs massive, and is granular. It is principally imported from the island of Naxos in the Grecian Archipelago, and was found by Mr. Smithson Tennant to consist of

Alumina, ...	86
Silica, ...	3
Oxide of Iron, ...	4
	93

It occurs also in Italy, Spain, and Saxony; and it is said, in small quantities, also in Wicklow, Ireland.—*Eng. Cyc. p.* 152. Corundum and its varieties, viz., Sapphire, Corundum and Emery are only surpassed in hardness by the diamond. They belong to the same class of minerals, and the emery of commerce which is so extensively used in Europe and imported into England for grinding and polishing metals, glass, &c., is supposed to be a mere variety of corundum, a mixed granular corundum; a mechanical mixture of corundum and oxide of iron, the iron in some of the varieties amounting to 33 per cent.

No.	Localities	Effective hardness Sapphire 100.	Specific gravity.	Chemical Composition.					
				Water.	Alumina.	Oxide of Iron.	Lime.	Silica.	Total.
1	Kulah ...	57	4·28	1·90	63·50	33·25	0·92	1·61	101·18
2	Samos ...	56	3·98	2·10	70 10	22·21	0 62	4·00	99 03
3	Nicaria ..	56	3·75	2 53	71·06	20 32	1 40	4·12	99·43
4	Kulah ...	53	4 02	2·36	63·00	30·12	0 50	2·36	98·31
5	Gumuch..	47	3·82	3·11	77 82	8·62	1·80	8·13	99 48
6	Naxos ..	46	3·75	4·72	68·53	24·10	0 86	3·10	101 31
7	Nicaria ..	46	3·74	3·10	75·12	13·06	0·72	6·88	98·88
8	Naxos ...	44	3 87	5·47	69·46	19·08	2·81	2·41	99·23
9	Gumuch..	42	4·31	5·62	60·10	33 20	0 48	1·80	101 20
10	Kulah ...	40	3·89	2·03	61·05	27·15	1·30	9·63	101·18

In the mixed corundums of Greece and Turkey the iron seems equably diffused through the mass imparting to it a bluish grey colour; but in the specimens which have reached the Madras Museum from Southern India the corundum and ore of iron, though occurring together, are not mixed, but remain apart, segregated, the corundum forming one side of a mineral and the oxide of iron, in a lump or lumps on the other side; and all such masses are magnetic and possess polarity. Of the different varieties of emery used in the arts that of Naxos is still preferred, as it is more uniform in its quality than that from Pulah and Gumuch: but it is believed that if the best qualities of Nicarian emery be found in abundance and such only sent to the market, they will prove equal, if not superior, to the emery of Naxos. That from Naxos is of a dark grey colour with a mottled surface and with small points of a micaceous mineral disseminated in the mass. It frequently contains bluish speeks or streaks which are easily recognised as being pure corundum. When reduced to powder it varies in colour from dark grey to black, but the colour of its powder affords no indication of its commercial value. The powder of emery examined under the microscope shows the distinct existence of the two minerals, corundum and oxide of iron. The specific gravity of emery is about 4, but its hardness is its most important property in its application to the arts; and those emeries which contain the least water, everything else being alike, are the hardest. The silica is

usually in combination with alumina, or the oxide of iron, or both, so that the quantity of alumina must not be regarded as an indication of the quantity of corundum in the emery. In addition to the component substances of emery, others, as titanic acid, oxide of manganese, oxide of zirconium, and sulphur, occur in some of the emeries, but in very minute quantities. These remarks have been made with the hope that the corundums of this country may be found suitable for all the purposes to which emery is now applied. The only difference in corundum seems to be the absence of oxide of iron, but there does not seem to be any quality given to the mineral by its presence in emery, essential to its value in the arts. This is a point however that I write on with diffidence. In Europe where machinery is so available, there could be no difficulty in preparing corundum powders of the requisite degrees of fineness, and its preparation in this country would perhaps be the only difficulty to be overcome. There can be no question of the great cheapness of corundum. Emery at the end of the last country was selling at from £7 to £8-10 per ton and between the year 1820 and 1835 it fell to even less than this: but a monopoly being allowed, it rose in 1846 and 1847 to £40 a ton. The discovery of other mines however at Gumuchdah near Ephesus has caused a great reduction since then, and the selling price in London has been from £10 to £25 a ton. What prices the several corundums of this country might bring in the London market it is difficult to say. There is no reason why the picked corundums should sell for less than the finest emeries, and Captain Newbold mentions that the corundums near Gram, when sorted into the three sorts known in commerce, viz., the *red*, the *whites*, and the *scraps* of these two, are sold to the Arab merchants at Mangalore and Tellicherry at prices from twelve to fifteen or thirty rupees the candy equal to £4, £6, and £12 a ton. —*Editor in Museum Report.*

(3375) ENAMEL.

Email, Fr. | Smalto, It.
Schmelz, Ger.

A kind of opaque coloured glass, formed by the combination of different metallic oxides, to which certain fusible salts are added, such as the borates, fluates, and phosphorates. There are several varieties, which are used for enamelling watch-cases, dials, jewellery, and numerous other articles. The best Enamel is that procured from Venice, which is in round cakes, about six inches in diameter, and half an inch thick.

(3376) ENAMELLING. Enamelling, or the art of fixing colours by melting in fire, is of very ancient date: it was practised by the Egyptians, and carried to a high degree of perfection in Persia. The art is known in every part of India, and some exquisite specimens were sent to the Exhibition, of 1851, both from Central and from North-western India. It is chiefly employed in ornamenting arms and jewellery, not only in gold, but also in silver.—*Royle, Arts &c. of India, page* 475. Enamels being vitrifiable substances, to which peculiar colours are given, we may compare the Indian with the European methods of making enamel. In general, ten parts of lead and three parts of tin are oxidized by continued heat and exposure to air. To the mixed oxides add ten parts of powdered quartz, and ten parts of common salt, and melt in crucibles. Thus is obtained a white enamel, and the basis of coloured enamel, metallic oxides being added. The oxide of lead or of antimony produces a yellow enamel: reds are obtained by a mixture of the oxides of gold and iron. The oxides of copper, cobalt, and iron, give greens, violets, and blues; and a variety of intermediate colours by mixtures. The workmen of Behar are stated to make two enamels, which are applied to the surface of some of the rings. One is yellow: five parts of lead are melted in a shallow crucible, and to these is added one part of tin; and the alloy is calcined for four or five hours. It is then heated to redness in the crucible of the glass-furnace. One part of white quartz is next added, and the mass stirred about for three hours. It is then taken out with a ladle, poured out on a smooth stone or iron, and cooled in water. They then take one part of their palest green glass, and add a fourth part of the other materials, to make the yellow enamel. The green enamel is made in the same manner; and to the melted glass is added, not only the prepared lead and tin, but a small portion of the black oxide of copper. In Mysore they make a bright yellow enamel, by first calcining five parts of lead and one of tin, then adding one part of zinc, calcined in a separate crucible. When these begin to adhere they are powdered in a mortar. When the maker of glass rings is at work, he melts some of this powder, and while the ring is hot, with an iron rod applies some of it (the powder) to the surface of the the glass.—*Royle, Arts of India, page* 476.

(3377) ENDIVE, Cichorium Endiva. Said to be a native of China. Used as salad, has a slight bitter taste, requires treatment similar to lettuce, should be planted on a bed elevated above the level and well manured, when properly grown they average about 15 inches in diameter. Blanched by the leaves being tied together. —*Jaffrey.* The seed of Curled and Flat-Endive may be sown in the earliest part of the rains in beds or boxes; the plants when about two inches high should be pricked out into beds, or sown in drills. They should not be nearer than one foot, and when grown to their full size, must be tied up to bleach. If in the rains, it is requisite that the plants should be every now and then opened, to let off the water that may have collected inside the plants, other-

wise they soon decay. The method adopted in England of placing a board on the plants for the purpose of bleaching, will not succeed in India, as the white ants attack them, and the board stopping the free circulation of air, prevents their growth and causes decay immediately.

(3378) ENGRAULIS ENCRASICOLUS. (Linnæus), the Anchovy (*Engraulis encrasicolus*, Fleming; *Engraulis Vulgaris*, Cuvier). This fish, which is a favourite condiment, is a native of the British seas. It has been taken in the river Dart; and Mr. Couch, in his 'Cornish fauna,' says, "This fish abounds towards the end of summer, and if attention were paid to the fishery enough might be caught to supply the consumption of the British Islands. It is abundant on the coast of Wales," and Mr. Yarrell says, "The Anchovy is reported to be at this time an inhabitant of the large piece of water below Blackwall called Dagenham breach; and in May 1838, I received one that was caught in the Thames, where however this species is so little known that the specimen referred to was sent to me with a request to know what fish it was."—*Engl. Cyc. Vol.* ii, *page* 4. See ANCHOVY.

(3379) ENKIANTHUS QUINGUE-FLORUS. On these mountains from 1,000 to 2,000 feet above the level of the sea, the Enkianthus is found growing abundantly, and in great luxuriance. It is never seen in the valleys or low lands, unless when brought down by the natives: page 128 The plant delights in fixing itself in the crevices of the rock, and is often found in such situations with very little soil about its roots. About the end of April or beginning of May, at the change of the monsoon, the wet season begins. The Enkianthus then grows most luxuriantly, and all the leaves, buds, and shoots are then fully formed: page 129. The Enkianthus is always in blossom at the time of the Chinese new year, when its flowers are in great request in the south of China for the decoration of the houses, boats, and temples, just as those of the Nandian are in the north: page 130. In going up the river towards the Fa tee Gardens I met boats in great numbers loaded with branches of peach and plum trees in bloom, Enkianthus quinqueflorus, camellias, cockscombs, magnolias, and various plants which flower at this season. The Enkianthus is brought down from the hills with the buds just expanding; and after being placed in water for a day or two, the flowers come out as healthy and fresh as if the branches had not been removed from the parent tree. This plant is a great favourite amongst the Chinese. The common jonquil too comes in for a very extensive share of patronage; and in the streets of Canton one meets with thousands of bulbs growing in small pans amongst water and a few white stones.—*Fortune's Wanderings, p.* 157.

(3380) ENKIANTHUS RETICULATUS. There are several species of Amygdalas cultivated for their flowers, and at new year's day in Canton, the budding stems of the flowering almond, narcissus, plum, peach, and the Enkianthus reticulatus, or bellflower, are forced into blossom to exhibit, as indicating good luck the coming year. —*William's Middle Kingdom, page* 283.

(3381) ENTADA PUSÆTHA. MIMOSEÆ.

Gradul. Dck.

An immense climbing shrub forming elegant festoons, legumes from one to three feet long, four or five inches broad, formed of a series of joints, each containing one seed: they are roasted and eaten.—*Riddell.* In the Tenasserim Provinces, this magnificent creeper is occasionally seen lending its light verdure to lofty forest trees, and throwing down immense pods, often more than a yard long. These pods are filled with numerous large dark brown seeds, from one to two inches in diameter. Though not in Lindley, yet the seeds of this plant enter into the native Materia Medica as an anti-febrifuge.—*Mason.*

(3382) ENTOMOLOGY, is that branch of science which treats on insects. The term Entomology literally signifies a discourse upon insects, it being derived from the two Greek words Ἔντομον, an insect, and Λόγος, a discourse. The term Entoma was first applied to these animals by Aristotle, and is synonymous with the Latin word *insecta* (whence is derived the English name 'insects'), both having reference to a striking character exhibited in the insect tribe, that of having the body insected, or, as it were, cut and divided into numerous segments. *The Entomology of the Himalayas and of India* has been noticed by the Rev. F. W. HOPE, F. R. S, F. L. S., &c, *President of the Entomological Society of London.* "It may by some be considered" he remarks, "a proof of presumption, that any individual should undertake to describe the entomo-geographical character of a country which he has never visited; and bold, he is willing to allow, is the attempt to embrace, in his views, not only the distribution of Insects in the Himalayas, but those also of the whole Continent of India and its adjacent islands. Possessing, however, one of the richest Cabinets of Oriental Entomology, to be found in England or any other country, the major part of the species collected at Calcutta, Madras, Poona, and Singapore, and in the islands of Java and Ceylon; and through the kindness of his friends, the late lamented General Hardwicke, Colonels Sykes and Whitehill, Captains Law, Smee, and Smith, having access to their rich and extensive collections from Nepal, Bombay and the Deccan; I may, he continues, be enabled, perhaps, from such a mass of materials, to offer some new facts respecting the geographical distribution of Insects, a subject apparently little studied, and certainly not sufficiently appreciated. It is, in-

deed, with diffidence that I undertake a task beset on all sides with difficulties; and before I enter on it, I claim the indulgence of my readers, and solicit them to regard the present attempt merely as an outline sketch, which can afterwards be filled up with greater accuracy, as our acquaintance with the nature of the soil, and the forms of animal and vegetable life belonging to the East, become better known. The entomological character of a country is particularly influenced by three things; first, by its temperature; secondly, by its vegetation; and, lastly, by its soil; and, perhaps, a few remarks on these subjects (relating chiefly to the Eastern world) may not here be deemed out of place, before entering more fully into the entomology of the Himalayas and of India." Dr. Royle apologized to the Rev. Mr. Hope and to his readers for the long delay which had occurred in the publishing of this valuable Paper, written for him in 1834, and which has been in type for a considerable time. The Insects of Dr Royle's collection, which Mr. Hope described, were collected in the neighbourhood of Saharunpore, in the valleys of the Himalayas, and on the mountains in the neighbourhood of Mussooree, at 6,500 feet of an elevation in 30° of N. latitude. Many of the desiderata required by Mr. H. on temperature and vegetation, are detailed throughout Dr. Royle's "Illustrations," and there is a remarkable coincidence in opinion, respecting the distribution of Insects as given by Mr. Hope, with that of Dr. Royle on the geographical distribution of the Flora of the plains and mountains of India.

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(3383) *Cicindelidæ.*—The following genera belonging to this family are not uncommon in India, *viz.* Therates, Tricondyla, and Colliuris: the two former are characteristic of a southern range, while the latter is abundant throughout the eastern continent. Of Indian Cicindelidæ, more than sixty species have fallen under my notice: the most splendid of the race abound in Nepal. Among various species, however, peculiar to the Himalayas, only one approaches the form of European Germanica.

(3384) *Dryptidæ.*—As I am only acquainted with a single species of Indian Casnonia, I pass on to Drypta, a Nepalese individual of this family belonging to the genus Desera, Leach, which is described in General Hardwicke's collection. Five others are also recorded as inhabiting India.

(3385) *Lebiadæ*—Cymindis has not yet been discovered in India: eventually it may occur in the Himalayas: it is difficult to imagine what genus takes its place Lebia is of rare occurrence in the East: a non-descript, named unicolor, in my collection, is from the Himalayas. Aplos is found at Poona. Orthogonius is common to Africa and Asia: the gigantic species, however, predominate in the latter country.

(3386) *Brachinidæ.*—The French writers appear unacquainted with the true type of Helluo, exclusively belonging to New Holland: the genus denominated Omphra by Dr Leach, applies solely to the Indian Helluones. Ozæna and Pseudo-zæna inhabit Calcutta and Cayenne; while Trigonodactyla appears in Africa and Asia. The Graphipteræ of the sandy deserts have no representative in the East. This genus appears to unite Brachinus and Anthia: the latter is found throughout the continent of India. Some of the specimens from Nepal, however, are very diminutive. Aptinus is partly confined to Northern Europe and America; while true Brachinus enjoys the unlimited range of the world. Catascopus is found in Nepal, and resembles in its habits Elaphrus of Europe, and probably occupies its place. Dyscolus, Promecoptera, and Thyreopterus, prefer the southern tropical regions and are not found to range as far north as the Himalayas.—*Hope, M. L. J. July* 1840, *p.* 115.

(3387) *Scraitidæ.*—Siagona atrata is met with in Nepal, and various parts of India; a specimen lately received from Egypt, if not the self-same, is so exceedingly alike in size and sculpture, that it is very difficult to distinguish The Scraitidæ abound in both hemispheres. Scapterus of India is represented by Oxystomus in the Brazils, and in Africa by Acanthoscelis. Morio and Clivina will, perhaps be found in both the Old and New World; the latter, indeed, is common to all temperatures; the former may eventually occur in Europe, perhaps in Sicily.—*Hope. M. L. J. July* 1840, *page* 115.

(3388) *Harpalidæ.*—Harpali are found dispersed nearly in all the countries of the globe: they abound more in the arctic than antarctic regions. The following genera are recorded as belonging to India, *viz.* Harpalus, Platymetopus, Selenophorus, Cyclosomus, and many others. Some species of Ophonus from Bengal and Poona, closely resemble British species.—*Hope. M. J. L. J. July* 1850, *page* 118.

(3389) *Pogonidae.*—Some of the genera of this family are not confined to the temperate zones; the major part of them prefer the polar regions. Pogonus and Cardiaderus are met with in Asia and Africa; while Patrobus is apparently peculiar to Northern Europe and America. —*Hope. M. L. J. July* 1840, *page* 118.

(3390) *Calathidae.*—Dolichus has not yet been discovered in India: it is probable, however, that it will occur there. Pristonychus inhabits Nepal and Europe: while Calathus prefers a northern more than a southern climate.—*Hope. M. L. J. July* 1840, *p.* 116.

(3391) *Feroniadæ.* Instead of finding Pœcilus in India, we meet with Trigonotoma, Cata-

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lromus, Lesticus, and Distrigus : most of them peculiar to that continent, Argutor antiqua occurs in the East; Omaseus and Platysma in Nepal; and Steropus in the vicinity of Poona. It is by mistake that Percus has been introduced among oriental genera. Cephalotes is found in Nepal and Australia; Stomis, Zabrus, and Pelorus prefer the temperature of Southern Europe. They may, however, be expected to appear in the Himalayas. Amara is captured in Japan; Anarctia and Masoreus are equally natives of Europe, Africa and Asia. Several nondescript species from the East, of the latter genus, are to be found in English cabinets.—*Hope. M. L. J. July* 1840, *p.* 116.

(3392) *Sphodridæ.*—The genus Sphodrus occurs in Nepal, and the anomalous form of Mormolyce in Java and Singapore; which last has been ranged with this family, but appears to be sadly out of place, as it is most likely a subcortical feeder.—*Hope. M. L. J. July* 1840, *p.* 116.

(3393) *Anchomenidæ.*—I am not aware that Platynus, Agonum, or Olistophus, have yet been discovered in India: the two former will no doubt be found in the Himalayas, when the Insects of that country are better known.—*Hope. M. L. J. July* 1840, *p.* 116.

(3394) *Callistidæ.*—Epomis and Chlænius abound in the tropics: the maculated set appear common to Asia and Africa, each country possessing species almost exact representatives of each other. Chlænius nepalensis approaches in form to Licinus; and although Oodes is widely dispersed over India, no Nepalese examples have yet come under my notice. Callistus occurs in the Mysore.—*Hope. M. L. J. July* 1840, *p.* 116

(3395) *Dicælidæ.*—Rembus is found on the Malabar and Coromandel coasts, at Calcutta, and in Nepal: its allied genus, Licinus, may be expected to occur, as some Asiatic species have already been described. Panagæus has its metropolis in India.—*Hope. M. L. J. July* 1840, *page* 116.

(3396) *Proceridæ.*—Among the Insects collected by Dr. Wallich, there were four or five species of true Carabus, only one of which I was enabled to describe. Several may occur in the colder mountain temperature, and it is probable they will resemble Siberian forms. Wherever the oak grows, there Calosoma will be found. Seven eastern species are known to me. C. indicum inhabits Nepal. If caterpillars are necessary to keep in check the luxuriance of tropical vegetation, surely the Calosomata, are equally necessary to keep within bounds these Insects, which sometimes destroy, in northern climes, nearly the foliage of the year.—*Hope. M. L. J. July* 1840, *page* 117.

(3397) *Nebriadæ.*—This family may be considered as belonging to a Northern and Alpine range. Should it occur in Nepal, it will be found at a considerable elevation, possibly amid the Himalayan snows. As to Elaphrus, I have already stated an opinion that Catascopus represents it in India—*Hope. M. L. J. July* 1840, *page* 117.

(3398) *Bembidiidæ and Trechidæ.*—Of the former family, several genera will no doubt eventually be found in Nepal: a single species of Tachys is the only example I am able to record at present. Of the latter, Stenolophus, Acupalpus and Tetragonoderus have occurred: the last of which may take the place of Bembidium.—*Hope. M. L. J. July* 1840, *page* 117.

(3399) *Dyticidæ.*—Aquatic Coleoptera are apparently not much influenced by climate: the temperature of water not varying like that of the earth or air, is the reason we meet with the self-same species in the interior of India and the south of France. Dyticus appears confined to Northern Europe or America, while Cibister is dispersed throughout the world. Eunectes and Hydaticus belong to Nepal and India, and to the latter country we may add also the following genera, *viz.* Colymbetes, Laccophilus, Noterus, Hyphydrus and Hydroporus.—*Hope. M. L. J. July* 1840, *page* 117.

(3400) *Gyrinidæ.*—Many gigantic species of Gyrinidæ abound in India. Dineutus nepalensis, politus, and spinosus, have been found within the Himalayan districts.—*Hope. M. L. J.* 1840, *page* 117.

(3401) *Hydrophilidæ.*—Several genera of this family are as widely distributed as the Ditticidæ; and most of those found in India inhabit Nepal. —*Hope. M. L. J. July* 1801, *page* 117.

(3402) *Necrophaga.*—Differing with most entomologists, I am inclined to believe that the carrion feeders abound more in warm countries than is generally believed. The religious prejudices of the Indians not allowing them to touch a dead body, may account for the few species which have hitherto reached Europe from the East. Necrophorus, Necrodes, Silpha, and Oiceoptoma, are met with in India and Nepal. It is probable that Necrophorus is more peculiarly adapted to Northern climates, while the remaining genera affect those of tropical regions.—*Hope. M. L. J. July* 1840, *p.* 118.

(3403) *Erotylidæ.*—Passing Nitidulidæ, which have been captured in India, we arrive at Engidæ and Erotylidæ. In the former family, we find Triplax, Ips, and Dacne; in the latter, Erotylus; and next to this group. Languiria and Eumorphus should be placed; genera abounding in species in Nepal and India.—*Hope. M. L. J. July* 1840, *p.* 118.

(3404) *Dermestidæ.*—In General Hardwicke's Collection, there is a Nepalese specimen of Dermestes, similar in every respect to D. lardarius

of Europe : a second species is closely allied to D. vulpinus of Africa. It is scarcely possible that either of them can have been imported into the Himalayas by commerce. This genus, and its congeners, is apparently a predominant group throughout the world.—*Hope. M. L. J. July* 1840, *p.* 118.

(3405) *Byrrhidae.*—The foreign Helocerata require attentive examination. Among the drawings of the Nepal Collection, made purposely for General Hardwicke, two species of Anthrenus are figured : they appear novel in form.—*Hope. M. L. J. July* 1840, *p.* 118.

(3406) *Histeridae.*—This family abounds in India. I am acquainted with more than fifty species from the East : some of the Nepalese specimens are in too mutilated a state to describe. —*Hope. M. L. J. July* 1840, *p.* 118.

(3407) *Lucanidae.*—I formerly described six species from Nepal : two more from the Himalayas are undescribed in Dr. Royle's Collection. In no country is there a greater admixture of temperate and tropical forms than in India ; some of the Lucanidæ resemble British species very closely, while others are the same as those in Java and Singapore. Forty species have been submitted to my inspection. Passalidæ are not equally abundant in the Old as in the New World.—*Hope. M.L.J. July* 1840, *p.* 118.

(3408) *Lamellicornes.*—The celebrated Ateuchus Ægyptiorum, or Sacred Beetle, has almost an exact representative in India. Gymnopleurus capicola, Hope, and azureus, Jab. both of them African species, are replaced in the East by G. sinuatus, Jab. and splendens, Hope. Sisyphus is met with in both hemispheres. Epirinus is an African, as well as an oriental form. Several Indian Copridæ resemble those of Egypt. Copris Midas of India and Nepal, exactly corresponds with C. Isidis of Africa. C. Sabæus and Pithecius appear common to both continents, and are equally abundant in Ceylon ; and several smaller species of Copris, from the eastern part of Africa, if not the same, approach so closely to those of Western Asia, as to induce a belief that they are the same Insects, only modified by climate. Onitis and Oniticellus have also several representatives in both regions, if not in some instances the self-same species. Onthophagus abounds more in India than any other country ; some of them unrivalled in size, splendour, and variety of form. More than 120 oriental species may be seen in European cabinets five only now are described from Nepal ; double that number, however, are in too mutilated a state to be characterized. Pactolus of Nepal and India, is represented in Senegal by Harpax, Jab. Aphodius, compared with Onthophagus, as an Indian group, is quite insignificant ; scarcely twenty species are recorded, including those of Manilla and the Eastern Isles : a nondescript from Nepal will appear in the Appendix. There was only a single specimen of Trox in General Hardwicke's collection.—*Hope. M. L. J. July* 1840, *p.* 119.

(3409) *Geotrupidæ.*—Geotrupes has been denied by Latreille to exist in India ; the Baron de Jean also makes no mention of any Eastern species from that country in his last catalogue. Two species are in my recollection ; one from Delhi, and a second from Japan ; a third also, unique, is among Dr. Royle's Insects from the Himalayas. It is probable that this genus, when found in India, appears on mountains at a considerable elevation : the species also may be the common food of the Shrikes of that country, as they are in Europe, should those birds be found there. Orphnus, Athyreus, and Hybosorus, occur in India. Bolboceas appears in some measure to supply the place of Geotrupes, which last is not so important a group in the East, as in a northern region.—*Hope. M. L. J. July* 1840, *p.* 119.

(3410) *Scarabæus.*—Under this term, the gigantic and most remarkable Insects of the Old World are ranged. Four species, allied to S. Atlas, Jab. are indigenous to Nepal, a convincing proof that equatorial forms extend beyond the tropics, and that they are found in much colder temperature than is generally believed. There are several genera of Scarabæidæ, besides Oryctes, found on the Himalayas, as yet uncharacterized ; some of them approaching African types.—*Hope. M. L. J. July* 1840, *p.* 120.

(3411) *Melolonthidæ.*—Some of the Melolonthæ of Nepal are closely allied to the British M. vulgaris ; others again, with the margins of the thorax serrated, evince their affinity to tropical species. Geniates, Apogonia, &c. are common to the Himalayas, the whole continent of India, and the Southern Isles.—*Hope. M. L. J. July* 1840, *p.* 120.

(3412) *Mimelæ and Euchlora.*—These genera appear peculiar to the East ; in a monograph, read before the Entomological Society, there are thirteen Mimelæ described ; several from Nepal. Euchlora appears wherever Mimela ranges, and is more abundant in species.—*Hope. M. L. J. July* 1840, *p.* 120.

(3413) *Popillia.*—This genus appears nearly equally abundant in Asia and Africa, and is common to the Old and New World. Fourteen species have been collected in Nepal. The following genera of Melolonthidæ, also, *viz.* Anomala, Hoplia, Apogonia, and Adoretus, occur in the same territories.—*M.L.J. July* 1840, *p.* 120.

(3414) *Trichiidae.*—Acanthurus, Trichius, and Dicronocephalus, inhabit the Himalayas. The first of these forms approaches our European type, the latter is the representative in India of what Goliathus is in Africa, and Incas in Sou-

thern America. Goliatidæ is a conspicuous family, and may justly be ranked among the most extraordinary forms of the Insect world.—*M. L. J. July* 1840, *p.* 120.

(3415) *Cetoniadae.*—Although I described seventeen species from Nepal, Dr. Royle's collection appears to contain at least six more, entirely new. Campsiura xanthorhina, Hope, is represented in Africa by Cetonia scutellata, Jab. C. cornuta, Jab. is found in Africa, as well as Asia. I am acquainted with more than 111 species from India, and from this surprising number still likely to be greatly increased, it is evident that the metropolis of Cetoniadæ is situated in the tropical regions.—*M. L. J. July* 1840, *p.* 120.

(3416) *Buprestidae.*—Of this superb and extensive family, comprising at present more than one thousand species, existing in the cabinets of Europe, the most magnificent inhabit India; the splendid Sternocera and giant Catoxantha range the Equator and the Tropics. Ninety species belong to the continent of India, many to Nepal, the isles of Java and Sumatra: among them are forms of temperate as well as of northern climes.—*Hope. M. L. J. July* 1840, *p.* 121.

(3417) *Elateridae.*—This family presents us with types of form belonging both to the tropical and temperate regions: the former, however, are few in number, when compared with the latter. Several of the Nepalese Elateridæ resemble British species, some so closely as to induce one to imagine that difference of climate is the cause of variety of the species. Elater murinus, Jab. of England, is well represented in Nepal by Elater cœnosus, Hope; and various species, which in Europe frequent the oak, alder, and willow, have Nepalese species nearly resembling them, and we have stated that there is a correspondence of vegetation between Europe and the Himalayas. —*Hope. M. L. J. July* 1840, *p.* 121.

(3418) *Lampyridae.*—Passing the Cebrionidæ, few examples of which occur in India, we arrive at the Lampyridæ; and justly may the East boast of its numerous and fine species, unsurpassed probably by those of South America. The warm damp of the jungle is peculiarly adapted to the habits of this family. Lycus and Omalysus, as well as Lampyris, abound in the Himalayan range.—*Hope. M. L. J. July* 1840, *p.* 121.

(3419) *Malacodermata.*—By some writers, the families composing this group are considered rare within the Tropics, and they certainly are more abundant in Nepal than Central India; and yet they are not of rare occurrence. Anisotelus, Hope, appears to be peculiar to the East. Several species of Malachius and Melyris enjoy an Asiatic and African clime.—*Hope. M. L. J. July* 1840, *p.*121.

(3420) *Cleridae.*—By the family Cleridæ, abounding in the East, we arrive at the Ptinidæ; they, the latter probably, exist in Nepal; none, however, I believe, have yet been discovered in India, the nearest locality where they are found being the Mauritius. The Bostrichidæ are, however, abundant, and it is not unlikely that the Paussidæ commence where the Ptinidæ terminate.—*Hope. M. L. J. July* 1840, *p.* 121.

(3421) *Curculionidae.*—Without entering at large into the geographical range of the numerous genera of this family, I briefly state, that Nepal contains many tropical forms, as well as others, which are peculiar to temperate climes, some of them extending from the Himalayas, even to New Holland, particularly Sipalus.—*Hope. M. L. J. July* 1840, *p.* 122.

(3422) *Prioridae.*—By the Cucujidæ (common to India and Nepal) we arrive at the Longicornes. Prionus loves the torrid and tropical zones: some of the Himalayan species indicate an alliance to European types.—*Hope. M. L. J. July* 1840, *page* 122.

(3423) *Lamiadae.*—The largest, as well as the most beautiful species of this family, are found in Nepal. Lamia Roylii, Hope, is unrivalled in size; and L. Wallichii surpasses all others in beauty and colouring; it is found in Nepal, Japan, at Singapore, and the Isle of Java. Cerambyx, Callidium, Clytus, and Saperda, are predominant groups, and are found in all countries and climates. Many Nepalese species exactly represent our European types.—*Hope. M. L. J. July* 1840, *page* 122.

(3424) *Sagridae.*—Omitting Lepturidæ, confined almost entirely to Northern Europe and America, we arrive at Sagridæ. Donacia occurs in Java, and we may expect to meet with it in Nepal, and other parts of India; if not, it is probable that Sagra takes the place which Donacia does in northern regions. Several species of this genus are found on the Nympheacæ. I am doubtful if Sagra attaches itself to peculiar water-plants, or frequents the same as the former genus. Megalopus is found in Nepal, in Africa, as well as South America. Crioceris also appears to be a predominant group, while Adorium is confined more to Asia than Africa.—*Hope. M. L. J. July* 1840, *page* 122.

(3425) *Galleruoidae.*—Galleruca and Auchenia abound in Nepal. Halticæ are found throughout the world, and are intended probably to keep in check particular vegetation. In Europe, the genera Brassica and Sinapis almost annually suffer from their depredations; they appear to abound more in light and sandy soils; and where lime is used instead of animal manure, the crops are less attacked.—*Hope. M.L.J. July* 1840, *page* 122.

(3426) *Chrysomelidae.*—Many of the Nepa-

lese species resemble those of Siberia; others approximate closely to our European forms, so much so, that in many instances they appear like one and the self-same Insect; and if not the same, they are certainly similar representatives of their respective countries, and probably fulfil the same offices and functions. Podontia and Phyllocharis seem peculiar to Asia and New Holland.—*Hope. M. L. J. July* 1840, *p.* 123.

(3027) *Eumolpidae.*—The Eumolpidæ of India are not surpassed in beauty or splendour by those of South America; they seldom, however, equal the latter in size. Clythra and Cryptocephalus occur in the East, both of them abounding more in temperate than tropical countries; in Dr. Royle's collection there are found several undescribed species from the Himalayas.—*Hope. M. L. J. July* 1840, *p.* 123.

(3428) *Cassididae.*—About fifty species of Indian Cassida have come under my notice; some of the Napalese species resemble English specimens, and may be parasitic on the thistles, as they are there.—*Hope. M. L. J. July* 1840, *page* 123.

(3429) *Coccinellidae.*—Although I described twenty new species from General Hardwicke's collection of Nepal Insects, I find five others undescribed in Dr. Royle's collection from the Himalayas. Coccinella 7-puncata, Fab., appears common to Europe and Asia; at least the specimens agree so exactly in every respect, that after a very accurate examination, no important difference can be found; and believing them to be the same, I still cannot imagine that they have been imported into India by commerce. Endomychus may eventually be expected to occur in Nepal.—*Hope. M. L. J. July* 1840, *p.* 123.

(3430) *Hispidae.*—Hispa crinacea is abundant in Nepal; and two undescribed species are in Dr. Royle's collection from the same country.—*Hope. M. L. J. July* 1840, *p.* 123.

(3431) *Tenebrionidae.*—The transition from Hispidæ to the present family by means of Sarrotrium is rendered easy. Hegeter and Tagenia, common to India, appear to follow in successive order. Both Upis and Tenebris are found in the Himalayas, and are abundant in the Tropics.—*Hope. M. L. J. July* 1840, *p.* 123.

(3432) *Pimeliariae.*—Pimelia has not yet been described as existing in India; last year I received two species from the vicinity of Poona. Sepidium, Blaps, Eurynotus, and Opatrum, occur in the East; the first prefers the Southern Tropic; the two next appear at Bombay, Calcutta, and Nepal; and the last is widely dispersed throughout the East. Passing Diaperidæ and Cossyphus, both of them common to Asia and Africa, we next meet with Cistela and Lagria: the latter apparently a predominant group. Pyrochroa, also, has been discovered in Java.—*Hope. M. L. J. July* 1840, *p.* 124.

(3433) *Helopidae.*—This family is the grand receptacle for the various forms of Heteromera. Among the Indian genera we find Amarygmus, Cnodulon, and Platycrepis, with several true Helopidæ, rivalling in splendour and magnitude those of the South American Continent.—*Hope. M. L. J. July* 1840, *p.* 124.

(3434) *Mordellidae.*—Most of these Insects are parasitics of the Hymenoptera, and abound in tropical climates. Their office is probably to keep in check, and prevent the too rapid increase of Vespidæ and Bombidæ: they are common to the Old and New World.—*Hope. M. L. J. July* 1840, *p.* 124.

(3435) *Cantharidae.*—The geographical distribution of this family is particularly interesting as it contains those Insects which are used in Medicine, and denominated Blister Flies. Lytta gigas, Fab., is found abundantly in India, and also in Senegal; and there is little doubt that several species of Mylabris will be found common to both continents. These vesicatory Insects of the Old World are replaced in the New by the genus Tetranyx.—*Hope. M. L. J. July* 1840, *p.* 124.

(3436) *Staphilinidae.*—By the families Notoxidæ and Scydmænidæ, we arrive at the Pselaphidæ, and afterwards at the Brachelytra, which terminate the Coleoptera. Anthilephila and Notoxus occur in Nepal, and Scydmænus in Java; while various other genera of Staphilinidæ are widely dispersed throughout the East.—*Hope. M. L. J. July* 1840, *p* 124.

(3437) *On the Remaining Orders.*—Having entered fully into the consideration of Eastern Coleoptera, it is not my intention at present to go into lengthened details of the remaining Orders. It is sufficient to state, that in all of them there will be found similar and corresponding characters as in the Coleoptera. With regard to identity of species, I cannot help remarking, that of Lepidoptera, there appear to be a much greater number of species, widely disseminated throughout the world, than of any other order. In Asia and Europe we meet with Papilio Machaon, Gonepteryx Rhamni; with some species of Colias and Pontia, with Vanessa Atlanta, and Cynthia Cardui; and to these might be added, several identical Sphingidæ, particularly Acherontia, Atropos, Deilephila, Celerio, and Spynx. Among the Noctuidæ, Geometridæ, Tortricidæ, and Tineidæ, many species will also be found inhabitants of both continents. In the Orthoptera, some Gryllidæ are common to countries remotely situated, which may partly be accounted for by the migratory habits of these Insects; and the same remarks may be applied to the Sphingidæ. Among the Blattidæ, several tropical species range widely;

some of them have become naturalized even in a northern climate; and it is no uncommon occurrence to find Indian, Brazilian, and New Holland, species in a high state of perfection alive in the houses of London; and among the Eastern Neuroptera, there occur various Libellulinæ and Hemerobeidæ, closely resembling English species. Among the Hymenoptera, may be noticed the universal ranger, Evania appendigaster, ever attendant on Blatta; some Icheumonidæ, Crabronidæ, Apidæ, and Vespidæ, all of them presenting identical species with those of Great Britain. In referring to the Diptera, I need only mention the wide range of the Orange Fly, the same in England, India, and America; the Gnats and Mosquitoes, common to the four quarters of the globe, alike the pest of the Indian and Laplander; and, lastly, various species of Musca, as widely dispersed as the half-domesticated sparrow of Great Britain. Passing by the Aptera, and the various parasites of birds, quadrupeds, and of man himself, we shall find also among the Hemiptera, several identical species of Pentatoma, Reduvius, Tetyra, besides Cimex lectularius the scourge of all countries and climates. It does appear, then, from the above analysis, that Asia and Europe have many Insects in common, and probably other parts of the world will eventually be found to present not only similar genera and representatives, but also the same identical species, subject to the modifications of climate, and other external circumstances —*Hope. M. L. J. July* 1840, *p.* 125.

(3438) *Character of Himalayan Entomology* —The character of Himalayan Entomology is twofold, Asiatic and European; and the intermingling of forms of temperate and tropical climes is one of its most distinguishing peculiarities. In its valleys (probably influenced by the heat and moisture of the jungle) southern forms predominate over northern; and it is not unlikely, that to the uninterrupted belts of jungle stretching along the mountain ranges, we may partly trace several tropical phytyvorous genera far beyond their apparent natural limits. Some carnivorous Insects are also found ranging far to the north in the Himalayas; an example of which is Anthia 6-guttata, a well-known native of the Tropics: the specimens, however, are mere dwarfs, compared with those of Peninsular India, a fact which may be regarded as a proof, that Anthia has here reached its extreme limits, and consequently will soon disappear (as is the case) and be represented by another type, fulfilling the same functions, only under a difference of form. The following genera of Himalayan Insects, selected from many others, will evince their tropical relationship. Among the Cicindelidæ, Colliuris appears; among the Carabidæ, we find Desera, Omphra, and Cyclosomus; among the Lamellicornes, Euchlora, Mimela, and Dicronocephalus; and to these may be added, Anisotelus belonging to Telephoridæ, and Podontia and Phyllocharis to the Chrysomelidæ: all of them attached to warm countries, and some, indeed, are seldom found but within the Torrid Zone. It is needless to state many genera from the Himalayas evincing an affinity to European types; I may here add, that various Himalayan genera closely approximate Siberian forms, and that some of the species described by Dr. Gibler from the Altaic chain of mountains, particularly some Chrysomelidæ, I believe to be indigenous in both regions. Some few, however, are worth noticing, such as Broschus and true Carabus, Geotrupes and Pimelia; the two last have been declared by high authority never to be found in India. Regarding identity of Insects occurring in the Himalayas, as well as in Europe, there are several species of the following genera of Celeoptera, namely, Elater, Melontha, Chrysomela, Cassida, and Coccinella, which I cannot help thinking are the same as those of England; particularly as the vegetation of the two countries greatly coincide, for in very many cases, genera, and in some instances the self-same species of plants have been recognized. Among the carnivorous Insects, I believe that Dermestes lardarius, and vulpinus, Corynetes violaceus, and rufipes, and some of the Staphilinidæ, are essentially the same in Europe and the Himalayas. Of Lepidoptera, I figure Papilio Machaon, because it is evidently the same as what we meet with in England; the same remark will apply to Vanessa Atalanta, and Cynthia Cardui. The French entomologists are inclined to regard the Insects of widely separated countries as distinct species; I wish to esteem them as varieties, and I cannot help thinking, that as identity of Plants has been satisfactorily proved by Dr. Royle, so also we may believe in the identity of Insects in regions widely removed from each other. At any rate, should these varieties eventually prove distinct (which may be ascertained, I think, in the Lepidoptera order, when we become better acquainted with the oval, larval, and chrysalidous stages), yet the difference will ever be so slight, that we cannot separate or distinguish them in the image state with any degree of certainty. But whether they be accounted species, or only varieties, we see the grand object of their creation, in their fitness for performing certain functions which are assigned them; one of these is, to keep in check the luxuriance of vegetation and to restrain it within due limits; another may be, that these puny agents may fecundate the flowers, by carrying the fertilizing pollen from tree to tree, and thus be the means, in one case, of promoting vegetation, as in another they are the agents of its destruction.—*Hope. M. L. J. July* 1840, *page* 127.

(3439) *Entomological character of India.*— From the foregoing Analysis, I have no hesitation in asserting that the pervading character of

Indian Entomology is uniformity. It is true that we meet with numerous genera, both of tropical and temperate climes, associated together; the former more abundant, the latter less frequent (as we might naturally expect) than in the Himalayas. There is, however, a greater intermingling of forms than at first sight would be readily imagined; but when we take into our consideration, that many of the species resembling those of Europe may have been captured on the mountain ranges, at a considerable elevation we may partly account for it. This attempted explanation, however, is not always available or satisfactory; for in the heated valleys of the East, we find many European types and species, in numbers sufficient to excite our astonishment. It will appear, then, that many species taken in temperate and northern climes, are not confined to them, and that the range they enjoy is very considerable, extending not only over the Old World, but also to the New. As we advance from the Poles to the Equator, vegetation is more luxuriant, in proportion as heat increases, and the quantity of work assigned to Insect races is proportionately increased. Is it not natural to imagine that the functions performed by them in a colder climate, would in a warmer one require increased exertion and capabilities? It does not follow, because we find new types of form in tropical countries, and new genera of superior bulk and power, and more abundant in individuals, that therefore they necessarily replace the old ones, and are to perform the duties peculiar to both regions; both may live and thrive together, and abound in the same countries, and will eventually be found to do so. When the genera of temperate climes appear within the Tropics, I see no reason why they may not have the same functions assigned them there, as in colder latitudes; but when we find new types of form, and a more powerful organization, with the size of the Insects greatly increased (as is the case in tropical regions), does it not almost naturally follow that they are intended solely for those regions, and for the increase of work they are there destined to perform? To return, however, to the subject of uniformity of entomological character throughout the Peninsula and the East, I think it probable that it is in a great measure to be accounted for by the general uniformity of its temperature, vegetation, and soil. There may, indeed, be other causes, which particularly influence it, but these may be esteemed the most essential. When we look to the range which genera here enjoy, it is very considerable: in part of the Himalayas, at the extreme southern points of India, in the West, and even in its Eastern Isles, there is one pervading character, evincing every where the prevalence of tropical genera. To speak more specifically, in Nepal and the southernmost extremity of the Mysore, and in Ceylon, at Bombay, and at Madras, at

Calcutta and Singapore, in Japan and Java, with the rest of the Polynesian Isles, the majority of the same types abound; and what is of more consequence, a great majority of the same species also occur in most of the above-mentioned regions. Having noticed the intermingling of genera belonging to Europe and Asia, we may probably find a slight accordance elsewhere. Now, if we turn our eyes to Africa, we shall there find a considerable similarity in the entomology of this quarter of the globe with that of Asia; and this resemblance between the two countries will be readily seen by the short annexed list of some of the more particular genera, which are common to both of them. Among the Carabidæ occur Anthia, Orthogonius, Trigonodactyla, and Siagona. Among the Lamellicornes, Epirinus and Popillia, the conical Buprestidæ and the extraordinary Paussidæ, which last are chiefly found only in these regions; and to these may be added, as well as many more, the genera Melyris, Megalopus, Sagra, and Adorium; Dorylus, among the Hymenoptera, and Diopsis among the Diptera. Passing from genera to species, we shall find that precisely the same occur in both continents; among the most conspicuous, I shall mention but a few, namely, Copris Midas, Sabæus, and Pithecius, Cetonia cornuta, and Lytta gigas. Even supposing that no identical species occurred, which were common to Asia, and Africa, yet we could not help observing the very remarkable similarity in the representatives of each; one example of which is, Ateuchus sanctus, which very closely resembles the celebrated Sacred Beetle of the Egyptians, the object of their worship, by some regarded as an emblem of fertility, but I think more probably that of eternity. Before concluding my remarks on the similarity of Insects found in Asia and Africa, I cannot help expressing a wish that some individual may be induced to develope the character of the entomology of these gigantic regions more thoroughly than has yet been attempted; as there is an ample field for research and speculation. We shall feel much indebted to him, if he will explain how the Copridæ were transported from one country to another, and how they reached the island of Ceylon; how also Cetonia cornuta, which is taken on the banks of the Gambia, became an inhabitant of India. Lytta gigas may have travelled by land, and perhaps the Copridæ following the track and droppings of the camel, may have pursued the same route. Let him describe the sands of the desert and those in the vicinity of the Indus, give us a comparative Fauna of the Ganges and the Nile, record the varieties of temperature, the character of vegetation, and the genera peculiar to the different soils. Let him do this, following the steps of the celebrated Forskahl, and he indeed will advance the objects of science, deserve the thanks of the present generation, and command

the respect of posterity. By pursuing the course recommended by Mr. Hope, a naturalist would be enabled, not only to display the connection between soil, temperature, and vegetation, as well as the animal forms which the latter supports, but also prove the advantages of studying the natural sciences in connection with each other, and be enabled to explain something of the laws which influence the geographical distribution of plants and animals.—*J. F. R.—Hope. M. L. J. July* 1840, *p.* 129.

(3440) ORDER DERMAPTERA, Leach.

Family Forficulidæ.

Forficula Macropyga, Westw.

Piceo-nigra, punctata, abdomine æneo submicante, marginibus thoracis, tegminibusque rufescentibus, forcipe (♂) longissimo valde curvato, et gracili; (♀) fere recto tenuissimo.

Long. Corp. (forcipe excluso) ♂ lin. 6 ♀ lin. 5.

Ad genus Forficulam (stricte sic dictum Servilleo) appertinet, statura fere Forficulæ auricularіæ et paullo robustior, caput nigrum punctatum, impressionibus duabus anticis inter oculos. Antennæ ♀ (♂ mutilatæ) 13-articulatæ graciles rufescentes, articulis bassalibus obscurioribus.—*Prothorax* planus antice vix emarginatus, lateribus antice rectis, postice rotundatis, niger punctatus, margine tenui rufescenti; foveolis duabus rotundatis, antice impressus.—*Tegmina* piceo-rufescentia, punctata, portio alarum detecta concolor. *Abdomen* nigro-picum punctatum æneo submicans; segmento penultimo lateraliter et angulariter producto (♂) aut simplici (♀). Forceps (♂) niger valde elongatus, gracilis ad basin, valde externè curvatus, in medio, dentibus duobus parvis internis instructus, apice sursum et exterius producto, acuto (♀) elongatus multo gracilior, rufescens fere rectus et inermis.—*Westwood. M. L. J. July* 1840, *p.* 130.

(3441) ORDER LEPIDOPTERA, Linn.

DIURNA. Family Papilionidæ.

Papilio Machaon, Linn.

This handsome butterfly, like Vanessæ Antiopa, and Atalanta, Cynthia Cardui, and some others, affords an instance of wide geographical range, [Messrs. Godart and Latreille, in the Encyclopédie Méthodique (Vol. IX., Art. Papillon) state, that Pap. Machaon is found in Syria and Egypt] rather than of representative structure, since the individual figured cannot be regarded as specifically distinct from the European specimens, which differ amongst themselves in various slight particulars, as the size of the dark bars, and spots, &c. It may, however, be noticed, that the specimen figured has the small oval black spot near the extremity of the anterior wings almost entirely isolated, the large basal black portion of the same wings is very strongly covered with yellow powder, whilst the black lunules of the posterior wings are not nearly so much powdered with blue bloom, as in the ordinary English specimens.—*Westwood. Hope. M. L. J. July* 1840, *p.* 130.

Fam. Nymphalidæ.

Paphia Parakekta, Horsfield. Lepidopt. Javanica.

Paph. alis anticis ad apicem acutis, posticis subcaudatis; anticis supra ad basin cæruleis, fascia obliqua lata fulva in medio, apiceque nigro; maculisque duabus parvis albis (una discoidali, altera apicali) ornatis; posticis cæruleis.

The preceding characters, drawn from the upper surface of the wings of this remarkable butterfly, suffice for its determination until the publication of Dr. Horsfield's description. The under surface of the wings are, however, much more remarkable, bearing a most striking resemblance to a pale dried leaf; the deception being much increased by the form of the wings, when brought in contact by the Insect, whilst sitting upon a flower in the sun-shine, the short caudal appendages giving rise to the idea of the stalk of the leaf, thus completing the delusion.—*Westwood. Hope. M. L. J. July* 1840, *page* 131.

DIVISION ?——— ? Fam Zygænidæ ?

Genus Campylotes, Westw.

Genus anomalum Heleonæ et Anthonoyzæ &c. Gymnanto cenæque *Guér*, affine, alæ oblongæ, subovales, integræ, nervis apicalibus valde curvatis, anticæ cellula discoidali clausa nervos duos postice emittens, quorum exterior trifurcatis, posticæ etiam cellula discoidali clausá, nervo recurrente intermedio bifurcato. Corpus parvum abdomine gracili, pone alas haud protenso. Caput parvum. Ocelli 2. Antennæ graciles biramosæt Palpi brevissimi supra haud discernendi, maxillæ elongatæ spirales.

Campylotes histrionicus, Westw. Æneus, alis ad costam ruso—, interne flavo-lineatis, maculisque apicalibus albis. Long Corp. lin. 11. Expans. alar. unc. 3. Habitat in Nepalia. Hardwicke; in Montibus Himalayanis. Royle. Corpus nigro-æneum, palagris maculisque abdominalibus lateralibus flavis. Alæ anticæ aneæ costa, fasciisque duabus discoidalibus rufis, fasciisque tribus internis per totam longitudinem alarum currentibus flavis; maculis 8 vel 9 (spatium inter nervos apicales occupantibus) albis Alæ posticæ, similiter coloratæ, at maculæ terminales flavo ornantur. This remarkable Insect appears to be the extreme type of a very numerous Indian group of Lepidoptera, to which belong the species named Capys pectinicornis, Thallo, and Rhodope. It is impossible to decide upon their real affinities, until we obtain a knowledge of the metamorphoses of some of the species.—*Westwood. M. L. J. July* 1840, *page* 131.

(3442) ORDER ORTHOPTERA. Fam. Mantidæ.

Mantis Roylii, Hope, MSS.

(3443) ORDER HYMENOPTERA. Section Pupivora.

Fam. Chalcididæ.

Dirhinus Himalayanus, Westw.

Niger, pedibus 4 anterioribus, tarsisque posticis rufescentibus. Capite obtuse bicornuto. Habitat in Himalaya. Long.corp. lin. 2. Exp. alar. lin. 3.

Caput nigrum punctatum, antice obtuse bicornutum antennarum articulo primo nigro (articulis reliquis deteritis).Thorax fortiter punctatus; metathorace 4 lineato et ad latera,angulariter producto. Abdomen breve depressum thoracis latitudine. Pedes 4 anteriores rufuscentes, 2 postici, nigri, tarsis solummodo rufescentibus.

Obs. In hac specie partes oris valde elongatæ, labro oblongo-ovali ciliato, mandibulis inter se similibus, gracilibus, sub apice dente interno unico armatis.—*Westwood. M. L. J. July* 1840, *page* 132.

(3444) ORDER HETEROPTERA. Section Longilabres.

Fam. Scutelleridæ.

Scutellera Pulchella, Hope, MSS.

Cæruleo-nigra vel-æneo, nitida prothoracis disco antice, et margine postico æneo vel cupreo cincto, scutello aureo viridique intenti, fascia transversa basali, alteraque centrali obliqua, (in medio interrupta) et maculis tribus rotundatis (postice et in triangulum positis) cæruleo-nigris.

Statura fere Scutelleræ mauræ at paullo minor, scutelloque abdomen omnino obtegenti. Scutelleræ Stockeri affinis at robustior. Antennæ articulis duobus basalibus brevibus equalibus. 3tio. 2do. fere duplo longiori, ultimo omnium longissimo. Long. corp. lin. 5. lat. lin. 3.—*Westwood. M. L. J. July* 1840, *page* 132.

Fam. Pentatomidæ.

Megarhynchus Transversalis, Westw.

Fusco-niger, capite acuté bicornuto, angulisque anticis thoracis acuté antice productis, prothorace et scutello transverse striatis, parte coriacea hemelytrorum nigra, tenuissime punctata, membrana apicali albida. Antennæ et pedes nigri. Long. corp. lin. 7½. lat. lin. 3½.—*Westwood, M. L. J. July* 1840, *page* 132.

(3445) ORDER HOMOPTERA. Section Saltatoria.

Fam. Acadidæ.

Cicada Sulphurea, Hope, MSS.

Nigra, capite thoraceque sulphureo maculatis, alarum dimidio basali sulphureo, parte anticarum sulphurea, fascia obliqua nigricanti divisa, apicibusque fuscescentibus. Long corp. unc. 1½. Expans. alar, unc. 3¾.—*Westwood. M. L. J. July* 1840, *page* 132.

Affinis Cicadæ maculatæ. Caput nigrum orbitu interno oculorum sulphureo; thorax niger maculis 8 sulphureis abdomen nigrum segmentorum marginibus pallidis. Alæ anticæ costa sulphurea, maculáque ovali maxima (plus quam dimidium basale alarum occupante) sulphurea fascia obliqua tenui nigra interne dentata divisa; apice fusco nervis nigris Alæ posticæ ad basin sulphureæ, ad apicem fuscæ nervis nigris; pedes nigri. —*Westwood. M. L. J. July* 1840, *p.* 133.

(3446) ORDER DIPTERA. Section Pupipara.

Fam. Hippoboscidæ.

Hippobosca Maculata.

Thorace fusco, flavo variegato, scutello nigricanti, maculis tribus flavis, media majori, femoribus tibiisque posticis ad apicem fuscis.

Hippobosca equina; " ex India orientali paullo major, thoraceque magis albo variegato, at vix distincta." Fab. Syst. Antl. p. 338.

Hippobosca maculata, Leach, " on the genera and species of Eproboscideous Insects." Wernerian Trans. vol. ii. p. 549. Long. corp. lin. 4 Expans. alar. lin. 8¾. Caput flavum, oculis fulvis, linea longitudinali inter oculos fusca. Proboscis nigra. Thorax fuscus, macula magna ad angulos anticos flavescenti in medio fusca; fascia parva centrali lunulisque duabus in medio conjunctis posticis flavescentibus, scutello nigricante maculis tribus flavis media majori. Abdomen fuscum, punctatum, marginibus rufescentibus. Pedes fulvescentes tarsis omnibus femoribus tibiisque posticis ad apicem fuscis.—*Westwood. M. L. J. July* 1840, *p.* 133.

Fam. Nycteribidæ.

Nycteribia Roylii.

Obscure nigra pedibus fuscescentibus elongatis, vix compressis, coxis anticis brevibus, abdomine ovalo, conico, depresso, 5-articulato, apice subtruncato, stylis duobus incurvis subtus armato, capite compresso. Long. corp. lin. 1⅓. Habitat in India Orentali. Nyct. Roylii. Westw. in Trans. Zool. Soc. 1. p. 290-5.—*Westwood. M. L. J. July* 1840, *p.* 133.

(3447) ORDER COLEOPTERA.

Cetonia Roylii, Hope.

Long. lin. 12. lat. lin. 6. Nigro-viridis thorace flavo marginato elytrisque quatuor maculis flavis notatis. Clypeus quadratus. Antennæ nigræ. Caput quadratum punctatum, Thorax cupreis marginibus externis elevatis, lineaque flava utrinque externa, disco fortissime punctato. Scutellum magnum postice decitum. Elytra nigro-virescentia maculis quatuor flavis

notata, binæ fere rotundatæ ad basin posi-æ, binæ aliæ reniformes ante apicem locatæ. Corpus infra nigro-æneum segmentis abdominis utrinque aurantiis capillis obsitis pedibusque con-oloribus. In Mus. Dom. Royle; in montibus Himalayæ captus ceria.—*Westwood. M. L. J. July* 1840, *page* 134.

(3448) GEOTRUPES ORIENTALIS.

Long. lin. 10. lat. lin. 6½. Violaceus thorace parsim punctulato, elytris striatopunctatis, pedi-ous supra nigris, infra violaceis nitidis. Anten-næ piceæ capitulo fuscanti, thorax violaceus ongitudinali serie punctorum in medio posita, variis aliis sparsim dispositis. Elytra striato punctata striis quasi vermibus erosis. Corpus nfra violaceum nitidum, femoribus posticis uni-pinosis, tibiis pilosis, tarsis chelisque piceis. This singular species approaches very closely to ome of the British species, and is probably from high elevation of the Himalayan mountains. n Mus. Dom. Royle.—*Westwood. M. L. J. July* 1840, *page* 134.

(3449) ONTHOPHAGUS PHANÆOIDES.

Long, lin. 4½. lat. lin. 4¼. Niger obscurus, clypeo cornu reflexo abrupte truncato, thorace phanæoformi, postice lateribus in spinam obtusam productis, femoribus luteis. Antennæ piceæ capitulo fuscanti: clypeus hexagonus cornu re-verso abrupte truncato, thorax fere quadratus: punctatissimus, punctulis erosis tuberculo antice, fossulaque postice in medio marginis impressa, angulis posticis in spinas productis. Scutellum parvum nitidum. Elytra striata. Corpus sup-us atrum nitidum punctatum. Pedes femori-bus luteis, tibiis tarsisque nigropiceis. This singular insect will, at some future period, form the type of a new genus: in form it unites the South American Phanæus, and the widely-dis-seminated genus Onthophagus,—*Westwood. M. L. J. July* 1840, *page* 134.

(3450) LUCANUS LUNIFER.

Long. lin. 37. lat. lin. 10. Æneo-piceus, cereolo tomento aspersus, mandibulis exertis uni-dentatis, denticulisque minoribus instructis, apice bifurcatis. Clypeo deflexo lunifero, femoribus castaneis. Hab. in Montibus Himalayæ; in Mus. Dom. Royle. This Insect appears to unite in itself the characters of the Asiatic and Europe species, the latter rather predominating over the former: it is one of the finest forms of the Himalayan Fauna.—*Westwood. M. L. J. July* 1040, *p.* 135.

(3451) LAMIA WALLICHII.

Long. lin. 16. last. lin. 5. Viridisericeus, an-tennis penicillatis, elytris tribus fasciis nigris, binisque penicillis ornatis. Antennæ corpore lon-giores et nigrovirides, primo articulo subpenicil-lato, tribus sequentibus atris, penicillis magnis bilobum barbatis, et reliquis pubescentibus, ultimo annen pubescentia densiori tecto. Thorax viri-

dis, spinosus. Elytra ornata tribus fasciis vix suturam attingentibus, una in medio elytrorum, secunda inter mediam et apicem, tertiaque binis penicillis dorsalibus interrupta. Corpus subtus nigro-virens, sanguinea pubescentia aspersum. Segmenta quatuor abdominis sanguineo colore fucata, ultimum omne autem viride et nitidum. Pedes viridi-pubescentes, femoribus macula rufa notatis tarsisque infra flavis. It is impossible to describe accurately the beauty of this Insect; the sericeous covering, in different lights, imitating the various tints of opal, while the dark fasciæ flash with the iridescence of Labrador felspar.—*Westwood, M. L. J. July* 1840, *p.* 135.

(3452) PORUS, Hope.

{STENIDÆ, ML.
{LONGIPALPI, Lat.

Corpus oblongum fere parallelum subdepres-sum. Caput mediocre oculis magnis lateralibus. Antennæ crassæ articulis transversis. Mandibulæ acutæ dente interiori armatæ. Labrum transver-sum integrum ciliatum. Maxillæ elongatæ bilo-batæ. Palpi maxillares longitudine mediocres arti-culo 3tio. longo clavato, ultimo minimo. Labium elongatum apice lanceolato, paraglossis lateralib-us. Palpi labiales breves, articulo ultimo parvo conico. Thorax fere circularis. Abdomen elong-atum marginatum. Pedes simplices. Tibiæ cal-caribus binis armatæ. Tarsis articulis simplicibus. PORUS OCHRACEUS. Long. lin. 4. lat. lin. ¾. Ely-tris punctatis antennis fuscis, mandibulisque ad apicem nigris. Hab. in Montibus Himalayæ; in Mus. Dom. Royle. This genus somewhat ap-proaches the European Evæsthetus.—*Westwood. M. L. J. July* 1840, *p.* 135.

(3453) APHODIUS.

APHODIUS IRREGULARIS, Hope.

Long. lin. 4. lat. lin. 2. Flavus thorace nigro, elytris subaurantiis, fascia media maculis quatu-or nigris, pedibusque piceis. Antennæ piceo capi-tulo fusco. Caput angulis anticis oblique trun-catis. Thorax niger nitidus punctatus, angulis anterioribus flavis. Elytra flava, seu subauran-tia, fascia media irregulari nigra, binis maculis humeralibus, binisque aliis fere ad spicem locatis concoloribus. Hab. in Montibus Himalayæ; in Mus. Dom. Royle.—*Westwood, M. L. J. July* 1840, *p.* 136.

ANISOTELUS, Hope.

(3454) TELEPHORIDÆ.

Antennæ articulo Imo. crasso, reliquis multo crassiori, 9-10 obconices magnitudine paululum crescentibus ultimo majori ovato apice acuto. Mandibulæ valde acutæ. Maxillæ membranaceæ lobo unico intus tomentoso. Palpi articulo 1 mo. minimo. 2do. et quarto æqualibus, ultimo sub-securiforme. Mentum transversum. Labrum mem-branaceum fere rotundatum. Palpi labiales brev-es, articulo ultimo majori securiformi. Caput

transversum oculis prominulis. Thorax transversus lateribus rotundatis, angulis posticis acutis elevatis. Elytra sicut in Telephoris, in medio nonnihil dilatata. Tarsi 5-articulati, articulo penultimo bilobato.—*Westwood. M. L. J. July* 1840, *p.* 136.

(3455) ANISOTELUS BIMACULATUS, Hope.

Long. lin. 4½., lat. lin. 2. Lividus, elytris 2-maculatis. Antennæ articulo primo testaceo, reliquis fuscis. Thorax rufo-testaceus nitidus, elytris pallidioribus macula ovali nigra in singulo fere ad apicem posita. Corpus infra testaceum. Hab. in Montibus Himalayæ; in Mus. Dom. Royle.—*Westwood. M. L. J. July* 1840, *p.* 136.

ELATER CYANOPTERUS, Hope.

Long. lin. 4½., lat. lin. 4½. Cyaneus, antennis fuscis, marginibus thoracis pedibusque rubris Caput nigrum antennis fuscis. Thorax in medio nigro-cyaneus, marginibus lateralibus rubris. Elytra striato-punctata subpubescentia. Pedes rubris. Hab. in Montibus Himalayæ; in Mus. Dom. Royle.—*Westwood. M. L. J. July* 1840, *p.* 136.

RIPIPHORUS APICALIS.

Long. lin. 3., lat. lin. 1. Rufus. thorace pedibusque nigris, elytris flavo-rufis quatuor maculis notatis. Caput atrum ramo antennarum piceo, foliisque nigris. Thorax concolor. Elytra flavo-rufa, basi nigrofasciata, maculis binis fere mediis, apicibusque corporeque infra nigris. Hab in Montibus Himilayæ; in Mus. Dom. Royle.—*Royle's Illustrations of the Botany, &c. of the Himalayan Mountains, Supplementary Part.—Westwood. M. L. J. July* 1840, *p.* 136.

(3456) ENTOMOSTOMATA, De Blainville's name for his second family of his first order, *Siphonobranchiata*, of his first sub-class *Paracephalophora Dioica*, of his second class, *Paracephalophora*, of *Malacozoa*. This family appears to be nearly the same with the genus *Buccinum* of Linnæus and family *Buccinidæ* of other naturalists. The following are the principal Asiatic and Indian genera of this family :—

Cerithium.—Animal very much elongated, the mantle prolonged into a canal at its right side, but without a distinct tube; the foot terminated by a depressed proboscidiform muzzle; tentacula very distant, with large rings, swollen, as it were, in the lower part of their length, and carrying the eyes at the summit of this enlargement. Mouth terminal, in the form of a vertical slit, without any labial tooth, and with a very small tongue furnished with regularly disposed reflexed teeth. A single straight branchia. Shell more or less turriculated, tuberculous; aperture small, oval, oblique; the columellar border very much excavated, callous; the right lip sharp-edged, and dilating a little with age. Operculum horny, oval, rounded, sub-spiral, and striated on its external surface: sunk and bordered on its internal surface.

Cerithium Vertagus.—Locality, Indian Ocean and Moluccas. (Lamarck.)

Cerithium Aluco.—Locality, Indian Ocean and Moluccas. (Lam.)

Genus *Potamides*, Brongniart; *Pyrazus*, De Montfort.

Cerithium palustre.—Locality, coasts of the East Indies, in the salt marshes. (Lam.)

(Genus, *Pirena*, Lam.) *Cerithium Madagascariense.* The number of species of *Cerithia* at present described exceed one hundred.

Planaxis.—Animal unknown. Shell oval, conical, solid, transversely furrowed; aperture oblong; columella flattened and truncated anteriorly, separated from the right border or lip by a sinus: right lip furrowed or rayed within, and thickened by a decurrent callosity at its origin. Operculum horny, oval, delicate, subspiral. Lamarck established this genus for certain small shells approximating closely to the *Phasianellæ*, but differing from them by the truncation of the anterior part of the columella. He only records two species, namely *P. sulcata* and *P. undulata*. M. Rang states that he possesses six well-distinguished species. Woodward, in his 'Manual of the Mollusca,' gives eleven species. They are found in the West Indies, Red Sea, Bourbon, India, the Pacific, and Peru. The *Planaxis* is a littoral shell, and is sometimes found under stones. M. Rang says that he had had occasion to observe the animal at the Isle of France (Mauritius), where the rocks are sometimes covered with them, but, having lost his notes, he is unable to give its principal characters. According to his recollection, the animal differed very little from that of *Phasianella*. M. Deshayes, in his Tables, puts the living species at four.

Subula.—Animal spiral, very much elevated; foot very short and round; head with extremely small triangular tentacula, bearing the eyes at their summit; a long labial proboscis without hooks (crotchets), at the bottom of which is the mouth equally unarmed. Shell without an epidermis, turriculated, and with a pointed spire; whorls smooth, ribanded, bifid; aperture oval, small, deeply notched anteriorly; external lip thin and sharp-edged; internal or columellar lip with an oblique bourrelet at its extremity. Operculum oval, horny, lamellar, and as it were imbricated.

S. maculata (Lam.), *Buocinum maculatum* (Linn). It inhabits the Moluccas and Pacific Ocean, according to Lamarck, who speaks of his possession of a specimen taken on the shores of Owhyhee.

Terebra.—Animal spiral, rather elevated; foot oval, with a transverse anterior furrow and two lateral auricles; head bordered with a small fringe; cylindrical tentacula terminated in a

point, and very distant; eyes but little apparent at the origin and outside of the tentacula; mouth without a proboscis; tube of the respiratory cavity very long. Shell without an epidermis, inclining to oval; spire sharp, not much elevated or subturriculated; aperture large, oval, strongly notched anteriorly; columella with an oblique bourrelet at its extremity. No operculum. (De Blainville.)

Eburna.—Shell oval or elongated, smooth; spire pointed, whorls running together as it were without a marked distinction of suture; aperture inclining to oval, elongated, widened, and deeply notched in front; right lip entire; columella callous posteriorly, umbilicated, subcanaliculated at its external part. They are found in the seas of warm climates. Of the 9 living species Lamarck refers the locality of three to the East Indies and one to South America and perhaps India.

Buccinum.—Shell oval, elongated, with a pointed but moderately-elevated spire; aperture oblong or oval, deeply notched anteriorly, right lip entire, sometimes thick; columella simple or callous; operculum horny, oval, subconcentric; summit but little marked and marginal. The geographical distribution is very wide. Species occur in almost all seas. *B. glaciale* and *B. Sabinii* are noted in the 'Supplement to the Appendix of Captain Parry's First Voyage' as having been met with during the period in which the expedition remained within the arctic circle. The species are very numerous, and have been found at depths ranging from the surface to 17 fathoms. The greater part of the genus is littoral.

Nassa.—Animal very much depressed, with a very large foot, extending beyond the body on all sides, but especially in front, where it is large and angular, whilst posteriorly, it is insensibly narrowed. For the rest like the animal of *Purpura*. Shell globular, oval, or subturriculated; aperture oblong, notched anteriorly; right lip sharp-edged, often plaited within; columellar lip covered with a large callous plate, extending more or less far. Operculum horny. The species of *Nassa* have a world-wide distribution, being found in arctic, tropical, and antarctic seas. They have been found on reefs, coral sand, sand, sandy-mud, and under stones, at depths ranging from the surface to 15 fathoms. About 70 species are known. *N. reticulata* is common on English shores, and called the Dog-Whelk by fishermen.

Harpa.—Animal with a large head, without a proboscis, having the mouth opened below; two anterior tentacula, conical, and very much approximated, carrying the eyes upon an enlargement situated externally a little below the middle; foot large, furnished anteriorly with a sort of heel; siphon rather large and a little elongated; branchial pectinations unequal, two in number; orifice of the oviduct at the entrance of the branchial cavity of the right side, orifice in the deferent canal at the extremity of a very voluminous excitatory organ; vent on the same side. Shell oblong, more or less convex, generally rather delicate, enamelled, furnished with regular longitudinal ribs: spire a little elevated and pointed, the last whorl very large; aperture oval, elongated, widely notched anteriorly, the right lip with an external bourrelet; columella simple, pointed anteriorly. No operculum, according to M. Reynaud. The genus is found in the seas of warm climates, and is more especially abundant at the Mauritius and the neighbouring islands, whence the finest of the more common species and the many-ribbed Harps are procured. The animal is said to be of a rich vermilion red. The fishery is principally carried on at low water with a small rake, to which a net is attached, on sand-banks at night, and at sunrise when the Harps are probably out upon their feed. They have been known to take the bait on the fishing-lines laid for olives (*Oliva*). Messrs. Quoy and Gaimard, and afterwards M. Reynaud state, that the animal of the Harp can sometimes when attacked by an enemy, disembarrass itself of the posterior part of the foot, and completely withdraw itself into the shell. M. Reynaud explains this phenomenon by giving his opinion that the transverse laceration which causes, in the movement of contraction exerted by the animal, the separation of the posterior part of the foot, arises from the resistance which that part, too voluminous to enter the shell after the animal, encounters from the edges of the shell. M. Rang observes, that though no operculum has been found (and the animal appears to have been carefully examined) he does not hesitate to leave the genus among those which are provided with one, because, in the first place, *Harpa* is similarly organised, and, in the next, if deprived of that appendage, it has, at least, the posterior part of the foot to take, in some sort, its place. Authors generally make the number of living species eight, and of these the most precious, though lately greatly depressed in value, is the Many-Ribbed Harp *H. imperialis*). But some of the species are very difficult of definition though others are well marked. The shells when in fine condition are great favourites with collectors, and a drawer of fine Harps in all the freshness of their beauty is indeed a sight worth seeing. Care should be taken to keep them with their mouths downwards and from the sun and light, or their brilliant colours will soon fade. *H. ventriosa.* Locality, Mauritius, &c.

Dolium.—Animal generally resembling that of *Purpura.* Shell delicate, nearly globular, ventricose, furrowed transversely; spire but little elevated, pointed, the last whorl forming nearly the whole of the shell; aperture large, oval, right lip undulated. Columella often twisted; operculum horny. The species are found in the

seas of warm climates, especially those of India. They are also found in Australia and the Pacific. One species, *D. galea*, inhabits the Mediterranean. The species are often found on reefs, some of them are very large. Fourteen seems to be the greatest number hitherto recorded, and Cuvier has separated the species into two sections, namely the Tuns (*Dolium*) and the Partridge Tuns (*Perdix* of De Montfort).

D. galea and *D. perdix*.

Oniscia.—A genus separated from *Cassidaria* by Mr. G. B. Sowerby, and considered by him as having its place next to that genus in the natural system. It differs from *Cassis* in the canal not being suddenly reflected; but Mr. Sowerby states that he has seen *Cassides* which very nearly approach *Oniscia* in the form of the aperture, and in the short scarcely reflected canal. He thinks that the genus is intermediate between *Cassidaria* and *Cassis*. Shell oblong, sub cylindrical, apex generally rather obtuse, spire short, sometimes very short: base rather acuminated; aperture longitudinal, elongated, extending at the base into a very short canal; outer lip thickened, denticulated within, and rather contracted in the centre; inner lip expanded and covered with granules. (Sowerby.) The outside of the shell is tuberculated, cancellated, or ribbed. "Of the animal," says Mr. Sowerby, "we know nothing; but there is every reason for believing it to be related to that of *Cassis*, and that it has an operculum, though we have never seen it." Six living species are recorded, from the West Indies, China, and the Galapagos.

Cassis.—Animal said to resemble generally that of *Purpura*. Shell inclining to oval, convex, with a spire but little projecting, nearly flat; aperture oblique, long and narrow, with the anterior canal very short and recurved towards the back; right lip thick, furnished with an external bourrelet, and toothed within; columellar lip callous, nearly straight, and marked nearly throughout its length with transverse long teeth. Operculum horny, very rudimentary. The species occur principally in very warm latitudes in shallow water: two or three are said to be found in the Mediterranean. The number of living species is about thirty-four. These are divided into two groups by Lamarck; the first consisting of those species whose spire is marked by bourrelets (*C. cornuta*, for example); and the second of those whose spire is without bourrelets (*C. rufa*, for example).

Ricinula.—Animal nearly entirely resembling those of *Buccinum* and *Purpura*. Mantle provided with a tube; foot much wider, and auriculated, as it were anteriorly; head semilunar, with conical tentacula, supporting the eyes at the middle of their external surface; excitatory organ of the male very large, recurved in the branchial cavity. Such is De Blainville's description, who made his observation on 'la Ricinule horrible,' *R. horrida*. Shell oval or sub-globular, thick, beset with points or tubercles, with a very short spire; aperture narrow, long, with a notch (which is sometimes sub-canaliculated) anteriorly; right lip often digitated, externally and toothed within; the left lip callous and toothed or wrinkled. Operculum horny, oval, transverse, concentric. De Blainville describes the elements of the operculum as a little imbricated. There are 29 species of this genus. They are from India, China, the Philippines, Australia, and the Pacific. The species have been found on corals and rocks.

Cancellaria.—Animal said to resemble generally that of *Purpura*. Shell oval or globular, rather convex, reticulated, thick, with a spire slightly elevated and pointed; aperture demioval, notched or sub-canaliculated anteriorly; right lip sharp-edged, striated within; columella nearly straight, with many well-defined plaits. Operculum horny. The species are all exotic, and the inhabitants of warm seas. The localities of the bulk of those known are said by De Blainville to be inhabitants of the Indian and African seas. The species have been found on sandy bottoms, at a depth ranging from 7 to 16 fathoms.

Purpura.—Animal rather elongated, widened in front; head large with a very short proboscis; two tentacula, generally in front and approximated, conical, and supporting the eyes on an enlargement situated at the middle of their external part; mouth below, nearly always hidden by the foot, which is rather large, very much advanced, and bilobated, as it were, anteriorly; branchial pectinations two, unequal; orifice of the oviduct at the entrance of the branchial cavity on the right side; orifice of the deferent canal at the right side of the neck, at the extremity of the exciting organ, which is generally voluminous; vent on the same side. Shell oval, thick, unarmed or tubercular, with a short spire, the last whorl larger than all the others together; aperture very much dilated, of an oval form, terminated anteriorly by an oblique notch; columella flattened, finishing in a point anteriorly; right lip sharp edged, often thickened and furrowed internally, or strongly armed anteriorly with a conical point. Operculum horny, demicircular, the summit posterior. The form is widely distributed, but the number of European species is very small; the greatest development takes place in warm seas, where the species are most abundant, particularly in South America. The larger proportion of the species of this genus are littoral. The true *Purpuræ* have been found at depths ranging from the surface to 25 fathoms, and the division which forms the genus *Monoceros*, generally on rocks, at depths ranging from the surface to 7 fathoms.—*Eng. Cyc.*

Purpura Persica.—East Indian seas.

(3457) **EPIPACTIS**, a genus of Plants belonging to the natural order *Orchidaceæ* or *Orchideæ*, and the tribe *Limodoreæ* or *Arethuseæ*.

It has the perianth patent, the lip interrupted, the basal division concave, the terminal one larger, with two projecting plates at its base above; the stigma nearly square; the rostellum short, terminated by a globose appendage; the anthers terminal, erect, sessile, 2-celled, the cells without septa; the column short; the germen straight on a twisted stalk. There are two species of this genus found wild in Great Britain.—*Eng. Cyc.* Wight gives figures of Epipactis carinata, 1720; Dalhousiæ, 1728; macrostachya, 1722;

(3458) EPIPHYLLUM. This is a division of the Cactus family, containing about 20 known species and varieties. Beautiful plants with flat succulent jointed leaves, from the ends of which the flowers proceed. Grow well in coarse river sand, mixed with pieces of charcoal and a little decayed manure. They require care during the heavy rains, propagated by cuttings, every joint of the leaves will strike in sand. Natives of the tropics —*Riddell.*

(3459) EPIPHYTES are plants found growing upon other vegetables, adhering to their bark, and rooting among the scanty soil that occupies their surface, in which respect they are distinguished from parasitical plants, which, like Mistletoe and the various species of *Loranthus*, strike their abortive roots into the wood, and flourish upon the blood of the individual to which they attach themselves. In this sense of the word, Mosses, Lichens, Ferns, and plants of many other families, are Epiphytes; but as in England, at the present day, the word is principally employed with reference to those *Orchidaceæ* which grow upon trees, it is to plants of that description that we propose to devote the present article. Orchidaceous Epiphytes grow naturally upon trees in the recesses of tropical forests. They establish themselves upon the branches, and either vegetate amidst masses of decayed vegetable and animal matter, or cling by their long succulent grasping roots to the naked branches of trees, from which and the humid atmosphere together they exclusively derive their food. It appears from the testimony of Mr. Henchman that they are never found upon dead erect trees in forests; but if upon dead wood at all, then only upon fallen trunks, which, from their situation near the ground, are constantly damp. Such situations are however said to be by no means favourable to their growth. They also flourish upon rocks and stones in hot and damp climates, and Dr. Wallich found them in all cases growing equally well in Nepaul upon trees and stones, provided the latter had a certain quantity of mould and moss adhering to them. In the botanic garden at Calcutta they are said to be cultivated with success in raised beds of solid brickwork, so contrived as to insure a perfect drainage; the soil being rich vegetable matter mixed with at least two-thirds small pebbles, and covered with a dense layer of moss. A certain

quantity of shade seems, in many cases, essential to them, their natural situation being in forests, or among the branches of growing trees. In Brazil numbers of them occupy damp woods and rich valleys, among vegetation of the most luxuriant description, by which they are embowered. Reinwardt describes others as inhabiting in great abundance those deep shady, gloomy forests, which form the lower zone of vegetation in Java, where the air is heavy and damp with vapours that cannot ascend, and where the thickness of the vegetation is really frightful: where, in short, heat, moisture, and a most extraordinarily deep and rich vegetable soil combine to produce wood of a fungus-like softness and an inconceivable abundance of twining plants and Epiphytes. In those forests more especially where huge fig-trees constitute the principal part of the timber, intermingled with the most tropical forms of vegetation, such as *Sterculiaceæ*, *Sapindaceae*, and *Artocarpaceæ*, tufts of Orchidaceous Plants abound, in company with *Araceae*, *Acanthaceae*, and *Zingiberaceae*. In Nepaul Dr. Wallich states that Orchidaceous Epiphytes grow in company with Ferns; and the thicker the forest, the more stately the trees, the richer and blacker the natural soil, the more profuse the *Orchidaceae* and Ferns upon them. There they flourish by the sides of dripping springs, in deep shady recesses, in inconceivable quantity, and with an astonishing degree of luxuriance. It would however be a great error to suppose that it is only in very shady places that Orchidaceous Epiphytes appear. On the contrary, it is probable that the cases just cited are extreme, and that they more commonly prefer situations where the broken rays of the sun can readily reach them. The general habit of the whole order is extremely local in the majority of cases. Upon comparing the Orchidaceous Plants of Java, of Ceylon, and of the Burmese country, it is quite extraordinary how few species those countries possess in common; and the quantities of species found exclusively in every large collection are a corroboration of the same fact. A high mean temperature throughout the year, and a climate either constantly humid or at least periodically so, are also atmospheric elements eminently favourable to the production of these plants. All those species which simply exist clinging by their roots to the branches of growing trees, and probably others also, must necessarily derive their nourishment in a great measure, if not entirely, from the moisture, in a very elastic state, that surrounds them. And although nature seems in general to have provided for the scantiness of their food by the construction of them with a cuticle only capable of parting by slow degrees with the fluid they receive by their roots, yet it is obviously requisite that they should be so situated as to be within reach of an abundant supply, not only at the time when they are growing, but also at all other

times to a certain extent. Hence we find that the hottest countries, if dry, and the dampest, if cold, are destitute of them; while there is no instance of a country both hot and damp in which they are not plentiful. No country however exhibits in a more striking manner than India the necessity of a hot and damp climate for the production of Orchidaceous Epiphytes. In the Malayan Archipelago, the mean temperature of which is estimated at between 77° and 78° and is very damp, they are found in profusion. In Nepaul it is upon the sides of the lower mountains that they occur, where they vegetate amongst clouds and constant showers; while on the continent of India they are almost unknown, their place being occupied by parasitical *Loranthi*. The traveller finds himself in the morning on the dry plains of Hindustan, where the mean temperature is 80°, and where all the trees are destitute of *Orchidaceæ*; and at noon he is at the foot of the first range of the Nepaulese hills, where every tree teems with that class of plants. There are however places on the continent of India where they are not less numerous than in Nepaul; at the æstuaries of the Ganges, the Brahmaputra, the Irawaddi, and the rivers of Martaban, they exist in vast quantities; but all these stations are excessively damp. In the Botanic Garden at Calcutta, they grow most vigorously during the rainy season, but in the fiercely hot season, which begins in March and lasts till the 10th of June, they perish, notwithstanding all the care they receive. Madagascar and Mauritius offer similar evidence to the same effect. While however these statements are applicable to a very large part of Orchidaceous Epiphytes, there are some striking exceptions that require to be pointed out, both with regard to atmospheric moisture and to the temperature requisite for their production. Mr. Allan Cunningham has shown in the 'Botanical Register,' fol. 1699, that in Australia there are three of these plants which require a very dry atmosphere, and it is probable that others exist in other countries. "These are *Dendrobium æmulum*, Brown, an Epiphyte uniformly found upon the rugged trunk of *Eucalyptus resinifera*, or Iron-Bark, in the open, very dry forest grounds of the older colony at Port Jackson; *Cymbidium canaliculatum*, Brown, which of late years has been observed beyond the tropic both at Moreton Bay and still farther to the southward at Hunter's River, growing upon the principal limbs of several of the *Eucalypti* in the dry, open, shadeless forest. These two Epiphytes flourish most luxuriantly in an extremely dry atmosphere, and flower usually in the summer season in their native wilds, the high temperature of which is oftentimes greatly increased by the blighting hot winds which not unfrequently prevail at that period from the north-west. The third is *Dendrobium undulatum* of Mr. Brown, a handsome species, originally discovered by Sir Joseph Banks at Bustard Bay, and which has been lately found on barren hills naturally clear of timber upon the banks of the Brisbane River at Moreton Bay, where the plant forms tufts on bare rocks exposed to the full heat of the sun, which during nine months of the year is very considerable on that part of the coast." In many cases a much lower temperature than that hitherto spoken of is natural to these plants, and there are some instances where they are naturally accustomed to rigorous weather. In America their favourite station, according to Humboldt, is in the gorges of the Andes of Mexico, New Granada, Quito, and Peru, where the air is mild and humid, and the mean temperature is 63° to 67° Fahr. (17° to 19° Cent.) In these localities they are so abundant that, according to the authors of the 'Flora Peruviana,' above 1000 species might be found in Tarma, Huanuca, and Xauxa alone. It is therefore not surprising that one species, *Epidendrum conopseum*, should advance as far to the northward as the rice climate of Florida, where it grows on the bark of *Magnolia glauca;* nor that others should be found in the damp maritime parts of the government of Buenos Ayres. But it is more remarkable that an *Oncidium nubigenum* should occur at the height of 14,000 feet on the mountains of Peru, and that other species should, upon the authority of M. Descourtilz, be able to bear without difficulty the cold glacial winds of the high sierras of Brazil. The same peculiarities occur in the eastern world. Reinwardt speaks of great quantities of *Orchidaceæ* in the Storax and Laurel woods of Java, growing along with *Nepenthes*, Rhododendrons, Magnolias, and Oaks, in a zone of vegetation whose lower limit is 3000 feet above the sea. *Dendrobium nobile*, *Renanthera coccinea*, and some others, bear the periodical cold of Canton, where it occasionally freezes; *Dendrobium catenatum* and *D. moniliforme* occur in Japan as far north as 37° or 38°, or the parallel of Lisbon, and are periodically subject to a very low temperature; and Dr. Royle met with the deciduous *Coelogynes* and *Dendrobium alpestre* on the Himalaya Mountains, at the height of 7,500 feet, where snow sometimes lies in winter for a week or more. To the southward they not only occur in the latitude of Port Jackson, where the mean temperature does not exceed 66° 6', but even in much higher latitudes. The beautiful little *Gunnia Australis* grows on the branches of shrubs in Emu Bay, in Van Diemen's Land, in about 41° S. lat.; and *Earina mucronata* extends to 45° 45' S. lat., in "the very permanently damp woods which clothe the shores of Dusky Bay in New Zealand," where it was originally observed by Forster in Cook's second voyage, and where it has since been met with by Mr. Cunningham. —*Eng. Cyc.*

(3460) EQUIDÆ, a family of animals, to which the horse belongs. Mr. Bell is of opinion, and, in his 'British Quadrupeds' follows Dr. Gray in considering the Ass as belonging to a distinct genus from the Horse, and he adopts Dr. Gray's family-name *Equidæ*. Mr. Bell makes the following remarks on the character of the Ass and its nearest congeners as compared with those of the Horse, upon which it had been thought necessary to establish them as distinct genera in the family. After admitting the truth of the observation that, in the absence of any knowledge of the original condition of the Horse, the question can only be considered with reference to the characters of a domesticated and probably much altered race, he reminds the reader, nevertheless, that as the distinction upon which the division in question is founded are structural, there is less danger of error than if they had been only those of colour or of general form, and thus proceeds: "The character of the tail is one of the most striking points upon which this distinction rests. In the horse, the whole of this part is covered with long hair, totally concealing its actual form: whilst in the whole of the others, the ass, the zebra, the quagga, the dzigtai, &c., it is only clothed with long hair towards the extremity. The mane of the horse also is long and flowing; that of all the other species is short and upright. In the former animal, the hinder as well as the fore legs are furnished with those warty collosities, which in the others, without exception, are found only on the fore legs. Waiving some other particulars of minor importance, there is one character which, if not in itself to be considered of primary value, is yet interesting, and not unimportant as a collateral distinction: I mean the general tendency of the coloration and marking in the two forms. In the horse's coat there is an obvious disposition to the formation of small round spots of a different shade or hue from that of the ground, and this is the case whether the general colour be black, chesnut, or gray; in the genus *Asinus*, on the contrary, the markings are invariably disposed in stripes. The zebra, the quagga, and the mountain zebra are examples too familiar to require more than this allusion; and in the common ass, not only is the same tendency evinced by the cross-mark on the shoulders, but in the young ass there are frequently observed some obscure darkish bands on the legs. These tendencies to a peculiar character of coloration and marking are well worthy of especial notice in the *Mammalia*, among which will be found numerous instances bearing upon the distinction of approximating forms. In birds and insects it is still more general and striking, and has always attracted the attention of naturalists; but in the present class it has certainly been too much overlooked." Geographical Distribution of the *Equidæ*.—Although the Horse, the Ass, and the Mule, are now spread over the whole face of the civilised earth, and although the Horse is found wild, or rather has reverted to a wild state, in both the New and the Old World, there can be no doubt that the form which we are now considering was originally entirely confined to the latter portion of the globe, where the truly wild species of the family, the Zebra, the Quagga, &c. are still to be found in all their native freedom. And this leads us to consider the time and the place where the Horse was first subdued by the powerful hand of man. Mr. Bell, who appeals to the sacred scriptures in proof that the Horse is of eastern origin, is of opinion, from the same authority, that the Egyptians were probably the first who broke the proud spirit of this noble animal, and reduced it to obedience and servitude. The books of Genesis and Exodus abound with passages which prove that the Horse had been long under the dominion of man at the date of the events then recorded. It was expressly prohibited (Deut, xvii, 16) that the king should multiply horses to himself, or should cause the people to return to Egypt, to the end that he should multiply horses. Solomon however does not seem to have regarded this prohibition, for his stables were filled with these noble animals; he had 40,000 stalls of horses for his chariots, and 12,000 horsemen. (1 Kings, iv. 26.) The grand description in Job (xxxix. 19-25) is familiar to most, but Egypt (1 Kings, x. 28), and not Arabia, seems to have been the source whence Solomon's supplies were obtained. In very early Egyptian monuments the horse is seen in battle, and under circumstances, which denote long subjugation and experienced training. It seems to be quite clear that the wild horses of Tartary are as much the descendants of a domesticated race as the wild horses of America, whose ancestors were introduced by the Spaniards; nor have we any evidence to show the time when the horse existed in a primitive state of nature.

The *Equidæ* form two genera—*Equus* and *Asinus*: the species however freely breed together in confinement, but the produce is almost always, if not always, barren.

Equus has the tail covered with long hair to the base, the fore and hind legs with a wart (sallenders) on the inner side. The fur is dappled, that is, marked with round pale spots, having a dark net-like ground.

Equus Caballus, the Horse, is brown, gray, or black, with roundish pale spots. The following are the synonyms and varieties of this species given by Dr. Gray in the 'Catalogue of the British Museum;'—*Equus antiquorum* (Gesner). *Equus Caballus* (Linnæus); F. Cuvier; Fischer; Gray). *Equus, Equa* (Pliny). Horse (Pennant). Generous Horse (Pennant). Cheval (Buffon; Cuvier). Pferd (Redinger). Ross (Schrank,) The Horse (Youatt). The Tarpan Wild Horse, primeval bay stock (H. Smith). The Andalusian Horse (H. Smith). South American Horse (H.

Smith). The Parameros of Peru (H. Smith). Mexican Horse and Seminole Horse (H. Smith). Feral Horses of America (H. Smith). The Arabian Horse (Bewick; Low; Smith). The Race-Horse (Bewick; Low) English Race Horse (Smith). Hunter (Bewick). The Old Irish Hunter (Low). Black Horse (Bewick). The Old English Black Horse (Low). The Cleveland Bay Horse (Low). The Suffolk Punch (Low). The Clydesdale Breed (Low). Old English Road-Horse (Bewick). Common Cart-Horse (Bewick). Improved Cart-Horse (Bewick). The Barb of Morocco (H. Smith). The Bornou (white) Race of Africa (H. Smith). The Dongola (black) Race (H. Smith). The Turkish Race (H. Smith). The Persian Race (H. Smith). The Toorkee Races (H. Smith). The East Indian Races (H. Smith). The New Holland Horse (H. Smith). The Transylvanian Horse (H. Smith). The Moldavian Horse (H. Smith). The Greek Horse (H. Smith). The Spanish Horse (H. Smith). Cheval d'Islande—var., *Islandicus* (Quoy and Gaim.; Lesson). *Equus Mongolicus* (Lesson). Thibet Horse (Hodgson). Cheval a Port Frisses—*E. frisius* (F. Cuvier). *Equus Caballus frisius* (Lesson). Villous Horse—primeval of the white stock (H. Smith). The White or Gray Horse (H. Smith); Marengo.—'Bonaparte's Arab.' The Crisp-Haired Horse—primeval of the black stock (H. Smith). The Black Horse—the English Draught-Horse (H. Smith). The Dun or Tan Horse (H. Smith). The Decussated Horse, or the Eelback Dun Horse of Ukraine H. Smith). The Myautzee, or the Pied Horse of China (H. Smith). The Bhooteah Ponies (H. Smith). The Pickarrow Ponies (H. Smith). The Yaboos of Affghanistan Ponies (H. Smith). The Hungarian Horse, with slit nostrils (H. Smith). The Common Bashkir Horse (H. Smith). The Morea Ponies (H. Smith). The Swedish and Norwegian Ponies (H. Smith). The Shetland Ponies (H. Smith). The Galloway (H. Smith). The Dartmoor and Exmoor Pony (H. Smith). Sardinian Wild Horse (H. Smith). The Tatto, or the East Indian Pony (H. Smith). Tuttoo, or Mahratta Pony (Sykes); sedulously propagated in the Deccan: much used to transport luggage, and very vicious.—Sykes, Tattoo, or Hack Pony of Calcutta (Hardwick). The Tangun Piebald or Skewbald Horse—*Equus varius* (H. Smith). The Tangum, or Tanghans—primeval Piebald Stock of Thibet (H. Smith). Skewbald of Achin in Sumatra (H. Smith). Tanghan of China (Hodgson). Tangham of Lhassa (Hodgson). Tangham of Gyaunche (Hodgson). Hubstee of Deo Dharma (Hodgson). The Koomrah, or *Equus hippargus* (H. Smith). The Koomrah—*Equus Lalisi* (H. Smith). Hipparyus (Oppian). Boryes (Herodotus). Bourra of Koldagi (Ruppell); Northern Africa: not gregarious. The Kuda or Saran Horse (H. Smith). The Javan Horse (H. Smith). The Tamboro or Birma Horse (H. Smith). Horse with a curled moustache on the upper lip, of Asiatic Russia (Pallas). Horse covered with curled woolly hair, of Asiatic Russia (Falk.; Pallas). Naked Horse of a beautiful form, of Asiatic Russia (Pallas). The Argamaki of Bocharia—a white horse with very close, minute, orbicular, brown spots, of Asiatic Russia (Pallas). It is questionable as to whether there exist at the present day any truly wild horses or descendants of an originally wild stock. Dr. Gray observes that the figures of the Wild Horse, as given by Gmelin, very much resembles the ponies left at liberty on the commons of Cornwall and mountains of Scotland; and it appears very doubtful if these animals are not rather to be considered as domestic horses which have escaped and become deteriorated. Everywhere the horse is recognised as the most useful of the servants of man, and he yields in intelligence to the dog alone. In the earlier ages of the world he seems to have been devoted to the purposes of war or of pleasure, while the ox was our agricultural servant: but his beauty, and strength, and tractability have now connected him, directly or indirectly, with almost all the purposes of life. If he differs in different countries in form and in size it is from the influence of climate and cultivation: but otherwise, from the war-horse, as he is depicted on the freizes of ancient temples, to the stately charger of Holstein and of Spain, or from the fleet and beautiful Arabian to the diminutive Shetlander, there is an evident similarity of form and destination which clearly stamps his common origin. He is naturally and of choice an herbivorous animal. His thin and muscular lips, his firm and compressed mouth, and his sharp incisor teeth are admirably adapted to seize and to crop the grass; and although we know nothing of him in his natural state, yet when he has escaped from the bondage of man, and follows his own propensities, the grass is his chosen food. In his domesticated state however he was destined to live partially or chiefly on other aliment, and that of a much harder kind—the various species of corn; therefore while man and the carnivorous animals can only champ and crush their food, a provision is given to the horse, in the structure of some of the bones of the face, by means of which he can comminute and grind down his food as perfectly as in the best contrived mill. A horse is well broken when he has been taught implicit and cheerful obedience to his rider or driver, and dexterity in the performance of his work. A dogged, sullen, spiritless submission may be enforced by the cruel and brutal usage to which the breaker so frequently has recourse: but that prompt and eager response to the slightest intimation of the rider's will—that manifest aim to anticipate every wish, that gives to the horse so much of his value—must be built on

habitual confidence and attachment. The education of the horse should be that of the child. Pleasure should be as much as possible associated with the early lessons; while firmness, or, if need be, coercion must establish the habit of obedience. No horse should be urged on after he has exhibited unequivocal symptoms of distress, such as a drooping pace, a staggering gait, a heavy bearing on the hand, a rapid inspiration like a hurried sigh, and a peculiar convulsive action of the diaphragm, as though the heart were violently beating against the side. The administration of some cordial medicine, and slow leading to the nearest stable, are the best restoratives at the moment of distress; although the cordial might be absolutely destructive a few hours afterwards, where inflammation had commenced. The watering of the horse is a very important but disregarded portion of his general management. The kind of water has not been sufficiently considered. The difference between what is termed hard and soft water is a circumstance of general observation. The former contains certain saline principles which decompose some bodies, as in the curdling of soap, and prevent the solution of others, as in the making of tea, the boiling of vegetables, and the process of brewing. It is natural to suppose that these different kinds of water would produce somewhat different effects on the animal frame, and such is the fact. Hard water, freshly drawn from the well, will frequently roughen the coat of the horse unaccustomed to it, or cause griping pains, or materially lessen the animal's power of exertion. The racing and the hunting groom are perfectly aware of this; and so is the horse, for he will refuse the purest water from the well if he can obtain access to the running stream, or even the turbid pool. Where there is the power of choice the softer water should undoubtedly be preferred. The temperature of the water is of far more consequence than its hardness. It will rarely harm if taken from the pond or the running stream, but its coldness when recently drawn from the well has often been injurious. It has produced colic, spasm, and even death. It should therefore be exposed for some hours, either in the stable or in some tank. There is often considerable prejudice against the horse being fairly supplied with water. It is supposed to chill him; to injure his wind, or to incapacitate him for hard work. It certainly would do so, if, immediately after drinking his fill, he were galloped hard, but not if he were suffered to quench his thirst more frequently when at rest in the stable. The horse that has free access to water will not drink so much in the course of a day as another who, to cool his parched mouth, swallows as fast as he can, and knows not when to stop. When on a journey a horse may with perfect safety be far more liberally supplied with water than he generally is. An hour before his work commences he should be permitted to drink a couple of quarts. A greater quantity might be probably objected to. He will perform his task far more pleasantly and effectively than with a parched mouth and tormenting thirst. The prejudice both of the hunting and the training groom on this point is cruel as well as injurious. The task or the journey being accomplished, and the horse having breathed a few minutes, another quart, or even two, will be delightfully refreshing to him, and will never do him harm. His corn may then be offered to him, which he will readily take; and before he has eaten the whole of it two or three more quarts of water may be given. Towards the close of the day the speed of the traveller should somewhat abate, and the horse should arrive at his resting-place as dry and as cool as circumstances will permit. If he is hot he must be walked about awhile, or the perspiration will return in the stable. If he is wet he must be carefully rubbed dry. The sooner this is done the better; and after he is clothed, watered, fed, and bedded, he should as soon as possible be left to his repose. In travelling the horse should undergo some degree of training as to the pace, the distance, and the burden. When there has been no preparation, the stages must at first be short, and the pace gentle. For a journey of 300 miles the horse may travel from 20 to 25 miles a day, resting on the Sunday, and doing the work in two stages, at the pace of six miles an hour. This requires a seasoned horse, and number of working hours per day is about four.

Asinus.—The species of this genus have the upper part of the tail covered with short hair, and the lower part covered with longer hair forming a tuft; the fur marked with darker stripes; the fore legs only furnished with hard horny warts in a similar situation to those in the front legs of the horse, but there are none in the lower part of the hinder legs. We shall follow in our arrangement of the species that adopted by Dr. J. E. Gray in the 'British Museum Catalogue.' Colour nearly uniform, with a dark longitudinal dorsal stripe; some have a black stripe across the shoulders.—The Asses of Asia. Ears elongated, acute.—The Tame or Domestic Asses. These animals vary greatly in size and appearance, according to the climate. They are large and smooth-haired in the warmer climates; small and shaggy in the colder countries. It is very doubtful if the Domestic Ass is found in a truly wild state; the asses which have been described as wild appear rather to be domestic animals which have escaped, or mules between the Domestic Ass and the allied wild species; for when caught they, after a short time, submit themselves to man, which is not the case with that Dr. Gray has here considered as the wild kinds. Pallas justly observes, "In extensis Asiæ desertis

primam patriam esse quærendam *Equi feri* et *Onagri* a nomadibus in domesticos usus domatorum, æque ac Hemioni hactenus indomiti." ('Zool. Ross.,' A., i. 255.) This is equally applicable to the African species. *A. vulgaris*, the Domestic Ass. Gray, with a longitudinal dorsal streak and a dark streak across the shoulders; ears elongate; facial line arched; skull with suborbital foramen as in *E. Hemionus*. The following are some of the synonyms of this animal:—*Equus Asinus* (Linn.); *Asinus vulgaris* (Gray); *Equus Asina* (Fleming); *Asinus* (Plin.); Ass (Penn., Bewick); Asne (Buffon); Ane (Cuvier); *Asinus Onager* (Gray, Ronap. 'Index Mam. Eur.'); *Asinus domesticus*, Domestic Ass (H. Smith). *Var.* Without any cross. *Var.* Legs and body more or less banded. Domestic varieties. Gudha of the Mahrattas, very little larger than a good mastiff or Newfoundland dog (Sykes), Domestic Ass of Ispahan (H. Smith). Domestic Ass of Beloochistan (H. Smith). Domestic Ass of Tibet, with a cross-band (Strachey). The Pico of ancient Egypt (H. Smith). Tasandunt of the Shelluhs (H. Smith). The Djaar of Arabia (H. Smith). The Lalisiones, or Wild Ass Colts (H. Smith). Lalisio (Martial). Wild Ass (Lenant; Hoskins). Egyptian Ass (H. Smith). The common Domestic Ass is sometimes of the usual gray colour, without any appearance of the cross. They are sometimes black, and at other times white, rarely skewbald: but this is the common albinism and melanism of domestic animals, and when of these colours the cross is not apparent, or at least sometimes only to be seen when the animal is observed obliquely. Ears moderately short, rounded.—The Wild Asses. *A. Onager*, the Koulan, or Wild Ass. Pale reddish (in winter grayish); dorsal streak black, rather wider over the small of the back. Skull with the infraorbital foramen high up, about one-third the space between the face-line and the back edge of the teeth, far back, being directly over the front end of the cheek ridge and the back edge of the third grinder. This species is the *Asinus sylvestris* (Plin.); *Onager* (Plin.); *E. Asinus Onager* (Schreb.); *Equus Onager* (Brisson); Wild Ass (Bell, Heber); Koulan, or Wild Ass (Penn.); *Equus Hemionus*, Wild Ass of Kutch and the Indus (Sykes); *Asinus Hemionus*, (Gray); *Equus Khur*, Ane Khur (Lesson); Wild Ass, or Gour (Ker Porter); Wild Ass, or Khur, of the Persians; *Onager* (Xenophon); Hemione, or Dziggtai (Lesson); Hymar, or Hamar of Mesopotamia (H. Smith); *Asinus Hamar*, the Hamar (H. Smith); Chamor of the Hebrews. This species inhabits the plains of Mesopotamia, Persia, Kutch; shores of the Indus, Punjab. Mr. Layard says they are abundant in Mesopotamia, and are evidently the Wild Ass of Xenophon. The adults are very difficult to approach within rifle range. The young are sometimes caught alive. The *Khur* inhabits the deserts of Persia in troops, frequenting the hills in summer and the plains in winter. Bishop Heber, as quoted by Colonel H. Smith, says, "No attempt has been made to break the Wild Ass (of Rajpootana) in for riding, nor did it appear that the native ever thought of such. "The Wild Ass of Cutch has the cross-stripe on the shoulder, and differs in colours and heavier proportion from the Wild Ass of Ker Porter." Colonel Smith confounds the domesticated Gudha with the Wild Ass of the Deccan, described by Colonel Sykes, and states on the Colonel's authority that "it is not larger than a mastiff." Eversmann says that many specimens of the Kulan, or *Equus Onager* of Pallas, have been brought to Orenburg from the high steppes between the Caspian and the Aral seas. A good specimen and a skull are in the Museum of the University of Kasan. All these specimens are without the cross-band, and have only the longitudinal dorsal streak. Eversmann considers that the cross-band is either not the character of the species, or perhaps a sexual mark, as he observes that he is not able to discover the specific character which separates the *E. Hemionus* from the *E. Onager*. He further observes that the Mongolians have no particular name for the *E. Onager* of Pallas; the Tartars no name for *E. Hemionus*; the Mongolians called the *E. Hemionus* Deshiggetei, or more properly Tachikitei, meaning long ears, and the Tartars call the *E. Onager* Kulan. Eversmann remarks that Pallas ('N. Nord. Beytr.,' ii. 34) states that the male which M. Hablizl brought from Persia had no cross, but that the female which was shot on the Murecy had one. He proceeds to calculate the length of the ears of these animals, compared with the other measurements of them, and he finds that the ears of the male appear to be considerably (near two inches) shorter in proportion than the ears of the female. ('Bull. Soc. Imp. Nat. Mosc.,' 1840, 57.) The Mule with *Asinus domesticus* has the short smooth fur exactly like the sire, but with a short narrow cross-band on the shoulder; the ears rather longer and black-tipped. *A. Hemionus*, the Kiang. Fur short, smooth, bright-red bay. Legs straw-colour (in winter long, rather woolly grayish, legs whitish), with a broad longitudinal dorsal streak, broadest over the small of the back, without any cross-band on shoulders. Skull: the infraorbital foramen low down, in the centre of the space between the face-line and the base of the teeth, and placed in a line over the back edge of the second grinder, some distance in front of the end of the cheek-ridge. It is the *Mulus Dauricus foecundus* (Messerschm MSS.); *Equus Hemionus* (Pallas); *Equus Hemionus*, Kiang (Ogilby); *Equus Hemionos* (Bodd.); *Asinus Hemionus* (Gray); *Equus Onager* (Eversmann); (?) *Asinus Onager*, Onager Koulan, or Wild Ass of Tartary (H. Smith); *Asinus*

Equioides (Hodgson, Blyth); Wild Ass (Moorcroft); *Equus Kiang* (Moorcroft); *Equus varius* part. (H. Smith); *Asinus polyodon* (Hodgson); Jikta (Shaw); Dshikketee (Penn.); Dgiggetai (Cuvier); Dzigethai (Buffon); Wild Mule, Half Ass, or Fecund Mule (Penn); Wild Ass ('English in Tibet'); Hemionos (Plin.); L'Hemione ('Ency. Method.'); the Ghoor, or Khur (Moorcroft, H. Smith); Wild Esel (Eversmann); the Kiang (H.Smith); Wild Horse (Gerrard). It is found in Tibet. This animal must not be confounded with the domestic asses which are used for burden in Tibet. The male Kiangs are larger and deeper coloured. They live in troops of from eight to ten under the care of a solitary male, where the thermometer is below zero. They live partly on the plains and partly on the mountains; and the lower surface of the hoof varies considerably in form and concavity, perhaps from that circumstance. The Ghoor or Khur of Ladakh, according to Moorcroft, is white about the nose and under the neck, the belly and legs; the back is light bay and the mane dun. They herd in droves, fly at a trot, stop, and look back. Moorcroft saw the Kiangs on the highest summits of Tibet, in their shining summer coats and with their antelope form, scouring along in numbers. Dr. Walker observes—'The Kiang neighs like a horse. The Wild Ass of Cutch brays like an ass. The Kiang has no zebra stripes, neither in the adult nor in the foal.' The Wild Ass of Cutch: transverse zebra stripes are seen on the shoulder in the adult, and still more in the foal; sometimes also the shoulder-cross has been seen. The habitat of the Kiang is on the high tableland of Tibet; of the Wild Ass of Cutch in the sultry plains near the mouth of the Indus. The Kiang of Chinese Tartary greatly exceeds that of the Donkey of Cutch in size; the stallions often stand 14 hands high. Major Charlton and Major Biddulph state that they neigh like a horse. When taken young they will become so tame as to be led about like a horse, and will follow horses almost anywhere. They live in a climate where the temperature is below the freezing point in the middle of the summer; yet they throw off their pale woolly coat during that season, and become bright bay. The Donkey of Cutch is often domesticated in India.

A. Equuleus, the Yo-to tze. Yellowish red-clay colour. Tip of ears, mane, long hairs of tail, well-defined line down the black to middle of tail, and cross-band on the shoulder, three or four cross streaks on knees and hocks, black. It is the *Asinus Equuleus*, the Yo-to-tze (H. Smith); *Asinus Hipparyus*, the Yo-to-tze (H. Smith.) Dr. J. E Gray says, "The specimen described by Colonel H. Smith was alive in a livery stable near Park Lane, London; it was said to have been brought from the Chinese frontier north-east of Calcutta. It was most probably a Kiang, or perhaps a mule between it and the Domestic Ass."

A. Zebra, the Zebra. Hoofs narrow, deeply concave beneath; legs cross-banded.—Living on the Mountains. White; head, body, and legs to the hoofs, black-banded; nose reddish; belly and inside of thighs not banded; tail end blackish. Hoofs narrow, deeply concave beneath. Skull: suborbital foramen as in *E. Hemionus*. It is the *Zebra Indica* (Aldrov.); *Equus Indicus* (Johnston); *Equus Brasiliensis* (Jacob); *Hippotigris* (Dio Cass. 'Hist.' l. 77). *Equus Zebra* (Linn.); *Asinus Zebra* (Gray); Zébre (Buffon); Zebra (Ray; Sebra (Stubb); *Hippotigris campestris* (H. Smith); *Equus montanus* (Burchell); Male Zebra (Edwards); Wild Paard, or Wild Horse, of the Dutch Colonists (Burchell); Wilder Esel (Kolbe); Daow or True Zebra) of the Cape Colonists (Harris); Zeura or Zuora (Lobo); Wild Ass (Kolbe); Var. (?) *Hippotigris Zebra*, the Zebra (H. Smith); *Hippotigris antiquorum*, the Congo Dauw or Zebra of Pigafetta (H. Smith); *Hippotigris antiquorum*, Angola Dauw (H. Smith). It is a native of the mountains of South Africa. Hybrids between the species of *Equidæ* are numerous. The offspring of the male Ass (*Asinus vulgaris*) and a Mare is called a Mule, which has generally the form, in a great degree, of the dam, and the head, ears, and tail of the sire. The Spanish mules are well known for their symmetry, sureness of foot, and unwearied activity, and are the produce of a breed of asses far beyond those of Great Britain in stature, shape, and general appearance. The hinny, which is the offspring of the Horse and the female Ass, is altogether inferior, and is less esteemed than the Mule. Hybrids have also been produced from the Horse and the Ass breeding with the Zebra or the Quagga. Two mules that belong to the Zoological Society are the offspring of the Ass and the Zebra. The Earl of Morton bred a female hybrid from a fine Male Quagga and a mare of nearly pure (seven-eights) Arabian blood. Remains of *Equidae* occur abundantly in the third period of the Tertiary series (Pliocene of Lyell), in the fresh-water deposits, in what is called Diluvial Detritus, in superficial gravels, sands, and clays, in the Ossiferous Caverns, in the Osseous Breccia, in the Epplesheim Sand &c. Bones of the Horse occurred, but not abundantly among the remains found by Captain Cautley lying on the slopes among the ruins of fallen cliffs, and partly in situ in the Sandstone in the Sewalik Mountains at the southern foot of the Himalayas, between the Sutlej and the Ganges. Several species have been recorded, but we must not forget the opinion of Cuvier, who thought there were not sufficient data for specific distinctions. He informs us that he had carefully compared the skeletons of many varieties of horses, those of the Mule, the Ass, the

Zebra, and the Quagga, and he never could find a character sufficiently fixed to enable him to pronounce on a species from an isolated bone. Size, he remarks, furnishes but incomplete means of distinction: horses and asses vary much in this particular, from their state of domestication; and he adds, that though he had not yet procured the skeleton of a Dshikketee, he doubted not its resemblance to that of the other species as much as they resembled each other in the same particular. He therefore seems to be borne out in his opinion that comparative anatomy cannot solve the question whether the horse whose remains are found in a fossil state resembled the horses of the present day. The fossil species recorded by authors are *Equus fossilis* (*E. Adamiticus* of Schlotheim); *E.* (*Caballus*) *primigenius*; *E.* (*Mulus*) *primigenius*; *E.* (*Asinus*) *primigenius*. Professor Owen, in his 'British Fossil Mammals,' has described three species of *Equidæ*—*Equus fossilis*, *E. plicidens*, and *Asinus fossilis*. Their remains were all found in the Tertiary Formations of England. He thus concludes his remarks on the Fossil *Equidæ*:—"In reviewing the general position and distribution of the fossil remains of the genus *Equus*, we find that this very remarkable and useful form of Pachyderm first made its appearance with the Rhinoceros during the Miocene periods of geology. From the peculiar and well marked specific distinction of the primogenial or slender-legged horses (*Hippotherium*), which ranged from Central Europe to the then rising chain of the Himalaya Mountains, it is most probable that they would have been as little available for the service of civilised man as is the Zebra or the Wild Ass (*Equus Hemionus*) of the present day; and we can as little infer the docility of the later or Pliocene species, *E. plicidens* and *E. fossilis*, the only ones hitherto detected in Britain, from any character deducible from their known fossil remains. There are many specimens however that cannot be satisfactory distinguished from the corresponding parts of the existing species, *E. caballus*, which with the Wild Ass may be the sole existing survivors of the numerous representatives of the genus *Equus* in the Europeo-Asiatic continent during the Pliocene period. The species of *Equus* which existed during that geological period in both North and South America appears to have been blotted out of the Fauna of those continents before the introduction of man. The aborigines whom the Spanish conquistadors found in possession of Peru and Mexico had no tradition or hieroglyphic indicative of such a quadruped; and the horses that the invaders had imported from Europe were viewed with astonishment and alarm. "The researches of Mr. Darwin and Dr. Lund have however indisputably proved that the genus *Equus* was represented during the Pliocene period by a species (*E. curvidens*) which is shown to be distinct from the European fossil and the existing species. Fossil remains of the Horse have likewise been discovered in North America. The geographical range of the genus *Equus* at the Pliocene period was thus more extensive than that of the Rhinoceros, of which both the extinct and existing species are confined to the continents of the Old World of geography. The Horse, in its ancient distribution over both hemispheres of the globe, resembles the *Mastodon*, and appears to have become extinct in North America at the same time with the *M. giganteus*, and in South America with the *M. Andium*, and the *Megatherium*. Well may Mr. Darwin say, 'It is a marvellous event in the history of animals that a native kind should have disappeared, to be succeeded in after ages by the countless herds introduced with the Spanish colonist.'"—*Eng. Cyc.*

(3461) ERANTHEMUM CINNABARINUM. Cinnabar coloured Eranthemum. On the sides of some of the limestone cliffs in Amherst Province this bright orange-scarlet flower is often seen; and it would be quite an addition to gardens, in which it has not yet found a place, although it is represented in Wallich's rare Indian plants.—*Mason.*

(3462) ERANTHEMUM. The varieties cultivated in Madras are for the most part indigenous, E. pulchellum and E. montanum, grow in almost any soil and situation. E. bicolor requires shade and plenty of water: only fit for borders and flower beds, propagated by cuttings during the rains.—*Jaffrey.*

(3463) ERANTHEMUM PULCHELLUM. Nervose Eranthemum.

Gool-shan, Hind.

Found under the shade of trees in the Kotah jungles.—*Gen. Med. Top. page* 173.

(3464) ERIA OBESA. A species of Eria is one of the most abundant of Tenasserim epiphytes, but the flowers are small, and have little to recommend them.—*Mason.* Wight gives figures of Eria pauciflora, 1636; polystachya, 1634-35; pubescens, 1634-35; and reticosa, 1637.

(3465) ERINOCARPUS NIMMONII. Tiliaceæ. Jungle Bendy. A middle sized tree; flowers yellow in terminal panicles, appear in September and October. Fruit triangular, covered with bristles; angles somewhat winged, has a pleasing fragrance.—*Jaffrey.*

(3466) ERIOBOTRYA JAPONICA. Pomaceæ. The Loquat yang-ma, Chinese. This tree is now introduced all over the Deccan, and bears fruit twice in the year. It is highly esteemed both for deserts and preserves. It is a native of Japan, but grows in great perfection in New South Wales. The finest fruit is produced at the second crop, at the end of the cold season, and requires protection day and night; from

birds in the former, and flying foxes in the latter. The fruit is a yellow color, with thin skin, a sweet acid pulp, one or two seeds in the centre —sometimes more. The seeds grow easily. Proper attention does not seem to have been given to this fruit, as it appears to be capable of great improvement.—*Riddell.* In Ajmere, it is cultivated in gardens but does not thrive well.—*Gen. Med Top. p.* 195. It is very common in China and is often mentioned by Fortune, for instance, at one place, he found, (*Eriobotrya japonica*), the loquat or young-mai, (*Myrica, Sp*), peaches, plums, and oranges.—*Fortune's Tea Districts, p.* 30; and at another, Other fruits—such as the loquat (*Eriobotrya japonica*), the Chinese gooseberry (*Averrhoa Carambola*), the wangpee (*Cookia punctata*), and the longan and leechee.—*Tea Districts, page* 7.

(3467) ERIODENDRON, a genus of plants belonging to the natural order *Sterculiaceae*, known by the name of Wool or Cotton-Trees. The wool-trees are large trees, with a spongy wood which is used for little besides making canoes in the districts where they grow. The leaves are palmate, and the flowers are large, red, white, or scarlet, and rising singly or in clusters from the sides or tops of the branches. The calyx is naked, irregularly 5-lobed, with the lobes usually twin; the petals are 5-joined together, and are connected with the column of the stamens at the base. The filaments of the stamens are joined together into a short tube at the base, and divided into 5 bundles at the apex; these bundles are filiform, and each bears 1, 2, or 3 linear or anfractuous anthers at the apex, which have the appearance of one anther, and are either adnate or versatile. The stigma is 5- or 6-cleft. There are 6 species of *Eriodendron*, 5 of which are natives of America, and 1 of Asia and Africa.—*Eng. Cyc.*

(3468) ERIODENDRON ANFRACTUOSUM. *Bombaceae*, Icon. 400. (DeCand.), Cotton tree. *Syn.* Bombax pentandrum, L.

Elavum marum, Tam. | Suffed simul, Hind.

E. anfractuosum has versatile anfractuous anthers; leaves with 5, 7, or 8 entire cuspidate leaflets, glaucous beneath and a usually prickly trunk. This tree attains a height of 150 feet or more. There are two varieties described, the one growing in the East Indies and the other in Guinea. They differ chiefly in the colour of their flowers. The Indian species, *E a. Indicum*, has flowers yellowish inside and white outside; whilst the Guinea species, *E. a. Africanum*, has large crimson flowers. In Guinea this tree is one of the largest and tallest of the forest-trees and the trunk is employed for making the largest-sized canoes.—*Eng. Cyc.* It is an elegant tree, common on the Coromandel Coast; the leaves fall during the cold season, and the blossoms appear in February before the leaves. The trunk is perfectly straight, the seeds numerous, smooth, black, and enveloped in very fine soft silky wool. The gum is termed *Huttian ke goond*, and is given in solution with spices in bowel complaints.—*O'Shaughnessy, page* 227. This produces a light wood, employed by the toy-makers. It is likewise used for making rafts.—*Ainslie's Mat. Med, page* 208. Dr. Mc.Clelland mentions that in the Tenasserim Provinces, *Bombax pentandrum*, *B. heterophyllum* and *Cochlospermum gossypium*, all afford a soft down, which is attached to the seeds and which the Burmese collect for stuffing pillows. At the Madras Exhibition of 1857, a very powerful bast was exhibited by Mr. Jaffrey, from the *B. pentandrum*, now Eriodendron anfractuosum. This large tree grows in many parts of the Deccan.—*Riddell.*

(3469) ERIOLÆNA TILIIFOLIA.

Let pan, Burm.

Grows plentifully throughout the Pegu and Tounghoo districts, attaining a height of fifty feet, with a girth, of seven or eight feet sometimes, but usually about six feet. It is a strong tough timber, similar in its properties to Kydia. Wood, white-coloured, adapted to every purpose of house-building.—*McClelland.*

(3470) ERIOPHORUM, the systematic name of the sedge-like Plant which is called in Great Britain Wild Cotton, or Cotton-Grass, in consequence of the long cottony tufts which wave upon its stalks in marshy and sedgy heaths and wastes in all parts of this country. The appearance is owing to the hypogynous scales, which in this glumaceous genus, represent the calyx, being extended into long numerous white hairs, which project far beyond the scales of the flower-head. It is not a little curious that while, in most of the species, these hairs are indefinitely numerous they should in one, *E. alpinum* be reduced to the regular number, six, which is the general proportion of floral envelopes belongiug to Endogens. Professor Dunth enumerates twelve species, all inhabiting the colder parts of the northern hemisphere. The silky or cottony substance which clothes the fruit of the species of this genus is made into paper and the wicks of candles: it is also used for stuffing pillows, &c. The leaves of *E. comosum* are in the Himalayas extensively employed in the manufacture of ropes.—*Eng. Cyc.*

(3471) ERIOPHORUM CANNABINUM. Royle. Cotton-grass.

Bhabur, Hind.

All who have scrambled up the steeps of the Himalayas will remember the great support they derived from the toughness of the tufts of the *bhabhur*, which grows commonly there, as well in low valleys as at considerable elevations. It is every where employed by the mountaineers in making ropes as well as a rough strong twine well suited for all ordinary purposes. Specimens

of the dried leaves, made up into bundles about three feet long, were sent to the Exhibition of 1851, from Bheer-bhoom.—*Royle, Fib. pl. p.* 33. Its seeds are clothed at their base with a silky or cotton like substance, with which pillows are stuffed and wicks of candles, as well as paper made.—*Royle, Fib. Plants.*

(3472) ERODIUM GRUINUM. GERANICEÆ. So named from Geranos, a Crane. They are mostly all from the Cape of Good Hope. Most of the flowers are devoid of odour, and those which are particularly so are the most beautiful, whereas those again whose petals are the least showy, diffuse towards the evening and during the night a most powerful perfume; this is particularly the case with such as have white petals spotted with red. The almost innumerable varieties now produced in England have originated by hybridization, and to enumerate them all here is unnecessary. "The flowers of all the kinds are borne in umbels on a peduncle, which in the stemless kinds arises from the centre of the source of the leaves, and in the shrubby kinds from the axil of almost all of the upper leaves. The number of the flowers borne in an umbel is various in different kinds, and greatest in those of the horse-leafed group." The commonest sorts cultivated in gardens are the deep scarlet, light pink, and ivy leafed. The latter has a strong perfume, and scents the fingers if only slightly touched. The ordinary mode of propagation is by cuttings and seed. Almost all the varieties produce seed, which will immediately grow if sown, and should be transplanted as soon as two or three perfect leaves are formed. The cuttings grow most readily, and should be taken off at the joints when the wood is assuming a brown appearance, and beginning to ripen. The fibrous-rooted herbaceous sorts may be multiplied by dividing the roots. As all the species are rapid growers, they require pruning, and to be occasionally changed into fresh pots. They require a light rich soil of loam and old well rotted stable manure, or else leaf mould and sand: the cuttings when put down must be removed for a time to a shady spot, and the earth kept continually moist. I must particularly caution against cutting the plants during the rains, as the whole plant suffers by the ends of the shoots decaying; neither should they be exposed during the hot winds, especially the soft velvet-leafed varieties.—*Riddell.*

(3473) ERVIE, Urvie; Caladium Esculentum. This is a small bulbous root sown from March to July, in rows or beds, mostly along a water course where ginger is planted. It requires much water, and takes from six to seven months to ripen. When boiled and then roasted it is very wholesome and somewhat resembles a yam in taste: the natives also put it into curries.

(3474) ERVUM, a genus of Plants belonging to the natural order *Leguminosæ* and tribe *Vicieæ*. It is known by a 5-cleft calyx. with linear acute segments, about equal in length to the corolla; glabrous stigma; an oblong 24-seeded legume. Most of the species of this genus are weeds, two of which, the *E. hirsutum* and *E. tetraspermum*, are found in Great Britain. The former is called Tine-Tare, and is a great pest in corn-fields. —*Eng. Cyc.*

(3475) ERVUM LENS. Lin.

Mussoor, HIND. | Mussoor purpoo, TAM.
Masur, GUZ.

Mussoor is the Mahratta, as well as the Hindoostanee and Sanscrit name of a valuable pulse, much cultivated in the higher provinces of India, *Ainslie, p.* 242. *Ervum Lens* has branched stems; oblong nearly glabrous leaflets, usually eight in number; the stipules lanceolate and ciliated; the peduncles 23-flowered, about equal in length to the leaves; the legumes short, broad, finely reticulated; seeds two, compressed. It is a native of corn-fields on the continent of Europe. Lentils are not much eaten in Britain, but they are consumed in considerable quantities in France, Germany, and Italy. The Lentil is one of the oldest leguminous plants used as food of which we have any record. Ever since the time of Esau they have been eaten in the East. In Egypt and Syria they are parched in a frying-pan and sold in the shops, and considered by the natives as the best food for those who are on long journeys. The Lentil is still cultivated in England. There are three varieties known in France and Germany: the small brown, which is the lightest flavoured and the best for soups: the yellowish, which is a little larger and the next best; and the Lentil of Provence, which is almost as large as a pea, with luxuriant straw, and it might be cultivated as food for cattle. In its cultivation the Lentil requires a dry warm soil; it should be sown later than the pea at the rate of a bushel or a bushel and a half to the acre. It ripens earlier than the pea, and requires the same treatment and harvesting. The produce of the Lentil in grain is about a fourth less than that of the tare, and the straw is not more than a third as much. The straw is however considered very nourishing, and is used for feeding calves and lambs. Lentils, like all other leguminous fruits, contain a large quantity of nitrogenized matters. Einhoff found that 3840 parts of lentils contained 1260 parts of starch and 1433 parts of a matter analogous to animal matter. In a late analysis made by Dr. Playfair for the Royal Agricultural Society he found that 100 parts of lentils contained 33 parts of albumen or gluten and 48 parts of starch, &c.; whilst the same quantity of peas contained 29 parts of albumen, and of beans 31 parts. If the theory of nutrition propounded by Professor Liebeg in his late work on 'Animal Chemistry' be correct, then lentils constitute one of the most highly

nutritious foods in nature.—*Eng. Cyc.* It is said to be the flour of this plant which is so highly extolled as a farinaceous aliment. By a slight change, Ervum lens became the Ervalenta, and another person, with another little change, sold the same article as Revalenta adding the term Arabica to note its Asiatic origin. On analysis Warton's Ervalenta was found to consist of a mixture of the French or German lentil, ground and reduced to powder, including portions of the shells or husk, and of a substance very closely resembling in its microscopic characters maize or Indian-corn meal. The French lentil, either whole or ground, is of a yellowish colour, and has the taste of peas. It has been stated that the farina of a grass called "Dari," "Durra," &c., has been discovered in either Ervalenta or Revalenta. "Dari, I suspect means Durra, also spelt Doura, Dorv, &c. It is a corn used by the Arabs, and is cultivated in the South of Europe. It is the Holcus durra sativus of Forskal, the Sorghum vulgare of some other writers. "Its meal is said to resemble that of Indian corn. Now it deserves notice, that a German miscroscopist recently stated that he found the meal of Indian corn in ervalenta, or revalenta, I forget which. Did he mistake it for the Sorghum?" The article sold in bottles at 1s per lb., and recommended to be used in cases of obstinate constipation with the Ervalenta, appears to be nothing more than treacle, the name "Melasse" being derived from the word molasses. On analysis of Du Barry and Co.'s Revalenta Arabica, it was found to consist, like the first, of a mixture of the red or Arabian lentil and barley-flour, sweetened with sugar. A third sample consisted of the Arabian lentil and barley-flour, with the addition of saline matter, principally chloride of sodium or common salt; it also possessed a peculiar taste, as though flavored with celery-seed. While Warton's Ervalenta is of a yellowish colour, Du Barry's Revalenta is of a pink or rosy hue, this arises from the different species of lentil employed, the German being yellow, and the Arabian lentil of a red colour. Lentils belong to the natural family of plants, Leguminosæ, which includes the several kinds of beans and peas; they resemble, to a very great extent, in colour, structure, taste, and properties, the common pea; so great, indeed, is the similarity in organization, that it is difficult to discriminate between them, even by the aid of the microscope. Lentils, peas, beans, &c., all contain a considerable amount of nitrogenized matter, in the form of Legumine. When taken as an article of diet, they are found by most to be somewhat difficult of digestion, to occasion distention and flatulency, and to be slightly aperient. These properties and effects are so similar in the case of each, that it is almost impossible to draw any decided line of demarcation between them. As the cost of most of the prepared lentil powders—viz, 2s. 9d. per pound—forms a very serious obstacle to their use, supposing that in any respect it is desirable that they should be more generally consumed, we have framed the two following receipts, whereby a considerable saving of expense may be effected:—

1st Receipt.

Red or Arabian lentil-flour.....	2 lbs.
Barley-flour,.....	1 lb.
Salt,.....	3 oz.

Mix into a uniform powder.

The red lentil may be obtained of almost every corn chandler, at about 4d. per quart; the cost of a pound of this Ervalenta would be about 2d. per pound; and it is perfectly clear, from the analysis which we have given above, that whatever may be the advantages possessed by the much-vaunted Ervalentas, Revalentas, &c., the new article must contain them all.

2nd Receipt.

Pea-flour,.....	2 lbs.
Indian corn flour,.....	1 lb.
Salt,.....	3 oz.

Mix as before.

Being satisfied that lentils and peas do not differ in their properties to any great extent, we have devised the above receipt to meet those cases in which any difficulty may be met with in procuring the red lentil, which however is now very commonly kept by corn chandlers. Whatever may be the results of the experience of others as to the advantages derived from the use of lentil-powder, we ourselves are unable to say very much in its favor. We recently partook of some of Du Barry's Revalenta Arabica, and found the flatulent effects so unpleasant that we should not readily be induced to repeat the experiment. Hassall.—*Food and its adult. p.* 241.

(3476) ESCHSCHOLTZIA. PAPAVERACEÆ. This is a very beautiful little flower, of a deep yellow orange colour, very delicate. It blossoms only in the cold weather, and requires care in transplanting:—not more than one plant in a pot, which should be deep—the root being long, and tapering: grown from seed.—*Riddell.*

(3477) ESPARTO, SPARTO. A plant (*Stipa tenacissima*), growing in Spain and Africa; anciently held in esteem for the manufacture of cordage, but now nearly in disuse, except in the countries of its production, where it is made into cables, cordage, shoes, mats, baskets, nets, &c. It is found wild in places so barren as scarcely to produce any other spontaneous vegetation. At the present time it is used by the Spaniards for various purposes, especially in the manufacture of a kind of shoe, or rather sandal, called *alpergates*. *Waterston.*—*Faulkner.*

(3478) ESSENTIAL OR VOLATILE OILS occur in the stems, leaves, flowers and fruit of

many odoriferous plants and are procured by distillation along with water. They are called essences and contain the concentrated odour of the plant. They usually exist ready formed, but occasionally they are obtained by a kind of fermentation, as oil of bitter almonds and oil of mustard. Some of them consist of carbon and hydrogen, only, as oil of turpentine from Juniperus communis; Oil of savine from Juniperus Sabini; Oil of lemons and oranges from the rind of the fruit; and oil of neroli from Orange flowers. A second set contain oxygen in addition, as oil of cinnamon from Cinnamomum verum; Otto or attar of roses from various species of rose, especially Rosa centifolia: oil of cloves from Caryophyllus aromaticus. Those principally obtained from tropical shrubs and plants are citronella oil of oranges and lemons, from the rind of the fruit, oil of cinnamon and cloves, croton oil &c. The oil of Sandal or Sanders wood (Santalum album) grown on the Malabar coast is much esteemed as a perfume. Keora oil from Pandanus odoratissimus in Bengal. Oil of spikenard so highly prized on account of its perfume by the ancients may be procured in Sagur, Nepaul, and the mountains of the Himalaya. 956 lbs. of essential oils were imported into Hull in 1850. There were exported from Ceylon in 1842, 902 cases: in 1843, 138: in 1844, 20: in 1845, 25 cases of essential oils and in the last two years as follows:—

	1852 Cases.	1851 Cases.
Cinnamon oil, ...	17	23
Citronella oil, ...	110	87
Essential oil, ...	72	35

Of Chemical, essential, and perfumed oils imported into England from France the quantity is about 35,000 lbs. annually worth £10,000. The duty is 1s. per lb., we also imported from France in 1851, 9,596, cwt. of oil or spirit of turpentine worth £14,197. on which a duty of 5s. 3d. per cwt. is levied.—*Simmonds' Coml. Products, page* 565.

(3479) ESTRICH, Estridge.

Duvet d' autruche, Fr. | Struthionum plumæ molliores, Lat.
Penna Matta di strozzo, It.

The fine soft down which lies immediately under the feathers of the ostrich. The finer kind is occasionally used as a substitute for beaver in the manufacture of hats; the coarser is sometimes made into a species of cloth. Localities, the Levant, Italy, and other parts of the Mediterranean.—*Faulkner.*

(3480) ERYTHRINA, a genus of Tropical Trees and Tuberous Herbs belonging to the natural order *Leguminosæ*. The species have ternate leaves and clusters of very large long flowers, which are usually of the brightest-red; whence the species have gained the name of Coral-Trees. Frequently their stem is defended by stiff prickles. They occur in the warmer parts of the Old and New World. An Indian species, *E. monosperma*, is said to yield gum-lac. De Candolle mentions 32 species; of which *E. Crista Galli* is commonly cultivated in green houses for the sake of its splendid blossoms.—*Eng. Cyc.*

(3481) ERYTHRINA. The Mountain coral tree. A fine looking timber tree of this genus producing a reddish wood, is not uncommon in the interior of Tenasserim. The Karens select the tree in preference to all others on which to train their betel vines.—*Mason.*

(3482) ERYTHRINA INDICA, Indian Coral tree. Willd. Colebr 83 Hort. Mal. Mourucou. 6. p. 13 and 7.

Moorkoo marum. Tam. | Modooga Vriksha, Can.
Badida chettoo, Tel. | Palita Manda, Beng.
Pangra, Hind.

This is also sometimes called by the Tamuls, Kaliana Morkay. It is the wood commonly used by the sect of Mootchie men, for making light boxes, scabbards, children's play things &c. It is likewise employed in making rafts, and fisherman's floats, and is hollowed out and made into canoes. The wood used for this purpose in upper Hindoostan is the Bombax ceiba.—*Ains. Mat. Med. p.* 208. It is a pretty large tree common over India, and the islands, flowering at the beginning of the hot season. Seeds ripening in June and July. This tree is employed in many parts of India to support the black pepper vine. What seems to render these trees very proper for this purpose is their quick growth (from cuttings), their firm permanent though smooth bark, which never peels off and gives firm hold to the roots of the vine, and lastly, they are full of leaves and very shady during the hottest months of the year which shelters the vine from the intense heat of the sun and keeps the ground moist. As soon as the hottest weather is over, the leaves drop and expose the vines to the sun and weather during the cool season. Roxb.—*Rohde. M.S.S.*

(3483) ERYTHRINA SUBEROSA.

Mooni or Modooga, Tel. | Mooni Motaga, Tam.

A native of the Circars growing in every soil and situation, leaves deciduous during the cold season. Flowers in February and March, soon after which the leaves appear; the trunk is generally erect from eight to twelve feet to the branches.—*Rohde, M.S.S.* This tree is less common than the Indica, the trunk is covered with deeply cracked corky bark, deciduous in the cold season, flowers in February and March.

(3484) ERYTHRINA SUBLOBATA.

Badadoomoo, Tam. | Badeda, Tel.

A tree, frequently of great size, branches spreading and numerous, trunk without prickles.—*Jaffrey.* It is native of the inland mountains of the Circars. The wood of all these species is remark-

ably light, soft and spongy, it is much employed by the Moochies who make trunks, toys, and other things that are to be varnished, the wood retaining its priming or under coat of paint better almost than any other wood, it is not liable to warp, contract or split. The Moochies at Condapilly and Nursapore are famed for their art in forming and varnishing this wood for Toys &c. It is planted by the Tamil people about their temples. In Bengal the leaves fall during the cold season in February, when destitute of foliage, the blossoms appear and soon afterwards the leaves: the seed ripens in May, the trunk is perfectly straight in large trees five or six feet in circumference, tapering regularly, seeds are enveloped in fine, soft, or silky wool, adhering slightly to it.—*Rohde, M.S.S.*

(3485) ERYTHRINUS, a genus of Tropical Fishes belonging to the family *Clupeidae.*—*Eng. Cyc.*

(3486) ERYTHROXYLEÆ, a group of Exogenous Plants, considered by some as a distinct natural order; by others as a subordinate division of *Malpighiaceae*. They have alternate stipulate leaves and small pallid flowers. The calyx is 5-lobed: the petals are 5, with a remarkable appendage at their base, which afford one of the marks of distinction between *Erythroxyleae* and *Malpighiaceae*: the stamens are 10, slightly monadelphous. The ovary is superior, 3-celled, with 3 styles, and solitary pendulous ovules. The fruit is drupaceous. Some of the species of *Erythroxylon*, the only genus, have a bright-red wood, occasionally used for dyeing; but the most extraordinary species is the *Erythroxylon Coca*, an account of the inebriating effects of which is given under Coca.—*Eng. Cyc.*

(3487) ERYTHROXYLON AREOLATUM. Deo-dar. Deva-Daree. Areolated Erythroxylon Lin.

Devadaree, Tel.	Dawadar, Duk.
Deo dharee, Hind.	Shujrooljin, Arab.
Devatharum, Tam.	Devadaroo, Sans.

The young leaves and tender shoots of this tree are supposed to be of a cooling nature and when bruised and mixed with a certain portion of Gingilie Oil form a refreshing liniment for the head. The wood of this small tree is so fragrant that the inhabitants of Mysore use it instead of sandal wood.—*Ains. Mat. Med. p.* 212. Under the Tamil name of *Davahdarum-keeray*, the tender leaves of this tree are used as greens but mostly by the country people; the flowers are very small of a yellowish green color. —*Jaffrey.*

(3488) ERYNGIUM, a genus of Plants belonging to the natural order *Umbelliferae*, and the tribe *Sanicolae*. It has a calyx of five leafy teeth, the petals erect, oblong, with a long inflexed point; the fruit obovate, covered with chaffy scales without ridges or vittæ. The species are usually perennial spiny herbs, with the flowers congregated into oblong or roundish dense heads. Nearly 100 species of this genus have been described. They are found in greatest numbers in America, but many are inhabitants of Asia, Africa, and Europe. They are most of them handsome and ornamental plants, and worthy of cultivation. They will grow freely in any common garden soil, but the lighter or more sandy the soil the better they will grow. Some of the species require the greenhouse or frame, and they should be grown in pots. They may be propagated by dividing the roots, or by sowing the seed. (Don, *Dichlamydeous Plants*; Babington, *Manual of British Botany*; Lindley, *Flora Medica.*)—*Eng. Cyc.*

(3489) ERYNGIUM CAMPESTRE vegetates in Cashmere and Cabul as well as in Europe, but it is not officinal any where.—*Honigberger, p.* 274.

(3490) ERYNGIUM GIGANTEUM, of this extensive genus of plants, some are ornamental and well adapted for the flower border, the colours are blue, light blue, white, light white, and green, they thrive best in a sandy soil.—*Riddell.*

(3491) ERYSIMUM PERFOLIATUM, is cultivated in Japan for its oil seeds.—*O'Shaughnessy, p.* 187.

(3492) ERYSIMUM PEROWSKIANUM. *Cruciferæ*. This is the only one of a numerous genus at all ornamental, it thrives in any soil, the flowers are dark orange colour.—*Riddell.*

(3493) EUCALYPTUS, a genus of Australian Plants, consisting of lofty trees, with a volatile aromatic oily secretion in their leaves, and a large quantity of astringent resinous matter in their bark. They belong to the alternate-leaved division of *Myrtaceae*, and are generically known among these plants by their corolla being absent, and the limb of their calyx consolidated into a hemispherical or conical cap, which is thrown off when the stamens expand. This genus occurs in the Malayan Archipelago, but is chiefly Australian, and, together with the leafless Acacias, gives a most remarkable character to the scenery. The species exist in great profusion, and form the largest trees in the forests of that part of the world. A modern writer upon the plants of Van Diemen's Land says that *Eucalyptus* seems as if it had taken undisturbed possession of those Australian regions, clothing as it does with a stupendous mantle the surface both of Van Diemen's Land and Australia; while the intermixture of other plants, which this lordly tribe permits, is, compared with its own great extent, but small and partial. Wherever you go, one species or other is constantly before you. No trees in the world so constantly or

rapidly arrive at gigantic dimensions; they often become hollow, and are then used by the traveller as roomy places of shelter at night. Frazer found a hollow *Eucalyptus* at Moreton Bay, used by the natives as a cemetery. Even at Swan River, where, according to the report of Frazer, the species are stunted, they also attain a huge size. *E. calophylla* attains a height of 150 feet, and a girth of from 25 to 50 feet is not an uncommon dimension of these trees. Their timber is represented as highly useful for domestic and other purposes; being so soft at first as to render the felling, splitting, and sawing up of the tree, when green, a very easy process, and when thoroughly dry becoming as hard as oak. Upon the whole this genus must be considered the most important that Australia produces. As it occurs so far to the south as Van Diemen's Land it is almost certain that it might be naturalised in Devonshire, Cornwall, and in the west of Ireland. Even in the neighbourhood of London certain kinds bear moderate winters without shelter, especially *E. pulverulenta*. It is very much to be regretted that some settled nomenclature is not introduced, for the colonists apply the same names to different species in different parts of the country; this renders it difficult to tell of what they are speaking. As far as we can collect the evidence, it appears that the following are, or should be the botanical species to which the colonial names belong:—

Blue Gum of Port Jackson ...	*E. piperita.*
Blue Gum of Hobart Town ...	*E. globulus.*
Stringy Bark	*E. robusta.*
Iron-Bark	*E. resinifera.*
Kino-Gum	*E. resinifera.*
Peppermint Tree	*E. piperita*
Weeping Gum of Van Diemen's Land.	Uncertain.
Mountain Blue Gum of Van Diemen's Land	Uncertain.
Black Gum of Van Diemen's Land	Uncertain.
Black-Budded Gum of Van Diemen's Land	Uncertain.
Cider-Tree of Van Diemen's Land	Uncertain.
Manna Gum	Uncertain.
Manna of Moreton Bay	*E. Manna Cun.*
Blood wood of Port Jackson ..	*E. Corymbosa,*
WhiteGum ofVanDieman'sLand	*E. resinifera.*
White Gum of Moreton Bay...	*E. subulata-Cun.*
WhiteGum of the S.W Interior	*E. lencadendron Cun.—Eng. Cyc.*

Dr. Bennett, in his "Wanderings in New South Wales," states that a large quantity of camphorated oil, which closely resembles the cajeputi, is produced from the foliage of several species of *Eucalyptus*. Some of the leaves, which are of a bluish green, contain it in such abundance as to cover the hand with oil when one of the leaves is gently rubbed against it.—*Simmonds*. One of the species of Eucalyptus is called by the Australians Box tree and its bark, stringy bark, its

fibres are employed in making canvas and cordage, by the aborigines, as mentioned by Bennett —*Royle, page* 301. These trees might be useful in India.

(3494) EUCALYPTUS GUNNII, when wounded, furnishes the inhabitants of Van Diemen's Land with a copious supply of a cool, refreshing, slightly aperient liquid, which ferments and acquires the properties of beer.—*Eng. Cyc.*

(3495) EUCALYPTUS MANNIFERA, exudes a saccharine mucous substance resembling manna in its action and appearance, but less nauseous. It is not produced by insects, and only appears in the dry season. Other species yield a similar secretion at Moreton Bay and in Van Diemen's Land. Mr. Backhouse says it coagulates, and drops from the leaves in particles often as large as an almond.—*Eng*: *Cyc.*

(3496) EUCALYPTUS RESINIFERA.—*Syn.* E. Kino. Metrosideros gummifera. Botany bay *kino tree*, or brown gum tree. A native of Australia, cultivated in the Calcutta Garden. *E. resinifera* has leaves with very minute and numerous little dots, ovate lanceolate, with long tapering points narrowed to the base, with a vein next the margin. The flowers are umbellate, on a compressed peduncle rather longer than the petiole. The lid is conical, taper, leathery, twice as long as the capsule. The bark is so extremely astringent as to yield a gum not inferior to Kino, and sold as such. The bark of this and other species is so hard as to cause them to be called Iron-Bark Trees by the colonists. The Blue Gum-Tree and some others have the singular property of throwing it off in white or gray longitudinal strips or ribands, which, hanging down from the branches, have a singular effect in the woods. In many species the leaves are so variable in their form and other characters at different ages of the tree, or in different situations, that it is a matter of difficulty to know how they are to be botanically distinguished from each other; and in fact the subject of the distinction of species has hardly yet been taken up, no botanist feeling competent to undertake the task without some personal acquaintance with the plants in a native state. The leaves, instead of presenting one of their surfaces to the sky and the other to the earth, as is the case with the trees of Europe, are often arranged with their faces vertical, so that each side is equally exposed to the light. An astringent juice flows from this tree, named Botany Bay *kino*. Ainslie quotes *Dum-dul-ook-wain* as the Bazar name of this kino, but the term properly applies to the "Dragon's blood." It is infusible, occurs in fragments of variable size and form, often covered with brownish powder, brittle, thin, translucent and ruby coloured, fracture glassy and chocolate coloured, of variable depths of tint, destitute of odour. Taste

austere and somewhat bitter, powder red-brown; water dissolves about two-thirds, alcohol three-fourths, ether one-twentieth only. But there are different statements made by writers on this subject. Mr. White, who has witnessed the collection in Australia, says a single tree will yield 500 lbs. of this kino in one year by incisions practised on the bark. The medical uses of this article correspond exactly with those of *kino*, as already described. The bark and leaves are aromatic, but their essential oil has not been separated.—*O'Shaughnessy, page* 336. Its bark is a powerful tanning substance, and a single tree will often yield 60 gallons of an astringent resinous like substance from incisions in its bark; sold in the bazars of India as a kind of kino.—*Simmonds.*

(3497) EUCALYPTUS ROBUSTA, contains large cavities in its stem between the annual concentric circles of wood, filled with a most beautiful red or rich vermilion-coloured gum, which flows out as soon as the saw affords an opening.—*Eng. Cyc.*

(3498) EUCHARIDIUM. ONAGRACEÆ.—This is a small plant bearing a purple flower, and will thrive in a good garden soil.—*Riddell.*

(3499) EUGENIA, a genus of Dicotyledonous Polypetalous Plants of the natural order *Myrtaceae*, so named in honour of Prince Eugene of Savoy, who was a patron of botany and horticulture. The genus, as at present constituted, contains nearly 200 species, though numbers have been removed to the genera *Nelitris, Jossinia, Myrcia, Sizygium, Caryophyllus*, and *Jambosa*, in which are now contained the Clove-Tree, the Rose-Apple, and Jamoon of India, formerly included in *Eugenia*. This genus is confined to the hot and tropical parts of the world, as Brazil, the West India Islands, and Sierra Leone, and extends from the Moluccas and Ceylon to Silhet and the foot of the Himalayas in Asia. *Eugenia* is characterised by having the tube of the calyx of a roundish form, and the limb divided into four parts; the petals equal in number, and inserted on the calyx. The stamens are numerous. The ovary 2-3-celled, with several ovules in each. Seeds 1 or 2 roundish, and large, with the cotyledous and radicle united into one mass. In habit and inflorescence the species resemble many myrtles. Like the family to which they belong, some of the species of *Eugenia* secrete a warm volatile oil in their herbaceous parts; abound in tannin; yield good wood: and a few have fruit which is edible, though not very agreeable, from being impregnated with the aroma of the oil.—*Eng. Cyc.* Dr. Wight gives, in Icones,

Eugenia	*angustifolia*,	„	inophylla,
	cymosa,	„	lanceolata,
(A.)	*acuminata*,	„	leptantha,
„	*bracteolata*,	„	Wightinna,
„	*clavifora*,	(E.)	Mooniana,
„	*grata*,	„	Willdenowii;
(J.)	alba,	(S.)	grandis,
„	amplexicaulis,	„	Jambolana,
„	aquea,	„	Jambolana, var. micrócarpa,
„	cylindrica,		
„	hemispherrica,	„	lanceæfolia,
„	lanceolaria,	„	montana,
„	laurifolia,	„	myrtifolia,
„	macrocarpa,	„	Neesiana,
„	*Malaccensis*,	„	oblata,
„	Munronii,	„	obtusifolia,
„	pauciflora,	„	operculata,
„	polypetala,	„	Paniala,
„	purpurea,	„	polyantha,
„	teruifolia,	„	praecox,
(S.)	alternifolia,	„	pulchella,
„	Arnottiana,	„	reticulata,
„	brachiata,	„	revoluta,
„	calophyllifolia,	„	Rottleriana,
„	caryophyllifolia,	„	rubens,
„	caryophyllœa,	„	rubicunda,
„	cerasoides,	„	salicifolia,
„	cordifolia,	„	silvestris,
„	corymbosa,	„	Thumra,
„	cymosa,	„	toddalioides,
„	ferruginea,	„	venusta,
„	fruticosa,	„	Wallichii,
„	glandulifera,	„	Zeylanica,

(3500) EUGENIA. JAMBO FRUIT. A small black plum is often seen in Burmese bazars which is produced by a species of eugenia. According to Burman geography there is a eugenia tree on the great island or continent which we inhabit, that is twelve hundred miles high, one hundred and eighty-six in circumference, with five principal branches each six hundred miles long. From this tree, the island derives its name *Sambu-deba*, Eugenia Island.

(3501) EUGENIA ACRIS.

Sung, HIND.

A small tree; grows in Bombay, the leaves have a pleasant smell when bruised.—*Riddell.*

(3502) EUGENIA CARYOPHILIFOLIA. *Myrtaceae*, Icon. 553.

Nawel wood, ENG.	Naradidi Virksha, CAN.
Naredoo kurra, TEL.	Chota jamb, BENG.
Nawel marum, TAM.	Nareda Chettoo, TEL.

This is Ainslie's Calyptranthes Caryophyllifolia and his favorable account of the timber is such, as its appearance would lead one to expect. —*Wight.* It is a native of various parts of India growing luxuriantly in almost every soil and situation. Flowering time the hot season; bears a round berry, black when ripe, the size of a pea. The wood is whitish very strong, close grained hard and durable.—*Rohde, M.S.S.*

(3503) EUGENIA CARYOPHYLLATA.—*Syn.* CARYOPHYLLUS AROMATICUS. The cloves of commerce are the unopened flowers, the flower buds of the Clove-tree, *Caryophyllus aromaticus* (*Eugenia caryophpllata*), which was originally a native of the Moluccas, but is now cultivated in several parts of the East and West Indies. The tree may be propagated either from layers or seed. Layers will root in five or six months if kept moist. A strong dark loam, a gravelly,

sand, or clayey soil, but one not retentive of moisture, seems that best suited for its successful culture. It does not thrive well near the sea, nor in the higher mountains, the spray of the sea and the cold being found injurious. The plants at first require the shade of other trees, such as the mango, cocoa-nut, &c. Although generally a hardy plant, it suffers from excessive drought. They should be planted about twenty feet apart. In its native country the tree begins to yield fruit in the sixth year, but a crop can seldom be looked for in other quarters under eight years. It is very long lived, sometimes attaining the age of 130 years. There appears, according to Mr. Crawfurd, to be five varieties of the clove, viz—the ordinary cultivated clove; a kind called the female clove by the natives, which has a pale stem; the kiri or loory clove; the royal clove, which is very scarce, and the wild clove. The three first are equally valuable as species, the female clove being considered fittest for the distillation of essential oil. The wild clove, having scarcely any aromatic flavor, is valueless. The produce which may be expected from the tree seems to be uncertain; it may, however, be averaged at five or six pounds. A clove tree, well weeded and taken care of, will produce from five to twenty pounds. On the other hand, a tree that is neglected will not give above two or three pounds. At intervals of from three to six years they usually produce one extraordinary crop, but then a year now and then intervenes, when they yield none at all; in other they will afford a double harvest. The clove tree was originally confined to the five principal Molucca islands, and chiefly to Machean. From these it was conveyed to Amboyna, a very short time only before the arrival of the Portuguese. By them the cultivation was strictly restricted to Amboyna, every effort being made to extirpate the plant elsewhere. It has now, however, spread to Java, Singapore, and the Straits' Settlements, Ceylon, the Mauritius and Seychelles, Bourbon, Zanzibar, Cayenne, Dominica, Martinique, St. Kitts, St. Vincent, and Trinidad. The clove is remarkable for its limited geographical distribution. It is only in its native localities, the five small islets on the western coast of the large island of Gilolo, that it is easily grown, and attains the highest perfection. There, it bears in its seventh or eighth year, and lives to the age of 130 or 150. Rumphius informs us, that shortly before the arrival of the Portuguese it had been carried to and reared in Amboyna, where, however, it does not bear until its fifteenth year, and where the average duration of its life does not exceed 75 years. He informs us further that large islands are not favourable to its growth—that it succeeds indifferently even in such islands as Gilolo and Ceram, and that the natives of Celebes and Java who had attempted to grow it in their own countries had obtained plants which bore no fruit. Europeans, however, have succeeded somewhat better. The clove has been long transferred by them from the Moluccas to Sumatra,—to the islands in the Straits of Malacca,—to Bourbon,—to Zanzibar, on the eastern coast of Africa, and to Cayenne. In some of these places the culture has virtually failed, even where that of the nutmeg has succeeded, and everywhere the produce is of inferior quality to that even of Amboyna. A suitable soil seems to be as indispensable, as a suitable climate. The soil of the Molucca Islands is volcanic, which is not the case with any of the countries to which the tree has been transferred, except the Island of Bourbon, and here the suitable climate seems to be wanting. The clove appears, from Pigafetta's statement, to have been private property, and entirely free in culture and trade; Malays, Javanese, Chinese, Macassars, and Arabs, all competing for it in an open market. The annual quantity produced, according to him, in the five islands, seems to have been from 1500 to 2000 bahars; and the bahar is an Arabian weight, computed in the Moluccas at about 590 pounds. The companions of Magellan themselves loaded two ships with cloves at a single island, Tidor, after a stay, from their arrival to their departure, of no more than forty-four days. The Portuguese made their first appearance in the parent country of cloves in the year 1512: and having been expelled by the Dutch in 1605, they had the principal share of the clove trade for ninety-three years,—a period of rapine, violence, and bigotry. Their main object was the exclusive monopoly of spices, by the expulsion of all rivals. Their successors pursued the same object in a manner still more rigorous. They extirpated the clove trees in their native islands, and endeavoured to limit their growth to the five Amboyna islands, in which the clove is an exotic. Periodical expeditions for the extirpation of young plants that might spontaneously have sprung up, or been propagated by birds, formed part of this system. The clove monopoly still exists, but in a very tottering condition. The periodical exterminating expeditions have been merely nominal during the present century; and for the last thirty years, although the monopoly be persevered in, in the five Amboyna islands, where the parks, as they are called, are the property of the government, the culture and trade are legitimate everywhere else.—*Crawfurd Dictionary page* 104. The clove tree may be seen in a few gardens on the Tenasserim Coast, and cloves are abundant in the bazars. At the Madras Exhibition of 1855, *Cloves* were forwarded from Travancore, Tinnevelly, Canara, and Cochin. The plumpest and heaviest were from General Cullen's Gardens near Oodagherry, 1800 feet above the sea, these had a strong aromatic odour, and were of a dark brown colour; they were quite entire, and when pressed with the nail, the oil exuded.

The specimens from S. Warrier, Dewan of Cochin, and those from Tinnevelly District were almost equally good.—*M. E. J. R.* "The clove of Batavia is very dry, of a grey colour and appears to have been covered with plaster or lime (perhaps with talc). The clove of St. Lucea is of a whitish-yellow colour, and resembles the Cayenne clove with which it is frequently mixed. Cloves contain according to the analyses of Trommsdorf, volatile oil, 18: almost tasteless resin, 6; tannin, 13; difficulty-soluble extractive with tannin, 4; gum, 13; woody fibre, 28; and water, 18. The volatile oil is obtained from cloves by repeated distillation. The yield on an average is said to be from seventeen to twenty-two per cent. Cloves contain scarcely any starch. The quality and value of cloves are not unfrequently impaired like some other spices, by the abstraction of the essential oil. Cloves which have been thus deprived of their active properties, are distinguished by being light, shrivelled, not yielding oil when pressed upon, possessing but little aroma or taste, and by the frequent absence of the flower-bud. This fraud used to be extensively practised in Holland, the drawn cloves for more effectual concealment being mixed with others of good quality and even in some instances the trouble being taken to restore as nearly as possible to the exhausted cloves their original appearance by rubbing them over with some common oil. The volatile oil itself as imported into Britain from India has been found to be adulterated. Mr. McCulloch on the authority of Milburn states that the oil imported from India contains nearly half its weight of an insipid expressed oil which is discovered by dropping a little into spirits of wine and on shaking it the genuine oil mixes with the spirit and the insipid separating the fraud is detected. Cloves readily imbibe moisture whereby their weight becomes greatly increased; a fact of which dishonest dealers have not failed to avail themselves. Cloves are but seldom sold in powder, and hence the liability to adulteration is greatly lessened; they are however occasionally met with in that state. Clove-stalks although very inferior, contain some of the active properties of cloves and as already noticed are occasionally used by distillers for procuring the essential oil of cloves. We have reason to believe that in some cases the stalks are ground up and mixed with the powder of genuine cloves; this sophistication can be readily detected in a most satisfactory manner. The cloves-stalks present a structure somewhat similar to that of cloves themselves: that is they consist of cellular tissue hollowed out here and there into receptacles for the essential oil but in addition the stalks are provided with an epidermis or coating of the stellate cells which are of such frequent occurrence in different kinds of bark.—*Wood and its adulterations, page* 414.

(3504) EUGENIA JAMBOLANA.

Rose apple wood, ENG. | Burra jamoo and Race jamoo, HIND.
Pedda neroodoo and Sanna neroodoo, TEL. | Peroo naga Sinee naga, and Keatty naga marum, TAM.

This wood is said to be brittle and bad, but is described by Ainslie as fit for house building purposes.—*Wight.* In Burmah the bark is used as a mordant for blue and black dyes.—*Mason.* It grows to be a very large tree common everywhere both wild and cultivated, every soil and situation suiting it equally well, flowering time the beginning of the hot season, seed ripens in July and August. The wood is hard, close grained and durable. The bark is strongly astringent, and dyes excellent durable browns of various shades according to strength of decoction. The fruit is eaten when ripe by man and birds. They have a subacid astringent taste. There is a variety of the fruit in the Northern and mountainous parts of the Eastern Coast of superior quality and as large as a pigeon's egg.—*Rohde M.S.S.*

(3505) EUGENIA JAMBOS. Lin.

Jumboonawel pullum, TAM. | Jambo, CYNG.
Ghoolabijam, DUK. | Goolab-jamun, PERS.
Jembooneredei pundoo, TEL | Rose Apple, ENG.
Jamb, HIND. and MAL. | Raja Jemboo, SANS.

This tree bears a light whitish yellow fruit, pear shaped, with smooth skin, having a rose flavor: it is commonly cultivated in gardens on the coast. Hyderabad is the only part of the Deccan where it is known to flourish; many attempts have been made without success to rear it elsewhere. It is easily propagated by seed, and grows luxuriantly in a good garden soil. The red coloured species having the same flavor, is called the Jambo Malacca. E. Jambos, Syn. Jambosa vulgaris. The fruit of Eugenia Jambos is not much esteemed, and has got its English name from smelling like a rose.—*Ainslie, p.* 228. In Tenasserim, the rose apple described as "tasting like the smell of a rose," is cultivated to a small extent in European gardens.—*Mason.*

(3506) EUGENIA MALACCENSIS. Linn. JAMBOSA MALACCA.

Jamboo Malaca pullum, TAM. | Namball paio, MAL.

The tree which bears this fruit was first brought to India from Malacca. It is of the class Icosandria and order Monogynia. The produce somewhat resembles a pear in shape, is pleasant to the taste, and is reckoned very wholesome.—*Ainslie, page* 225. This tree thrives luxuriantly at Mergui, and bears some resemblance in taste to a juicy apple, but it is a very indifferent fruit.—*Mason.*

(3507) EUGENIA MICHELII is a Brazilian species, cultivated in Martinique where it is called Cerisier de Cayenne, as it yields a small edible fruit.—*Eng. Cyc.*

(3508) EUGENIA PIMENTA, the Allspice

Pimento, or Bayberry-Tree, is a native of South America and the West India Islands, especially Jamaica, and from being cultivated there is often called Jamaica Pepper. The tree is very handsome, often 30 feet high, and much resembles the Clove-Tree in the form and appearance of its leaves, as well as in habit. The trunk is smooth, and much branched towards the top. The older branches are round, the younger compressed, and the twigs as well as the flower-stalks pubescent; the leaves are petiolate, oblong or oval, smooth, and marked with pellucid dots, forming a dense evergreen foliage; the flower-stalks are both axillary and terminal, and are divided into 3-forked panicles; the flowers are small, without show, and conformable in structure to the character of the genus. The berry is spherical and crowned with the persistent calyx; when ripe, smooth, shining, and of a dark purple colour; usually 1-celled, occasionally 2-celled, containing large roundish seeds. The *Pimenta* is cultivated with great care in Jamaica, and abounds especially on the hills on the north side of the island. The trees are formed into regular walks, and begin to bear when three years old, but are not in perfection until they have been planted seven years. They thrive best in rocky lands, or a rich soil having a gravelly bottom. Mr. Bryan Edwards says that a single tree has been known to yield 150lbs. of the raw fruit, or 100lbs. of the dried spice; but the crop is uncertain, and plenteous perhaps only once in five years. The tree has been introduced into and flourishes in the southern parts of India. The berries, being the valuable part of the tree, require care in gathering as well as drying; the processes for which are described by Browne in his 'History of Jamaica,' page 248. They must be picked when they have arrived at full growth, but before they begin to ripen; they are dried in the sun, on raised boarded floors, and frequently turned during the first and second day; they are then put into sheets, often winnowed, and exposed to the sun until sufficiently dried, which is known by the colour and the rattling of the seeds in the berries. Browne says, "Such of the berries as come to full maturity do, like many other seeds, lose that aromatic warmth for which they are esteemed, and acquire a taste perfectly like that of Juniper Berries, which renders them a very agreeable food for the birds, the most industrious planters of these trees." The leaves and bark participate in the warm aromatic properties for which the berries are celebrated, and which have received their name of Allspice from their fragrant odour being thought to resemble that of a mixture of cinnamon, cloves, and nutmeg. Their taste being warm and aromatic makes them useful as a spice in cookery, and a stimulant in medicine.—*Eng. Cyc.* See ALLSPICE.

(3509) EUGENIA PULCHELLA. 1 Khwaytha-byai. Very plentiful in the Pegu and Toungh00 districts. 2. *E. myrtifolia*, 2 Thabaijeen. 3. *vulgaris*, 3 Thabyaitha-phan. 4. *ternifolia* and *jambolana*, 4 Thabyewtha-byai. Burm. also occur, but less plentifully than the first-mentioned species. They all afford excellent close-grained strong timber, but subject to the attack of white ants. Wood, red-colored, strong and adapted for house-building.—*McClelland.*

(3510) EULOPHIA (from εὖ, and λόφος, a crest), a genus of Plants belonging to the natural order *Orchidaceæ*. It has an open spreading perianth; the sepals and petals ascending, nearly equal, either quite distinct, or united with the more or less lengthened base of the column; the lip corned or shortly spurred, sessile, with the veins crested, bearded, or quite smooth, usually 3-lobed, sometimes undivided; the column half-terete, edged; the anther terminal, opercular; the pollen masses 2, waxy, 2-lobed, or hollowed out at the back, with a short linear caudicula, and a transverse gland. The species are terrestrial plants, with pseudo-bulbous rhizomata, long membranous plaited leaves, and radical many-flowered scapes. Most of the rhizomata and roots of the species of the family *Orchidaceæ* yield starch in a peculiar form. The roots of the species of *Orchis* are used in Europe under the name of Salep as an article of diet, and the same use is made of the rhizomata of a species of *Eulophia* in the East Indies. Although specimens of the plant were brought from Cashmere by Dr. Royle, they were not in a state of preservation to be identified. (Lindley, *Flora Medica.*)—*Eng. Cyc.*

(3511) EUONYMUS TINGENS. The bark in the inside is of a fine yellow colour similar to that of Rhamnus. It is used to mark the *Tika* on the forehead of the Hindus, and is considered by the natives to be useful in diseases of the eye (*Royle.*)—*O'Shaughnessy, page* 272.

(3512) EUPATORIUM, a genus of Plants belonging to the natural order *Compositæ*, the tribe *Eupatoriaceæ*, the sub-tribe *Eupatoriæ*, and the division *Adnostyle*. It has 3-100-flowered heads, a flat naked receptacle, the scales of the involucre in one or two or more rows, equal or unequal, loosely or closely imbricated, the throat of the corolla hardly dilated, the anthers inclosed, the arms of the style exerted, cylindrical, obtuse; the pappus in one row, hairy, rough.—*Eng. Cyc.*

(3513) EUPATORIUM AYAPANA.

Aya-pana, BEN.

Has subsessile, opposite, lanceolate, triple-nerved, acuminate, nearly entire, smooth leaves. It is originally a native of South America, on the right bank of the river Amazonas, whence it has been introduced into the East Indies. It has a stem shrubby at the base, branched, and smooth; the heads are pedicellate, and contain about 20 flo-

rets. An infusion of this plant is used in Brazil as a diuretic and diaphoretic. It has also been employed as an antidote against the bites of venomous serpents and insects. A quantity of the bruised leaves is laid upon the scarified wound, and the fresh juice is administered from time to time to the patient. The reputation of this plant for the bites of poisonous serpents, like that of many others, is probably undeserved. Other species of *Eupatorium* possess medicinal properties: *E. aromaticum* and *E. odoratum* have very fragrant roots; *E. perfoliatum* and *E. rotundifolium* have been employed in renal diseases and consumption. The *E. Guaco* of older botanists is now referred to the genus *Mikania*. (Burnett, *Outlines of Botany*; Lindley, *Flora Medica*; Lewis, *History of Materia Medica*.—*Eng. Cyc.* Odour slightly aromatic, agreeable, and balmy. Taste aromatic, astringent, and bitter. By Cadet de Gassicourt's analysis the stems and dried leaves appear to yield brown aromatic extract, volatile oil, gallic and benzoic acids. The infusion is very agreeable, resembling that of the coarser varieties of tea. The plant has had immense celebrity, and has been used in fever, cholera, tetanus, snake bites, and other most dangerous cases. All the romance about its extraordinary virtues are now however exploded; and we know it only as an agreeable and useful diaphoretic and gentle tonic.—*O'Shaughnessy*, *p.* 422.

(3514) EUPATORIUM PERFOLIATUM, or *bone-set*, is possessed of greater bitterness and less aroma, than E. Ayapana, and is stated to be employed with much success as an antiperiodic in the intermittent fevers of the United States of America.—*O'Shaughnessy*, *p.* 422-23.

(3515) EUPHORBIA, a genus of Exogenous Plants, giving its name to an extensive and important natural order. It has very small monandrous naked male flowers, crowded round an equally naked female one, in the inside of an involucre looking like a calyx, and formerly mistaken for that organ. The species have either a common leafy appearance, with the involucres proceeding from among large foliaceous bracts, or they are nearly leafless, with their stem excessively succulent, so as to resemble *Cacti*. Those with the former character are natives of most parts of the world, and are the only kinds found in Europe; succulent species chiefly appear in the hottest and driest countries. Barren uncultivated places in the plains of Hindustan, and the arid regions of Asia and the north of Africa are their favourite stations; in the Canaries, on volcanic soil, *E. Canariensis* and *E. laphylla* form great bushes with arms like candelabras. From *Cacti*, which some of these plants much resemble, they are readily known by their spines, when they have any, not growing in clusters, and by their emitting, when punctured, an abundant discharge of milky juice. This, in a concrete state, forms what is called the gum-resin, or rather resin, called *Euphorbium*, an acrid, corrosive most dangerous drug, principally furnished by *E. officinarum*, *E. antiquorum*, and *E. Canariensis*. The same properties exist in the herbaceous leafy species, diffused in some, concentrated in others. —*Eng. Cyc.* *E. peplus*, is purgative and emetic, in dose of 24 gr. *E. gerardiana*, *E. pithyusa*, *E xyloatica*, same effect, dose 15 to 24 gr.—*O'Shaughnessy*, *p.* 565.

(3516) EUPHORBIA AGRIA, (affinis species) grows in the mountains of Cashmere, where it is officinal. The root of this plant is sometimes as thick as an arm, knotty, with boughs, and is blackish, whence the Cashmerians call it the black Hirbee (Euphorbia) and consider it the strongest of all other species (white, yellow, etc.) A man who had taken such a root out of the ground not having observed the rule to have the wind, behind him, got a swollen face, from the powerful vapors.—*Honigberger*, *page* 274.

(3517) EUPHORBIA ANTIQUORUM. True Euphorbia.

Thuar, Hind.

E. antiquorum is common on barren and uncultivated lands all over India and Arabia Felix. It has a shrubby leafless succulent stem. The branches are spreading, triangular or quadrangular, the angles sinuated, and armed with double spines at the protuberances. The peduncles are solitary or in pairs, 3-flowered. There are only 5 stamens. The bark of the root when bruised in water is taken as a purgative. Some writers consider that this plant yields the drug *Euphorbium*, a resinous substance possessing acrid irritant properties. In all probability however this substance is chiefly obtained from *E. officinarum*. The Arabs make up violent diuretic pills by rubbing over the juice of *E. antiquorum* with flour, yet their camels will eat the branches when cooked. The juice of *E. heptagona*, *E. virosa*, and *E. cereiformis*, African species, furnishes the Ethiopians, and *E. continifolia*, the wild Brazilian, with a mortal poison for their arrows. The juice of the leaves of *E. nereifolia* is prescribed by the native practitioners of India internally as a purge and deobstruent, and externally, mixed with Margosa oil, in such cases of contracted limb as are induced by rheumatic affections. The leaves have no doubt a diuretic quality. Of the leafy Euphorbias great numbers are found to possess a milk with purgative or emetic qualities. The roots of some of the species are emetic. According to Deslongchamps the powdered root of *E. Gerardiana* is emetic in doses of 18 or 20 grains. The root of *E. Ipecacuanha* is said by Barton to be equal to the true Ipecacuanha—in some respects superior. *E. Pithyusa* is esteemed in the Mediterranean. *E. thymifolia* is somewhat aromatic and astrin-

gent, and is prescribed in India in the diarrhœa of children, and as a vermifuge. In the same way is employed *E. hypericifolia*, a plant of tropical America, which is astringent and somewhat narcotic. Nevertheless, *E. balsamifera* has no such qualities, and is eaten when cooked, *E. Mauritanica* is also employed as a condiment; but its acridity is unpleasant. It is said to be used in adulterating scammony. The sap of *E. phosphorea* shines with a phosphorescent light in a warm night in the ancient forests of Brazil. (Lindley, *Vegetable Kingdom.*)—*Eng. Cyc.* According to Dr. O'Shaughnessy, no Euphorbium resin is obtained from this species in India.—*O'Shaughnessy, page* 564. It occurs abundantly and other writers say that an immense quantity of gum resin, might be collected from it. The dried stalks are the cheapest of firewoods.—*Irvine.*

(3518) EUPHORBIA BOJERII. BOJER'S EUPHORBIA. This large scarlet-flowered species of euphorbia from Madagascar is very common in gardens in Tenasserim.—*Mason.*

(3519) EUPHORBIA CASHMEREANA TSOK, Tsuk—this root is of a dark brown colour, about an inch thick and is officinal in Cashmere.—*Honigberger. p.* 274

(3520) EUPHORBIA CYPARISSIAS. Syn. Tithymalus Cyparissias. Τιφυμαλος. Diosc. iv. 165. Europe. Root excessively acrid. Des Longchamps considers the bark of the root a good emetic in doses of 12 to 18 grains. —*O'Shaughnessy.*

(3521) EUPHORBIA CUTTIMUNDOO. This species and its product was discovered in the Northern Circars, and brought to public notice by Mr. Walter Elliot. See CUTTIMUNDOO.

(3522) EUPHORBIA EPITHYMOIDES, v. Euphorbia verrucosa.—*Honigberger, p.* 274.

(3523) EUPHORBIA HELIOSCOPIA, vegetates in the gardens of Cashmere. The juice is very acrid and irritating. The seeds of this plant are officinal, and combined with toasted pepper are recommended in Cholera.—*Honigberger, p.* 274.

(3524) EUPHORBIA IPECACHUANA. Action of root exactly like that of Ipecachuana, but more violent. It only requires to be given in proportionally small doses to be a perfect substitute for the best ipecachuan.—*O'Shaughnessy, page* 565.

(3525) EUPHORBIA LATHYRIS, Spurge. A common weed in cottage gardens, where it is called Caper, yields from its seeds an oil of the most violent purgative nature. If it were less dangerous it might be substituted for Tiglium oil. Fee states that with as much of this oil as could be sold for a franc ninety adults might be purged.—*Eng. Cyc.* The seed of this Euphorbium contains yellow fixed oil, stearine, acrid brown oil, crystalline matter, brown resin, an extractive colouring matter, and vegetable albumen. —*O'Shaughnessy, page* 565.

(3526) EUPHORBIA LIGULARIA, Bengal, Roxb. ii. p. 465.

Munsa sij, BENG.

A plant sacred to Munsa, the goddess of Serpents. The root of the tree mixed with black pepper is employed for the cure of snake bites, both internally and externally.—*O'Shaughnessy, page* 564.

(3527) EUPHORBIA LIGULATA. This large columnar *Euphorbia* is common all along the Soane, and is used everywhere for fencing. The *E. Neriifolia*; and the *E. Tirucalli* had been very rarely seen since leaving Calcutta.—*Hooker, Him. Jour. Vol.* 1. *page* 46

(3528) EUPHORBIA LITCHI. This fruit tree, introduced into India from China, attains a height of 25 to 30 feet but does not ripen its fruit at Madras.—*Hort. Gard.* 18.

(3529) EUPHORBIA LONGIFOLIA, its yellow root is long and smooth from about half an inch to an inch in diameter and is called the yellow Hirbee. This species is used at Lahore as well as in Cashmere. The Cashmerean Surgeons apply it in fistulous sores, etc.—*Honigberger, page* 275.

(3530) EUPHORBIA NERIIFOLIA, OLEANDER LEAVED EUPHORBIA. Roxb. ii. p. 467. E. Nivulia, Hamilton.

Patteoon, DUK.	Ela-Kullie, TAM.
Pattakarie, SANS.	Sij, HIND.

Branches round, otherwise like last species, juice used by the natives as a purgative, externally as a stimulant in rheumatism and contracted limbs; leaves diuretic.—*O'Shaughnessy, page* 565. Grows all over the rocky parts of the Deccan. It has a whitish dead appearance except during the rains, and forms a capital fence round fields, &c.—*Riddell.* Abundant over all the Hills within some miles of Ajmeer.—*Irvine.*

(3531) EUPHORBIA OFFICINARUM. Arabia, and Africa. Mr. Pereira considers the Mogadore Euphorbium resin to be produced by this species, which has a bright crimson flour.—*O'Shaughnessy, page* 564.

(3532) EUPHORBIA PILULIFERA. UMAWM PATCHEH-ARISE, T.—An abundant weed to be found every where; used but seldom, mixed with others as greens.

(3533) EUPHORBIA THYMIFOLIA. All over India. Thyme-leaved Euphorbia.

Shwet keerooi, BENG.	Dudhi, HIND.
Racta vinda chada, SANS.	

A little annual plant, flowers white and red,

juice of stalks and flowers a violent purgative, fresh plant applied to wounds by the Arabs, leaves and seeds given by the Tamools in worm cases, and in the bowel affections of children.—*O'Shaughnessy, p.* 565. Euphorbia thymifolia vegetates at Lahore, but is seldom used. The natives call this plant the greater milky one, on account of its erect stalks and milky juice. The former creep along the ground. The juice of the stalk and flowers is said to possess violent purgative qualities. The leaves I used both of this and of the abovementioned, were not very acrid. A very common weed every where in the plains.—*Dr. Honigberger, page* 275.

(3534) EUPHORBIA TIRUCALLI. Milk hedge, *Roxb. Fl. Ind.* ii. *page* 370.

Lunka sij, BENG.	Sendh, HIN.
Milk-hedge, ENG.	Kulli, TAM.—*O'Shaugh.*

Euphorbia Tirucalli has erect naked round branches, which are succulent, polished, and abounding in milky juice. The leaves are small, linear, fleshy, sessile, and at the ends of the twigs. The flowers are crowded, sub-sessile, terminal, and axillary; the lobes of the involucre are five in number, roundish, smooth, and peltate; the tube woolly on the inside. The capsule is villous. The milk when introduced into the eye produces severe inflammation and even blindness. It is used medicinally in India.—*Eng. Cyc.* This plant is much used for making hedges, and from its continual green appearance is well adapted for the purpose. It grows best either upon a bank, or wall of large stones laid loosely for the purpose, having a good cover of earth upon it. Any cuttings will grow, and the plant if by itself will attain the height of twenty feet or more. The wood makes the best charcoal for gunpowder. A parasite of a yellow thread-like appearance, and leafless, (the Cassytha filiformis) is very destructive to it, and will totally destroy a tree or a whole hedge in a short time, if not removed.—*Riddell.* Wood light colored, the root of old shrubs is understood to be well adapted for gun stocks, but plants of sufficient age are seldom met with.—*Madras Exhibition of* 1855. The milk mixed with flour, in doses of a drachm daily is, an Indian specific in syphilis. The inspissated milk is a violent emetic and purgative.—*O'Shaughnessy, page* 563.

(3535) EUPHORBIA TITHYMALOIDES. The Slipper Plant. This is thick deep-green leafed plant: it grows about three feet high, but if kept trimmed may be used for a border to a flower parterre, for which purpose it is admirably adapted. It suffers nothing by cutting, and if occasionally watered is always green. It grows well from slips; bears a small pink flower, and can be kept at any height. It is sometimes called buckthorn.—*Riddell.*

(3536) EUPHORBIA TORTILIS. Rottl. Tirooghoocullie.

Tirooghoocully, TAM.	Jemoodoo, TEL.
Peelie sayad DUK.	Vajratoonda, SANS.
Azfur sukkoom, ARAB.	

The milky juice of this plant, which has got its Tamul name from its branches being as it were scolloped and twisted, is very similar in its appearance and nature to that of the Euphorbia antiquorum, and is a very powerful cathartic and deobstruent: it is prescribed in small doses in conjunction with Palmira jaggery. In its undulated state it acts as a vesicatory but when mixed with a certain portion of castor oil it forms a useful embrocation in cases of Palsy and chronic Rheumatism. The flowers of this jungle plant Dr. Ainslie had never seen. The plant itself would appear to differ from the Euphorbia antiquorum chiefly in the shape of its branches which in place of being three sided and distinct, are contorted, undulating and, as it were, scolloped, are of a yellow green colour, and contain much more milky juice.—*Ain's Mat. Med. p.* 120.

(3537) EUPHORBIA TRIBULOIDES, has a stem about two inches high and one inch broad, ovate, fleshy, quadrangular, having two opposite, stalked, ovate spathulate leaves growing from its base. The prickles are in pairs, white, clustered on the margin of the angles. It is said to be a sudorific.—*Eng. Cyc.*

(3538) EUPHORBIA VARIEGATA, will be raised from seed in any common garden soil.—*Riddell.*

(3539) EUPHORBIACEÆ, SPURGEWORTS, a natural order of Exogenous Plants with definite suspended anatropal ovules, scattered flowers, and tricoccous fruit. The genera consist of trees, shrubs, or herbaceous plants, often abounding in acrid milk. The leaves are mostly opposite or alternate, simple, rarely compound, often with stipules. The flowers are axillary or terminal, arranged in various ways, sometimes inclosed within an involucre resembling a calyx; flowers monœcious and dicœcious. The calyx inferior, with various glandular or scaly internal America, not above an eighth having been found in tropical Africa, including the islands; a sixth is about the proportion in India. A good many species inhabit the Cape, where, and in the north of Africa, they often assume a succulent habit; and there are about 120 species from Europe, including the basin of the Mediterranean, of which 16 are found in Great Britain, and 7 in Sweden. A large number of these plants are poisonous. The poisonous principle resides chiefly in their milky secretion. The hairs of some are stinging. The bark of many is aromatic; and the flowers of some tonic. Many are used in medicine, such as *Croton, Cascarilla*, and *Euphorbia*. The stimulating poisonous principle however appears to be volatile since the action

of heat is sufficient to dispel it. Thus the starchy root of the Manihot, or Cassava, which when raw is a violent poison, becomes a wholesome nutritious food when roasted. Some yield a fixed oil from their seeds, as the species of *Elaeococca*. For further particulars respecting the important and various properties of the species of this order, see Pedilanthus, Croton, Buxus, Cascarilla, Jatropha, Ricinus, and Euphorbia. The order contains 191 genera, and 2800 species.—*Eng. Cyc.*

(3540) EUPHORBIUM.

Furfioon, Akal-nafzah, Gholak, kala, ARAB.	Sayud-ka dood, Nara shij. HIND.
Nara-shij, BENG.	Euphorbium, LAT.
Dalookgaleh-keery, CING.	Vajrakshira. Vajrakantaka. SANS.
Sayud-ka dood, DUK.	Shadraykullie pall, TAM.
Euphorbe. FR.	Bonta-jeemmoodoo paloo TEL.
Euphorbien gummi, GER.	

The produce of a perennial plant, a native of Africa, and of many parts of India, &c. It is a concrete gum-resin; is inodorous; when first chewed has little taste, but it soon gives an acrid burning impression to the tongue, palate, and throat, which is very permanent and almost insupportable. It is met with in small, hollow, forked pieces, often mixed with seed, and other impurities. *Thomson's Chemistry.—Faulkner.*

(3541) EUPHRASIA (from εὐφρασια, delight) a genus of Plants belonging to the natural order *Scrophulariaceae* or *Ecrophularineae*. It has a campanulate 4-cleft calyx; the upper lip of the corolla galeate, emarginate, the lower larger, spreading, with the middle lobe emarginate; 4 stamens, fertile, the lower cells of the upper anthers with a long spur; the capsules oblong-ovate, compressed, emarginate, with entire valves; the seeds few.—*Eng. Cyc.*

(3542) EUPHRASIA OFFICINALIS. Euphrasy. Eye-bright, has ovate or cordate-ovate nearly sessily serrate leaves, the corolla glabrous, the lobes of the lower lip emarginate, of the upper lip patent sinuate-dentate, the anthers unequally mucronate, hairy. It is from one to four inches high, and is a native of the heaths and pastures of Europe, the Himalaya mountains, Cashmere, and all the north of Asia. It is common in Great Britain. This species is particularly subject to variation. The leaves are ovate, or cordate-ovate, or cordate-triangular, with the teeth acute or obtuse, ascending or spreading. The capsule also varies much in shape. There is scarcely a character permanent except the pubescence of the corolla. This elegant little plant has a slightly bitter and aromatic flavour, and has been employed much in medicine, particularly in disease of the eye. Its use in these complaints seems to have originated in its bright appearance, and when the doctrine of signs and seals prevailed this was supposed to indicate its value in brightening the eyes. Although it has lately fallen into disuse its astringent effect is undoubtedly of value in certain diseases of the eye, and will explain the fact that Professor Kramichfeld has related of its being useful in catarrhal affections of the eye. The expressed juice and distilled water of this plant have been the forms in which it have been employed.—*Eng. Cyc.* Eye-bright is a pretty plant, slightly bitter and aromatic, once celebrated as an application to weak eyes, but now seldom or never employed.—*O'Shaughnessy, p.* 478.

(3543) EURYALE, (after one of the Gorgons, in allusion to the threatening armed appearance of the plant), a genus of Plants belonging to the natural order *Nymphoeaceae*. It has a calyx of 4 sepals inserted in the torus, and adhering to it; 16-28 petals; numerous stamens; 16-20 carpels; the fruit half-inferior, arising from the sepals; petals and stamens adhering half-way up. There is but one species of this genus, *E. ferox*, which is an elegant aquatic, covered all over with prickles, with large peltate orbicular leaves, and bluish-purple or violet flowers, about the size of those of the yellow water-lily. It is a native of the East Indies in the Gumtoe and Gogra, also in the province of Kianang in China. This plant presents a very singular appearance. Its petioles and calyces are hispid with stiff prickles. The leaves are about a foot in diameter. The root or root-stock contains starch, which may be separated as food, or the roof may be eaten, as is done by the inhabitants of the districts where it grows. In cultivation, this plant must be kept in water in a hotbed or stove. It will produce seeds if the pollen of the anthers, when it is in full bloom, be shaken on the stigmas. It can only be propagated by means of its seeds.—*Eng. Cyc.*

(3544) EURYALE FEROX. An Indian water-lily with a small red flower covered everywhere with prickles, and so closely allied to *Victoria regia* as to be scarcely generically distinguishable from it. It grows in the eastern Sunderbunds, and also in Kashmir. The discoverer of Victoria called the latter "*Euryale Amazonica.*" These interesting plants are growing side by side in the new Victoria house at Kew. The Chinese species has been erroneously considered different from the Indian one. The fruit of *Euryale ferox*, is round, soft, pulpy, and the size of a small orange; contains from eight to fifteen round black seeds as large as peas, which are full of flour, and are eaten roasted in India and China, in which latter country the plant is said to have been in cultivation for upwards of 3000 years.—*Hooker Himalayan Journ. Vol. ii. p.* 255.

(3545) EURYCLES AMBOINENSIS. A fragrant white flowering bulb of the amaryllis tribe, and of the genus eurycles, is not uncommon in native gardens of Tenasserim.—*Mason.*

(3551) EVOLVULUS EMARGINATUS.—Lin.

Yelichavy keeray, TAM. | Shamburdie, SANS.
Yellakachevie koora, TEL.

This is the green of a plant of the class Pentandria and order Tetragynia.—*Ainslie's Mat. Med. page* 258.

(3552) EXACUM. *Sibth. Prod.* N. 135 Tetrandria Monogynia. Dr. Wight gives the following species, Exacum bicolor, 1321; Courtallense, 1323; *hyssopifolium*, 600; pedunculare, 336; Perrottetii, 1322; petiolare, 1324; pumilum, 1324; sessile, 1324; Wightianum, 840; and Zeylanicum, 1322.

(3553) EXACUM BICOLOR, Nat. Ord. Gentianeæ, Country kreat, *Eng.* The plant grows in Cuttack, at Mangalore and on the Neilgherries and has long been used as a bitter tonic.—*Ind. Ar: No.* 6. It grows, rare, on the Neilgherries, below Kotagherry, and abundant a mile below Nedawattum, where it flowers during the autumnal months. This species enamels the swards of the Western Ghauts with its beautiful blossoms, has the same bitter stomachic principles for which the Gentiana lutea is so much employed, and it is believed may be used with advantage in lieu of Gentian, for medicinal purposes. It is known in Mangalore as country creat, and sold there at 1 anna 6 pie per lb. The infusion of *E. bicolor*, is a mild pure bitter.

(3554) EXACUM TETRAGONUM, Nat. Ord. Gentianæ Ooda Cheretta *Hind.* purple *Chiretta.* Koochuri *Bengalies.* A most elegant plant, used as a tonic bitter.

(3555) EXCÆCARIA, a genus of Plants belonging to the natural order *Euphorbiaceæ.* It has monœcious or dioecious amentaceous flowers; the sterile flowers nothing but staminiferous bracts; the stamens 7-9, united into about three parcels, all connected at the base; the fertile flowers with the calyx 3-fid or absent; the style 3-parted; the capsule 3-coccous.—*English Cyc.* Wight figures Exæcaria Agallocha, 1865; crenulata, 1865; and oppositifolia, 1865.

(3556) EXŒCARIA AGALLOCHA. Aloe wood? Arbor excæcans, *Rumph.* Amb. ii. t. 79, 80. East Indies.

Ugoorpo, Sundarbunds. | Bone hayaga, BURM.
Bing.

Wood knotty, grey or blackish, smooth, and resinous.—*O'Shaughnessy, page* 563. *E. Agallocha* is a small crooked stunted tree, with alternate leaves about the extremities of the branches, stalked, ovate, or cordate, but usually acute at the base, smooth on both sides, remotely and slightly serrate, pointed with two glands at the base, and about two inches long; the petioles about an inch long, smooth, channelled; the stipules small, fine-pointed. The trunk of this plant abounds in a virulently acrid milk, which acts as a powerful poison. Roxburgh says that wood-cutters who accidentally injure this tree have inflammations and ulcerations on those parts of the body where the milk touches. Rumphius calls this tree 'Arbor excæcans,' and says that the Dutch sailors, who were sent ashore at Amboyna to cut down timber, became furiously mad from the pain produced by the juice of this tree getting into their eyes, and that some of them lost their sight altogether. This tree is common in various parts of the continent of India, and in the Indian Islands, especially near the coast. Its specific name appears to have been given it on the supposition that it was one of the plants that yielded the *Agallochum*, or Aloes-wood, but this is not the case, and this wood is yielded by a different family of plants.—*Eng. Cyc.* This is plentiful in the Rangoon and Tounghoo districts. The wood is white colored, adapted to every purpose of house-building.—*McClelland.*

(3557) EXOCETUS, a genus of Fishes belonging to the Abdominal *Malacopterygii*, forming part of the family *Esocidoe.* The distinguishing characters are—pectoral fins nearly equal to the body in length; head flattened above and on the sides; the lower part of the body furnished with a longitudinal series of carinated scales on each side; dorsal fin placed above the anal; eyes large; jaws furnished with small pointed teeth.—*Eng. Cyc.*

(3558) EXILE TREE. Thevetia neriifolia.

F

(3559) [illegible] genus of Plants belonging to the natural order *Leguminosæ.* It has a tubular 5-cleft or 5-toothed calx, with the two superior teeth shortest. The style is villous at the apex. The legume is large and coriaceous, lined with short hairs, and containing several large flat seeds. The leaves are almost without tendrils, and the stem is erect. The flowers are white or [illegible].—*Eng. Cyc.*

(3560) FABA VULGARIS, the Common Bean, has thick leaves with 2-5 broad oval mucronate leaflets. It has semi-sagittate oval stipules, and the teeth of the calyx are almost linear. This plant is much cultivated, and subject to considerable variety. Its seeds differ [illegible] sometimes round and comparatively small, at other times large and flat. The flowers are mostly white, with a black or blue milky spot in the middle of the two lateral petals called wings. The Common Bean is said to be found wild in Persia, no

far from the Caspian Sea, but it is one of those plants, which, having from time immemorial been cultivated by man, may have anywhere been introduced by his agency. It does not occur wild in the countries of Europe, where it grows most luxuriously under the care of man.—*Eng. Cyc.*

(3561) FABACEÆ, *Leguminous Plants*, a name proposed by Dudley in his 'Vegetable Kingdom' for the natural order *Leguminosæ*.—*Eng. Cyc.*

(3562) FAGHURRA JABRONG a spice of Assam and Himalayas.

(3563) FAGOPYRUM, a genus of Plants belonging to the natural order *Polygonaceæ*. It has a 5-parted perianth, 8 stamens, 3 styles, a 1-seeded trigonous nut, a central embryo, and large foliaceous contorto-plicate cotyledons There is but one British species of this plant, the *F. esculentum*. This is the *Polygonum Fagopyrum* of Smith, and known as the common Buck-Wheat. It has an erect stem without prickles, the flowers in cymose panicles, 8 stamens, leaves cordate, sagittate, acute, a triquetrous acute nut, with entire angles. This is a valuable plant, as it grows on the worst and poorest soils, and is often sown as food for game. Though now admitted into the British Flora, there can be no doubt that it was originally a native of Persia and other Asiatic countries. It was introduced into Europe by the Crusaders; and hence in many parts of France, where it is commonly grown, is called Saracen Corn; and so much is it esteemed in Belgium, that M. Bory St-Vincent says he was shown the tomb of the person who is reported to have first brought it into that country. (Babington, *Manual of British Botany*; Burnett, *Outlines of Botany*.—*Eng. Cyc.*

(3564) FAGRÆA FRAGRANS. This fagræa, in Tenasserim, yields a very hard and excellent timber, which Mr. O'Riley says the teredo will not attack. The Burmese regard it as too good for the laity, and say it ought to be confined to sacerdotal purposes. At Tavoy, it is used principally for the posts of Buddhist edifices —*Mason*. Dr. Wight figures. Fagræa Coromandelina, 1316; Malabarica, 1317; and Zeylanica, 1317;

(3565) FALCONIDÆ, Leach's name for a family of Raptorial Birds, or birds of prey (Raptores of Illiger). In this family the destructive power is considered by all zoologists to be most perfectly developed; and we find in the birds composing it natural instruments for striking trussing, and dissecting their prey, combined with a power of flight and strength of limbs equivalent to the necessities of the case, whether the prey be aerial, that is, whether it be the habit of the raptorial bird in question to strike down its quarry while the latter is in the act of flight, or whether the prey be terrestrial, or, in other words, captured on the ground.—*Eng. Cyc.* See BIRDS OF ASIA.

(3566 FALSA, *Grewia Asiatica*.

(3567) FANAM, a small silver coin, the 1-12th of a rupee formerly current in the Carnatic: no longer coined.

(3568) FAN PALMS, the Chamærops humilis Linn: used for this purpose grows in considerable abundance on the shores of the Mediterranean. The leaves of many of the palms of southern Asia, the Corypha and Date palms, are similarly employed.

(3569) FANS of China are principally exported to the United States; a few go to India and South America. Those sent abroad are made of palm leaf and paper; feather and silken ones are not so often shipped Fire-screens are included under this head as well as fans; these are lackered. In 1836-7, 171,143 fans and five-screens were shipped to America, at $1½ per thousand, and 2,200 feather fans to 40 cents each. According to the old duty, 100 fans paid 1½ mace duty. The greatest part of the fans sent abroad are those which do not fold up.—*Morrison*.

(3570) FARINACEOUS FOODS, those sold in London and their composition, etc.*

Gardiner's Alimentary Preparation.—Consists entirely of rice, reduced to the state of an extremely fine powder which crepitates, under pressure, in the same manner as do most of the arrowroots.

Leath's Alimentary Farina, or Homœopathic Farinaceous Food.—Consists principally of Wheat flour, slightly baked, and sweetened with sugar, together with Potato-flour, and a very small quantity of Indian-corn meal and tapioca.

Semolina.—Consists of the gluten of wheat, with a certain proportion of the starch, part of this having been removed. Semolina resembles in appearance sago but the little granules of which it is composed in place of being round as in sago are angular. When moistened the water is rendered perceptibly opaque and milky by the starch still present and the fragments swell up and become soft and glutinous. Semolina is not a proprietary article, it is kept by most corn chandlers and many grocers and oilmen.

Prince Arthur's Farinaceous Food—Consists entirely of Wheat Flour slightly baked.

Prince of Wales' Food—Consists entirely of potato Flour.

Hard's Farinaceous Food.—Consists entirely of wheat-Flour baked.

Maidman's Nutritious Farina—Consists of Potato flour artificially coloured of a pink or rosy hue the colouring matter probably being Rose Pink.

Bradense Farinaceous Food—Consists of wheat-flour baked.

Jones's Patent Flour—Consists of wheat-flour with Tartaric Acid and Carbonate of soda.

Soojee—Consists of Wheat Flour sweetened with sugar. Baxter's Compounded [illegible] consists of Wheat Flour sweetened with sugar. [illegible]'s Improved Farinaceous Food consists principally of Bean or Pea-Flour, most probably the former, with a little Tuca, Arrow-Root, some Potato-Flour, and a very little Maranta Arrow-Root.

Vitaroborant.—Consists of a mixture sweetened with sugar of the Red or Egyptian Lentil and Wheat-Flour, the latter in considerable amount. Vitaroborant bears considerable resemblance to Du Barry's Revalenta and is sold at 2s. per pound,—*Food and its adulterations*, *p.* 250.

(3571) FARFUGIUM GRANDE. Mr. Fortune says at Ningpo, in the garden of an old Chinese gentleman there, he met with a beautiful new herbaceous plant, having rich blotched or variegated leaves which has since been named as above by Dr. Lindley. It was growing in a neat flower-pot, and was evidently much prized by its possessor, and well it might for it was the most striking looking plant in his garden. He informed Mr. Fortune that he had received it from Peking the year before, and that at present it was very rare in Ningpo, but he thought his visitor might be able to procure a plant or two from a nursery-man in the town, to whom he had given a few roots. He lost no time in paying a visit to the nursery indicated and secured the prize. It has reached England in safety, and will shortly be a great ornament to the houses and gardens there.—*A. Res. among the Chinese p.* 420.

(3572) FEATHERS, (Bed.)

Bedveern, Pluimen, Dut.	Par, Guz Hind.
Plumes, Plumes a lit, Fr.	Piume, It.
Federn, Bettfedern, Ger.	Plumas, Sp.

Are procured from common poultry; but the most esteemed, however, are those of the goose, which are best when plucked from the living animal. They are used for beds, pillows, &c.—*Faulkner*.

(3573) FEATHERS. The preparation of the feathers of various birds for ornamental purposes forms the art of the *plumassier*, the French term for the artisan who works on them and combines them into their various forms, according as they are wanted for military use, or for purposes of the toilette. The feathers most esteemed in Europe are those of the ostrich, which are accordingly imported from the African shores in considerable quantities. The west of Europe is chiefly supplied from the northern margin of the Great Desert. Those plucked from the living animal are far more beautiful, as well as more durable, than those taken from the animal some time after death. But the feathers obtained from recently killed birds have the same qualities as the living ones, and are far superior to the cast or dropped feathers. The plumage of the male bird, as is generally the case in all varieties of the feathered race, is very superior to that of the female, the fine drooping plumes on the back and near the tail being of the purest white, while those of the female are never free from a tinge of grey near the tip. In preparing the feathers for use, they are first tied together in bundles, plunged into tepid soap-and-water, and rubbed with the hand to free them from grease. After remaining in it for a few minutes, they are washed several times in pure water, as hot as the hand can bear, to rid them of the soap. Then they are bleached by being placed for a quarter of an hour in boiling water, holding in solution Spanish-white, the solution being frequently agitated during the time, and the feathers washed in pure water on their removal. The next process is to pass the feathers quickly through a bath of cold water tinted with indigo, and the final one consists in sulphuring them in the same way as straw hats are done, and then hanging them up to dry. The ribs of the feathers are scraped to render them pliant, and the filaments are curled by drawing the edge of a blunt knife over them. Feathers are made to take a variety of beautiful colours, and of these rose colour is given with safflower and lemon-juice, and deeper shades of red by a boiling bath of Brazil wood, and subsequently a bath of cudbear. Indigo supplies the blues, and turmeric the yellows, alum being the usual mordant. Various shades are obtained by mixtures of the above dyes in different proportions. Besides the ornamental purposes to which feathers are applied, there are highly useful ones, of which we all reap the benefit in the comfortable beds they supply, and in the facility with which their quills are converted into organs of communication. For bed feathers, those of the goose are employed, being dried in the air, in the sun, or in an oven, and also beaten many times. The down of the eider duck, a bird which is only found in northern countries, is remarkable for its lightness, and is very valuable for making quilts; but this down should never be employed for sleeping on, as it thereby loses its elasticity. Goose feathers unite all the qualities required in beds, namely, softness, elasticity, lightness, and warmth. After long use it becomes necessary to purify the feathers which have been used for beds, but this cannot be done by washing, as with wool or cotton. Sometimes they are put into large metal cylinder, the double end of which receives the fire, and then agitated with sticks and beaten in order to be employed again; this operation, however, dries the feathers very much. A much better mode of purification consists in keeping the feathers moving in rotation, during a convenient time, in a cylinder with double partitions, between which steam is introduced. The feathers are exposed during several instants

to the action of the steam of water and are then dried by simple exposure to the air.—*Tomlinson.* Commercially is celebrated for its feathers. They are either prepared singly for head-dresses, or made into tippets, boas, and muffs, some of them are exceedingly beautiful and apparently not inferior in quality to those imported into Great Britain from Africa.—*Mr. Taylor.* The Down of the young Adjutant Crane (Ciconia Argala) and of other cranes, are made into Ladies' Boas and Victorines. The Adjutant is very rarely found in Southern India, but a kindred species the Ciconia alba, (Jerdon) is pretty common. Of this the under tail coverts are collected and sold in considerable quantity. Many are procured at Trichoor in Malabar.—*M. E. J. R.* In Madras, of all the dealers in bird's feathers, Hoossain Saib is the only person now remaining: he lives in Anguppah Naik's street, Black Town, and carries on this trade on an extensive scale:—he has nearly 100 sets, each composed of 4 or 5 shikarees and one cook—most of these people are koravahs (basket makers) who live in and about Madras. Each set has its head man who is responsible for the others. These sets are sent out once a year, each receiving from 20 to 100 Rupees together with a certain number of nets, a knife &c.—they traverse various countries between Bombay, Delhi, Benares, Calcutta and all over the Deccan, collecting the feathers of the birds (king-fishers) and return after 6 or 8 months to Madras (each set bringing from 1000 to 6000 feathers) i. e. according to the amount they receive; they deliver the feathers to the Merchant who settles their accounts, at once, rating them at 14 Rupees per hundred and they then return to their houses and do not go out for the next 6 months. The Merchant subsequently watches for an opportunity to dispose of the feathers at Madras to the Birmese and, if he fails here, ships them off to Penang, Singapore and Malacca, and sometimes direct to China, where they are much required and sold at 10 or 13 dollars per cent. The whole of the shikarees have their families who receive monthly allowances in the absence of their husbands, brothers, fathers &c. They are trustworthy people, because the merchant trusts to their simple agreement and pays them any sum they require.—*Madras Central Committee for Exhibition of* 1851.

(3574) FELIDÆ, or FELINA, a Family of the Cat kind, of the order *Carnivora*, in which the organs of destruction reach their highest development. They are, among the quadrupeds, what the *Falconidæ* are among the Birds. Sometimes this family is made to include the Dogs, Hyænas, Wolves, and smaller *Carnivora*. We shall confine ourselves here to the members of the tribe *Felina* of Dr. J. E. Gray, comprising the Cats, Lions, Tigers, Leopards, and Lynxes. The principal instruments of the destructive energy of these animals are the teeth and claws. The dental formula in these animals is the following:

$$\text{Incisors, } \frac{6}{6}; \text{ canines, } \frac{1-1}{1-1}; \text{ molars, } \frac{4-4}{3-3} = 30.$$

It will be advantageous to be put in possession of M. Temminck's well-considered and digested monograph of the genus *Felis*, divided into two sections, according to their geographical distribution.

Section 1.

This comprises the *Felidæ* of the Old Continent and its archipelagos.

Species.

Felis Leo, including the three varieties of Barbary, Senegal, and Persia.

Felis Tigris, the Royal Tiger.

Felis jubata, the Hunting Leopard.

Felis Pardus, the Panther. Of this M. Temminck gives the following character:—When adult, less than the Leopard. Tail as long as the body and the head, its extremity when turned back reaching to the tip of the nose; colour of the fur deep-yellowish fulvous, its internal parts marked with rose-like spots of the same hue as the ground-colour of the fur; the numerous spots closely approximated; the rose-like spots from 12 to 14 lines at the utmost in diameter; caudal vertebræ 28.—N. B. The number of caudal vertebræ assigned to the Leopard by M. Temminck is 22. It would appear that there is no correct figure of the true Panther. The Black Tiger, *Felis melas*, Riman Kumbang of Sir Stamford Raffles, is considered as only a dark variety of the Leopard.

Felis macrocelis, the Rimau-Dahan.

Felis cervaria, the Lynx.

Felis Catus.

Felis maniculata.

Felis minuta, identical with the *F. Javanensis* of Horsfield's 'Zoological Researches in Java,' and therefore not to be adopted.

Felis Leo, var. *Goojrattensis*, Smee; *F. Leo*, Linn, Morocco, Nubia, Ushantee, Mozambique,	Lion.
Felis Tigris, Linn. Goa, Baroda, Bengal, ...	Tiger.
Felis Pardus, Linn. Western Africa, South Africa, Ceylon, India, Malacca, ...	Leopard.
Felis jubata, Sch. Nubia, South Africa, India, ...	Cheetah.
Felis macrocelis. Java, ...	Riman-Dihan.
Felis viverrina, Bennett. Bengal, ...	Wagati.
Felis Chaus, Guldenstedt. Egypt, ...	Marsh Cat.
Felis Caracal, Schreber. Gambia, Bombay, Nubia, ...	Caracal.

Eng. Cyc.

(3575) FELSPAR, a Mineral which occurs in very part of the earth, and is one of the consti- uents of granite. It occurs crystalline and mas- ive. The primary form of the crystal is an ob- que rhombic prism. Colour white, [illegible] ed, of different shades. Trans[illegible] hat, or opaque. Lustre vitreous, [illegible] ity 2·5 to 2·6. Hardness, 6·0. [illegible] h-white. Cleavage parallel to the terminal lane and oblique diagonal.—*Eng. Cyc.*

(3576) FENNEL FLOWER. NIGELLA SATIVA. Lin.

arin Serigum, TAM.	Nulla zilakara, TEL.
olunjan, ARAB.	Calonjira, HIND.
oonecz, ARAB.	Mangvi, SANS.
eadanch, PERS.	

This aromatic seed is used by the Native Practioners of Southern India, in cases of indigestion d in certain bowel complaints, it is also prescribed as an external application, when mixed th gingelie oil, in eruptions of the skin. The tives have a notion that, when put amongst their en, it keeps away insects.—*Ainslie's Mat. Med.* 15. In Tenasserim, the seeds of this plant, hich were formerly used for pepper, are valued the inhabitants for their carminative proper- s, but the plant is rarely seen in cultivation. he Hebrew word, which in Isaiah is rendered *ches* designates this plant; but not in Ezekiel here the original word for fitches signifies spelt, species of wheat.—*Mason*

(3577) FENNEL FLOWER OIL. NIGELLA TIVA.

Carun Seeragum, TAM.	Kulanjee and Siah danah,
Nulla Gilikarra TEL.	HIND.

The black aromatic seeds of the nigella sativa ld by expression a dark colored fragrant oil. -*Madras Exn. Ju. Rep.*

(3578) FENNEL SEED, SWEET. ANETHUM FŒNICULUM, Lin.

zeeanuj, ARAB.	Adas JAV.
wadooreo, CYNG.	Badeeyan, PERS.
nf, DUK.	Madhurika SANS.
nouil, FR.	Perun-Siragum, TAM.
urrialee, Maytri, Guz, & HIND.	Pedda-gillakara, TEL.

The fragrant, warm, aromatic seeds of the eet fennel, which are much used by native ctitioners as a carminative and stomachic. e plant is cultivated in Bengal, in some parts the Bombay Presidency and in great abun- nce in many parts of India. The Natives use as we do, as a carminative and stomachic: by ropeans as well as Natives, it is apt to be ufounded with Anise seed, which is very scarce the southern parts of the Peninsula, and the khanie name for both is the same.—*Ainslie, t Med. p.* 16.

(3579) FENUGREEK. TRIGONELLA FŒNUM GRŒCUM,

Vendium, TAM.	Methee, HIND.
Menthiloo, TEL.	

(3580) FENUGREEK SEED.

Holbeth, ARAB.	Methee, Methee, Guz. Hind.
Methesha, PERS.	Menthi, PERS.
Menta-Sagra, Methi, Guz.	Methee, Port.
Oolowa, CYNG.	Methee, Rus.
Methee, DUK.	Methee, SPA.
Fenugrek, FR.	Methee, TAL.

These seed have rather an unpleasant odour, with an unctuous farinaceous taste, accompanied with a degree of bitterness. They are much used by native practitioners in dysenteric complaints; and also as an ingredient in curries. The plant is a native of the South of Europe, and is cultivated in Asia-minor, and India.—*Faulkner.*

(3581) FERNS, the common name for a group of Cryptogamous Plants. [FILICES; DANÆACEÆ; LYCOPODIACEÆ; POLYPODIACEÆ; MARSILEACEÆ; OPHIOGLOSSACEÆ.]—*Eng. Cyc.* The rhizome of *Pteris esculenta* is used as food in Australia, and that of *Marattia alata* in the Sandwich Islands. The trunks of the *Alsophila*, or tree fern, of the western side of Van Diemen's Land, and of the common tree fern, *Cibotium Billardieri* (the *Dicksonia antarctica*, of Labillardiere), contain the edible pith or bread-fruit eaten by the natives. Many other species of ferns are esculent. Typha bread is prepared in Scinde from the pollen of the flowers of the *Typha elephantina*, and in New Zealand from another species of bulrush (*Typha utilis*). "It must not be supposed, as some have believed, that the fern root, wherever it grows, is fit for food On the contrary, it is only that found in rich loose soils which contains fecula in sufficient quantity for this purpose: in poorer ground the root contains proportionally more fibre. We were now encamped on an alluvial flat in the valley of the river, thirty or forty feet below the general level of the plain; and I observed that, even in this favourable spot, a great deal of discrimination was used in selecting the best roots, which was discoverable by their being crisp enough to break easily when bent: those which would not stand this test being thrown aside. Here a quantity sufficient for several days was procured, and was packed in baskets, to last till another spot equally favourable could be reached."—*Simmonds.* Mr. Royle informs us that many of these articles are still used in medicine in India. The rhizomes, or dried leaves of *acrostichum*, are sold under the altered name, *Iskoolikundriqon*. Those of Polypodium are called *bulookunboon*. The Asplenium *radiatum*, *morpunkhee*, or peacock's fan, is employed by the natives probably as an anthelmintic. The *Adiantum capillus veneris*, or Venus' hair, is indigenous in the Himalayas, where it is called *zhuer-ul-jin*, or fairy's hair. *Moolaithee* and *hungraj* are also applied to several Indian. European article it is given as an expectorant. In Europe it is the basis of the celebrated *Syrop de Capillaire*.—*O'Shaughnessy, page* 977.

Botrychium virginicum,—Is a large succulent fern which grows plentifully in the Jaldhaka Pass in the Sikkim Himalayas; it is boiled and eaten, both there and in New Zealand. Indeed ferns are more commonly used for food than is generally supposed. In Calcutta, the Hindoos boil the young tops of a *Polypodium* with their shrimp curries; and both in Sikkim and Nepal the watery tubers of an *Aspidium* are abundantly eaten. So also the pulp of one tree-fern affords food, but only in times of scarcity, as does that of another species in New Zealand (*Cyathea medullaris*); the pith of all is composed of a coarse sago, that is to say, of cellular tissue with starch granules.—*Hooker Him. Jour.* p. 292. Ferns are among the most curious objects in the vegetable kingdom, and numerous species are indigenous in the Tenasserim Provinces.

Polypodium giganteum,—A tree fern, is very rare but is occasionally seen in the southern Provinces, resembling a small palm. Griffith found the same species in Assam. The natives have but one name for both the cycas and tree fern.

Lygodium scandens. Ophiglossum scandens,—Climbing ferns. One of the most elegant climbers on the Tenasserim Coast is a terrestrial species of fern, easily recognized by its habit of running over other plants, and by the fringed margin of its leaflets, from which it is sometimes called "fringed fern." An allied species is found in the United States.

Polypodium quercifolium.—Oak-leaved polypod. In some parts of the forests of Tenasserim the trunks of almost every tenth tree have a great abundance of a large species of polypod growing upon them. The barren fronds are cordate, and stemless; but the fertile ones stand on long slightly winged stems, and are gashed like the leaves of an English oak.

Polypodium pertusum,—Pitted polypod. In Tenasserim, this fern is often found in company with the preceding species; and may be easily recognised by its creeping habit, and by the margins of the upper parts of its fronds being rolled together when in fructification.

Polypodium,—Reed fern. This is a large terrestial fern with hollow stems like a reed, which are often used by the natives of Tenasserim instead of quills for pens.

Pteris amplexicaulis,—Stipe-clasping brake. A large brake is common at Tavoy with pinnate fronds, whose leaflets have two lobes at the base which clasp their stripe.

Pteris graminifolia,—Grass fern. The trunk of forest trees in Tenasserim are often clothed with the green drapery of the grass fern, which grows upon them precisely like bunches of long grass. It belongs to the same genus as the common brake.

Davallia,—Davallia. An elegant fern of the genus davallia, characterized by the fructifications being "in roundish separate spots, near the margin," is very plentiful in the neighbourhood of Maulmain.

Hemionitis cordifolia,—Male fern. Near the sea shore, in Tenasserim, a species of male fern with cordate fronds is sometimes seen.

Lomaria scandens,—Scandent lomaria. The low lands near the mouths of rivers and nullahs in Tenasserim are often fantastically dressed with a species of lomaria which creeps up to the tops of the tallest trees.

Tænis blechnoides?—Tapeworm fern. The tapeworm fern, so called from the resemblance of the line of sori to a tape worm, is not infrequent in Tenasserim.

Adiantum,—maidenhair. A small handsome fern is seen in Tenasserim, in the crevices of old ruins and walls every where, of the same genus and nearly resembling the English maidenhair—"the prettiest of all ferns."

Lycopodium,—club moss. The green woods of the Tenasserim southern provinces are often carpeted with the club moss, or ground pine, of which we have one or two handsome species.

Salvinia cucullata,—salvinia. A curious little floating plant, related to the ferns, of the genus salvinia, is often seen on the surface of old tanks and stagnate waters in Tenasserim.—*Mason.*

(3582) FERONIA, the name of a genus of Plants belonging to the natural order *Aurantiaceae*. The flowers are often polygamous. The petals are usually 5 in number, occasionally 4 or 6, spreading. The calyx is flat and 5-toothed. Stamens 10; filaments dilated and united at the base; anthers linear-oblong, tetragonal. The ovary is seated on the elevated disc, 5 or occasionally 6-celled; ovules numerous in each cell. It has scarcely any style and an oblong stigma. The fruit is inclosed in a hard rind, 5-celled and many seeded, which seeds are immersed in a fleshy pulp. The leaves are pinnated with from 5 to 7 leaflets nearly or quite sessile, very slightly crenulated, with pellucid dots along the margin, inconspicuously dotted elsewhere: the racemes are axillary, terminal, and few-flowered.—*Engl. Cyc.*

(3583) FERONIA ELEPHANTUM. Wood apple Capitha, As. Res. vol. iv. p. 283.

Koit, HIND.	Bilvurthiththa maru, CAN.
Veela maram, Vellanga, TAM.	Vellaga betlen, TEL.
	Cavita Vrikshe, CAN.

F. Elephantum is the Elephant-Apple or Wood-Apple of the Coromandel coast, where it is very generally eaten. The branches of this tree are armed with small spines. The leaflets which vary in number from 5 to 7, are small obovate and smooth; when very young they are

lin, and when bruised have a most fragrant mell resembling anise. The native practitioners f India consider them stomachic and carminative. fter a certain age however, the leaves become ough and almost coriaceous. The fruit is highly ed extremely acid before it arrives at maturity, n when ripe, it contains a dark brown agreeble subacid pulp. In appearance the fruit is rge, spheroidal, rugged, and often parted externally; the seeds are in five parcels, and are flat nd woolly, adhering to the branched placentæ y means of long cords. A transparent, oily uid exudes from the trunk of this tree when an cision is made into it, which is used by painters r mixing their colours. A clear white gum ay also be obtained from the tree very much sembling gum-arabic. The wood is likewise luable on account of its durability, whiteness, d hardness.—*Eng. Cyc.* It is a large tree nd in most parts of India. Both leaves and wers have a strong odour of anise. The young ves are used by native practitioners as a genstomachic stimulant in the bowel complaints children. A large quantity of gum (*karil ka ed*) is procured from this tree. It very much sembles gum Arabic in its chemical and sensie properties. The babul tree also furnishes uch of the gum found in the Bazars. The nim, ngo, cassia auriculata, cotton tree, and several hers, yield this principle, and the products of are mixed for sale by the native druggists, as m arabic.—*O'Shaughnessy, page* 333.

(3584) FERRIOLA BUXIFOLIA.

Croombala, Eng. | Hoombully marum. Tam.

This plant grows among the Circar mountains be a small tree but in the low countries it is ly a shrub. The berries of this tree are unirsally eaten when ripe, and are very well tast-. The wood is dark colored, remarkably hard d durable; it is employed for such uses when size will admit, as require the most durable avy wood.—*Rhode, M.S.S.* Its fruit is pleasant the taste and is well known over all the lower ovinces of India. It is a small red fruit conning one seed.—*Ainslie, p.* 224.

(3585) FERULA, a genus of Plants belongto the natural order *Umbelliferæ*, whose spes often yield a powerful stimulating gum resin ployed in medicine. It differs from *Pastinaca* [illegible] *Peucedanum* by its fruit having several vittæ, ach channel, and from *Opoponax*, which it erwise resembles, in the margin of the fruit ng thin and flat, not thickened and convex. e fruit is in appearance extremely similar to t of a parsnip; it is compressed from the k till it is extremely flat, and it thins away at edge. There are [illegible] filiform nal ridges, and the [illegible] are distinct, olete, or lost in the [illegible]. In each channel e are three or more vittæ, and on the commare four, or a great many. The flowers are always yellow, and the stem solid, its cavity being filled with a spongy substance, in which fibres are vaguely dispersed. The drugs called Sagapenum and Assafœtida were supposed to be produced by species of this genus, but by which in particular it was not known with certainty. Dr. Falconer has shewn that Assafœtida at least is produced by another genus, which he calls *Narthex*.—*Eng. Cyc.*

(3585) FERULA ASSAFŒTIDA, is found in only two districts of Persia, namely, the fields and mountains of Herat, the capital of Khorassan, and the range of mountains in the province of Lar (Laristan), extending from the river Curus far as the town of Congoon, along the coast of the Persian Gulf. Kæmpfer states that even here the plants do not always yield the drug; that it is only those of the desert near Herat and of the mountains round Disgunn in Laristan that furnish it; and he figures a plant, with a naked simple stem, clothed with leafless sheaths, umbels without involucre, a coarse woody root rising above the ground, and pinnated leaves with pinnatifid segments and oblong obtuse lobes. This plant is the *Ferula Assafœtida* of Linnæus and De Candolle; what is supposed to be it has since been met with in Beloochistan, and Lieutenant Burnes saw what he calls *Assafœtida* growing in great luxuriance in the mountains of Hindoo-Koosh at an elevation of 7000 feet. He states that it is an annual, and grows to the height of 8 or 10 feet, when it withers and decays. The milk which it exudes is first white, and then turns yellow and hardens, in which state it is put in hair bags and exported. Sheep browse upon the tender shoots, which are believed to be highly nutritious. ('Travels,' ii. 243.) It is however by no means certain that this was true Assafœtida. Indeed if it was, as Lieutenant Burnes states, an annual, it must have been some other plant; for Kæmpfer expressly describes the root of Hingiseh, or Assafœtida as "ad plures annos restibilem, magnam, ponderosam, nudam," and in fact it is from wounds in this root that the gum-resin flows. It is probable that Assafœtida is yielded by different plants. Professor Royle obtained seeds of two kinds from the bazar of India; and it appears from a communication made to Mr. Macneil from a medical gentlemen at Sooneeana in Beloochistan, that in that province a kind of *Ferula* called Hoosbee yields a similar product, which however is not collected. The F. *Assafœtida* is said to arrive at as great an age as man himself, and in consequence its roots sometimes attain a considerable size. It is from wounds in this part that the drug is obtained. The roots are not wounded before they are four years old, the greater their age the better the quality of their produce. There were four operations each year when Kæmpfer visited the country; the first in the middle of April, the second at the latter end of May, the third ten

days later, and the fourth in the beginning of July. The gatherers on the first occasion only cleared the hard sandy or stony soil away from the root to the depth of a span or so, pulling off the leaves, replacing the earth about the roots, and then heaping the leaves on them, pressing them down with a stone. On the subsequent occasions they slice the roots transversely, beginning a little below the top, and collecting the juice that flows from the wounds. After every operation they cover the root with the old leaves to screen it from the sun. After the last gathering the screens are thrown away and the roots are left to perish. Dr. Falconer believes his Narthex Assafœtida to be identical with Kæmpfer's plant.—*Eng. Cyc.*

(3587) FERULA FERULAGO. *Syn.* F. galbanifera, (Nees and Ebermaier.) Coasts of the Mediterranean, the Caucasus, &c. yields copiously a secretion which dries into a gum resin, supposed to be galbanum. Although *F. ferulago* has been taken for the plant which furnishes galbanum, Professor Don states that this drug is really yielded by quite a different genus, called by him *Galbanum officinale.*—*Eng. Cyc.*

(3588) FERULA HOOSHEE. Beloochistan. Resembles the asafœtida in size and appearance, and yields a gum like the opoponax of the European shops, (*Mrs. M'Neil's letter*, 1833.) Professor Royle alludes to this also as resembling opoponax.—*O'Shaughnessy, page* 364.

(3589) FERULA ORIENTALIS, Feshook, *F. ammonifera.* Fee. Has also been quoted as the source of gum ammoniacum; and it appears that such a substance is really produced, either by that plant or a nearly allied species, in the Empire of Morocco.—*Eng. Cyc.* It grows in Asia Minor, Greece, and Morocco.—*O'Sh. p.* 364.

(3590) FERULA PERSICA. *Syn* F. Sagapenum. Fee, vol. ii. p. 201.

Sugbeenj, Arab. | Kundel, Hind.
Sugafioon, Pers. & Greek.

Persica, a perennial species with a glaucous stem and suprade-compound leaves with linear cut segments, has been reported to yield assafœtida. Dr. Hope entertained this opinion, from which Nees and Ebermaier do not dissent. Treviranus found it yielding a substance extremely like assafœtida in the botanic garden of Breslau; and the same thing has often occurred in the Apothecaries' Garden at Chelsea. Nevertheless, Fee suspects, after Willdenow, that it is rather the origin of sagapenum. Olivier believed it to produce gum ammoniacum: but according to Professor Don that drug is yielded by his *Dorema ammoniacum.*—*Eng. Cyc.* A native of Persia, stem about two feet high. According to some authorities it produces Sagapenum. Nees von Esenbeck and Lindley consider it as one of many plants from which asafœtida is procured.—*O'Shaughnessy, page* 363. *Sagapenum*, is found in masses formed of soft, adhesive fragments the size of the thumb or more, somewhat transparent, reddish yellow externally, pale within, of waxy or brittle consistence, often mixed with impurities and seeds. Its odour resembles that of garlic and asafœtida, its taste is hot, nauseous, and rather bitter. It is sometimes adulterated with bdellium, gundabirosa, and other similar gum resins or turpentines. Sagapenum is totally soluble in weak spirit. It softens under the fingers, becomes tenaceous, and melts at a low temperature. It is collected in the same manner as asafœtida; in the Bengal bazars small quantities are procurable at the rate of four rupees the lb. The medical uses of Sagapenum are the same as those of asafœtida, but it is considered less energetic, and is but little employed.—*O'Shaughnessy, pp.* 363-64.

(3591) FIBRES AND FIBROUS PLANTS. Botanists have for some time arranged all plants into a few large divisions, from characters derived from their internal structure: thus, some being composed of cells only, are called *Cellular*; others are called *Vascular*, because, in addition to cells, they also contain vessels usually accompanied by woody tissue. The cellular tissue being developed in every direction, is sometimes called the *horizontal* system, while the vascular growing vertically, is distinguished as the *longitudinal* system. It is in this direction that the fibres of which we have to treat are placed in the plant. The development and arrangement of these two systems produce three distinct forms of growth and of internal structure. *Acrogens*, or summit growers, are so called from the growth of the stem taking place by the junction of the bases of the leaves at the top of the stem, as in Tree Ferns. Under this—used as a general term—cellular plants, such as Mosses, &c., are included; but none of them yield fibre, either for cordage or for textile purposes, though it is possible that some of the ferns contain fibre enough to form pulp for paper-makers. *Endogens*, or inside growers, are so called because the bundles of vessels and fibres proceed from the bases of the leaves into the cellular centre of the stem, and are thence pushed outwards by the new growths, so that the outside of such stems, as of Palms, is harder than the inside. These plants have no regular bark which can be stripped off, and their leaves have the veins running parallel to each other. It is these leaves which abound in fibre, which may be separated by simple pressure and washing, as in the Pine-apple, Agave or American aloe, Plantain, and many others. In Palms, the structure of the leaves is too dense for the fibres to be separated so easily. *Exogens*, or outside growers, are so called from additions to their stems being made on the outside of the growth of former years, as seen in

the rings of wood on a transverse section of the trunk of any of the ordinary trees of Europe. There is also a distinct bark of which the outer part is composed of cellular, but the inner contains the woody tissue. From this the fibres are separated for various economic purposes, usually by stripping off the bark and then steeping it in water, as with Flax and Hemp, Jute and Sunn. The leaves of Exogens have a reticulated or net-like, instead of a parallel venation. The above characters, taken from the parts of vegetation, are found to be accompanied by others equally characteristic, in the parts of fructification. Thus the spores of Acrogens, in germinating, are unaccompanied by anything like a leaf: the Endogens have a single seed-leaf, as may be seen in Wheat and other Cereals, as the Rice; while Exogens, in sprouting, display two of these seed-leaves, as in Peas and Beans. From these peculiarities other names are given to the above divisions, but which it is needless for our purposes to notice.—*Royle, Fib. Plants, page* 28. Dr. Hunter mentions that under the head of Endogenous plants yielding fibres may be classed the

Palms.	Musa or Plantain.
Aloes and Agaves.	Pandanus or screw pine.
Yucca or Adam's Needle.	Rushes.
Sanseviera, or Marool.	Grasses.
Fourcroya, or gigantic Aloe.	Sedges, &c.
Ananassa or Pine Apple.	

The Exogenous fibrous plants embrace those yielding Cotton and silk cotton, Flax and its substitutes, viz.:

Calotropis, or yercum.	Bendee, or Abelmoschus.
Sylophora asthmatica.	Toothee, or Abutilon.
Cryptostegia grandiflora, or Palay.	Barks of Trees, including varieties of Ficus.
Sæmia extensa, or Ootrum.	Bauhinia.
Hemp—Cannabis sativa, and its substitutes.	Grewia.
Jute, Corchorus olitorius.	Dalbergia.
Sunn or Junapum, Crotolaria juncea.	Isora.
Ambaree, or Hibiscus cannabinus.	Butea.
	Vernonia, &c.
	M. E. of 18.. *Juries Report.*

Preparation of the fibre of Endogens.—Though both the stem and the leaves of Endogens abound in fibre, it is from the latter chiefly that this is separated for practical purposes. The fibres of some plants are not separated from the rest of the vegetable matter, but the stems and leaves are simply dried and twisted, as in the case of some Grasses, Sedges, Rushes, and even the leaves of Palms. The leaves of others are simply beaten with a stone on a flat board or on another stone, and afterwards the rest of the vegetable matter washed away. Occasionally such fleshy leaves have been passed between rollers, as those of a sugar-mill, and with the consequent saving of both time and labour, also with diminution of cost. Very frequently, however, these leaves are steeped in water until fermentation takes place, when the labour of separating the fibre is much diminished. But this often

FIBRES AND FIBROUS PLANTS.

takes place with great loss of strength as well as of the beautiful white colour, for which most of these endogenous fibres are particularly distinguished. Dr. Hunter, who has paid much attention to the separation of this class of fibres, has observed that the ordinary modes of separating the fibres of plants in India, that is, steeping them in water, are exceedingly faulty. Every day's steeping of a vegetable substance in water takes from its strength, and communicates a tinge to the fibres, which can only be removed by the subsequent application of some chemical agent, such as lime, the alkalies or chlorine, which in some cases, no doubt, diminishes their strength. He observes that in most parts of India the fermentation which takes place in plants heaped together or steeped in water proceeds so rapidly, that it is extremely difficult to prevent the accession of putrefactive decomposition. This, he says, commences, in succulent plants, when immersed in water, in twenty or twenty-two hours, during warm weather. The sooner, therefore, that the decomposing parts of a plant—that is, the mucilaginous, saccharine, and other constituents of the sap and pulp—are removed, the whiter are the fibres, and they retain more of their original strength. The fibres cleaned within a day or two after the plant or leaf had been cut, were found to be white, strong, and silky. On wetting the same repeatedly and exposing them to the dew, it has been found that their strength is impaired. Those fibres that were steeped in water for a few days acquired somewhat of the color of English tow. Those steeped for three weeks became quite rotten, brown, and brittle. Dr. Hunter has further ascertained by experiment that the partial drying of the leaves or bark of plants in the sun, as recommended and practised by the natives, does more harm than good, as it makes the process of cleaning more tedious, and is apt to tinge the fibres. Such as have been thoroughly dried in the sun before being cleaned, give brittle and often brown-coloured fibres, unless there be naturally very little moisture to be dried up. The only way he found of preparing fibres by rotting, is that followed by the natives in a few localities near large rivers, where the leaves of the Agave, from their outside hardness, are sometimes buried under wet sand below the level of the water in the river.—*Royle's Fibrous Plants.*

General Observations on the fibre of Endogens.—The veins of this class are parallel, and not reticulated; also, arranged longitudinally, as are likewise the woody fibres; and all so regularly, that if these leaves were to grow together round the central flower-stalk, they would form rings of woody and vascular tissue, much as we see in Exogens or, indeed, in the different species of Musa or Plantain, in which the rings seen on the transverse section of the so-called stem, are actually formed by the encircling of the flower-and fruit-stalk or core by the sheath-

ing foot-stalks of the leaves. Hence, to separate such fibres, simply scraping with a piece of wood, or beating between two stones, is sufficient. Therefore, passing them between rollers, such as those of the common cotton *churka* of India, if enlarged, or those of a sugar-mill, would not only be efficient, but economical. Whether these rollers should be plain or grooved must be ascertained by experiment, and will depend, in some measure, upon the external hardness of the leaves, or their more or less fleshy nature; as this might soon fill up the grooves. Motion might be given to such cylinders, either by the Archimedean screw, cog-wheels, or by bands, moved by hand, or by bullock-or horse-power as practised in the cotton-cleaning machines and sugar-mills of different parts of India. Careful washing of the separated fibres is essential, in order to get rid of the adhering mucilaginous or other matter and the cellular texture, but the boiling in an alkaline ley may probably be dispensed with, as it does not seem to be practised in all places. But steeping in water, followed by fermentation and decomposition, is followed in some of these localities, and no doubt facilitates the separation of the fibre, at the expense, sometimes, of its strength, as well as of its colour. Careful drying cannot be omitted, as, if packed up in a moist state, fermentation followed by complete destruction would ensue. The characteristic of these fibres generally, is that they are white in colour, of different degrees of fineness, and most of them capable of bearing a considerable strain, but liable to break at knots. They are, therefore, not suited to all the purposes of cordage, but admirably so to many, from strength and lightness, as well exemplified in the case of Manilla Hemp. There is, however, an unreasonable prejudice against white cordage, though its true nature can be better ascertained than when soaked with tar. From the experiments of Du Hamel and others, it appears that this substance, unless carefully washed, promotes the decomposition of vegetable fibre; and though it is undoubtedly useful at the surface when ropes are exposed to wet, there does not seem any advantage in its covering the interior. Many compositions could, no doubt, be devised, for covering the exterior, which would be efficacious in excluding wet. These fibres, though well known to the natives of the countries where the plants are indigenous, have not attracted from others the attention which they deserve, especially as they are produced in abundance, and necessarily very cheaply, as most grow in a wild state, or form the refuse of cultivation that has already paid its expenses. Almost all, moreover, are produced on the sea-coast, or in moist climates traversed by navigable rivers, and therefore could cost little for carriage. All would be valuable as affording employment for the people, and materials useful to them for a variety of purposes, if not for exportation. Both Grasses and Sedges abound as well on the banks of the Indus as of the Ganges, and might be turned to useful account. The Pine-apple abounds in Assam and the Tenasserim provinces; and on the islands near Singapore nearly 2000 acres are covered with it, according to Mr. Logan, 'Journ. of the Indian Archipelago,' vol. ii, p. 528, who recommends their cultivation for the manufacture of Pina cloth. The Moorva and the True Aloes, as well as some of the so-called "Silk-grasses" of South America, and the inner fibres of the Plantain resemble each other in fineness of fibre, and therefore of fitness for the manufacture of similar textile fabrics, which are esteemed, at least, by the people of the East, and worn by them. All may, moreover, be twisted into fine twine or cord, and the refuse form excellent materials for paper-making. The Pita or Agave, commonly called Aloe, as well as the Yucca, New Zealand Flax, Manilla Hemp and the outer fibres of other Plantains, are coarse in texture, and fitted for cordage, at least for ordinary purposes. But if we take the Manilla Hemp as an example, or the French experiments on the Pita, or its employment for naval purposes in South America, we may consider it as fitted, with ordinary precaution, for most of the purposes of cordage, as well as from its lightness for upper rigging. In the experiments made at Madras, the Agave fibre grown there certainly did not stand the trial to which it was subjected. But, the cause of this it is no easy to determine, whether owing to natural weakness of the fibre, or to the high temperature of the water in which the ropes were exposed producing fermentation and consequent decomposition. All of these, as well as the finer kinds are well fitted for paper-making, and therefore cannot fail to be always in demand. In cultivating any of these on account of their fibrous products, it is an important point to determine the proportion in which this is yielded by the several plants. In this, as might be expected, there is considerable discrepancy in the statements of different observers—some mentioning a few ounces, where others find pounds of fibre. By some, from one seventh to one tenth part of fibre has been obtained, but this will depend upon the greater or less dryness of the leaves operated upon. In the experiments upon New Zealand Flax, it was calculated that 16 cwt., or 1792 lb. of fibre might be obtained per acre. Dr. Roxburgh obtained two crops of 1613 lb., or 3226 lb., per acre of the Moorva fibre. In one statement respecting plantain fibre, it is mentioned that 600 lb. of fibre may easily be obtained per-acre in addition to the fruit, but of [illegible] upon four or five pounds per plant, [illegible] plants to the acre, calculate that from [illegible] to 2550 lb., or about a ton an acre might easily be obtained. Others, counting upon the

suckers which are successively produced, calculate upon much higher returns, which, with good cultivation and manuring, may, no doubt, be realised. But as there is danger in over-crowding, from the want of ventilation, and weakness of fibre from the thinness and delicacy of the plants which would be produced in a crowded plantation, it is safer to leave to practical experience, to ascertain the degree to which a plantation may be safely and profitably crowded. The expenses of producing fibrous materal in suitable localities, and with appropriate means and machinery, ought not to exceed from £9 to £10; and even from India, some of these fibrous productions can be landed in England for from £13 4*s*. to £16,8*s*. per ton according to difference of quality. While we have been informed by competent judges that most of the fibres, but especially the Plantain and Pine-apple fibre, are worth about £30 to £35 per ton, if sent in sufficient quantities and in a proper state. The difference in value, therefore, would easily repay any extra trouble in preparing the fibres in a careful manner, especially if we consider how cheaply Jute is grown and prepared, as has been shown in the foregoing pages. Mr. Dickson (*v*. p. 133) is of opinion that, though many of the white fibres, are fit only for rope- and twine-makers, others are suited for textile purposes, as, for instance, the Pine-apple fibre; even "for the spinning of yarn for the fine cambric manufactures in Ireland."

On the Fibres of Exogenous Plants.—We have already noted the great differences in point of internal structure, between what botanists call Endogenous and Exogenous growth, a distinction which we have shown to be useful even for practical purposes. Exogenous plants may in general be at once known even by their leaves, of which the venation is reticulated or net-like, and not parallel as among the Endogens; and therefore the fibres, united to each other in meshes, cannot be separated from the leaves for economical purposes, but must be obtained from other parts of these plants, where the said fibres lie nearly parallel to each other, as, for instance, in the bark. The peculiar structure of Exogens may also be seen on making a transverse section of the stems or branches, for instance, of the trees of European climates. There we may see rings of wood and layers of bark. But in annual stems, we see in the centre a circle of white cellular tissue called pith, and round it a layer of wood-like matter, which in some plants is called *boon*, *ergalone*. This is surrounded by layers of cellular tissue, which, examined longitudinally, form a tubular sheath, inclosing the other parts. It is in some plants composed of long tough elongated cells or fibres, which are sometimes called *bast*, and is covered externally by a delicate skin or cuticle. It is these bast fibres which are separated from the Flax and Hemp

plants, and familiarly known by these names. If we proceed to examine the transverse section of an Exogenous branch or tree, we see a number of rings, proportioned to its age. In the centre we observe the pith, which is usually small when compared with the bulk of wood. There may also be observed a number of lines, usually lighter coloured, radiating from the centre towards the circumference. These are called medullary rays, and formed of cellular tissue like the pith. This is surrounded by a longitudinal canal, which is called the medullary sheath, and contains spiral vessels. Outside of this are the rings of wood, formed of vessels and of woody tissue; those near the centre, called the heartwood, are denser and more highly coloured than those which are more external. Of these, the youngest are known by the name of sap-wood, and are those most recently formed, as all additions of wood are on the outside of the growth of previous years, in these trees. On the outside of the layers of wood, we find the part called bark, but composed also of a series of layers; of these the oldest are on the outside, and may in some trees be seen splitting and scaling off in a withered and dead state. The new layer of bark will, however, be found in the inside of all, and next to the young wood. The structure of this part can be best examined in the bark of a young shoot. It will be found to be composed of two layers of cells, which receive different names from botanists, having the delicate epidermis or cuticle on the outside; but in the inside of all, the layer consists of tough, elongated cells and vessels, and is called *liber* or *bast*. This part is very conspicuous in the Lime tree of Europe, which, by the stripping off of its bark, yields the bast of which Russia mats are made. In the East, species of Grewia, of Hibiscus, and of Mulberry, are equally remarkable for their bast. Besides the above characteristics in the leaves, wood, and bark of Exogens, we may likewise observe distinctions in their seeds and flowers, by which they may also be readily distinguished. Thus, the seeds of Exogens contain two seed-lobes, which, in sprouting, become the two seed-leaves, as seen in the germinating of Peas, Beans, Cucumbers, &c.: while in Endogens only a single seed-leaf is seen, as in the sprouting of Wheat and Barley, Rice, or the Date tree. In the flowers, also, distinctive characters may be observed; but we shall direct attention only to those of the Exogens, in which we may see the flowers composed of stamens and pistils, surrounded on the outside by floral envelopes. In some, these floral envelopes consist of two distinct kinds—the outer usually green and the inner variously coloured; both consisting sometimes of several pieces more or less united, as seen in the Flax plant, the Jute, the Hibiscus and Cotton plant, the Sunn, and many other fibre yielding plants. Or, these

two layers may be composed of the several pieces of each, or of the sepals and petals, united together into a single piece, as seen in the Convolvulus, the Jessamine, and Vinca. The last contains tenacious fibre, is allied to the old genus Asclepias, which abounds in plants yielding strong fibre, as the *Asclepias gigantea, &c.* Some plants have only a single floral covering, which may be green or otherwise coloured, as may be seen in the Hemp, the Nettle, China grass, and other fibre-yielding plants. Plants belonging to this division of the Vegetable Kingdom are the best known on account of their fibres. Of these many are remarkable for their strength and useful properties. Having lately had occasion to report on some Indian fibres, Dr. Royle was anxious to ascertain the comparative strength of several of those fibres, which were upon the whole, but little known. He therefore had equal weights and equal lengths of several of these fibres taken, their ends tied and fixed in a vice, and then the number of pounds ascertained with which each broke. In these experiments,

Petersburgh clean Hemp	broke with	160 lb.
A fibre from Travancore, called Wuckoo	„	175
Yercum fibre	„	190
Jubbulpore Hemp	„	190
China grass, from China	„	250
Rheea fibre or China grass, from Assam	„	320
Wild Rheea, also from Assam	„	345

Hemp from Kote Kangra, in the Himalayas, bore 400 lbs. without breaking.

Though many Indian fibres are possessed of all the good qualities required of such substances, objections are made to most of them. To some, that they are coarse; to others, that they are not strong enough, or that they break at knots; also, that they are incapable of fine subdivision on the hackle, or that they do not spin well, or have little twisting property on the spindle; but the greatest of all objections probably is that modifications of machinery are sometimes required for new fibres. With regard to the alleged coarseness, and that they are not capable of fine subdivision; this is, in most cases, merely a question, of preparation, which might be carried to a greater extent in India or in England, before attempting to spin them. Dr. Royle gave several of these fibres to Mr. Dickson, of Deptford, and he returned them in a few days, in a state in which he was scarcely able to recognise them, from their soft and silky, hair-like appearance; and he has little doubt but that the progress of experiment will show that this change can be effected at a comparatively small cost. With respect to their breaking at knots, this appears to be the case only with the white fibres, of which we have just treated, and which in this respect are like New Zealand Flax and Manilla Hemp. Some of the same objections were made against the Jute, when first introduced; and many years elapsed before it came to be used as it now is, and considered indispensable to the manufactures

of some localities. For instance, about 15,000 tons are annually employed in Dundee alone. Jute is certainly characterised by fineness, silkiness and facility of spinning; but it is less strong than many other Indian fibres, which are possessed of similar properties with greater strength as we hope to be able to show among the Mallow and other nearly allied tribes of plants. Among the Nettles, we hope to be able to prove that the combination of strength with fineness and capability of being spun, is as great in the Rheea fibre from Assam as in the China grass from China. When, at the end of 1854, he was endeavouring to prove that many of these fibres were fit for all the purposes of rope-making, he was equally told that they were weak, or would not twist, or not take tar. He has since had some of them made into every variety of cordage, from fine whipcord to a five inch rope, and finds that, in all cases, many exceed Russian Hemp in strength, and are therefore more than efficient substitutes. Though some practical men have stated that these Indian fibres do not subdivide, and will not spin, others are of a contrary opinion; and he refers to the statements of Mr. Dickson, published in the 'Journal of the Society of Arts.' In the then expected deficiency of Russian Hemp and Flax and looking to the sources whence consumers might obtain substitutes for them, he observes "From the experiments I have made on all kinds of fibre, I fearlessly assert that they can have a cheaper and better supply of fine and coarse fibre from India, for rope-makers and fine spinners, than it is possible for them to get from any other country, and the samples in the Society's rooms are a proof" (referring to his own and the East India House specimens then displayed there). "Dr Royle gave a very correct account of the superiority in the strength of the Himalayan Hemp compared with that of Russia; but that is not the only advantage to be gained by the importers and consumers of Hemp" "I have made the Himalayan Hemp so soft, fine, and white, that it will not only take the place of Petersburgh Flax—now £60 per ton, the best of which can only make 40s. warp yarn—but it can be used in place of Dutch Flax, at £80 per ton; and I speak from twenty years' practical knowledge, when I say it is capable of being spun into 60s. warp yarn." "The Rheea fibre, or Assam grass, when so prepared by the machines and liquid, is a finer, and consequently, more valuable fibre. It is equal in strength and fineness to China grass, at £100 per ton." "The Yercum, which very much resembles Belgian Flax, is also well calculated for prime warp yarns, and worth £10[illegible] per ton." The Wuckoo nar, Mr. Dickson places next this in another statement. "The Neilgherry Nettle is a most extraordinary plant; it is almost all fine fibre, and the tow is very much like the fine wool of sheep, and no doubt will be

largely used by wool-spinners." "The Madras Hemp, and Bombay and Sunn Hemps, will at all times command a market, when *properly cleaned out*, at £45 to £50 per ton, for twines or common purposes." In another published statement (Flax Works, Grove Street, Deptford, April, 1854), Mr. Dickson says of—"Madras Hemp, valued when imported at £24 per ton:

	cwt.	qr.	lb.
Madras Hemp, ...	2	3	3

Produced by the machines:

	cwt.	qr.	lb.
Clean, long fibre, good, valued at £45 per ton,	1	1	7½
Clean tow, valued at £30 per ton, ...	1	1	9
Waste, ...	0	0	14½
	2	3	3
Cost of Preparation, ...	6s.		1½d

"This Hemp, when prepared with the patent liquid, became soft, white, and so fine when hackled, as to bear the closest comparison with Flax at £80 per ton. It is better than any Russian Flax for fine spinning." Practical men alone can judge of practical questions, when they have made careful experiments on new products, and have laid aside all prejudices in favour of old ones. But Dr. Royle was surprised with the improved appearance and fineness of many of the coarse-looking Indian fibres; though he says he ought not to have been so, from what he had previously seen of some of these fibres. This more especially, as there is no rational reason why the varied soil and climate of India should not produce as finely divisible fibres as any produced in the short, but warm and dry summers of Russia. These fibres would, moreover, look as well in the market, if the natives of India would take the same trouble with their preparation as is done in Europe with Flax and Hemp. Natives of India do little justice to the products of their own country; for most of their fibres, like their cotton, come to market intermixed with much dust: some, moreover, almost in the state of bast, upon which freight and charges have to be paid before they can be used either for cordage or for textile purposes. Manufacturers, therefore, give a lower price for them than would be the case if they reached England in a clean and workable state. A considerable loss is likewise sustained, by what is very unusual, that is, the *extra* care bestowed on some of these fibres in different parts of India. Some are twisted into rope-like bundles; others are plaited into the form of Chinese pigtails, or tied together with knots at the ends. In this case, these ends must at once be cut off, and the fibres, thus much shortened, before they can be used. When twisted or plaited, boys and girls are obliged to be employed in untwisting and opening them out, in order to bring them to a state from which they have been needlessly removed. All that is necessary is that the fibres should be tied in convenient-sized bundles; and retained in the state in which they are removed from the plant, and that in which they must be when undergoing the different processes of preparation, that is, nearly parallel to each other. They may then be simply tied together near the thicker end, so as to form what are called *heads*: or they may be similarly tied in two or three places, if it is thought desirable to do so, with long fibres. Such fastenings can most easily be cut across with a knife, and with the least possible expenditure of time and labour; so as to expose the fibres in a state in which they can be immediately made use of. Besides this mode of tying up the bundles of fibres, which would, in fact, save much of the time and labour, now injuriously expended, it would be desirable if the native could be induced, generally, to pay more attention to the preparation of these fibres, especially in not macerating the plants longer than absolutely necessary for the purpose of separation. The benefits of such care would soon be apparent in the increased demand and improved prices for Indian fibres, not only in this country but in other parts of the world.—*Royle's Fib. Pl. page* 125. In sending Fibres to the English market, it would greatly facilitate their employment, if the natives of India would prepare them in a cleaner state, and have them made up in the manner to which manufacturers there are accustomed. Most of the Indian Fibres have been examined by practical men of skill, who consider them to be well adapted for many purposes, and have assigned to them such prices as appear to be sufficient to pay for their culture and export. The subject of Fibres has of late attracted considerable attention in India, as the Governor-General has issued instructions for the sending to England some of the stronger Fibres, both from the northern and the southern parts of the Empire. The Madras Government has also given directions for the investigation of the fibrous materials procurable in that Presidency, and has issued a Volume of great value. At Bombay a Company has been established for the collection of materials for paper-making, while individuals are paying attention to the preparation of Fibres. In Sindh and in the Punjab, the culture of Flax has been taken up and patronised by the Indian Government and the Court of Directors—*Dr. Royle in Fibrous Plants.* Only a few years have passed since hemp and flax were almost the sole vegetable fibres used in the manufactures of Great Britain for making cordage &c., but our knowledge of the fibre yielding plants has greatly augmented of late, and numerous Asiatic species may yet be added to the list. Amongst the plants of Eastern and Southern Asia most deserving of attention may be enumerated the following, which are the principal of the fibrous plants there:

Abelmoschus esculentus, ...	Vendee fibre.
Abelmoschus ficulneus, ...	
Abroma augusta, ...	
Abutilon indicum, ...	Tootee.

Abutilon polyandrum	
Abutilon tomentosum	
Acacia leucophlœa	Oody nar.—This tree is common near Cape Comorin. The fibres from the bark are used by the fishermen in making nets. A course kind of cordage is also made from it.
Acacia arabica	Karoovillum nar.
Agave americana	Pitu fibre or great Aloe.
Agave cantala	
Agave discantha	
Agave vivipara	Kathalay.
Agave yuccæfolia	
Ailantus malabaricus	Poroomarum.—Inner bark not much used.
Aletris nervosa	
Aloe indica, or vulgaris	Kuttally nar.
Aloe perfoliata	Aloe fibre
Ananassa sativa	Pine Apple fibre.
Andropogon schœnanthus	Camachy.
Andropogon muricatus	
Arenga saccharifera	
Antiaris saccidora	Arengee.
Areca vestiaria	
Artocarpus, several species	
Bauhinia racemosa	Malfhun.
Bauhinia diphylla	
Bauhinia Vahlii	Yepy tree bark.
Bauhinea tomentosa	Vellay Aatee nar.
Banhinea scandens	
Boehmeria; several species	
Bombax malabaricum	
Borassus flabelliformis	Palmyra fibre.
Bromelia, several species	
Broussonetia papyrifera	
Butea frondosa	
Butea superba	
Callicarpa cana	
Callicarpa lanata	Thondy nar.—Inner Bark. Not much used.
Calotropis gigantea, &c	Ak Mudar or Yercum
Calotropis Hamiltonii	
Calotropis procera	
Cannabis sativa	Hemp
Careya arborea	
Caryota urens	
Chamœrops or Hemp palm	
Chamœrops humilis	
Chamœrops Ritchiana	
Cordia obliqua	Pothooveroosen nar.—Moderate strength
Cocos nucifera	Cocoa.
Corchorus olitorius	Jute.
Corchorus capsularis	
Corchorus fusous	
Corypha, several species	
Crotalaria juncea	Under the name of Canamboo or Wuckoo, it is cultivated extensively in the Southern Travancore districts. It is not exported. Fishing nets are made from them, the best kinds are grown in the Northern district. Sunn (wuckoo nar.)
Crotalaria tenuifolia	
Cyperus textilis	Mat grass, or Coaray.
Cyperus tegetum	
Daphne Bholua	
Daphne Canabinus	
Daphne Gardneri	
Decaschistia crotonifolia	
Dœmia extensa	Ootrum ka bel.
Eriochlœna Candollii	
Eriodendron anfractuosum	
Eriophorum cannabinum	
Eriophorum Commosum	
Erythrina indica	
Ficus religiosa	Arasa nar.
Ficus racemosa	Atti nar.
Ficus indica	Aulamarum nar. Aallen nar.—Not much used.
Ficus oppositifolia	Bodda nar.
Ficus mysorensis	Kul aallum nar.—Not much used.
Fourcroya gigantea	Seemay Kathalay.
Grewia asiatica	Neilgherry nettle.
Gossypium indicum	Indian Cotton.
Gossypium acuminatum	Brazil Cotton.
Gossypium herbaceum	
Grewia asiatica	Beat.
Grewia tiliæfolia	
Grewia rotundifolia	Oonoo—Moderate strength.
Grewia didyma	
Grewia oppositifolia	
Guazuma tomentosa	
Guazuma ulmifolia	

Hibiscus cannabinus	Poolychny fibre.
Hibiscus fragrans	
Hibiscus sabdariffa	Roselle fibre.
Hibiscus striatus	
Hibiscus vesicarius	Wild ambora.
Hibiscus rosa chinensis	Shoe plant fibre.
Hibiscus vitifolia	
Hibiscus lampas	
Hibiscus macrophyllus	
Hibiscus manihot	
Isora corylifolia	Valumbrikai, Kywen nar.—This is the most valuable fibre in Travancore. The plant grows abundantly at the base of the hills. It is from the stem of this shrub that the natives produce fibre.
Juncus	
Lodoicea Seychellarum	
Linum usitatissimum	Flax
Maranta dichotoma	
Marsdenia Roylei	
Marsdenia tenacissima	
Mimosa Intsia	Eenjy nar.
Musa paradisiaca	Plantain fibre.
Musa sapientum	
Musa textilis	
Pandanus	
Pandanus odoratissimus	Fragrant Screw Pine.
Papyrus	
Pangres	
Paritium macrophyllum	
Paritium tiliaceum	
Raphis cochinchinensis	
Raphis flabelliformis	
Raphis	
Saccharum sara	Sara.
Saccharum munja	
Sanseviera zeylanica	Moorghee, or Marool.
Salmalia malabarica	Elavum parooty.
Sesbania aculeata	
Sesbania cannabina	
Sida asiatica	
Sida gravcolens	
Sida indica	
Sida rhomboidea	
Sida rhombifolia	
Sida tiliæfolia	
Sida periplocifolia	
Sida populifolia	Used for Cordage &c.
Strychnos potatorum	Katha vennaer.
Smilax ovalifolia	Krinkoddy nar.—Used for tying bundles &c.
Sterculia guttata	
Sterculia ornata	
Sterculia villosa	
Terminalia alata	Mooroothen nar.—Bark, very strong and lasts many years used for dragging timber, cordage &c. Common in the forests
Terminalia belerica	Umburathee nar.
Triumfetta lobata	Koorinja.
Tylophora asthmatica	
Typha elephantina	
Urena lobata	Bun—Ochra.
Urena sinuata	
Urtica, several species	
Vernonia anthelmintica	Coat seeragum.
Yucca angustifolia	
Yucca gloriosa	Pita or Adam's Needle.
Yucca aloifolia	

In the Tenasserim Provinces, as in other parts of India, cordage is made of coir, the outside shell of the cocoa-nut, but ropes are more frequently made from the bark of three different trees belonging to the genera hibiscus, paritium, and sterculia.—viz. Paritium macrophyllum and P. tiliaceum; Hibiscus macrophyllus, Sterculia guttata and Sterculia ornata.—*Mason*. Of the very extensive and varied fibrous substances in all parts of the Madras Presidency only a few are cultivated as articles of commerce, though Southern India is abundantly supplied with fibrous materials for every description of textile manufacture, from the coarsest packing cloth, to the finest cambric, lawn, or muslin. It would be impossible to say how far the cultivation of fibrous

plants might be carried, and what would be the demand for them in the Madras Presidency, if properly prepared for the market; but there is no doubt, that the usual careless and slovenly mode of preparing these materials, has hitherto tended greatly to interfere with their sale in the European market. A large and interesting class of Fibrous substances, which have hitherto attracted but little attention, is the Barks of Trees, many of which yield a strong and ready substitute for rope, and from the quantity of Tannin, which some of them contain, they resist moisture, and retain their strength for a long time. With a little care and the employment of simple machinery, excellent ropes, mats and baskets might be prepared from some of these substances, and they would probably find a ready sale for agricultural and commercial purposes. One of the most common of these barks is the *Bauhinia diphylla*, called Authee nar, Yepy, and Apa. This is a strong coarse brown bark of which the Natives make temporary ropes for securing thatch, matting or fences. The barks of several other Bauhinias are used for the same purposes The Ara nar is the bark of the Bauhinia parvifolia, of which matches for native guns are made. This class also includes the barks of the Banian, Ficus indica or Ala nar, Peepul, Ficus religiosa or Arasa nar, Ficus racemosa, Atti nar, Ficus oppositifolia, Bodda nar, Ficus (?) Cullethy nar. the bark of the Ficus tomentosa, the barks of several species of Acacia, as the Babool (*Acacia arabica,*) or karoovalum nar, the white Acacia, or Oday nar, (Acacia Leucophlea,) Velvaila nar, Wrightia tinctoria, and a number of other plants not yet identified. The trailing roots, twigs, tendrils, and drops of a number of plants are used for the same purposes.—*M. E. J. R.* 1855.

In *China* Mr. Fortune says that the staple summer crops are those which yield textile fibres. The plant well known by the name of jute in India, a species of Corchorus—which has been largely exported to Europe of late years from India, is grown here to a very large extent. In China this fibre is used in the manufacture of sacks and bags for holding rice and other grains. A gigantic species of hemp (Cannabis) growing from ten to fifteen feet in height is also a staple summer crop. This is chiefly used in making ropes and string of various sizes; such articles being in great demand for tracking the boats up rivers and in the canals of the country. Every one has heard of China grass-cloth—that beautiful fabric made in the Canton province and largely exported to Europe and America. The plant which is supposed to produce this (Urtica nivea) is also abundantly grown in the western part of this province and in the adjoining province of Kiangse. Fabrics of various degrees of fineness are made from this fibre and sold in these provinces, but none so fine as that made about Canton; it is also spun into thread for sewing purposes, and is found to be very strong and durable. There are two very distinct varieties of this plant common in Chekiang—one the cultivated, the other the wild. The cultivated variety has larger leaves than the other; on the upper side they are of a lighter green, and on the under they are much more downy. The stems also are lighter in colour, and the whole plant has a silky feel about it which the wild one wants. The wild variety grows plentifully on sloping banks, on city walls, and other old and ruinous buildings. It is not prized by the natives, who say its fibre is not so fine, and more broken and confused in its structure than the other kind. The cultivated kind yields three crops a year. The last great crop which I observed was that of a species of juncus, the stems of which are woven into beautiful mats, used by the natives for sleeping upon, for covering the floors of rooms, and for many other useful purposes. This is cultivated in water, somewhat like the rice-plant, and is therefore always planted in the lowest part of these valleys. At the time of my visit, in the beginning of July, the harvest of this crop had just commenced, and hundreds of the natives were busily employed in drying it. The river's banks, uncultivated land, the dry gravelly bed of the river, and every other available spot was taken up with this operation. At grey dawn of morning the sheaves or bundles were taken out of temporary sheds, erected for the purpose of keeping off the rain and dew, and shaken thinly over the surface of the ground. In the afternoon before the sun had sunk very low in the horizon it was gathered up again into sheaves, and placed under cover for the night. A watch was then set in each of the sheds; for however quiet and harmless the people in these parts are, there is no lack of thieves, who are very honest if they have no opportunity to steal. And so the process of winnowing went on day by day until the whole of the moisture was dried out of the reeds. They were then bound up firmly in round bundles, and either sold in the markets of the country, or taken to Ningpo and other towns where the manufacture of mats is carried on on a large scale. —*Fortune.* Hemp is cultivated in the provinces north of the Meiling, but the plant also grows in Fuhkien; the grasscloth made from it is not so much used for common dresses as cotton and silk. There are three plants which produce a fibre made into cloth known under this name, viz., the *Cannabis sativa* or hemp at Canton, the *Urtica nivea*, a species of nettle grown about Sucham, and the *Sida tiliæfolia* near Tientsinfu. —*Williams' Middle Kingdom, page* 108. Fibres of various kinds are largely imported into England, the quantity of foreign Flax and Hemp in three years having been as follows:—

	Flax Tons.	Hemp Tons.	Total Tons.
1851	59,709	64,671	124,380
1852	70,129	53,714	123,843
1853	95,169	63,142	158,311

The money value of the above was calculated at Rupees 2,72,04,700. When plants are grown to produce fibres, they ought to be sown thick, to induce them to grow tall and slender, and without branches, so that the straight stems may yield a greater length of fibre, and it may be laid down as a general rule that the softness or clearness of a fibre, forms a good criterion of its strength and vice versa. The best process to be followed in extracting the fibres of plants, is of importance to be known. It will have been seen that the method of cleaning fibres by rotting is not suited to warm-climates owing to the rapidity with which putrefaction sets in, and to the irregular periods at which the fermentive action commences, in different parts of the plant. While one part of a heap of leaves or stalks are beginning to ferment other parts are brown and stained with putridity, the central parts remaining fresh and unaltered. As a general rule, every days steeping of a fibre, takes from its strength, and imparts more or less color. Therefore, with plants having bark and woody fibres, of which much of the cordage of commerce is made,—the fibre can be purest extracted, by beating them, at first, well with a wooden mallet in order to loosen and allow the removal of the bark from the stalk, as it is generally on the inner surface of the bark that the fibres suitable for cordage usually occur. When the bark has been brought into a pulpy state, it should be well washed in clean water, to remove as much of the sap as possible, as this is the part, in which the putrifactive process first begins. The leaves, stalks, or barks of plants should be cut when in full vigour and in their bright green colour; when old, dried or decayed, they yield coarse and stiff fibre. Only so much should be cut at a time as can be cleaned within two days, and the plants when cut should not be exposed to the sun, as the sap dries up, and the process of cleaning them is made more tedious. The sooner the sap, pulp, and impurities can be removed from the fibre, the cleaner and stronger will it be. The process of rotting or steeping the fibres is objectionable in a warm climate, and is now being abandoned even in cold climates, as it discolors the fibres and takes from their strength. If a plant be well crushed or beaten soon after it is cut, it may be immersed in water, for a night, and a good deal of the injurious part of the sap will be removed. Beating, crushing, and scraping fibres, improves their quality, and the more a fresh fibre gets knocked about, provided it be not cut across or rendered too short in the staple, the softer and more pliant does it become. These remarks are particularly applicable to the coir fibre. All that is necessary with the Agave, Yucca, Fourcroya and Sanseviera is to beat or crush the pulp with a mallet, or crushing cylinder, or a brake, and then to scrape away the pulp and wash the fibres. In cleaning the fibres of pulpy

FIBRES AND FIBROUS PLANTS.

plants, the plants should first be bruised or crushed, and the juice which exudes may be kept to be converted into a coarse kind of vinegar required in another process. For this part of the process the common sugar mill of India, with two perpendicular rollers and a channel to convey the juice into some convenient vessel, answers well, and the cost does not exceed ten Rupees. Where this small sum cannot be afforded, and labour is abundant, the plant may be well beaten with wooden mallets, on planks, until all the pulp is loosened. When it has assumed a pulpy consistence, the plant should be seized at both ends and well twisted on itself in various directions, to squeeze out the sap. It should then be well washed in plenty of water, untwisted, and scraped on a board, in small handfuls at a time, with a blunt straight knife, on a long piece of hoop iron, fastened into a wooden handle. When all impurities are thus removed the fibres may be soaked for an hour or two in clean water and then hung up in the shade to dry, the latter being a point of much importance as exposure to the sun at first, is apt to discolor them. By this simple process, fibres, of great length, of a silky appearance and of a good colour, can readily be prepared. The scrapings must be well washed and set aside in the shade to dry as tow, for packing, or as a material, for making paper. This process is applicable to all fleshy or pulpy plants such as those known as Aloe plants, the Agave, and Yucca, Sanseviera and plantain. Prices have been offered in England, of Rs. 250 to Rs. 700. £25 to £75, for fibres cleaned in this manner, while only from £10 to £18 per ton was offered for fibres sent to England at the same time, but which had been cleaned by the ordinary rotting process.—*Dr. Hunter.*

Comparative strength of fibres. Hemp, Russian.—The difference in strength between the best and ordinary Russian Hemp is in the proportion of 5 to 4 and sometimes 6 to 4, and the strength of the best Russian Hemp to the best Sunn bears a proportion of 6 to 4.—*Royle, Fibrous plants, p.* 277. The Strength of fibres is of very great consequence. Dr. Royle remarks, (*Fibrous Plants*) that having lately had occasion to report on some Indian fibres, he was anxious to ascertain the comparative strength of several of those fibres, which were, upon the whole, but little known. He therefore had equal weights and equal lengths of several of these fibres taken, their ends tied and fixed in a vice, and then the number of pounds ascertained with which each broke. In these experiments,

Petersburgh clean Hemp, ...	broke with	160 lb.
A fibre from Travancore, called Wunkoo, ...	„	175
Yercum fibre, ...	„	190
Jubbulpore Hemp, ...	„	190

China grass, from China,... with 250 lb.
Rheea fibre or China grass, from Assam,... ... ... } " 320
Wild Rheea, also from Assam, " 343
Hemp from Kote Kangra, in the Himalayas, bore 400 lb. without breaking.

Rheea.—Dr. Roxburgh found the Rami or Calooe bore 240 lb. when Hemp bore 158 lb. and Sunn 150 lb., Messrs. Sharpe, in 1815, found a cord bore 252 lb., when Russian Hemp was only required to bear 82 lb., So in Dr. Royle's experiments with these fibres in an untwisted state, Petersburgh Hemp bore only 160 lb. when China-grass bore 250 lb., the Rheea 320 lb. and the Wild Rheea 343 lb., Mr. Henly had previously found the Kunkhoora or Rheea to bear about three times the weight of Russian Hemp.—*Royle's Fibrous Plants, p.* 372. In the year 1810 three bales of this Calooe fibre were sent to the India House, having been produced in the Botanic Garden at Calcutta. In December 1811, one of these bales was sent to Messrs. Sharpe, then of Mark Lane. On the 4th February 1812, they reported, that having brought the Calooe fibre to the state of Hemp for the use of cordage, a thread was spun, of the size of those spun in the King's Rope yards, which bore 252 lb., whereas the weight required to be borne in his Majesty's yards by Russian Hemp of the same size is only 28 lb.—*Royle's Fibrous Plants, p.* 347. Experiments on strength of Rope made from samples of Fibre of the growth of India, received from Dr. Royle, at Messrs Huddart's Rope manufactory, Limehouse, February 13, 1854.

Description and Name.	Size of Rope.	Number of Yarns in the strand. Length of Yarn in Rope.	Strength of Rope in lbs.	Strength of Rope per Inch, circumference squared.	Size of Rope at breaking.	Tar absorbed.	Amount of stretching.
	In.						
Wild Rheea, 1st experiment,	4¼	44	132	19,032	·814	4¼	1-7th	1 in 16
Do. 2d do.	4¼	44	132	21,025	·894	4¼	1-7th	1 in 16
Rheea Fibre, ..	4¼	44	132	20,486	·910	4¼	1-9th	1 in 16

It will be seen from the abstract, that amongst the thirteen samples of the 2 inch rope, the Deyrah Hemp stands the fifth in strength and the twelfth in elasticity. ('Journ. Agri-Hortic. Soc.' iii. p. 227.) Further details are given in other tables, at pp. 224-25 of the Journal. But Hemp of far greater strength is produced in these, which are probably the native hills of the plant. Mr. Williams, of Jubbulpore, gave to Dr. Royle in the year 1853, a sample of Hemp, which he stated had been forwarded to him by D. F. Macleod, Esq. as the produce of Kote Kangra, in the Sikh Himalayas. This Dr. Royle has, in his Lecture and Experiments as well as in communications with various individuals, called Kote Kangra Hemp. It is the fibre which is mentioned (at p. 133) as not breaking with a weight of 400 lb., when China-grass from Assam broke with 320 lb., and Petersburgh Hemp with only 160 lb. It has moreover, appeared to all the practical men who have since then examined it, as the strongest fibre with which they were acquainted.—*Royle's Fibrous Plants, p.* 331.

Abstract of Report of Proof of Moorgahvi, Arracan, Deyra, and Jetee Rope, compared with Europe, Manilla, New Zealand, Sunn, and Coir Rope, in the order of Strength and Elasticity.

No. of Sample.	STRENGTH. 2-Inch Rope. NAMES.	Weight at which broken.	STRENGTH. 1¾-Inch Rope. NAMES.	Weight at which broken.	ELASTICITY. 2-Inch Rope. NAMES.	Length stretched before breaking.	ELASTICITY. 1¾-Inch Rope. NAMES.	Length stretched before breaking.
		lbs.		lbs		Inches.		Inches.
1	Manilla, (white),	2731	New Zealand,	2231	Sunn, (white),	17½	Coir, (plain),	32
2	Sunn, (do.),	2679	Europe, (1839),	1967	Ditto (tarred),	13¾	Jeetee,	15
3	Europe, (Pat),	2655	Ditto. (Pat),	1743	Manilla, (tarred),	13½	Sunn, (white),	13½
4	New Zealand,	2591	Sunn, (tarred),	1703	Moorgahvi, (white)	13	Manilla, (white),	13
5	Deyrah,	2519	Ditto. (white),	1607	Manilla, (white),	11½	Sunn, (tarred),	11½
6	Europe, (1839),	2463	Manilla, (tarred),	1463	Europe, (1839),	10¾	Europe, (Pat),	10½
7	Sunn, (tarred),	2239	Ditto. (white),	1431	New Zealand,	10½	Moorgahvi, (tarred),	10
8	Arracan,	2231	Europe, (twice-laid),	1214	Europe, (Pat),	10¼	Ditto (white),	9¾
9	Manilla, (tarred),	1712	Jeetee,	903	Moorgahvi, (tarred)	9½	Europe, (1839),	9½
10	Europe, (twice laid,	1351	Moorgahvi, (white),	875	Arracan,	9	Manilla (tarred),	8½
11	ditto. ditto.	1295	Europe, (twice-laid),	871	Europe, (twice laid),	8¼	New Zealand,	8
12	Moorgahvi, (white),	1175	Coir, (plain),	823	Deyrah,	7¾	Europe, twice laid,	6½
13	Ditto (tarred),	1065	Moorgahvi, (tarred),	711	Europe, (twice-laid)	7	Ditto. ditto.	6

A. B. Clapperton, 1st Assistant to the Master Attendant, 1844.—*Royle, Fibrous Plants, page* 332.

Comparative Strength of Coir.

Coir, ...	224	lb	
Poolywungee (Hibiscus cannabinus), ...	220	"	
Sunn (Crotalaria juncea), ...	407	"	
Agaval (Sanseviera Zeylanica)	316	"	
Cotton (Gossypium herbaceum)	346	"	
Cutthalay aar (Agave [illegible])	363	lb.	
Jannapa (Crotalaria juncea, [illegible] hindee,	407	"	
Yercum (Calotropis gigantea)	552	"	

Royle's Fibrous Plants, p. 710.

Comparative strength between Sunn Cordage, when first made, and three years after, to ascertain the deterioration by Age, and the supposed effects of Tar.

Species of Rope.	Growth of Sunn.	When made.	Where Made.	When tried.	Size.	Weight to break, 1803.				Weight to break, 1806.				The average of five trials.
					Inches.	Tons.	Cwt.	Qr.	lb	Tons.	Cwt.	Qrs.	lb.	per cent.
Hawser-laid Whale-line...	Malda.	1803	London	1803	6½	6	0	3	11	5	17	0	0	2½
Common Yarn...	do.	do.	do.	do.	4	2	6	3	0	2	2	2	0	11
	do.	do.	do.	do.	3	1	14	2	0	1	0	2	0	14
	do.	do.	do.	do.	2½	1	4	1	14	0	19	0	0	20
	do.	do.	do.	do.	2	0	17	3	14	0	14	1	0	16

Comparative strength between Cordage made in the common way, from the best Petersburgh clean and Ordinary Hemp, and the Sunn Cordage made by Huddard's Warm Register.

Size.	Common make.								Cuttosah Sunn in 1802.				
	Best Petersburgh.				Ordinary.								
Inches.	Tons.	cwt.	qrs.	lb	Tons.	cwt.	qrs.	lb.	Tons.	cwt.	qrs.	lb.	
8	14	8	1	20	12	4	0	0	15	7	1	2	Warm Registered.
7	12	17	1	8	10	16	3	20	10	18	1	[illegible]	
6½	9	17	0	0	9	10	2	0	8	2	2	[illegible]	
5	6	7	1	8	5	17	0	0	5	17	2	[illegible]	
4½	5	19	2	10	4	17	0	0	4	10	1	20	
4	4	13	1	20	3	7	0	0	3	3	1	14	
3	2	15	0	14	2	6	3	7	2	2	2	24	
2½	1	19	1	14	1	10	0	0	No warm Registered these sizes.				
2	1	7	2	14	1	6	0	14					

Comparative strength of the above best Petersburgh clean Hemp Cordage, in December, 1802, and May 1806.

8	14	8	1	20	12	19	2	0	The depreciation of strength would be in greater proportion with ordinary Hemp.
7	12	17	1	8	11	13	2	0	
5	6	7	1	8	5	16	0	0	

Royle, Fib. Plants, p. 288.

Wuckoo fibre small Cord, ...	broke at	86
Petersburgh Hemp Cord, ...	,,	170
Wild Rheea Cord, same size as Russian,...	,,	190
Rheea Fibre Cord, one thread larger,. ...	,,	230
Pound line of Wild Rheea, ...	,,	510
Six thread Cord of Petersburgh Hemp, ...	,,	505
Six-thread Ratline of Rheea, tarred,	,,	525
Six-thread do. of Wild Rheea do. ...	,,	530
Nine-thread do of do. do. ...	,,	860
Twelve-thread do. of do. do. ...	,,	1120
One-inch Rope of Wild Rheea,... ...	,,	1350
One and half inch Rope of Wild Rheea, tarred,	,,	1900
One and half inch Rope of Wild Rheea, do.	,,	1900
Two inch Cord of Russia Hemp, ...	,,	1800
Two inch Rope of Rheea Fibre, tarred,...	,,	2800
Twelve-thread Rope of Plantain, made in India,	,,	864
Twelve-thread do. of Pine-apple, do.	,,	924
Two-inch Cord of Russia Hemp, ...	,,	1800
Two-inch Rope of Dhunchee fibre, made in India	,,	1850
Two-inch Rope of Agave, usually called Aloe, do.	,,	1900

—*Royle's Fibrous Plants of India, page* 374.

For the sake of comparison we reprint the experiments made with the untwisted selvages of some of the same fibres, and of which the specimens were very carefully prepared by George Aston, and their strength tried in the office of the Military Stores.

Petersburgh clean Hemp,... broke with		1160 lb.
A fibre from Travancore, called Wukka,.....	,,	175 ,,
Yercum fibre,.....	,,	190 ,,
Jubbulpore Hemp,.....	,,	190 ,,
China grass, from China,.... broke with		250 lb.
Rheea fibre or China grass, from Assam,.....	,,	320 ,,
Wild Rheea, also from Assam,	,,	343 ,,

Hemp from Kote Kangra, in the Himalayas, bore 400 lb., without breaking.—*Royle's Fibrous Plants of India, page* 375.

Madras Pine Apple Fibre bore, 260 lb. weight.
Singapore do do. do. 350 do.
New Zealand Flax do. do. 260 do.
—*Royle's Fibrous Plants of India, page* 341.

Report of several kinds of Rope, the manufacture of Messrs. W. H. Harton & Co. of Calcutta tested in the Arsenal of Fort William, 3rd June, 1853.

Kind and quality of Rope.	Size.	Government proof.			Breaking weight.		
	Ins.	Cwt.	qr.	lb.	Cwt.	qr.	lb.
Oiled Jubbulpore Hemp (Crotalaria tenuifolia). Artillery Traces	3	36	0	0	43	2	0
Untarred do. superior four strand plain laid	3¼	42	0	0	83	0	0
Untarred Dunchee (Æschynomene cannabina do. do.....	3¼	49	0	0	75	0	0
Pine-apple Fibre do. do....	3¼	42	4	0	57	0	0

(Signed) J. Wilkins, officiating Prin. Conductor, Rear Godowns.—*Royle's Fibrous Plants, p.* 292.

Experiments made in Arsenal at Fort. St. George, July 30th 1850, *on Ropes made in Jail at Madras, in* 1850.

	Circumference.	Length	Weight required to break.	After 24 hours in water, and used 7 days after.	Immersed in water 10 days and dried.	Manilla Rope.	English Hempen Rope.	Weight of one fathom of each. Peta	Manilla.	Europe.
	In.	Fm	lb.	lb.	lb.	lb.	lb.	oz.	oz.	oz.
Rope..	1⅛	2	2218	1994	2016	—	—	19 1/16	—	—
Do.	1⅛	2	1154	—	—	1490	1184	8 1/16	9½	13
Line...	0⅞	1	86½	—	—	—	—	0 7/16	—	—
Cord...	0 3/16	1	39½	34½	37 1/16	—	—	0 3/16	—	—

From Royle's Fibrous Plants of India, p. 19.

Europe hemp, made of sewing twine (untarred) broke at		212 lb.
Harris's patent colonial bolt rope tarred	,,	204 ,,
Manilla hemp untarred	,,	188 ,,
Europe bolt rope tarred	,,	168 ,,
Balasore fibre untarred at Calcutta	,,	137 ,,
Do. spun by Captain Bond thumb hnn.....	,,	135½ ,,
Europe rope tarred...	,,	88 ,,

Page 56, *Royle's Fibrous Plants of India.*

Statement showing the comparative Strengths of the undermentioned Specimens of Rope, Cord, String &c. made from the fibres of the Plantain, with Hempen Rope, as exemplified in a set of Experiments carried on at the Arsenal. Fort Saint George, in July 1850.

Number marked on label.	LABELLED.	Arsenal Number.	Description.	Circumference.	Length of Rope &c. used.	Weight required to break the Rope &c.	WEIGHT REQUIRED TO BREAK				WEIGHT OF ONE FATHOM OF EACH DESCRIPTION.		
							After immersion in water 24 hours dried in the shade, & tested 7 days after.	After being immersed in water 10 days and dried in the sun.	Manilla Rope of same circumference.	English Hemp Rope of same circumference.	Plantain.	Manilla.	Europe.
				In.	Fms.	lb.	lb.	lb.	lb.	lb.	oz.	oz.	oz.
1	Rope and String made from the fibres of the Plantain. Mr. Lima, Porto Novo.	1	Line.	0¾	3	248	—	—	—	—	2 1-16	—	—
		2	String.	0½	1	54½	—	—	—	—	0 4-16	—	—
2	Rope and Line made from the fibres of the Plantain, by the Prisoners of the House of Correction.	3	Line.	1	3	288	—	—	—	—	2 7-16	—	—
		4	do.	0¾	3	190	—	—	—	—	1 12-16	—	—
		5	String.	0½	1	114	—	—	Bengal log line, 137	—	0 9-16	—	—
3	Rope made from the fibres of the Plantain, in the House of Industry. Fibres prepared in the House of Correction, Madras.	6	Rope	3½	3	2330	2387	2050	4669	3885	19 9-16	28 11-16	30
		7	do.	1¼	3	638	—	—	869	—	6	5	—
		8	do.	1¼	3	694	—	—	869	—	5 13-16	5	—
		9	do.	1¼	3	624	—	—	—	Ratline. 638	4 5-16	—	5 1-16
4	Rope made from the fibres of the Plantain, by a pauper in the Monegar Choultry, Madras.	10	Line.	1	1½	323	—	—	—	—	2 10-16	—	—
		11	do.	1	1	330	—	—	—	—	3	—	—
		12	do.	0¾	3	183	—	—	—	—	1 8-16	—	—
		13	do.	0¾	0¾	362	—	—	—	—	1 9-16	—	—
5	Rope and String made from the fibres of the plantain by five Europeans in Her Majesty's Jail.	14	Rope.	1¾	3	1240	1266	762	1490	1184	7 9-16	9 8-16	13
		15	do.	1¾	3	974	—	—	—	—	5 8-16	—	—
		16	String,	0¾	1	185	—	—	Bengal log line 137	—	1 4-16	—	—
		17	do.	0¾	1	38	—	—	—	—	0 5-32	—	—
6	Ditto, Ditto, by the same prisoners, from fibres of the plantain prepared in the House of Correction.	18	Rope	2	3	1490	—	—	—	—	11	—	—
		19	do.	1¾	3	1323	—	—	1490	1184	8 6-16	9¼	13
		20	do.	1¼	3	806	—	—	757	Ratline 638	5	3¼	5 1 16
		21	String.	0¾	1	43½	—	—	—	—	0 3-16	—	—

Royle's Fibrous Plants, page 88.

Comparative Strength of Fibres, both dry and wet ascertained by weights suspended to four feet lengths of the several lines.

Number.	NAMES OF THE PLANTS, and brief remarks on the various materials employed in these experiments.	Average weight each line broke with when dry.	Average weight each line broke with when wet.	Average of weight gained by wetting the line.
1	Hemp, the growth of 1800, from the Company's Hemp Farm near Calcutta, ...	158	190	20
2	Jeetee (Asclepias tenacissima), ...	248	343	38
3	Sunn (Crotalaria juncea), cut before the plants were in blossom, and steeped immediately, ...	112	158	41
4	The same as No. 4, but dried, or rather kept for some time before they were steeped, ...	60	78	30
5	Sunn cut when in full blossom, and steeped immediately, ..	130	185	42
6	No. 6, kept drying for some time, ...	100	166	66
7	Sunn cut when the seeds were perfectly ripe, ...	150	203	35
8	The same as No. 8, but dried, ...	110	163	48
9	Sunn, winter crop, cut when the seeds were ripe and steeped immediately, ...	160	209	31
10	A var. of Corchorus capsularis, Teetah Paat, ...	143	146	2
11	Reddish Corchorus capsularis, from China, ...	164	164	0
12	Corchorus olitorius, Bunghi Paat, ...	113	125	11
13	Æschynomone Cannabina, Dancha, cut when the seed was nearly ripe, ...	138	145	5
14	Abroma augusta, young shoots cut before the blossoms appeared, ...	100	112	12
15	The same, from Old ligneous plants, that had ripened their seed,	121	121	0
16	Hibiscus striatus, from the Moluccas, ...	104	115	10
17	No. 17, after it had ripened its seed, ...	128	135	5
18	Hibiscus cannabinus, cut when in blossom, and steeped immediately,	115	133	15
19	The same, cut when the seed was ripe, ...	110	118	7
20	Hibiscus (No. 18 of the next table) cut when in flower, and steeped immediately, ...	116	123	6
21	Hibiscus sabdariffa, cut when in flower, and steeped immediately,..	89	117	31
22	Hibiscus abelmoschus, Calee Kustoree, cut when in full flower, and steeped immediately, ...	107	107	0
23	Hibiscus esculentus, D'heroos, cut when the seed was ripe, and steeped a few days thereafter.	79	95	20
24	Hibiscus furcatus, cut when in flower, and steeped immediately, ...	89	92	3
25	Hibiscus pilosus, a large annual species, cut when in advanced flower, and steeped immediately.	97	130	34
26	Guazuma ulmifolia, stout young shoots of about (6) feet in height, from 2 years old roots, steeped immediately, ...	100	140	40
27	Fibres of the footstalks of the leaves of a large luxuriant wild Musa, or Plantain, ...	79	...	...
28	A line made of fifteen threads of sail twine Callooe, Urtica tenacissima,	240	278	16

Comparative Statement of the effect of Maceration 116 days in stagnant water, comparing the strength by weights suspended to four-feet lengths of the various Cords therein mentioned, when fresh.

Number.	NAMES OF THE PLANTS, and brief remarks on the various materials employed in these experiments.	AVERAGE WEIGHT AT WHICH EACH SORT OF LINE BROKE.					
		WHEN FRESH.			AFTER 116 DAYS' MACERATION.		
		White.	Tanned	Tarred	White.	Tanned.	Tarred.
1	English Hemp, a piece of a new tiller-rope,	105			rotten, Eng.	as was log-line	also an
2	Hemp, Cannabis, the growth of this season from the Company's Hemp Farm near Calcutta,	74	139	45	all rotten.		
3	Coir, the Fibres of the husk of the Cocoa-nut,	87			54		
4	Ejoo, Saguerus Rumphii, Roxb.,	96			94		
5	Æschynomene cannabina, Dansha of the Bengalese. The fibres of plants that had nearly ripened their seed,	88	101	84	40	56	65
6	The fibres of the bark of No. 5, from plants coming into blossom,	46	61	48	rotten	68	45
7	Crotalaria juncea, Sunn of the Bengalese,	68	69	60	rotten	51	65
8	Corchorus olitorius, Bunghi-Paat. The fibres of its bark called Jute,	68	69	61	40	49	60
9	Corchorus capsularis, Ghee-Nalta-Paat. The fibres called Nalta Jute,	67			50		
10	Flax, Linum usitatissimum, the growth of the Company's Hemp Farm near Calcutta,	39			rotten		
11	Agave americana,	110	79	78	rotten	rotten	15½
12	Sanseviera Zeylanica; in Sanscrit Murva,	120	73	48	30	26	34
13	Abroma augusta. Woollet-comal of the Bengalese,	74	58	44	38	54	50
14	Guazuma ulimifolia, Bastard-Cedar. The fibres of the bark of some straight luxuriant young plants,	52	47	45	30	39	
15	Hibiscus tiliaceus, Bola of the Bengalese,	41	62	61	40	55	70
16	Hibiscus striatus, from the Moluccas, a tall, white-flowered variety of it,	61			26		
17	Hibiscus mutabilis,	45	53		rotten	45	
18	Hibiscus, from the Cape of Good Hope,	22			17		
19	Bauhinia racemosa, Roxb., a large scandent species,	69			rotten		
20	The same as No. 19, only maceration was used to help to take the bark off the twigs with more ease,	56			rotten		
21	Sterculia villosa,	53			30		

From Royle's Fibrous Plants, page 269.

(3592) FICOIDEÆ. Drs. Royle and Ainslie mention no medicinal species in this order, but allude to the genus *Mesembryanthemum*, as a ready source of soda. Dr. Roxb. speaks of the order as of little consequence in a medicinal view; he mentions that all the species are rich in alkaline carbonates; but this is sufficiently explained by their usually frequenting the sea shore.—*O'Shaughnessy, page* 354.

(3593) FICUS, a large genus of Plants belonging to the natural order *Urticaceæ*, having the flowers, both males and females, mixed indiscriminately on the inside of a fleshy receptacle, which is so concave that its edges are drawn to-

gether into a narrow opening. This is illustrated by the common eatable Fig, the receptacle of *Ficus Carica*, which, although resembling a fruit as simple as a gooseberry, is in fact a collection of a large number of minute unisexual flowers growing to a succulent base; as its apex will be found the narrow opening where the edges of the receptacle are drawn together, and when its interior is laid bare the flowers are seen closely packed all over its surface, divided from each other by soft colourless bristle-like bracts or scales. What are called the seeds in the ripe fig are the pericarps, each of which contains a single seed. The calyx is variable in the number of its segments, sometimes having only 3, sometimes 7 or 8. The stamens are solitary in many species, 3 in others, and 5 in some. The pistil consists of a single ovary terminated by an awl-shaped style, ending in a 2-lobed stigma. The number of species of *Ficus* is very considerable, perhaps as great as that of any arborescent genus. They are all either tropical or inhabitants of warm countries. Some are small plants creeping upon the surface of rocks and walls, or clinging to the trunks of trees like ivy; others are among the largest trees of the forest. All travellers in the woods of South America speak of the noble aspect of the fig-trees (meaning species of *Ficus* not of the cultivated sort), of their gigantic dimensions, and of the thick delightful shade cast by their leafy heads. They are specially remarkable for throwing out roots from their branches, which, after they have reached the ground and established themselves there, increase rapidly in diameter, produce other branches, and thus contribute to extend an individual over a considerable space of ground. Frazer speaks thus of what he saw of their habits in the forests at Moreton Bay in Australia:—"I observed several species of *Ficus* upwards of 150 feet high, enclosing immense iron-bark trees, on which originally the seeds of these fig-trees had been deposited by birds. Here they had immediately vegetated, and thrown out their parastical and rapacious roots, which adhering close to the bark of the iron-tree had followed the course of its stem downwards to the earth, where, once arrived, their progress of growth is truly astonishing. The roots of the *Ficus* then increase rapidly in number, envelope the Iron-bark, and send out at the same time such gigantic branches that it is not unusual to see the original tree, at a height of 70 or 80 feet, peeping through the fig, as if itself were the parasite on the real intruder. In the singular angles or walls, as they are here termed, which are formed by the roots of these trees, and of which I observed many 16 feet high, there is room enough to dine half a dozen persons. The fruit is eagerly sought by Regent Birds (*Sericulus chrysocephalus*), blue pigeons, and Swamp Pheasants (*Cuculus Phasianus*), and the spreading and massy boughs support a number of superb parasitical plants." Reinwardt assures us ('Ueber den Charakter der Vegetation auf den Inseln des Indischen Archipels') that he observed on the island of Semao a large wood whose trunks all proceeded from one single stem of a *F. Benjamina*, all united with each other by their branches though the trunks were distinct. The well-known *F. Indica*, or Banyan-Tree, is another instance of this peculiar habit. The species abound in a milky juice containing caoutchouc, and there is every reason to believe that what of this substance comes from Java is exclusively procured by tapping different species of *Ficus*. The best known on the continent of India is yielded by *F. elastica*. Although the fruit of *F. Carica* and some others is eatable, yet the whole genus abounds in an acrid highly dangerous principle, diffused among the milky secretion. This is perceptible even in the common fig, whose milk produces a burning sensation on the tongue and throat; but when the fruit of that species is ripe, the acridity is destroyed by the chemical elements entering into new combinations. In some species it is so concentrated that they are among the most virulent of poisons. *F. toxicaria*, a Sumatra species, and *F. dæmona*, from Tanjore, derive their names from this circumstance, in which many more equally participate.—*Eng. Cyc.* Wight in Icones gives,

Ficus ampelos,	exasperata,	polycarpa,
angustifolia,	*excelsa*	quercifolia,
aquatica,	fruticosa,	racemifera,
asperrima,	glomerata,	radicans,
Attimeeraloo.	hederacea,	ramentacea,
Bengalensis,	heterophylla,	rapiformis,
Benjamina,	hirsuta,	repens,
cannabina,	hirta,	scabrella,
caricoides,	humilis,	scandens,
comosa,	*Indica*,	*Serrata*,
congesta,	infectoria,	tomentosa,
conglomerata,	laccifera,	*truncata*,
copiosa,	lanceolata,	Tsiala,
cordifolia,	macrophylla,	tuberculata,
cunia,	nitida,	vagans,
dœmona,	obtusifolia,	virgata, &
denticulata,	oppositifolia,	Wassa, *Cleghorn*.
elastica,		

The genus *Ficus* is celebrated for one of the species yielding the Fig, one of the most early cultivated of fruits, and another yields the Caoutchouc of Assam, while the Bur and the Peepul are, in India, two of the most highly esteemed of trees. It is a genus numerous in species which abound in all parts of India. It is probable that the bark of some of the species, like that of the Mulberry, may be converted into half-stuff, as Mr. Ostandje states that the bark of one of the species is used for paper making in the Island of Ceylon.—*Royle, Fib. Plants*, p. 348.

(3594) FICUS AMPELOS.

Barenki, Tel.

A large tree, a native of mountainous countries chiefly. Trunk remarkably short, but very thick

and sometimes so completely ornamented with small very leafy branchlets, as to hide it entirely. The leaves are used to polish ivory, horn &c., The leaves of the Trophis aspera also called Warinka are used for the same purpose.—*Roxb. M.S.S.*

(3595) FICUS BENJAMINOIDES. Tenasserim Banyan. Few persons are aware that a species of ficus exists in the Tenasserim Provinces which has the habit of dropping roots from its branches that root in the ground, and become trunks as large as the parent tree, to an extent nearly equal to the famous banyan. It escapes notice because it developes itself in the greatest perfection near the mangrove swamps, and some who see it call it a mangrove; and it never grows spontaneously except on the banks of tide water streams. It is not found however, in the mangrove lands which are under water every tide, but above that belt where Heritiera trees, and their associates show themselves, on land that is inundated by the spring tides only. Specimens are seen farther toward the interior, as on the banks of the Gyaine, but on the low banks near the sea between Tavoy and Mergui, the trees often form labyrinths from which Mr. Mason, more than once has found it difficult to extricate himself. It is rather remarkable that the tree has never been introduced into the towns, where it would be quite an ornament to the sides of the public walks. In a few instances he has seen the tree planted on high ground, one at a village near the sea-coast west of Tavoy, where it appears to grow very well. A very nearly allied species, Wight says, is "much used as an avenue tree" in southern India. Perhaps our tree will be referred to the same species. *F. Benjamina;* but though much resembling it, there is still a difference that appears to be constant, and therefore specific. The *Benjamina* has the fruit smooth on short stems, while the Tenasserim tree has rough fruit and stemless. There is a difference too in the leaves, but it is only slight, and not alone sufficient to establish a species. Wight, in uniting *F. nitida* with *F. Benjamina*, characterizes the united species thus: "*Ficus Benjamina*, Leaves oval and obovate, obtuse, polished; fruit axilliary, paired, smooth." The Tenasserim tree may be thus characterized: *Ficus Benjaminoides*. Leaves oval, suddenly acuminate, smooth, polished above; fruit axilliary, paired, sessile, rough.—*Mason.*

(3596) FICUS CARICA. Linn. The common Fig. *Diœcia Triandria*, Linn. The fig has been employed in diet and in medicine from very early times. A small tree. Leaves cordate often palmately lobed, scabrous above, pubescent beneath. Flowers monœcious, numerous, stalked, and inclosed within a pear-shaped fleshy receptacle, which converges so as to leave only a small orifice at the apex, forming what is commonly called the fruit or Fig, with a few bracteal scales at its base. *Male.* Perianth 3-lobed. Stamens 3. *Female.* Perianth 5-parted. Ovary semi-adnate. Style single. Stigmas 2. Utricle single, covered with the persistent, somewhat fleshy, perianth, and sunk into the fleshy receptacle. Achænium lenticular, hard. Embryo curved, within fleshy albumen.—Native of Asia, long introduced into Europe. Nees von E. 97. St. and Ch. 154. Formerly, as in the present day, the process of caprification was practised, to assist the ripening of the fruit. This consists in puncturing the fruit with a sharp instrument covered with oil. The trunk and branches of the common as of other Fig trees abound in milky, usually acrid juice. This is found also in unripe Figs; but as they ripen, mucilaginous and saccharine matter is produced, the fig becomes soft, juicy, and of a delicate flavour in all favourable climates. When nearly ripe, they are dried in large quantities in the south of Europe, and are exported to this country. They form also an article of commerce in Asia, imported into India from Affghanistan and Persia.—*Royle.* In the Dekhan, this tree bears fruit almost the whole year round. There are two varieties, the white and the blue, cultivated in all the native gardens, the young trees producing the finest fruit. The Italians, as the fruit begins to ripen, prick each with a pin, putting a drop of sweet oil on the spot;—it is said that this causes an increase in the size of the fruit. The trees may be grown by layers and suckers at the commencement of the rains, and during the cold season. Cuttings strike easily in the course of six weeks. The finest fruit that Dr. Riddell has seen grown has been on young trees of two years old, near which dead animal matter had been buried. The trees should be pruned annually, and the best way is to cut down the old branches that have borne fruit, leaving one or two buds that promise to throw out healthy shoots. The fruit when ripening must be protected from birds, either by nets or bags.—*Riddell.* In Tenasserim though a stunted fig-tree or two may be seen in a few European gardens, the fruit rarely comes to perfection; although there are perhaps more indigenous trees in the jungles belonging to the fig genus, than to any other in the whole vegetable kingdom.—*Mason.*

(3597) FICUS CORDIFOLIA. Heart-leaved Fig. In Tenasserim this is the tree which usually supplies the place of the peepul in the public places, and in the neighborhood of religious edifices. "It approaches," says Roxburgh, "nearest to *F. religiosa*, of any species I know, yet it is easily distinguished from it by the leaves being narrower in proportion to the length, with much shorter points, and instead of the lobes forming a sinus at the base there is a small degree of projection at the insertion of the petiole. And in the second place by the fruit being perfectly round and not, as in *religiosa*, vertically compressed."—*Mason.*

(3598) FICUS ELASTICA, the Indian Caoutchouc-Tree, is now a common tree in the hothouses of Britain. It has large, shining, oval, pointed, thick leaves, small axillary eatable fruits, the size of an olive, and long pink or red terminal buds, composed of the stipules rolled together. This species inhabits the Pundua and the Juntipoor Mountains, which bound the province of Silhet on the north, where it grows to the size of a European sycamore, and is called Kastneer. It is chiefly found in the chasms of rocks and over the declivities of mountains among decomposed rocks and vegetable matter. It produces when wounded a great abundance of milk, which yields about one-third of its weight of caoutchouc. It grows with great rapidity; a tree is described as being 25 feet high, with the trunk a foot in diameter when only four years old. The juice of this valuable plant is used by the natives of Silhet to smear over the inside of baskets constructed of split rattan, which are thus rendered water-tight. Old trees yield a richer juice than young ones. The milk is extracted by incisions made across the bark down to the wood, at a distance of about a foot from each other, all round the trunk or branch up to the top of the tree, and the higher the more abundant is the fluid said to be. After one operation the tree requires a fortnight's rest, when it may be again repeated. When the juice is exposed to the air it separates spontaneously into a firm elastic substance, and a fetid whey coloured liquid. Fifty ounces of pure milky juice taken from the trees in August yielded exactly 15½ ounces of clean-washed caoutchouc. This substance is of the finest quality, and may be obtained in large quantities. It is perfectly soluble in the essential oil of Cajeput. (Roxb., 'Fl. Ind.,' iii. 545.)—*Eng. Cyc.* This India-rubber tree, (*Ficus elastica*) abounds in Assam, but the outer Himalaya at Punbabarree, is its western limit. It penetrates amongst the mountains, as far as the Teesta valley in Sikkim but is of small size.—*Hooker. Him. Jour. Vol.* I. *page* 102, *and* II. *p.* 13.

(3599) FICUS GLOMERATA.

Glomerous fig tree, ENG.	Attee marum, TAM.
Medee, TEL.	Rulla kith mara, CAN.
Gol seer, HIN.	Oombur, DUK.

A large tree with fruit like the common fig, grows in clusters along the branches, flavour insipid, but eaten by the poorer classes. This tree thrives best near a watercourse, or on the banks of rivers.—*Riddell.*

(3600) FICUS INDICA.

Banyan tree, ENG.	Bur ka jhar, HIN.
Ala marum, TAM.	Vata vriksha, SANS.
Ahlada mara, CAN.	Mari chettoo, TEL.

Ficus Indica, the Banyan-Tree, is a native of most parts of India, both on the islands and the mainland. Roxburgh states that it is found in its greatest perfection and beauty about the villages on the skirts of the Circar Mountains. The leaves are ovate, heart-shaped, 3-ribbed, and entire; when young, downy on both sides; when old, much smoother: they are from 5 to 6 inches long, and from 3 to 4 inches broad; at the top of the leafstalk on the under side is a broad, smooth, greasy-looking gland. The figs when ripe grow in pairs from the axils of the leaves, are downy, and about the size and colour of a middle-sized red cherry. The wood is light, white, porous, and of no value. The Brahmins use the leaves, pinned together as plates, to eat off; bird-lime is manufactured from the tenacious milky juice. If the seeds drop in the axils of the leaves of the Palmyra-Tree (*Borassus flabelliformis*), the roots grow downwards, embracing the trunk in their descent; by degrees they envelop every part except the top, whence in very old specimens the leaves and head of the Planyra are seen emerging from the trunk of the Banyan-Tree, as if they grew from it. The Hindoos regard such cases with reverence, and call them a holy marriage instituted by Providence. The Banyan-Tree, covering, with its trunks a sufficient space to shelter a regiment of cavalry, and used as a natural canopy for great public meetings, has been so often described by writers on India as to have become familiar to the reader. The branches spread to a great extent, dropping their roots here and there, which as soon as they reach the ground rapidly increase in size till they become as large as and similar to the parent trunk, by which means the quantity of ground they cover is almost incredible. Roxburgh says that he has seen such trees full 500 yards round the circumference of the branches, and 100 feet high, the principal trunk being more than 25 feet to the branches, and 8 or 9 feet in diameter. Gum lac is obtained from this tree in abundance. The white glutinous juice is applied to the mouth to relieve tooth-ache; it is also considered a valuable application to the soles of the feet when cracked and inflamed. The bark is supposed to be a powerful tonic by the Hindoos. An excellent account of such a tree will be found in the 'Oriental Annual' for 1834; and a graphic description of the mode of growth in Rumf.'s 'Herbarium Amboinense,' vol. iii. p. 126. See also 'Asiatic Researches,' vol. v. p. 310. It is called Vuta in Sanscrit, Bur or But in Bengali, Bagha in Cingalese, a glutinous juice is extracted by incision, from which bird-lime is prepared.—*Riddell.* The drops when well prepared by water seasoning, oiling &c. are valued for tent poles, spars of small vessels &c. The timber of the tree does not seem to be employed, but Mr. Rohde has used planks, sawn from large drops after they had been seasoned in water with advantage: for knife boards it is excellent. Bird-lime is pre-

par ed from the tenacious milky juice. The leaves are sewn together for plates to eat off.—*Rohde M.S.S.* Dr. O'Shaughnessy, states that the lac insect abounds on it, and the bark yields abundance of milky juice containing caoutchouc. —*O'Shaughnessy.*

(3601) FICUS INFECTORIA. The waved leaved fig tree.

Joovee, TEL.	Kallalin, TAM.
Jovee, HIND.	Bassari mara, CAN.

(3602) FICUS NITIDA, the Chinese banyan, is one of the most valuable trees for ornamental purposes met with in the south of China. It grows rapidly with but little care, its foliage is of a glossy green colour, and it soon affords an agreeable shade from the fierce rays of the sun, which renders it peculiarly valuable in a place like Hong-kong.—*Fortune's Tea Districts, page* 6. A fig-tree (*Ficus nitida*)—a kind of Banyan—is a great favourite with the priests, and is always found growing beside the temples, to which its dark green leaves and wide spreading branches afford an agreeable *shade* from the fierce rays of the sun.—*Fortune's Wanderings, page* 381.

(3603) FICUS RACEMOSA. COUNTRY-FIG. Linn.

Attie pullum, TAM.	Bodda wood, ENG.
Guller, DUK.	Boddah kurra, TEL.
Oodumburra, SANS.	

A large tree common throughout the country, the milky juice of this tree is considered a valuable external application in ring-worm.—*Riddell.* Attai-kai, *Tam.* Madipundoo, *Tel.* the fruit is used in various ways, dried, in curries, roasted and eaten, pickles are likewise made with them. —*Jaffrey.* This species of fig is of an inferior quality and is only eaten by the poor.—*Ainslie, page* 222.

(3604) FICUS RELIGIOSA. Poplar leaved fig tree.

Ravee, TEL.	Arasa, TAM.
Peepul, HIND.	

Wild poplar leaved fig tree.

Konda ravee, TEL.	Kat Arasu, TAM
Junglee peepul, HIND.	

Ficus religiosa. The Pippul Tree.

Arasa maram, TAM.	Ravichettoo, TEL.
Ranghy mara, CAN.	Peppal, HIND.
Ray amun, TEL.	Bogaba, CYNG.

F. religiosa, the Pepul-tree, is a large tree, common in every part of India, especially near houses, where it is planted for the sake of its extensive dark grateful shade. It is held in superstitious veneration by the Hindoos, because their deity Vishnoo is fabled to have been born under its branches. The leaves are heart-shaped, long, pointed, wavy at the edge, not unlike those of some poplars; and as the footstalks are long and slender, the leaves actually tremble in the air like those of the Aspen-Tree (*Populus tremula*). Silk-worms prefer the leaves next to those of the Mulberry. The leaves are used for tanning leather by the Arabs, who call the tree Mudah or Vudah, and also Undi. *Zebid.* See 'Asiatic Researches,' iv. 309, for further information concerning this.—*Eng. Cyc.* This very large tree is preferable for avenues to the Banyan, as its shade is not so dense: the wood is not in general use.—*Rohde M.S.S.* It is generally planted about Hindoo temples. The roots are most destructive to buildings, for if once they establish themselves amongst the crevices, there is no getting rid of them.—*Riddell.* Pepul bark is deemed a good tonic; the lac insect also flourishes on this tree.—*O'Shaughnessy.* In Tenasserim, the F. religiosa, or aspen-leaved peepul, is quite an ornamental tree but very scarce. The peepul of the residents, but not of the Burmese who recognize the distinction, is an allied but different species of ficus. It is the most sacred of trees with the Buddhists, for it was under this tree that Gaudama slept, and dreamed that his bed was the vast earth, and the Himalaya mountains his pillow, while his left arm reached to the eastern ocean, his right to the western ocean, and his feet to the great south sea. This dream he interpreted to mean that he would soon become a Buddha; and it was while seated beneath the same tree, that his dream was verified—He vanquished the forces of Mara, the Indian Cupid, and became divine.—*Mason.*

(3604) FICUS SEPTICA AND F. TOXICARIA have an acrid and corrosive juice; *F. tinctoria* of the Society Isles gives a good yellow dye. The *Ficus elastica* of India (Sylhet and Assam especially) yields abundance of caoutchouc of the best quality. (*See p.* 560.)—*O'Shaughenssy, p.* 577.

(3605) FICUS SYCOMORUS, the Sycomore Fig, is a large tree found in Egypt, where it is planted extensively by the road-side, near villages, and on the sea-coast, for the sake of the shelter of its very widely-spreading branches. The Arabs call it Djummeiz. Forskahl states that its head is often forty yards in diameter. The leaves are broadly ovate, repand or somewhat angular, rather blunt, nearly smooth, heart-shaped at the base. The figs are not produced upon the young branches, but in clustered racemes upon the trunk and the old limbs. They are sweet and delicate, and eaten by the Egyptians. The timber appears to be of little value, for Forskahl excludes it from the lists of carpenters' wood, and places it among the trees which are used for firewood. It can hardly therefore have furnished the wood of which mummy-cases were made, as has been supposed. Professor Don, with greater reason conjectures that they were made from the timber of *Cordia myxa*. When old this tree becomes very gnarled and broken, as is shown in a plate in Salt's 'Abyssinia,' where it is figured under the name of Daroo-Tree, but it is so bare of foliage as to be hardly a picturesque object.—*Eng. Cyc.*

(3605) FICUS TSIELA. Roxb. *Moreæ*, Icon. 668.

Bichie wood, Eng.	Joovi Chetto, Tel.
Bichie maram, Tam.	

I presume, like all the other species of ficus, this is of very little value as timber, the people of Coimbatore know nothing of it.—*Wight.*

(3606) FICUS VIRENS.

Goovee manhoo. Tel.

The Natives use the wood for common purposes. It is well adapted for avenues, being a very ornamental tree constantly in leaf. There are many varieties, the smaller leafed seem to stand better than the banyan in exposed situations.—*Rohde, M.S.S.*

(3607) FIGS.

Teen, Arab.	Fici. Lat.
Rata Attika, Cing.	Anjeer, Pers.
Vygen, Dut.	Figos, Port.
Figues Fr.	Higos, Sp.
Feigen, Ger.	Udumvara, Sans.
Anjeer, Guz. Hind.	Simie attie pullum, Tam.
Fichi, It.	Maydipondoo, Tel.

The fruit of a small tree (*Ficus carica*), indigenous to the temperate parts of Asia, and now cultivated in the fertile islands of the Mediterranean, in Spain, Italy, France, Greece and India. An inferior description of dried figs are largely imported into Bombay from the Persian Gulf.—*Faulkner.*

(3608) FILBERTS. The fruit of a variety of the hazel-nut (*Corylus avellania*), produced partly by the superiority of soil and climate where it grows, and partly by culture.—*Faulkner.*

(3609) FILE.

File, Dan.	Lime It.
Vylen, Dut.	Limas Port.
Lime, Fr.	Pili, Rus.
Feilen, Ger.	Limas, Sp.
Kanus Guz. Hind.	

An instrument of iron or forged steel, cut in little furrows, and used to smooth or give form to metals, wood and other hard substances.—*Faulkner.*

(3610) FILFIL BURREE.—Wild pepper, fruits of Vitex trifolia, agnus-castus and negundo.—*Irvine.*

(3611) FILLIGREE, a style of delicate wire-work, used for ornamenting gold and silver, introduced by the Italians, who call it *filigrana*, a word compounded of *filum* a thread or wire, and *granum* a grain or bead: this is in allusion to the early practice of ornamenting the wire-work with small beads. Wire used for this purpose is seldom drawn round, but flat or angular. The display of filligree work in the Great Exhibition was very wonderful for delicacy of workmanship and fantastic beauty. The chief exhibitors were from Sardinia, Turkey, the Ionian Islands and Malta.—*Tomlinson.*

(3612) FIREWORKS.

Feux de artifice, Fr.	Atishbazee, Guz. Hind.
Fenerwerke, Ger.	Pers.

Well-known devices, composed of explosive combustibles, generally of gunpowder, along with iron, steel, copper, zinc filings, resin, camphor, &c.—*Faulkner.*

(3613) FIREWORKS, in eastern countries form superb displays of pyrotechnic skill. They are of various forms, represent animate and inanimate things, such as trees, tigers, ships, elephants, men, sea-fights, eclipses of the sun and moon. They are imported from China: but are also manufactured in the principal cities of India.

(3614) FISH, (French, Poisson; German, Fisch), a name applied to all the species of a class of animals occupying the lowest station of the four great divisions of the section *Vertebrata*. A fish may be defined as a Vertebrate Animal, breathing through the medium of water by means of branchiæ, or gills, having one auricle and one ventricle to the heart, cold red blood, and extremities formed for swimming.—*Eng. Cyc.*

(3615) FISHERIES OF SOUTHERN AND EASTERN ASIA. The fishermen supplying the markets of Pinang and Singapore are principally natives of China. The fishing boats vary from one to three tons burden; they are of a slight make and calculated to ply at but short distances from the shore. They are pulled by oars and seldom carry sails. The nets are made of twine, tanned with bark of Mangrove. The bamboo fishing-stakes are clumsy contrivances. That they answer well enough in fine weather is more owing to the riches of the sea and their sheltered position, than to the ingenuity of the contrivance or the durability of the materials. In nautical skill, the Chinese fishermen of the Straits settlements are far behind the Malays. The fishmongers are also natives of China, but they form a class far superior to the fishermen. Their trade comprizes the branches,

Fresh Fish,	Shark's Fins,
Dried Fish,	Balachan,
Isinglass (Fish Maws),	Fish Manure, and
Fish Roes,	Tripang.
Red Fish and "Sardines."	

Fresh fish.—The fishermen dispose of their boat loads to the fishmongers who assort the different kinds in heaps, over which sea water is continually poured, and from these the daily customers are supplied. Although comparatively few kinds of Fishes appear on the tables of Europeans, the Malays and Chinese are less nice in their selection, and reject but very few kinds.

Dried fish.—The daily surplus of fishes is cured by the fishmongers. The process commences with a partial abrasion of the scales, after which the larger fishes are opened length-

wise and the intestines removed. Water is repeatedly poured over the fishes till blood and impurities have disappeared, when they are placed in casks in flat layers, between which is thrown a quantity of salt. In this state the fishes remain from 24 to 48 hours, when they are exposed to the sun, and frequently turned, till they are throughly dried. The smaller kinds are not opened nor are they all salted before drying in the sun. The little care bestowed upon the curing appears, however, to be sufficient for local consumption, and none of the settlements in the straits export dried fishes. The pikul of 133⅓ lbs sells from 3 to 7 Spanish Dollars valued at 4s. 6d. The katty being 1⅓ lb, of which 100 go to the picul.

Isinglass, Fish Maws, Fishsounds, or Air-Bladders, (*Paloppong ikan* or *ari ari ikan* of the Malays, *loo-pa* of the Chinese) appear to have formed an article of exportation from the islands of the Indian Archipelago as early as they became visited by the Chinese. When these people commenced to settle in the straits, they not only there collected what are called fishmaws but also from distant localities. Bombay, Ceylow, Madras, Bengal, Tenasserim and most of the Malayan Islands contribute to the annual supply, which is bought up by Chinese dealers at Penang, Malacca, and Singapore. By them the Maws are exported to China. The fact was noted by Mr. Crawfurd, but that the Fish maws are isinglass, appears to have been the discovery of an anonymous correspondent in Parbury's *Oriental Herald* for January 1839. The personal exertions of Mr. McClelland have been mainly instrumental in adding isinglass to the articles of exportation from India to the European Markets. Since 1842, Mr. W. T. Lewis, Assistant Resident Counsellor of Pinang, has made some very successful attempts to inprove the production of isinglass in Prince of Wales Island. But European Merchants there appear unwilling to engage in this novel branch of commerce, as the supply from want of proper care is uncertain, and procurable but in comparatively small quantities. These, however, are no objections to the Chinese dealers, as they are sure of a profitable and quick return of their outlay. The fishes from which isinglass is obtained at Pinang are,

Lates heptadactylus, (*Ikan siyakup.*)
Polynemus indicus, (*Ikan kurow.*)
Otolithus blanritus, (*Ikan salampae.*)
Otolithus ruber, (*Jarang gigi.*)
Otolithus [illegible], (*Jarang gigi.*)
Otolithus [illegible], (*Jarang gigi.*)
Johnius diacanthus, [illegible] (*Tabareh.*)
Lobotes erate, (*Ikan bata*[illegible])
Arius truncatus, (*Ikan saludu,*)
Arius arius, (*Ikan saludu.*)
Arius militaris, (*Ikan saludu.*)

The total Qantities and value of Fish maws imported into and exported from Prince of Wales Island, from 1832 to 1842,

IMPORT.			EXPORT.		
1832—33 TO 1841—42	Quantity in Pikuls.	Value in Dollars.	1832—33 TO 1841—42	Quantity in Pikuls.	Value in Dollars.
Total,..	1,323	50,172	Total,...	1,939	73,842

Fish Roes, Red Fish, and *Sardines*. These are condiments and the species used in the preparation, are *Alausa toli*, (*Ikan trubok.*) *Engraulis Broeuii*, (*Bunga ayer or badak.*) *Dussumieria acuta* (*Tamban-bulat*) and *Clupeonia perforata*, (*Tamban-nepes or balub.*)

Shark's Fins.—The Chinese fishmongers of the Straits settlements obtain Shark's fins from the same localities which supply them with Fish maws. These fins are not exclusively selected from Sharks (Squali,) but equally from Rays (Raiæ). Quantities examined at Pinang were composed of Fins of the following Genera: *Stegostoma, Carcharias, Sphyrna, Pristis, Rhinobatus, Tryyon, and Myliobatis.* Of all fishes Sharks and Rays are the most valuable to Chinese. The flesh and entrails of all, not even the electric Rays (*Torpedinidæ*) excepted, are eaten either fresh or dried, the skin is used for polishing or converted into Shagreen; gelatine is obtained from the larger fins, glue from t e smaller. All, except the caudal fins, are cut at the root so as to leave as little flesh as possible. The root is dipped in wetted lime (Chunam) in the erroneous belief of preventing attacks of insects, and then the fins are dried in the sun. Those imported in the Straits Settlements are packed promiscuously in gunny bags, each containing from one half to one Pikul. According to the value in the Chinese market, the fishmongers assort the fins in two kinds, "white" and "black." The *white* consist exclusively of the dorsal fins, which are on both sides of a uniform light colour and reputed to yield more gelatine than the other fins. In China the lovers of gelatinous soups pay from 30 to 40 Spanish Dollars per Pikul of white fins. The pectoral, ventral and anal fins pass under the denomination of *black* fins. The colour, however, varies according to the species from buff to grey or brown, and most of them are of two different colours, the upper surface being dark, the lower light. The black fins, for obvious reasons the most numerous, are supposed to yield a comparatively small quantity of gelatina and sell in China from 15 to 20 Spanish Dollars per Pikul, Mr. W. T. Lewis has communicated the annexed table, shewing the quantity of Shark's fins imported into and exported during 10 years from Penang to China. The total quantities of Shark's Fins imported into and ex-

ported from Prince of Wales Island, from 1832 to 1842.

IMPORT.			EXPORT.		
1832—33 TO 1841—42	Quantity in Pikuls.	Value in Spanish Dollars.	1832—33 TO 1841—42	Quantity in Pikuls.	Value in Spanish Dollars.
Total,...	1,350	19,216	Total,...	3,177	48,036

Balachan.—Is a condiment prepared from small fishes of all descriptions and shell fish. The ingredients are placed in a pit to undergo fermentation, and afterwards dried, pounded and preserved with spices. With the Malays, Siamese, Burmese and Cochin Chinese, Balachan has become a necessary of life, as it serves to season the daily food of these nations.

Fish Manure.—The smallest fishes, and all offal are employed in the spice plantations by the Chinese gardners and agriculturists of Penang, who consider the fluid in which fishes have been salted very useful manure in cocoanut plantations. In addition to the preceding, there are two animal productions of the eastern seas, which also are considered fishes by the Chinese. They are the dried *Holothurioideæ*, called *Tripang Seala* or *Beche de mar*, and *Cuttle Fishes*. Of both, large quantities are annually collected and dried for the market in China. The naked Cephalopods are not only eaten fresh, but one species, a Loligo, forms in its dried state a considerable article of traffic. The preparation consists in removing the inkbag without laying open the mantle. After all impurities have been removed by water, the mollusk is submitted to a slight pressure and ultimately exposed to the sun. Small bundles of one Katty's weight are tied up with slips of ratan, and enclosed in cases holding ten Katties and upwards. The Pikul sells at the rate of 14 to 16 Spanish Dallars.—*Beng. As. Soc. Jour. No.* 208. Along the Asiatic coasts, the high price obtained for the superior and well manufactured Isinglass affords inducements not to be expected elsewhere, but all the parts of Fish, as the Flesh, the Roe, and the Sounds can be turned to account, much of the Fish caught must be everywhere consumed for food, while considerable quantities are dried, and form articles of commerce, as do Shark-fins and Fish-maws. The sounds of many Indian Fishes might, like Sturgeons, yield Isinglass, while Fish-glue and Fish oil might be obtained from others. The natives of Asia are not unacquainted with the modes of preserving fish. The Roe appears among their articles of Materia Medica under the name of Butarookh, and Mr. Crawfurd informs us, that "the Roe of enormous size of a kind of Shad which frequents the great river of Siak in Sumatra, constitutes an article of commerce: while the Balachang of the Eastern Seas, consisting of small fish with prawns and shrimps, first fermented and then dried, gives rise to a considerable traffic, as no food is deemed palatable without it, and its use extends to every country from China to Bengal. In Java and Sumatra a preparation of small fish with red rice, having the appearance of anchovies, and the colour of red cabbage, is esteemed as a delicacy. So in India, the preparation called Tamarind Fish, is much prized as a relish, the acid of the Tamarind being made use of for preserving fish cut in transverse slices: the demand for dried fish exists in every part of Asia, and Isinglass is in request both in Europe and China. It might perhaps become an article of consumption even in India, as it is mentioned in their systems of Materia Medica by the name of ghurree-al-su-mak and sureshum mahee, that is Fish-glue, and is described as a good diet for patients in a decline. The Sele combines the advantages of fineness of flavour, with wholesomeness as food; while considerable in size, it is migratory in habit and enters the Bengal rivers in great shoals in the cold weather. Its swimming bladder is of value as an article of commerce, and its flesh, is esteemed as food in a fresh state; this would become still more valuable if it could be properly cured. In China, the consumption of salted provisions is very general, "and also," in consequence of the immense quantities of both sea and river fish which are daily caught, and the rapidly putrescent nature of that species of provision a considerable portion is cured with salt and dried in the sun, the haut gout which accompanies it being rather a recommendation to the taste of the Chinese. Indeed it is one of their most favorite as well as universal articles of food, and they even overcame their prejudice or indifference for whatever is foreign, on the occasion of salted Cod being introduced for two or three years in English ships, the somewhat decayed condition in which it reached China being said to have been anything but a drawback. This species of cargo, besides its disagreeable nature and the injurious effect which it might have on some delicate articles of shipment, was found during the voyage to breed a peculiar insect, which from the readiness with which it bored into the planks and timbers of a ship, was considered as dangerous, and accordingly the import was greatly discontinued. Sir A. Burnes represents "the mariner of Cutch in the present day as truly, adventurous putting to sea for a trifling reward, and stretching boldly across the ocean to Arabia, the Red Sea, and the Coasts of Zanzuebar in Africa. The Sea vessels of Gurachee sail to Muscat, Bombay, and the Malabar Coast, and the fishing-boats at the mouths of the Indus he describes as good sea-boats, sailing very quickly, and as numerous, because the fisheries there are extensive, and form a source of commerce on the South-Eastern part of the Peninsula of India. In Ceylon as also in China, the Pearl fisheries are of consider-

able value. Dr. Cantor states that at the mouths of the Ganges, the Fishermen have sea-going boats, which they build themselves, and that they are a superior description of Indian sailors, of much more industrious habits than the majority of the natives of India. Still further to the eastward, we see the Burmese and Siamese almost living in boats, and the Malays most formidable as Pirates in the Indian Seas. Mr. Crawfurd represents the Indian Islanders as expert fishermen, and that there is no art which they carry to such perfection as fishing, which the nature of their climate allows them to practise, with hardly any interruption, from one end of the year to the other; the fishing-boats proceeding to sea with the land-breeze at an early hour of the morning, and return with the sea-breeze a little after noon. The fisheries afford a most valuable branch of their commerce, as a great variety of their fish are dried in the sun, or salted and dried, and sent by the inhabitants of the coast in large quantities into the interior Islands, or transmitted to every part of the Archipelago. Dr. Cantor has particularly called attention to the importance of attending to, and encouraging the sea fishery, which is carried on to a very small extent, chiefly because the distance to Calcutta is too great to allow of the carriage of fish in a fresh state. The only class of fishermen who have sea built boats inhabit villages situated near the entrance of the Hoogly. Their chief and most profitable employment consists in attending, with their boats, on the shipping entering and leaving the river for which they receive 16 rupees per diem. Whenever this employment fails, they resort to work with their nets, which they drag during high water along the coasts of the Sunderbuns. Two or three times are generally speaking sufficient to load a boat with fishes and shell-fish (a truly prodigious quantity being brought up in a few hauls). The larger portion of the prize which is not consumed or otherwise disposed of on the spot, is then preserved. This process consists simply in dividing the fish, taking out the viscera, and spreading them in the sun till they become sufficiently dried. The Polynemus Illiah, or Saccolih, enters the mouths of the Ganges in shoals. The Kharrah, or Indian Mackerel, a species of Thynnus, is rather uncommon in this estuary, but it must be found in abundance off the Burmese coast, as from thence, great numbers in a dried state are annually imported into Bengal. The Cartilaginous fishes, Dr. C. states, abound in numbers and species, and are remarkable for their wide geographical distribution. The Sharks enter the rivers to a considerable distance from the sea. Shark skin, he says, is used by the native workmen for polishing wood and ivory; and Shark-fins we have seen are largely exported to China. Of the better known salt water fishes of a wider geographical distribution, such, for instance, as are valued as articles of food, at the three distant points, Calcutta, Madras and Bombay, the market of the first is the least rich in varieties in consequence of its greater distance from the sea. The abundance of the supply, however, makes up for what it wants in variety, and the great demand for fish affords a livelihood to great numbers of fishermen, who every night spread their nets in the river and in the salt-water lake. The Lates nobilis, different species of Polynemus, and the Mugil Corsula daily cover the tables of Europeans, who will more readily recognise these fishes under the names of the Begti or Cockup, Sudjeh, Tupsi (Mango fish), and the Indian Mullet. At the Sandheads, may be found some of those delicious fishes, which are more familiar to the residents of Madras and Bombay; for instance, the Indian Soles, the Roll-fish, and, above all, the Black and White Pomfrets, and the Bummoloh, which latter, in a dried state, is known by the name of the Bombay duck. Of these, the Indian Mullet is the most widely distributed, being common in the Straits of Malacca, the Bay of Bengal, the Persian Gulf, and the Red Sea, also at the Cape of Good Hope. "The bazars in Calcutta," Dr. Cantor remarks, "are always stocked with an ample supply of dry fish, which is consumed partly by the European and native shipping of that port and partly by the poorer classes of Bengal, and the Upper Provinces. Cargoes of this article are annualy imported by the Burmese and Arabs." These dried fishes consist chiefly of the Bummalos, the above named Siluroid Fish, which sells in Calcutta at the rate of four or five rupees a hundred, in Indian Mullet, the Sudjeh, the Begti, and the Kharrah or Indian Mackerel. The demand for dried fish exists all along the coasts of the Peninsula. At Bombay large quantities of the Bummalo, are consumed and exported. At the mouths of the Indus, the fishery is extensive and some Fish Sounds are there procured, perhaps Sounds of Polyneme, but they may also be those of other fish; as the specimens of Fishmaws are very different in form from the Isinglass sent from Bengal. Mr. McCleland, in his paper, calls attention to the very important subject of increasing the supply of fish in the interior of India. Wherever there are any large pieces of water for the purposes of irrigation, as in the Peninsula of India, these he conceives might support quantities of fish, if proper kinds were selected, and pains taken to destroy the injurious animals, in the season when the water is sufficiently low for the purpose. He also suggests that at the different sanitaria which have been established in the mountains, it would be desirable and easily practicable to form rivaria, which would at all times yield a supply of fish. This might, as he suggests, be done by damming up a portion of some of the valleys through which the mountain

streams pass. He also further recommends that the natives of India should turn their attention to the curing of fish in districts where they are abundant, and sending them to others where they are less so, and for consumption at seasons when fresh fish becomes scarce. "The cold season, from November to February, when most fishes are taken, in short. The fishermen not having the means of curing their fish, have nothing to stimulate them to any exertion, beyond what can be consumed when fresh. Had the fisherman the means of preserving the result of his labors, his chief market would commence when the fishing season ends, and his industry would then become a permanent benefit to himself and the county at large. Mr. Crawfurd, after stating that the Fisheries of the Indian islands form the most valuable branch of their commerce, and that a great variety of the fish caught, are dried in the sun, proceeds to observe, that "ordinary dried fish form no portion of the foreign exports of the Indian Islands, but three singular modifications of it do, Fish-maws, Shark-fins, and Tripang, all of which are sent to China in large quantity." The Tripang Swala, or Beche de Mar, often called Sea Slug, one of the tribe of Holothuria, is an unseemly looking molluscous animal, which constitutes, in quantity and value, one of the most considerable articles of the exports of the Indian Islands to China. There are fisheries of Tripang in every Island of the Indian Archipelago, from Sumatra to New Guinea, and upwards of not less than 8,000 cwt. are yearly sent to China from Macassar. The price ranging from 8 Spanish Dollars per picul to 20, and as high as 115, according to the quality. The same author states, that Shark-fins are exported to China from every maritime country, between the Arabian Gulf and the East Indian Islands. A picul of Shark-fins usually sells in China as high as 32 Spanish Dollars, or at £6. 1s. per cwt. which high price makes it evident, that they are only articles of luxury for the use of the rich. In the market of Macassar the ordinary price is about 15 Spanish Dollars, or £2 16s. 8½d. per cwt. Of the three substances mentioned by Mr. Crawfurd as exported from the Indian Islands, one only remains to be noticed, and this is Fish-maws. But of this he merely says that it is a favourite article of the strange luxury of the inhabitants of that country, often bringing as high as 75 Spanish Dollars per picul or £14. 3s. 6d. per cwt. in the market of Canton. Raw dried split fish are abundantly cured (without salt) in Tibet; they are caught in the Yaru and great lakes of Ramchoo, Dobtah, and Yarbru, and are chiefly carp, and allied fish, which attain a large size. It is one of the most remarkable facts in the Zoology of Asia, that no trout or salmon inhabits any of the rivers that débouche into the Indian Ocean (the so-called Himalayan trout is a species of carp). This widely distributed natural order of fish (*Salmonidæ*) is, however, found in the Oxus, and in all the rivers of Central Asia that flow north and west, and the *Salmo orientalis*, M'Clelland, ("Calcutta Journ. Nat. Hist." iii., page 283), was caught by Mr Griffith (Journals, p. 403) in the Banean river (north of the Hindo Koosh) which flows into the Oxus, and whose waters are separated by one narrow mountain ridge from those of the feeders of the Indus. The central Himalayan rivers often rise in Tibet from lakes full of fish, but have none (at least during the rains) in that rapid part of their course from 10,000 to 14,000 feet elevation: below that, fish abound, but I believe invariably of different species from those found at the sources of the same rivers. The nature of the tropical ocean into which all the Himalayan rivers débouche, is no doubt the proximate cause of the absence of *Salmoninæ*. Sir John Richardson (Fishes of China Seas, &c., "in Brit. Ass. Rep. &c.") says that no species of the order has been found in the Chinese or eastern Asiatic seas.—*Hooker Him. Jour.* vol. ii. *page* 183. There are assuredly no seas in the world more abundant in esculent fish than those of the Asiatic Archipelago, and a few of them are of excellent flavour. Fish constitutes the chief animal aliment of all the inhabitants, and everywhere of those of the sea-coast who are by profession fishermen. Among the best fisheries are those of the eastern coast of the Malay Peninsula, those of the entire Straits of Malacca, of the northern coast of Java, and of all the coasts of Borneo and Celebes, with those of the Philippine Islands. The taking of the mother-of-pearl oyster, the pearl-oyster in a few places, of the holothurion or tripang, and of the shell tortoise, form valuable branches of the Malayan fisheries.—*Crawfurd's Dictionary, page* 138. In China, the various modes of catching and rearing fish exhibit the contrivance and skill of the Chinese quite as much as their agricultural operations. According to the Repository, at least one tenth of the population derive their food from the water, and necessity leads them to invent and try many ingenious ways of securing the finny tribes. Nets are woven of hempen thread, and boiled in a solution of gambier, *Uncaria gambier*, to preserve them from rotting. The smacks which swarm along the coast go out in pairs, partly that the crews may afford mutual relief and protection, but chiefly to join in dragging the net fastened to their boats. In the shallows of rivers, rows of heavy boats are driven down, and nets secured to them, which are examined and changed at every tide. Those who attend these nets, moreover, attach scoops or drag-nets to their boats, so loaded that they will sink and gather the sole, ray, and other fish feeding near the bottom. Lifting nets, 20 feet square, are suspended from poles elevated and depressed by a hawser worked by a windlass on

shore; the nets are baited with the whites of eggs spread on the meshes. Cormorants are trained in great numbers in the eastern provinces to capture fish, and are sometimes under such good order that they will disperse at a given signal, and return with their prey without the precaution of a neck-ring. A single boatman can easily oversee twelve or fifteen of these birds, and although hundreds may be out upon the water, each one knows its own master. If one seize a fish too heavy for him alone, another comes to his assistance, and the two carry it aboard. The birds themselves are fed on bean-curd, and eels or fish. They lay eggs when three years old, which are often hatched under barn-yard hens, and the chickens fed with eel's blood and hash. They do not fish during the summer months. The price of a pair varies from $ 5 to $ 8. Mussels are caught in small cylindrical basket traps, attached to a single rope, and floated with the tide near the bottom.—*Williams' Middle Kingd., Vol.* II. *page* 110. The rearing of fish is an important pursuit, and the spawn is sometimes deposited in proper vessels, and placed in favorable positions for hatching. The bulletin Universel for 1239 asserts that in in some part of China, the spawn so taken is carefully placed in an empty egg-shell, and the whole closed: the egg is then replaced in the nest, and after the hen has sat a few days upon it, re-opened, and the spawn placed in vessels of water warmed by the sun, where it soon hatches.—*Williams' Middle Kingdom, p.* 270. Shell-fish and mollusks, both fresh and salt, are abundant in the Chinese market, but they have not been examined scientifically. Oysters of a good quality are common along the coast, and a species of Mactra, or sand calm, is fished up near Macao. The Pearl river affords two are three kinds of freshwater shell-fish, of the genus Mytilus, which are obtained by dredging. The prawns, shrimps, crabs, crawfish, and other kinds of crustacea met with, are not less abundant than palatable, one species of crawfish, as large, but not taking the place of the lobster called lang hai, or dragon crab, cuttle-fish of three or four kinds, and the large king-crab (Polyphemus), are all eaten by the natives, though not relished by others.—*Williams, p.* 272. The true cod has not been observed on the Chinese coast, but several species of Serrani (as Plectropoma susuki, Serranus shihpan, megachir &c.) generally called ship-pan by the natives and garoupa by foreigners, are common about Macao, and considered the most delicate flavoured of any in the markets. Another common and delicious fish is the Polynemus tetradactylus or bynni-carp, usually called salmon by foreigners, isinglass is prepared from its skin. The pomfret, or stang-u of the natives (Stromateus argenteus), is a good pan-fish, but not so delicate as the solefish, many species of which abound in the shallows of the Bogue. Two or three species of mackerel, the Sciœna lucida, an ophicephalus, the mullet, the white rice fish and a kind of shad, complete the list of good table fish found in the markets of Canton.—*Williams' Middle Kingdom, page* 169. Immense quantities of fish are daily caught in the river above the town. Their mode of catching them is ingenious and amusing. One day I was going up a considerable distance in a boat, and set out a little before low water, that I might have the full benefit of the flow of the tide, and get as far up as possible before it turned. On the side of the river, a few miles above Ning-po, I observed some hundreds of small boats anchored, each containing two or three men; and the tide turning just as I passed, the whole fleet was instantly in motion, rowing and sculling up the river with the greatest rapidity. As soon as the men reached a favourable part of the stream they cast out their nets and began to make a loud noise, splashing with their oars and sculls with the intention, I suppose, of driving the fish into the nets. After remaining in this spot for about a quarter of an hour, all the boats set off again, farther up, for the next station, when the crew commenced again in the same noisy manner, and so on for a long way up the river, as long as the tide was flowing; they then returned with the ebb loaded with fishes for the next morning's market. There is another mode of catching fish, which I have frequently seen in the northern provinces, even more curious than that which I have just noticed. Every one acquainted with Chinese history knows that the fish abound in all the rivers and lakes of the north: indeed every little pond swarms with them. I was greatly surprised when I first saw the fish catcher following his profession in these places. He is literally amphibious. He is to be seen perfectly naked, half-walking, half-swimming; now he raises his arms and hands above his head, and, bringing them down, strikes a sharp blow upon the water, making a loud and splashing noise. His feet are not idle; they warn him that a fish is at hand, and they are now feeling for him amongst the mud at the bottom of the pond. The next moment the fisherman has disappeared: he is now under water, and he remains so long that you think something has happened to him. There is, however, no cause of fear: a few seconds more and he appears, rubbing his face and eyes with one hand, and in the other triumphantly holding up the poor little fish which he has just captured. It is immediately placed safely in his basket, and the work goes on as before. The surface of the water is struck and splashed, as I have just described, in order to freighten the fish which are swimming amongst the feet of the Chinamen. Being freightened, they dive immediately to the bottom amongst the mud, where they are felt by the feet, and are soon taken by these expert divers. But the most singular of all the methods of catching fish in China is that of training and employing a large

species of cormorant for this purpose, generally called the fishing cormorant. These are certainly wonderful birds. I have frequently met with them on the canals and lakes in the interior, and, had I not seen with my own eyes their extraordinary docility, I should have had great difficulty in bringing my mind to believe what authors have said about them. The first time I saw them was on a canal a few miles from Ning-po. I was then on my way to a celebrated temple in that quarter, where I intended to remain for some time, in order to make collections of objects of natural history in the neighbourhood. When the birds came in sight, I immediately made my boatmen take in our sail, and we remained stationary for some time to observe their proceedings. There were two small boats, containing one man and about ten or twelve birds in each. The birds were standing perched on the sides of the little boat, and apparently had just arrived at the fishing ground, and were about to commence operations. They were now ordered out of the boats by their masters, and so well trained were they, that they went on the water immediately, scattered themselves over the canal, and began to look for fish. They have a beautiful sea-green eye, and, quick as lightening, they see and dive upon the finny tribe, which, once caught in the sharp-notched bill of the bird, never by any possibility can escape. The cormorant now rises to the surface with the fish in its bill, and the moment he is seen by the Chinaman he is called back to the boat. As docile as a dog, he swims after his master, and allows himself to be pulled into the San-pan, where he disgorges has prey, and again resumes his labours. And, what is more wonderful still, if one of the cormorants gets hold of a fish of large size, so large that he would have some difficulty in taking it to the boat, some of the others, seeing his dilemma, hasten to his assistance, and with their efforts united capture the animal and haul him off to the boat. Sometimes a bird seemed to get lazy or playful, and swam about without attending to his business; and then the Chinaman, with a long bamboo, which he also used for propelling the boat, struck the water near where the bird was, without, however, hurting him, calling out to him at the same time in an angry tone. Immediately, like the truant school boy who neglects his lessons and is found out, the cormorant gives up his play and resumes his labours. A small string is put round the neck of the bird, to prevent him from swallowing the fish which he catches; and great care is taken that this string is placed and fastened so that it will not slip farther down upon his neck and choke him, which otherwise it would be very apt to do. Since I first saw these birds on the Ningpo canal I have had opportunities of inspecting them and their operation in many other parts of China, more particularly in the country between the towns of Hang-chow-foo and Shanghae. I also saw great numbers of them on the river Min, near Foo-chow-foo. I was most anxious to get some living specimens, that I might take them home to England.—*Fortune's Wanderings, from page* 104 *to* 111. The Chinaman from whom I bought these birds has a large establishment for fishing and breeding the birds about thirty or forty miles from Shanghae, and between that town and Chapoo. They sell at a high price even amongst the Chinese themselves—I believe from six to eight dollars per pair, that is, from 30s. to 40s. As I was anxious to learn something of their food and habits, Mr. Medhurst, jun, interpreter to the British Consulate at Shanghae, kindly undertook to put some questions to the man who brought them, and sent me the following notes connected with this subject:—"The fish catching birds eat small fish, yellow eels and pulse jelly. At 5 P. M. every day each bird will eat six taels (eight ounces) of eels or fish, and a catty of pulse jelly. They lays eggs after three years, and in the fourth or fifth month. Hens are used to incubate the eggs. When about to lay, their faces turn red, and then a good hen must set upon them. The date must be clearly written upon the shells of the eggs laid, and they will hatch in twenty-five days. When hatched, take the young and put them upon cotton, spread upon some warm water, and feed them with eel's blood for five days. After five days they can be fed with eel's flesh chopped fine, and great care must be taken in watching them. When fishing, a straw tie must be put upon their necks, to prevent them from swallowing the fish when they catch them. In the eighth or ninth month of the year they will daily descend into the water at ten o'clock in the morning, and catch fish until five in the afternoon, when they will come on shore. They will continue to go on in this way until the third month, after which time they cannot fish until the eighth month comes round again. The male is easily known from the female, in being generally a larger bird, and in having a darker, and more glossy feather, but more particularly in the size of the head, the head of the male being large and that of the female small." Such are the habits of this extraordinary bird. As the months named in the note just quoted refer* to the Chinese calendar, it follows that these birds do not fish in the summer months, but commence in autumn, about October, and end about May—periods agreeing nearly with the eighth and third month of the Chinese year.—*Fortune's Wanderings, pages* 104 to 113.

(3616) FISHES OF EASTERN AND SOUTHERN ASIA, being Catalogue of Malayan Fishes. By Theodore Cantor, *Esq. M. D. Bengal Medical Service.*

[Localities printed in *Italics* signify those from whence the fishes were obtained; in ordinary type those previously given

by authors. The descriptions are drawn up from recently taken specimens.]

Subclass. TELEOSTEI. Order. ACANTHOPTERI. Fam. PERCOIDÆ.

Genus LATES, *Cuvier and Valenciennes*, 1828. Infraorbital and humeral bones, and preopercle strongly toothed, the latter with a spine at the angle; anterior dorsal fin higher but shorter than in *Perca* and *Labrax*; tongue smooth.

(3617) *Lates heptadactylus*, (Lacepede.)

SYN. Perca maxima, Sonnerat (MS. ?) Cuv. and Val. II. 96.
Holocentre heptadactyle, Lacepede, IV. 344 and 391.
Russell, CXXXI. Pandoomenoo.
Coius vacti, Buchanan Ham. 86, 369, Pl. 16, Fig. 28.
Lates nobilis, Cuv. and Val. II. 96, Pl. 13.
Lates nobilis, Cuv. R. A. II. 134 (n).
Lates nobilis, Richardson: Report, 1845, 222.
Lates nobilis, Bleeker: Verh. Batav. Genoots. XXII. 16, 27.
Ikan Siyakup of the Malays.

Head and back brownish, or blackish pale green, sides silvery grey; scales with a brownish spot at the root, or edged with that colour; abdomen silvery; pectorals and ventrals pale yellow, the other fins brownish or blackish. Iris blackish golden; pupil cornelian red. D 7 or 8—1/11 or 12, C 18 or 17$\frac{3}{4}$, A 3/8 or 9, V 1/5, P. 17 or 18 Br. VII. (Russell: D 7—1/13, C 18, A 3/9, V 1/5, P 15. Buchan: D 7—1/12, C 18, A 3/11, V 1/5, P 17. Cuv. and Val: D 7 or 8—1/12, A 3/8 or 9.) Inhabits the *Sea and estuaries of Pinang, Malayan Peninsula, Singapore.* Bay of Bengal, estuaries of the Ganges, Indian Ocean, China Sea, Canton, Java, Madura. Total length, 5 feet. Those inhabiting brackish water are of a muddy flavour, and blackish or of much darker colours than those living in the sea. The species appears to be less numerous in the Straits of Malacca than in Bengal. Both in fresh and in dried state, it is highly valued as an article of food. It also yields isinglass, of which however, in the Straits, but little is collected, partly on account of the comparative scarcity of the fish, and partly owing to the thinness of the air-vessel. That of a large-sized fish when dried, weighs upwards of one ounce. At Pinang this kind sells at the rate of 25 to 30 Spanish Dollars pr. Pikul.

Genus APOGON, *Lacepede*, 1802. Scales large, deciduous; the two short dorsals widely separated; margin of the preopercle double, finely toothed; pyloric appendages few.

(3618) *Apogon pœcilopterus*, Kuhl. and Van Hasselt?

SYN. ? Apogon pœcilopterus, Cuv. and Val. II. 154.

Head above, back and upper half of the sides reddish brown; lower half and abdomen mother of pearl; crown and sides of the head minutely dotted with black; opercles silvery; on the tail, in the middle of the base of the caudal, a large rounded blackish spot; membrane between first, second and third spines black; rest hyaline, minutely dotted with brown; posterior dorsal, caudal and anal, pale yellowish, dotted with pale brown, ventrals pale yellowish; pectorals hyaline. Iris mother of pearl, upper half black. D 6—1/9, C 15$\frac{6}{7}$, A 2/8, V 1/5, P 13, Br. VII. Inhabits *Sea of Pinang, Singapore.* Total length, 4$\frac{7}{8}$ inch. The length of the head is $\frac{1}{3}$ of the total; the orbit borders on the profile, and occupies the second fourth of the head; the distance between the orbits across the forehead is $\frac{3}{4}$ of the horizontal diameter of the orbit, which is $\frac{1}{4}$ of the length of the head. The posterior margin of the preopercle is finely serrated nearly all round, except a small portion of the lower part; the opercle terminates in a broad triangular membranous point, in the upper margin of which appears a deep rounded incision. The vertical diameter at occiput is $\frac{2}{3}$, in front of the anterior dorsal a little less than the length of the head, at the root of the caudal it slightly exceeds $\frac{1}{3}$ of the head. The sides are covered by 11 longitudinal series of rounded, finely ciliated scales, each with 15 to 18 radiating lines at the base. The lateral line follows the outline of the back; it occupies the third upper series of scales, 23 or 24, on each of which appears a central, longitudinal tube, with one or two minute tubes on each side of its root. The scales of the series immediately above and below the lateral line present an indistinct longitudinal elevation. The first dorsal spine is $\frac{1}{4}$ of the second and third, the longest and strongest, each of which is 2$\frac{1}{2}$ of the length of the head; the sixth spine exceeds the first by one third; the spine of the posterior dorsal, the second anal and the ventrals are of equal length, $\frac{1}{3}$ of that of the head. In the inconstant character of colours, the present species differs from *A. pœcilopterus*, but both agree in their number of fin rays, and general resemblance to the Mediteranean species. (*A. rex mullorum*, Cuv. and Val. II. 143). It is to be regretted that the description of *A. pœcilopterus* is not sufficiently explicit for identification. At Pinang and Singapore single individuals of the present species are of uncertain occurrence.

(3619) *Apogon quadrifasciatus*, Cuv. and Val.

SYN. ? Mullus fasciatus, White; Voyage, 268, Fig. 1.
Apogon quadrifasciatus, Cuv. and Val. II. 153,
Apogon quadrifasciatus, Bleeker: Verh. Batav. Gen. XXII. 16, 28.

Crown of the head and back brownish black; sides and abdomen, mother of pearl; a broad black band from above the orbit to the root of the caudal; a second parallel from behind the orbit, first beneath the lateral line, but from near

the posterior part of the second dorsal it intersects the lateral line, continuing above it through the middle of the caudal fin; upper half of anterior dorsal, between 3d and 6th spine, more or less intense black; the other fins pale yellowish, or pale crimson; all except the pectorals with broad blackish margins. Iris silvery with large black spots. D 7—1/9, C 17$\frac{5}{6}$, A 2/8, V 1/5, P 16, Br. VII. Inhabits *Sea of Pinang, Singapore.* Pondicherry, Batavia. Total length, 4$\frac{1}{8}$ inch. In the young the two lateral black bands, and the blackish margins of the fins are very indistinct, or scarcely perceptible. All the species of the fins exhibit traces of transversal striæ. This species is not numerous at Pinang.

(3620) *Apogon fucatus*, Cantor.

Body and fins, except the pectorals, silvery carmine with rainbow reflections, cheeks, throat and abdomen paler; from the lower part of the orbit to the muzzle a gamboge oblique line; at the root of the caudal a large round black spot, surrounded by numerous minute brown dots, and a few similar on the scales of the posterior part of abdomen. Pupil circular, black with crimson reflection; iris golden gamboge, the upper fourth part ultramarine. D 6—1/9, C 18$\frac{4}{4}$, A 2/16, V 1/5, P 13, Br. VII. Inhabits *Sea of Pinang.* Total length, 2$\frac{6}{8}$ inch. The length of the head is contained about 3$\frac{1}{2}$ times in the total; its depth, which is little less than that of the body, equals its length; the eye is large, circular, the diameter slightly exceeding $\frac{1}{3}$ of the length of the head; the mouth small, little protractile; gape subvertical; the angle of the mouth a little in front of the anterior margin of the orbit; teeth excessively minute; margin of preopercle very finely toothed; lateral line following the outline of the back, nearly throughout oblique, becoming horizontal close to the root of the caudal. Examined under a lens, the spines of all the fins are transversely striated, as in the Genus *Chanda.* The spines of the anterior dorsal are very slender, as in *A. macropterus*, Kuhl and Van Hasselt, and scarcely arched. The lower part of the anterior margin of the second spine is armed with three blunt teeth, vertically situated. The second, third and fourth spine, are of nearly equal length; about one half of the vertical diameter of the body. The spine of the posterior dorsal fin equals in length the longest anterior, but the second branched ray, which slightly exceeds the first and third, is $\frac{2}{3}$ of the vertical diameter of the body. The distance between the last, double, ray of the posterior dorsal, and the root of the caudal equals the length of the head. The caudal is slightly forked: the length of the centre $\frac{1}{6}$ of the total. The basal extent of the anal is a little less than the length of the head; the second and third branched rays are the longest, equalling the corresponding rays of the posterior dorsal fin. The distance between the sixteenth double anal ray, and the root of the caudal is but about one half of that between the latter and the last ray of the posterior dorsal, or about $\frac{1}{3}$ of the length of the head. The first branched ray of the ventrals equals in length the second spine of the anterior dorsal. The length of the transparent pectorals is about $\frac{2}{3}$ of the vertical diameter of the body. This species is closely allied to *Apogon lineolatus*, Ehrenberg, the peculiar coloration is strikingly similar in both, but it differs from the latter, and the other species, in the greater number of anal rays, and in the toothed appearance of the second dorsal spine. A single specimen was observed at Pinang in July 1845. The fishermen asserted it to be of very rare occurrence. The very capacious stomach, occupying the whole length of the abdominal cavity, was expanded with minute shrimps; the intestinal canal is less than one third of the total length, and without cœcopyloric appendages. The rounded acoustic bones are, for the size of the fish, remarkably large.

Genus CHANDA,* *Buchan. Ham.* 1822. (*Ambassis,*† Cuv. and Val. 1828.—*Hamiltonia,*‡ Swainson, 1839.) Teeth sharp, scattered in both jaws, with some of the bones of the head distinctly indented on the edge; with prickles in some of the fins, and with bodies more or less diaphonous, and much compressed; the sides nearly perpendicular. *Notes.* * Not from χανδὸς, hians, as stated by mistake in *Nomenclator Zoologicus*, (Pisces, p. 15,) but from *Chanda*, the vernacular name, applied in Bengal to the Genus. (*Chandee*, Hind. Silver.) † MM. Cuvier and Valenciennes observe that the two first species of *Chanda*, described by Buchanan, belong to a different genus, and they have for that reason cancelled *Chanda.* ‡ Buchanan himself expressed doubts as to the propriety of placing his first species in that genus. Fam. *Zenidæ* (*Scombroidæ*, Bonap.) Swainson, *Fishes, &c.* Vol. II. p. 250. "*Hamiltonia ovata*, Sw., Ham. fig. 37, and *H. lata*, Sw., Ham. fig. 37." Both references are errata.

(3621) *Chanda dussumieri*, (Cuv. and Val.)

Syn. Ambassis dussumieri, Cuv. and Val. II. 181.
Ambassis dussumieri, Bleeker: Verh. Bat. Gen. XXII. 17, 30.

Crown of the head and the back pale greenish, minutely dotted with black, opercle bluish silvery; sides pale silvery with a narrow longitudinal shining silvery band from the opercle to the caudal fin; abdomen transparent with the silvery peritoneum shining through. Fin-membranes transparent; that connecting the 2d and 3d dorsal spine, minutely dotted with black and with a black margin; caudal in some with a blackish margin. Iris silvery; the upper fourth part black. D 7—1/9. C 17$\frac{5}{6}$, A 3/9, V 1/5, P 17, Br. VI. Inhabits *Sea of Pinang.* Malabar, Java, Madura. Total length: 3 inch. The vertical

diameter of the body is contained about 3½ times in the total length. This species appear to occur but rarely at Pinang. In three examined there was no external appearance of the horizontal spine in front of the first dorsal.

(3622) *Chanda nalua*, Buchan. Ham.

Syn. Chanda nalua, Buch. Ham. 107, Pl. 6, Fig. 36.
Ambassis nalua, Cuv. and Val. II. 182.
Ambassis nalua, Bleeker: Verh. Bat. Gen. XXII. 17, 29.

Crown of the head and back pale greenish, with a few indistinct blackish spots at the dorsal fins; sides pale silvery, with a narrow longitudinal shining silvery band from the opercle to the caudal fin; cheeks and opercles iridescent silvery, the latter with a blackish spot between the angle and the orbit, produced by numerous blackish dots; abdomen transparent, iridescent, with the silvery peritoneum shining through: fins pale citrine, the membrane of the anterior dorsal minutely dotted with black, particularly between the 2d and 3d spine, with a black margin. Iris silvery with a black spot beneath the upper margin of the orbit; pupil circular, black with crimson reflection. D 7—1/9, 10 or 11, C 17/7, A 3/9 or 10, V 1/5, P 15, Br. VI. Inhabits *Sea of Pinang*, Rivers of Lower Bengal, Batavia, Samarang, Surubaya, Bima, Sumbawa. Total length: 4⅛ inch. As observed by MM. Cuvier and Valenciennes this species differs from *Chanda gymnocephala* (Lacépede). Syn. *Sciæna safgha* Forskal?—*Lutjanus gymnocephalus*, Lacep.—*Centropomus ambassis*, Lacep.—*Ambassis commersonii*, Cuv. and Val. II. 17. Pl. 25) by its comparatively shorter head, blunter muzzle, and greater depth of the body. Besides, it may at once be distinguished by the extent of the membrane connecting the anterior to the posterior dorsal, which in the present species attaches itself to the lower third of the spine of the posterior dorsal, but does not as in *Chanda gymnocephala* descend nearly down to the level of the back. From the individuals described by Buchanan, those inhabiting the sea differ slightly in colours, and in having one, rarely two, branched rays less in the posterior dorsal and anal fins. The species is at all seasons of no rare occurrence at Pinang. It feeds on small *Crustacea*. The preceding species of *Apogon* and *Chanda* are of little value as articles of food. At Pinang they, as well as numerous other small fishes, the daily residue of the market, are used as manure.

Genus SERRANUS, *Cuv. and Val.* 1828. Dorsal fin single; preopercle serrated; opercle with two or three flat spines; teeth velvety, with a greater or smaller number of longer, pointed teeth; crown of the head, opercles, and cheeks covered with scales; muzzle and jaws with more or less perceptible scales, or aparently naked.

(3623, *Serranus hexagonatus*, (Forster).

Syn. Perca hexagonata, Forsrer.
Holocentrus hexagonatus, Bloch. Schneider.
Serranus hexagonatus, Cuv. and Val. II. 330.
Serranus stellans, Richardsor, Ann. Nat. Hist. March 1842.
Serranus hexagonatus. Richardson: Voy. Sulph. 82, Pl. 38, Fig. 1.

Ground colour of the head above, back and upper half of the sides pale reddish brown with numerous rounded, frequently confluent spots, all indistinct and of a shade but slightly darker than the ground colour; lower half of the sides diluted reddish brown, becoming whitish on the abdomen; fins reddish brown, darker than the body from their numerous indistinct spots, the largest of which along the back between the dorsal spines; upper margin of the dorsal membrane black; all the spines greyish brown. Iris reddish brown, with a narrow golden ring. D. 11/17, C 17-⅔, A 3/8, V 1/5, P. 17, Br. VII. Inhabits *Sea of Pinang* Isles of Borabora and Oualan, South Pacific. Total length: 7⅜ inch. The length of the head is 3¼ of the total; the vertical diameter at occiput is ⅔ of the length of the head; the greatest oblique diameter of the orbit is about 4½ of the length of the head; the margin of the preopercle is rounded, the ascending part strongly toothed, the three lowest teeth larger than the rest; of the three spines of the opercle the upper one is the smallest, and the centre one the largest, its length equalling ½ of the diameter of the eye; the membranous portion of the opercle is elongated to a sharp point. The upper maxillary teeth are preceded on each side by a single curved canine, inside of which appear several pointed teeth, conspicuously longer than all the rest. The lower maxillaries have two canines on each side of the symphysis. All the fins are rounded; the dorsal spines are rather slender and a little shorter than the soft rays; the second anal spine is longer and stronger than any of the other spines, its length equalling the extent of the base of the anal fin. The greatest vertical diameter of the body slightly exceeds ¼ of the total length. The stomach is moderate, coriaceous, particularly near the fundus; the appendicula cœcopylorica are of equal length, about ⅝ inch; the length of the intestinal canal is a little less than the total. This species, of which a single individual occurred at Pinang in 1845, agrees with the description of *Serranus stellans*, Richardson, which the author later referred to *S. hexagonatus*. In the Pinang specimen the dark spots disappeared shortly after death, leaving behind a uniform reddish brown colour.

(3624) *Serranus lanceolatus*, (Bloch.)

Syn. Holocentrus lanceolatus, Bloch. Pl. 242, Fig. 1.

Holocentrus lanceolatus, Shaw. IV. 567.
Russell, CXXX. Sugglathoo Bontoo.
Serranus lanceolatus, Cuv. and Val. II. 316.
Serranus lanceolatus. Bleeker: Verh. Batav. Gen. XXII. 9, 18, 35.
"Ikan Krapu" of the Malayas.

Ground-colour of the body and fins bright gamboge, with five broad vertical brown or black bands, of which the first from the orbit over the preopercle, the second from the crown of the head obliquely over the opercle to behind the pectoral fins, where it joins the third; in the obliquely oval space between these two bands some individuals have a large oval black spot; the third band, which occupies the space between the 2nd and 10th dorsal spine, becomes narrower on the body and continues jointly with the second band over the abdomen; the fourth band spans nearly the whole lower half of the dorsal rays, proceeds over the body and the anal, on the posterior part of which the ground colour is visible, with one or more black spots; the fifth band is in front of the caudal; all the fins with one or more series of large black spots, more or less confluent; the pectorals in some with three arched undulating black bands; jaws with large black spots. Pupil circular black; iris golden. In the young the ground colour is citrine or sulphur. D 11/16, C 17$\frac{4}{4}$, A 3/8, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang*, Bay of Bengal, Batavia, Samarang. Total length: 6$\frac{4}{8}$ inch. In three individuals examined the number of fin rays was the above stated; Russell and M.M. Cuvier and Valenciennes give the dorsal 11/14, and the latter give the anal 3/10.

(3625) *Serranus horridus*, Kuhl and Van Hasselt.

Syn. Serranus horridus, Cuv. and Val. II. 321.
Serranus horridus, Bleeker: Verh. Bat. Gen. XXII. 7, 19, 36.
"Ikan Krapu" of the Malays.

Crown of the head and back blackish brown; sides and abdomen brownish grey, largely marbled with blackish brown; spinous part of the dorsal yellowish pale brown, with a large basal brownish spot, between each pair of spines: the rest of the dorsal gamboge, the lower half with three or four oblique downward directed blackish bands, above which some large round black spots; caudal, anal and ventral fins gamboge, with large round, sometimes confluent, black spots; pectorals with a large black spot in the centre of the base, and three or four more or less interrupted arched black bands. Iris blackish brown with a golden ring. D 11/15 or 16, C 17$\frac{3}{3}$, A 3/8, V 1/5 P 17 or 19, Br. VII. Inhabits *Sea of Pinang*, *Singapore*, Java. Total length; 4 feet 3 inch. This species is closely allied to *Serranus geographicus*, Kuhl and Van Hasselt, which according to M.M. Cuvier and Valenciennes has one or two additional soft rays in the dorsal, and two in the anal fin. It attains to gigantic size. In one, the weight of which exceeded 130 lb., the stomach contained remains of *Stromateus*, *Sphyrna blochii*, and of a *Limulus*. Though not plentiful, it is not of uncommon occurrence at Pinang, where it is valued by the natives both in its fresh and dried state. In the adult the colour of the fins is greenish olive.

(3626) *Serranus altivelis*, Cuv. and Val.

Syn. Serranus altivelis, Cuv. and Val II. 314 Pl. 25.
Cromileptes altivelis, Swainson, Nat. Hist. of Fishes, II. 201.
Serranus altivelis, Richardson: Report 1845, 230.
Serranus altivelis, Bleeker, Verh. Batav. Gen. XXII. 18, 33.

Head and body brownish buff changing to white on the abdomen; fins lilac-grey; all parts with distant round black spots, edged with white; those of the body and dorsal fins larger than the rest; iris brownish buff with a narrow golden ring, the upper part with two ocelli. D 10/18, C 17$\frac{5}{5}$ A 3/10, V 1/5, P 17, Br. VII. Inhabits *Sea of Pinang*, Java, China Seas. Total length: 4$\frac{6}{8}$ inch. M.M. Cuvier and Valenciennes count 19 soft rays in the dorsal fin, but their figure represents 18; the latter is probably taken from a perserved specimen, and gives but an inadequate idea of the exquisitely delicate tints of the living fish. A single, probably young individual observed at Pinang in June 1845, farther differs from Pl. 25, *Hist. Nat. des Poiss.* in having the dorsal spines from the third of equal length, whereas in the plate, their length is represented as gradually increasing from the first to the tenth. The very capacious stomach was expanded with remains of *Crustacea*.

(3627) *Serranus bontoo*, Cuv.

Syn. Russell CXXVIII. Madinawa Bontoo.
Serranus bontoo, Cuvier R. A. II. 141,(3)
Serranus bontoo, Cuv. and Val. II. 334.
Serranus bontoo: Bleeker: Verh. Bat. Gen. XXII, 9.

Brownish grey, lighter on the abdomen; head and body with numerous round blackish spots; fin membranes brownish grey; the dorsal blackish at the base and upper half. Iris pale greenish olive with a narrow golden ring. D 11/17, C 17$\frac{5}{5}$, A 3/8, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*, Madras, Vizagapatam, Java. Total length: 5 inch. A single individual with one soft anal ray less, but otherwise corresponding to the description and figure of Russell, was observed at Pinang in 1843. The lowest three teeth of the preopercle are larger than the rest. On each side of the intermaxillary bone appears a canine, stronger than the rest of the teeth. The black spots of the body become indistinct after death.

(3628) *Serranus coioides*, (Buchanan Hamilton).

Syn. Russell CXXVII, Bontoo.
Bola ? coioides. Buchanan Ham. 82. 369. An unfinished coloured sketch in the depulicate series of Buchanan's Drawings leaves no doubt of the species in question.
Serranus suillus, Cuv. and Val. II. 335.
Serranus suillus, Bleeker: Verh. Bat. Gen. XXII, 9.

Head, body and fins reddish ash-coloured, whitish on the abdomen, with numerous rust-coloured or orange round spots, those of the dorsal sometimes confluent, forming one or two longitudinal bands. Iris pale golden with one or two rusty spots. D 11/15, C 17⅔, A 3/8, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang*, *Singapore*, Coromandel, Bay of Bengal, Gangetic estuaries, Java. Total length: 1 foot 6 inch. This species grows to a gigantic size. Russell saw one 7 ft. in length, 5 in circumference, weighing more than 300 lb. Smaller individuals are highly valued as articles of food. It is not numerous at Pinang.

Genus GENYOROGE, *Cantor*. γωγὴ cheek; γένυ cleft. Substituted for *Diacope*, Cuvier 1187, preoccupied by *Diacope*, Hubner 1816, (*Lepidopt.*) (*Equivalent to* Diacope, *Cuvier*.) Canines among the velvety maxillary teeth; margin of preopercle toothed; opercle generally terminating in two or three flat points; margin of preopercle with a notch receiving a tuberosity of the interopercle.

(3629) *Genyoroge notata*, (Cuv. and Val.)

Syn. Russell XCVIII, Antika Doondiawah.
Diacope notata, Cuv. and Val. II. 422.
Mesoprion Russelli, Bleeker: Verh. Batav. Gen. XXII. 20, 41.

Head above crimson; cheeks golden, margin of preopercle pale carmine: of opercle vermilion; back reddish brown; sides pale golden with red reflections; abdomen yellowish white; from the orbit, above the lateral line, three obliquely ascending orange lines, of which the lowest reaches the middle of the base of the dorsal rays; beneath which a large black spot; beneath the lateral line three or four parallel similar lines, of which the uppermost divides the black spot; the rest nearly straight from the opercle towards the tail; fin membranes yellowish; apical third of dorsal spines and rays, and upper, lower and posterior margin of caudal fin crimson; anal and ventral fins gamboge. Iris golden. *Young.*—Head above and back brownish; cheeks, sides and abdomen, silvery white; stripes of the body brown; fine pale yellow, points of dorsal rays and posterior margin of caudal fin pale crimson. D 10/14, C 17¼, A 3/8, V 1/5, P 16, Br. VII. Inhabits *Sea of Pinang*, Indian Ocean, Bay of Bengal, Batavia. Total length: 9 inch. Russell gives 3/6 in the anal; M.M. Cuvier and Valenciennes 11/13 in the dorsal fin. Russell has observed the changes of colour produced by age. On each side of the throat appear three small oval fossets, of which the posterior is the largest. The species is not numerous at Pinang.

Genus MESOPRION, *Cuvier* 1829. Teeth on the palate and vomer; canines among the velvety maxillary teeth; the middle of each side of the head armed with teeth like those of a saw.

(3630) *Mesoprion Johnii*, (Bloch).

Syn. Camboto, Renard T. I. Pl. 31.
Anthias johnii, Bloch, IX. 97, Pl. 318.
Lutjanus johnii, Lacepede IV. 235.
Sparus tranquebaricus, Shaw IV. 471.
Russell XCVII. Doondiawah.
Coius catus, Buchanan Ham. 90, 369, Pl. 38, fig. 30.
Mesoprion unimaculatus, Quoy and Gaim. Zool. de Freyc. 304, Pl. 5. fig. 3.
Mesoprion unimaculatus, Cuv. R. A. II. 143,(3).
Mesoprion johnii, Cuv. and Val. II. 443.
Mesoprion unimaculatus, Cuv. and Val. II. 441.
Mesoprion unimaculatus, Richardson: Report 1845, 229.
Mesoprion unimaculatus, Bleeker: Verh. Bat. Gen. XXII. 4, 20, 42.

Head above and back greyish green, opercles silvery with golden edges; sides silvery with numerous longitudinal blackish lines, produced by a central spot or line on each scale; beneath the middle of the base of the dorsal rays a large black spot, in front of which, in some, two or three blackish vertical bands, terminating a little below the lateral line; abdomen yellowish white or silvery; fins reddish yellow; upper margin of the membrane of the dorsal spines blackish; of that of the rays and posterior margin of the caudal fin pale carmine. Iris pale golden. D 10/14, C 17⅔, A 3/8, V 1/5, P. 16 or 17, Br. VII. Inhabits *Sea and estuaries of Pinang*, *Malayan Peninsula*, Indian Ocean, Bay of Bengal, Gangetic estuaries, island of Lantao (Canton River), China Seas, Celebes, Amboina, Batavia, Tagal, Samarag, Surubaya, Pasuruan. Total length: 10 inch. The intensity of the black lateral spot and lines differs individually, and such as habitually live in brackish muddy water, have a general blackish hue, and two or three vertical blackish bands in front of the constant lateral spot. Such was the individual first described by Bloch as *Anthias johnii*, which denomination therefore takes precedence. M.M. Cuvier and Valenciennes, indeed, question the specific difference between the latter, and *Mesoprion unimaculatus*, and point out the identity of *Coius catus*, Buch. Ham. and the present species. The first ventral ray is elongated, but it is frequently mutilated. In some, not in all individuals, the margin of the preopercle is so deeply indented, and the tuberosity of the in-

teropercle so conspicuous, that they might be considered species of *Genyoroge*, and as such they were considered by Kuhl. On each side of the throat appear three small oval fossets as in *G. notata*. At Pinang this species is numerous at all seasons. It is insipid; the natives however dry it.

(3631) *Mesoprion rangus*, Cuv and Val.

Syn. Russell XCIV. Rangoo.
Mesoprion rangus, Cuv. and Val. II. 481.
Mesoprion rangus, Cuv. R. A. II. 144,(3).

Head, body and fins cherry or indian-red, lighter on the sides and abdomen; the latter in some reddish white. Iris silvery carmine. *Young.*—Head and back purple; cheeks and sides pale indian-red; abdomen reddish white. D 10/13, 14 or 15, C 17$\frac{3}{3}$, A 3/8, V 1/5, P 16, Br. VII. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Java, Coromandel. Total length: 1 foot 8 inches. In the upper jaw appear on each side of the muzzle two canines, of which the posterior are very large, slightly curved; on each side of the lower jaw are four similar, conical and equidistant. In the adult of this as in other species, the teeth of the margin of the preopercle become worn and indistinct. The very large, scaleless, subrhombic infraorbital bone, affords a distinguishing character. According to Russell this fish is not much esteemed. At Pinang and Singapore, where single individuals occur at all seasons, it is of excellent flavour, and considered a great acquisition to the table. At Malacca it is plentiful, and in our settlements in the Straits it is known under the denomination of the "red rock-cod."

(3632) *Mesoprion annularis*, Cuv. and Val.

Syn. Mesoprion anularis, Cuv. and Val. II. 484, III. 497.
Diacope annularis, Rüppell: Atlas, 74.
Diacope annularis, Rüppell, Neue Wirb. Fische. 91.
Quoy et Gaimard, Astrol: Pl. 5, fig. 4.
Mesoprion annularis, Richardson: Rep. 1845, 229.
Mesoprion annularis, Bleeker: Verh. Bat. Gen. XXII., 4, 22, 47.

Head above and back brown with crimson hue, paler on the cheeks and sides; abdomen silvery rose-coloured; in front of the root of the caudal fin, on each side, a large round black spot: both joined on the back, and both with a broad white margin, except on the back; dorsal spines crimson: the lower half of the rest of the dorsal fin reddish brown, the upper half crimson; the anterior half of the caudal fin reddish brown; posterior half pale crimson; the upper half of the anal silvery reddish brown, the rest black; pectorals pale rose-coloured. Iris golden with crimson hue. *Young.*—Colours generally paler and the black marks less distinct. D 11/13 or 14, C 17$\frac{3}{3}$, A 3/9, V 1/5, P 16 or 17, Br. VII. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Indian Ocean, Massaua (Red Sea), Ceylon, China Seas, Batavia, Bantam, Cheribon, Samarang, Surubaya, Pasuruan, Patjitan, Celebes. Total length: 7 inches. The brown oblique lines of the body, described by M.M. Cuvier and Valenciennes, do not exist during life, but appear after death, as the original colours fade. The ascending margin of the preopercle is very minutely toothed, but the lower part is very strongly so; the latter is arched, but there is scarcely any notch where it joins the ascending straight part. This species is distinguished by the beauty of its colours no less than by the symmetry of its forms. It feeds upon *crustacea*. A few occur at times at Pinang.

(3633) *Mesoprion gembra*, (Bloch-Schneider.)

Syn. Alphestes sambra, and gembra, Bloch-Schneider. page 236 Pl. 51, fig. 2.
Mesoprion gembra, Cuv. and Val. II. 485.
Mesoprion gembra, R. A. II. 144, (3).

Upper part of the head and the back blackish brown: cheeks and sides silvery brownish grey; abdomen whitish: from occiput to the tail numerous (from 10 to 15) vertical brownish black bands, terminating near abdomen, with intervals narrower than the bands themselves: apical part of dorsal spines and margin of their membrane pale crimson; the membrane with a transversal series of brownish spots; upper third of the rest of the dorsal fin pale blackish, central third whitish, basal pale yellowish brown; anterior third of the caudal fin pale yellowish brown, central whitish, posterior blackish; lower third of anal blackish, the rest successively as the caudal; pectorals and ventrals whitish, the lower half of the two anterior ventral rays, and their connecting membrane pale crimson, a large brownish central spot between the 2d, 3d and 4th ventral ray. Iris pale golden, blackish near the orbit. *Young.*—Ground colour and black bands less distinct; between the dorsal rays some irregular series of brownish dots; posterior half of ventral fins blackish; no crimson on this nor the dorsal fin. D 10/13 or 14, C 17$\frac{3}{3}$, A 3/8, V 1/5 P 17, Br. VII. Inhabits *Rivulets of Pinang*, Tranquebar, according to Bloch. Total length; 5$\frac{2}{3}$ inch. The anterior ventral ray is elongated, bristle-like. In the peculiar distribution of colours this species much resembles a *Datnia* from the estuaries of the Ganges described and figured by Buchanan Hamilton as *Coius polota*, (pp. 25, 270, Pl. 38, fig. 31.) Referred by M.M. Temminck and Schlegel as a second species of their genus *Anoplus*. This latter name however is inadmissible, as it has been preoccupied by *Anoplus*, Schonherr, 1826, (*Coleopt.*) From Coius polita the present differs not only in the number of its branchiostegous and fin-rays, but also by its more elongated form. But two individuals were at different times ob-

served at Pinang: both were taken in rivulets, which however communicate with the sea.

(3634) *Mesoprion caroui*, Cuv. and Val

Syn. Mesoprion caroui, Cuv. and Val. II. 489. Russell CXXV. Karooi.

Head above and back reddish brown; cheeks and sides silvery brownish yellow; abdomen white; between the back and the lateral line a number of more or less distinct oblique brownish lines: from the posterior margin of the orbit a reddish light brown band to the tail; from the opercle four undulating reddish lines, converging towards the tail; fins brownish yellow. Iris brownish golden. D 11/12, C 17$\frac{5}{5}$, A 3/8 or 9, V 1/5, P 16, Br. VII. Inhabits *Sea of Pinang*, Madras, Vizagapatam. Total length, 4$\frac{3}{8}$ inch. Russell counted 9 anal rays: a single individual observed at Pinang had but 8. The margin of the preopercle is finely toothed, except at the angle where the teeth are stronger.

Genus NANDUS, *Cuv. and Val.* 1831. Mouth very protractile, with velvety teeth in both jaws, on the palate and vomer; margin of preopercle and interopercle finely toothed; spine of opercle very minute.

(3635) *Nandus marmoratus*, Cuv. and Val.

Syn. Coius nandus, Buchan. Ham. 96, 370, Pl. 30, Fig. 32.
Nandus marmoratus, Cuv. and Val. VII, 482, Pl. 207.
(*Icon.*) Bedula hamiltonii, Gray, Ill. Ind Zool. II. Pl. 88, Fig. 3.
Bedula nebulosus, Gray, *Ibid.* Fig. 2.
Coius nandus, McClelland, Calc. Jour. Nat. Hist. II. 574.

Head and body silvery or golden greenish olive, lighter on the sides; cheeks and abdomen silvery with rose-coloured or orange reflection; on the head and body large dark olive patches, edged with black dots, in some disposed like irregular vertical bands; on the cheeks two or three such, radiating from the orbit; in most a greenish black oval spot on the middle of the side of the tail; spines and fin-membranes transparent, minutely dotted with black, marbled with pale brownish lake and greenish olive; pectoral rays pale greenish olive, minutely dotted with black; rest of the rays pale brownish red with transversal greenish black bars. Iris golden greenish olive, minutely dotted with black, with a narrow golden circle round the pupil; upper orbital margin black. D 13/12, C 12$\frac{3}{3}$, A 3/7, V 1/5, P 16, Br. VI. Rarely: D 12/13 or 13/11 or 14/12, C 17 or 18$\frac{3}{3}$, A 3/8 or 9, P 17 or 18. Inhabits *Fresh water Malayan Peninsula*, Bengal (in ponds), Sutlej, Chenaub (at Ramnuggur). Total length, 6 inch. The length of the head is about $\frac{1}{3}$ of the total; the vertical diameter at occiput is 1$\frac{1}{3}$ of the length. The eye nearly borders the profile, the diameter is in the young 4$\frac{1}{2}$, in the adult $\frac{1}{5}$ of the length of the head; the distance from the muzzle is 1$\frac{1}{2}$ diameter from the flat membranous point of the opercle 2$\frac{1}{2}$ diameter. The openings of the nostrils are situated closely in front of the orbit. Between the centre of the supraorbital margin and the muzzle appear three distant fossæ; on the infraorbital bone two or three; beneath the symphysis of the lower jaw two pores, and behind them on each branch of the jaw two fossæ. The teeth are minute inwardly pointing, like those of a card; in the intermaxillaris they are placed 3 to 4 deep, but they become more crowded beneath the symphysis, where those of the innermost series are a little, yet perceptibly, longer than the rest. Such is also the case with those of the symphysis of the lower jaw, but on the branches they are placed in a single series, and are somewhat distant from each other. The vomer is raised into an acute angular crest, surmounted by a series of minute pointed teeth; the palatal, pharyngeal and those at the root of the flattened membranous tongue, are very minute velvety. The greatest vertical depth of the body, at the seventh dorsal spine, is $\frac{3}{4}$ of the length of the head. The lateral line consists of a series of minute tubes, bifid at each extremity; it follows on the upper fourth of the side the arch of the back towards the termination of the dorsal, where it is suddenly interrupted, but it reappears lower down, and proceeds straight in the middle of the tail to the caudal. This fish is as numerous in the Malayan Peninsula as in Bengal. It is of voracious habits, preying upon small *Cyprionidæ*, and, as observed by Buchanan, is very tenacious of life. The longitudinal mark of the scales, described and figured by Buchanan, does not exist in the living fish, but appears after death. Buchanan Hamilton has correctly described the teeth: "intermixed with these, in each jaw, are several sharp teeth of a larger size." Such is the case in Bengal and Malayan specimens. Those examined by M.M. Cuvier and Valenciennes appear to have been defective in this character, and they therefore express some doubt about the identity of the species. As yet however, no other species of *Nandus* has been discovered. They have corrected the error of Buchanan in counting seven, instead of six branchiostegous rays. The figure of *Bedula nebulosa*, *Ill. Ind. Zool.* appears to be intended to represent the present species, but whether the defect is attributable to the original specimen, or to the copyist, is impossible to ascertain. The figure of *Bedula hamiltonii*, is inferior to that of Buchanan Hamilton, and the colours are those of a specimen preserved in spirits of wine.

Genus THERAPON, *Cuv. and Val.* 1829. Preopercle toothed, opercle terminating in a strong spine; dorsal fin deeply emarginated between the spinous and soft part; the external series of teeth stronger than the rest, conical; teeth of the vomer apt to fall out; air vessel divided by a stricture in two compartments.

(3636) *Therapon trivittatus*, (Buchanan Ham.)

Syn. Russell CXXVI. Keelputa.
Coius trivittatus, Buchan. Ham. 92, 370.
Therapon puta, Cuv. and Val. III. 131, and 144, ("un therapon, le trivittatus.")

Icon. Pterapon trivittatus, Grey: Ill. Ind. Zool. II. Pl. 88, Fig. 1.
Pterapon trivittatus, (Syn. Therapon theraps) Richardson's Report, 1845, 238.
Pterapon puta, Bleeker: Verh. Batav. Gen. XXII. 23, 50.

Head above and back pale greyish green, sides silvery, abdomen white; from the first dorsal ray to the middle of the base of the soft part a brownish or black slightly downward arched band; a second from the nape of the neck towards the root of the upper margin of the caudal fin; a third, paler, from the opercle to the centre of the caudal; fin-membranes white, upper half of the membrane between the six anterior dorsal spines, and in some between the ninth and tenth, black; the upper margin of the soft dorsal with one or two black spots; caudal with a central horizontal blackish band, above and below which two, more or less distinct, oblique black bands; posterior half of anal, and anterior half of ventral fins pale ochre. Iris golden; pupil broad lanceolate with the apex forward. D 11/10, C $17\frac{1}{1}$, A 3/8, V 1/5. P 13, Br. VI. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Bay of Bengal, estuaries of the Ganges, Batavia. Total length, 6 inch. This species is well marked by three or four teeth at the angle of the preopercle, conspicuously larger than the rest. Buchanan Hamilton describes *Coius trivittatus* (l. c. 93), as having "the four lower toothlets" (of the preopercle) "larger than the others." In his duplicate series of drawings is a correct representation of this species, marked in his handwriting as "*Holocentrus Katkaya.*" Buchanan's drawing is evidently the original of the figure in Hardwicke's Illustrations named *Pterapon trivittatus*. In the copy however, the distinguishing character is not represented, nor is Buchanan's name affixed to the specific. The incorrectness of the copy has caused Sir John Richardson to consider it as intended to represent *Therapon theraps*, Cuv. and Val., and he consequently placed, as a synonym of the latter, *Pterapon trivittatus*, "*Gray*," an entirely distinct species, first described by Buchanan Hamilton (Richardson: Report 1845, 238.) M. M. Cuvier and Valenciennes count 12/10 or 10—1/10 in the dorsal, and 3/9 in the ventral fins. In colours the young resemble the adult, but the distinctness of the lateral bands varies individually in all ages, and in some they are greenish, instead of black. The young have velvety teeth on the vomer, but they disappear with age. In the Straits of Malacca the species is numerous at all seasons.

(3637) *Therapon obscurus*, Cuv. and Val.

Syn. Therapon obscurus, Cuv. and Val. III. 135.
Therapon obscurus, Bleeker: Verh. Batav. Gen. XXII. 23, 51.

Pale blackish or bluish silvery, with two broad longitudinal white bands on the sides; abdomen white; dorsal and caudal fins coloured like *T. trivittatus*, lower half of the anal and ventral fins blackish; body and fins minutely dotted with black. Iris pale golden, black towards the orbit. *Young.*—Of a general darker colour than the adult. D 12/10 or 11, C $17\frac{8}{8}$, A 3/8, V 1/5, P 13 or 14, Br. VI. Inhabits *Sea of Pinang*, Indian Ocean, Batavia. Total length, $4\frac{2}{8}$ inch. This species may readily be distinguished from the preceding by its shorter, broader shape, by the uniformly toothed preopercle, and the smaller spine of the opercle. From *Therapon squalidus*, Cuv. and Val. it differs in having but 7 cœcopyloric appendages. It is of rare occurrence at Pinang. In the young of this species as well as of *T. trivittatus*, the suprascapular and humeral bones are not crenulated, but they become so in the adult.

Genus SILLAGO, *Cuvier*, 1817. Head elongated, slightly pointed; mouth small; velvety teeth in the jaws and in front of vomer; opercle terminating in a small point; six branchiostegous rays; two contiguous dorsal fins, of which the anterior with thin spines, the posterior is long and little elevated.

(3638) *Sillago Malabarica*, (Bloch.Schneider.)

Syn. Sciæna malabarica, Bl. Schn. Pl. 19.
Russell CXIII. Soring.
Sillago malabarica, Cuv. R. A. II. 149.
Sillago acuta, Cuv. and Val. III. 400.
Sillago actua, Bleeker: Verh. Batav. Gen. XXII. 25, 61, 4.
"Ikan Ubi" of the Malays of Pinang.

Head above pale reddish purple; cheeks pale orange; opercles bluish silvery: back pale greenish; sides pale reddish silvery, with a silvery longitudinal band beneath the lateral line; abdomen mother-of-pearl; membrane of dorsal fins with some minute obliqne black lines, particularly near the anterior margin of the spines and rays, where they in some form faint blackish vertical lines; the rest of the fins whitish or pale yellowish. Iris pale golden. D 10 or 11—1/21, C $17\frac{1}{7}$, A 1/23, V 1/5, P 15, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Bay of Bengal, estuaries of the Ganges, Macao. Bantem, Batavia, Tjilatijap, Samarang, Surabaya, Passuruan, Bangkallang, Makassar, Celebes, Sumbawa. Total length, 1 foot. The length given of the present species is the greatest observed, but M. Leschenault has seen single individuals upwards of three feet. Although this species occurs at Pinang in numbers at all seasons, it is never very plentiful.

(3639) *Sillago domina*, Cuv. and Val. which is very numerous at Pondicherry, Madras, and indeed as far north as the mouths of the Ganges, appears to be unknown at Pinang and Singapore.

Genus URANOSCOPUS, *Grónov.* 1754. Head large, depressed, rough; eyes and mouth vertical; lower part of preopercle crenate; shoulder with a strong spine; branchiostegous rays six; dorsal fins two, or both united into one; vent central.

(3640) *Uranoscopus cognatus*, Cantor. Head above and back pale brownish green, cheeks, sides and abdomen silvery, minutely dotted with black; jaws blackish; anterior dorsal fin black, near the base clouded whitish; posterior dorsal whitish, minutely dotted with black between the branches, and along the upper half of the rays; caudal bright gamboge; the membrane between the branched part of the rays white, and along the branches minutely dotted with black; anal and ventral fins white; pectorals white, minutely dotted with black, the apex of each ray scarlet. Iris pale golden green, blackish towards the orbit; pupil very minute, like a brilliant black point. D 3—1/15, C 12½, A 14, V 1/5, P 18, Br. VI. Inhabits *Sea of Pinang*. Total length, 5⅛ inch. Except in colours and in the number of fin-rays, this species so closely resembles *Uranoscopus scaber*, Linné, that it will be sufficient to point out the differences. The eyes are vertical, and the very small circular pupils are directed upwards, but the level of the orbit is somewhat sloping, the outer margin being lower than the inner; the orbit itself is oval, its greatest diameter, equalling the distance between the eyes across the vertex, is oblique slightly diverging forward from the medial line of the vertex. The length of the head from the lower jaw to the nape of the neck slightly exceeds ⅓ of the total, but measured to the apex of the opercle it slightly exceeds ¼ of the total length. The anterior process of the infraorbital bone covering the maxillary, terminates in an obliquely downward pointed spine, which is rugged or shagreened like the rest of the covering of the head. The lips have a series of close fleshy papillæ. The upper maxillary teeth are in two series, of which the outer is the more minute, those in the centre of the inner series are stronger than the rest; the lower jaw has on each side four or five long, distant, recurved teeth; on the symphysis they are closer, in two series, of which the inner contains the longer teeth. The four spines of the lower margin of the preopercle are placed by a central interval in two pairs: an anterior, and a posterior. Of the four indentations or shallow depressions of the ascending margin, the uppermost is the smallest. The lower part of the posterior margin of the opercle has a finely toothed appearance, produced by some oblique ridges terminating there. The strong vertical spine of the subopercle is on a level with the four spines of the preopercle. In front of the anterior of the latter is a small broad triangular spine. Between and beneath the angles of the lower jaw appear on each side three forward pointed spines, of which the superior, the longest, is directed obliquely downward, and touches the opposite one; the other two pairs are vertical, the posterior being the shorter. The scapular spines are small, but distinct; the humeral spine is very strong, triangular and longitudinally furrowed like a bayonet; its length is little less than ½ of the pectoral fin, or equal the upper margin of the opercle. The length of the pectorals equals ⅕ of the total; the inferior eight rays are thicker than the rest. The ventrals are less than ⅒ of the total. The anterior dorsal is triangular, its height less than ⅕ of the vertical diameter of the body, which is contained about 4½ times in the total length. The posterior dorsal commences with a short, thin spine, which so closely reclines towards the back, that it easily may escape observation; the first three rays are undivided, gradually increasing in length; the fourth is the longest, about ⅔ of the vertical diameter of the body; the fifth and sixth are shorter; the rest nearly equal about ½ of the length of the fourth ray. The rays of the anal fin are somewhat shorter, but not thicker than those of the posterior dorsal The precise shape of the fin could not be ascertained, as it happened to be somewhat mutilated in the only individual observed. The naked space behind the posterior dorsal and that behind the anal, is a little more than 1½ of the total length; the caudal is about ⅕. The space on the back between the lateral lines is covered with scales like those of the rest of the back, sides, and the posterior half of the abdomen; the anterior half of the latter and the chest are apparently naked. Of the Asiatic species, described by M. M. Cuvier and Valenciennes, the present nearest approaches *U. marmoratus*, which differs in colours, in the smaller humeral spine, in having five preopercular teeth, the space between the lateral lines naked, and the skull is shagreened but on the posterior part only. The capacious, leathery stomach contained remains of minute *Crustacea* and mud; its length (4⅛ inch.) a little less than ⅛ of the total; that of the intestinal canal 4⅛ inch. There are eight cæcopyloric appendages. The gall-bladder excessively large, elongated, bottle shaped, in length nearly equalling the stomach, transparent pale greenish. The fishermen of Pinang asserted this species to be of very rare occurrence and to grow but little larger.

Genus SPHYRÆNA, *Artedi.* 1738. Body elongated with two separated dorsal fins, head oblong, with the lower jaw projecting in a point beyond the upper; some of the teeth large, pointed, trenchant; preopercle not toothed; opercle without spines; branchial rays seven; cæcopyloric appendages numerous.

(3641) *Sphyræna jello*, Cuv. and Val.

Syn. Russell CLXXIV. Jellow.
Sphyræna jello, Cuv. and Val. III. p. 349.
Sphyræna jello. Belanger, Voy. Zool. p. 346, Pl. I. Fig. 1.
Sphyræna jello, Ruppell, N. W. Fische, p. 98.
? Sphyræna jello, Bleeker: Verh Batav. Gen. XXII. 24, 56, 4.

Head above and back dark greyish green, forming on the upper part of the sides a festooned band, intersecting the lateral line; cheeks and sides pale silvery, abdomen white; ventral fins whitish, the other fins pale yellowish; dorsals, caudal and pectorals minutely dotted with black near the margins. Iris pale golden, blackish near the orbit. D 5—1/9, C 17$\frac{8}{8}$, A 1/8 or 9, V 1/5, P 13 or 14, Br. VII. Inhabits *Sea of Pinang, Singapore*, Bay of Bengal, Red Sea. Total length, 1 foot 6 inch. The length of the head is 3$\frac{1}{2}$ of the total, taken from the symphysis of the lower jaw to the centre of a vertical line cutting the lobes of the caudal; but taken from the symphysis to the centre of the caudal itself, the head is 3$\frac{1}{3}$ of the total. The horizontal diameter of the oval eye is $\frac{1}{5}$ of the length of the head. The opercle terminates in two small, flat, membranous points. At Pinang a few at the time occur at all seasons. The length given is the common, but according to Russell an individual of 4 feet has been observed. In one examined the stomach contained remains of *Trichiurus*. The air vessel is long, cylindrical.

(3642) *Sphyræna obtusata*, Cuv. and Val.

Syn. ? Sphyræna chinensis, Lacepede, Pl. 10, Fig. 2.
Sphyræna obtusata, Cuv, and Val. III. 350.
? Sphyræna obtusata, Bleeker: Verh. Batav. Gen. XXII. 24, 56, 4

Head above and back dark greyish green, paler on the upper part of the sides, and clouded beneath the lateral line, cheeks and the rest of the sides pale silvery; abdomen white; pectorals and ventrals whitish, the other fins and the iris like *S. jello*. D 5—1/9, C 17$\frac{8}{8}$, A 1/9, V 1/5, P 13, Br. VII. Inhabits *Sea of Pinang, Singapore*, Port Jackson, Isle of France, Malabar, Pondicherry, Batavia, Surabaya. Total length: 2 feet 6 inch. The length of the head from the symphysis to the centre of the posterior caudal margin is about $\frac{1}{3}$ of the total lengh. The horizontal diameter of the oval eye is $\frac{1}{4}$ of the length of the head: the eye consequently appears comparatively larger than in *S. jello*. The opercle terminates in a single flat, membranous point; the preopercle is not rounded, but almost rectangular: the sympysis of the lower jaw is obtuse, and less prominent than in *S. jello*. There are but three longer teeth [illegible] the second, third and [illegible] "its membranous front on each side of the palatals; [illegible]oval. It occupies uniformly small. The ventral fins terminating [illegible]ated opposite the anterior dorsal, at the termination of the pectorals, but in front of the anterior dorsal opposite the posterior half of the pectorals. The caudal fin is less deeply cleft than in *S. jello*. At Pinang a few individuals occur at all seasons.

Genus, POLYNEMUS, *Gronov.* 1754. (Pentanemus, *Artedi.*) Head compressed, covered with scales; muzzle obtuse, prominent; branchiostegous rays 7; pectoral fins with distinct appendages.

(3643) *Polynemus Tetradactylus*, Shaw.

Syn. ? Trigla asiatica, Linné, Syst. 1345.
Russell CLXXXIII. Maga Jellee.
Polynemus tetradactylus, Shaw, V. 155.
Polynemus teria, Buchan. Ham. 224, 381.
Polynemus tetradactylus, Cuv. and Val, III. 375.
(*Icon.*) Polynemus teria, Gray: Ill. Ind. Zool. I. Pl. 92, Fig. 2.
Polynemus salliah, Cantor: Journ. Royal As. Soc. V. 166.
Polynemus quadrifilis, Cantor: l. c.
Polynemus tetradactylus, Swainson: Nat. Hist. Fish. II. 234.
Polynemus tetradactylus, McClelland: Journ. As. Soc. VIII.
Polynemus tetradactylus, Royle: On Isinglass, 25 26.
Polynemus tetradactylus. Penny Cyclop. Vol. XVIII. p. 360 Note.
Polynemus tetradactylus, Richardson, Report 1845 218.
Polynemus tetradactylus, Bleeker: Verh. Batav. Gen. XXII. 24 57.
Ikan Salangan, 'Sinanghi,' or 'Salanghi' of the Malays.

Head silvery; back and sides silvery green; the latter beneath the lateral line, silvery; abdomen white; pectoral, ventral and anal fins gamboge or pale orange; dorsals and caudal greyish minutely dotted with black, their margins broad blackish; filaments white; iris silvery, metallic green at the upper part of the orbit. D 8 or 9—1/14 or 15, C 17$\frac{8}{8}$, A 3 or 4/15 or 16, V 1/5, P 17, Filaments 4, Br. VII. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula, Lancavy*, Bay of Bengal, Gangetic estuaries; Australia, China, Bantam, Batavia, Tjilatjap, Samarang, Surabaya, Bangkallang. Total length: 4 feet. It is highly valued as an article of food, its flavour being compared with that of salmon. In the Straits of Malacca single individuals occur at all seasons, but it is there not so numerous as it is in the Bay of Bengal, and the Gangetic estuaries nor of such gigantic dimensions as Buchanan Hamilton describes it to attain in the latter locality. Some individuals, which in 1837 were observed in the Bay of Bengal, and by the native fishermen denominated *Salliah* or *Soccolia*, I was induced to consider as belonging to a distinct, although closely allied species, *(P. Salliah)* as they all agreed in presenting one dorsal, and two anal-spines more than were attributed to *P.*

tetradactylus. The following is the number of fin-rays given by the different describers:

Russell:	D 8—1/14, C 22? A 1/16, V 1/5 P 17.
Buchanan:	D 8—1/14, C 15+, A 2/15, V 1/5 P 17.
Cuv. and Val.:	D 8—1/15, C 17, A 1/16, V 1/5 P 17.

The first anal spine is very minute, and as well as the succeeding one or two almost hid by scales, particularly in larger individuals. Although the figure of this species in Buchanan Hamilton's duplicate drawings represents the anal fin with *four spines* and fifteen rays, his description gives but 2/15. The length of the filaments is liable to individual variation, and in the adult they are comparatively shorter than in the young. Normally the two posterior are the longest, equalling the length of the head; the first is but $\frac{2}{3}$ of the fourth. The ascending margin of the preopercle is very finely toothed, but the lowest tooth is conspicuously larger than the rest. The lateral line is nearly straight from its posterior half. From the base of the caudal it continues sloping a little downwards on the lower half of the fin, and divides in two or three horizontal, branches, which reach the margin of the fin. A little behind the place where the cystic and hepatic ducts jointly enter the duodenum, the latter sends forth three branches which again terminate in innumerable cœcopyloric appendages. This species, as first observed by M.M. Cuvier and Valenciennes, has no air vessel.

(3644) *Polynemus plebeius*, Broussonnet.

Syn. Polynemus plebeius, Emoi, Broussonnet: Fasc. I. Pl. 7.
Polynemus plebeius, Linne, Syst. 1401.
Bynni, Bruce, Appendix.
Polynemus plebeius, Bloch.
Polynemus lineatus, Lacepede V. 469, Pl. 13, Fig. 2.
Polynemus plebeius, Shaw, V. 150, Pl. 125, Bynni Carp.
Polynemus niloticus, Shaw, *Ibid*, 151.
Polynemus commersonii, Shaw. *Ibid*, 156.
Polynemus plebeius, Cuv. and Vol. III, (380. *Excl Syn. P. sele, Buchan.*)
Polynemus plebeius, Temminck and Schlegal: Fauna, Jap. Pisc, 29, Pl. XI. Fig. 1.
Polynemus plebeius, McClelland, Cal. Journ. of Nat. Hist. Vol. III. p. 185, (*Excl. Syn. P. sele and the accomp. Pl.* VI. *P. sele.*)
Polynemus plebeius, Richardson: Report 1845, 219, (*Excl. Syn. P. sele.*)
Polynemus plebeius, Bleeker, Verh. Batav. Gen. XXII. 25, 58. (*Excl. Syn. P. sele.*)

Head above and back greenish grey, or pale bluish silvery; sides pale silvery; abdomen white; fins whitish grey, minutely dotted with black; dorsals, caudal and pectorals with pale blackish margins. Iris silvery, metallic green at the upper part of the orbit. Filaments white. D 8—1/13 or 14, C $17\frac{3}{3}$, A 3/12 or 13, V 1/5, P 13 or 14, Filaments 5, Br. VII. Inhabits *Sea of Pinang*, Otaheiti, Isle of Tanna, Isle of France, Coast and estuaries of Coromandel, Japan, Polynesia, Batavia, Samarang, Surabaya, Sampang, Madura. Total length, 1 foot: The length of the head is $\frac{1}{4}$ of that of the body, measured from the muzzle to the centre of the caudal margin; but in the length taken from the muzzle to the centre of a vertical line cutting the lobes of the caudal, that of the head is contained $4\frac{1}{2}$ or 5 times according to the individually varying length of the caudal fin. The horizontal diameter of the eye is contained $3\frac{1}{3}$ times in the length of the head. The preopercle is more finely toothed than it is in *P. traductylus*: the lowest tooth is longer than the rest. The anterior dorsal fin commences opposite the posterior extremity of the opercle, the extent of the base being $\frac{2}{3}$ of the length of the third spine. The posterior dorsal commences a little in front of the anal, the extent of its base equalling the length of the third dorsal spine. The distance between the two fins exceeds by $\frac{1}{4}$ the extent of the base of the anterior dorsal, while it is but little less than the extent of the base of posterior dorsal. The two or three posterior filaments are longer than the pectoral fin. The lateral line is nearly straight towards the root of the caudal, over which it extends in a downward slightly oblique direction to a little beneath the cleft. The caudal fin is more or less deeply cleft: the upper lobe in some individuals is longer than the lower; both are pointed, but neither terminates in a filament. In a fresh state no longitudinal dark lines appear on the body, but in the young three or four of the scales of the lateral line near its origin, are densely dotted with black, so as to appear like a blackish serrated spot. The individuals observed at Pinang differ from the description of *P. plebeius* by M. M. Cuvier and Valenciennes in having three or four pectoral rays less, anal three anal spines instead of two, but the first of the three is so short, and so hid by the scales, that it easily may escape observation. In other external characters there is no difference, and they also agree in presenting a great number of cœcopyloric appendages, and in having an elongated narrow air-vessel, *without appendages*. At Pinang this species is of rare occurrence, and of the few observed, the largest measured but one foot in length. Its value as a fish yielding isinglass requires to be ascertained in localities which it frequents, and where it attains its full size: 4 feet.

(3645) *Polynemus indicus*, Shaw.

Syn. Russell CLXXXIV. Maga Booshee.
Polynemus indicus, Shaw, V., 155.
Polynemus sele, Buchanan, 226, 381.
Polyne[illegible]us, Cuv. and Val, III.
38[illegible]chant; pres
Poly[illegible]out spines [illegible], Swainson, Nat. Hist.
[illegible] appendages

Polynemus sele, McClelland, Journ. As. Soc. Vol. VIII. p. 203, Plate.
Polynemus sele, Cantor, Proc. Zool. Soc. Pt. VII.
Polynemus sele McClelland, } Cal. Journ. N. H. Vol. II. p. 450.
Polynemus ploteus, McClelland, }
Polynemus plebeius, McClelland, } Ibid Vol. III. pp. 179 181 Pl. VI.
Polynemus sele, McClelland, }
Polynemus lineatus McClelland, }
Polynemus gelatinosus, McClel. }
Polynemus uronemus, Bleeker, Verh. Batav. Gen. XXII. 25, 58,
Ikan Kurow of the Malays.

Head above dark bluish, or greyish, lighter greyish on the sides ; abdomen white ; opercle bluish silvery with a blackish spot on the upper half ; the body everywhere more or less densely dotted with black ; pectorals black, the other fins greyish or bluish white, dotted with black, often so densely as to give the dorsals, ventrals, the anal and the caudal a blackish appearance ; the filaments of the caudal lobes black ; the anterior half of the pectoral filaments white, the posterior blackish. Iris silvery. D 8 1/13 or 14, C 17½, A 3/11 or 12, V 1/5, P 13 or 14, Filaments 5, Br, VII. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Pondicherry, Madras, Vizagapatam, estuaries of the Ganges, Surabaya. Total length : 3 feet. The length of the head is contained about 3½ times in that of the body, measured from the muzzle to the centre of the caudal margin. The horizontal diameter of the eye is about ⅓ of the length of the head. The ascending margin of the preopercle is more strongly toothed than in *P. plebeius*, the lowest tooth being the longest. The anterior dorsal commences behind the termination of the opercle, opposite the second half of the pectoral fin, the extent of its base being nearly equal to the length of the fourth spine. The posterior dorsal commences considerably in front of the anal, the extent of its base equalling the third dorsal spine. The distance between the two fins is nearly equal the base of the anterior dorsal. The two or three posterior or upper filaments are longer than the pectoral fins. In the young they are comparatively larger : one or two reaching to the anal fin. The lobes of the caudal fin are unequal, the lower being, generally, but not always, the longer. The length of the caudal filaments is greater in the very young, in which the lower almost equals the length of the body. The lateral line proceeds nearly straight to the centre of the root of the caudal, from whence it is continued obliquely downwards over the lower lobe. The most striking character by which this species at once may be distinguished from *P. plebeius* is the structure of the air vessel, of which M.M. Cuvier and Valenciennes observe : " its membrane is silvery, thick, the general form oval. It occupies the whole length of the stomach, terminating behind in a very sharp point, which penetrates the thick of the tail over the first interspinal of the anal. It adheres to the third, fourth, fifth, sixth and seventh abdominal vertebræ. From both sides towards the ventral surface, proceed twenty eight to thirty-five appendages, which, with the exception of the three last ones, have two roots, but terminate in a single sharp point. Above each of these, towards the dorsal surface, appear one or two others. All the appendages penetrate the thick of the muscles, and are slightly directed towards the back of the fish." (Hist. Nat. des Poiss. T. III. p. 285.) Also this species is distinguished by a very great number of cœcopyloric appendages, divided in two portions : one containing the longer and larger, adheres to the stomach, the other to the intestine. At Pinang single individuals occur at all seasons, but numbers are taken from June to August. The weight is commonly from 4 to 6 lb, seldom exceeding 20. The air-vessel of a good-sized fish when dried, and ready for the market in China, weighs upwards of 2 ounces, is considered very good isinglass, and fetches 25 to 30 Spanish Dollars per Pikul. The fish itself is valued as an article of food, although less so than *P. tetradactylus*. As to the *Synonymy of Polynemus indicus*, it may be stated that *Russell*, the first describer of this species, has also published the only correct figure, No. CLXXXIV. His formula of the fin-rays is : D 8—1/14, C 20, A, 3/13, V 1/5, P 17. *Shaw*, quoting the description of Russell, named the species *P. indicus*, which denomination, however objectionable, claims priority. *Buchanan Hamilton* described this species as *P. sele*, which he observed strongly resembles the description of Russell's No. CLXXXIV. but he strangely misunderstood Russell's formula of the anal fin, so as to believe that it expressed "two fins behind the vent." and concluded that *P. sele* must be identical with *P. plebeius*. As to the identity of *P. sele*, there can be no doubt, as there exists in the duplicate series of Buchanan's drawings, a coloured figure, which although not quite correct, it is but justice to add, is far superior to the two copies of the drawing published by Mr. McClelland. *M.M. Cuvier and Valenciennes*, who could judge of *P. sele* but by the in part erroneous description of Buchanan, admit on his authority its identity with *P. sele*, not however without expressing a doubt. *Mr. McClelland*, in *Journ. As. Soc.* Vol. VIII. p, 203, published a description of "*Polynemus sele*," and a copy of the drawing in Buchanan's duplicate series. The fin-rays are given as follows : D 7—14. C 20 (?), A 12 or 13, T 6, P. 13. The air vessel is described as "a large spindle-shaped organ about half the length of the fish, thick in the middle and tapering towards the extremities, where it ends in front by two, and behind by a single tendenous cord ; similar small tendenous attachments, about twenty-two in number, connect it on either side to

the upper and lateral parts of the abdominal cavity." The characteristic form of this organ was first observed by M.M. Cuvier and Valenciennes, and a reference to their description of *P. uronemus* (*P. indicus*, Shaw) might have proved the identity of that and *P. sele*. Notwithstanding the distinctive character presented by the air vessel of this species, Mr. McClelland, in an editorial "On the East Indian Isinglass," (Cal. 'Journ. of Nat. Hist. Vol, III. p. 179) asserts, "*Polynemus plebeius*, *P. lineatus* and *P. sele* are names which have been proposed by different authors for the same species," and suggests as a more appropriate name a new one of his own: *P. gelatinosus*. Mr. McClelland quotes a translation of the description of *Polynemus plebeius*, by M.M. Cuvier and Valenciennes, in which it is distinctly observed, that this species "has a very large swimming bladder, thin, and without appendages." Yet Mr. McClelland, by way of illustrating the description of this species *without appendages to the air vessel*, has republished a copy of Buchanan's drawing of *P. sele* (l. c. Pl. VI.), the air-vessel of which Mr. McClelland himself had previously (Journ. As. Soc. Vol. VIII. l. c.) described as presenting on either side about "*twenty-two tendenous attachments*." Thus, in a paper avowedly written to call attention to the air-vessel (the isinglass) of one species, and to instruct the reader how to distinguish this species from others, not only are two species confounded, but the confusion is increased by publishing a description of a species, totally distinct from the one intended to be described, and by illustrating that description by means of a figure of another different species.

(3646) *Polynemus sextarius*, Bloch, Schneider.

Syn. Polynemus sextarius, Bl. Schn. 18, Pl. 4.
Polynemus sextarius, Cuv. and Val. III. 388.
Polynemus sextarius, Bleeker, Berh. Batav. Gen. XXII. 59.

Young. Head above and back yellowish green, lighter on the sides; abdomen pale silvery; opercle silvery with a blackish spot; another black spot, nearer the back, between the head and the anterior dorsal; fin-membranes greyish white, minutely dotted with black towards their free margins; filaments white. Iris silvery, black towards the upper part. D 8—1/12, C 17$\frac{10}{10}$, A 3/12, V 1/5, P 14, Filaments 6, Br. VII. Inhabits *Sea of Pinang*, Tranquebar, Coromandel, Batavia. Total length: 4 inch. The length of the head is $\frac{1}{4}$ of the total measured from the muzzle to the centre of the posterior caudal margin. The orbit is oval obliquely situated: its greatest diameter, parallel to the upper jaw, is $\frac{1}{3}$ of the length of the head. The ascending margin of the preopercle is finely toothed, the lowest tooth longer than the rest. The length of the third dorsal spine, the longest, is little less than the greatest vertical diameter of the body; the length of the second dorsal spine equals the extent of the base of the anterior dorsal fin. In height the fin itself slightly exceeds the posterior. The lateral line is nearly straight; from the root of the caudal it deviates a little downwards proceeding to the posterior margin of the lower lobe. The filament nearest the pectoral is a little longer than the rest, its length nearly equalling that of the head; the other five are nearly equal. A solitary individual occurred at Pinang in 1843. As observed by M.M. Cuvier and Valenciennes, the air-vessel is excessively small, pointed at both extremities, of the shape and size of a grain of oats.

(3647) *Polynemus hexanemus*, Cuv. and Val.

Syn. Polynemus hexanemus, Cuv. and Val. III. 389.
Polynemus hexanemus, Bleeker: Verh. Batav. Gen. XXII. 25, 59.

Head above and back yellowish green, abdomen pale silvery; fin-membranes pale yellow minutely dotted with black, particularly the pectoral fins which have a black appearance; filaments white. Iris silvery, dotted with black towards the upper orbital margin. D 8—1/12, C 17$\frac{5}{5}$, A 3/11, V 1/5, P 13, Filaments 6, Br. VII. Inhabits *Sea of Penang*, Batavia, Samarang, Pasuruan. Total length: 4 inch. The length of the head is $\frac{1}{4}$ of the total, measured from the muzzle to the centre of the posterior caudal margin. The orbit is oval, situated as in *P. sextarius*: its greatest diameter is contained 3$\frac{1}{2}$ times in the length of the head, in consequence of which the eye appears comparatively smaller than in the preceding species. The ascending margin of the preopercle is finely toothed, the lowest tooth being stronger than the rest. The first dorsal spine is minute and almost hid by the scales. The length of the third and fourth dorsal spines, the longest, are but about $\frac{3}{4}$ of the greatest vertical diameter of the body. The length of the second dorsal spine is a little less than the extent of the base of the anterior dorsal fin. In height the fin itself is somewhat less than the posterior, the reverse of which is the case in *P. sextarius*. At the root of the caudal fin the hitherto straight lateral line deviates a little downwards, and then again continues straight towards the centre of the margin. The scales of the body have a short raised line in the centre, producing series of continued lines parallel to the lateral. The second, third and fourth filaments from the pectoral fin, are the largest, greatly exceeding the length of the head, almost extending to the anal fin; the rest are nearly equal, somewhat shorter. From the description of M.M. Cuvier and Valenciennes, founded upon a drawing by M.M. Kuhl and Van Hasselt, the present principally differs in the comparative shortness of the 2d, 3d, and 4th pectoral filaments. Although not extending to the caudal fin, they are the longest, and thus retain the re-

lative dimensions. As these organs are liable to individual variations in all the other species, there appears no reason to doubt the identity of the present and *P. hexanemus*. From *P. xanthonemus*, Cuv. and Val. the present differs in the lineated scales, and in the length of the caudal lobes, being more than ⅓ of the total. A single individual was observed at Pinang in 1844.

(3648) *Polynemus heptadactylus*, Cuv. & Val.

Syn. Polynemus heptadactylus, Cuv. and Val. III. 390.
Polynemus heptadactylus, Bleeker: Verh. Batav. Gen. XXII. 25, 60.

Head above and back yellowish green; sides beneath the lateral line and abdomen pale silvery; fin-membranes pale yellow, minutely dotted with black, particularly the pectoral fins which have a black appearance; filaments white; the points of the four superior, nearest the pectorals, bright yellow. Iris silvery, blackish towards the upper margin of the orbit. D 8 —1/12, C 17$\frac{1}{10}$, A 3/11, V 1/5, P 13, Filaments 7, Br. VII. Inhabits *Sea of Pinang*, Batavia, Cheribon, Samarang. Total length: 4$\frac{1}{8}$ inches. In colours, general outline, and relative proportions this species so greatly resembles *P. hexanemus* that no difference can be assigned, but the additional seventh filament. The straight lateral line deviates slightly downward at the root of the caudal; on the middle of the fin it divides in two parallel branches, which terminate in the centre of the posterior margin. The scales have a raised central line, forming series of continued lines, parallel to the lateral line. The two filaments nearest the pectoral fins and the seventh are equal, shorter than the other four which extend to the anal fin. The ascending margin of the preopercle is toothed as in *P. hexanemus*. According to M.M. Cuvier and Valenciennes the present in forms and colours so closely resembles the American species: *P. plumieri*, (Lacep), *P. virginicus*, Linne?—*P. paradisæus*, Bloch.—*Polydactylus plumieri*, Lacep.—*P. americanus*, Cuv. and Val. that they can assign no distinguishing characters.—Nevertheless, the two are specifically distinct. The American species is described as having a large, thin air-vessel, without appendages, and numerous small cœca. *P. heptadactylus* has but four rather large cœcopyloric appendages, and no air-vessel. At Pinang it is of very rare occurrence. Of three individuals observed, none exceeded the length given.

GEN. MULLUS, *Linne* 1766.

Sub. Gen.—HYPENEUS, *Cuvier*, 1829.

Resembling *Mullus*, but with teeth in both jaws; some with velvety teeth on the palate and vomer; opercle generally terminating in a sharp point.

1. *With velvety teeth in both jaws, on the palate and vomer.*

(3649) *Hypeneus vittatus*, (Forskal) Var.? *Mullus vittatus*, Forskal Fauna Arab. 31, No. 28.—*Mullus vittatus*, Linne: Syst. 1341.—Lacepede, III. Pl. 14, Fig. 1.—*Mullus barbatus*, Bloch-Schneider, 79.—Russell CLVIII. *Bandi Goolivinda.*—*Mullus bandi*, Shaw IV. 615.—*Mullus vittatus*, Shaw IV. 616, Pl. 69.—*Upeneus vittatus*, Cuv. and Val. III. 448. *Young.* Head above and back pale bronze, with a whitish band above the lateral line, along which the ground colour appears like a bluish line; sides and abdomen pale silvery; a yellow longitudinal band from the posterior angle of the eye, at first beneath the lateral line, which it intersects a little in front of the caudal fin; a second paler yellow band from the pectoral to the root of the caudal; cheeks and opercles silvery; opercle with a pale crimson spot continued obliquely down the preopercle; a second smaller spot over the point of the opercle and the root of the pectoral; dorsals with two or three transversal blackish back; caudal pale yellowish with a broad blackish margin; pectorals white; rays of anal, ventrals and the gular filaments pale yellow. Iris pale golden. *Older.* Head above Indian red, continued on the back; cheeks and opercles silvery rose-coloured; caudal pale orange with a broad blackish margin. Iris golden crimson. D 8 —1/8, C 15$\frac{1}{4}$, A 1/6 or 7, V 1/5, P 15 or 16, Br. IV. Inhabits *Sea of Pinang*, Total length: 5 inch. M.M. Cuvier and Valenciennes count 7 spines in the anterior dorsal; Russell gives 8, and correctly figures the first as being very small. Single small individuals occur at Pinang at all seasons.

2. *With velvety teeth in both jaws; palate toothless.*

(3650) *Hypeneus flavolineatus*, (Lacepede) Var. *Mullus flavolineatus*, Lacepede III. 406.—*Mullus aureo-vittatus* Shaw IV. 618.—*Upeneus flavolineatus*, Cuvier and Valenciennes III. 456. Head above and back pale bluish brown or bronze; cheeks, sides and abdomen pale greenish silvery; from the lower part of the orbit a vertical crimson streak; opercle and the root of the pectorals crimson; on each side beneath the lateral line a broad longitudinal orange, or rust-coloured band, intersecting the lateral line at the commencement of the posterior dorsal, and terminating above it at the root of the caudal; fins pale yellow; dorsals and caudal each with three or four oblique waved reddish bands; lower part of anal and ventrals pale reddish; gular filaments yellow. Iris golden. D 7 or 8—9, C 15$\frac{1}{4}$, A 7, V 1/5, P 14 or 15, Br. IV. Inhabits *Sea of Pinang*. Total length: 5$\frac{1}{4}$ inch. M. M. Cuvier and Valenciennes count 7—9 in the dorsal fins; in some individuals however, a very minute spine precedes the longest. Those observed at Pinang appear principally to differ from *H. flavolineatus* in having waved reddish bands on the dorsals and caudal fins. It must

however be observed that these bands become totally obliterated shortly after death. The lateral band remains, but it changes to blackish. In other characters this fish agrees with the description of *H. flavolineatus*. The length of the head is contained 4¼ times in the total, measured to the centre of the caudal margin; the greatest vertical diameter of the body is 5½ of the total: the eye occupies about the third fourth from the muzzle, its diameter equalling ¼ of the length of the head. The distance between the two dorsals equals the extent of the base of the posterior, but is somewhat less than that of the anterior. The ramifications of the lateral line consist of 5 or 6 branches on each scale, of which three or four are directed obliquely upwards, one downwards. The root of the scales has four or five crenulations. The filaments are rather thick, fleshy, slightly exceeding the commissure of the gill-openings. Single individuals occur at all seasons at Pinang.

Fam. CATAPHRACTOID.E.

Genus Platycephalus, (*Bloch, Schneider* 1801) *Cuv. and Val.* Head much depressed with trenchant edges, armed with spines, body covered with scales; ventral fins five-rayed, widely separated from each other, owing to the lengthened and flattened shape of the pelvic bones; palate with sharp teeth; branchiostegous rays 7.

(3651) *Platycephalus insidiator* (Forskal).

Syn. Cottus insidiator Forskal, Fauna Arab 25, No. 8.
Cottus insidiator. Linne: Syst. 1213.
Callionymus indicus, Linne: Syst. 1153.
Cottus spatula. Bloch, Pl. 224.
Batrachus indicus, Bloch: 43.
Callionymus indicus. Bloch, 59.
Calliomorus indicus, Lacepede II. 344.
Cotte madecasse, Lacepede, III. 248, Pl 11, Fig. 1, 2.
Platycephalus spatula, Bloch-Schneider. 59.
Russell XLVI. Irrwa.
Cottus insidiator, Shaw IV. 260.
Cottus madagascariensis, Shaw IV. 261. Pl. 37.
Colliomorus chacca, Buch. Ham. 133. 373.
Platycephalus insidiator, Cuvier and Val. IV. 227.
(*Icon.*) Platycephalus chacca, Gray: Ill. Ind. Zool. II. Pl. 93 Fig. 2.
Platycephalus insidiator. Temm. Schl. Fauna Japon. Pisc. 39. Pl. XV. Fig. 1.
Platycephalus insidiator. Richardson Rep. 1845, 216.
Platycephalus insidiator, Bleeker, Verh. Batav. Gen. XXII. 6.

Head above and back greenish or brownish grey with a few smaller and larger dark brown scattered spots; sides, from a little below the lateral line, and abdomen white; fin membrane of the caudal white, orange or yellow at the base and along the rays; the base indistinctly spotted with brown; the upper and lower angle black, between both three longitudinal, somewhat oblique black bands, liable to individual variations, the membranes of the other fins whitish, transparent; the dorsal, ventral and pectoral rays more or less distinctly annulated with brown. Iris pale golden green; pupil black, heart-shaped by a pointed lobe descending from the upper margin of the iris. D 1—8—1—13, C 15⅔, A 13, V 1/5, P. 18 or 19, Br. VII. Inhabits *Sea of Pinang*, Sea of Madagascar, Red Sea, Moluccas, Seas of China and Japan, Batavia, Bay of Bengal, estuaries of the Ganges. Total length: 1 ft. 6 inch. M.M. Cuvier and Valenciennes count 8 spines in the anterior dorsal fin; at a short distance, however, in front of the first of these eight, is a very small isolated reclining spine, and in the space between the eight spine, and the first ray of the posterior dorsal, slightly nearer the latter than it is the former, is another very minute isolated reclining spine, which thus make the whole number of spines 10 instead of 8. The first and the tenth spines are so minute, and in the living fish so hid in the scales, that they easily escape notice. Russell, indeed, in Pl. XLVI. correctly gives the tenth spine, and his description counts 9—13 inch the dorsal fins. This as well as the following species *Platycephalus* is occasionally taken in the fishing stakes placed along the coasts; they are all capable of sustaining life some little time out of water. They are eaten by the natives.

(3652) *Platycephalus clavulatus*, Cantor. (*Young?*)—Head above, opercles, back and sides pale reddish brown; beneath and behind the posterior dorsal fin some large patches of a lighter brown; along the anterior half of the back some distant brown dots; along the lateral line a more regular series of distant brown dots; abdomen and sides, from a little below the lateral line, white; from behind the ventral fins minutely dotted with brown; cheeks whitish, minutely dotted with brown, and with two short vertical brown streaks beneath the orbit; membrane of anterior dorsal minutely dotted with brown; the upper half so closely so, as to acquire a blackish appearance; posterior dorsal whitish, each ray with one or two brown; dots at the upper part; caudal membrane whitish, minutely dotted with brown; at the root an indistinct semicircular brown band, near the margin some irregular brown spots, which near the lower part are confluent, forming an oblique band; anal whitish; ventrals and pectorals minutely and so closely dotted with brown, as to have a blackish appearance; the upper six or seven pectoral rays white, annulated with brown, the 19th and 30th ray, white. Iris pale greenish golden, minutely dotted with brown; pupil heart-shaped. D 8—11, C, 15⅔, A 11, V 1/5, P 20, Br. VII. Inhabits *Sea of Pinang*, Total length 5⅞ inch. The length of the head is contained nearly 3½ times in the total; the eye occupies the second

fourth part from the muzzle; the distance between both eyes is less than one half of the vertical diameter of the eye. The nasal bone is rough, but without spines. At the commencement of the supraorbital crest is a reclining spine, on the posterior half three smaller, and on its continuation along the sides of the occiput are two distant spines: from the orbit along the upper margins of the opercles proceed 5 small gradually backwards increasing spines; the opercle has two backwards diverging linear crests without spines. On the middle of the anterior infraorbital bone is a small reclining spine: on the posterior two distant larger, from whence proceeds a raised linear crest, terminating in the upper angular spine of the preopercle. The latter spine extends to the margin of the opercle, its length exceeding three times that of the smaller, lower spine. The angle of the mouth is situated opposite the anterior angle of the orbit. The dentition resembles that of *Platycephalus insidiator*: the upper maxillary velvety teeth form a very narrow band, which is considerably widened on the intermaxillary bones, where the posterior series has on each side three teeth longer than the rest. The lateral line is nearly straight, less approaching the back than in *P. insidiator*; at its commencement, as far as the middle of the anterior dorsal, every other scale has a minute reclining spine; the rest of the lateral line, though raised and distinct, appears to be spineless. The present species of which a single, apparently young, individual was observed at Pinang in 1843, appears to be closely allied to *Platycephalus scaber*, (Linne).

(3653) *Platycephalus carbunculus*, Cuv. and Val.

Syn. Platycephalus carbunculus, Cuv. and Val. IX. 461.

Ground colour greenish buff; head, cheeks, back and sides spotted with blackish brown, forming three short vertical bands on the sides of the head beneath the orbit, and three larger irregular bands on the sides of the body; throat and abdomen white; anterior dorsal fin white, upper half pale blackish, marbled with white veins; posterior dorsal, caudal, ventrals and pectorals white; the rays annulated with pale black; posterior half of caudal pale blackish with two or three waved vertical white lines; anal white, each ray with one or two brown dots near the extremity. Iris pale greenish golden, spotted with brown; pupil black, heart-shaped. D 9—11 or 12. C 11$\frac{1}{3}$, A 12, V 1/5, P, 19, Br. VII. Inhabits *Sea and estuaries of Pinang*, Bombay. Total length: 6$\frac{1}{4}$ inch. The length of the head is $\frac{1}{3}$ of the distance from the muzzle to the root of the caudal; the latter is $\frac{1}{5}$ of that distance. The breadth of the head in front of the eyes exceeds by $\frac{1}{3}$ the distance from the muzzle to the anterior part of the orbit. The raised supraorbital crest is strongly serrated, leaving the upper part of the skull like a narrow furrow, the breadth of which is scarcely $\frac{1}{4}$ of the vertical diameter of the eye. The upper maxillary teeth form a much broader band than in either *P. insidiator* or *P. clavulatus*, and it is but little widened on the intermaxillary bones, on which the teeth are of uniform length, velvety like the rest. The number of spines of the head renders this species conspicuous. It occurs, although not numerously, at all seasons at Pinang, and it is eaten by the natives.

Genus SCORPÆNA, (*Artedi*) Linne 1748. Head large, spinous, filamentous, scaleless, compressed; eyes placed near each other; teeth in the jaws, vomer, and palate; dorsal fin single, anterior part spinous; branchiostegous rays seven.

(3654) *Scorpæna picta*, Kuhl and Van Hasselt.

Syn. Scorpæna picta, Cuv. and Val. IV. 321.
Scorpæna picta, Bleeker: Verh. Batav. Gen. XXII. 4.

Head greenish olive, largely spotted with black, radiating round the orbit; ground colour of body and fins pale greenish or brownish buff, on the back and sides above the lateral line largely and irregularly marbled with black, which beneath the anterior part of the soft dorsal is continued vertically towards the abdomen; the latter and the rest of the sides irregularly spotted with brownish black; spines and fin rays, except the ventral, greenish buff, annulated with brownish black; membranes of dorsal, caudal and anal fins greenish buff; the spiny part of the dorsal largely washed with black, the rest with a broad vertical blackish spot, continued over the body, and with two smaller at the posterior margin; caudal with a vertical blackish band at the root, a second in the middle, a third at the margin; membranes of pectorals blackish brown; of anal with a black spot behind the root of the second spine, and an irregular blackish transversal band across the middle, with black spots on the margin; ventrals uniformly blackish brown. Filaments of the body black with slate grey points; the two large supraorbital ones olive, largely spotted with black. Iris golden dark olive with five broad radiating black streaks. D 12/10, C 13$\frac{2}{3}$, A 3/5, V 1/5, P 17, Br. VII. Inhabits *Sea of Pinang*, Java, Celebes. Total length: 7 inch. The length of the head is a little less than $\frac{1}{3}$ of the total; the eye occupies the second fourth from the muzzle; the angle of the mouth is situated a little in front of the eye, opposite the lowest of the anterior infraorbital spines, which latter is arched downwards, but has its point directed forwards like the two larger ones. Of the three supraorbital spines the central is the strongest: behind it appears a fleshy pointed filament, in length equalling the diameter of the orbit. Smaller filaments are scattered over the body, and a series appears above the lateral line.

The second anal spine is the strongest of all, its length equalling that of the anal fin, which is $\frac{1}{6}$ of the total length. The band of velvety teeth in the upper jaw is narrowed towards the intermaxillary bones. The reverse is the case in the lower jaw, where the band of teeth is considerably widened on the symphysis. The innermost of the lower maxillary teeth are longer than the rest. The present offers the specific characters of *S. picta* in having the lowest of the anterior infraorbital spines directed forwards, and the second anal spine excessively large; but it differs in presenting a long filament above each eye, which did not exist in the specimen described by M. M. Cuvier and Valenciennes. A single individual occurred at Pinang in 1842.

Genus PTEROIS, *Cuvier*, 1819. Differs from *Scorpæna* in the absence of palatal teeth, and in having the dorsal spines and pectoral rays excessively elongated.

(3655) *Pterois miles*, (Bennett.)

Syn. Scorpæna miles, Bennett: Ceylon, Pl. 9.
Pterois muricata, Cuv. and Val. Although this Vol bears 1829 on the title-page, the description quotes *S. miles* Bennett, in *Fishes of Ceylon*, the first edition of which appeared in 1830. However this may be, M. M. Cuvier and Valenciennes in quoting Bennett, admit the priority of his description and figure, and his specific denomination must therefore be retained. IV. 363.
Macrochyrus miles. *Macrochyrus*, Swainson, founded on *Scorpæna miles*, Bennett, is characterised as having "the pectoral fins only one-third as long as the body, and the mouth subvertical." Both characters however, are incorrect; the pectorals in every stage of growth much exceed one-third of the body (total length?), and the mouth opens obliquely as in *Pterois* miles. Swainson II. 264.

Adult. Ground colour of head and body, impure rose or flesh-colour, the scales edged with lighter or darker reddish brown, so as to produce a net-work; sides of the head and body with oblique and vertical scarlet bands, the number and breadth varying individually: across the hind-head two or three such, and between the eyes a longitudinal scarlet band; behind the point of the opercle a triangular black spot; lips, throat and abdomen reddish white; dorsal spines scarlet, broadly annulated with black, or white; their membrane scarlet, in some with the pointed portion attached to each spine, black, or with a triangular black spot near the base; dorsal, caudal and anal rays and membranes scarlet; and spines scarlet, their membrane reddish back; pectoral rays scarlet, more or less annulated with black; base of the pectoral scarlet, continued over the root in the shape of three oblique bands; membrane brownish green or bronze, with a black streak along each ray; ventral spine alternately white and scarlet; membrane pale blackish green, with longitudinal series of black and milky spots between and across the rays; posterior half of the membrane black; a scarlet spot inside the root of each pectoral. Supraorbital fleshy filaments black; those of the upper jaw and preopercle white with scarlet points. Iris silvery white, with four or five scarlet or reddish back radiating bars. *Young.* Colours distributed as in the adult; the scarlet paler; pectoral fins uniformly greenish black. D 13/11, C $14\frac{3}{3}$, A 3/7, V 1/5, P 12 or 13, Br. VII. Inhabits *Sea of Pinang*, Ceylon, Red Sea, Bourbon. Total length, $9\frac{3}{8}$ inch. The length of the head is $\frac{1}{4}$ of the total, equalling that of the caudal fin; the eye occupies the third fourth from the muzzle. Besides the nasal spine, there are two or three supraorbital ones, of which the posterior is the largest; behind it proceeds the spiny temporal ridge obliquely downwards to the commencement of the lateral line, which has one or two spines. On each side of the occiput appears a very broad spine, sharp like a knifeblade, with two points. The ridge of the infraorbital bones is spiny, proceeding obliquely over the cheek towards the margin of the preopercle, from which rise three spines. The surface beneath the infraorbital ridge is uneven to the touch, but without spines. The interval between the orbits is broad equalling the transversal diameter of the eye. From the central supraorbital spine rises a pointed fleshy filament, which in the young equals one half of the vertical diameter of the eye; but in the adult it is much shorter, or absent. The most constant of the other filaments is one on the upper jaw near the angle of the mouth, and the largest are two or three on the lower margin of the preopercle. The membrane of the three or four upper pectoral rays has a very deep incision, so as to give each ray a feather-like appearance, and the points of the lowest four or five rays are free, projecting beyond the membrane. The length of the pectoral fin varies not only according to age, but also individually. In a young one the point of this fin reaches to the middle of the caudal, its length being about $\frac{2}{3}$ of the total. In one of two adults of equal length, $9\frac{3}{8}$ inches, the pectoral measures $3\frac{7}{8}$ inches, in the other $4\frac{2}{8}$ inches. In the fish as commonly seen, but a small portion of the base of the dorsal spines is connected by the membrane. In such, however, as have been examined alive, the instant they are taken out of the sea, the membrane is found continued along the posterior margin of each spine till near the point, where an elongated long flap appears, like the pendant of a lance. Out of the element the scarlet colour of the fish soon fades to a deep rose-colour, which then makes the vertical strips, on which the brown net-work appears, more con-

spicuous. The fish appears to be a heavy swimmer, and, as observed by Bennett, it never attempts to support itself in the air. At Pinang single individuals occur at all seasons. It is a very bony fish, and the flesh is said to be insipid. It preys on small *Crustacea*.

Genus PROSOPODASYS, *Cantor*. Πρόσωπον, mask; δασύς, rough. Substituted for *Apistus* Cuvier, 1829, preoccupied by *Apistis* (Ser. *Apistus*,) Hubner 1816 (*Lepidopt.*) (*Equivalent to* Apistus, *Cuvier.*) Differs from *Scorpæna* in having fewer pectoral rays and all branched, a long moveable spine on the infraorbital bone, and a similar on the preopercle.

(3656) *Prosopodasys trachinoides*, (Cuv. and Val.)

Syn. Apistus trachinoides, Cuv.and Val. IV. 401, Pl. 92. Fig. 1.
Trichosomus trachinoides. Swainson,Nat. Hist. Fish. II. 265. *Trichosomus*, in itself inadmissible, is not equivalent to *Apistus*, Cuv.
Apistus trachinoides, Richardson, Rep. 1845, 213.
Apistus trachinoides, Richardson, Voy. Samarang, Fishes, Pl. III. Fig. 3—5.
Apistus trachinoides, Bleeker, Verh. Bat. Gen. XXII, 8.

Head above and back blackish brown; sides and abdomen pale neutral tint; membrane of the dorsal fin pale bluish grey with four large oblique blackish bands, between which some oblique pale brownish lines; anal and ventrals pale bluish grey, the former with larger oblique black bands, between which some pale brownish oblique lines; the posterior half of the latter blackish; caudal yellowish white, minutely dotted with brown and with a black vertical band at the root, and one or two vertical series of black spots near the posterior margin; pectorals pale neutral tint largely spotted with blackish brown. Iris golden flesh-colour, minutely dotted with black. D 14 or 15/5. C $12\frac{3}{8}$, A 3/4, V 1/5, P 12, 13 or 14, Br. VI. Inhabits *Sea and estuaries of Pinang, Singapore*, Java, Madura, Sea of China. Total length, $3\frac{1}{8}$ inch. The fish is numerous at all seasons It is capable of living a considerable time out of its element. It is applied as manure, but not eaten.

Genus CORYTHOBATUS, *Cantor*. Κόρυς helmet; βάτος thorny. Substituted for *Minous*, Cuvier and Valenciennes 1829, pre-occupied by *Minois*, Hübner 1816 (*Lepidopt.*) *(Equivalent to* Minous. *Cuv. and Val.)* Differs principally from *Prosopodasys* (*Apistus*,) by the absence of scales, and of teeth on the palatal bones. *Minous woora*, and *M. monodactylus*, the two only species discribed by Cuvier and Valenciennes, and *M. adamsii*, Richardson: Voy. Samar. Fishes, 7, Pl. II. Fig. 4—5, have a free undivided ray beneath the pectoral fins, but *Carythobatus echinatus* has no such free ray.

(3657) *Corythobatus woora*, (Cuv. and Val.)

Syn. Russell CLX. Worrah Minoo A. [(8.)
Apistus minous, woora, Cuv.R.A. II.168.
Minous woora, Cuv. and Val. IV. 421.
Apistes Russellii, Swainson, II. 265.
Minous woora, Richardson, Rep. 1845, 213.

Head above and back brownish grey, or pale silvery grey; sides and abdomen buff or bluish white; dorsal fin buff, the margin of the spiny portion, and the upper half of the soft portion black; caudal pale yellowish white, with a vertical blackish band at the root; a second in the middle, and a third near the margin; anal and ventrals buff, their external half black; pectorals buff at the root, the rest black; the free ray white, more or less distinctly annulated with black; body and fins minutely dotted with black; filaments of lower jaw white. Iris silvery grey, minutely dotted with black. D 9 or 10/10 or 11, C $11\frac{3}{8}$, A 1/9, V 1/5, P 10 or 11—1, Br. VII. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula*, Isle of France, China Seas, Vizagapatam. Total length, $3\frac{3}{8}$ inch. M.M. Cuvier and Valenciennes count 11/12 in the dorsal, Sir J. Richardson 10/11. (China Spec.) At Pinang the species is numerous, and applied as manure.

(3658) *Corythobatus echinatus*, Cantor.

Plate XIII.

Ground colour of head and body umber, pale on the sides and abdomen; fins of a darker brown than the body; on the opercles, above the lateral line and close to the anal fin some larger and smaller irregulars, light spot, edged with black; numerous similar small round spots on the fins; on the caudal three large such bordering the margin; from the root of the pectoral to the gill-opening two rose-coloured irregular bands edged with black; a similar angular sport behind the eye, and some similar bars radiating over the iris; the latter with a narrow golden circle round the pupil. D 13/11, C $11\frac{1}{2}$, A 2/8, V 1/5, P 11, Br. VI. Inhabits *Sea of Pinang*, Total length, $3\frac{7}{8}$ inch. The form of the body is broad lanceolate, with the sides highly compressed. The profile of the forehead ascends nearly vertically, from thence the back forms an arch ascending to the sixth dorsal spine, when it gradually descends towards the tail; the profile of the abdomen is a little less arched than the back. The length of the head is $3\frac{3}{8}$ of the total. The eye is placed high on the head; the vertical diameter of the orbit, slightly exceeding the horizonal, is $\frac{1}{4}$ of the length of the head; the distance of the orbit from the back, or the root of the anterior, dorsal spine is $\frac{1}{4}$ of the diameter of the orbit. The anterior, moveable, infraorbital bone carries two blunt spines of which the superior, the longer, scarcely projects beyond the middle of the orbit: both are directed backwards and downwards. The posterior infraorbital is immoveable, and has but two very minute spines.

The rounded preopercle carries four distant, flattened spines: the two lower ones are very minute, the two upper hardly extend beyond the anterior third of the opercle. The opercle terminates above in a flat membranous point, below which appear two oblique long ridges. There appears to be but a single nasal opening which is a small tube, situated in front of the lower part of the eye. The small oblique mouth scarcely reaches the level of the anterior orbital margin. The velvety teeth (Pl. XIII. Fig. 2.) are placed in both jaws on a crescent-shaped band; that of the upper is divided under the symphysis by a naked linear interval, behind which appears a minute fleshy tubercle. On the vomer appears a small crescent of velvety teeth. But the palatals are toothless. The tongue resembles that organ of *Prosopodasys trachinoides* and *Corythobatus woora:* it is moveable, fleshy, rounded, and occupies nearly the whole cavity. The greatest vertical diameter, at the root of the pectoral, equals the length of the head, the greatest thickness is $2\frac{1}{2}$ of the former diameter. The dorsal fin occupies the whole length of the back. The anterior spine rises between the anterior orbital margins: it is the longest and strongest of all, its length being about $\frac{3}{4}$ of that of the head. The succeeding spines and rays gradually decrease to the seventh ray, which is about $\frac{3}{4}$ of the length of the head. The remaining rays abruptly decrease; the eleventh, being but $\frac{1}{3}$ of the length of the head, is attached to the tail by a continuation of the dorsal membrane. All the fin rays are undivided, but jointed. The caudal is subrhomboidal or rounded, the longest, central, rays are a little shorter than the head. The extent of the anal fin slightly exceeds $\frac{1}{3}$ of the dorsal; the two spines and the seventh and eighth ray are a little shorter than the intervening rays, which are $\frac{1}{2}$ of the length of the head. The lower half of the eighth anal ray is attached to the tail by a very short continuation of the fin membrane. The anus is situated a little in front of the fin. The pectorals are elongated, rhomboidal, the central rays equalling the length of the head. The anterior ventral ray, the longest, slightly exceeds $\frac{1}{2}$ of the length of the head; the fifth is attached to the abdomen by a continuation of the fin membrane. The lateral line is a series of linear tubes, nearly following the outline of the back on the upper third of the side. The fish appears to be without scales, but it is studded with small tubercles, each surmounted by a minute, backward directed spine. The tubercles may be seen by the naked eye, but their spines may be perceived by passing a finger from the tail forward. On the back, the sides of the head and body the tubercles are fewer and more distant than on the throat and abdomen, where they are crowded. The axilla and the space covered by the pectorals is naked. A solitary individual occurred at Pinang in July 1842.

Genus SYNANCIA, *Bloch Schneider.* 1801. Differs from *Pelor* by the want of teeth on the palate and vomer, and of free rays beneath the pectoral fins.

(3659) *Synancia elongata*, Cuv. and Val.

Syn. Synancia elongata, Cuv. and Val. IV. 456.
Trachicephalus elongatus, Swainson II. 268.
Synancia elongata, Bleeker: Verh. Batav. Gen. XXII. 10.

Head, back and sides bluish brown or neutral tint, paler on the abdomen and with rose coloured lustre, everywhere minutely dotted with black, and with scattered round white spots, and white warty filaments; dorsal, caudal, anal and pectoral fins neutral tint, largely marbled with black, and with numerous white spots; ventrals neutral tint, posterior half black; points of all the rays white. Iris pale golden, dotted with black and with radiating black bars. D 10 or 11/14 or 15, C $12\frac{1}{1}$, A 2/13 or 14, V 1/5, P 14 or 15, Br VII. Inhabits *Sea of Pinang*, Java, Pondicherry. Total length: $4\frac{3}{8}$ inch M.M. Cuvier and Valenciennes count 9/15 in the dorsal fin. The length of the head is about $\frac{1}{3}$ of the total; the eye occupies the second fourth from the muzzle. On the lateral line appears a series of distant filaments, of which the anterior four are long, the rest fleshy, all with the apex divided in two. The anterior half of the line proceeds from the angle of the opercle obliquely upwards, the posterior half follows the back till the root of the caudal, where it bends obliquely downwards to the centre of the fin, terminating horizontally near the margin. This species is numerous at Pinang where, if used at all, it is with other offal applied as manure. It is capable of living a considerable time out of water.

Fam. SPAROIDÆ.

Genus. CHRYSOPHRYS, *Cuvier*, 1829. Rounded molars on the sides of the jaws, disposed in the upper jaw in at least three series; in front some conical or blunt teeth; branchiostegous rays six.

(3660) *Chrysophrys calamara*, Cuv. and Val.

Syn. Russell LXCII. Calamara.
Chrysophrys calamara, Cuv. and Val. VI. 117.

Head above blackish brown, the rest of the body silvery grey, the scales minutely dotted and edged with brown; spines, ray and fin membranes grey, minutely dotted with brown, which gives the anal and ventral membranes a blackish brown appearance. Iris silvery, minutely dotted with brown, the upper margin black. D 11/10 or 11, C $19\frac{2}{3}$, A 3/9 V 1/5 P 15, Br. VI. Inhabits *Sea of Pinang*, Java, Madras, Vizagapatam, Malabar. Total length: 10 inch. When the upper jaw is protracted the length of the head is $\frac{1}{3}$ of that of the body, the caudal fin not included; the eye borders on the profile

and occupies the centre between the protracted muzzle and the membranous point of the opercle; its diameter is little less than ⅓ of the length of the head. The second anal spine is the largest of all, its length equalling the distance from the protracted muzzle to the posterior margin of the orbit. The ventral spine equals the length of the fourth dorsal; the first soft ray terminates in a short filament. The pectoral fins when at rest, are slightly falcated, the fifth ray, the longest, reaching to the second anal spine. At Pinang this fish appears to be an occasional visitor, a few individuals occurring together at irregular intervals, and they rarely exceed 7 inches in length. The flavour is said to be good.

Genus PENTAPODUS, *Cuvier*, 1829. With three elongated pointed scales, of which one above the root of each ventral, and a single between these fins, appearing like five ventrals, or feet: mouth little cleft; body rounded, with rather hard scales, advancing farther in front than in *Dentex*. In each jaw two canines, between which sometimes two or four smaller; the rest of the teeth velvety, disposed in narrow bands.

(3661) *Pentapodus nubilus*, Cantor. Head above and back light reddish brown, paler on the sides; cheeks gill-covers and abdomen silvery white; an indistinct blackish oblique band from the nape of the neck to the point of the opercle; a second similar in front of the dorsal, terminating beneath the lateral line in a large rounded spot; a few indistinct blackish clouded spots along the sides; the scales of the body indistinctly edged with brownish and minutely dotted with brown; dorsal caudal and anal pale yellowish; pectorals and ventrals white, the posterior half of the latter pale blackish: the fin-membranes minutely dotted with brown. Iris pale golden. A number of minute pores on the infraobital bones, the cheeks, the margin of the preopercle and on the lower jaw. D 10/9, C 17½, A 3/8, V 1/5, P 13, Br. VI. Inhabits *Sea of Pinang*. Total length, 4⅜ inch. The head is elongated, the profile much sloping, its length, when the muzzle is protracted, is ⅓ of that of the body, the tail not included. The eye is situated behind the centre of a line drawn from the protracted muzzle to the point of the opercle; its diameter is a little less than ⅓ of the length of the head. The canines of both jaws are very small; there are 4 in the upper, 6 in the lower, of which the two outer ones are the largest and slightly outwards arched. The pores are very minute, scarcely perceptible by the naked eye, rather closely distributed over the infraorbitals, the cheeks, the margin of the preopercle and the lower jaw. The lateral line is very distinct, following the outline of the back. The scales are very finely ciliated: there are about 47 on a straight line. This species is closely allied to *P. porosus*, Cuv. and Val. from which it differs in the eye being situated farther back, in the comparatively longer pectoral fins, the second and third upper rays reaching the anal spine, and in the comparative greater length of the anal spines. The anterior of the latter is half the length of the second and third, which are equal and of nearly the same length as the succeeding soft rays. The description is taken from a solitary individual, observed at Pinang in 1844.

Genus. SPONDYLIOSOMA, *Cantor*. Σπονδύλιον spindle; σῶμα, body. Substituted for and Equivalent to *Cantharus*, Cuvier, 1829, pre-occupied by *Cantharus*, Montfort, 1808, *(Polypi.)* Teeth card-like, close, the external series a little stronger than the rest and slightly curved: mouth slightly cleft, not protractile.

(3662) *Spondyliosoma guliminda*, (Cuv. & Val.)

Syn. Russell CVII. Lama Guliminda.
Cantharus guliminda, Cuv. and Val. VI. 344.

Young. Head above, back and sides above the lateral line rose-coloured; the latter bordered beneath by a pale blue line; sides and abdomen silvery with five parallel straight longitudinal lines, each rose-coloured, bordered beneath with pale blue; cheeks and opercles silvery, washed with rose colour; beneath the orbit an elongated blue spot; a larger on the opercle. Dorsal fin whitish transparent, either pale blue at the base, or with a bluish line behind each spine; the spiny part edged with vermilion; anterior half of caudal bluish, posterior pale crimson; the other fins whitish transparent; the anal membrane in some bluish near the margin. *Adult.*—Head above and back vermilion; ground-colour of the upper half of the sides greenish grey, of the lower and of abdomen silvery, from the occiput a golden longitudinal band bordering the back; the lateral line bordered above by a crimson, beneath by a golden band; the scales at the origin of the lateral line broadly edged with crimson, forming a large rounded spot, from which proceeds a straight longitudinal crimson band, bordered beneath by a narrower golden band, beneath which four similar parallel bands, gradually lengthening and becoming paler towards abdomen. Infraorbitals silvery crimson; cheeks and opercle crimson; preopercle violet silvery; caudal rose-colored; the other fins transparent white; dorsal edged with vermilion. Iris golden, upper margin bluish black. D 10/9, C 17½, A 3/7, V 1/5, P 17, Br. V. Inhabits *Sea of Pinang*, Madras, Vizagapatam. Total length: 6 inch. The head is ¼ of the total length to the centre of the posterior margin of the caudal; the greatest vertical diameter of the body equals the length of the head; the horizontal diameter of the eye is ⅓ of the latter; the eye occupies the second third. The ascending margin of the preopercle is finely toothed, the angle rounded; on its outer surface as well as on the

infraorbitals appear some distant minute pores. The upper lobe of the caudal is longer than the lower, and the third upper ray terminates in a not very long filament, which is also the case with the first ventral ray. The following errors occur in Russell's figure. The first dorsal spine is too short, its length in the fish is $\frac{3}{4}$ of the second. The pectoral is also too short, its length being equal to that of the head; the dorsal rays likewise: their length slightly exceeds that of the spines. The anal fin is erroneously represented with one spine: it has three, the first of which is $\frac{1}{2}$ of the second, which is but little shorter than the third. The ventral spine is one half the length of the head and equals the 10th dorsal, which slightly exceeds the preceding. All the spines are very slender and flexible. Single, mostly young individuals occur, but rarely, at Pinang.

Genus CRENIDENS, *Cuvier and Valenciennes*, 1830. The jaws with crenulated teeth, behind which others globular.

Sub. Gen. GIRELLA, (*Gray,*) *Richardson.* Teeth curved, flat and expanding towards their ends which are tricuspid, standing out in three rows on the margin of the jaw; a little way behind them a brush like band of much smaller teeth which are also tricuspid and like the others, except in size. Founded upon *Crenidens punctatus*, Richardson, (Report 1845, 242,) of which a figure appears in *Ill. Ind. Zool.* under the name of *Girella punctata.*

(3663) *Crenidens sarissophorus*, Cantor.

Pl. I. Figs. 1-4.

Young.—Head, back and sides above the lateral line pale umber brown; rest of the sides and abdomen silvery buff; all the scales broadly edged with pale umber; spines buff, minutely dotted with dark brown; fin-membranes and rays buff, so closely dotted with dark brown, as to appear a shade darker than the body. Iris pale golden, orbital margin blackish. D 11/15, C 15/7, A 3/14, V 1/5, P 19, Br. V. Inhabits. *Sea of Pinang, Malayan Peninsula.* Total length: $7\frac{5}{8}$ inch. The form is elongated oval; the abdominal profile a little less arched than the dorsal. The vertical diameter at occiput is $\frac{1}{4}$, at the fifth dorsal spine $2\frac{3}{4}$, between the last dorsal and anal rays $\frac{1}{5}$ of the total length. The body is much compressed, particularly towards the back; the greatest thickness is at the lower third of the vertical diameter, where it equals $\frac{1}{2}$ the length of the head. The muzzle is obtuse; the forehead a little arched between the eyes; the length of the head is $\frac{1}{4}$ of the total; the eye is placed high up, its horizontal diameter is about $3\frac{1}{2}$ of the length of the head; the distance from the muzzle equals the diameter. The posterior opening of the nostril is an almost vertical fissure immediately in front of the eye; the anterior is oval and situated a little behind the muzzle; the infraorbital bone is very large, occupying nearly the upper half of the cheek, it is tumid and of an elongated, nearly oval shape; the preopercle is narrow and obscurely ridged, with a single minute spine at the angle; the opercle terminates in two widely separated flat points; the subopercle and interopercle are small. The scales of the head are very small, those of the cheek less indistinct than on the other parts of the head. The mouth is small, both jaws of equal length; their teeth are curved, flat, widening towards the three cusps, of which the centre one is a little larger than the lateral ones; the outer series consists of about 18 teeth gradually increasing in length towards the angle of the mouth; immediately behind, and in close contact with the outer, appears a second series of similar teeth; at a little distance behind these two series are two others also consisting of tricuspid teeth, but much smaller and almost setaceous; at the angle of the mouth the teeth of all four series coalesce, and have no interval between them. The gill-opening is small linear, and the five branchiostigous rays are completely hid in the membrane; the suprascapular bone is naked. The body is covered with scales of different sizes; the largest are those of the sides, from immediately beneath the lateral line as far as the pectorals extend, they appear bony and tumid; the posterior rounded margin carries upwards of 40 minute spines; their vertical diameter, nearly double the length of the horizontal, is about $\frac{1}{2}$ of the diameter of the eye. From the apex of the pectorals the scales gradually decrease in size towards the caudal. The scales above the lateral line and those of the abdomen are much smaller than the rest; all are placed in irregular series, so that their number cannot be counted. The lateral line is a little below the upper fourth of the side; it consists of minute single tubes and follows the profile of the back towards the tail, in the middle of which it proceeds straight to the root of the caudal. The anterior dorsal spine, about $\frac{1}{2}$ of the diameter of the eye, is situated at the anterior third of the total length; it is immoveable, placed horizontally, has no membrane and becomes more or less hidden by age; the second spine is the shortest of all, about $\frac{1}{4}$ of the diameter of the eye; the third is $\frac{3}{4}$, the fourth exceeds by $\frac{1}{4}$ the diameter of the eye; the fifth is excessively long, robust and appears to be composed of two parts; the lower half, when reposing, covers with its grooved posterior margin the sixth spine; the upper half overlaps the succeeding five spines; the length of the fifth is $\frac{1}{5}$ of the greatest vertical diameter of the body, from the root of this spine. The rest of the spines gradually decrease in length towards the tenth, which equals the diameter of the eye; the eleventh exceeds it by $\frac{1}{4}$ and is closely attached to the anterior dorsal

ray. The first four dorsal rays are the longest, of equal length, $\frac{3}{5}$ of the head; the rest gradually decrease, the fifteenth, double one, being $\frac{1}{3}$ of the first. The caudal is almost truncated, the central rays being but a little shorter than the rest, which are $\frac{2}{3}$ of the length of the head. The anal rays resemble the dorsal; the spines are strong, the second, the longest, about $2\frac{1}{2}$ of the head. The anus is situated a little in front of the first spine. The pectoral is nearly triangular, the longest ray $\frac{3}{4}$ of the head. Each ventral is enclosed by two elongated scales; the spine is $\frac{1}{2}$ of the length of the head; the anterior ray is undivided, filamentous, its length equals that of the head; from the second, which slightly exceeds the spine, the rest gradually decrease. The individual described was observed at Pinang in August 1845. The fishermen declared it to be a young one, and of rare occurrence. A second, of somewhat larger size, was taken on the coast of Malacca.

(Sub-Fam. MÆNOINÆ.)

(3664) *Cæsio*, (*Commerson*) *Cuv. and Val.* 1830. (*Cæsio*, Lacepede, 1800, is founded upon erroneous characters.) Dorsal and anal fin covered with small slender scales; mouth very slightly protractile; no teeth on the vomer; a pointed scale above the root of each ventral, and a third between the fins; on the occiput a chevron or crescent with the horns backwards pointed.

(3665) *Cæsio cærulaureus*. Lacepede. Var. (Lacep. III. 86.—*Picarel raillard*, Quoi and Gaim. Freycin, 290, Pl. 44, fig. 3.—Cuv. Val. VI. 434.) Head above and back deep blue, changing to bluish olive on the sides; an indistinct golden line from the orbit along the sides, in the centre of which it changes to silvery blue, continued to the root of the caudal; opercle golden; cheeks, preopercle, subopercle and interopercle, lower half of the sides and abdomen silvery glazed with cherry red; dorsal pale olive grey, the membrane minutely and closely dotted with brown and edged with black; caudal membrane black, rays yellowish olive, the upper, lower and posterior margin cherry; ventrals and the spiny part of anal white, the membrane of the soft anal rays pale cherry; the three upper rays of the pectoral white, the rest pale cherry; on the inner side at the root a large black spot, continued as a small black point outside at the root of three upper rays. Iris golden, the orbital margin blackish. D 10/15, C $17\frac{1}{2}$, A 3/12, V 1/5, P 21, Br. VI. Inhabits *Sea of Pinang*. Total length: $6\frac{3}{8}$ inch. The scales are large, deciduous; there is no crescent-shaped space on the occiput, which is uniformly covered with scales, which advance on the crown as far as midway between the eyes. The present nearest approaches the Variety from the Red Sea, which Prof. Ehrenberg denominated *cæruleo-tæniatus*; it also resembles *C. chrysozona*, Kuhl and Van Hasselt, apud Cuvier and Valenciennes. As the distribution of colours of *C. cærulaureus* is liable to considerable variations, *chrysozona* may turn out to be but a Variety. The description of the present was drawn up from a single dead specimen, observed in the fish-bazar at Pinang in 1845. The fishermen were unacquainted with the fish, and had on that account put it aside.

Genus CATOCHAENUM. *Cantor*. Κάτω, downwards; χαίνων, yawing. Substituted for *Gerres*, Cuvier, 1829, pre-occupied by *Gerres* (Latr.) Fabricius 1794, (*Hemiptera*) (Equivalent to GERRES, (*Cuvier*.) Mouth very protractile downwards; the jaws with velvety teeth the angle and inferior margin of the preopercle minutely toothed in some, in others not: opercle terminating in an obtuse angle; body compressed, high; chest square beneath; head, cheeks and opercles like the body with large, deciduous scales: anterior dorsal and anal spines more elongated than the rest; the base of these fins is hid in a scaly sheath; the ventral fins with an elongated scale above the root.

(3666) *Catochænum limbatum* (Cuv. and Val.).

SYN. Gerres limbatus. Cuv. and Val. VI. 476.

Silvery with lilac reflections; dorsal, caudal and anal fins pale yellow; dorsal spines, rays and membrane minutely dotted with brown, the upper margin black, caudal with a broad blackish margin; ventrals and pectorals white. Iris silvery or pale golden. D 9/10, C $17\frac{1}{2}$, A 3/7 or 8, V 1/5, P 15 or 16, Br. VI. Inhabits *Sea of Pinang*, Malabar, Pondicherry. Total length: 7 inch. The greatest vertical diameter is contained three times and one-third in the total length. The length of the second dorsal spine is contained two and a half times in the vertical diameter. In the adult this spine slightly exceeds the third in length, but in the young the two spines are of equal length, and the lower margin of the preopercle is finely toothed, of which all trace is obliterated in the adult. The blackish margin of the caudal is very indistinct in the young, which bears a strong resemblance to *Catochaenum lucidum* (Cuv. and Val.). Young individuals of this species are exceedingly numerous at Pinang at all seasons, and large quantities are dried. Large individuals are of comparatively rare occurrence.

(3667) *Catochaenum filamentosum* (Cuv. and Val).

SYN. Russell LXVII. Woodawahah.
Gerres filamentosus, Cuv. and Val. VI. 482.
Gerres filamentosus, Bleeker: Ver. Bat. Gen. XXII., 4.

Head above and back pale greenish grey, the rest of body silvery with lilac reflections; above and following the lateral line two parallel series of large oval blackish spots; below the lateral line one or two straight series of similar, but smaller

spots; dorsal, caudal and anal fins pale yellow; the spines, rays and membranes of the dorsal and caudal minutely dotted with brown; the superior margin of the dorsal black; the posterior margin of the caudal pale blackish; ventrals and pectorals white. Iris pale golden. D 9/10, C 17½, A 3/7, V 1/5, P 15, Br. VI. Inhabits *Sea of Pinang*, Madura, Vanikolo, New Guinea, Java, Coromandel. Total length: 7⅛ inch. The length of the second dorsal spine appears to vary: in an adult and a few young, it but slightly exceeded the vertical diameter of the body, and did not reach the caudal fin, as described by M.M. Cuvier and Valenciennes. The young ones have no series of blackish spots, which vanish soon after death; in the smallest examined, 4⅛ inches in length, the margin of the preopercle was not toothed. This species but rarely visits Pinang.

Fam. SCIÆNOIDÆ.

Sub-Genus OTOLITHUS, *Cuvier* 1829. Head gibbous, supported by cavernous bones; preopercle toothed or crenulate; bony opercle terminating in one or two flat points; dorsal fins two, or one deeply emarginated, the soft part of which longer than the spinous; anal spines extremely small; strong canines in the upper jaw, and in some also in the lower; under the symphysis of the latter two very minute pores, or none: air-vessel in some, [M.M. Cuvier and Valenciennes add (*Hist. Nat. des Poiss.* V.) that such is the case in the species dissected by them,] with a hornlike, forwards directed process on each side; in others with numerous lateral branched appendages. Vide infra *Otolithus ruber* and the subsequent species, a very large loose bone in each auricular cavity; branchiostegous rays 7. The Malays distinguish the fishes belonging to the Genus *Otolithus* by the common denomination of *Járang* (distant, open), *gigi* (tooth).

(3668) *Otolithus biauritus*, Cantor. Ikan Salampai, sometimes Jarang gigi, of the Malays. *Adult.* Head above and back greenish grey with golden reflections; sides golden orange, paler towards abdomen, everywhere minutely dotted with brown; lateral line golden: dorsal, caudal and anal fins brownish yellow or pale orange, minutely dotted with brown, black towards the margin; ventrals pale orange; pectorals brownish with a black spot in axilla, spreading over the basal third of the nine upper rays. Iris golden orange. *Young.* Paler than the adult; abdomen silvery buff; upper half of opercle silvery bluish black; the spot in the axilla very indistinct or absent. D. 9—1/27; 9—1/30; 9—1/32; 8—1/32; C 17½, A 2/7, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, *Lancavy*, Tenasserim Provinces. Total length: 3 feet. This fish is of a very elongated cylindrical form, not unlike that of the Genus *Ophiocephalus*; the profile of the back and abdomen is nearly horizontal, imperceptibly sloping towards the bluntly pointed muzzle. The length of the head is from 4½ to ⅕ of the total; the depth at occiput exceeds by ⅛ half the length of the head. The eye occupies about the second eight of the length of the head; the anterior upper half of the orbit borders upon the profile, while the posterior half deviates downwards; the greatest oblique diameter is ⅓ of the length of the head, while the vertical is but ⅔ of the oblique diameter. The head above is depressed, slightly arched between the eyes, the distance of which is about double the oblique diameter. The nostrils open closely in front of the eye: the posterior obliquely oval aperture is but little larger than the minute rounded anterior, the margin of which is provided with a small raised membranous fold. The mouth is large; the widely arched upper jaw is hidden when the mouth is closed, by the scaly fold which covers the infraorbitals; the lower jaw is scaly, narrower, more pointed, and slightly shorter than the upper, which is naked, with longitudinal striæ, and a rather large triangular impression near the angle, which is situated opposite the posterior part of the orbit. In the upper jaw appear an external series of pointed inwards arched, distant teeth. On each side of the symphysis is one or two canines, larger than the rest; the other teeth gradually decrease in size towards the angle of the mouth. At a slight interval behind the external appears a second narrow series of minute crowded conical (cardlike) teeth. In the lower jaw the external series consist of conical teeth, although small, yet perceptibly larger than the card-like ones of the upper jaw. The internal series consists of single distant large teeth, increasing in size as they approach the angle of the mouth. The tongue is large triangular, pointed, fleshy, on each side of the base, flat, bony in the centre, membranous towards the margins and the apex. The angle of the preopercle is rounded, the ascending margin is but very indistinctly crenulated. The bony part of the opercle terminates in two flat points of which the upper is the smaller; both are enveloped in a membranous point, projecting beyond the root of the pectoral fin, and formed by a prolongation of the subopercle. The third upper branchiostegous ray is very broad, like the blade of a sabre. Above the pointed termination of the opercle appears another, triangular point, formed by a lobe of the skin, the scales of the margins of which terminate in short setaceous points. This second, earlike appendage also appears in *Otolithus puna*, [*Syn Bola puna*, Buchan. Ham. 79, 368, Pl. 32, Fig. 26—*Sciæna puna*, Cuv. and Val. V. 55, Pl. 101, who observe it might with equal propriety be considered a species of *Otolithus*. Their description appears to have been drawn up from young specimens, in which the canines are less developed than in the adult, in

which they appear as strong and conspicuous as in several species of *Otolithus*. The form of the air-vessel is not exclusively characteristic of *pama*.] (Buchan. Ham.) The body is elongated, cylindrical, compressed towards the back; the vertical diameter taken in front of the dorsal fin is 6⅓ of the total length. The dorsal spines are very slender; the third is the longest, equalling about ½ of the vertical diameter; the rest gradually decrease towards the ninth, but the last spine is longer, nearly ½ of the third. The caudal fin is rhomboidal very pointed, its length from 6½ to 7½ of the total. The pectorals are very pointed 5⅔ to 6½ of the total. The ventrals and the anal are equal ½ of the length of the head. The second anal spine is scarcely one half of the length of the rays, very attenuated, and not striated. The scales of the body are moderate, deciduous; the lateral line is very distinct and proceeds obliquely downwards to the very point of the caudal. The air-vessel is nearly one half of the total length, narrow, tapering backwards to a fine point. On each side of the latter commences a narrow tape-like process, which, continuing along each side, deviates at a little distance from the fundus of the air-vessel, which it again joins. The organ might be compared with an elongated antique urn with two handles. From the anterior part of each of the latter proceed five branches, the four of which give off smaller ones to each side, and the fifth is tortuous and larger than the rest. This organ strongly resembles that of *O. pama*, (Cuv. and Val. V. Pl. 138,) yet it presents differences more easily perceived by comparison than described. This species approaches to *O. senegalensis*, Cuv. and Val. and to *O. pama*, from which latter it, however, differs in its more elongated form, particularly of the head, and in having much fewer rays in the dorsal fin. *O. Reevesii*, Richardson, (Rep. 1845. 224.) differs in having 10—1/31 in the dorsal fin, the preopercle spinously toothed on the upper limb and rounded corner, where the teeth are large, and in having the second anal spine stout and finely striated. Single individuals occur at Pinang at all seasons, but numbers from June to August. Although not much esteemed by Europeans, this fish is consumed by the natives both fresh and dried. It yields a large quantity of isinglass, which in the Chinese market is considered to be of the best quality, and fetches 40 to 45 Spanish Dollars per Pikul.

(3669) *Otolithus ruber*, (Bloch-Schneider.)

Syn. Johnius ruber, Bloch Schn. 75, No. 3 Pl. 17.
Otolithus ruber, Cuv. and Val. V. 60, Pl. 102.
Otolithus raber, wainSson, Nat. Hist. Fish. II. 219.
Jarang gigi of the Malays.

Adult. Head above and back pale brownish el with silvery, iridescent reflections; sides of the head and parts beneath the lateral line reddish or pure shining silvery; upper part of opercle steel-blue; lateral line silvery; dorsal pale brownish red, the membrane minutely dotted with brown; the other fins pale reddish yellow. Iris reddish golden brown, towards the orbit. *Young.* Sides of the head and parts beneath the lateral line silvery pale orange. D 10—1/29 or 30, C 17⅔, A 2/7, V 1/5, P 16, Br. VII. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore*, Coromandel, Malabar. Total length: 2 feet 6 inch. The length of the head is 3½ times in the total; its vertical diameter equals the distance from the muzzle to the anterior margin of the preopercle, or exceeds by ⅛ half the length of the head. The greatest oblique diameter of the eye is ⅙ of the length of the head. The depth of the body in front of the dorsal is contained 4¾ times in the total length. In the young, the caudal fin is rhomboidal, pointed; but with age it becomes rounded, and its length little less than ⅙ of the total. On each side of the symphysis of the upper jaw appear two large arched canines, of which the exterior is the shorter: between the two pairs rise two distant smaller, yet conspicuous teeth. On each side of the symphysis of the lower jaw appears a long canine; in most individuals but one such is visible, the corresponding one being either missing or much smaller. Behind the canines both jaws have an external series of small conical teeth, and in the upper appears an inner series of velvety teeth. But the lower jaw has but a few such behind the canines on the symphysis. The stomach is elongated, cylindrical with four cœcopyloric appendages. In several it contained remains of fishes, of a small *Melania* and *Crustacea*. The air-vessel is large, flattened, broad lanceolate, terminating behind in a short point. Its length is ½ of the body, the caudal not included. On each side of the body of the vessel appear 34 processes, of which the anterior four or five divide in four branches, the next in three, the next in two, but the posterior process, which are slightly longer than the preceding, are simple; all again divide in minor ramifications. The isinglass is considered very good, and sells in the Chinese market from 40 to 45 Spanish dollars per Pikul. The fish is consumed both in a fresh and dried state. Single individuals occur at Pinang at all seasons, but they are plentiful from June till August.

(3670) *Otolithus argenteus*, Kuhl and Van Hasselt.

Syn. Otolithus argenteus, Cuv. and Val. V. 62.
Otolithus argenteus, Richardson, Rep. 1845. 225.
Otolithus argenteus, Bleeker: Verh. Bat. Gen. XXII. 4.
Jarang gigi of the Malays.

Adult. Head above and back iridescent grey-

ish green, with pale reddish reflections; sides of the head and beneath the lateral line reddish golden; upper part and posterior margin of opercle blackish blue; membrane of the whitish dorsal spines reddish transparent, of the rays and caudal reddish yellow, minutely dotted with brown, margin black; pectoral, ventrals and anal pale yellowish red; ventral and anal spines whitish. Iris golden, bluish black towards the orbit. *Young.* Sides of the head and beneath the lateral line pale golden orange; upper part of opercle steel blue; soft dorsal, caudal, anal, ventrals and pectorals orange or yellowish red more intense than in the adult. D 9 or 10 — 1/26, 27 or 28, C 17$\frac{5}{6}$, A 2/7, V 1/5 P 20, Br. VII. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore*, Malabar, Celebes, Madura, Batavia. Total length: 2 feet 7 inch. The length of the head is $\frac{1}{4}$ of the total, its greatest vertical diameter exceeds by $\frac{1}{4}$ half the length of the head. The oblique diameter of the eye is 5$\frac{1}{3}$ of the length of the head. The vertical diameter in front of the dorsal is 5$\frac{1}{2}$ of the total length. On each side of the symphysis of the upper jaw appear two, sometimes three canines, of which the posterior, or centre one when three are present, is the longest, but all are shorter and more distant than those of *O. ruber*. The canines are succeeded by a series of distant conical teeth of a comparatively larger size than those in *O. ruber*. Behind the external series is an inner one of velvety teeth. On each side of the symphysis of the lower jaw is a very small canine, preceding a series of velvety teeth, behind which is an inner series of large distant conical teeth, some of which in size exceed the lower canines. The lateral line describes an arch, terminating opposite the middle of the soft dorsal fin, from whence it proceeds horizontally to the point of the caudal. The latter fin is rhomboidal; its length about 5$\frac{1}{2}$ of the total. The stomach is elongated, cylindrical, containing fishes and *Crustacea*. There are six cœcopyloric appendages. The body of the air-vessel is very narrow, lanceolate, about $\frac{1}{4}$ of the length of the fish, terminating in a fine point. From each side of the body of the air-vessel proceed 25 branched processes, of which the anterior are the longest and have the greatest number of branchlets. At Pinang this species is taken in numbers from June till August. It is valued by the natives as an article of food. Owing to the small size of the air-vessel, it yields but a small quantity of isinglass, the quality of which however is considered very good. M.M. Cuvier and Valenciennes have observed this species figured in Colonel Farquhar's collection of drawings at the India House, and its name is said to be at Malacca; *Ikanhampay*, which most likely is a mistake for *Salampai*, the Malayan denomination of *O. bilauritus*.

(3671) *Otolithus maculatus*, Kuhl and Van Hasselt.

Syn. Otolithus maculatus, Cuv. and Val. V. 64.
Jarang gigi of the Malays.

Head above and back iridescent yellowish brown, lighter, silvery on the sides; cheeks, preopercle and abdomen silvery buff; upper part of opercle steel blue; lateral line shining silvery; on the back and sides to within a little beneath the lateral line, a number of brownish spots, the scales of each spot edged with black; dorsal, anal, ventral and pectoral fins yellowish light grey, their membranes minutely dotted with brown; caudal rays silvery at the base; posterior half and membrane brownish yellow; single large irregular black spots scattered over the fin. Iris pale golden, blackish towards the orbit. D 10—1/34, C 17$\frac{5}{6}$, A 2/11, V 1/5, P 18, Br. VII. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore*, Batavia. Total length: 2 feet 9 inch. The length of the head is 3$\frac{3}{4}$ of the total; its greatest vertical diameter exceeds by $\frac{1}{7}$ half the length of the head. The oblique diameter of the eye is a little more than $\frac{1}{6}$ of the length of the head. The vertical diameter of the body in front of the dorsal is 5$\frac{1}{2}$ of the total length. The dentition resembles that of *Otolithus ruber*, but the external series of the lower jaw consists of fewer, more distant and stronger conical teeth. The lower jaw greatly projects beyond the upper. In the adult the caudal fin is nearly rounded; its length is 7$\frac{3}{4}$ of the total. The pectorals and ventrals are comparatively short, their length equalling that of the caudal. The stomach is very elongated, cylindrical, thin. In it were found fishes, shells of a *Cerithium*, and *Crustacea*. The air-vessel is very large, broad lanceolate, tapering behind into a fine point. The length is one half of the body, the caudal fin not included. Each side has from 52 to 55 branched processes, the number of which differs not only individually, but from side to side. The lower abdominal surface of the body of the vessel is perfectly smooth, and as usual, silky white, but the upper or vertebral surface is longitudinally divided by a narrow furrow, from which proceed a number of distant, backwards arched, transversal lines or ribs. The intervals between the latter are filled up by short backwards bifurcating raised lines, of which those nearest the central furrow are directed obliquely inwards; but they increase in length, and become longitudinal towards the margin of the vessel, while those covering the lateral branched processes deviate outwards and are much longer than the rest. Thus the whole of the upper or vertebral surface of the air-vessel presents a kind of raised net-work of singular beauty. This species, although not uncommon, appears at Pinang to be less numerous than the others, which it accompanies. It is reported to

be flavourless, but it is highly valued for the sake of the air-vessel, which yields a considerable quantity of the best kind of isinglass.

(3672) *Otolithus versicolor*, Cuv. and Val. ?

Syn. Russell CIX. Pottee Kanasah ?
Otolithus versicolor, Cuv. and Val. V. 64 ?
Jarang gigi of the Malays.

Young. Head above and back iridescent greyish green, lighter on the sides; cheeks and preopercle silvery; opercle steel-blue; sides beneath the lateral line silvery white; lateral line shining silvery; fins yellowish buff; membrane of the spinous dorsal and marginal half of the soft, of the anal and caudal minutely dotted with black, on the latter fin so closely as to produce a general blackish colour. Iris arrow golden round the pupil; the rest bluish black. D 10—1/25, C 17$\frac{1}{3}$, A 2/7, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang*. Total length: 6$\frac{1}{8}$ inch. The length of the head is about $\frac{1}{4}$ of the total; its greatest vertical diameter exceeds one half the length by $\frac{1}{7}$. The oblique diameter of the eye is 5$\frac{1}{2}$ of the length of the head. The vertical diameter in front of the dorsal is about $\frac{1}{6}$ of the total length. The dentition, as represented by Russell, resembles that of *O. maculatus*. The broad triangular part of the upper jaw at the angle of the mouth, is finely radiated, but without the large triangular impression, which appears in some of the other species. The second anal spine is proportionally stronger than in the other species; its length slightly exceeds $\frac{1}{2}$ of the anterior ray, and the two lateral surfaces are compressed, finely radiated, whereas in the preceding species this spine is rounded. The air-vessel is lanceolate with numerous lateral branching appendages; its length equals that of the head, or about $\frac{1}{4}$ of the total length. The only individual observed, occurred at Pinang in 1844. It resembles more *O. versicolor* than any of the preceding species: Russell indeed gives 21 dorsal rays, but their number varies considerably in all. In the present, as well as in the young of the preceding, the caudal fin is proportionally much longer and more pointed than in the adult, and the eye is also proportionally larger.

Genus JOHNIUS, *Bloch-Schneider*, 1801. Velvety teeth in both jaws: in the upper an external series of arched teeth, considerably longer and more distant than the rest; in the lower an internal series of conical teeth somewhat longer than the rest. Differs from *Sciæna* by the comparative greater thickness and length of the second anal spine, which is nearly two thirds of that of the first ray.

(3673) *Johnius dussumieri*, (Cuv. and Val.)

Syn. Corvina dussumieri, Cuv. and Val. V. 119.

Head above and back dark greenish brown, paler, silvery on the cheeks, preopercle and sides; opercle steel-blue; the scales minutely dotted with brown; abdomen pearl-coloured; membrane of dorsal transparent, minutely dotted with brown, edged with black; caudal and anal yellowish white, minutely dotted with black, their marginal part blackish; ventrals white; upper half of pectorals brownish, lower yellowish white. Iris silvery, upper part bluish black. D 10—1/28 or 29, C 17$\frac{1}{3}$, A 2/7, V 1/5, P 19, Br. VII. Inhabits *Sea of Penang, Malayan Peninsula, Singapore*, Malabar. Total length: 6$\frac{1}{8}$ inch. The teeth of the external series of the upper jaw are distant, but little longer than those of the internal. Under the symphysis of the lower jaw appear five pores. The anterior part of the air-vessel is dilated, forming a rounded lateral process on each side of the vertebral column. Immediately behind them the body of the vessel is constricted, and the rest presents a broad lanceolate form, tapering backwards into a sharp point. From each side proceed ten processes of which the eight are branched, but the two posterior pairs, the longest, are either simple or bipartite. The length of the air-vessel is about $\frac{1}{4}$ of the total. At Pinang single individuals occur at all seasons. The isinglass is reputed good, but as the fish is of small size and not numerous, but little is procurable.

(3674) *Johnius belengeri*, (Cuv. and Val.)

Syn. Corvina belengeri, Cuv. and Val. V. 120.
Corvina belengeri, Belanger, 358.

Colours similar to those of *J. dussumieri*, but the body and fins so closely dotted with black and brown as to impart a general pale brownish appearance; the marginal half of the caudal, anal and ventral fins blackish. Iris silvery, upper half bluish black. D 10—1/28, 29 or 30, C 17$\frac{1}{3}$, A 2/7, V 1/5, P 17, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Malabar. Total length: 6$\frac{1}{8}$ inch. The teeth of the external series of the upper jaw are less distant, and rather longer than in *J. dussumieri*. There are five pores under the symphysis of the lower jaw. The form and length of the air-vessel is that of *J. dussumieri*; each side has ten branching processes, shorter, however, and apparently placed at a greater distance from each other than in the former species. The three posterior pairs are much longer than the preceding, the eighth and ninth bipartite, the tenth pair is undivided, pointed. Also this species occurs singly at Pinang. The two preceding species not only closely resemble each other, but also a third: *Johnius coitor*, (Buchanan Hamilton.) [*Syn. Bola coitor*, Buchan. Ham. 75, 368, Pl. 27, Fig. 24. —*Corvina coitor*, Cuvier and Valenciennes, V. 116.] Their external distinguishing characters will appear from the following table.

	Johnius dussumieri.	*Johnius belengeri.*	*Johnius coitor.*
Length of the head	4⅓ in total length	⅓ of total length	⅓ of total length
Depth at occiput	⅓ of the length of the head	⅓ of the length of the head	⅓ of the length of the head...
Diameter of the eye	⅓ of do.....	1⅓ in do.	5⅓ in do. .....
Distance from the muzzle to the eye	equal the diameter of eye,	⅛ less than the diameter	exceeding the diameter by ⅛
Depth in front of dorsal fin, ...	5⅓ in total length	⅓ of total length	⅓ of total .....
Length of the posterior anal spine.	slightly exceeding ⅓ of first anal ray,.....	⅓ of the first ray but slenderer than in *coitor.*	of the first anal ray .....

(3675) *Johnius carutta*, Bloch.

Syn. Johnius carutta, Bl. Pl. 356.
Corvina carutta, Cuv. and Val. V. 124.

Head above and back dark brown claret colour, lighter, silvery on the cheeks, opercles, sides and abdomen; the scales minutely dotted with black, and their margins of a darker brown than the ground colour; fin-membranes pale whitish yellow, minutely dotted with black; the upper half of the spiny dorsal, from 2d to 7th spine, black; the soft dorsal with four equidistant, large, oblique black spots; the marginal half of the caudal, anal and ventral fins blackish. Iris golden, the orbital half bluish black. D 10—1/28, C 17?, A 2/8, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang*, Malabar; sea and rivers Tranquebar, Pondicherry. Total length: 6 inch. The length of the head is 4⅓ in the total, the depth at the occiput ⅓ of its length. The transversal diameter of the eye is ⅓ of the length of the head, equal to its distance from the muzzle. The vertical diameter in front of the dorsal fin is little less than the length of the head. The external series of teeth of the upper jaw is but little larger than the external; the velvety teeth of the lower jaw, form a broader band than those of the upper. Under the symphysis of the lower jaw appear four pores. The second anal spine is very thick, ⅔ of the length of the first ray. A single individual was observed at Pinang in May.

(3676) *Johnius diacanthus.* (Lacepede.)

Lutjanus diacanthus, Lacepede IV. 195, 244.
Russell CXV. Nalla Katchelee. (*Adult.*)
Russell CXVI. Katchelee. (*Young.*)
Johnius cataleus, Cuvier R. A. II. 173 (4)
Corvina catalea, Cuvier and Valenciennes, V. 128.
(*Icon.*) Sciæna maculata, Gray, Ill. Ind Zool. II. Pl. 89, Fig. 3. (*Young.*)
Corvina catalea, Belanger, 360.
Corvina catalea, Richardson; Rep. 1845, 226.
Corvina nalla katchelee, Richardson l. c.
Corvina catalea, Bleeker: Verh. Batav. Gen. XXII. 4.
Ikan Tambareh of the Malays.

Young. Head above and back dark brown claret colour; cheeks, preoperele, and sides to a little beneath the lateral line lighter with lilac silvery reflection, the scales edged with dark brown, and the back and upper half of the sides with numerous larger and smaller round black spots; lower half of the sides silvery buff; the scales minutely dotted with brown; opercle silvery lilac or blue; dorsal and caudal fin membranes brownish buff; minutely dotted with brown, and with more or less numerous large black scattered spots; anal, ventrals and pectorals brownish buff at the base, the rest pale neutral tint, minutely dotted with brown, and the marginal half black. *Adult.* Head and sides darker, with or without indistinct black spots; sides beneath the lateral line pale silvery bluish or lilac brown; opercle blackish blue; branchiostegous rays and membrane pale lilac silvery; dorsal-caudal and anal membranes pale yellowish brown, minutely dotted with brown, with or without indistinct large dark brown spots; ventrals and pectorals yellowish brown, posterior half blackish. Iris silvery lilac, minutely dotted with brown; the orbital half, bluish black. D 10—1/24, C 17⅔, A 2/7, V 1/5, P 19 or 20, Br. VII. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Malabar, Coromandel, Bay of Bengal, Gangetic estuaries, Tenasserim, Canton, China Seas, Madura, Java. Total length: 2 feet 9 inch. The length of the head is 3⅓ in the total, the caudal fin not included. In the young the latter fin is rhomboidal, very pointed, and its length equal to that of the head: but with age the point becomes worn, and in the adult the length is but ⅔ of that of the head, or equal to the depth at the occiput. The oblique diameter of the eye is a little less than ⅓ of the length of the head; the distance from the muzzle to the eye exceeds the diameter by ⅓. The vertical diameter in front of the dorsal fin is ⅓ of the total length. The teeth of the external series of the upper jaw are long, distant, and there is generally a canine on one or both sides, at a little distance from the symphysis. The lower jaw has a smaller canine on each side of the symphysis, and an internal series of longer conical teeth. Under the symphysis appear four large pores, and in some a fifth, very minute. The air-vessel, ⅓ of the length of the fish, is of a broad, lanceolate shape, tapering behind into a very elongated point. Each side has 20 to 24 processes, of which the two posterior pairs are simple or bipartite; the rest branching. The contents of the stomach of one dissected were the remains of a species of *Leptocephalus* and an eel, of Crustacea, and of a *Loligo*. At Pinang individuals of this species occur at all seasons, but in numbers and of the largest size, from June to August. They are not only valued as articles of food, but also on account of the quantity and quality of the isinglass, which sells in the China market from 40 to 45 Spanish Dollars per Pikul.

(3677) *Johnius maculatus*, Bloch-Schneider, Var.? [*Syn.* Russell CXXIII. *Sari Kullu.*—

Johnius maculatus, Bl. Schn. 75.—*Corvina maculata*, Cuvier and Valenciennes, V. 126.] Bloch, Schneider, Var ? Head above and back dark greyish green, lighter, silvery on the cheeks, opercles and sides, the scales minutely dotted with black, not, however, sufficiently to influence the general colour; abdomen silvery; membrane of dorsal spines transparent with black margin; between the anterior six spines dotted throughout, and rather largely with black and brown; between the four posterior spines the central part of the membranes without dots; membrane of dorsal rays, caudal and anal yellowish white, minutely dotted with brown and black, their marginal portion blackish; pectorals and ventrals whitish the latter dotted with black, particularly towards the margin. Iris silvery, dotted with black; upper orbital half bluish black. D 10—1/23, C 17$\frac{5}{6}$, A 2/7, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*. Total length: 5 inch. The length of the head is 4$\frac{1}{3}$ in the total, its vertical diameter at the occiput $\frac{1}{4}$ of the length. The oblique diameter of the eye is 3$\frac{1}{2}$ in the length of the head; the distance from the muzzle is less than the oblique diameter. The vertical diameter in front of the dorsal fin equals the length of the head. The distance from the orbit, across the infraorbitals, exceeds, $\frac{1}{3}$ of the diameter of the eye. This character may serve at once to distinguish a very closely allied species: *Johnius chaptis*. [*Syn. Bola chaptis*, Buch. Ham. 77. 368, Pl. 10, Fig. 25.—*Corvina chaptis*, Cuvier and Valenciennes, V. 130.] (Buchan. Ham.), in which the breadth of the infraorbitals is much less. The anterior teeth of the external series of the upper jaw are rather long and closely set; the rest are scarcely longer than the rather broad internal series of velvety teeth. Under the symphysis of the lower jaw appear five pores. The lower part of the rounded margin of the preopercle is distinctly and distantly toothed. The opercle terminates in two flat spines. The laternal line is distinct; on each scale appears a small longitudinal tube, from whence proceed an upper and lower oblique process. Most of the scales of the sides have each a central oblique line. The second anal spine is rather strong, longitudinally radiated, and $\frac{1}{3}$ of the length of the first ray. The caudal fin is rhomboidal somewhat rounded at the point. From the defective descriptions of *Johnius maculatus*, it is impossible to determine if the present is specifically distinct or a variety. A single individual was observed in 1844 at Pinang. The form of the air-vessel and the number of the lateral appendages resemble those of *Johnius belengeri*.

Sub-Genus CORVINA, *Cuvier*, 1829. Differs from *Johnius* by the comparatively greater size of the second anal spine, the length of which nearly equals that of the first anal ray.

(3678) *Corvina Soldado*, (Lacepede.)

Syn. Holocentre soldado, Lacepede, IV. 341, 373.
Russell CXVII. Tella Katchelee.
Corvina [Misprinted "*Sciæna*."] miles, Cuvier and Valenciennes, V. 94, IX. 474.
Sciæna argentea, Kuhl and Van Hasselt MS. Cuv. and Val. V. 95.

Adult. Head above and back iridescent greyish green; lighter, silvery on the cheeks, preopercle and sides; opercle steel-blue in the centre; abdomen pearl-coloured; membrane of dorsal spines transparent, minutely dotted with black and brown, and with black margins; membrane of the rays near the root, and in front of each ray, with a small brownish spot; upper third minutely dotted with brown, the margin black; ventrals whitish; the rest of the fins pale yellowish white, the membranes and rays minutely dotted with black on the marginal half, so closely as to impart a general blackish colour. Iris silvery, upper orbital half bluish black. *Young*. Of general lighter colour; fins, of a deeper yellow; anal spines and three anterior rays and their membrane dotted with brown. D 10—1/29 or 9—1/30, C 17$\frac{5}{6}$, A 2/7. V 1/5 P 16 or 17, Br. VII. Inhabits *Sea of Pinang*, Java, Tenasserim, Coromandel, Bombay. Total length: 2 feet. The length of the head is about 4$\frac{5}{6}$ in the total; the depth at occiput $\frac{1}{7}$ less than the length. The oblique diameter of the eye is a little less than $\frac{1}{4}$ of the length of the head; the distance from the muzzle equals the diameter of the eye. The vertical diameter, in front of the dorsal, slightly exceeds the length of the head. The air-vessel is about $\frac{1}{3}$ of the total length, elongated oval, with numerous lateral branching appendages, which increase in length towards the posterior extremity. Four pores appear under the symphysis of the lower jaw. Small individuals occur at Pinang at all seasons; larger ones but rarely. The fish is eaten by the natives, and the few air-vessels procurable, are valued as good isinglass. M. Dussumier found this species abundant at Bombay.

Genus UMBRINA, *Cuvier*, 1817. Differs from *Johnius* in having a cirrus under the symphysis of the lower jaw.

(3679) *Umbrina russelli*, Cuvier.

Syn. Russell CXVIII. Qualar Katchelee.
Umbrina russelli, Cuv. and, Val. V. 178.
Umbrina russelli, Richardson Report 1845 226.
Ikan Gulama of the Malayas.

Young. Head above and back silvery greyish; green, light on the sides above the lateral line cheeks, opercles and beneath the lateral line shining silvery; from the vertex, between the eyes, a blackish band obliquely backwards over the temple, terminating on the opercle in a large steel-blue spot; behind the occiput a broader black

band obliquely downwards to the origin of the lateral line; membrane of the dorsal spines blackish, minutely dotted with brown; of the rays the upper half minutely dotted with brown and black, the lower transparent; the rest of the fins pale orange. *Adult.* Body paler; in certain lights reflecting fifteen obliquely backwards ascending lines; no trace of the blackish band of the temples, and but a faint of the occipital; a pale steel-blue spot on the opercle; membrane of dorsal spines brownish. Iris silvery, upper orbital half bluish black. D 10—2/27 or 10—1/26, C 17$\frac{1}{3}$, A 2/7, V 1/5 P 17, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Vizagapatam, Indian and China Seas. Total length: 6 inch. The length of the head is 4$\frac{1}{3}$ in the total; the depth at occiput $\frac{1}{7}$ less than the length. The oblique diameter of the eye is $\frac{1}{4}$ of the length of the head, equalling the distance of the eye from the muzzle. The vertical diameter in front of the dorsal fin is $\frac{1}{3}$ of the length of the body, the caudal not included, but with the lateral fin it is 3$\frac{2}{3}$ in the total length. The teeth of the external series of the upper jaw, are but little longer than the rest, and rather closely set. The cirrus is thick, fleshy; in the adult fish its length equals the lower jaw to the angle of the mouth, but it is shorter in the young. On each side of and a little behind the cirrus appear two large pores. The fold of the skin covering the infraorbitals and the upper maxillary forms a small rounded lobe on each side of the muzzle. The verticle distance from the lower part of the orbit down the fold is $\frac{2}{3}$ of the oblique diameter of the eye. The lateral line consisting of a small central tube on each scale, follows the arch of the back till opposite the middle of the anal, from whence it proceeds nearly straight to the point of the rhombic caudal fin. In individuals with 12 dorsal spines, the eleventh is slightly, the twelfth much longer than the tenth, and their membranes much narrower than those connecting the rest, which from the fourth gradually decrease in length. The pectorals are pointed, their length equalling that of the caudal. The second anal spine, $\frac{4}{5}$ of the first ray, is compressed, broad except near the root where it is somewhat narrowed. The air-vessel about $\frac{1}{3}$ of the length of the fish, is elongated oval, terminating in a long thin point. From each side proceed 14 to 16 appendages, of which the two posterior ones are simple or bipartite, and much longer than the preceding branching ones. At Pinang this species is of too rare occurrence to make it valuable as an article of food, or as yielding isinglass, although the latter is considered of good quality. The fishermen assert that individuals upwards of a foot in length have been taken.

Genus PRISTIPOMA, *Cuvier*, 1817. Dorsal fin single, and, as well as the anal, without scales; as observed by M. Swainson, this character does not exist in all species; angle of opercle blunt, or hid in the membrane; the external series of the velvety teeth stronger than the rest; under the symphysis of the lower jaw two pores, behind which a small fossety; branchiostegous rays seven.

(3680) *Pristipoma commersoni*, (Lacepede.)

Syn. Labre commersonien, Lacep. III. 431, 477, Pl. 23. Fig. 1.
Lutjan microstome, Lacep. III. Pl. 34, Fig. 2; IV. 181, 216.
Labrus commersonii, Shaw, IV. 493.
Pristipoma kaakan, Cuv. and Val. V. 244, XIII. 8[1].
Pristipoma commersonii, Cuv. and Val. V. 252.
Pristipoma kaakan? Ruppell: N. W. Fische, 123, Taf. 30, Fig. 1.
Pristipoma kaakan, Richardson: Report 1845, 227.
Pristipoma kaakan, Bleeker: Verh. Batav. Gen. XXII. 3.

Young. Head above and back pale greyish green; opercle bluish silvery, the posterior part minutely dotted with black; cheeks, sides and abdomen silvery; the back and upper part of the sides minutely dotted with black and with distant indistinct brownish spots; fin membranes transparent, between the dorsal spines, with a black margin and with two or three series of brownish spots; between the dorsal rays two transversal series of smaller brownish spots; posterior half of caudal pale blackish. Iris golden. D 12/14, C 17$\frac{1}{3}$, A 3/7 or 8, V 1/5, P 17, Br. VII. Inhabits *Sea and estuaries of Pinang, Singapore*, Sea and estuaries of Coromandel, Malabar, Island of Lantao, China Sea, Balli, Java, Sumbawa, Celebes. Total length: 7 inch. The length of the head and the greatest vertical diameter of the body are contained 3$\frac{1}{2}$ times in the total length. The fourth dorsal spine equals half the greatest vertical diameter of the body. The second anal spine is two third of the vertical diameter above it, and as long as the fourth dorsal, but stronger. Individuals of the length described are excessively numerous at all seasons at Pinang and Singapore, where they are consumed by the natives either fresh or dried.

(3681) *Pristipoma guoraca*, Cuv. and Val.

Syn. Perca grunniens, Froster?
Anthias grunniens, Bloch-Schneider, 308?
Russell CXXXII. Guoraka.
Pristipoma guoraca, Cuv. R. A. II. 176[1].
Pristipoma guoraca, Cuv. and Val. V. 256.
Pristipoma guoraca, Belanger, 363.

Head above and back pale blackish olive; cheeks, opercles and sides silvery grey with blue and golden reflections; abdomen silvery yellowish white; most of the scales have the edges minutely dotted with brown, and those above the lateral line a pale brown spot at the root, forming six or seven indistinct parallel lines; fins pale yellowish;

membrane of the dorsal minutely dotted with brown, between the spines one or two series of large clouded brown spots, and a single series of smaller between the rays; margins of the dorsal and caudal blackish; the membrane of the latter and of the anal slightly dotted with brown. Iris golden. D 12/14, C $17\frac{2}{3}$, A 3/8, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang*, Isle of Tanna, Batavia, Coromandel, Mahe (Fresh-water). Total length: 1 foot. The air-vessel is elongated, nearly one third of the total length, swelling in the middle, terminating in a point; the anterior extremity is blunt and appears to have on each side a pointed process, a little less than one third of the length of the vessel itself, which is restricted at the origin of the lateral processes. The second anal spine is excessively thick, striated on the anterior surface; its length slightly exceeds one half of the vertical diameter of the body above it, but it is considerably less than one half of the vertical diameter at the pectorals. This spine is therefore comparatively shorter in the present species than it is in *P. kaakan*, Cuv. and Val. which it however much resembles in distribution of colour and other characters. The fish is finely flavoured, but its isinglass is of little value, as the air-vessel is very thin. At Pinang it is of very rare occurrence.

(3682) *Pristipoma nigrum*, Mertens.

Syn. Pristipoma nigrum. Cuv. and Val. V. 258.

Young. Blackish brown, opercles pale silvery; membrane of dorsal spines pale brown with lilac reflections, margin black; soft part of dorsal and anal blackish brown with whitish yellow margin; pectorals and caudal whitish yellow with a blackish vertical band at the root; ventrals blackish brown. Iris King's-yellow with a black orbital margin. D 14/16, C $17\frac{2}{3}$, A 3/7, P 17, Br. VII. Inhabits *Sea of Pinang*, Manila. Total length (*of the young*): $2\frac{4}{8}$ inch. The head is $\frac{1}{3}$ of the length of the body, not including the caudal which is $\frac{1}{5}$ of the total length. The greatest vertical diameter of the body is $\frac{1}{3}$ of the total length. The eye occupies the second third of the head. The basal half of the soft dorsal, anal, and of the caudal fin covered with minute scales. This fish, of which a single individual was observed in 1845 at Pinang, appears to be the young of *P. nigrum*, from which it merely differs by the yellowish colour of the caudal, pectorals and of the margins of soft dorsal and anal fins.

(3683) *Pristipoma paikeeli*, Cuv. and Val.

Syn. Russell CXXI. Paikeeli.
Pristipoma paikeeli, Cuv. R. A. II. 176 (a.)
Pristipoma paikeeli, Cuv. and Val. V. 259.

Silvery brownish white; abdomen buff; on the back and sides as far as the pectoral fin six parallel longitudinal bands, Van Dyke brown, each enclosed by two black lines; fin-membranes yellowish white, all except the pectoral minutely dotted with brown; the margin of the spinal part of the dorsal black; the upper half of the soft part, and the posterior margin of the caudal blackish. Iris golden. D 12/15, C $17\frac{2}{3}$, A 3/9, V 1/5, P 17, Br. VII. Inhabits *Sea of Pinang*, Madras, Vizagapatam. Total length: 6 inch. The figure of Russell represents the dorsal spines much too slender, and the caudal fin too deeply cleft. It is also defective in not representing the minute scales half covering the membrane of the dorsal rays, of the caudal, anal and of the ventrals. A single individual observed at Pinang in 1845, had nine anal rays, (the last one double.)

(3684) *Pristipoma caripa*, Cuvier.

Syn. Anthias maculatus, Bloch. Pl. 326. Fig. 2?
Lutjan tacheté, Lacépède IV. 239.
Russell CXXIV. Caripe.
Pristipoma caripa Cuv. R. A. II. 176.
Pristipoma caripa, Cuv. and Val. V. 261.

Head above and back brownish black, sides silvery brownish white: cheeks and abdomen silvery white, bluish on the opercles; over the infraorbitals an oblique blackish band, edging the orbit; a second from the occiput, edging the margin of the preopercle and the opercle; a third in front of the dorsal to just beneath the lateral line; three or four blackish spots along the back, three larger, placed in quincunx towards the former, along the lateral line; membrane of dorsal spines hemi-transparent, edged and minutely dotted with black, and with a large black spot between the 4th, 5th, 6th, 7th and 8th spine; upper half of the soft dorsal minutely dotted with black, and with a small indistinct blackish spot in front of the six anterior rays; the other fins pale yellowish white; the membrane of the caudal and anal minutely dotted with brown. Iris golden. D 12/14, C $17\frac{2}{7}$, A 3/7, V 1/5, P 16 or 17, Br. VII. Inhabits *Sea of Pinang*, Batavia, Coromandel, Malabar. Total length: 5 inch. Two individuals together were observed in 1845 at Pinang, where the fishermen asserted the species to be very seldom seen, and never of large size.

(3685) *Pristipoma auritum*, Cuv. and Val.

Syn. Pristipoma auritum, Cuv. and Val. V. 263.

Upper part of the muzzle dark brown, of the rest of the head the upper half of the opercle and of the lax gill-membrane and the cheeks light brownish grey with silvery reflections; preopercle, lower half of opercle and of the gill-membrane silvery yellowish-white, minutely dotted with brown; back and upper part of the sides light greyish green, lower part of the latter and abdomen yellowish white; the scales of the occiput and upper half of the body with a reddish brown spot at the root, reflecting lilac and forming irregular series or longitudinal lines; the scales of the lower half of the sides silvery at the

root, and minutely dotted with brown; fin-membranes whitish transparent, minutely dotted with brown, rays yellowish white; between the dorsal spines numerous reddish brown round or elongated spots, forming from 3 to 6 oblique series; the margin of the membrane black; between the dorsal rays some rounded smaller spots, forming 4 transversal lines. Iris golden. D 12/14, C 17½, A 3/7 or 8, V 1/5, P 17, Br. VII. Inhabits *Sea of Penang*, Siam, Total length: 1 foot 8⅝ inch. The eye occupies the third seventh of the length of the head when the muzzle is protracted; the length of the opercle is little less than one half of that of the head; it is convex and projects backwards above the anterior half of the pectoral; the mouth is comparatively very small with few teeth; the external series under the symphysis of the upper jaw is a little stronger than the rest; those few in the lower jaw nearest the angle of the mouth are the largest, nearly conical. The length of the second anal spine equals that of the fourth dorsal, the longest, and it is nearly ¾ of the vertical diameter of the body immediately above it. The anterior surface of all the spines is longitudinally furrowed. The caudal fin is covered almost throughout with minute rough scales, so as entirely to hide the short accessory rays; the membrane of the ventrals is scaly; the rest naked. The fish but rarely occurs at Pinang, where it is highly valued on account of its excellent flavour and firmness of flesh. Of four at different times examined, the smallest measured 1 foot 5 inches in length: in external characters all resembled each other except in the number of anal rays, varying from 7 to 8, the last one being double. M.M. Cuvier and Valenciennes describe the specimen discovered by Dr. Finlayson in Siam, with 11 dorsal spines, whereas those from the sea of Pinang present 12. In other characters the latter so perfectly agree with the description, that their identity appears to admit of no doubt.

Genus PLECTORHYNCHUS, *Lacepede*, 1801. (Diagramma, *Cuvier* 1817.) Two minute pores under the symphysis, and two fossets on each branch of the lower jaw; preopercle toothed; lips folded and turned back.

(3686) ***Plectorhynchus Blochii***, (Cuvier & Val.)

Syn. Anthias diagramma, Bloch, Pl. 320.
Sparus diagramma, Shaw, IV. 440, Pl, 65.
Diagramma blochii, Cuvier and Valenciennes, V. 312.

Young. Ground-colour of the head, cheeks, opercles and upper half of the body bright orange, lower half yellowish white; from between the eyes a longitudinal brown band following the back, continuing above the base of the soft dorsal fin; a second from the muzzle above the orbit, dividing in two portions which again unite above the middle of the pectoral fin, and continue straight to the posterior part of the soft dorsal; a third, the broadest, from the eye straight to the root of the caudal; a fourth under and following the course of the latter; a fifth and sixth of lighter brown, from the muzzle to the posterior part of the abdomen; a seventh similar from the gill-opening to the posterior part of the root of the anal fin. The margin of the dorsal membrane black, base and upper part orange, intermediate part milk white; between the root of the third and fourth dorsal spine a black spot; from the point of the second to the base of the eighth spine a broad oblique black band, continuing straight to the middle of the soft dorsal, where it unites with the first band of the body, and thus continues to the posterior part of the fin; caudal orange with scattered irregular black spots; anal and ventrals greyish, posterior part black; pectorals orange with a black band across the root, the centre and the point. Iris golden orange, D. 10/23, C 17½, A 3/7, V 1/5, P 17 Br. VII. Inhabits *Sea of Penang*, Southern coast of Ceylon, Total length: 5⅜ inches. As observed by M.M. Cuvier and Valenciennes, this species differs from *Plectorhynchus lineatus*, [Syn. Seba III. XXVII. Fig. 18,—*Perca diagramma*, Linne, Syst. 1319.—*Anthias diagramma*, Bloch, 101. *Pl.* 9.—*Sciæna lineata*, Lin. Mus. A. F. I. 66.—*Perca lineata*, Linne, Syst. 1310.—*Grammistes lineatus*, Bloch, S. 182.—*Diagramma lineatum*, Cuv. and Val. V. 309,] in the greater length of the second, third and fourth dorsal spines, which equals or even slightly exceeds one half the greatest vertical diameter of the body, and in the comparative shortness of the anterior dorsal spine, which is one third of the length of the second. The first anal spine scarcely exceeds one fourth of the second, which, as well as the third, equals the length of the tenth dorsal spine, and slightly exceeds one third of the greatest vertical diameter of the body. The number of fin rays given by M. M. Cuvier and Valenciennes: D 12/16? A 2/7, appears to be incorrect. In fresh state the prevailing, or ground colours of the fish are orange and yellowish white. In the absence of a detailed description of *Bodian cuvier*, Bennett, (*Fishes of Ceylon*, 13,) the species cannot be determined. If the relative proportions of the dorsal spines as represented in the figure, are correct, the fish would appear to be *P. lineatus*. A single individual was observed at Pinang in 1845.

(3687) ***Plectorhynchus Balteatus***. (Kuhl and Van Hasselt.)

Syn. Diagramma balteatum, K and V. H.Cuv. and Val. V. 316.

Bright yellow and black striped; upper part of the back and sides black: a bright yellow narrow longitudinal band from the occiput to the commencement of the soft dorsal fin, sending a short

vertical portion to the third dorsal spine; a second yellow broader band from above the orbit straight over the posterior part of the soft dorsal; next a black band from the muzzle, through the eye, across the cheek and opercle, straight to the caudal over which it continues; next a yellow band, bordered beneath by a pale bluish black, following the abdomen to the caudal; cheeks and lower half of opercles yellow washed with black; abdomen yellow. Dorsal spines black, the membrane between the three anterior spines yellow, the rest black; the soft part of the dorsal yellow with a black margin, beneath which a broad yellow longitudinal band, next a black, but the lower half of the six or seven posterior rays, yellow, in continuation of the second yellow band of the body. Caudal fin yellow with a broad black margin, and longitudinally divided by a continuation of the central black band of the body. Anal yellow, lower half as far as the fourth ray black. Membrane, spine and three first rays of ventrals black; the rest yellow. Pectorals white. On the centre of the whitish lips a black spot. Iris yellow with a transversal black bar. D 10/23, C 17, A 3/7, V 1/5, P 16, Br. VII. Inhabits *Sea of Singapore*, Java. Total length: 3⅝ inch. The head is contained 4⅔ times in the total length; the eye is situated a little in front of the second third of the head; its diameter is a little less than one third of the length of the head. The greatest vertical diameter of the body is ⅓ of the length, the caudal fin not included. The first dorsal spine is ⅓ of the second, the longest, which slightly exceeds ¾ of the greatest vertical diameter of the body; the third is a little shorter, the fourth equals half the depth of the body; the rest gradually decrease, the tenth equalling the first. The second anal spine is remarkably short and slender, its length scarcely exceeding the first dorsal, the second anal is but little shorter and slenderer than the first. The preopercle is very finely toothed; the opercles terminate in three small membranous points. The caudal fin is nearly rhombic, its length slightly exceeding ⅕ of the total. The pectorals are the shortest fins, their length being contained 6½ times in the total. The intestinal canal is simple, about ⅘ of the total length of the fish; the stomach is elongated pyriform, the coats thickened: it contained minute shells. There are 5 cœcopyloric appendages, their length is nearly one half of the intestinal canal. The air-vessel is elongated triangular, its length about one third of the total; from the sides of both its extremities proceed two lateral short, pointed processes, and six equidistant, shorter ones from each side; its colour is white. A few individuals (the one described the largest), were observed at Singapore in June 1840.

Genus LOBOTES, *Cuvier*, 1829. Muzzle short; lower jaw prominent; preopercle strongly toothed; the elongated rounded soft portion of the dorsal and anal fin, and the caudal giving the posterior part of the body a trilobate appearance; towards the symphysis of the lower jaw four groups of very minute pores. Branchiostegous rays six.

(3688) *Lobotes erate*, Cuvier and Val.

Syn. Lobotes erate, Cuv. and Val. V. 322.
Lobotes farkarii Cuv. and Val. V. 325, (*Young?*)
Lobotes erate Bleeker: Verh. Bat. Gen. XXII. 4.
Ikan batu or Ikan pichat briuk, of the Malays.

Young. Head and body blackish brown, light reddish brown, or brownish green, either uniformly or with large blotches of a lighter or darker shade; soft portion of dorsal and anal fin like the body, membrane black; caudal like the body, black towards the yellowish white margin, membrane of the dorsal and anal spines and ventral brownish or greenish grey, tinged with orange; pectorals yellowish white. *Adult.* Brownish lilac or mulberry coloured, either uniformly, or with large blotches of silvery grey; the scales either of the ground colour with silvery grey edge, or vice versa; pectorals yellowish white; soft portion of dorsal and anal, and the caudal like the body, their terminal half bluish or greenish black; membrane of dorsal and anal spines light brown or grey marbled with blackish; ventrals dark bluish grey; throat, inter and preopercle silvery grey. Iris silvery of the ground colour of the body. D 12/15, C 17⅔, A 3/12 or 11, V 1/5, P 15 or 16, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Java, Madura, Malabar, Ceylon, Bay of Bengal, Estuaries of the Ganges. Total length: 2 feet 5 inch. The young differs from the adult in having the margin of the caudal fin or its posterior third, yellowish white, and in having comparatively fewer but much larger teeth or spines on the margin of the preopercle, particularly towards the rounded angle. As the latter is the principal distinguishing character assigned to *L. farkarii*, Cuv. and Val. it is probable that Colonel Farquhar's drawing, upon which the description is founded represents a young individual of *L. erate*. Single individuals weighing upwards of 15 lbs., occur at Pinang at all seasons, and are dried by the natives. The air-vessel is very large, about ⅓ of the total length, silvery white and of a lanceolate shape. It is excessively thin, and so firmly adhering to the back, that but a small part can be removed. The isinglass is by the Chinese dealers considered to be of good quality, but the small quantity procurable renders the fish less valuable in this respect.

Genus SCOLOPSIS, *Cuvier*, 1817. (Scolopsides, *Telfair*, 1830.) The second infraorbital bone terminating in a rounded lobe

generally toothed, with a backwards directed spine at the angle adjoining the orbit; third infraorbital with a forwards directed spine, in some hid in the skin, crossing the former; preopercle toothed; submaxillary pores either absent or very minute; body oval or oblong with large scales; dorsal fin single; mouth moderate; teeth velvety; branchiostegous rays five.

(3689) *Scolopsis aurata*, (Mungo Park).

Syn. Perca aurata, Mungo Park: Tr. Linn. Soc. III. 35.
Anthias vosmori Bloch, Pl. 321.
Lutjanus vosmeri, Lacepede, IV. 213.
Lutjan galon-d'or, Lacep. IV. 216.
Pomacentrus enneadactylus, Lacep. IV. 505, 508.
Scolopsides vosmeri, Cuv. R. A. II. 178(n.)
Scolopsis argyrosomus Khul and Van Hasselt, Cuv. and Val. V. 333.
Scolopsides vosmeri, Cuv. and Val. V. 333.

Head above red; back pale bluish green; sides light red with two indistinct mother-of-pearl coloured longitudinal bands above the lateral line, beneath which a third broader and distincter, terminating opposite the soft dorsal fin; cheeks, opercles and abdomen reddish white; infraorbitals greenish golden; all the scales, the infraorbitals, preopercle and opercle with vermilion edges; membrane of dorsal, anal and ventrals whitish transparent, spines and rays vermilion; caudal and pectoral membrane and rays pale vermilion. Iris reddish golden. D 10/9, C 17½, A 3/7 or 8 V 1/5 P 19, Br. V. Inhabits *Sea of Pinang*, Java, Sumatra. Total length: 7⅝ inch. The eye occupies the second third of the length of the head, which, when the muzzle is protracted, is ¼ of the total length. The greatest vertical diameter of the body is contained about 2½ times in the total length; the series of scales forming the lateral line are much smaller than the rest and of a triangular shape; the upper lobe of the caudal is somewhat longer than the inferior: the length of the anterior anal spine is one half of the second, which is as long as the pectoral spine, but much thicker. The cheeks are concave, and the ascending margin of the preopercle is salient, diverging from the opercle, its teeth distant, bent outwards, but generally pointing backwards. Most of the teeth have at the base a minute downwards pointed spine, which may be perceived by passing a finger from below upwards along the margin. The spine of the first infraorbital is long, bayonet-shaped; beneath it appear two or three smaller; these, the margin of the infraorbitals, preopercle, opercle, the spines and rays of the dorsal, anal and ventral fins, as well as the upper and lower margin of the caudal appear as if they were lackered with vermillion. Two individuals of nearly equal length were observed at Pinang in May and July 1845.

Fam. ANABANTIDÆ.

Genus ANABAS, Cuvier, 1817. Head rounded, broad; muzzle very short, obtuse, more or less depressed; the eye near the muzzle; mouth small; velvety teeth in both jaws; a small transversal band of similar teeth on the anterior, and a few on the posterior part of vomer between the third upper pharyngeals; margins of opercle, subopercle and interopercle strongly toothed; branchiostegous rays six.

(3690) *Anabas scandens*, (Daldorf.)

Syn. Perca scandens, Daldorf: Linn. Tr. III. 62.
Anthias testudineus, Bloch, Pl. 322.
Lutjan tortue, Lacepede IV. 192, 235.
Lutjan grimpeur Lacepede, l. c. 195 239.
Amphiprion testudineus et scansor, Bloch-Schneider, 204.
Cephalopholis, id. 570.
Sparus testudineus, Shaw, IV. 471.
Anabas scandens, Cuv. R. A. (1817). II. 340.
Coius cobojius, Buchanan Hamilton 89, 370, Pl. 13. Fig. 33.
Anabas testudineus, Cuvier, R. A. (1829) II. 226.
Anabas scandens, Cuv. and Val. VII. 325, Pl. 193.
(Icon.) Anabas spinosus, Gray. Ill. Ind. Zool. II. Pl. 89, Fig. 1.
Anabas scandens, Swainson, II. 237.
Anabas scandens, Cantor: Ann. Nat. Hist. IX. 28,
Anabas scandens, Richardson: Rep. 1845, 250.
Anabas scandens, Jerdon: Madras Journal, XV. 144.
Anabas scandens, Bleeker: Verh. Bat. Gen. XXII. 4.
Harooan of Malays.

Adult. Head above and back dark green, lighter on the sides, abdomen greenish silvery; the membrane between the two largest opercular spines black, forming a rounded spot; dorsal and anal spines and membranes pale greenish lilac, minutely dotted with brown; soft part of dorsal and anal, as well as caudal fin greenish grey. Iris narrow golden round the pupil; the rest golden brown, amber, or pale crimson; the upper half of the orbital margin green bronze. *Young.* Body and the single fins of much lighter colour: at the centre of the root of the caudal a large round black spot; ventral and pectoral rays reddish yellow or pale orange, their membranes transparent whitish. D 18 or 19/9 or 10, C 16⅔, A 10/10 or 11, V 1/5, P 15, Br. VI. Inhabits *Fresh water and estuaries Malayan Peninsula and Islands*, fresh water and estuaries Chusan, Celebes, Java, Madura, Sumatra, Burmah, Tenasserim, Bengal, Assam, Coromandel, Philippines. Total length: 7 inch. At Pinang and Singapore this species is less numerous than in Bengal, and in the former localities large individuals are of comparatively rare occurrence.

The Malayan individuals agree with the Bengal ones in most of the external characters: the length of the head is $\frac{1}{3}$ of the body, the caudal fin not included; the diameter of the eye is $\frac{1}{3}$ of the length of the head. But the caudal fin is comparatively longer varying from $\frac{1}{4}$ to $\frac{1}{5}$ less than the length of the head; the dorsal and anal spines are longer, the ventral rays reach the first anal spine; the greatest vertical diameter of the body varies from $\frac{1}{3}$ to somewhat less than $\frac{1}{4}$ of the total length. Individuals taken in Bengal have the caudal fin $\frac{2}{3}$ of the length of the head; the greatest vertical diameter of the body slightly exceeds the length of the head. The colours are slightly different and the number of fin rays are, D 16 or 17/9 or 10, A 10 or 11/10. In the Malayan countries the fish is eaten by the poorer classes, who, however, attribute to it neither the medicinal qualities nor the climbing propensities, for which it is famed by the natives of Bengal.

Genus MACROPODUS, *Lacepede*, 1820. Velvety teeth in both jaws, with an external series of longer, distant, recurved teeth; margins of infraorbitals and opercles externally smooth: lateral line, when present, interrupted; dorsal and anal rays undivided; dorsal fin of less extent than anal; first ventral and some of the posterior and anal rays elongated, filamentous.

(3691) *Macropodus puguax*, Cantor.

Plate II. Figs. 1, 2, 3.

Head above and back pale brownish or olive grey, lighter on the opercles, sides and abdomen; from between the eyes along the back 8 to 11 blackish vertical bands, reaching the abdomen; along the sides 5 or 6 longitudinal silvery lines, produced by a silvery dot on each of scale; from the angle of the mouth, through the iris to the termination of the opercle a horizontal black band; lips, chin, and throat blackish blue spreading as a horizontal band over the lower part of the side of the head to the gill-opening; dorsal, caudal and ventral membranes pale reddish hemitransparent; margin of the dorsal and the filamentous anterior ventral ray pale golden or silvery green; anal membrane pale Indian red, lower margin silvery bluish or greenish; rays blackish; pectorals whitish transparent. Iris narrow, golden; the half below the black transversal band carmine; the half above the band golden, and near the orbit dark olive. D 1/8 or 9, C 13½, A 2/25 or 26, V 1/5, P 13, Br. VI. Inhabits *Fresh water*, *Pinang*, *Malayan Peninsula*. Total length: 3⅜ inch. The head is much depressed, and far broader than the body, which is gradually compressed towards the caudal fin. The profile of the back is slightly arched, the highest part being at the dorsal spine; the abdominal profile is less arched than the former. The length of the head is $\frac{1}{3}$, or slightly more, of the length of the body, the caudal not included; the depth at the occiput $\frac{2}{3}$ of the length of the head. The eyes are prominent, occupying the second fourth, and bordering on the profile. Their distance across the forehead is nearly double the diameter. The mouth is semicircular, moderate; the angle is in front of the orbit. The posterior opening of the nostrils is situated close to the orbit; the anterior is provided with a small fleshy tube. The tongue is free, fleshy and very pointed. Behind the velvety teeth of the upper jaw appear successively three semicircular membranous folds, of which the posterior is papillular on the margin, which thus appears as if studded with a second series of minute teeth. The head is everywhere covered with large rounded scales like the rest of the body, but the slightly protractile jaws are naked; the posterior part of each branch of the lower jaw is covered by a single large oval scale. The greatest vertical diameter of the body, at the dorsal spine, is in some individuals $\frac{3}{4}$ of, in others equal the length of the head. The vertical diameter at the root of the caudal fin varies from 5½ to $\frac{1}{6}$ of the length of the body. The dorsal fin commences a little behind the posterior half of the body; the rays gradually increase towards the fifth, the longest; the extent of the base is from $\frac{1}{3}$ to $\frac{1}{2}$ of the length of the body; the distance from the last ray to the caudal is $\frac{1}{4}$ of the length of the body. The caudal is very broad lanceolate; the two central rays are the longest, in some individuals $\frac{1}{5}$ of the entire length of the fish, but frequently less. The length of the anterior filamentous ventral ray rarely exceeds that of the head. The pectorals are rounded, their length but slightly exceeds $\frac{1}{2}$ of the head. Opposite their posterior half is situated the anus, immediately behind which the anal fin commences. The rays of the latter gradually increase in length to the twenty-third or fourth, which are sometimes elongated beyond the point of the caudal fin. The extent of the scaly base of the anal equals $\frac{1}{2}$ of the length of the body. No lateral line appears, but on the series it would occupy if present, some of the anterior scales have each a central rounded depression, which, however, also appears of single scales near the back. Three series lower down, on the posterior half of the sides, commences sometimes a row of similar depressions, which then continue to the caudal fin. The scales are rather large, higher than long; the anterior margin is straight with 21 striæ, the posterior round, ciliate; a line from the gill-opening to the caudal fin contains 32; the greatest vertical diameter presents 10. Of the six branchiostegous rays the upper one is longer and broader than the rest; the fifth and sixth are rounded, setaceous. Œsophagus is voluminous, short, suddenly widening into the rounded capacious stomach. The intestinal canal is doubled upon itself, about $\frac{1}{7}$ of the length of the fish. Neither cœcopyloric appendages nor air-vessel

appear. The liver is elongated of a reddish yellow. The skeleton has 28 vertebræ of which 10 are abdominal. The branchial labyrinth (Plate II. Fig. 2.) is still more reduced than it is in *Macropodus viridi-auratus*, Lacep. and almost as simple as in *Spirobranchus capensis*, Cuv. (Cuv. Val. VII. 392, Pls. 200 and 205.). It consists of a single backwards bent lamina, and a very small posterior rudimentary one. At the foot of the hills at Pinang this species is numerous in rivulets. Like the rest of the family it is capable of living for sometime out of water. The Siamese inhabitants with whom this species is a great favourite, keep these fishes in jars with water, where the larva of musquitoes is their food, and denominate them "*Pla kat*," *Pla*, fish; *kat*, a fighter. The Variety is noticed by Lieut. Colonel Jas. Low. i. e. the fighting fish, although they live peaceably together. The real fish however, the exhibition of whose combats is a popular amusement with the Siamese, appears to be a variety of the present species, produced by artificial means, like the varieties of the golden carp of China.

(3692) *Macropodus pugnax*, *Var.* Plate II. Fig. 4.

Pla kat of the Siamese.

Head above and back dark greenish olive, lighter on the sides, the lower part of which and the abdomen deep blood red; all the scales edged with black; a black longitudinal band from the eye to behind the dorsal fin, a second from the nostrils, through the iris to the root of the caudal; a third from below the eye obliquely downwards to the gill-opening; dorsal membrane silvery greenish brown with numerous black undulating lines, vertically intersecting the black rays; caudal membrane golden green, the rays bright blood red, the fin edged with black; anal membrane bright blood red as far as the posterior 4 or 5 rays, the rest as well as the lower margin silvery light green or sky-blue, the rays black; ventral spine and rays black, the first ray terminating in a silvery filament; the membrane between the first, second and third ray bright blood red, the rest black; branchiostegous rays and their very wide membrane black; pectorals white, transparent. Iris pale reddish golden with a bluish black spot in the centre of the lower half. The number of fin rays, and other external characters are the same as in the species, but the colours and the length of the dorsal, caudal, anal and ventral fins are individually varying. The branchiostegous membrane is remarkably wide and lax. When the fish is in a state of quiet with the fins at rest, the dull colours present nothing remarkable. But if two are brought within sight of each other, or if one sees its own image in a looking glass, the little creature becomes suddenly excited, the raised fins and the whole body shine with metallic colours of dazzling beauty, while the projected gill membrane, waving like a black frill round the throat, adds something grotesque to the general appearance. In this state it makes repeated darts at its real or reflected antagonist. But both when taken out of each other's sight, instantly become quiet. The description was drawn up in 1844 at Singapore, where a gentleman had been presented with several by the King of Siam. They were kept singly in glasses with water, fed with larvæ of musquitoes, and had thus lived for many months. The Siamese are as infatuated with the combats of these fishes as the Malays are with their cock fights, and stake considerable sums, and sometimes their own persons and their families. The license of exhibiting fish fights is farmed, and affords a considerable annual revenue to the King of Siam.

Genus OSPHROMENUS, (*Commerson*) *Cuvier*, 1829 (OSPHRONEMUS [*Comm.*] *Lacepede*, 1800.) Differs from *Polyacanthus*, Kuhl and Van Hasselt, by the shorter extent of the dorsal fin, by the more complicated labyrinthform (superbranchial) organ, by the very elongated, setaceous first ventral ray, and by the toothed margin of the infraorbitals. In the young, the margin of pre- and interopercle are toothed.

(3693) *Osphromenus olfax*, Commerson.

SYN. Osphroneme gourami, Lacepede, III. 117, Pl. 3, Fig. 2.
Trichopus goramy, Shaw, IV. 388, Pl. 55,
Trichopus satyrus, Shaw, l. c. 391, Pl. 35?
Osphronemus olfax, Hardwicke: Zool. Journ. Vol. IV. 309.
Osphromenus olfax, Cuvier, R. A. II. 228.
Osphromenus olfax, Cuv. and Val. VII. 377, Pl. 198.
Osphromenus notatus, Kuhl and Van. Hasselt. (*Young?*) Cuv. and Val. VII. 386.
Osphromenus olfax, Swainson, II. 236.
Osphromenus olfax, Richardson: Rep. 1845, 251.
Osphronemus olfax, Bleeker: Verh. Bat. Gen. XXII. 4.
Ikan gorammi, of the Malays.

Young. Head above and back dark brown or olive, lighter greenish on the sides of the head and body to a little above or below the lateral line; lower parts of the sides of head and body, and abdomen silvery brownish or reddish buff; from the occiput to the caudal 7 to 9 oblique blackish bands; at the root of the pectorals, and in the penultimate lateral band, a little in front of the termination of the anal, a black spot; pectorals and posterior half of ventrals whitish, the rest and the membranes of the other fins closely and minutely dotted with brown; spines and rays brownish grey. *Adult.* Head, back and upper part of the sides reddish or greenish dark brown; opercles and lower half of the sides impure yel-

lowish white; lateral bands very indistinct; fins greyish brown, ventrals and pectorals paler than the rest; iris reddish golden with scattered black spots. D 13/1; 10/10; 13/12; C 16½, A 9/28; 10/30; 11/19; 12/20; V 1/5, P 15, Br. VI. Inhabits (*Naturalised*) *Fresh water, Pinang, Malacca*, China, Java, Madura, (*Naturalised*) Isle of France, Cayenne. Total length: 1 foot 6 inch. The very young individuals differ from the adult not only in colour, but also in having the head more elongated: its length being from 2½ to 2⅔ in that of the body, the caudal not included. In the adult the head is 3¼ in the body alone, the toothed margin of the pre- and inter-opercle becomes smooth, and the first ventral ray is comparatively shorter than in the young, in which it sometimes reaches the caudal fin. Both at Pinang and at Malacca this fish has been successfully naturalised though in the former place it is not numerous, but confined to a few ponds. They become tame so as to appear on the approach of their feeder, and will rise to flies, beetles, and certain flowers, particularly a large *Hibiscus*. Among themselves they are pugnacious. Many years ago several living ones were imported, and placed in a tank in the Calcutta Botanical Gardens, where they appeared to thrive. Little care, however, having been bestowed on their preservation, but a solitary one survived in 1841.

Genus TRICHOPODUS, *Lacepede*, 1809. Scarcely differs from *Osphromenus* but by a more convex forehead, and by a dorsal fin of less extent. Although to these differences may be added a less complicated labyrinth-form organ, and five branchiostegous rays, the genus rests but on slender characters.

(3694) *Trichopodus trichopterus*, (Pallas.) Plate II. Fig. 5. (Head.)

SYN. Sparus Koelreuter. Nov. Comm. Petrop. IX. P. 452 Pl. 9. Fig. 1.
Labrus trichopterus, Pallas: Spicil, Fasc. 8, 45.
Labrus trichopterus, Linne: Syst. 1286.
Trichopode trichopotere, Lacepede, III. 129
Trichogaster trichopterus, Bloch-Schneider, Pl. 295, Fig. 2.
Trichopus pallasii, Shaw, IV. 392.
Trichopus trichopterus. { Cuvier, R. A. II. 229(1.) / Cuv. and Val. VII. 388, Pl. 199.
Trichopus maculatus, Swainson. II. 235.
Trichopus trichopterus, Bleeker; Verh. Batav. Gen. XXII. 4.

Head above, back and sides to a little below the lateral line brownish olive, each scale of the latter with a sky-blue or verdigris rectangular spot; cheeks and opercles silvery light blue with lilac reflection; sides below the lateral line silvery light blue, abdomen silvery reddish lilac, all the scales iridescent, edged with reddish brown forming an irregular network; from the angle of the mouth through the iris, below the silvery lateral line to the root of the caudal a black zig-zag band, widening at the termination into a large spot, and in some individuals a similar in the centre part of the band; dorsal spines and rays whitish grey, their membrane dark grey with numerous white rounded spots; caudal membrane and rays like the dorsal; anal spines carmine, their membrane and rays whitish, each ray terminating in a short silvery filament; ventral spine, membrane and four rays whitish, the anterior elongated ray carmine; pectoral pale carmine at the root, the rest white transparent. Iris narrow golden round the pupil, lower half sky blue, upper half above the black bar golden brown. D 6/9; 7/8: 7/9; 7/10, C 16½, A 10/34; 12/29; 13/29; 14/28, V 1/5, P 9, Br. V. Inhabits *Fresh water, Pinang, Malayan Peninsula*, Moluccas, Madura, Java. Total length: 4⅜ inch. Like all the species of this family, the present is liable to considerable individual variations of colours, number of fin rays and proportions. Thus M.M. Cuvier and Valenciennes count: D 5/8, C 16, A 11/35 or 36, V 5, P 14, Br. IV. and ask with doubt if the species be different which Bloch characterises: D 7/7, C 16, A 1/33, V 3, P 10, Br. IV. With regard to the number of branchiostegous rays, it is *five* on each side; the superior is the longest and broadest, the rest gradually decrease in length and breadth. They are difficult to count as the second is completely hid under the first, and the fourth and fifth are very thin, setaceous, and may thus easily be mistaken for a single one. The ventral spine is very short, and thick, but so firmly adhering to the root of the first elongated ray, that it easily escapes observation. The short, gradually decreasing 2d, 3d, 4th, and 5th ray are divided, but the latter is frequently undivided. The length of the head varies in individuals of equal length from 3½ to 3⅓ in that the body, the caudal fin not included. The latter is a little shorter than the head, the vertical diameter of which at the occiput, equals the length. The diameter of the eyes is 3½ times in the length of the head; their distance across the forehead is 1½ diameter. The anterior smaller opening of the nostrils has a short membrany tube. The mouth is small and rendered more so as the lower jaw forms a much smaller half circle than the upper. Both have a narrow band of velvety teeth. The tongue is small, fleshy, and its margin completely adhering to the floor of the mouth. The greatest vertical diameter of the body at the fourth dorsal spine varies from 2⅖ to 2⅔ in the length of the body, the caudal fin not included. The distance from the last dorsal fin to the upper caudal appears to be constantly equal the length of the head. The longest dorsal, caudal and anal rays seldom exceed the length of the head, but are frequently a little shorter. The first ventral ray in some

reaches the termination of the anal, in others beyond that of the caudal. The anal rays are either all undivided or a few of the posterior are divided, and the last connected to the caudal. The length of the pectoral is ¾ of that of the head. The lateral line consists on each scale of a central transversal tube, above and below which appears a short elongated furrow. A straight line from the gill-opening to the root of the caudal contains from 44 to 46 scales; a vertical at the deepest part of the body from 2[illegible] to 25. The lower margin of the infraorbitals and of the preopercle are closely and rather strongly toothed. The stomach is rounded, contracted in the middle, and as well as the spirally twisted intestines almost entirely hid by the large light brown liver. There are two rather long cœcopyloric appendages. The gall-bladder is rather large, the spleen small. Between the vertebral column and the abdominal cavity appears a very short air-vessel, silvery like the peritoneum, but much thinner. The intestinal canal is nearly double the length of the fish. The labyrinth-form organ (Plate II. Fig. 5,) is less complicated than in *Osphromenus olfax*: it consists of three laminæ of which the central is the largest, entirely hiding the third, the inner one. Like the rest of the family, this species is capable of sustaining life out of water, particularly if kept in wetted fresh leaves, or occasionally sprinkled with water. At Pinang it is numerous in streamlets and ponds, where it is eaten by the poorest classes. The exquisite beauty of the metallic irridescent colours make these fishes acquisitions in garden tanks. Like *Osphromenus olfax* they are very pugnacious among themselves. A second species of *Trichopodus* has been discovered by Mr. Campbell, Superintendant of Darjeeling, in the rivers at the Sikkim passes on the northern frontier of Bengal. An incorrect and defective description and figure have been published by Mr. McClelland, who imagining the fish to belong to the Family of *Chætodontidæ*, and the genus to be new, denominated it *Ctenobs nobilis*. Cal. Journ. Nat. Hist. V. 281, Pl. 21, Fig. 1.

Genus OPHIOCEPHALUS, *Bloch-Schneider*, 1801. With labyrinth-form superbranchial organ; fins without spines, the ventrals commencing with a divided or undivided, joined ray; dorsal occupying nearly the whole length of the back; caudal rounded; lateral line uninterrupted; head depressed, covered with polygonal scales; both jaws, vomer and palatal bones with velvety, or card-like teeth, among which generally some longer than the rest; body elongated, almost cylindrical. Branchiostegous rays five.

(3695) *Ophiocephalus striatus*, Bloch.

Syn. Ophicephalus striatus, Bloch, Pl. 359.
Ophicephalus wrahl, Lacepede, III. 552.
Ophicephalus striatus, Shaw, IV. 530.
Russell, CLXII. Muttah.
Opicephalus wrahl ? Buch. Ham. (*"Sol."*) 60, 367, Pl. 31, Fig. 17.
Ophicephalus cheta, Buch. Ham. (*Kur.*) 62, 367.
Ophicephalus striatus, Cuv. Reg. A. II. 230. (s.)
Ophicephalus striatus, Cuv. and Val. VII. 417, Pl. 202.
Ophicephalus striatus, Swainson, II. 237.
Ophicephalus wrahl, McClelland, Cal. Journ. Nat. Hist. II. 575.
Ophicephalus striatus, Jerdon. Madr. Journ, XV. 146.
Ikan haruan of the Malays.

Head above and back greenish olive with indistinct clouded black spots; cheeks, opercles and sides to a little beneath the lateral line lighter with metallic lustre; throat, abdomen and lower part of the head and sides white; from the angle of the mouth a short metallic-olive oblique line, and on the throat a few distant dark spots; lower part of sides with a number of backwards directed oblique, blackish lines, the intervals between which pale salmon-coloured; dorsal membrane minutely dotted with brown so as to produce oblique brownish lines, between which, at the base, appear some rounded whitish spots; caudal pale brownish with indistinct light concentric lines; upper half of anal white with oblique brown lines; lower half blackish brown; ventrals white with indistinct blackish spots; pectorals transparent whitish, minutely dotted with brown along the margins of the rays. Iris amber-coloured, orange or reddish golden round the pupil, the rest golden olive, clouded with black. D 41, 42 or 43, C 14½, A 25, 26, or 27, V 6, P 16 or 17, Br. V. Inhabits *Fresh water and estuaries, Malayan Peninsula and Islands*, Manilla, Celebes, Tenasserim, Rangoon, Irawaddy, Ganges, Bengal, Barrampootr, Goalparah, Coromandel, Malabar, Hindoostan. Total length: 2 feet. The length of the head is from 3½ to 3⅔ in the total; (it is ⅓ of the distance from the muzzle to the last dorsal ray;) the height at the occiput is 2⅓ in the length. The horizontal diameter of the eyes slightly exceeds ⅛ of the length of the head; their distance across the forehead equals two such diameters. The vertical diameter at the first dorsal ray is ½ of the length of the head. The anterior part of the lateral line gradually descends towards the commencement of the second third of the dorsal, from whence it proceeds straight to the root of the caudal. The line is marked on each scale by a short central tube, which bifurcates. The number of component scales vary from 60 to 62. An oblique series from the anus consists of 18 to 20 scales. In these and other characters the Malayan individuals exactly correspond to *O. striatus*, Bloch, as described by M.M. Cuvier and Valenciennes. Individuals of *O. wrahl?* apud Buchanan Hamilton, (*Sol.*)

taken in the vicinity of Calcutta, differ but slightly in colours, and in presenting from 43 to 46 dorsal, and from 26 to 28 anal rays. *O. chena*, Buch. Ham. offers the same number of rays as the latter, and appears but to be another variety, probably as Buchanan suggests, the identical one which Russell figured No. CLXII. *Muttah*. In the Malayan countries, the fish is as numerous as in Bengal, and it is also there eaten by the natives.

Fam. MUGILISIDÆ.

Genus MUGIL, (*Artedi,*) *Linne*, 1748. Body nearly cylindrical, covered with large scales; two dorsal fins widely separated: the anterior spinous, the posterior with one or two spines, the rest rays; ventrals behind the pectorals; centre of the lower jaw with an elongated angular point, corresponding to a notch in the upper jaw; teeth minute. Branchiostegous rays six.

(3696) *Mugil parmatus*, Cantor. *Young?* Head above and back pale brownish olive; cheeks and upper half of the sides silvery greenish grey; lower half of the sides and abdomen silvery white; on the upper part of preopercle a triangular bluish black spot, behind which an indistinct amber-coloured spot; the rest of preopercle and opercle pale silvery blue, faintly vermiculated with brown; dorsal and caudal membranes pale grey, minutely dotted with brown; the rest of the fins white. Iris silvery grey. D 4—1/8, C 14 ½, A 3/9, V 1/5, P 14, Br. VI. Inhabits *Sea of Penang*. Total length 4⅝ inch. The length of the head is 4⅔ in the total, or ¼ of the length of the body, the caudal not included; the height at the occiput ⅖ of the length of the head. The orbit occupies the second fourth of the head; the eye is covered in front and behind by a crescent-shaped adipose lobe; the distance of the orbits across the forehead equals 1½ diameters. On the anterior margin of the infraorbital bone appears a broad angular incision, which receives the angle of the lips; the inferior margin is truncated, minutely toothed; near the upper margin of the infraorbital, below the two small openings of the nostrils, appear two minute pores. The mouth is very small; both jaws have excessively minute setaceous teeth, scarcely projecting beyond the cartilaginous lips. The greatest vertical diameter of the body, in front of the anterior dorsal spine, equals the length of the head; that in front of the caudal fin is ½ of the former. A straight line from the gill-opening to the caudal contains 27 scales, an oblique series 10. The anterior dorsal spine is strong: its length is a little less than ¾ of that of the head; no elongated triangular scale appears at the base of the anterior dorsal, nor of the pectoral. The second dorsal, the caudal and anal fins are half covered with very small scales. The first anal spine is excessively minute. The two central rays of the caudal are but very slightly shorter than the rest. A single individual was observed at Pinang in April 1844. The present greatly resembles *M. grandisquamis*, Cuv. and Val. (XI 103), an African species, remarkable for the great size of its scales. The latter differs in the following particulars. The greatest height is nearly ¼ of the total length; at the occiput the height is ⅓ of the length of the head; at the root of the caudal it is one half of the greatest. It is described as having no teeth.

(3697) *Mugil macrolepidotus*, Ruppell.

Syn. Muge christian, Quoy et Gaimard: Voy. de Freycinet.
Mugil macrolepidotus, Ruppell: Atlas, Fische, p. 140, Taf. 32, Fig. 2.
Mugil macrolepidotus, Cuv. and Val. XI. 134.
Mugil macrolepidotus, Richardson: Report, 1845, 249.

Young. Head above and back pale bluish green; lighter, silvery, on the sides of the head and abdomen; opercle steel blue; on the sides four parallel pale blackish lines; dorsal, caudal, and anal spines, rays, and membranes minutely dotted with black; on the dorsals and anal so closely as to give the marginal half a black appearance; ventrals white, posterior half of the three anterior rays minutely dotted with black; upper ten pectoral rays black, the rest white. Iris silvery. D 4—1/8, C 14½, A 3/8, V 1/5, P 16, Br. VI. Inhabits *Sea of Pinang*, Waigiou, Rawak, Borabora, Vanikolo isles, Malabar, Red Sea, China Seas? Total length: 5 inch. The length of the head is 4⅓ in the total; the height at occiput ⅓ of the length. The diameter of the eyes is 3½ in the length of the head; their distance across the forehead equals two diameters. The anterior margin of the infraorbital bone is arched, so as to receive the angle of the lips and as well as the inferior truncated margin finely toothed. The young has no perceptible teeth; M.M. Cuvier and Valenciennes describe them as short and fine in the adult. The posterior margin of the preopercle has three deep indentations. The vertical diameter in front of the first dorsal spine slightly exceeds ¼ of the total length; that in front of the caudal fin is less than one half of the former. A straight line between the gill-opening and the root of the caudal contains 29 scales; an oblique series in front of the anterior dorsal fin 9. The first dorsal spine is scarcely ⅓ of the length of the head, and less strong than in *M. parmatus*. A single individual was observed at Pinang in August, 1843.

(3698) *Mugil cephalotus*, Cuv. and Val.

Syn. Mugil our, Forskal, Consp. p. XIV. No. 109, Var. 8?
Mugil cephalus, Russell CLXXX. Bontah.
Mugil cephalus? (Sole bhanggan), Buchan. Ham. p. 219, 381.
Bontah, Russell. (Syn.—Mugil our, Forsk.) Cuvier R. A. II. p. 232 (1).
Mugil cephalotus, Cuv. and Val. Syn.—Mugil our, Forskal) XI. 110.

Russell II. CLXXX. Ruppel: Nepe Wirbelth. Fische, p. 131.
Mugil cephalotus, Bleeker, Verh. Bat. Gen. XII. 5.
Jumpul of the Malayas.

Head above and back lead-coloured tinged with green, lighter silvery on the sides of the head and body as far as the upper margin of the pectoral fins; all the parts below dull silvery white; on the sides five to seven parallel, dark grey longitudinal bands; anterior dorsal fin light bluish grey; posterior and caudal membrane dark grey, rays lighter; anal and ventrals white; pectorals outside white, semi-transparent, inside with a large oblique blackish spot on the anterior half. Iris silvery or mother-of-pearl round the pupil; the rest blackish brown. D 4—1/8, C 14⅗, A 3/9, V 1/5, P 17, Br. VI. Inhabits *Sea of Penang*, *Malayan Peninsula*, *Singapore*, *Lancavy Isles*, Chusan, Macao, Maderia, Coromandel, Bay of Bengal, Gangetic estuaries, Malabar. Total length; 2 ft. The head is much depressed, broad oval, the muzzle being about half the breadth of the occiput. The upper surface is less transversely arched than the lower; both surfaces where they join, form a blunt ridge from behind the eye to the short triangular membranous point in which the opercle terminates. The eye is situated in front of the ridge, occupying the third eighth of the head; its transversal diameter being ⅓ of the length of the head, which is 4½ times in the total, or ¼ of the body, the caudal fin not included. The distance between the eyes across the forehead equals 3¾ diameters. The vertical diameter of the head between the eyes is about ⅓ of the length: at the occiput it is ½. The openings of the nostrils are situated a little above the level of the orbit, along the superior margin of the infraorbital; the posterior, the larger, is transversely oval; the anterior is circular. The infraorbital bone is broad triangular, with the rounded, truncated apex downwards; the latter, as well as the backwards arched anterior margin, is finely but distinctly toothed, and naked, but the rest of the external surface is covered with small scales. The adipose membrane covering the circumference of the eye is of a whitish grey. No such series of pores appear on the lower half of the membrane, as M. Ruppell has observed in *Mugil oür*, Forskal (*not* apud Cuvier and Val.), nor are there any pores under the lower jaw. The lower half of the posterior margin of the preopercle has two large, a little obliquely upwards-directed indentations, and in some the upper half of the margin has two similar ones. *M. oür* as well as *M. cephalus* are according to M. Ruppell distinguished by six pores beneath the lower jaw, and by three not very distinct oblique indentations in the lower margin of the preoperculum. The mouth is horizontal, the angle is opposite the anterior opening of the nostril; the upper jaw projects beyond the lower. The upper mandible is flattened, broad in the centre, tapering towards the angles of the mouth; in the centre is a very small notch. In the upper lip appears a single series of very minute teeth. The symphysis of the lower jaw forms a tubercle under which appears a notch deeper than that of the centre of the upper mandible. The lower lip is more fleshy than the upper, and the margin is bent downwards, so as to form on each side a furrow proceeding from the notch under the symphysis to the angle of the mouth. The teeth of the lower jaw are so excessively minute, few, and distant, that even in large individuals they are imperceptible to the touch, and can only be seen through a lens. In smaller individuals these teeth are absent, or at least confined within the half transparent mandibles, and appear like short seta, bent with the lip, but not projecting beyond it The tongue is fleshy, broad at the root, narrower, rounded at the apex, and raised in a keel in the centre. Along the margin which is fixed to the floor of the mouth, appears a series of rounded or oval patches of velvety teeth. At the root of the central keel is an elongated patch, and close behind the apex two smaller ones of velvety teeth. On each side of the vomer is raised into a tubercle, carrying a transversely placed linear patch of similar teeth. Every part of the head is covered with scales, of which those of the opercle are very large, but in young individuals they are so thin as to make the silvery opercle appear scaleless. The vertical diameter in front of the anterior dorsal spine equals the length of the head minus the diameter of the eye. The anterior dorsal spine equals the distance from the muzzle to the posterior margin of the orbit, or about ½ of the last mentioned vertical diameter. The anterior dorsal fin commences in the centre of the distance between the muzzle and the root of the caudal. The extent of the base equals the length of the anterior spine; from its centre commences an elongated, triangular scale, projecting midway behind the very slender fourth spine, the length of which is ½ of the preceding three. The distance between the anterior and posterior dorsals equals ⅓ of the length of the head, the latter fin commencing opposite the centre of the anal, much nearer the caudal than the anterior dorsal. The anterior ray equal ¼ the length of the head. The distance between the posterior ray and the root of the caudal equals the length of the anterior dorsal spine. The posterior margin of the caudal fin is but slightly furcated, the inferior lobe is a little larger than the upper. The anal fin commences about halfway between the termination of the ventrals and the root of the caudal fin. Its height equals, its extent slightly exceeds the second dorsal. The two anterior spines are so completely covered by

scales, that they escaped the observation of Russell, whose figure (CLXXX.) represents the third much too long: it exceeds but slightly ½ of the anterior ray. The length of the pectoral fin is 7½ in the total, or nearly equal that of the caudal. Above the root of the pectoral appears no trace of an elongated triangular scale, as in some other species, but in the axilla, hidden by the fin, are two elongated oval scales, much smaller than the rest. The ventral fins are a little shorter than the pectorals: the spine is strong and but slightly shorter than the anterior dorsal. At the base of each fin appears an elongated triangular scale, and a similar, but shorter and broader between the two fins; the anterior half of the fifth ray is attached to the abdomen by a membrane. A straight line between the gill-opening and the root of the caudal fin contains from 33 to 35 scales, an oblique series in front of the anterior dorsal 11 or 12. The scales are very large, nearly as broad as long; the anterior margin is straight, but with from 2 to 6 crenulations, produced by a number of radiating lines, varying in number from 3 to 7. The posterior margin is rounded and with excessively minute points, the termination of a very fine concentric net-work on the exposed surface. Each scale is marked by a fine central line, horizontal in most, but pointing obliquely downwards on the scales immediately beneath the root of the pectoral fins. The stomach is composed of two portions: the cardiac into which the short capacious œsophagus opens, terminates in an elongated cylindrical fundus; the pyloric portion is shorter, globular like a large button, and very thick, gizzard-like. The cavity is very small and presents a few coarse longitudinal folds. In several examined, it contained some mud, mixed with green mucus. Pylorus is surrounded by five short but capacious cœcopyloric appendages. The intestinal canal, about 7 times the length of the fish, is folded several times upon itself and firmly enveloped in fat. The gall is rather large, ovoid with a short duct opening close to Pylorus. The liver is moderate, resting across the stomach, with several lobes, of which the longest is attached to duodenum. The spleen is small, elongated, completely hidden by the fat between the folds of the intestines. The abdominal surface of Peritoneum is black, the opposite silvery. The air-vessel is large, elongated, its parietes very thin, pearl-coloured. At Pinang this species occurs, though not numerously, at all seasons, and when newly taken it is highly valued for its excellent flavour. The present is the fish supposed by Russell to be *Mugil cephalus*, Linn. (Vol II. p. 64.) The figure, (CLXXX. *Bontah*,) among other inaccuracies represents the mouth without teeth, and the anal fin with a single, too long spine. The latter, as well as the margins of the scales being entire, (as they in reality appear to the naked eye,) induced Buchanan Hamilton to consider the individuals which he obtained from the estuaries of the Ganges, to be a distinct species, and also he overlooked the minute teeth in the lips. MM. Cuvier and Valenciennes (T. XI.) unite both under the denomination of *M. cephalotus*. They doubt, however, without reason, the correctness of Russell's omitting to figure, and Buchanan to mention, any elongated triangular scale above the pectoral fins, and they believe that the fish is identical with *Mugil our*, Forskal, (*Descr.* p. XIV. No. 109, *Var.*, and characterised: "Labio utroque ciliato, inferiori unicarinato, oculis pinguedine fere obtectis, operculo macula p. p. oblonga obliqua.") Dr. Ruppell, (*Neue Wirbelth, &c. Fische*, p. 131,) observes that if Russell's description of "*Bontah*," as being "without teeth" is correct, the fish cannot be identical with *M. our*, the microscopical teeth of which Forskal expresses by the word "ciliato." It is to be regretted that Dr. Ruppell did not communicate a more detailed description of the fish from the Red Sea, which is most likely Forskal's species, for although Russell happens to be incorrect, the fish he described presents neither the six-pores under the lower jaw, nor the arched series of pores in the adipose membrane, covering the lower part of the eye, which Dr. Ruppell points out as characters distinguishing *M. our*. It is therefore impossible with certainty to determine if the latter is identical with the present species.

(3699) *Mugil cunnesius*, Cuv. and Val.

Syn. Russell CLXXXI. Kunnesee.
Mugil kunnesee, Cuvier R. A. II. 232 (1.)
Mugil cunnesius, Cuv. and Val. XI. 114.
Mugil cunnesius, Ruppell: Neue Wirbelth. Fische, 131.

Young. Head above and back silvery bluish green, lighter, minutely dotted with black on the upper half of the sides; lower half and abdomen silvery white; sides and abdomen with parallel silvery lines, produced by a short line on each scale; cheeks and opercles shining silvery, the latter with steel-blue reflections; fin-membranes white, those of the dorsals and caudal minutely dotted with black, particularly towards their margins, so as to make them appear blackish; in some a black spot at the root of the upper pectoral ray, continued in the axilla as a blackish line. Iris silvery round the pupil, the rest dotted with black. D 4—1/8, C 14 5/4, A 3/9, V 1/5, P 16 or 17, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Moluccas, Bay of Bengal, Coromandel, Malabar, Red Sea. Total length: 6½ inch. The length of the head is ¼ of the body, not including the caudal fin. The height at the occiput is about ⅘ of the length of the head. The eye occupies the second fourth of the head; the diameter, not including the adipose covering, is ⅕ of the head; but the diameter of the orbit is ¼ of the head;

the distance across the forehead is $\frac{1}{2}$ diameter. The infraorbital is triangular, with the apex truncated, slightly rounded and finely toothed; the anterior margin is nearly straight, neither toothed nor notched. The anterior opening of the nostril is minute, circular; the posterior a little larger, transversely oval, both situated along the upper margin of the infraorbital. The mouth is small, the lower jaw but little shorter than the upper; the angle is situated opposite the anterior opening of the nostril. The notch of the upper lip corresponds to the tubercle of the lower, which is notched underneath. There are no teeth perceptible in the lips. On each side of the vomer appears a transversal tubercle. In the young the opercles appear to be scaleless. The vertical diameter in front of the first dorsal spine equals the length of the head. A straight line from the gill-opening to the root of the caudal fin contains 42 or 43 scales; an oblique in front of the anterior dorsal fin 13. Each scale is marked by a central line, horizontal in most, but almost vertical in those immediately below and in front of the pectoral fins. The third dorsal spine is situated at equal distance from the muzzle and the root of the caudal fin. The length of this, as well as of the two preceding spines, exceeds $\frac{1}{2}$ of the vertical diameter of the body beneath them, and it also slightly exceeds the extent of the base of the fin itself. The fourth spine is about $\frac{1}{2}$ of the preceding three. On each side of the base is an elongated scale. The second dorsal fin commences at equal distance from the first dorsal spine and the root of the caudal, opposite the third anal ray; the base nearly equals the length of the first ray. The caudal fin is slightly lunated: the length of the first and fourteenth ray is about $\frac{1}{5}$ of the total length. The length of the pectoral fins is $5\frac{1}{2}$ times in the total; above the root of each appears an elongated scale, formed like a knife-blade with the back towards the upper margin of the fin; its length is nearly $\frac{1}{2}$ of that of the fin. At Pinang young individuals are numerous at all seasons.

(8700) *Mugil borbonicus*, Cuv. and Val.

Mugil borbonicus, Cuv. and Val. XI. 113.

Young. Head above and back bluish green; lighter silvery on the upper half of the sides; lower half abdomen and cheeks silvery white; opercles shining silvery; anterior dorsal fin-membrane transparent minutely dotted with black; first spine blackish; posterior dorsal, caudal, anal and pectoral pale yellow, minutely dotted with black; spine and upper half of the first ray of second dorsal, and the upper, lower, and posterior broad margin of caudal black; at the root of the upper pectoral ray a black spot continued over the anterior half of the inside of the pectoral; ventrals white. Iris silvery round the pupil, blackish green towards the orbit. D 4—1/8, C $14\frac{1}{2}$, A 3/9, V 1/5, P 17, Br. VI. Inhabits *Pinang River*, Bourbon. Total length 6 inch. The length of the head is $\frac{1}{4}$ of the body, the caudal fin not included; the height at occiput $\frac{1}{3}$ of the length. The eye occupies the second fourth of the head; the diameter of the orbit is $\frac{1}{3}$ of the length of the head; the distance between the eyes across the forehead is $\frac{1}{3}$ diameter. The infraorbital is triangular, covered with small scales, and with three pores placed obliquely in the middle of the external surface; the anterior margin is finely toothed, and slightly arched, but becomes a little concave towards the truncated, finely-toothed apex. The superior margin is somewhat angular in the centre, on each side of which appear the openings of the nostrils. The mouth is small, transversal; the angle is situated opposite the posterior opening of the nostril; the lower jaw is but slightly shorter than the upper. There are no visible teeth in the lips; the lower has in the centre a strong tubercle which in front and beneath is deeply furrowed. On each side of the vomer appears a strong transversal ridge. Under each branch of the lower jaw appear three pores. The preopercle is covered with large very thin scales, and has a long transversal incision in the posterior margin, near the angle; the opercle and subopercle are apparently without scales, and brilliantly shining with silver. Nearly all the scales of the occiput are divided lengthwise by a shallow furrow, which on the scales of the body becomes a short longitudinal line. But the scales immediately below the pectoral fin are each marked near the root by a short vertical line. A longitudinal series between the gill-opening and the root of the caudal consists of 39 scales; an oblique in front of the anterior dorsal fin of 14. The vertical diameter in the latter place is $4\frac{1}{2}$ of the total length. The length of the three anterior dorsal spines is about $\frac{1}{2}$ of the length of the head, and equals the extent of the fin itself; the fourth spine slightly exceeds $\frac{1}{2}$ of the length of the preceding three. At the base appears an elongated scale, extending to the posterior margin of the fin. The second dorsal spine is situated in the centre between the muzzle and the root of the caudal fin. The posterior dorsal fin is situated at equal distance from the anterior and from the root of the caudal, and it commences opposite the anterior anal ray. The upper margin is falcated; the eighth ray is a little longer than the preceding. The extent of the fin equals that of the anterior dorsal. The posterior margin of the caudal is lunated. The anal fin is nearly triangular, but that the posterior ray slightly exceeds the preceding; the third spine is $\frac{1}{3}$ the length of the anterior ray. The length of the pointed, slightly falcated, pectoral fin is $\frac{1}{5}$ less than the length of the head; above the superior margin appears an elongated, knife-blade-like scale, $\frac{1}{2}$ the length of the fin. The ventral fins commence opposite the posterior half of the pectorals; their length equals $\frac{1}{2}$ of

that of the head. The elongated scale above the root extends to the margin of the membrane which connects the anterior half of the fifth ray to the abdomen. The elongated scale between the fins is broader and projects far behind the latter connecting membrane. A single young individual was obtained from a part of the Pinang River, (Sungei Pinang), where the water is fresh.

Sub Fam. ATHERINOINÆ.

Genus ATHERINA, (*Artedi*), *Linne*, 1766. Body elongated; two widely separated dorsals; ventrals behind the pectorals; upper jaw protractile; minute teeth in both jaws; in some species also on the vomer, palatals and pterygoids; each side with a broad silvery band. Branchiostegous rays six.

(3701) *Atherian forskali*, Ruppell.

Syn. Atherina hepsetus, Forskal 69, No. 101?
Atherina forskalii. Ruppell: Neue Wirbelth, Fische: 132. Tab. 33, Fig. 1.

Head above, back and upper third of the sides pale sea green, dotted with black; from the axilla to the caudal a light blue longitudinal line, under which a pale yellowish, bordered beneath by a broad shining silvery band; muzzle and lips blackish; cheeks and opercles shining silvery, upper half of the latter steel-blue; throat and abdomen silvery white; fins hyaline, margins of spines and rays of the dorsals, caudal and pectorals minutely dotted with black; posterior margin of caudal blackish. Iris silvery; above the pupil a transverse bluish black spot. D 5—1/9 or 10, C 17 $\frac{2}{3}$, A 1/13, V 1/5, P 15, Br. VI. Inhabits *Sea of Pinang*, Red Sea. Total length: 3 $\frac{2}{8}$ inch. The length of the head is 3 $\frac{4}{5}$ in the total, measured to the centre of the posterior margin of the caudal. On each side of the flattened vertex, where the opercle joins, appears a longitudinal furrow containing two or three pores. Three or four such appear on the infraorbitals, several beneath the nostrils, and three beneath each branch of the lower jaw. The diameter of the eye is 2 $\frac{1}{2}$ in the length of the head. At the lower part of the ascending margin of the preopercle, near the angle, is a deep incision. In both jaws, on the vomer, palatals and pterygoids appear bands of velvety teeth. The vertical diameter at the ventrals is 5 $\frac{1}{3}$ in the total length. The anterior dorsal fin commences a little behind the centre of the back; the four first rays are placed close together; the fifth is somewhat removed from the fourth. The body is covered with seven longitudinal series of rather large scales; the third series from above carries the lateral line, which consists of a minute notch on the posterior margin of each scale. The anterior 7 or 8 scales of the series appear to have no such notch, so that the lateral line appears to commence on the ninth scale. The pectorals are triangular, a little downwards pointed; their length slightly exceeds $\frac{1}{6}$ of the total length. The last ray of the second dorsal, and of the anal fin is a little elongated. Two individuals observed at Pinang in July 1843 and April 1845, differ from Dr. Ruppell's description in having five instead of six spines in the anterior dorsal fin. The smaller, 2 $\frac{4}{5}$ inches in length, is of a more elongated form, its vertical diameter at the ventrals being $\frac{1}{6}$ of the total length. It is also distinguished by having on the vertex a small raised triangular space, resembling an escutcheon, with the point between the orbits. The latter ('ecusson'), is described by M.M. Cuvier and Valenciennes as a character distinguishing *Atherina lacunosa*, Forster. As both individuals examined at Pinang present similar pores, and the characteristic incision of the margin of the preopercle, neither of which characters are noted in the description of *A. lacunosa*, their identity with *A. forskali* cannot be doubted.

Fam. SCOMBROIDÆ.

Genus SCOMBER (*Artedi*) *Linne*, 1748. Anterior dorsal fin separated by a considerable interval from the second, the posterior part of which as well as of the anal fin, forms five spurious fins; on each side of the tail two small crests, the one above the other; body fusiform with small smooth scales. Branchiostegous rays 7.

(3702) *Scomber Microlepidotus*, Ruppell.

Syn. Scomber microlepidotus, Ruppell: Neue Wirbelth. Fische p. 38, Taf 11.Fig.2.

Head above, back and sides as far as the lateral line intense steel-blue, after death with three irregular series of black spots; sides of the occiput and of the body immediately beneath the lateral line silvery light blue; lower part of the sides, abdomen, and sides of the head shining silvery, immediately behind the angle of the mouth a black triangular spot; membrane of anterior dorsal transparent, scantily dotted with brown along the spines; second dorsal, caudal, anal and the spurious fins pale yellow; the dorsal spurious fins and the caudal with black margins; ventrals and pectorals whitish, the latter with a blackish line along the root. Iris silvery round the pupil, the rest bluish black. D 9—12—V, C 17 $\frac{2}{3}$, A 1/11—V, V 1/5, P 18, Br, VII. Inhabits *Sea of Pinang*, Massaua, (Red Sea.) Total length: 5 inch. The length of the head is 3 $\frac{1}{2}$ in the total. The diameter of the orbit is 3 $\frac{1}{2}$ in the length of the head; the distance between the eyes across the forehead is $\frac{2}{3}$ of the diameter. The anterior and posterior thirds of the eye are covered by an adipose crescent-shaped membrane, leaving a central, lanceolate space open. A single series of minute, yet visible teeth, appear in both jaws. The cavity of the mouth is whitish, minutely dotted with black; the anterior part of the tongue is flattened, round-

ed, and closely dotted with black, the posterior part is a narrow linear crest, covered by a series of small rounded spots of velvety teeth. The sides of the head are scaleless, except the cheeks, or the anterior half of the preopercle, which as well as the space below the pectoral fins are covered with scales, larger than the very small ones of the body. Along the lower margin of the preopercle, appear some rather indistinct radiating lines. The vertical diameter in front of the anterior dorsal is $4\frac{1}{2}$ in the total length. The first spine of the anterior dorsal fin is but little shorter than the second, (in the figure of Russell No. CXXXVI, *Scomber kanagurta*, Cuv. its length is $\frac{1}{3}$ of the second,) the second and third are each $2\frac{1}{2}$ in the length of the head. Although the present fish differs from Dr. Ruppell's in having 9 instead of 10 spines in the anterior dorsal fin, in other characters both agree so perfectly that they appear to be identical. A single individual was observed in August 1844, at Pinang.

Genus THYNNUS (*Willoughby*, 1686), *Cuvier*, 1817. Round the thorax a kind of corslet formed by scales larger, but less smooth than those of the rest of the body; a cartilaginous keel on each side of the tail between two small crests; anterior dorsal fin elongated, separated by a very short interval from the second.

(3703) *Thynnus affinis*, Cantor. Head above and back indigo-blue, lighter, silvery, with rose-colored reflections on the sides above the lateral line; from the angle between the points of the corslet to the tail, a number of oblique, backwards and upwards directed undulating blackish bands; sides beneath the lateral line and abdomen pale silvery or satin, with rose-coloured and light-blue reflections; cheeks and opercles shining silvery with similar reflections; anterior dorsal fin greyish buff with a dark brown line along the anterior margin of the six first spines, changing to a triangular spot in front of the succeeding ones; second dorsal, anal and their spurious fins pale brownish yellow, edged and washed with blackish; caudal yellowish buff, washed with brownish in the centre; ventrals brownish grey; pectorals silvery grey, blackish towards the margin. Iris silvery, blackish blue towards the orbit. D 15—3/10—VIII, C $17\frac{6}{9}$, A 3/11—VII, V 1/5 P 27, Br. VII. Inhabits *Sea of Penang*. Total length: 1 foot 10 inch. In general outline this species resembles *T. pelamys* (Linne). But compared with the description and figure of the latter species, (Cuv. and Val. T. VIII. p. 113, Pl. 214,) the present differs in colours, number of fin rays and in characters to be pointed out. The length of the head is contained three times in the distance from the symphysis of the lower jaw to the centre of a vertical line drawn between the fifth dorsal and the anal spurious fins; it is about $3\frac{1}{3}$ in the total length. (In *T. pelamys* the head but slightly exceeds $\frac{1}{3}$ of the latter.) The height at occiput is $\frac{3}{4}$ of the length of the head. The vertical diameter of the eyes is $\frac{1}{5}$, the horizontal $\frac{1}{7}$ of the distance from the point of the upper jaw to the gill-opening. (In *pelamys* the diameter of the eye is $5\frac{1}{2}$ in the distance given.) In the upper jaw appear 23 distant, small, inwards arched teeth; in the lower 30, the posterior of which are a little stronger than the rest. The posterior part of the external margin of the palatal bones carries a single series of very minute teeth. The tongue is free, flattened, oval, and as well as the whole cavity, of a pale blackish blue colour. The vertical diameter in front of the pectoral fins is $4\frac{1}{4}$ in the total length. The anterior dorsal spine is placed opposite the second seventh of the pectoral fin. Its length is $\frac{1}{2}$ of the head, taken from the symphysis of the lower jaw. (In *pelamys* it is shorter.) The second spine is nearly as long, but only half the breadth of the preceding; the rest gradually decrease in length to the sixth, which is about $\frac{1}{3}$ longer than the seventh; the succeeding decrease less perceptibly towards the fifteenth, the length of which is about $\frac{1}{2}$ of the seventh. The distance between the anterior and second dorsal fin equals the length of the seventh spine. The anterior spine of the second dorsal fin is very short; the third scarcely exceeds $\frac{1}{2}$ of the first ray: all three spines are so completely hid by the integuments, as to be nearly imperceptible unless the latter be removed, and such is also the case with the spines of the anal fin. A vertical line drawn between the points of the caudal fin is contained a little more than $3\frac{1}{2}$ (in *pelamys* scarcely more than 3) times in the total length. The length of the pectorals fin is $6\frac{1}{2}$ in the total length. The ventrals are $\frac{2}{3}$ of the length of the pectorals, and each is received into a furrow, externally bounded by a fold of the corslet. Between the fins appears an elongated lamina, in length equalling the fifth ray, the anterior half of which is connected by a membrane to the abdomen. The corslet consists of three points: the superior extends to and clasps the second dorsal fin. The series of scales nearest the anterior dorsal fin, particularly those of the anterior part, are very large, nearly rhombic; the next three series are smaller, yet conspicuously larger than the rest. The central point, the largest, commences opposite the seventh dorsal spine, and terminates in a blunt point opposite the fourteenth spine, while the lower, somewhat undulating margin, extends to a little in front of the origin of the ventral fins. Between the occiput and the anterior third of the pectoral fin, appears an oblique triangular space, covered with narrow elongated scales, but bounded behind by 4 or 5 oblique series of large rectangular scales. The lateral line commences gently ascending towards the sixth dorsal spine, from whence it gently descends till opposite the anterior dorsal spurious fin, when it proceeds straight to the

cartilaginous keel of the tail. The third point of the corslet terminates on the abdomen, opposite the point of the pectoral fins. A single individual occurred at Pinang in December 1844.

Genus CYBIUM, *Cuvier*, 1829. Body elongated, without corslet; maxillary teeth large, compressed, trenchant, (lancet-shaped;) palatal bones, anterior part of vomer, tongue and branchial arches with velvety teeth.

(3704) *Cybium commersoni*, (Lacepede.)

Syn. Scomber commerson, Lacep. II. 600, Tab. 20, Fig. 1.
Scomber maculosus, Shaw: Nat. Misc. No 982.
Russell, CXXXV. Konam.
Scomber commersonii, Shaw: Gen. Zool. IV., 589, Pl. 85.
Scomber maculosus, *Ibid.* p. 592.
Cybium commersonii, (Cuv.) Ruppell: Atlas, Fische, Pg. 94, Taf. 25, Fig. 1.
Cybium commersonii, Cuv. R. A. II. 200.
Cybium commersonii, Cuv. and Val. VIII. 165.
Cybium commersonii, Ruppel: Neue Wirbelth, Fische, p. 41.
Cybium commersonii? Richardson: Report, 1845, 268.
Ikan Tanggiri of the Malays.

Head above and back intense blue with golden green reflections, lighter on the sides of the head and body to a little beneath the lateral line; the rest of the sides, the abdomen, opercles and cheeks shining silvery with lilac reflections; membrane of the anterior dorsal fin pale lilac grey, minutely dotted with brown, upper margin black; second dorsal, anal and their spurious fins pale silvery lilac grey; anal and its spurious fins with white margins; caudal silvery blackish; ventrals white; anterior half of pectorals white, posterior blackish; between the gill-opening and the root of the upper margin of the pectorals a large black spot. Iris silvery, bluish black near the orbit. After death the sides above the lateral line acquire a number of close, vertical undulating lines and spots; beneath the lateral line appear fewer and more distant black lines. D 17—4/13—X, C 17$\frac{1}{1}$, A 4/13—X, V 1/5, P 23, Br. VII. [The anterior dorsal and the anal fin rays are preceded by four spines (undivided rays) which however cannot distinctly be perceived without removing the covering scales and integuments. The caudal fin consists of 17 central branched rays, above and below which appear 14 gradually decreasing, undivided rays. The following number of fin-rays have been given by the different describers: Russell, whose figure is more correct than his description: D 16—16, C 24, A 14, V 6, P 22, Br. VII. Ruppell: D 16—14—X, C 26, A 3/14—X, V 1/5, P 24, Br. VI. Cuvier and Valenciennes: D 16—1/15—X, A 1/15—IX, P 22 or 23, Br. VII.] Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Isle of France, Coromandel, Bay of Bengal, Massaua, (Red Sea,) China Seas. Total length: 3 feet. The length of the head is 4$\frac{1}{3}$ in the total. The orbit is surrounded by a circular, rather broad, adipose membrane. The diameter of the orbit is a little less than $\frac{1}{4}$ of the length of the head; the distance of the eyes across the forehead is a little less than two diameters. In the upper jaw appear on each side 20 to 25 large lancet-shaped teeth in the lower 10 to 15, of which the posterior ones are the largest of all; velvety teeth appear on the anterior part of vomer, on the palatals, pterygoids, on the tongue, and on the margin as well as the internal surface of each hyoid bone. The only perceptible, small elongated scales appear along the anterior dorsal, on the second dorsal, caudal and anal fins, and from behind the infraorbitals round the eye to the occiput. The vertical diameter in front of the anterior dorsal is $\frac{1}{7}$ of the total length. The lateral line deviates but little from the upper third of the body, till opposite the first spurious dorsal fin, when it suddenly descends, describing an arch which terminates nearly opposite the fourth spurious dorsal fin; from thence it proceeds in the middle of the body, over the strong keel in front of the caudal fin. Both in front of and behind the arch, the lateral line makes a few, in different individuals varying, slight undulations. The spines of the anterior dorsal fin terminate in excessively slender points, which when uninjured are completely connected by the membrane. Such, indeed, was the case but in very few young individuals observed at Pinang, the instant they were taken out of the sea. The membrane, however, is easily torn and the spines are left each terminating in a filament as represented by Dr. Ruppell (Atlas: Taf. 25, fig. 1). The fish occurs at Pinang during all seasons, but not in numbers. As an article of food it is there valued both in its fresh and dried state. Single individuals may be seen in the cold season, but very rarely, in the Calcutta bazars. But they are not eaten by Europeans, as this as well as other Indian mackarels requires to be very fresh, to be fit for the table.

(3705) *Cybium lineolatum*, Cuvier.

Syn. Cybium lineolatum, Cuv. and Val. VIII. 170.
Cybium lineolatum, Belanger: Voyage, p. 366, Pl. II. Fig. 1.
Cybium lineolatum, Bleeker: Verh. Bat. Gen. XXII. 4.
Tanggiri of the Malays.

Head above and back intense blue with golden green reflections, lighter on the sides of the head and body, to a little beneath the anterior half of the lateral line; the rest of the sides, the abdomen, opercles and cheeks shining silvery with pale lilac reflections; membrane of anterior dorsal fin pale lilac grey, minutely dotted with brown, upper margin black; second dorsal and

purious fins pale silvery lilac grey; caudal silvery blackish grey: anal and spurious fins silvery white; ventrals white; pectorals silvery white, minutely dotted with black on the posterior outer half and on the whole inner surface, so closely as to appear blackish. Iris silvery, bluish black towards the orbit. After death appear several series of black spots: irregular above the lateral line; beneath the latter three or four series of longitudinal short linear spots, each series appearing like an interrupted line. D 16—4/12—IX, C 15$\frac{1}{1}$, A 5/14—X, V 1/5, P 21, Br. VII. Inhabits *Sea of Pinang, Peninsula, Singapore,* Malabar, Bay of Bengal, Madura, Java. Total length: 2 feet. The length of the head is 4$\frac{1}{2}$ in the total measured to the centre of the posterior caudal margin, but $\frac{1}{5}$ to the centre of a vertical line between the points of the caudal lobes. The diameter of the orbit is 4$\frac{1}{2}$ in the length of the head; the margin of the orbit supports a rather broad circular adipose membrane. The distance of the eyes across the forehead is 1$\frac{1}{4}$ diameter. On each side of both jaws appear upwards of 18 lancet-shaped large teeth, of which, however, more than 10 or 11 are seldom present. The middle ones of the lower jaw are the largest. On the anterior part of the vomer appears a pointed triangular spot with velvety teeth, and on each palatal and pterygoid a rather broad continued line of similar teeth. Others appear at the root of the small oval, flattened tongue, on the margin and internal surface of each hyoid bone. The scales are perceptible in the places noted under *Cybium commersoni.* The greatest vertical diameter slightly exceeds $\frac{1}{6}$ of the total length. The lateral line, a series of short rectangular elevations, commences following the upper fourth of the body, from which it gently deviates towards the termination of the second dorsal fin; from thence it continues declining to below the middle of the body, opposite the fifth spurious fin, when it slightly ascends towards the strong keel in front of the caudal fin. The spines of the anterior dorsal fin are very slender, and the membrane is easily detached, so as to leave the filamentous points of the anterior and the whole of the posterior five or six very short spines unconnected. The anterior spine scarcely equalling the diameter of the eye, is $\frac{2}{3}$ of the length of the second, which is shorter than the third. The fourth, the longest, is $\frac{1}{4}$ of the length of the head; the rest gradually decrease; the sixteenth is so short and slender that it easily may escape observation. The anterior spurious fin is often by a short membrane connected to the second dorsal and anal. Each caudal lobe equals the length of the head. The length of the pectorals is 8$\frac{1}{2}$ in the total; the ventrals $\frac{1}{3}$ of the pectorals. At Pinang this species occurs at all seasons, but not in numbers. In quality it resembles *C. commersoni,* and like it, a solitary, stray one, may, during the cold season, be seen in the fish bazars of Calcutta.

(3706) *Cybium guttatum.* (Bloch-Schneider).

Syn. Scomber guttatus, Bl.-Schn. 23, Pl. 5.
Russell, CXXXIV. Wingeram.
Scomber leopardus, Shaw? Gen. Zool. IV. 591.
Cybium guttatum, Cuv. R.A. II. 200 (1).
Cybium guttatum, Cuv. and Val. VIII. 173.
Cybium kuhlii, Cuv. and Val. *Ibid.* 178 (*Young*).
Cybium guttatum Richardson Report, 1845. 268.
Cybium guttatum, Bleeker: Verh: Bat. Gen. XXII. 4.
Tanggiri papan of the Malays.

Adult. Membrane of the first seven or nine spines of anterior dorsal fin black, that of the succeeding spines white, minutely dotted with brown, and broadly edged with black; rest of the body and eyes coloured like *Cybium lineolatum.* After death appear on the back and upper half of the sides numerous black rounded and oval spots, of different sizes, mostly irregularly scattered, here and there in regular longitudinal series. D 18—4/16—X, C 15$\frac{10}{10}$, A 5/16—IX, V 1/5, P 21, Br. VII. or D 17—5/16—X, A 6/16—IX. *Young.* Ventrals, second dorsal, anal and their spurious fins pale yellowish; caudal whitish, the root the posterior margin and between the central five rays silvery bluish. Rest of the body like the adult, but no black spots appear after death. D 17—5/17—VII, A 6/16—VII, or D 15—5/16—VIII, A 6/16—VIII. Inhabits *Sea of Pinang, Malayan Peninsula Singapore,* Java, Madura, Malabar, Coromandel. Total length: 3 feet. The length of the head is $\frac{1}{5}$ of the total, measured to the centre of the posterior caudal margin, but 5$\frac{1}{2}$ in the total centre of a vertical line between the points of the caudal lobes. The orbit is surrounded by a circular adipose membrane. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. The distance of the eyes across the forehead is 1$\frac{1}{2}$ diameter. The maxillary teeth are generally shorter and less broad than in *C. commersoni* or *lineolatum.* On each side of the upper jaw appear upwards of 19, of the lower upwards of 15 teeth. The velvety teeth are disposed as in *C. lineolatum,* but they are more numerous, as the whole of the roof of the mouth, bounded in front by the vomer and on each side by the palatals, is studded with patches of teeth. The very centre of the roof behind the anterior pointed part of vomer, presents a singular appearance: it is covered with linear elevations separated from each other by narrower lines of the naked lining membrane. The greatest vertical diameter in front of the second dorsal fin equals the length of the head. The lateral line, consisting of little rectangular elevations follows the outline of the back while gently de-

clining till opposite the third or fourth dorsal spurious fin; from thence it continues straight to the strong keel in front of the caudal fin. In the young of this and the preceding species the latter keel is very little developed. Single individuals occur at Pinang at all seasons, and are valued as articles of food. In Calcutta they are very rarely seen, and during the cold season only.

Genus TRICHIURUS, *Linne*, 1766. Body elongated, compressed, with a single extensive dorsal fin; tail terminating in a slender finless filament; neither ventrals nor anal, but instead of the latter a number of minute spines; muzzle elongated; lower jaw projecting beyond the upper, both with distant lancet-shaped teeth, among which several arched ones longer than the rest, and with the posterior part of the point barbed; each palatal with a series of velvety teeth. Branchiostegous rays seven.

(3707) *Trichiurus haumela*, (Forskal,)

Syn. Willoughby: App. Pl. 3. Fig. 3.
Clupea haumela, Forskal: Fauna Arab. p. 72, No. 106.
Clupea haumela, Linne: Syst. 1408.
Lacepede, II. Pl. J, Fig. 1.
Russell XLI. Sawala
Trichiurus lepturus, Buchan. Ham. Fishes p. 31, 264.
Trichiurus haumela, Cuvier, R. A. II. 218.
Trichiurus haumela, Cuv. and Val. VIII. 249.
Trichiurus haumela, Ruppell, N, W. Fische, 41.
Trichiurus haumela, Swainson, II. 254.
Trichiurus haumela, Bleeker: Verh. Batav. Gen. XXII. 4.
Ikan Puchuk of the Malays.

Adult. Head above, back and naked point of the tail blue blackish, lighter silvery on the jaws sides of the head and body; abdomen silvery; dorsal rays and membrane pale reddish yellow, the latter to the twelfth ray, and from thence the upper half, minutely dotted with black, so as to appear blackish; anterior third of pectorals pale reddish yellow, the rest blackish. Iris silvery blue, blackish towards the orbit. *Young.* Head above, back and naked point of the tail silvery bluish: the rest of the body shining silvery; dorsal and pectorals yellowish white, minutely dotted with black like the adult, without, however, acquiring the blackish general appearance of the latter. D 127 to 133, P 11, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Chusan, Canton River, Coromandel, Bay of Bengal, Gangetic estuaries, Malabar, Djetta, (Red Sea,) Java, Celebes, Madura. Total length: 2 feet 8 inch. The length of the head, measured from the symphysis of the lower jaw to the termination of the opercle, is $\frac{1}{4}$ of the total. The diameter of the eye is $\frac{1}{6}$ of the length of the head, or $\frac{1}{2}$ of the vertical diameter of head, through the eye itself. In the upper jaw appear on each side upwards of 15 distant teeth, of which the anterior pair which are present in the very young ones only, are directed forwards. Behind these appear a pair, or a single lower arched tooth, the posterior part of the point of which is barbed. Next follow 3 or 4 very small lancet-shaped, behind which is a very long arched, half-barbed tooth. The rest of the space is occupied by some distant lancet-shaped teeth, of which those in the middle are the largest. On each side of the symphysis of the lower jaw appears an arched tooth, like the corresponding one of the upper jaw, but shorter. Behind the tooth is a vacant space, followed by upwards of 12 lancet-shaped teeth, which with the exception of one or two half-barbed in the middle, are smaller than the corresponding of the upper jaw. Along the margin of each palatal is a series of velvety teeth. The tongue is small, oval, a little pointed, and smooth. The anterior dorsal ray is $\frac{1}{4}$ of the length of the head. The greatest vertical diameter of the body is generally $\frac{1}{15}$, but in the adult $\frac{1}{17}$ of the total length. This species is excessively numerous at all seasons in the Straits of Malacca and in the estuaries of the Ganges. The common length is about one foot, and but a solitary individual of 2 feet 8 inch was observed at Pinang. The fish is consumed fresh, but chiefly dried, by the natives, and forms in the latter state an article of exportation. It is of voracious habits, devouring its own kind, as well as other fishes, and crustacea. The adult had a nodulous enlargement of the size of a coffee seed, on one of the anal interspinal bones, similar to those observed in *Platax arthriticus*, Cuv. and Val.

(3708) *Trichiurus savala*, Cuvier.

Syn. Trichiurus savala, Cuvier, R. A. II. p. 219.
Trichiurus armatus, Gray: Zool. Misc. 9. (*Excl. Syn. Sawala, Russell.*)
(*Icon.*) Trichiurus armatus, Gray: Ill. Ind. Zool. II. Pl. 93, Fig. 1.
Trichiurus savala, Cuv. and Val. VIII. p. 251, Pl. 224.
Trichiurus savala, Cantor: Ann. Nat. Hist. IX. 15.
Trichiurus armatus, Richardson, Report, 1845, 268.
Puchuk of the Malays.

Head above, back and the naked point of the tail pale bluish, all other parts shining silvery; dorsal and pectoral rays yellowish white, their membrane hyaline. Iris silvery, bluish towards the orbit. D 112 to 120, P 11, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Canton River, Chusan, Pondicherry, Bay of Bengal, Gangetic estuaries, Malabar, China Seas. Total length; 1 foot 4 inch. The length of the head is from $6\frac{1}{2}$ to $7\frac{1}{4}$ in the total. The diameter of the eye is from $8\frac{1}{2}$ to $\frac{1}{5}$ of the length of the head, or $\frac{3}{4}$ of the vertical diameter

of the head through the eye itself. The anterior rays of the dorsal fin are proportionally shorter than in *T. haumela:* the length of the first ray but slightly exceeds the diameter of the eye. The lancet-shaped teeth of the jaws are proportionally smaller than in the preceding species, which it in other respects greatly resembles. Although not very scarce at Pinang and at the Sandheads, it is of far rarer occurrence than *T. haumela*, which it resembles in voracious habits. As observed by M.M. Cuvier and Valenciennes, neither species is electrical, but both give at certain seasons, like many other fishes, a vivid phosphoric light.

Genus ELACATE, *Cuvier*, 1829. Head depressed; body fusiform; a number of free spines preceding the dorsal fin, but none the anal; no keel in front of the caudal fin.

(3709) *Elacate bivittata*, Cuv. and Val.

Syn. Elacate bivittata, Cuv. and Val. VIII. 338.
Elacate bivittata, Temm. Schl. Fauna Japon. Pisc. 104. Pl. LVI
Elacate bivittata, Richardson, Report, 1845, 269.

Head above and back inky, or bluish black; from the posterior part of the orbit to the root of caudal, a pale silvery longitudinal band, dotted with black; from the shoulder, enclosing the posterior $\frac{1}{4}$ of the lateral line, an intense bluish black band; beneath which a narrower, pale silvery, dotted with black; under which a bluish black; throat and abdomen pale silvery, dotted with black; upper half of sides of the head silvery blackish; lower half: pale silvery dotted with black; dorsal free spines, and all fin rays whitish; their membranes pale greyish, minutely dotted brown so as to acquire a general brownish, or bluish black appearance; caudal whitish at the root, and with a white triangular spot at the upper and lower angle; in some the posterior margin whitish; pectorals whitish at the root, the rest intense black. Iris silvery, minutely dotted with black. D 8—2/30, 34, 35 or 36, C $17\frac{1}{1}\frac{3}{3}$, A 2/25, 26, 27 or 28, V 1/5, P 20, Br. VII. Inhabits *Sea of Pinang, Singapore*, Moluccas, Japan, China Seas. Total length: 2 feet. The length of the head is $\frac{1}{5}$ of the total. The eye is surrounded by a large circular adipose membrane. The transversal diameter of the orbit is $\frac{1}{4}$, the vertical $\frac{1}{5}$ of the length of the head. The distance of the orbits across the forehead slightly exceeds their transversal diameter. The diameter of the eye itself is $\frac{1}{6}$ of the length of the head. Besides the cardlike teeth of both jaws, the vomer and the palatals, the whole of the roof of the mouth between the three latter bones, the tongue and the innerside of the gums are covered with velvety teeth. As in *E. pondiceriana*, Cuv. and Val. the upper surface of the cranium has on each side a fascicle of striæ, radiating forwards and backwards. They are indeed less apparent during life and in specimens preserved in spirits, than in dried ones, which probably accounts for M.M. Cuvier and Valenciennes describing the surface as nearly smooth (VIII. p. 338). On each opercle appear upwards of 9 backwards radiating, sharp striæ. Each side of the occiput and the cheeks are covered with small oval, slightly pointed scales, like those of the body; the rest of the head is naked. The eight free dorsal spines are all directed backwards; each is attached to its groove by a small triangular membrane. The anterior ray of the dorsal and anal fins is shorter than the second, and not branched like all the succeeding. The lateral line proceeds nearly straight towards the termination of the pectorals from whence it gently declines, keeping the middle of the body, and terminating a little in front of the posterior margin of the caudal. It makes several slight undulations, and the anterior portion is sometimes found double, the one above the other. The length of the caudal fin is $\frac{1}{5}$ of the total; the posterior margin is straight, vertical. The pectoral is a little falcated; the length $\frac{1}{7}$ of the total, nearly double the length of the ventrals. The stomach is an elongated muscular sac; at some distance from the pylorus appears a cœcum nearly as long as the stomach, from the side of which proceed a number of short processes, each terminating in many minute branches, all forming a countless mass of cœca. The intestinal canal makes a single circumvolution: its length is about $\frac{1}{3}$ of the total. The liver is elongated, single-lobed. The gall-bladder is reduced to a narrow tube. The spleen is small triangular. There is no air-vessel. In several dissected the stomach contained fishes (*Clupeoidæ*) and *Loligo*. Single individuals occur at all seasons at Pinang. They are eaten by the natives.

Genus CHORINEMUS, *Cuv. and Val.* 1831. [Substituted for *Scomberoides*, Lacepede, 1800.] Body oblong, compressed; no keel in front of the caudal fin; anterior dorsal fin consisting of singly moveable spines, each with a small membrane; the first of these spines preceded by an immoveable one, [as the immoveable spine is rarely perceptible except in very young individuals, it will not be given in the formulas of the dorsal fins, but special mention will be made of it,] more or less hid in the skin and pointing forwards; rays of the second dorsal and anal fin either entirely detached, or united by a membrane so brittle, as to easily disappear, and make the rays resemble spurious fins; two free spines, resembling those of the anterior dorsal, behind the anus.

(3710) *Chorinemus lysan*, (Forskal).

Syn. Scomber lysan, Forskal: Pl. 54, No. 67.
Scomberoide commersonien, Lacep. II. Tab. 20, fig. 3.
Russell, CXLI. Aken Parah.
Scomber madagascariensis, Shaw, Gen. Zool, IV. Pt. II. p. 590, Pl. 85.

Lichia lysan, Ruppell: Atlas p. 91.
Scomberoide commersonien, Cuv. R. A. II. 204 (').
Scomber lysan, Cuv. *Ibid.*
Scomber madagascariensis, Bennet: Life of Raffles.
Chorinemus commersonianus, Cuv. and Val. VIII. 370.
Chorinemus lyzan, Cuv. and Val. VIII. 387.
Chorinemus lysan, Ruppell, N. W. Fische 44.
Chorinemus commersonii, Bleeker: Verh. Batav. Gen. XXII. 4.
Tallang raya of the Malays.

Head above and back golden greenish olive, the rest of the head and body brilliant golden citrine or sulphur colour; second dorsal, anal, pectoral and caudal like the body, but not golden; posterior margin of caudal blackish, anterior dorsal, ventrals and post-anal spines white. Iris golden sulphur-coloured, greenish towards the orbit. *After death.* Head above and back greyish olive, lighter on the sides towards the lateral line; rest of the head and body silvery; sides along or above the lateral line with 6 or 7 large oval blue-blackish or greyish spots; second dorsal, anal, pectoral and caudal yellowish white. Iris silvery. D 7 or 6—1/20, C 17/7, A 2—1/18, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Sumatra, Java, Madura, Coromandel, Red Sea, Madagascar. Total length: 2 feet. The length of the head is 4⅔ in the total, measured to the centre of the posterior margin of the caudal; the height at occiput nearly equals the length of the head. The diameter of the orbit, supporting an adipose membrane, is ¼ of the length of the head; the distance across the forehead equals the diameter. The angle of the mouth is situated at some distance behind the orbit; the distance from the muzzle to the angle of the mouth slightly exceeds ½ the length of the head. The immoveable spine preceding the first dorsal, is apparent in the very young, but later it becomes entirely hid by the integuments. The lateral line forms an obtuse angle opposite the first dorsal spine, and at equal distance between the latter and the middle of the pectoral fin. The anterior of the black spots which appear after death is situated beneath the origin of the lateral line, between it and the root of the pectoral; the upper part of the opercle becomes frequently blackish; of the rest of the spots, the two or three are above, but touch the lateral line; the others are altogether above it. The scales are minute, oval, with a longitudinal central furrow, and enveloped in the transparent epidermis. The greatest vertical diameter of the body, in front of the posterior dorsal fin varies from 3¼ to 3½ in the total length. At Pinang single individuals occur at all seasons. They are eaten either fresh or dried by the natives.

(3711) *Chorinemus tol.*, Cuvier and Valenciennes.

Syn. Russell, CXXXVIII. Tol Parah.
Chorinemus tol, Cuv. and Val. VIII p. 385.

Head above the back metallic bluish grey, lighter on the sides to a little above the lateral line; opercles and the rest of the body silvery white; pectorals and caudal yellowish white, the latter edged with blackish; the rest of the fins white; the angle of the second dorsal fin black. Iris silvery, bluish black towards the orbit. *After death.* Upper part of opercle and a spot immediately behind it, metallic bluish grey; in some a series of from 6 to 8 similar spots above the lateral line. D 7—1/20 or 21, C 17/6, A 2—1/18, 19 or 20, V 1/5, P 18, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Amboyna, Buru, Coromandel, Bay of Bengal, mouths of the Ganges, Malabar. Total length: 8⅝ inch. The length of the head is from 4¾ to ⅕ of the total, measured to the centre of the posterior margin of the caudal fin; the depth at occiput is ¾ of the length of the head. The transversal diameter of the orbit is 3½ of the length of the head; the distance across the forehead equals the diameter. The greatest vertical diameter of the body equals the length of the head. The lateral line makes a very obtuse angle opposite the third dorsal spine, from thence it declines till opposite the third or fourth ray of the second dorsal, when it proceeds straight to the centre of the caudal. The length of the lobes of the caudal equals that of the head, but generally one of the lobes is shorter than the other. The length of the pectorals and ventrals slightly exceeds ⅓ of the length of the head. The angle of the mouth is situated beneath the centre of the orbit; the lower jaw slightly projects beyond the upper. The scales appear like numerous, close, horizontal needles. The immoveable spine preceding the first dorsal, is in some partially apparent, in others entirely hidden. Younger individuals are at Pinang excessively numerous during all seasons, and are dried by the natives.

Genus TRACHYNOTUS, (*Lacep*) *Cuvier*, 1817. (Cæsiomorus, *Lacep.* 1800.—Acanthinion, *Lacep.* 1802.—) Differs from Gen. *Lichia* by a more elevated body, a profile more rapidly descending in front of the eyes, and by the more elongated points of the second dorsal and anal fin.

(3712) *Trachynotus mookalee*, Cuv. and Val.

Syn. Gasterosteus ovatus, Linne, Syst: 1325?
Centronote ovale, Lacepede?
Russell, CLIV. Mookalee Parah. Dr. Ruppell consider this identical with *Trachynotus falcatus*, (Forsk.) of which also the following synonymes are given: *Scomber falcatus*, Forskal, p. 57, No. 76.—*Cæsiomorus blochii*, Lacep. III. Tab. 3, Fig. 2,—(Ruppell: Atlas, p.

88.) To these Dr. Cantor has later added: *Trachinotus drepanis*, Cuv. and Val. VIII. 429, Trachinotus mookalee, Cuv. and Val. VIII. 423

Head above and back silvery green; sides above the lateral line golden green; beneath the line, abdomen and opercles golden gamboge; all fins gamboge; anterior margin of dorsal spines and first ray of second dorsal blackish; membrane of second dorsal, caudal and pectorals minutely dotted with brown. Iris golden gamboge, Green towards the orbit. D 6 —1/19. C $17\frac{2}{3}$, A 2—1/17, V 1/5, P 20, Br. VII. Inhabits *Sea of Pinang*, Coromandel, Malabar. Total length: 8 inch. The length of the head is $\frac{1}{4}$ of the total measured to the centre of the posterior margin of the caudal; the depth at the occiput exceeds by $\frac{1}{8}$ the length of the head. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. The infraorbital is broad, rounded in front, tapering to a point beneath the centre of the orbit, so as to leave the inferior half of the narrow maxillary bone exposed. The preopercle consists of a very narrow vertical portion, and a shorter, broader horizontal; where both join, the posterior margin describes a segment of a circle. The external surface is divided in two parts by a ridge in the middle: the anterior part has at the angle four longer and several smaller spine-like radiating processes, between which appear numerous radiating lines which continue along the vertical part of the posterior margin, which has the appearance of being very finely denticulated in an oblique upward direction. The angle of the mouth is situated in front of the orbit. In a young individual, $3\frac{3}{8}$ inches in length, a band of card-like teeth appear in both jaws; but in another, 8 inches in length, the jaws have no perceptible teeth, and such was also the case in those examined by Russell. M.M. Cuvier and Valenciennes describe their specimens of *T. mookalee* with velvety, easily perceptible teeth in both jaws *T. blochii* (Lacep.) and *T. falcatus*, (Forskal), which Dr. Ruppell considers to be identical with the present species, have no teeth. (Cuv. and Val. VIII.) It would therefore appear that some, not all, individuals with age lose their teeth. As a young individual examined at Pinang has very distinct teeth, it follows that the division adopted by Dr. Ruppell (Atlas, p. 88) of *Trachinotus*, Lacep. containing species supposed to have no teeth, is inadmissible. The anterior opening of the nostrils is much smaller than the posterior. The lateral line commences slightly ascending till above the point of the pectoral fin, from whence it gently descends till opposite the posterior third of the second dorsal, when it proceeds straight to the middle of the caudal fin. The scales of the body are very minute, appearing like points. In the young individual examined at Pinang, the spine preceding the movable dorsal ones, had the point projecting, but in the larger one, although perceptible, it was imbedded in the integuments. In Russell's figure the point projects. The length of the point of the second dorsal slightly exceeds $\frac{2}{3}$ of the extent of the base of the fin. The point of the anal is a little shorter. The greatest vertical diameter, in front of the second dorsal, is by $\frac{1}{6}$ less than half of the total length. The lobe of the caudal is $\frac{1}{3}$ of the total length. The length of the pectorals is $\frac{3}{4}$ of the head; that of the ventrals $\frac{1}{2}$ of the pectorals. The two above mentioned individuals were observed at Pinang in June, 1843, and in February, 1845.

(3713) *Trachynotus quadripunctatus*, (Ruppell.)

Syn. Cæsiomorus quadripunctatus, Ruppell: Atlas, p. 90, Tap. 24. Fig. I.
Trachinotus quadripunctatus, Cuv. and Val. VIII. 434.

Head above and back silvery greyish green, lighter on the sides to a little above the lateral line; rest of the sides, abdomen, opercles and cheeks silvery white; on the lateral line 2 to 5 distant black spots; fins hyaline; point of second dorsal and anal, and lobes of caudal black. Iris silvery, greenish towards the orbit. D 6 —1/22, C $17\frac{2}{3}$, A 2—1/22, V 1/5, P 17, Br. VII. Inhabits. *Sea of Pinang*, Massaua, (Red Sea,) Seychelle Islands. Total length: $7\frac{2}{3}$ inch. The length of the head is $4\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at the occiput equals the length of the head. The diameter of the orbit is $3\frac{1}{2}$ in the length of the head. The nostrils, the infraorbital and the preopercle resemble *T. mookalee*. In both jaws, on the vomer and palatals appear card-like teeth. The lateral line is slightly arched downwards till the origin of the second dorsal fin, from whence it proceeds straight in the middle of the body towards the caudal. The scales are minute, scarcely perceptible. In the individual examined at Pinang the point of the immovable spine, preceding the first dorsal, projected far beyond the integuments. On the left lateral line appeared four small black spots: the first opposite the 4th dorsal spine, the second, the largest of all, opposite the root of the second dorsal, the third opposite the middle of, and the fourth opposite the termination of the second dorsal. On the right lateral line, however, the last spot was absent. The individual described by Dr. Ruppell had on each side two such spots, corresponding to the second and third in the present. In those examined by M.M. Cuvier and Valenciennes the number of spots varied from 3 to 5. The greatest vertical diameter of the body in front of the second dorsal is $2\frac{1}{4}$ in the total length, measured to the centre of the posterior margin of the caudal. The length of the point

of the second dorsal equals the extent of the base of the fin ; that of the anal slightly exceeds it. The length of the caudal lobes is $2\frac{1}{3}$ in the total, measured as above observed. The pectorals are $\frac{3}{4}$ of the length of the head ; the ventrals $\frac{2}{3}$ of the pectorals. A single individual was taken at Pinang in June 1835, while unusually strong southerly winds prevailed. The fishermen asserted the species to be of very rare occurrence.

Genus APOLECTUS, *Cuvier and Valenciennes*, 1831. Differs from *Trachinotus* by the ventral fins being fixed under the throat.

(3714) *Apolectus stromateus*, Cuv. and Val.

Syn. Apolectus stromateus, Cuv. and Val. IX. 439.

Head above back and sides to the lateral line silvery brownish olive : cheeks, opercles and abdomen silvery pale neutral tint, everywhere minutely dotted with black ; dorsal and anal pale greenish olive, minutely dotted with black ; edges and the posterior part, containing the 3 or 4 last rays yellowish white ; ventrals blackish ; pectorals yellowish white, minutely dotted with black ; caudal yellowish white posterior half minutely dotted with black. Iris silvery buff, orbital half blackish blue. D 4—1/43, C $17\frac{1}{1}$, A 2—1/37, V 1/5, P 21, Br. VI. Inhabits *Sea of Pinang*, Java, Pondicherry. Total length : $3\frac{5}{8}$ inch. The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal fin ; the depth at occiput exceeds by $\frac{1}{4}$ the length. The diameter of the eye is $\frac{1}{3}$ of the length of the head. In each jaw appears a single series of excessively fine teeth. The greatest vertical diameter in front of the second dorsal fin is $1\frac{2}{3}$ in the total length. In front of the first minute dorsal spine appears an immovable forward-pointing one, anterior to which two minute spines may be felt by passing the finger along that part of the back. The length of the point of the second dorsal and anal fins is $2\frac{2}{3}$ in the total. That of the falcated pectorals and caudal lobes is $\frac{1}{3}$ of the total length. The ventrals are $\frac{1}{2}$ of the pectorals ; the rays are very slender. A single individual was observed at Pinang in June, 1844.

Genus CARANX, (*Lacep.* 1800,) *Cuvier*, 1828. Lateral line more or less mailed with scaly plates, each keeled and with a spine ; two dorsal fins ; a horizontal immoveable spine in front of the anterior dorsal ; two free spines in front of the anal ; body, the lateral line excepted, covered with small scales ; crest of cranium trenchant ; last rays of second dorsal often slightly connected ; in some separated in spurious fins.

A.—With several spurious fins behind the second dorsal and anal.

(3715) *Caranx rottleri*, (Bloch.)

Syn. Scomber cordyla, Linne, Syst. 1332 ?
Scomber rottleri. Bloch, Tab. 346.
Russell, CXLIII. Worugoo.
Scomber rottleri, Shaw IV. 598.
Caranx rottleri, (Lacep.) Ruppell : Atlas, 102.
Caranx rottleri, Cuv. R. A. II. 208 (')
Caranx rottleri. Cuv. and Val. IX. 29.
Caranx rottleri, Ruppell, N. W. Fische, 48 52.
Caranx rottleri Richardson, Report, 1845, 273.

Head above and back steel blue or silvery dark green, light on the sides towards the lateral line ; the latter as well as the rest of the body shining silvery ; on the upper part of opercle a bluish black spot ; fins transparent, yellowish ; point of the second dorsal, and margin of the caudal minutely dotted with black. Iris silvery ; adipose fold of the orbit pale amber-coloured. D 8—1/30 or 11—IX, C $17\frac{7}{7}$, A 2—1/8—VIII or VII, V 1/5, P 22. Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Coromandel, Malabar, Massaua, (Red Sea,) China Seas. Total length : 7 inch. The length of the head is $\frac{1}{4}$ of the body, the caudal not included : the greatest vertical diameter, in front of the second dorsal fin, is $3\frac{1}{2}$ in the length of the body. The diameter of the orbit is a little less than $\frac{1}{3}$ of the length of the head ; the broad adipose fold of the orbit leaves a vertically oval space, in which the eye appears. The anterior part of the lateral line is formed by very small rounded scales and describes a short high arch, which terminates opposite the middle of the anterior dorsal fin ; the rest of the line is straight, consisting of 53 to 55 oblique, keeled and spinous plates. The anterior of the latter are narrow ; each nearly $\frac{1}{2}$ of the vertical diameter of the body ; the posterior ones increase in breadth and entirely cover the tail. The falcated pectoral fins are $3\frac{1}{2}$ in the total length, measured to the centre of the posterior margin of the caudal. Single individuals occur at all seasons at Pinang. They are eaten by the natives.

B.—Without spurious fins behind the second dorsal and anal fins.

(3716) *Caranx vari*, Cuv. and Val.

Syn. Caranx vari, Cuv. and Val. IX. 48.

Head above and back steel blue with silvery green reflections, lighter on the upper half of the sides ; the rest of the body shining silvery ; abdomen with rose-coloured reflections ; on the upper part of the opercle and at the commencement of the lateral line a large pale bluish-black spot ; anterior dorsal fin black ; second dorsal and caudal pale yellowish white, their marginal halves minutely dotted with black : the rest of the fins hyaline, white ; the middle of the anal sparingly dotted with brown. Iris silvery ; adipose fold of the orbit pale amber-coloured. D 8—1/24, C 17$\frac{4}{4}$, A 2—1/20, V, 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*, Pondicherry. Total length : $6\frac{5}{8}$ inch. The length of the head is $3\frac{1}{2}$ in that of the body, or $3\frac{3}{4}$ in the total measured

to the centre of the posterior margin of the caudal. The inferior margin of the opercle is very slightly concave. The diameter of the orbit is $3\frac{1}{2}$ in the length of the head; the opening of the adipose fold of the orbit is vertically oval. The greatest vertical diameter of the body, in front of the second dorsal, is $\frac{1}{5}$ of the length of the body. The arched portion of the lateral line extends to opposite the anterior part of the second dorsal, the straight portion consists of from 55 to 58 plates, none of which exceeds in height $\frac{1}{9}$ of the greatest vertical diameter of the body. The falcated pectorals are $3\frac{1}{2}$ in the total length. This species is of uncommon occurrence at Pinang.

(3717) *Caranx mate*, Cuv. and Val.

Syn. Caranx mate, Cuv. and Val. IX. 54.

Head above and back steel blue, with silvery green reflections; lighter on the upper half of the sides, rest of the body shining silvery; abdomen with mother-of-pearl reflections; pectoral, caudal and second dorsal yellowish white, the latter minutely dotted with black towards the margin; first dorsal, ventrals and anal whitish, the latter sparingly dotted with brown; upper part of opercle with a bluish black spot. Iris silvery; adipose fold of the orbit pale amber-coloured. D 8—1/24, C $17\frac{1}{2}$. A 2—1/20, V 1/5, P 22, Br. VII. Inhabits *Sea of Pinang*, Seychelles, New Guinea, Anjer, Pondicherry. Total length: $9\frac{1}{8}$ inch. The length of the head slightly exceeds $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at the occiput is $\frac{3}{4}$ of the length of the head. The diameter of the orbit is $3\frac{2}{3}$ in the latter; the opening of the adipose fold of the orbit is vertically oval. The lower margin of the opercle is nearly straight, or slightly concave about the middle. The greatest vertical diameter of the body in front of the second dorsal is $3\frac{1}{2}$ in the total length. The arched portion of the lateral line terminates opposite the anterior fourth of the second dorsal; the rest is straight and covered by 37 to 40 plates, none of which in height exceeds $\frac{1}{6}$ of the greatest vertical diameter of the body. The length of the falcated pectorals is $3\frac{1}{3}$ in the total. The last dorsal and anal ray is stronger and more elongated than the preceding ones, and as the connecting membrane easily becomes torn, these two rays acquire the appearance of spurious ones. M.M. Cuvier and Valenciennes describe *C. xanthurus* as corresponding in every respect to the present species, except in its having a series of eight or nine dorsal spots of a darker blue than the rest of the back. From *C. affinis*, Ruppell, (*Neue Wirbelth. Fische*, 49, Tab. 14, Fig. 1.) the present also differs but slightly; in *affinis* the head is $\frac{1}{4}$ of the total length, and the pectorals equal the length of the head: both are therefore shorter than in the present. The first dorsal spine is $\frac{1}{3}$ of the fourth, the longest. In the present the first spine is $2\frac{1}{3}$ in the length of the third and fourth, which are of equal length. Single individuals occur at all seasons at Pinang. They are eaten by the natives.

(3718) *Caranx leptolepis*, Kuhl. and Van Hasselt.

Syn. Caranx leptolepis, Cuv. and Val. IX. 63.
Caranx mertensii Cuv. and Val. IX. 64.

Head above and back steel blue; from above the orbit to the caudal a broad gamboge band; the rest of the body shining silvery; dorsal and caudal fins gamboge, the rest white. Iris silvery, blue towards the orbit. In some individuals a large bluish black spot on the upper part of the opercle. D 8—1/25 or 26, C $17\frac{6}{6}$, A 2—1/22 or 23, V 1/5, P 20, Br. VII. Inhabits *Sea of Pinang*, *Singapore*, Java, Manilla. Total length: $4\frac{4}{8}$ inch. The length of the head is $3\frac{1}{3}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is $\frac{1}{6}$ less than the length. The diameter of the orbit, which is surrounded by a very narrow adipose fold, is $\frac{1}{3}$ of the length of the head. The lower margin of the opercle is straight. The snout is uncommonly protractile; the teeth of both jaws are excessively minute, so as to be barely perceptible to the touch. The very slight arch of the lateral line terminates opposite the middle of the second dorsal; the anterior part of the rest is covered by minute scales, which do not preceptibly increase in size till opposite the posterior third of the second dorsal, from whence may be counted 25 such. None of these scales exceed $\frac{1}{16}$ of the greatest vertical diameter of the body, which equals the length of the head. The length of the falcated pectorals also equals that of the head. M.M. Cuvier and Valenciennes describe *C. mertensii* as merely differing by the absence of the black opercular spot. At Pinang, where the fish is uncommon, individuals occur with and without the spot, in forms and colours so exactly like, as to leave no doubt about their identity.

C.—With trenchant profile, forming a segment of a circle; plates exclusively on the straight portion of the lateral line; pectorals falciform; in front of the first dorsal an immoveable horizontal spine, often hid in the integuments.

(3719) *Caranx forsteri*, Cuv. and Val.?

Syn. Scomber hippos, Lin. apud Forster?
Caranx forsteri, Cuv. and Val. IX. 107?

Young. Head above and back golden green, lighter on the sides; rest of the body shining silvery; abdomen with mother-of-pearl reflections; at the angle of the opercle a very faint bluish black spot; first dorsal minutely dotted with brown, so as to appear pale grey; ventrals and anal white; pectoral, caudal and second dorsal yellowish, the point and margin of the latter, and the posterior margin of the caudal minutely dotted with brown, so as to appear greyish. Iris

silvery, bluish black towards the orbit. D 8—1/20 or 21, C 17/7, A 2—1/15, 16 or 17, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*. Total length: 4⅛ inch. The length of the head is a little less than 3½ in the total, measured to the centre of the posterior margin of the caudal fin; the depth at occiput equals the length. The diameter of the orbit is 3¼ in the length of the head. The infraorbital is longer than broad: its greatest breadth, along the superior margin equalling ½ the diameter of the orbit. The arched, very slightly undulating, portion of the lateral line terminates opposite the fifth or sixth ray of the second dorsal; the straight portion is covered by 30 to 31 plates, none of which exceed about ⅙ of the greatest diameter of the body, which is 3¼ in the total length of the body. The length of the falcated pectorals equals that of the head. Single individuals occur at Pinang at all seasons. They appear nearest to correspond to the description of *C. forsteri*.

(3720) *Caranx malabaricus*, (Bloch-Schneider.)

Syn. Scomber malabaricus, Bloch-Schn. p. 31. Russell, CL. Tallam Parah.
Caranx malabaricus, Cuv and Val. IX. 121.
Caranx malabaricus, Richardson, Report, 1845, 275.

Head above and back pale silvery sea green; sides of the head and body shining silvery with blue reflections; abdomen white; at the upper part of the opercle a bluish black spot; pectorals, second dorsal and caudal yellowish white, the two latter sparingly dotted with black towards the margin; anal and ventrals white; first dorsal hyaline. Iris silvery, minutely dotted with brown; upper orbital margin bluish black. D 8—1/22, C 17/7, A 2—1/18, V 1/5, P 20, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Coromandel, Bay of Bengal, Red Sea, China Sea. Total length: 8 inch. The length of the head is 3⅓ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput equals the length. The transversal diameter of the orbit is a little less than ⅓ of the length of the head. The teeth of both jaws, of the vomer and the palatals are velvety, but those on each side of the symphysis of the jaws are a little longer than the rest. The tongue is very small, linear, and with the exception of the apex, covered with velvety teeth. The arched portion of the slightly undulating lateral line terminates opposite the posterior third of the second dorsal; the straight portion is covered by 35 to 36 plates, none of which exceeds 1/10 of the greatest vertical diameter of the body, which is about 2½ in the total length. The pectorals equal the length of the head. Single individuals occur at Pinang at all seasons, and are eaten, fresh or dried, by the natives.

(3721) *Caranx nigripes*, Cuv. and Val.

Syn. Russell CLII. Mais Parah.
Caranx nigripes, Cuv. and Val. IX. 122.
Caranx nigripes, Richardson, Report, 1845. 275.
Caranx nigripes. Bleeker; Verh. Batav. Gen. XXII. 4.

Head above and back pale silvery blue or green; sides of the head and body shining silvery with rose coloured reflections; abdomen white: on the upper part of the opercle an indistinct bluish black spot; base and anterior margin of ventrals white, rest greenish black, and between these fins a black spot; first dorsal greyish, minutely dotted with black; the rest of the fins white, the second dorsal and caudal minutely dotted with black towards the margin; at the symphysis of the lower jaw a black spot; branchiostegous rays and membrane silvery white, the latter broadly brimmed with black between the four lower rays. Iris silvery, upper orbital margin bluish black. D 8—1/21 or 22, C 17/6, A 2—1/18, 19 or 20, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Coromandel, Bay of Bengal, Java, Balli, Madura, China Seas. Total length: 6 inch. The length of the head is 3½ in the total, measured to the centre of the posterior caudal margin; the depth at occiput exceeds by ⅙ the length. The transversal diameter of the eye is 3¼ in the length of the head. The greatest vertical diameter of the body is 2⅛ in the total length. The horizontal, immovable, spine in front of the first dorsal, is rather strong, with the point free. The arched portion of the lateral line terminates opposite the fifth ray of the second; the straight portion is covered by about 36 or 37 slightly pointed plates, none of which exceeds 1/20 of the greatest diameter of the body. The length of the falcated pectorals is 3⅕, that of the ventrals is 4⅕ in the total. The length of the ventral spine is 2½ in the nearest ray. The point of the second dorsal and anal fin is 3⅛ in the greatest vertical diameter of the body. Behind the eyes appear some indistinct scales; the cranial crest, the rest of the head and the thorax are scaleless; the rest of the body is covered by small orbicular, somewhat deciduous scales. This species is at all times excessively numerous in the Straits of Malacca and the Bay of Bengal. The natives eat it in its fresh and dried state.

(3722) *Caranx atropus*, (Bloch-Schneider).

Syn. Brama atropus, Bloch-Schneider, 98, Pl. 23.
Olistus atropus, Cuv. and Val. IX. 141.

D 8—1/21, C 17/6, A 2—1/17, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*, Tranquebar. Total length: 7½ inch. In proportions, number of fin rays and colours this fish exactly resembles *Caranx nigripes*, from which it merely differs in having the 6th, 7th, 8th, 9th, 10th,

11th, and 12th rays of the second dorsal longer than the rest, and the elongated part not connected by the membrane. The 8th and 9th are the longest, each being about 2½ in the greatest vertical diameter of the body. All the elongated rays, although filamentous, are distinctly branched, which consequently excludes the fish from the genus *Olisthus*. *Olisthus, Cuv.* (R. A 1829.) Differs from *Caranx*, (*Citula*) in having the middle rays of the second dorsal not branched, but merely articulated, and each elongated into a filament. The elongated part, as well as the half of the membrane in front of each ray, is minutely dotted with black. However erroneous Bloch's description and figure of *Brama atropus* may be, there seems to be no reason to doubt that a specimen of the present fish was his original. M.M. Cuvier and Valenciennes observe that the specimen now extant, marked by Bloch: *Brama atropus*, (his specimen of *Caranx nigripes* is labeled: *Brama melampus*), is nothing but *Caranx nigripes*. Mutilation of the delicate filaments of *C. atropus* would indeed render it indistinguishable from *C. nigripes*. A single individual of the present was observed at Pinang in June, 1844, and it remains to be ascertained if the elongation of some of the dorsal rays is more than an individual distinction. Dr. Ruppell obtained in the Red Sea a specimen of his *Citula ciliaria* (Syn. *Olistus? rupellii*, Cuv. and Val.) which had the middle rays of both the second dorsal and of the anal fin elongated filamentous, and he therefore thinks it possible that the fish is identical with *Olistus malabaricus*, Cuv. and Val. (Neue Wirbelth. Fische: p. 50).

(3723) *Caranx armatus*, (Ruppell).

Syn. Sciæna armata, Forskal Fauna Arab. p. 53 No. 68?
Sciæna armata, Linne, Syst. 1306?
Russell CLI. Tchawil Parah. (*Young*).
Citula armata, Ruppell: Atlas, 103.
Caranx citula (cirrhosus Ehrenb.) Cuv. and Val. IX. 126 Pl. 250.
Caranx armatus, Cuv. and Val. IX. 127.
Caranx ciliaris Cuv. and Val. IX 129. (*Young*).
Citula armata, (Syn. Caranx cirrhosus), Ruppell Neue Wirb. Fische 50.
Caranx ciliaris. Temm. et. Schl. Fauna Japon. Pisc. 112.
Caranx ciliaris, Richardson Report, 1845. 276.

Young. Head above and back pale sea green or bluish green; sides of the head and of the body beneath the lateral line mother-of-pearl with pale rose coloured reflections: abdomen white; an indistinct black spot at the upper part of the opercle; first dorsal hyaline minutely dotted with black; second dorsal yellowish white the elongated point and the upper margin minutely dotted with black; caudal yellowish white; marginal half minutely dotted with black; anal and pectorals white; base and anterior margin of the ventrals white, rest pale greenish grey, minutely dotted with brown. Iris silvery, upper orbital half greenish black. D 8—1/21, C 17⅗ A 2—1/16 or 17, V 1/5, P 19, Br VII. Inhabits *Sea of Pinang, Singapore*, Seas of China and Japan, New Guinea, Java, Coromandel, Red Sea, Indian Ocean. Total length: 4⅝ inch. The length of the head is 3⅓ in the total, measured to the centre of the caudal fin: the depth at occiput exceeds by ¼ the length. The diameter of the orbit is ⅓ of the length of the head. The greatest vertical diameter of the body, in front of the second dorsal, is 2¼ in the total length. The arched portion of the lateral line does not abruptly become straight; it straightens a little in front of and opposite the third posterior part of the second dorsal, and is covered by about 24 plates, none of which exceeds ⅓ of the greatest vertical diameter of the body. The elongated first dorsal ray exceeds by about ¼ the greatest vertical diameter of the body; the first anal ray scarcely exceeds ⅔ of the first dorsal, but is frequently less. The point of the horizontal spine, in front of the first dorsal fin, is exposed. The length of the falcated pectorals is ⅓ of the total length; the ventrals slightly exceed ⅓ of the pectorals. The species is of uncommon occurrence at Pinang. It corresponds exactly to Russell's No. CLI. (*Caranx ciliaris*, Cuv. and Val.) which would appear to be the young of *Citula armata*, which Dr. Ruppell considers to be identical with *Caranx citula* (*cirrhosus*, Ehrenb.) Cuv. and Val. The description of the latter affords no specifically distinguishing characters.

(3724) *Caranx oblongus*, Cuv. and Val.

Syn. Caranx oblongus Cuv. and Val. IX.

Young. Head above and back pale yellowish green; sides of the head and body beneath the lateral line shining silvery; abdomen white; first dorsal hyaline, sparingly dotted with brown; second dorsal and anal hyaline, the marginal half minutely dotted with brown, the elongated points of the fins bright yellow; ventrals and caudal yellow, the margin of the latter minutely dotted with black; pectorals white. Iris golden light green; upper half of orbital margin bluish black. D 8—1/22, C 17/7, A 2—1/19, V 1/5. P 21, Br. VII. Inhabits *Sea of Pinang*, Vanicolo, Oualan. Total length: 5⅝ inch. The length of the head is ⅓ of the total, measured to the centre of the posterior margin of the caudal; the depth at occiput slightly exceeds the length of the head, of which the diameter of the orbit is ⅓. Of the velvety teeth those of the symphysis of both jaws are somewhat stronger than the rest. The greatest vertical diameter of the body in front of the second dorsal is 2½ in the total length, measured to the centre of the posterior margin of the caudal. The lateral line is slight-

ly arched, following the profile of the back it terminates opposite the second third of the dorsal. The straight portion is covered by 40 strongly keeled plates, none of which exceed $\frac{1}{8}$ of the greatest vertical diameter of the body. The point of the horizontal spine in front of the first dorsal is exposed. The elongated anterior ray of the second dorsal exceeds by $\frac{1}{7}$ the greatest vertical diameter of the body, of which the anterior ray of the anal is but $\frac{1}{2}$. The falcated pectorals equal the lobes of the caudal, and are $2\frac{1}{2}$ in the total length. The ventrals are $\frac{1}{2}$ of the pectorals. A single individual occurred at Pinang in September, 1843.

(3725) *Caranx Speciosus*, (Forskal.)

Syn. Scomber speciosus Forskal, Fauna Arab 54 No. 70.
Scomber speciosus Linne Syst. 1332.
Lacepede III. Tab. 1 Fig. 1.
Russell, CXLIX. Poloosoo Parah.
Scomber speciosus Shaw. IV. 603.
Caranx a six bandes. Quoy et Gaim. Tab. 65 Fig. 4.
Caranx speciosus Ruppell Atlas, 96.
Caranx speciosus. (Syn. C. petaurista: Isid. Geoff. Eg. Tab. XXV. Fig. 1. *Adult.*) Cuvier, R. A. II. 209 (1)
Caranx speciosus, Cuv. and Val. IX. 130.
Caranx speciosus Ruppell: Neue Wirbelth. Fische 45.
Zonichthys subcarinata. Swainson: II. 248.
Caranx speciosus Bleeker: Verh. Batav. Gen. XXII. 4.

Ground colour citrine or king's-yellow with a bluish black oblique band from the centre of the orbit of the occiput; a second from the occiput vertically over the posterior margin of the opercle: a third narrow line from in front of the first dorsal to a little below the lateral line; a fourth broad band from the middle of the first dorsal to abdomen: a fifth narrow line from between the dorsals; a sixth broad band from the anterior part of the second dorsal; a seventh narrow line from the middle; an eighth broad band from the posterior part; and a ninth narrow line from the termination of the second dorsal: the posterior three alternate bands and lines reaching the abdomen; in some a bluish black spot at the root of the pectoral; branchiostegous rays and membrane, the two spines in front of the anal and the ventrals white; the rest of fins citrine, the dorsals minutely dotted with black, the points of the caudal and the posterior margin black. Iris golden citrine, upper orbital margin bluish black. D 7—1/19 or 20, C $17\frac{1}{2}$, A 2—1/14 or 16, V 1/5, P 22, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, New Holland, Vanicolo, Isle of France, Red Sea, Trincomalie, Coromandel, Java, Madura. Total length: 9 inch. The length of the head is $3\frac{1}{3}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput equals the length. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. In individuals not exceeding $3\frac{1}{2}$ inches in length, velvety teeth may be felt on each side on the symphysis of the upper jaw; on each side of the symphysis of the lower they may distinctly be seen, and a single series of from 10 to 12 rather distant teeth appear across the vomer. In an individual 9 inches in length no teeth appeared except a small, yet distinct, one on each side of the symphysis of the lower jaw. The greatest vertical diameter of the body, in front of the second dorsal, is $\frac{1}{3}$ of the total length. The arched portion of the lateral line terminates, but not abruptly so, a little in front of and opposite the middle of the second dorsal fin. The straight portion is covered by upwards of 34 slightly keeled plates, of which none of the posterior 12, the largest, exceeds $\frac{1}{2\frac{1}{4}}$ of the greatest vertical diameter of the body. The length of the falcated pectorals equals that of the head. Single individuals occur at Pinang at all seasons. They are eaten by the natives.

Genus SCYRIS, *Cuvier*, 1829. Differs from *Caranx* by a more elevated, trenchant profile; first dorsal entirely hid; second dorsal with some of the rays elongated, filamentous.

(3726) *Scyris indicus*, Ruppell.

Scyris indicus, Ruppell: Atlas, 128, Tab. 33 Fig. 1. (*Young.*)
Scyris indica, Cuv. and Val. IX. 145, Pl. 252. (*Adult.*)
Scyris indicus, Ruppell: Neue Wirbelth. Fische 51.
Scyris ruppelli, (*Young*) } Swainson, II.
Scyris indicus, (*Adult*) } 251.
Scyris indica, Richardson, Report, 1845, 276.

Head above and back blackish silvery; cheeks and opercles shining silvery, the latter minutely and sparingly dotted with brown; at the upper part of the posterior margin of the opercle a small intensely black spot; the rest of the body silvery satin, abdomen sparingly dotted with brown; fin-rays and membranes yellowish white; upper margin of the second dorsal and posterior margin of the caudal minutely dotted, so as to appear blackish; root of the pectoral silvery. Iris silvery, upper orbital half bluish black. D 1/'9, C $17\frac{1}{6}$, A 1/16, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*, Java, Pondicherry, Red Sea, China Seas. Total length: 1 foot 9 inch. The length of the head is $3\frac{1}{3}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is but $\frac{1}{3}$ of the total length. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. In both jaws appears two or three series of small, but strong, conical teeth resembling those of some *Sparoids*; those on each side of the symphysis are larger than the rest. The vomer presents a few similar, but the small, oblong, tongue is covered with card-like

teeth. The greatest vertical diameter of the body, in front of the dorsal fin, is $2\frac{2}{3}$ in the total length. Each of the small scales composing the lateral line has a central longitudinal tube, from the posterior part of which branch off two smaller ones: one upwards and backwards, the other downwards and backwards. The arched, somewhat undulating portion of the line terminates opposite the middle of the dorsal fin. The straight portion consists mostly of small scales, but towards the termination of the dorsal the posterior eleven gradually enlarge and become sharply keeled; the three or four last, although the largest, do not exceed $\frac{1}{2\frac{1}{2}}$ of the greatest vertical diameter of the body. In the adult the cranial crest is very large and arched, like that observed in *Platax arthriticus*, but the posterior part, from opposite the opercle, is not contiguous, but consists of three separate, gradually decreasing, egg-shaped pieces of bone. Behind the last, lie six successive pieces, entirely hid under the integuments, and resting on the interspinals. The anterior undulating dorsal ray is the longest, slightly exceeding the length of the head. This, as well as the three succeeding, gradually decreasing ones, are undivided; the fifth and sixth are branched like the following, but their anterior branch is undivided and slightly elongated. The anterior anal ray equals in length the corresponding dorsal, and is as well as the second undivided. In front of the anal fin lie two small distant spines entirely concealed under the integuments. The length of the falcated pectorals is $\frac{1}{5}$ of the body, not including the caudal; that of the ventrals a little less than $\frac{1}{6}$ of the pectorals. Single individuals are of very rare occurrence at Pinang.

Genus GALLICHTHYS, *Cuv. and Val.* 1833. Body high and compressed: profile much elevated; ventrals elongated; caudal furcated; first dorsal fin very low or reduced to a series of short spines; anterior rays of second dorsal and anal excessively elongated.

(3727) *Gallichthys major.* Cuv. and Val.

Syn. Russell, LVII. Gurrah Parah.
Gallichthys major, Cuv. and Val. IX 168, Pl. 254.
Blepharis gallichthys, Swainson, II. 250.
Gallichthys major, Richardson Report, 1845, 271.

Head above and back blackish silvery; cheeks and opercles shining silvery; at the upper part of the latter an indistinct bluish spot; rest of the body silvery satin; fin-rays and membranes yellowish white; elongated portion of the dorsal and anal, upper margin of the dorsal and posterior of the caudal minutely dotted with black; dorsal and anal filaments, and ventral fins black. Iris silvery, upper orbital half bluish black. D 6—1/18 or 19, C $17\frac{1}{2}$, A 2—1/16, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang, Singapore,* Coromandel, Moluccas, China Sea. Total length: 6 inch. The length of the head is $\frac{1}{4}$ of the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is nearly double the length of the head. A narrow band of velvety teeth appears in both jaws and on the vomer. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body is $1\frac{1}{2}$ in the total length. The lateral line in its component scales, and its course exactly resembles that of *Scyris indicus*. The length of the anterior ray and its hairlike filament, of the second dorsal, anal, and ventral fins equals the length of the body; it is, however, liable to individual variations. The four anterior rays of the second dorsal are undivided, and as well as the five succeeding branched rays, terminate in gradually decreasing hairlike filaments. The two anterior anal rays are undivided, and as well as the third, which is branched, terminate in similar filaments. The anterior ventral ray is undivided, and, as well as the second, which is branched, filamentous. The length of the falcated pectorals and of the caudal lobes is $2\frac{2}{3}$ in the total. Single individuals are rarely seen at Pinang.

Genus SERIOLA, (*Risso,*) *Cuvier* 1829. Two dorsals, no spurious fins; tail without keel or crests; jaws, vomer and palatals with velvety or card-like teeth. Differs from *Caranx* by the not mailed lateral line; from *Lichia* by the membrane uniting the spines of the first dorsal.

(3728) *Seriola binotata*, Cuv. and Val.

Syn. Seriola binotata, Cuv. and Val. IX. 215.

Head above, back and sides to the lateral line yellowish green; sides of the head and body beneath the lateral line greenish yellow, abdomen bluish white or green; dorsals greenish yellow; a black vertical band above the eye, a second broader from occiput over the opercle; a third from between the second and fourth spine of first dorsal down towards the pectoral; a fourth from the point of second dorsal to the side below the lateral line: a fifth from the middle of the second dorsal to the lateral line; a sixth from the posterior part of the second dorsal; a seventh in front of the upper half of the root of the caudal; between the bands some round and irregular black spots; caudal yellow with a round black spot in the centre and an oval over each lobe, the point of which is yellowish white; anal light bluish green, lower half black, anterior and posterior angle yellowish white; ventrals light bluish green, posterior half black, point of anterior ray yellowish white; pectorals pale yellow. Iris light golden green, orbital margin blackish. D 7—1/32 or 33, C $17\frac{1}{2}$, A 2—1/15, 16 or 17, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang, Singapore,* Pondicherry, Bay of Bengal. Total Length: $4\frac{4}{5}$ inch. The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal;

the depth at occiput is a little less than the length of the head. The diameter of the eye is $\frac{1}{4}$ of the length of the head. The forehead between the eyes is arched, not trenchant. The angle of the mouth is opposite the posterior margin of the orbit. The card-like teeth of the jaws, vomer and palatals are rather large, recurvous; those of the tongue velvety. The greatest vertical diameter of the body, in front of the first dorsal, slightly exceeds the length of the head. No immoveable spine is perceptible in front of the first dorsal fin. The anterior third of the lateral line is a little arched, the rest nearly straight. The first dorsal, is small: its height but $\frac{1}{3}$ of the greatest vertical diameter of the body; the point of the second dorsal is more than double the height of the former. The length of the ventrals equals that of the head; the anterior half of the fifth ray is connected to the abdomen by a membrane. The length of the pectorals is $\frac{1}{6}$ of that of the body, the caudal not included. The caudal lobes are $\frac{1}{4}$ of that distance. Single individuals occur rarely at Pinang. This species greatly resembles *Seriola nigrofasciatus* (Ruppell,) [Syn. Nomeus nigrofaciatus, Ruppell, Atlas, 82 Pl. 24, Fig. 1. — Seriola ruppelli, Cuv. and Val. IX. 216.] From which it, however, may at once be distinguished by the remarkably shorter distance between the first and second dorsal.

Genus LACTARIUS, *Cuv. and Val.* 1833. (Platylepis, *Swainson* 1839.) Differs from *Seriola* in having one or two long arched teeth on each side of the symphysis of the upper jaw; in having a single series of fine teeth in the lower, and on the symphysis one or two longer ones; and in the absence of free spines in front of the anal fin.

(3729) *Lactarius delicatulus*, Cuv. and Val.

Syn. Scomber lactarius, Bl.-Schn. 31, No. 26. Russell CVIII, Chundawah.
Seriola lactaria, Cuv. R. A. II. 206,
Lactarius delicatulus, Cuv. and Val. IX. 238. Pl. 261.
Platylepis lactaria, Swainson, II. 247.
Lactarius delicatulus, Richardson Report 1835, 272.
Lactarius delicatulus, Bleeker: Verh. Bat. Gen. XXII. 4.

Head above, back and sides to the lateral line greenish grey or lead coloured; the rest shining silvery; a black spot at the upper part of the posterior margin of the opercle; fins hyaline, marginal half of dorsals and caudal minutely dotted with black. Iris silvery, upper half of orbital margin black. D 8—1/21 or 22, C $17\frac{?}{?}$, A 3/25, 26 or 27, V 1/5, P 16, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Coromandel, Bay of Bengal, mouths of the Ganges, Malabar, Java, Madura. Total length: $4\frac{1}{3}$ inch. The length of the head is $\frac{1}{4}$ of the total, measured to the centre of the posterior margin of the caudal; the diameter of the eye is $3\frac{1}{2}$ in the length of the head. The greatest vertical diameter, in front of the first dorsal equals the length of the head. The lateral line follows at the upper third of the body the outline of the back. The scales of the lateral line and the body are rather large, orbicular, very thin and deciduous. This species is excessively numerous at all seasons. It is eaten both fresh and dried.

Genus STROMATEUS, (*Artedi, Linne.*1748.) Ventral fins none; dorsal single with the spines hid in the anterior margin; vertical fins covered with scales.

(3730) *Stromateus niger*, Bloch.

Syn. Stromateus paru, Bloch Pl. 160.
Stromateus niger, Bloch Pl. 422.
Stromateus paru, Linne: Syst. 1148.
Stromateus paru, Shaw IV. p. 108, (Bloch Pl. 160.)
Stromateus niger, Shaw ibid. 111.
Stromateus niger, Russell, p. 35, No. XLIII. Nalla Sandawah.
Stromateus niger, S. paru, Cuv. R. A. II. 213 (2).
Stromateus niger, Cuv. and Val. IX. 385.
Stromateus niger, Cantor: Ann and Mag. N. H. IX. 15.
Stromateus niger, Richardson Report 1847, 272.
Stromateus niger, Bleeker: Verh. Bat. Gen. XXII. 4.
Bawar or Bawal tumbak of the Malays.

Head above, back and sides dark greyish brown with blue reflections; cheeks, opercles and abdomen silvery light bluish grey or pale neutral tint; dorsal and anal silvery bluish grey, blackish towards the margin; pectorals and caudal yellowish light grey, edged with blackish. Iris silvery blackish or brownish blue. D 1/42 or 43, C $17\frac{?}{?}$, A 1/37 or 38, P 23 Br. VI. (VII?) Inhabits *Sea of Malayan Peninsula and Islands,* Chusan, Macao, Coromandel, Bay of Bengal, Bombay, Java, Celebes, Madura. Total length: 1 foot. The length of the head is $3\frac{1}{3}$ in the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is $\frac{1}{4}$ of the length of the head. In each jaw appears a single series of excessively minute teeth. The greatest vertical diameter of the body, from the middle of the point of the dorsal to the anal, is a little less than $\frac{1}{3}$ of the total length. The lateral line, at the upper third of the body, follows the outline of the back to a little in front of the dorsal, from whence it proceeds straight to the caudal. It is raised, like a thin cord; the tail is distinctly keeled. The dorsal fin is preceded by four or five, the anal by four short spines, which, however, are completely hid by the integuments. The length of the falcated pectorals is a little more than $2\frac{1}{2}$ in the total. The lobes of the caudal equal the length of the head. This species, "*the black pomfret,*" is at all seasons taken in abund-

ance in the Straits of Malacca, where, however, it is considered inferior to *Stromateus sinensis*, "*the white pomfret*." In dried state it is largely exported, and thus it appears in the bazars of Hindustan, which are chiefly supplied from Bombay.

(3731) *Stromateus sinensis*, Euphrasen.

Syn. Stromateus sinensis Euphrasen: Act. Acad. Stockh. IX. 49, Tab. 9.
Stromateus atoo-koia, Russell, p. 35. No. XLIV. Atoo Koia.
Stromateus albus, Cuv. R. A, II. 213 (2).
Stromateus albus, Cuv. and Val. IX. 388.
Stromateus atous, Cuv. and Val. l. c. 389.
Stromateus albus, Cantor, Ann. Nat. Hist. IX. 15.)
Stromateus atous, Richardson Report 1845, 273.
Bawar or Bawal chirmin of the Malays.

Young. Head above and back reddish brown; rest of the body and fins lighter silvery, with a mixture of ventral tint, lilac or blue; dorsal, anal, and caudal with the marginal half blackish; everywhere with brown dots of different sizes: the larger with a silvery point in the centre. *Adult*. Head above, back and sides to the lateral line deep neutral tint; rest of the body with a mixture of brownish grey with metallic reflection, lighter, silvery towards abdomen; everywhere dotted as the young; large patches of milk white naked skin, where the scales have disappeared; fins silvery grey, marginal half blackish; cavity of the mouth and tongue pale bluish grey with brown dots, silvery in the centre. Iris reddish silvery or copper-coloured, minutely dotted with brown. D 1/43 to 46, C 17/7, A 1/39 to 42, P 26 or 27, Br. VI. Inhabits *Sea of Malayan Peninsula and Islands*, Coromandel, Bay of Bengal, Macao, Chusan. Total length: 10 inch. The length of the head is 4½ in the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is a little less than ⅓ of the length of the head. The lower jaw projects a little beyond the upper: in both appears a single close series of excessively minute teeth. The thread-like lateral line, at the upper fifth of the body, follows the outline of the back to the termination of the dorsal fin, from whence it proceeds straight, along the upper third of the tail to the caudal. The scales of the body are small, orbicular and so deciduous that the fish generally appears with large patches of milkwhite naked skin. The greatest vertical diameter of the body, from the middle of the point of the dorsal to that of the anal fin, exceeds by ⅕ half the total length. The pectorals are broad, pointed but not falcated and project from the body; their length is 3½ in the total. The length of the broad triangular caudal lobes equals that of the head. Both the dorsal and anal fin are preceded by four spines completely hidden by the integuments. As in *Stromateus fiatola*, Linne, and in *S. argenteus* Bloch, the fleshy oesophagus is armed with numerous bony, barbed, spines or teeth. In the stomach of those examined appeared remains of fishes. This is par excellence the "*white pomfret*" of the Straits Settlements and Madras, "*pample blanche*" of Pondicherry. It is justly renowned for its flavour, but it requires to be freshly taken when used. In the Straits and on the Coromandel Coast it is abundant at all seasons. At the Sandheads in the Bay of Bengal, (21° N. L.) it occurs, but less numerously. Russell happened seldom to see this species and considered it very inferior to the "*black*" (*Stromateus niger*, Bloch) or "*white pomfret*," by which latter Russell means *Stromateus argenteus*, Bloch. (Russell p. 34.)

(3732) *Stromateus argenteus*, Bloch.

Syn. Stromateus argenteus, Bloch, Pl. 421.
Stromateus argenteus, Shaw IV. 110.
Stromateus argenteus, Russell p. 31, 35 No. XLII. Tella Sandawa.
Stromateus candidus, Cuv. R. A. II, 213 (2).
Stromateus candidus, Cuv. and Val IX, 391.
Stromateus argenteus, Cuv. and Val. IX. 393.
Stromateus securifer, Cuv. and Val. IX. 394, Pl. 273 (*Young.*)
Stromateus candidus, Belanger, 369, Pl. II. Fig. 2.
Stromateus securifer, Cantor Ann. Nat. Hist, IX. 15.
Stromateus securifer, Richardson Report 1845, 273.
Stromateus candidus, Bleeker: Verh. Bat. Gen. XXII. 4.

Head above back and sides to the lateral line neutral tint with purple reflections; sides of the head and body beneath the lateral line silvery grey, everywhere with minute black dots, disposed on the sides of the occiput, and the upper half of the body so as to produce alternate indistinct, blackish and silvery grey-undulating, irregular lines; on the upper part of the opercle an irregular black spot; abdomen silvery white; dorsal and anal silvery, minutely dotted with black so as to render the point and marginal half blackish; caudal and pectorals yellowish white, minutely dotted with black so as to make the posterior half and the margins blackish; cavity of the mouth and tongue as in *S. sinensis*. Iris silvery, minutely dotted with black. D 9—1/39 to 43, C 17/7, A 6—1/34 to 38, P. 25, Br. VI. Inhabits, *Sea of Malayan Peninsula and Islands*, Malabar, Coromandel, Bay of Bengal, Macao, Chusan, Java, Madura. Total length: 9 inch. The length of the head is 4½ in the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is 3½ in the length of the head. The muzzle is a rounded protuberance which

considerably projects beyond the mouth. Both jaws have a single close series of excessively minute teeth. The naked skin of the upper part of the head and the anterior part of the back is longitudinally wrinkled. The lateral line follows a similar course to that of *S. chinensis*, and the scales of the body are equally deciduous. The points of the dorsal and anal are more falcated and as well as the lobes of the caudal and the pectorals more elongated than in the former species. The length of the point of the anal, slightly exceeding that of the dorsal, equals the pointed pectorals which as well as the caudal lobes are $\frac{1}{3}$ of the total length. The greatest verticle diameter of the body between the commencement of the dorsal and anal fin, exceeds by $\frac{1}{4}$ half the total length. The dorsal fin is preceded by nine truncated processes of which each has one forwards and one backwards directed spine; the anal is preceded by six similar ones, differing, however, in having the longer spine pointing backwards. In young individuals these spines are much more distinct than in the adult, and in this stage the fish has been described as *Stromateus securifer.—Stromateus argenteus*, Euphrasen,—*Stromateus aculeatus*, Bloch-Schneider, is probably also the young of this species. In the adult fish the anterior two or three of the truncated dorsal processes are completely hidden by the integuments, and the rest are barely piercing the back, so as to be more readily felt than seen. Although they escaped the observation of Bloch, Russell correctly identified his No. XLII. *Tella Sandawa*, with Bloch's Pl. 421. In the Straits Settlements as well as at Madras, also, this species is denominated the "*white pomfret.*" In abundance and excellence it vies with *S. sinensis*.

(3733) *Stromateus cinereus*, Bloch.

Syn. Stromateus cinereus, Bloch Pl. 420.
Stromateus cinereus, Shaw IV. 109.
Russell XLV. Sudi Sandaweh.
Stromateus sudi, } Russell p. 35
Stromateus cinereus, }
Stromateus griseus, Cuv. R. A. II. 213 (?)
Stromateus griseus, Cuv. & Val. IX. 395.

Head above, back and sides to the lateral line lead grey; cheeks and opercles silvery, slightly dotted with black; an irregular black spot on the upper part of the opercle; sides beneath the lateral line silvery grey; abdomen silvery white; dorsal and anal silvery grey, minutely dotted with black; their elongated points margins blackish; caudal yellowish white, minutely dotted with black, margins and posterior part of the lobes blackish; pectorals buff, upper margin and posterior half minutely dotted with black; cavity of the mouth and tongue as in *S. sinensis*. Iris silvery, orbital half lead grey. D 7 or 8—1/39 to 41, C 17/7, A 5—1/32 to 39, P 23 to 25, Br. VI, Inhabits *Sea of Malayan Peninsula and Islands*, Coromandel, Bay of Bengal.

Length of the body..... 4 inch.
„ of the lower caudal lobe, ... 4 „
Total length: 8 inch.

The length of the head is $\frac{1}{4}$ of the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The muzzle forms a large rounded protuberance projecting over the mouth. Each jaw has a close series of excessively minute teeth. The lateral line is situated as in *S. sinensis* and *argenteus*. The scales of the body are small, orbicular and so deciduous that the fish generally appears scaleless. The truncated processes preceding the dorsal and anal fin resemble those of *S. argenteus*, from which the present may readily be distinguished by the far greater elongation of the lower lobe of the caudal, and of the falcated point of the anal fin. The falcated point of the dorsal equals the length of the pointed pectorals, which are $2\frac{2}{3}$ in the total length. The upper caudal lobe is but $\frac{1}{2}$ of the lower, which equals the length of the body, the caudal not included. The length of the falcated point of the anal fin in some individuals equals the lower caudal lobe, in others it is but $\frac{2}{3}$ of the latter. The greatest vertical diameter of the body, between the commencement of the dorsal and anal fin, exceeds by $\frac{1}{3}$ half the total length. At Pinang this species is as abundant as the preceding, but probably from its inferior size it is considered somewhat inferior in quality. At the Sandheads it occurs rarely.

Genus CYRTUS, *Bloch.* 1787. Body compressed; back greatly elevated with several small trenchant blades in front of the dorsal; between the ventrals on the pelvis a horizontal, backwards directed spine; scales excessively minute, transparent; ribs dilated, convex, forming rings in contact with each other and producing a conical cavity.

(3734) *Cyrtus indicus*, Bloch.

Syn. Kurtus indicus, Bloch Pl. 169.
Kurtus indicus, Linne, Syst. 1184.
Kurtus blochii, Lacep, II. 516 & 517.
Kurtus indicus, Shaw IV. 185, Pl. 25. } (*Female?*)
Russell XLVIII. Somdrum Kara Moodee. (*Male?*)
Kurtus indicus, Cuv. R. A. II. 215. (*Female?*)
Kurtus cornutus, Cv. l. c. (*Male?*)
Kurtus blochii, Cuv. and Val. IX. 421, Pl. 277. (*Female?*)
Kurtus cornutus, Cuv. and Val. IX. 226. (*Male?*)
Kurtus blochii, Swainson II. 253.
Kurtus blochichiü, Bleeker: Verh. Bat. Gen. XXII. 4.

Head above and body flesh-coloured, hemitransparent; back minutely and closely dotted with black, forming immediately behind the occiput a large rounded spot, from which in some

(the males?) projects the black, downwards arched, horn-like process; opercles and jaws silvery, with steel blue reflections; abdomen silvery with rose-coloured, lilac and golden reflections; pectorals and ventrals whitish, the rest of the fins pale reddish or whitish yellow, minutely dotted with black. Iris silvery, upper orbital margin blackish. D 8—2/13, C 17$\frac{1}{2}$, A 2/33 or 34, V 1/5, P 23, Br. VII. Inhabits *Sea of Malayan Peninsula and Islands*, Java, Madura, Coromandel, Sandheads. Total length: 5 inch. The length of the head in a straight line from the symphysis of the lower jaw, is $\frac{1}{4}$ of the total, measured to the centre of the posterior margin of the caudal, but taken obliquely upwards to the membranous angle of the opercle, it is but $\frac{1}{4}$ of the total, and equals the depth at occiput. The diameter of the eye is $\frac{1}{4}$ of the former length of the head. In each jaw is a band of card-like teeth: in the upper immediately under the symphysis is a naked excavated space, which receives from the lower a corresponding protuberance, covered with teeth; on the vomer and the palatals appears a single series of excessively minute velvety teeth. On the inferior margin of the preopercle appear three strong backwards arched spines, of which the posterior is the longest and somewhat removed from the others. The angle of the opercle projects far back, and is excessively thin, membranous, supported by four or five backwards radiating rays, the points of which are exposed. In those, supposed by Cuvier to be males, projects immediately behind the occiput a horn-like, compressed process, broad at the base, somewhat attenuated, but truncated at the apex. It is arched, placed horizontally, with the apex bent downwards. On the upper margin, close to the apex appear four minute spines. The two first dorsal spiny processes immediately behind the horn-like one, are very minute, triangular, with the point directed backwards; the third is truncated with a minute spine in front and behind; the fourth is much larger and consists of a forwards directed spine; the succeeding four spines gradually increase and are all directed backwards. The dorsal fin is preceded by two spines of which the anterior is $\frac{1}{4}$ of the second, which again is $\frac{1}{2}$ of the length of the first ray. The greatest vertical diameter of the body, in front of the first dorsal ray, is $\frac{1}{3}$ of the total length. Each of the broad, excavated ribs, from the third to the fifteenth vertebra, serves to form a conical, funnel-shaped cavity, very pointed towards the tail. The broad truncated lower extremity of each rib is striated, so as to appear as if fringed. The stomach is a rounded, rather capacious sac, generally expanded by remains of *Crustacea*; the liver is small, divided in two lobes; the gall bladder and the spleen excessively minute. The narrow intestinal canal forms two circumvolutions: its length is about $\frac{2}{3}$ of the length of the fish. In the Straits of Malacca and the Bay of Bengal as far as the mouths of the Ganges, it is excessively numerous at all seasons. Individuals with the horn-like process are far less numerous than those without it. Large quantities are dried, and consumed by the natives of India. Plate 277 of Cuvier and Valenciennes represents the fish much too red.

Genus EQUULA, *Cuvier* 1817. Body compressed; dorsal undivided; snout greatly protractile; edges of back and abdomen dentated along the fins.

(3735) *Equula caballa*, Cuv. and Val.

Syn. Scomber equula, Forskal, Faun. Arab, 58, No. 77.
Centrogaster equula, Linne: Syst. 1337.
Cæsio poulain, Lacep. III. 90.
Russell LXII. Tottah Karah?
Scomber equula, Shaw, IV. 596.
Equula caballa, Cuv. and Val. X. 73.
Equula caballa, Ruppell: Neue Wirbelth, Fische, 51.
Equula caballa, Bleeker: Verh. Bat. Gen. XXII. 5.

Head above and back silvery pale green, minutely dotted with black; the rest of the head and body shining silvery; muzzle above greenish grey, minutely dotted with black; dorsal and anal spines pale silvery irridescent, and as well as their membranes sparingly dotted with black; the base of the dorsal and anal membrane pale reddish yellow, the rest hyaline, the margin of the dorsal blackish; caudal yellowish white, minutely dotted with black, so as to render the posterior margin blackish, ventrals white, reddish yellow at the base and with a few black dots; pectorals hyaline, blackish silvery outside along the root, on the innerside and in axilla black. Iris silvery, orbital half blackish. D 8/16 or 7/17, C 17$\frac{1}{2}$, A 3/14 or 15, V 1/5, P 18 or 19, Br. V. Inhabits *Sea of Pinang*, *Sngapore*, Red Sea, Bombay, Malabar, Guam, Coromandel, Java, Sumbava, Madura. Total length: 6 inch. The length of the head is 3$\frac{2}{3}$ in the total, in the centre of the caudal margin; but with the muzzle protracted it slightly exceeds $\frac{1}{3}$ of the total. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The narrow band of fine flexible teeth in the jaws, is almost hid by the fleshy lips. The lower part of the protracted muzzle is considerably arched downwards. The greatest vertical diameter of the body, in front of the dorsal fin, is $\frac{1}{2}$ of the total length. The second dorsal spine is broad, sabre-like, with a sharp edge, and on each side with a narrow longitudinal furrow. The second anal is shorter, but of the same shape. The anterior margin of the third and fourth dorsal, and of the third anal spine is toothed like a saw. Both the dorsal, anal, and ventral spines have the posterior margin transversely striated, a structure also observed in some species of the Genera *Apogon*, Lacep. and *Chanda*, Buchan, Ham. The succeeding

species of *Equula* present the same structure of these organs. The length of the second dorsal spine equals that of the head, or $\frac{1}{2}$ of the greatest vertical diameter of the body; the third dorsal is $\frac{1}{3}$ shorter than the second. The second anal spine is even broader than the second dorsal, but shorter, its length but slightly exceeding that of the third dorsal. The third anal is $\frac{2}{3}$ of the second. In *Equula edentula* (Bloch) (Syn. *Scomber edentulus*, Bloch.—*E. ensifera*, Cuv. and Val.) the two spines are of nearly equal length. At Pinang single individuals are of rare occurrence.

(3736) *Equula bindus*, Cuv. and Val.

Syn. Russell LXIV. Bindoo Karah.
Equula bindus, Cuv. and Val. X. 78.

Young. Head above and back silvery pale green, minutely dotted with black, so as to form a blackish line along the base of the dorsal; rest of the body shining silvery; upper part of opercle steel blue; dorsal fin hyaline, edged with black, upper third of second, third, fourth and fifth dorsal spines bright orange; caudal pale yellowish, minutely dotted with black, posterior margin blackish; anterior third of anal bright yellow, the rest hyaline; ventrals and pectorals whitish; inside of the mouth and gill-covers dotted with black. Iris silvery, orbital half blackish. D 8/16, C $17\frac{1}{7}$, A 3/14, V 1/5, P 15, Br. V. Inhabits *Sea of Pinang*, Coromandel. Total length: 3 inch. The length of the head is $3\frac{1}{3}$ in the total to the centre of the caudal margin; when the muzzle is protracted, it is $\frac{1}{3}$. The latter projects horizontally, forming a short truncated, cone. In both jaws appear a single series of excessively fine setaceous teeth. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The two small spines above the anterior part of each orbit are strongly marked. The upper margin of the orbit is very finely toothed, but all the cranial crests are smooth. Russell's remark, that the back before the dorsal fin feels serrated to the finger, must therefore refer to the upper margin of the orbit. Between the interparietal crest and the first dorsal spine appears a smaller interspinal crest, the apex of which, however, does not in this more than in the other species penetrate the integuments. The greatest vertical diameter of the body, in front of the dorsal fin, is $\frac{1}{2}$ of the total length. The second dorsal spine is $\frac{1}{7}$ of the latter, or $\frac{2}{3}$ of the greatest vertical diameter; the third dorsal spine is but little shorter. The second anal spine equals in length the second dorsal, but it is a little less broad; the third anal is $\frac{3}{4}$ of the second. The ventral fins are remarkably short; their length equals the diameter of the eye; their spine is distinct, but slender. A single individual was observed at Pinang in April 1844.

(3737) *Equula splendens*, Cuvier.

Syn. Russell LXI. Goomarah Karah.
Equula splendens, Cuvier R. A. II. 212 (1).
Equula gomorah, Cuv. and Val. X. 80.
Equula gomora, Ruppell, Neue Wirb. Fische. 51.

Head above and back pale golden green, minutely dotted with black, forming a blackish line along the base of the dorsal fin; rest of the body silvery satin; the muzzle minutely dotted with black; a little above the lateral line an arched pale reddish line joining the posterior third of the lateral, which itself above borders a broad longitudinal pale reddish band; cheeks and opercles shining silvery; membrane of dorsal hyaline, the upper half between the second and sixth spine black; the rest edged with black; caudal pale reddish yellow, minutely dotted with black; anal pale reddish yellow; ventrals and pectorals white. Iris silvery, orbital margin black. D 8/16, C $17\frac{7}{7}$, A 3/14, V 1/5, P 19, Br. V. Inhabits *Sea of Pinang*, Coromandel, Malabar, Red Sea. Total length: 4 inch. The length of the head is $3\frac{2}{3}$ in the total to the centre of the caudal margin; with the muzzle protracted, it is $3\frac{1}{3}$. The latter projects very slightly downwards, forming a short truncated cone. The lips are rather fleshy and hide the single series of fine setaceous teeth. The diameter of the eye is a little more than $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body, in front of the dorsal, is $2\frac{1}{3}$ in the total length. The second dorsal spine is $\frac{1}{5}$ of the total length, a little less than $\frac{1}{2}$ of the greatest vertical diameter; the third dorsal is but little shorter. The second anal spine is $\frac{2}{3}$ of the second dorsal; the third anal slightly shorter than the second. Single individuals occur, but rarely, at Pinang.

(3738) *Equula daura*, Cuvier.

Syn. Russell LXV. Dacer Karah.
Equula daura, Cuvier, R. A. II. 212, (1).
Equula dacer, Cuv. and Val. X. 83.

Young. Head above and back light greenish grey, minutely dotted with black, forming a black line along the base of the dorsal; rest of the body silvery satin; between the occiput and dorsal fin a large triangular blackish spot, not descending to the lateral line; from the posterior angle of the opercle to the caudal a pale yellowish longitudinal band; cheeks and opercles shining silvery, infraorbitals blackish; dorsal hyaline, upper half between the second and sixth spine blackish; caudal yellowish white, minutely dotted with black; anal and pectorals hyaline; ventrals white. Iris silvery, orbital half black. D 8/16, C $17\frac{7}{7}$, A 3/15, V 1/5, P 19, Br. V. Inhabits *Sea of Pinang*, Coromandel, Ceylon. Total length: $2\frac{5}{8}$ inch. The length of the head is $3\frac{1}{4}$ in the total to the centre of the caudal margin; when the conical, slightly downwards arched muzzle is protracted, it is $3\frac{1}{3}$. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body is little less than $\frac{1}{4}$ of the total length. The second dorsal spine is $4\frac{2}{3}$ in the total length; the third is but

little shorter; the second anal is $\frac{1}{4}$ of the second dorsal; the third anal is $\frac{2}{3}$ of the second. Single individuals occur occasionally at Pinang.

(3739) *Equula filigera*, Cuv. and Val.

Syn. Cuvier: Mem. du Mus. I. 402, Pl. 23, Fig. 1.
Equula filigera, Cuv. and Val. X. 92 Pl. 284.
Equula filigera, Swainson II. 250.

Head above and back pale greyish green, minutely dotted with brown; rest of the head and body shining silvery; fins yellowish white; dorsal spines and their membranes, and the muzzle dotted with pale brown. Iris silvery, orbital margin blackish. D 8/16, C 17, A 3/14, V 1/15, P 19, Br. V. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Moluccas, Seychelles, Malabar, Ceylon. Total length: 5 inch. The length of the head is $3\frac{1}{3}$ in the total to the centre of the caudal margin; with the protracted downwards arched muzzle it is $\frac{1}{3}$. The diameter of the eye is $3\frac{1}{3}$ in the length of the head. The fleshy lips entirely cover the narrow bands of setaceous teeth. The greatest vertical diameter, in front of the dorsal fin, slightly exceeds $\frac{1}{4}$ of the total length. The second, slender, flexible dorsal spine is by $\frac{1}{7}$ less than the greatest vertical diameter of the body: the third is about $\frac{1}{3}$ of the length of the second anal; it slightly exceeds $\frac{1}{2}$ of the second dorsal, and is of equal breadth; the third anal is $\frac{2}{3}$ of the second. This species occurs, but not numerously, at all seasons at Pinang.

(3740) *Equula insidiatrix*, (Bloch).

Syn. Zeus insidiator, Bloch, Pl 192, Fig. 2.
Zeus insidiator. Linne, Syst. 1221.
Zee ruse, Lacep. IV. 575.
Zeus insidiator. Shaw IV. 284. Pl. 41.
Equula insidiatrix, Cuv. R. A. II. 212 (2).
Equula insidiatrix. Cuv. and Val. X. 98.
Equula insidiatrix, Bleeker: Verh, Bat. Gen. XXII. 5.

Head above and back metallic violet, paler on the sides towards the lateral line; rest of the head and body shining silvery; head and back minutely dotted with black, forming a blackish line along the base of the dorsal; along the upper part of the sides nine or ten pale reddish brown vertical bands, each consisting of three or four round or irregular spots, descending a little beneath the lateral line; in some individuals a blackish spot on the upper part of the opercle; from the lower part of the orbit along the anterior margin of the cheek an oblique black line bordered behind by a sulphur-coloured one; fins hyaline; caudal minutely dotted, dorsal edged with black; cavity of the mouth minutely dotted with black; internal surface of opercles sulphur-coloured, partially dotted with black. Iris silvery, orbital margin black. D 8/16, C 17, A 3/14, V 1/5., Br. IV ? Inhabits *Sea of Malayan Peninsula and Islands*, Surat, Coromandel, Malabar, Bay of Bengal, mouths of the Ganges, Java, Madura. Total length: $3\frac{3}{8}$ inch. The length of the head is $\frac{1}{4}$ of the total to the centre of the posterior margin of the caudal; when the slightly upwards directed tubular mouth is protracted, it is $\frac{1}{3}$ of the total. The lower margin of the preopercle, particularly the anterior part, is finely yet distinctly toothed. The diameter of the eye is $2\frac{1}{2}$ in the length of the head. The greatest vertical diameter of the body, in front of the dorsal, is a little less than $\frac{1}{3}$ of the total length. The second dorsal spine is $\frac{1}{3}$ of the greatest vertical diameter of the body. The second anal spine is $\frac{2}{3}$ of the second dorsal; the third anal is $\frac{1}{2}$ of the second, but much slenderer. The ventrals are very short, their length somewhat less than the diameter of the eye. The branchiostegous membrane appears to have a fifth excessively minute ray. This species is at all seasons very abundant in the Straits of Malacca, and numbers are dried and consumed by the natives.

(3741) *Equula longimana*, Cantor.

Head above and back lead coloured, minutely dotted with black along the dorsal fin; rest of the head and body shining silvery, slightly iridescent; where the opercle and preopercle join above appears a pale blackish spot; on the anterior part of the side between the commencement of the dorsal and the anterior third of the pectoral, a large rounded bluish black spot; fins hyaline; upper half of dorsal membrane, between the third and eighth spine, indistinctly spotted with pale brown. Iris silvery, orbital half black. D 10/15, C 17, A 4/13, V 1/5, P 13, Br. V. Inhabits *Sea of Malayan Peninsula Islands*. Total length: $4\frac{1}{8}$ inch. The general form of the fish is elongated oblong, the greatest vertical diameter of the body, in front of the dorsal fin, being $\frac{1}{5}$ of the total length, measured to the centre of the posterior margin of the caudal. The length of the head is $3\frac{1}{3}$ in that distance; when the very little downwards protractile mouth is extended, it is $\frac{1}{3}$. The cranial crests are short and less sharp than in the preceding species. No spines appear above the anterior part of the orbit. The diameter of the eye is $2\frac{1}{2}$ in the length of the head. The lips are fleshy, covering a narrow band of minute, recurvous, setaceous teeth, of which there are fewer in the lower than in the upper jaw. The opercle terminates behind in a very obtuse, membranous angle; it is joined to the sub-opercle by an oblique line; by a vertical to the preopercle. The latter the triangular, with the posterior part very thin; the posterior margin is smooth, not toothed, its ascending portion is vertical, the lower rounded, nearly horizontal; the anterior margin is thick, forming a broad, oblique line. The interopercle fits closely so as to cover the branchiostegous membrane; its lower margin is convex. The in-

fraorbitals are completely hid. The cheeks, as well as the rest of the head are covered with scales like those of the body, but the opercles have a scaleless appearance. The indistinct lateral line follows the outline of the back along the upper third of the body. It appears during life to be naked; it is, however, covered with large rounded, diaphanous scales. They are deciduous, and the vertical diameter of the part exposed exceeds three to four times the horizontal. All the spines of the fins are finely transversely striated, but not toothed, and, except the second anal, remarkably slender, transparent. The first dorsal spine is excessively minute; the second is $\frac{1}{3}$ of the third, the length of which slightly exceeds $\frac{1}{4}$ of the greatest vertical diameter of the body; the fourth and fifth are but little shorter. The second anal spine is $\frac{3}{4}$ of the second dorsal, but much broader, sabre-like; the third anal is $\frac{3}{4}$ of the second. The pectorals differ from those of all the other species by being very elongated and falcated; they extend as far back as the posterior third of the dorsal fin; their length is $\frac{1}{3}$ of the total. The ventral are less than $\frac{1}{3}$ of the pectorals. The caudal lobes equal the length of the head. The series of spines along the base of the dorsal and anal fin are very small. In the Straits of Malacca this species is very abundant at all seasons, and quantities, both fresh and dried, are consumed by the natives.

Genus GAZZA, *Ruppell* 1835. Body compressed, with very minute scales; mouth moderate, greatly protractile, with a single series of crooked teeth among which a few longer and stronger than the rest; no teeth on the palatals nor vomer; preopercle with a double margin; the lower part of the external margin serrated; otherwise resembling *Equula*, but the series of spines along the base of the dorsal and anal fins may be felt, not seen.

(3742) *Gazza equulaeformis*, Ruppell.

Syn. Gazza equulaeformis, Ruppell: Neue Wirbelth. Fische, 4, Tab. 1, Fig. 3.

Head above and back pale lead coloured, minutely dotted with black; rest of head and body shining silvery; muzzle and upper lip minutely dotted with black, the cheeks with pale blue; palate, floor of the mouth and internal surface of branchiostegous membrane minutely dotted with black; dorsal and anal spines pale steel blue; fin-membranes hyaline; dorsal between the second and sixth spine minutely dotted with black, superior margin black; posterior half of caudal minutely dotted with black. Iris silvery, orbital margin black. D 8/16, C 17, A 3/14, V 1/5, P 16 or 17, Br. V. Inhabits, *Sea of Pinang, Malayan Peninsula, Singapore*, Massaua (Red Sea). Total length: 4 inch. The length of the head is $3\frac{1}{5}$ in the total to the centre of the posterior margin of the caudal; with the mouth protracted it is $\frac{1}{5}$. The diameter of the eye is $\frac{1}{3}$ of the length of the head. Above the anterior part of the orbit appear two minute spines, and behind them the whole of the upper margin of the orbit is very finely toothed. The greatest vertical diameter of the body, in front of the dorsal fin, slightly exceeds $2\frac{1}{2}$ in the total length. The second dorsal spine is $2\frac{1}{3}$ in the greatest vertical diameter; the second anal is $\frac{3}{4}$ of the length of the second dorsal; third anal is but slightly shorter than the second. The superior branchiostegous ray is closely adhering to the gill-cover; the inferior, (the fifth), is farther removed from the fourth than the other four or among themselves. In the Straits of Malacca this species is very numerous at all seasons, and forms like the rest an article of food.

Genus MENE, *Lacepede* 1803. Mouth like that of *Equula*, but body more compressed; margin of abdomen trenchant, very convex owing to the development of the scapular and pelvic bones, throwing the ventrals farther back than the pectorals; profile of the back nearly horizontal.

(3743) *Mene maculata*, (Bloch-Schneider).

Syn. Zeus maculatus, Bloch-Schneider, 479, 480, Pl. 14, Fig. 2.
Mene anne-caroline, Lacep. V. 95, No. 6, Pl. 22.
Russell LX. Ambata Kuttee.
Mene maculata, Cuv. and Val. X. 104, Pl. 285.
Mene maculata, Swainson II. 251.
Mene maculata, Temm. Schl. Fauna Japon. Pisc. 127, Pl. LXVII. Fig. 3.
Mene maculata, Richardson, Report 1845 276.

Head above and back greenish lead coloured, paler on the sides towards the lateral line; rest of the body silvery satin; above the lateral line one or two longitudinal series of more or less distinct, rounded, lead coloured spots; beneath the lateral line two similar series; jaws, cheeks and opercles shining silvery; dorsal pale olive greyish, minutely dotted with black; caudal silvery at the base, rest yellowish white, minutely dotted with black; anal silvery white; ventrals white, first, elongated ray, silvery at the base, rest blackish; pectorals hyaline; lips blackish; tongue, and internal surface of the mouth dotted with black. Iris silvery, orbital margin blackish. D 4/43, C $17\frac{1}{2}$, A 31, V 1/5, P 16, Br. VII. Inhabits, *Sea of Pinang*, Java, Coromandel, Japan. Total length: 5 inch. The length of the head is $3\frac{1}{3}$ in the total to the centre of the posterior margin of the caudal with the muzzle protracted it is $2\frac{3}{4}$. The diameter of the eye is $3\frac{1}{2}$ in the length of the head. The teeth are excessively minute, velvety: in the upper jaw their narrow linear band suddenly widens towards the angle of the mouth. In the space between the interparietal and the interspinal crest, front of the dorsal fin, appear in succession three small flat-

tened, lancet-shaped ossicles. The greatest vertical diameter of the body, in front of the dorsal fin, is a little less than ⅓ of the total length. In a solitary individual, observed in August 1845 at Pinang, the lateral line presents the following appearance, The short anterior part, consisting of three rather large tubes, rises nearly vertically, when it turns backwards under a nearly right angle, and proceeds very close to the back towards the origin of the dorsal, where it suddenly disappears. A similar line, but formed of much smaller tubes, commences on the upper fifth of the back, opposite the eighth dorsal ray, and proceeds, deviating a little obliquely upwards. to the thirty-first dorsal ray, where it suddenly terminates. The length of the first ventral ray is 2½ in the total length. The pectoral rays are remarkably broad, compressed, particularly the second which resembles the blade of a sabre.

Fam. CHÆTODONTIDÆ.

Gen. CHÆTODON, (*Artedi*) *Linne* 1748. Teeth of the jaws slender, flexible and close like the hairs of a brush; mouth very small, slightly or not at all projecting; body elliptical or nearly orbicular; caudal fin truncated; 12 or 13 dorsal, 3 anal spines; dorsal spines and rays continued in a nearly uniform curve; branchiostegous rays six.

(3744) *Chætodon prætextatus*, Cantor.

Plate III.

Head as far as the occiput, gill-covers and throat black; on the chin a rounded white spot; a white band round the throat to the angle of the mouth; a second, also encircling the throat, obliquely upwards and forwards in front of the eye across the forehead; a third, narrow, backwards arched white line on the forehead between the eyes; a broad white band surrounding the chest, narrowing as it vertically ascends between the preopercle and the eye, and continues to a little in front of the first dorsal spine; body and the scaly part of the dorsal and anal fin lightly greyish brown; each scale minutely dotted with black, and on the body with a short central dark bar, reflecting a series of parallel lines ascending obliquely backwards; dorsal spines vermilion, their membrane light greyish brown; margin of the soft fin black (the very point of the rays colourless,) beneath bordered by a narrow white line, under which a broad vermilion band, gradually widening backwards; in some the latter is placed immediately under the black margin, and longitudinally divided by a narrow white line; on the anterior half of the caudal a vertical vermilion band, next a narrower black, behind which the rest of the fin is white; anal spines light brownish grey, membrane black; margin of the soft part black (the very point of the rays colourless,) bordered above by a broad crescent shaped vermilion band; ventrals black; pectorals brownish or blackish at the root; the rays brownish white, membrane transparent. Iris milky white or buff. D 12/26, 27 or 28, C 17½ A 3/20, 21 or 22, V 1/5, P 15 or 16, Br. VI. Inhabits *Sea of Pinang*. Total length 5⅛ inch. The outline of the much compressed body is broad oval, deeply emarginated behind by the three vertical fins; the profile descends nearly straight from the dorsal fin to the narrow, slightly elongated muzzle. The greatest vertical diameter of the body, taken from the root of the 7th dorsal spine, is ½ of the total length. The length of the head, nearly equalling the height at the occiput, is about ¼ of the total length; the eye is situated a little above the centre of the longitudinal diameter, but in the centre of the greatest vertical diameter of the head; its diameter is ⅓ of the length of the head. The mouth is slightly protractile, very small, the cleft being ⅓ of the length of the head; the teeth are normal; the nostrils open near the anterior part of the orbit; the preopercle is narrow; near the angle are a few indistinct crenulations: the operacle terminates in a small flat membranous point. The black ocular band is in front bordered by the second white band, which obliquely encircles that part of the head; behind by the posterior white band; which from the chest proceeds vertically over the preopercle to a little in front of the anterior dorsal spine. As the profile of the head is sloping, the black ocular band is nearly threesided, much broader above than below the eye. The dorsal spines gradually increase in length till the fifth which, as well as the rest, is nearly equal ⅔ of the length of the head; the two anterior spines are exposed; the rest become gradually covered with scales which spread in an oblique arched line, so as barely to leave the points of the three last spines visible; the soft portion is gently arched, scaly, highest in the middle, where the rays slightly exceed the length of the fifth spine. The length of the caudal fin is a little more than ½ of the length of head; the posterior margin is straight when at rest, but rounded when expanded, and then more than double the length of the fin; the anterior ¾ are covered with scales. The anal commences opposite the 8th or 9th dorsal ray; the anterior spine is ⅓ of the second and third, which in length equal the fifth dorsal; they are gradually covered with scales, so that of the last one third only is exposed; the soft part is rounded, scaly, its highest elevation in the middle equalling that of the dorsal. The ventrals commence opposite the termination of the root of the pectoral; the length of the spine is ½ that of the head, and ⅔ of that of the first ray; above the root of each ventral appears a broad pointed scale. The length of the pectorals is a little more than ⅕ of the total. The scales of the body are rounded, higher than long, ciliated; those of the lateral line much smaller than the rest and nearly triangular; the line itself ascends

backwards till opposite the 11th dorsal spine, from whence it descends, closely following the back to the termination of the soft dorsal fin. The lateral line follows a similar course in *Chætodon reticulatus*, Cuv. and Val. Of the present species two were observed at Pinang in May 1845, and in June, eleven were taken together in a fishing net, all nearly of equal size. The fishermen asserted the fish to be an excellent article of food, but of rare occurrence, and not to attain greater dimensions. Like other species of this and the neighbouring genera, the present expires immediately, when removed from its element. It appears to be allied to *C. reticulatus* and *C. lunula*, Cuv. and Val.

Genus CHELMON, *Cuvier* 1817. Muzzle excessively long, slender formed by the horizontally elongated internaxillary bone and the lower jaw, both of which have one half or two thirds united by a membrane, so as to reduce the mouth to a small horizontal cleft at the extremity of the cylinder; teeth in both jaws fine, velvety; in other respects like *Chætodon*.

(3745) *Chelmon Rostratus*, (Linne.)

Syn. Seba. III. Pl. 25 Fig. 17.
Chætodon rostratus, Lin. Mus. Ad. Fr. I. 61, Tab. 33, Fig. 2.
Chætodon rostratus, Linne, Syst. 1244.
Jaculator. Schlosser: Phil. Transact, 1764, 39, Pl. 9.
Chætodon rostratus, Bloch. Pl. 102, Fig. 1.
Chætodon enceladus, Shaw: Nat. Misc. 2, Pl. 67.
Chætodon rostratus Shaw: IV. 337, Pl. 47.
Chelmon rostratus. Cuv. R. A. II. 190.
Chelmon rostratus, Bennett: Life of Raffles, 689.
Chelmon rostratus. Cuv. and Val. VII. 87.

Ground colour of body and fins silvery, with one frontal and five vertical, lateral bands; all, except the fifth, orange or brownish ochreous, edged with blackish brown, outside of which with white; the frontal band along the profile of the head to the point of the elongated muzzle; the first lateral from the occiput through the iris to the throat; the second from between the first and second dorsal spine over the opercle in front of the pectoral to the abdomen in front of the ventrals; the third from the sixth and seventh dorsal spine down to the anus; the fourth, the broadest from between the ninth spine and the tenth dorsal ray to between the third anal; within this band, at the base of the soft dorsal, a rounded black spot edged with white; the fifth, in front of the caudal, black with white margins. The soft dorsal and anal with a black margin, the base of which bordered by a white line enclosed between two black ones; the anterior half of the caudal pale ochreous, the rest as well as the pectorals and ventrals white, the latter minutely dotted with black. Iris pale golden orange, longitudinally divided by the ocular band. D 9/29, C 17/$\frac{1}{3}$, A 3/20, V 1/5, P 10, Br. V. Inhabits *Sea of Singapore, Malacca*, Sea and rivers of Java, Sumatra. Total length: 5$\frac{1}{8}$ inch. Numbers were observed in May 1840, at Singapore; they were, however, all dead, and their colours apparently somewhat faded. The fish is considered excellent by the natives, and eaten both fresh and dried. At Malacca it appears to be of rare occurrence, and at Pinang no specimen was observed during upwards of four years search. The fishermen, judging from a drawing, asserted that they were acquainted with the species, but they invariably brought *Platax ocellatus*, Cuv. and Val. instead, which in colours and their peculiar distribution, certainly offers a remarkable resemblance to the present species.

Genus DIPHREUTES, *Cantor*. [Διφρευτης, a charioteer. Substituted for *Heniochus*, Cuvier 1817, pre-occupied by *Henioche*, Hubner 1816. (*Lepidoptera.*)] (*Equivalent to* Heniochus, *Cuvier.*) The anterior dorsal spines rapidly increasing in length, the third or fourth filamentous, sometimes double the length of the body, resembling a coach-whip; scales large.

(3746) *Diphreutes macrolepidotus*, (Linne.)

Syn. Chætodon macrolepidotus, Linne, Syst.
Chætodon macrolepidotus, Bloch, Pl. 200, Fig. 1.
Chætodon bifasciatus, Shaw IV. 342.
Heniochus macrolepidotus, Cuv. R. A. II. 191. (1.)
Heniochus macrolepidotus, Cuv. and Val. VII. 93, Pl. 176.
Heniochus macrolepidotus, Temm. and Schl. F. J. Pise. 82, Tab. XLIV. Fig. 1. (*Young.*)
Heniochus macroclepidotus, Richardson, Report 1845, 246.

Young. Ground colour of the head and body milk-white; on the upper part of the muzzle, as far as the anterior opening of the nostrils, a small black rectangular band; between the eyes across the forehead, a backwards pointing angular black band; a broader, comprising the three anterior and in some the root of the elongated fourth dorsal spine, proceeds obliquely downwards over the side and posterior part of the opercle, from whence it becomes broader, spreading in front over the ventrals, behind over the spinous part of the anal, edging, the soft part; a posterior black band, partially covering the 5th, 6th, 7th and 8th dorsal spine, proceeds obliquely backwards over the side covering the posterior half of the soft anal. The fourth elongated, flexible, dorsal spine and its membrane milk-white, minutely dotted with black; rest of the dorsal, the caudal and pectoral fins bright gamboge or citrine. Iris gamboge, blackish towards the orbit, divided by an oblique

black band, appearing as a continuation of the angular one of the forehead. D 11/25 or 26, C 17⅔, A 3/18 or 19, V 1/5 P 17, Br. V. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula,* Manilla, Moluccas, New Guinea, Celebes, Ceylon, Pondicherry, Isle of France, Mauritius, Mozambique, Japan. Total length; 6 inch. Solitary young individuals, not exceeding the length given, occur at all seasons at Pinang.

Genus ILARCHES, *Cantor.* [Ιλαρχης, commander of a troop. Substituted for *Ephippus*, Cuvier 1829, pre-occupied by *Ephippium*, Latreille 1802 (*Diptera.*)] (*Equivalent to* Ephippus, *Cuvier.*) Body oval or nearly orbicular: dorsal fins two, or one deeply emarginated between the spinous and soft portion; the former not covered with scales, capable of reclining in a groove, formed by the skin of the back; anal spines three; pectorals oval.

(3747) *Ilarches orbis*, (Bloch.)

Syn. Chætodon orbis, Bloch, Tab. 202, Fig. 2.
Chætodon orbis, Linne, Syst. 1244.
Chætodon orbe, Lacep. IV. 458, 491.
Chætodon orbis, Shaw, IV. 339.
Ephippus orbis, Cuv. R. A. II. 191 (3).
Ephippus orbis, Cuvier and Val. VII. 127.
Ephippus orbis, Swainson, II. 213.
Ephippus orbis, Richardson Rep. 1845, 245.

Head above and back light greyish green; sides and abdomen silvery with pale lilac lustre; fin-membranes transparent, minutely dotted with black, giving the marginal half a blackish appearance; dorsal and anal spines and their membranes, pale silvery, the rays yellowish white. Iris pale golden, minutely dotted with black. D 8—1/19, C 17⅞, A 3/16, V 1/5, P 19, Br. VI. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula,* Malabar, Tranquebar, Pondicherry, Indian and China Seas. Total length: 5⅛ inch. The greatest vertical diameter of the head exceeds by ⅓ its length, which is a little less than ¼ of the total; the greatest vertical diameter of the body is 1¾ in the total length. The young individuals, like those of *Ilarches fuber*, (Brouss). are of a less orbicular outline than the adult, their greatest vertical diameter being ½ of the total length. On each side of the centre of the upper jaw appears a small pore, and on each side of the symphysis of the lower two similar, the one placed a little in front of the other. There is besides a large pore or sometimes two on each branch of the lower jaw. The posterior margin of the caudal fin is not straight, but convex in the centre, above and below which it is slightly concave. In the young the color of the dorsal membrane, particularly the upper half of the soft, the anal and the ventral is of a deeper black than in the adult. Although individuals occur at Pinang at all seasons, they are not numerous. The fish though bony, and considered indifferent, is by the natives consumed both fresh and dried.

Genus HARPOCHIRUS, *Cantor,* [Αρπη, scythe χειρ, hand. Substituted for *Drepane*, Cuv. and Val. 1831, pre-occupied by *Drepana*, Schrank 1802 (*Lepidoptera*).] (*Equivalent to* Drepane, *Cuv. and Val.*) Pectoral fins elongated, falciform, nearly reaching the base of the caudal; outline of the body almost quadrangular.

(3748) *Harpochirus punctatus*, (Linne).

Syn. Chætodon punctatus, Linne: Syst. 1243.
Chetodon faucheur, Lacepede.
Chætodon punctatus, Shaw, IV. 365.
Russell LXXIX. Latte.
Ephippus punctatus, Cuv. R. A. II. 191 (4).
Drepane punctata, Cuv. and Val. VII. 132, Pl. 179.
Drepane punctata, Swainson II. 213.
Drepane punctata, Richardson, Report 1845, 245.
Drepane punctata, Bleeker: Verh. Bat. Gen. XXII. 5.

Head and body iridescent silvery; the crest from the occiput to the dorsal fin blackish; the upper half of the sides with more or less regular vertical series of small black spots; in some a small black spot in the axilla, in others a single oblique series of spots at the base of the soft dorsal; spines and rays pale silvery, the anterior margins of the first dorsal ray black; fin-membranes whitish transparent, the scaly portion silvery, the marginal minutely dotted with black, in some sufficiently strong to impart a blackish appearance to the marginal half. Iris silvery. D 8—1/20 or 21, C 17⅜, A 3/17, V 1/5, P 17 or 18, Br. VI. Inhabits *Sea and estuaries Pinang, Malayan Peninsula, Singapore,* Coasts of New Holland, New Guinea, Southern coasts of China, Java, Celebes, Madura, Bay of Bengal, Gangetic estuaries, Malabar. Total length: 1 foot 5 inch. The body appears to become elongated with age; in the adult the diameter from the angle of the back to that at the commencement of the anal fin is about ⅚ of the length of the body, the caudal not included. In the young it is something more than ⅘ of that distance. In the very young individuals the occipital crest is denticulated, and they are at all seasons numerous at Pinang, but large individuals occur rarely. In the largest observed, the length of which is given above, the rounded protuberance of the skull between the eyes is very large and prominent, and the roots of the four central caudal rays are enlarged and joined together without any intermediate membrane. A similar enlargement of the occipital crest and some of the bones occurs in adult individuals of *Platax arthriticus*, Cuv. and Val. The present species is bony and insipid. It is, however, eaten by the natives in its fresh and dried state.

(3749) *Harpochirus longimanus*, (Bloch-Schneider.)

Syn. Chætodon longimanus, Bloch-Schneider, 231.
Russell LXXX. Terla A.
Russell LXXXI. Terla B.
Ephippus longimanus, Cuv. R. A. II. 191 (3).
Drepane longimana. Cuv. and Val: VII. 133.
Drepane longimana, Richardson Report 1845.

Young. Head and body iridescent silvery; the crest from the occiput to the dorsal fin blackish; the upper half of the sides with four or five vertical, more or less distinct, lead coloured bands. Fins like *H. punctatus*. Iris silvery. *Adult.* Body uniformly iridescent silvery; rest like the young. Number of fin rays like *H. punctatus*. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore,* Java, Bay of Bengal, Gangetic estuaries, Malabar, China Seas. Total length: 8⅛ inch. Except the colours, no external character can be assigned to distinguish the two species; but anatomical differences have been pointed out by M.M. Cuvier and Valenciennes. Large individuals are rarely seen at Pinang, but there, as in the mouth of the Ganges, young ones are very numerous. During life or shortly after death, none of those examined presented the red colour described by Russell.

Genus CACODOXUS, *Cantor.* [Κἀκοδοξος, ill-reputed. Substituted for *Scatophagus*, Cuv. and Val. 1831, pre-occupied by *Scatophaga*, Meigen 1802. (*Diptera.*)] (*Equivalent to* Scatophagus, *Cuvier and Valenciennes.*) Four anal, eleven dorsal spines; scales excessively small.

(3750) *Cacodoxus argus*, (Linne.)

Syn. Chœtodon argus, Linne, Syst. 1248.
Chætodon argus. Bloch Tab. 204, Fig. 1.
Chætodon argus, Shaw, IV. 332.
Russell LXXVII. Chitsillo.
Chætodon pairatalis. Buchan. Hamilton, 122, 372, Pl. 16, Fig. 41.
Ephippus argus. Cuv. R. A. II. 191.
Chætodon atromaculatus, Bennett: Ceylon No. 18.
Scatophagus areus, Cuv. and Val. VII. 136.
Scatophagus argus, Richardson Report 1845. 245.
Scatophagus argus, Bleeker: Verh. Bat. Gen. XXII. 5.

Head above and back silvery blackish or brownish green, or purple, lighter on the sides; abdomen whitish or yellowish; back and sides, and in some the opercles, with blackish or brownish spots, in form, number and size liable to individual variations; dorsal and anal spines and membranes silvery, minutely dotted with black, imparting to the latter a more or less intense colour; dorsal, caudal and anal ray of the ground colour of the body, their membranes more or less intense black, with or without some smaller spots like those of the body; ventrals greyish or whitish, minutely dotted with black; pectorals whitish. Iris brown or blackish with a narrow golden circle round the pupil. D 10 –1/18, C 17½, A 4/14, V 1/5, P 18. Br. VI. Inhabits *Estuaries and Sea of Pinang, Malayan Peninsula, Singapore,* Malabar, Ceylon, Bay of Bengal, Gangetic estuaries, Java, Celebes, Madura, Moluccas, China Sea. Total length: 10 inch. The young are generally of more brilliant colours; in one taken in the Joomrah, one of the mouths of the Ganges, the dorsal spines and ventral fins were of a deep red. At Pinang this species is not very numerous. It is eaten by the natives, though many reject it on account of its reputed disgusting habits. In several examined in the estuaries of the Ganges, and at Pinang, the stomach contained remains of small fishes and crustacea. According to Bennett, it is in Ceylon angled on hooks baited with a kind of sea-weed ("Pendah,") of which this fish appears to be particularly fond.

Genus HOLACANTHUS, *Lacepede* 1802. With a large backwards pointed spine at the angle of the preopercle, the margins of which are toothed.

(3751) *Holacanthus annularis*, (Bloch.)

Syn. Chætodon annularis, Bloch. Tab. 214.
Chætodon annularis, Linne: Syst. 1262.
Holacanthe anneau, Lacepede IV, 526, 533.
Chætodon annularis, Shaw, IV. 330, Pl. 47.
Russell, LXXXVIII. Sahni Tchapa.
Holacanthus annularis, Cuv. R. A II. 122 (4).
Holacanthus annularis, Cuv. and Val.

Ground colour of the body and fins light brown with golden lustre, darker on the head; external half of soft dorsal and anal blackish; scales of the body with a central blackish spot; at a little distance above the shoulder and opercle a ring of deep blue, internally and externally edged with black; on the body a number of similarly coloured oblique, slightly arched bands: the anterior, from the 7th dorsal spine, obliquely downwards, terminating a little below the ring; the second from the 10th dorsal spine; the third from the 4th dorsal ray joins the termination of the two preceding bands; the succeeding radiate from about the fifth dorsal, each describing a larger arch, the fourth terminating opposite the point of the opercle; the fifth in the axilla, the sixth, seventh and eighth, which latter passes along the base of the anal, terminate between the root of the pectoral and ventral; the ninth passes vertically in front of the caudal fin, spanning the soft anal; the tenth and eleventh follow the course the ninth. From the orbit a short horizontal blue black edged band, which on the opercle divides in three branches, of which the lower

passes obliquely down to meet the fourth of the body; from the nostrils to the upper part of the preopercle another horizontal band. Dorsal and anal spines white, covered by the brownish membrane; caudal, ventral and pectoral rays, light yellowish brown, membrane dark brown; the large preopercular spine white, the shallow groove on the external surface filled with a brown membrane; to the slightly convex upper margin is attached a black, loose membrane. Iris brownish golden, the orbital half speckled with black. D 13/22, C 17, A 3/21, V 1/5, P. 18, Br. VI. Inhabits *Sea of Pinang*, Moluccas, Malacca, Pondicherry, Vizagapatam. Total length: 1 foot. In November 1843 a single individual was observed at Pinang. From the descriptions and figures published, it appears that the number and distribution of the bands are liable to individual variations. In the one examined, the length of the entire fourth dorsal ray did not exceed that of the first ventral, whereas it commonly projects beyond the caudal fin. The figure of Russell is defective in not representing the loose membrane attached to the superior concave margin of the large spine, nor the dentitions of the margins of the preopercle.

Genus PLATAX, *Cuvier* 1817. Teeth setaceous, external series trilobate; body very compressed and high; dorsal spines few, hid in the anterior margin of the fin; anterior rays of dorsal, anal and ventral fins elongated, in some falciform.

(3752) *Platax Vespertilio*, (Bloch).

ADULT.

Chætodon vespertilio, Bloch. Pl. 199, Fig. 2.
Chætodon vespertilio, Linne, Syst. 1257.
Chætodon vespertilio, Shaw, IV. 344.
Platax vespertilio, Cuv. R, A. 1817 II. 304, (3).
Platax vespertilio, Ruppell: Atlas 143 (Verzeichniss) Note 5.
Platax vespertilio, Cuv. R. A. 1829, 193, (1).
Platax blochii, Cuv. and Val. VII. 22.
Platax vespertilio japonicus. Temm. and Schl. faun. Jap. Pisces, 83, Tab. XLIII.
Platax vespertilio, Richardson, Report 1845, 245.
Platax blochii, Bleeker: Verh. Batav. Gen. XII. 5.

Head and body pale bluish silvery brown, lighter on the cheeks, opercles, throat, sides and abdomen; the scales minutely dotted and edged with blackish brown, and sometimes with a few scattered small dark spots on the sides; the ocular, pectoral and caudal band indistinct; basal half of dorsal and anal fins like the body; upper half blackish; the rays whitish; caudal pale greyish transparent; posterior margin blackish; ventrals blackish; pectoral rays brownish yellow, with a broad brownish band at the base. Iris brownish golden, vertically divided by the ocular band. D 5/36, 37, 38 or 39, C. 17½, A 3/25, 26, 27 or 28, V 1/5, P 17 or 18, Br. VI, Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Isle of France, Red Sea, Ceylon, Bay of Bengal, China Sea, Japan, New Guinea, Amboina, Java, Madura. Total length: 7 inch. The greatest height of the body is a little less than ¾ of the total length or equal the distance from the symphysis of the lower jaw to the termenation of the dorsal and anal fins. [In the present and in the two succeeding species, it is calculated from the first dorsal to the first anal spine].

YOUNG.—VAR. A.

SYN. Seba III. 25, Fig. 15?
Chætodon pinnatus, Linné: Mus. A. F. Pl. 33, Fig. 6?
Chætodon pinnatus Linné Syst. 1241?
Chætodon vespertilio, Bennett: Ceylon No. 5.
Platax ehrenbergii, Cuv. and Val. VII. 221.
Platax ehrenbergii, (*Syn.* vespertilio) Rüppell: N. W. Fische, 33.
Platax ehrenbergii, Richardson, Report 1845, 245.

Head, body, dorsal and ventral fins light rust-coloured, or reddish ochre, lighter on the sides and abdomen, minutely dotted with black; on the forehead above the centre of each orbit a brown dot; from the occiput through the iris to the ventral spine a more or less distinct, often interrupted, blackish brown band; traces of a second such from the anterior dorsal spine to the pectoral fin; in some a blackish spot at the base of the anterior dorsal fin and a corresponding smaller at the base of the anal; a blackish spot at the termination of the base of the dorsal and anal fins; caudal pale reddish yellow with a vertical reddish brown band at the base; pectorals pale yellow, in some with a brownish line along the base. Iris golden of the ground colour of the body, vertically divided by the ocular band. Total length from 1⅛ to 4⅜ inch.

YOUNG.—VAR. B.

SYN. Vlaming No. 199, Cambing.
Valentyn No. 62.
Renard Pl. 24. Fig. 129.
Platax albipunctatus, Rüppell: Atlas. 69, Tab. 18. Fig. 4.
Platax guttulatus, Cuv. R. A. II. 193 (1)
Platax guttulatus, Cuv. and Val. VII. 227 Pl. 186.
Platax vespertilio. Rüppell: Neue Wirbelth. Fische. 33.

Head and body pale silvery chocolate coloured; cheeks, opercle, throat and abdomen bluish white; on the forehead above each orbit a brown dot; from the occiput through the iris to the ventrals, a continued or interrupted dark brown band, or light brown with dark edges; from the first dorsal spine to the pectoral more or less distinct traces of a second band; on different parts

of the body some scattered pearl-coloured spots, with dark brown edges and of irregular shape; base of dorsal and anal of the ground colour of the body; rest of their membranes bluish white dotted with black; their margins blackish; rays light greyish; base of the caudal of the ground-colour of the body with a vertical, forwards arched, dark brown band; rest of the fin pale yellow; ventrals blackish; the fifth ray and its membrane whitish, minutely dotted with brown; pectorals yellowish white. Iris pale chocolate coloured, with a narrow golden ring, vertically intersected by the ocular band. Total length: 1⅛ to 3⅛ inch. In individuals of the given dimensions, the greatest height equals the length of the body to the centre of the dark band on the caudal fin, or it is about ⅛ less than the total. The elongation of the anterior dorsal, anal and ventral rays is liable to individual variations, the maximum of the two former fins not exceeding ¾ of the greatest height of the body. The ventrals never exceed ⅔ of the greatest height. On each side of the lower jaw appear three minute distant pores. In the early age the teeth of the two or three external series are trilobate, but they become blunter with age. At Pinang young individuals with pearl-coloured spots, appear to be of rarer occurrence than the others. The intestinal canal is nearly twice the length of the fish; of the five cæcopyloric appendages the three larger are of nearly equal length; the other two are very minute; the air-vessel is lanceolate, very thin, pearl coloured. In individuals of all ages the stomach contained remains of fishes and crustacea. Dr. Ruppell adds *Platax gaymardi*, Cuv. and Val. (VII. 216) to the synonymes of the present species.

(3753) *Platax teira*, (Forskal).

Syn. Chætodon pinnatus, Chinens. Lagerstr No. 25?
Chætodon teira, Forskal, 60 No. 82, Tab. XXII.
Chætodon teira, Bloch, Tab. 199 Fig. 1.
Chætodon teira, Linné Syst. 1265.
Chætodon teira, Shaw, IV. 345, Pl. 48.
Platax teira, Cuv. R. A. II. 193 (1)
Platax teira, Ruppell: Atl. 68.
Platax teira, Cuv. and Val. 226.
Platax teira, Ruppell: Neue Wirbelth. Fische 33. 37.

Young. Ground colour of the body, dorsal, anal and ventral fins pale silvery whitish, the scales edged with blackish brown or deep purple; opercles, throat and abdomen bluish white, minutely dotted with black; from the occiput, through the iris over the ventral soft fin a blackish band; a second from the anterior margin of the dorsal fin, spreading over the dorsal spines, continuing vertically over the posterior part of the opercle to the abdomen; a third over the posterior part of the dorsal, the body and the anal fin and over the base of the caudal; the rest of the caudal and the pectorals whitish. Iris pale golden, vertically divided by the ocular band. *Older.* The vertical bands very indistinct; dorsal, anal and ventral fins bluish black or brown; caudal greyish brown, the margin blackish. Iris blackish or brownish with a narrow golden ring round the pupil. D 5/31 or 32, C 17½, A 3/23, 24 or 25, V 1/5, P 17, Br. VI. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Red Sea, Malabar, Bay of Bengal. Total length: 8 inch. The greatest height equals the length of the body, the caudal fin not included; the latter, as also the head, being ¼ of the total length. The elongation of the anterior rays of the dorsal, anal and ventral fins is comparatively greater in young than in older individuals; in all, however, it is liable to considerable individual variations. The dorsal and anal are either equal or differing: in the young their greatest elongation exceeds by ⅓ the greatest height of the body. The ventrals often differ among themselves: in the young their greatest length does not exceed the greatest height of the body, in older ones it slightly exceeds one half of that distance. On each side of the lower jaw appears three small distant pores. At Pinang smaller individuals occur at all seasons; larger ones are less frequent.

(3754) *Platax arthriticus*, Cuv. and Val.

Syn. Ecan bonna, Bell: Philosoph. Transact. 1793.
Chætodon arthriticus, Cuv. and Val. VII. 229.

Head, back, sides, dorsal, caudal and anal fins dull chocolate brown or lead coloured, in some largely marbled with dark brown; abdomen pale whitish; ventrals brownish yellow; pectoral whitish. Iris of the ground colour of the body, with a narrow golden ring. D (5)/31, C 17½, A (3)/23, V 1/5, P 17, Br. VI. Inhabits *Sea of Pinang*, *Singapore*, Java, Sumatra. Total length: 1 foot 7 inch. The dorsal and anal spines are so completely hidden, that they are imperceptible to the touch, but on close inspection their points may be perceived through the integuments. The greatest height equals the distance from the muzzle to the termination of the dorsal and ventral fins. The diameter of the eye is ¼ of the length of the head, which is about ¼ of the total. The large arched occipital crest, and the nodulous enlargement of some of the bones render this species easily distinguishable. On each side of the symphysis of the upper jaw appears a minute pore, and five somewhat larger on each side of the lower jaw. At Pinang this species is not numerous, although from October till January eight or ten are sometimes captured at a time in the fishing stakes. The flavour is considered excellent. The large air-vessel is too thin, and yields too little isinglass to become of value.

(3755) *Platax ocellatus*, Cuv. and Val.

Syn. Platax ocellatus, Cuv. and Val. VII. 229.

Ground colour of body and fins pale ochreous silvery; with one frontal and five lateral ferruginous bands, edged with black: a narrow frontal band along the profile of the head to the point of the muzzle; the first lateral from the occiput, describing a forwards directed arch, through the iris, over the cheek to a little in front of the ventrals; the second, less arched, from in front of the dorsal, bordering on the opercle, enclosing the base of the pectoral to midway between the ventrals and anus; the third following obliquely the two or three posterior dorsal spines, proceeds a little backwards down the side, to the anterior margin of the anal; the fourth, the broadest, from between the spine and soft part of the dorsal, describing a slightly backwards directed arch down the side and over the anterior third of the anal; at the base of the dorsal within this band a large rounded or oval black spot; the fifth band follows the margin of the soft dorsal; in front of the caudal, within the black edges of this band, a vertical oval black spot with a broad white margin; the rest of the band following the margin of the soft anal, successively joins the fourth and third preceding bands; the dorsal spines and the angle they form with the rays of a brilliant orange, which spreads over the origin of the fourth and fifth bands. Anterior half of caudal ferruginous, posterior whitish, bluish or blackish towards the margin; pectorals yellowish white; ventrals milky white, the marginal half of the soft part black. Iris pale golden, vertically divided by the anterior lateral band. C 6 or 7/29 or 30, C 17½ A 3/19 or 20, V 1/5, P 15, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore.* Total length: 3⅝ inch. The length of the head is a little less than ¼ of the total, its greatest vertical diameter slightly exceeding the length. The eye is situated a little above the centre of the vertical diameter of the head, close to the profile; the diameter is a little less than ⅓ of the length of the head, equal the distance across the forehead. The form of the body is broad oval, the back and abdomen forming uniform arches, interrupted by the somewhat horizontally protracted muzzle. The greatest height of the body, from the root of the fourth dorsal ray to the first anal spine, exceeds by ⅓ half the total length. The mouth is very small, slightly protractile, the lower jaw longer than the upper; the teeth setaceous, all uniformly pointed, none trilobate. The anterior dorsal spines are very short, the rest gradually increase, the last equalling the length of the head. The two or three anterior rays, the longest, slightly exceed ⅓ of the greatest height of the body; the extent of the base of the dorsal fin equals the length of the body, the head and caudal not included. The posterior margin of the caudal is slightly arched; the length of this and the pectoral fins is about ⅓ of the total. The third anal spine equals the fifth dorsal; the two anterior rays, the longest, measure ⅓ of the longest dorsal rays; the extent of the base of the anal is less than ⅔ of that of the dorsal. The ventral spine equals the fifth dorsal spine; the first ray is elongated, about the length of the head. The scales are rather large, orbicular, finely ciliated; the lateral line continues straight to a short distance from the head, where it rises to a moderate arch, gradually approaching the back till suddenly terminating beneath the last dorsal rays. The proportions and the colours are the same in all ages. The uniformly setaceous teeth, the comparatively less height of the body and elongation of the dorsal and anal fins are characters which remove this species from the rest, and approach it to the Genus *Chætodon*. As above observed, the peculiar distribution of colours bears a striking resemblance to that of *Chelmon rostratus*. (Linne). During the month of May 1840 numerous individuals were daily observed in the fishmarket at Singapore. At Pinang single individuals occur during all seasons. The fish is eaten both fresh and dried by the natives, although reputed indifferent and bony.

Genus MONODACTYLUS. *Lacepede.* 1800. Body compressed; dorsal and anal scaly, more or less falciform, with their spines hid to the point in the anterior margin; teeth close, velvety, ventral spines minute, the latter so as easily to escape observation.

(3756) *Monodactylus rhombeus* (Forskal.)

Syn. Scomber rhombeus, Forskal Fauna Arab. 58, No. 78.
Centrogaster rhombeus, Linne: Syst. 1338.
Centropodus rhomboidalis, Lacepede III 303, 304, 305.
Russell, LIX. Kauki Sandawa.
Psettus rhombeus, Cuv. R. A. II. 193
Psettus rhombeus, Cuv. and Val- VII. 245.
Monodactylus rhombeus, Swainson II. 212.

Adult. Profile of the head and back black: the rest above the lateral line golden green: sides of the head, opercles, and the body beneath the lateral line pale silvery; from the anus to the anal fin a black line; from the occiput to the centre of the upper margin of the orbit an oblique black band, continued through the pale golden iris, and in some over the cheek; a second similar band from the first dorsal spine to the point of the opercle; anterior margin of dorsal and angle formed by the anterior six or eight rays black; the branched part of the succeeding rays gamboge, minutely dotted with black; the rest of the fin golden green; caudal gamboge, margin black or blackish; anterior margin of anal and the angle formed by the anterior four rays

bluish black; the branched part of the succeeding rays pale bluish or blackish, minutely dotted with black: the rest of the fin greenish or bluish silvery; anal spines and rays white, the latter minutely dotted with black; pectorals yellowish white. *Young*. Like the adult, but the head, body, dorsal and anal fins, minutely dotted with black, in some so closely, as to impart a general blackish colour. D 8/28, 29 or 30, C 17⅔, A 3/29 or 30, V 1/3, 4 or 5, P 17 or 18, Br. VI. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Isle of France, Red Sea, Coromandel. Total length: 5⅛ inch. The length of the head is contained 3½ times in the total; its greatest vertical diameter is ⅓ of the total length. The diameter of the eye is contained 2½ times in the length of the head, but equals the distance across the forehead. The height of the body, between the origin of the dorsal and anal fins, is contained about 1½ time in the total length: it equals the distance from the centre of the anterior part of the orbit to the termination of the dorsal and anal fins. Vertically measured, the dorsal equals the length of the head; the anal is somewhat more; it nearly equals the greatest vertical diameter of the head or about ⅓ of the total length. The ventral spines are very short, but strong, each being $\frac{1}{10}$ of the length of the head; at the base both are almost in contact, but their points diverge. The ventral rays of each fin are contained in a small grove in the body; they are very minute and their number not only varies from 5 to 3 in different individuals, but also on either side in the same individual. The proposed genus *Psettus*, Cuv. and Val. 1831, is characterised as having no palatal teeth, which, as far as the present species is concerned, is a mistake. Forskal's diagnosis of *Scomber rhombeus*: "*dentes numerosi subtiles. Lingua obtusa, prope apicem superne callo ovali, plano, albido scabro*," which is perfectly correct. All the teeth are velvety, "en velours ras et serre;" those of both jaws appear like narrow bands; of the vomer like a small rhombic elevation; of the plate on each side like a lancet-shaped line, broader in front; of each of the pterygoid bones like a triangular band, broader than the rest, and with the apex in front. On the oval tongue the teeth occupy the middle, leaving the margin naked. Single individuals occur during all seasons at Pinang, where they are eaten by the natives.

Genus **PIMELEPTERUS**, *Lacepede* 1802. Body oval, compressed; dorsal single, its rays, as well as those of the caudal and anal, covered with scales; the single external series of maxillary teeth trenchant, fixed by means of a horizontal posterior process resembling a talon.

(3757) *Pimelepterus oblongior*, Cuv. and Val.

Syn. Pimelepterus oblongior, Cuv. and Val. VII. 264.

Adult? Head above and back blackish brown; the scales silvery brownish grey, edged with brown: those above the lateral line with darker brown than those below; each series of scales longitudinally separated from the succeeding by a lighter or darker ferruginous stripe, imparting to the body a striped appearance; from beneath the eye, over the cheek and opercle a ferruginous stripe; a second continued or interrupted, from behind the orbit to the point of the opercle; on the occiput some irregular ferruginous spot. Dorsal and anal spines and membrane pale greyish brown, or neutral tint, minutely dotted with brown; soft portion of dorsal, anal and the caudal of the ground colour; their marginal part blackish; ventrals pale bluish grey, minutely dotted with brown, marginal half blackish; pectoral rays buff, membrane transparent; the scales of the base and those between the rays like those of the body. Iris silvery near the pupil, the rest bluish black or brown. *Young*. Ground colour of the body paler and with a bluish tint; lateral stripes paler and fewer. D 11/12, 14 or 15, C 17⅔, A 3/12, 13 or 14, V 1/5. P 18 or 19, Br. VII. Inhabits *Sea of Pinang*, *Malayan Peninsula*. Total length: 7⅝ inch. The length of the head is contained less than four times in the total: its height at the occiput equals the length. The eye is situated above the centre of the head, nearer the muzzle than the gill-opening: its horizontal diameter is about ⅓ of the length of the head. The greatest vertical diameter of the body slightly exceeds ⅓ of the total length. The number of external maxillary teeth appears to increase with age: the largest individual examined had 30 in each jaw. Their size decreases from the centre towards the angles of the mouth; the posterior, horizontal process is slightly longer than the anterior trenchant one. Behind the external series is a narrow crescent-shaped naked space, from the posterior concave margin of which rises a single series of minute, distant, backwards arched teeth. On the vomer appears a transversely oval elevation with velvety teeth; on each palatal bone a narrow line, and on each pterygoid a broad lanceolate elevation with similar teeth. The tongue is small, but broad, rounded in front; on each side of the base appears a small oval spot of velvety teeth. The largest individual presented nine longitudinal series of scales above the lateral line, eighteen below, the longest of which contained 52 scales. The anal spines gradually increase in length; the posterior, the longest, is less than ½ of the length of the succeeding ray. From the figure of *Pimelepterus boscii*, Lacepede (Cuv. and Val. Pl. 187), it would appear, that in that species the second and third anal spines are of equal length. At Pinang single individuals of the present species occur, but rarely, during all seasons. The flavour is said to be very good.

Genus PEMPHERIS, *Cuvier* 1829. Anal

fin long, scaly; dorsal short, elevated; head obtuse; eye large; opercle with a small spine; velvety teeth in the jaws, on the vomer and palatal bones.

(3758) *Pempheris molucca*, Cuv.

Syn. Pempheris molucca, Cuv. R. A. II. 195 (1).
Pempheris molucca, Cuv. and Val. VII 306.
Pempheris molucca, Temm. Schl. Fauna Japon. Pisc. 85, Pl. XLIV. Fig. 3.
Pempheris molucca, Richardson, Report 1845, 244.

Young. Head above and back pale metallic copper-coloured, lighter on the upper half of the sides; cheeks, opercles and abdomen silvery with golden and steel-blue reflections; all parts minutely dotted with brown, on the opercles and cheeks so closely as to acquire the appearance of a brown band following the posterior and the inferior margin of the orbit; lateral line pale orange; fins pale reddish yellow; the scaly portion of the dorsal, caudal and anal coloured and dotted like the body; the upper half of the dorsal spines and membrane so closely dotted with reddish brown, as to acquire a general brownish appearance. Iris pale golden round the pupil, the rest minutely and closely dotted with black. D 6/9, C 17$\frac{1}{2}$, A 3/42, V 1/5, P 19, Br. VII. Inhabits *Sea of Pinang*, Moluccas, Batavia, Japan. Total length: 3$\frac{1}{8}$ inch. The length of the head is contained 4$\frac{1}{3}$ times in the total: its greatest vertical diameter equals the length. The profile between the eyes is not convex, but somewhat concave, owing to a slight projection of the upper margin of the orbit, thus intersecting the profile. The diameter of the eye is a little less than $\frac{1}{2}$ of the length of the head; the orbit occupies the upper half, nearer the muzzle than the gill-opening. The greatest vertical diameter of the body, at the origin of the dorsal fin, is about $\frac{1}{3}$ of the total length. The stomach is thick, leathery, with four larger and two smaller appendicula cœcopylorica. The intestinal canal is $\frac{3}{4}$ of the length of the fish. The gall bladder is long, linear. The air-vessel large, thick; the anterior third is rounded joined by a constriction to the posterior oval portion. A single young individual was observed at Pinang in May 1845.

Genus TOXOTES, *Cuvier* 1817. Body short and compressed; dorsal fin placed on the posterior half of the back, with very strong spines; soft part of dorsal and anal scaly; muzzle depressed, short; lower jaw projecting beyond the upper; velvety teeth in the jaws, vomer, palatals, pterygoids and on the tongue; lower margin of infraorbital and preopercle finely toothed; branchiostegous rays 7.

(3759) *Toxotes jaculator*, (Pallas).

Syn. Sciæna jaculatrix, Pallas: Spicil. Fasc. 8, 41.
Sciæna jaculatrix, Hommel: Phil. Transact. LVI. 1766. p. 187.
Scarus schlosseri, Linné: Syst. 1282.
Sciæna jaculatrix, Bonnaterre; Encycl. Method. Pl. d'Ichthyol. 121.
Scarus schlosseri, Lacepede IV. 5, 17.
Labre sagittaire, Lacepède III. 425, 463.
Scarus schlosseri, Shaw, IV. 398.
Labrus jaculator, ibid. 485, Pl. 68.
Toxotes jaculator, Cuv. R. A. II. 196.
Coius chatareus, Buchan. Hamilton, 101, 370 Pl. 14, Fig. 34.
Toxotes jaculator, Cuv. and Val. VII. 314, Pl. 129.
Toxotes jaculator, Swainson, II. 214.

(3760) *Var. Toxotes malaccensis*, Cuv. and Val.

Syn. Cuv. and Val. VII. 320.
Ikan sumpit or Sa sumpit of the Malays.

Head above silvery olive green, brown or blackish, all the rest silvery buff or greyish; all the scales with minute brown dots, either spread or collected round the centre, so as to produce faint brownish longitudinal lines; along the side five large rounded spots: the first on the occiput in front of the opercle; the second behind the opercle, intersected by the lateral line; the third between the spiny and soft dorsal; the fourth close to the termination of the soft dorsal; the fifth at the upper half of the root of the caudal; above this series another of smaller black spots, viz. one between the first and second lower spots; another between the second and third; a third at the centre of the base of the soft dorsal; in some the upper series of spots is confluent along the back: some have a small black spot on the symphysis of the lower jaw. Dorsal spines and membrane either brownish black or greyish, minutely dotted with black; the soft dorsal silvery olive, with a large oblique black spot joining the third of the upper dorsal series; another spreading over the upper half of the posterior seventh or eight ray; margin of the soft portion black; caudal bright gamboge with a more or less distinct black, backwards arched band behind the root; upper half of anal silvery olive or greyish green, lower half black; pectorals and ventrals white, the latter with a large black spot, in some occupying nearly the whole space between the first and fourth ray. Iris bright gamboge or orange, blackish towards the orbit. D 5/12 or 13, C 17$\frac{1}{2}$, A 3/15, 16 or 17, V 1/5 P 13 or 14 Br. VII. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, New Guinea, Isle of Buru, Java, Malabar, mouths of the Ganges. Total length: 7 inch. This appears to be the variety, described by M.M. Cuvier and Valenciennes from a drawing in the series, formerly in the late Colonel Farquhar's possession. The food of several examined, consisted of remains of crustacea. In the Straits of Malacca this fish occurs, but not numerously, at all seasons. It is eaten by the Malays, who record its habits in the denomination: *ikan* signifying a fish, *sumpitan* a blow-pipe.

Fam. TÆNIOIDÆ.

Genus CEPOLA, *Linne* 1766. Body elongated, compressed like a sword-blade; dorsal and anal fins very long; caudal pointed; ventrals

attached under the pectorals; muzzle obtuse; jaws opening nearly vertically, with pointed teeth; the ventrals are the only fins preceded by a bony spine.

(3761) *Cepola abreviata*, Cuv. and Val.

Syn. Cepola abreviata, Cuv. and Val. X. 403.
Cepola variegata, Swainson II. Appendix, 402.

Head above carmine; cheeks and opercle paler; jaws, preopercle and throat silvery whitish; back deep flesh-coloured, paler, with silvery reflections on the sides and abdomen, pale bluish under the pectorals; lateral line silvery; along the middle of the sides a longitudinal series of about 14 round, distant, orange, or cornelian-red spots, gradually decreasing in size towards the caudal; dorsal and anal rose-coloured, deepening to crimson on the marginal half; and hedged throughout, dorsal at the posterior part, with dark purple; membranes sparingly dotted with brown; caudal rays black; membrane cornelian-red; pectorals transparent, ventrals white. Iris silvery rose-coloured, orbital margin black. D 72 or 74, C 13, A 74, V 1/5, P 19, Br. VI. Inhabits *Sea of Pinang*, Moluccas, Anjer (Java,) China. Total length: 7⅜ inch. The length of the head is ⅛ of the total; the depth at the occiput ¾ of the length. The distance from the muzzle to the eye is ⅕ of that from the muzzle to the point of the opercle. The diameter of the eye is ⅓ of the length of the head. In each jaw appears a single series of small pointed recurvous teeth, of which those near the symphysis are a little longer than the rest. There are about 24 on each side of the upper, 12 on each side of the lower jaw. On the lower margin of the preopercle appear five rather strong spines: two pointing obliquely backwards and downwards at the angle, and three, pointing forwards, along the margin. The cheeks and opercles are covered with scales, the rest of the head is naked. The vertical diameter at the pectorals nearly equals the length of the head; the diameter in front of the caudal is scarcely ⅙ of the former. They body is covered with small rounded scales, considerably larger, however, than in *Cepola rubescens*, Linne. The lateral line, like a thin cord, consists of keeled scales. It proceeds from the upper part of the gill-opening obliquely upwards to the fourth dorsal ray, from whence it accompanies the base of the dorsal fin to the termination, which latter is joined to the caudal. The length of the longest dorsal ray is ⅓ of the vertical diameter of the body. The anal commences opposite the eighth dorsal ray; the longest rays slightly exceed those of the dorsal. The pectorals are rounded, their length is $\frac{1}{14}$ of the total. The ventrals are situated a little in front of the pectorals, and are a little shorter; the first ray terminates in a filament reaching the anus, or origin of the anal fin; the fifth ray has three fourths of its length attached to the abdomen by a membrane. The caudal is pointed; its length is 11½ in the total. The stomach is small, but thickened. There are eight cæcopyloric appendages. The instestinal caudal is ⅓ of the length of the fish. The air-vessel is rather large, silvery. Two individuals occurred at Pinang in March and April 1845. The smaller, 4 inches in length, resembled the one just described, in colours and in the distribution of the spots; but it differed in the following dimensions. The length of the head was 6½ in the total, of which the caudal and the pectorals measured ⅓. Both head and these fins, therefore, were proportionally considerably longer in the smaller than in the larger individual. The specimen in the Zoological Society's Museum, London, described by Mr. Swainson, measnres one foot in length.

Fam. GOBIOIDÆ.

Genus GOBIUS, *Linne*, 1748. Head depressed with pores between the eyes; dorsal fins two, distinct, rays of both flexible; ventral fins united at the edges, forming a circle; vent with a tubercle; body covered with scales, the free edges of which ciliated; teeth small, numerous; branchiostegous rays five.

(3762) *Gobius elegans*, Kuhl. and Van. Hasselt, Var. Buff with a tinge of olive, minutely dotted with brown; the upper half of the sides with 3 or 4 indistinct lines, each formed by a series of very short brown streaks, beneath which a series of indistinct brown spots; a blackish spot at the posterior margin of the orbit; a second at the upper part of the root of the pectoral fin, and a third at the lower part of the root, spreading on the gill-membrane. Near the lower part of the root of the pectoral is a faint trace of a fourth brown spot. The membranes of the fins are of a very pale bluish green, minutely dotted with brown; those of the dorsals, particularly the second, with 3 or 4 indistinct series of blackish spots, and few similar on the caudal membrane. The rays of the anterior dorsal have 2 or 3 series of brown spots. Iris pale greenish silvery, minutely dotted with brown. D 6—1/9, C 15⅘, A 1/8, V 1/5, P 18, Br. V. Inhabits *Sea of Pinang*. Total length: 3⅘ inch. A single individual observed differs from *Gobius elegans*, Cuv. and Val. XII. 58. found in Vanikolo, New Guinea, Java, and Bombay, in having one soft ray less in the 2nd dorsal and anal-fins; and slightly in colours, which differences however appear not sufficient to constitute a distinct species.

(3763) *Gobius kokius*, Cuv. and Val.

Syn. Russell LI. Kohu.
Gobius kokius, Cuv. and Val. XII.
Gobius kokius, Jacquemont, Atlas: Pl. 14, Fig. 3?
Gobius kokius, Jerdon, Madras Journ. XV. 148.

Gobius kokius, Bleeker: Verh. Batav. Gen. XXII. 24, 5.

Head above and back greenish brown, sides pale reddish yellow; abdomen white; the back with 5 large, distant, brownish spots; 5 similar on the sides, the latter disposed beneath the intervals of the former. The rays and membranes of the dorsal and caudal fins with brown spots distributed in transversal series, which, however, are frequently very indistinct, and in some scarcely perceptible. One or two brown spots appear in some at the root of the pectoral fins, the membrane of which and of the ventral and anal fins is whitish. The lower half of the anal and caudal membrane is blackish in some individuals. Iris golden, in some dotted with black. D 6—1/9, C 16⅔ or 19/7, A 1/8, V 1/5, P 20 or 21, Br. V. Inhabits *Fresh-water and sea of Pinang*, Isle of France, Malabar, Coromandel, Orissa, Java, Madura. Total length: 8¼ inch. This species is closely allied to *Gobius giuris*, Buch. Ham. from which M. Valenciennes observes, it chiefly differs in the comparatively smaller eye, the diameter of which is ⅛ or ⅐ of the length of the head, while in *G. giuris* it occupies the second fourth of the length of the head.

(3764) *Gobius sublitus*, Cantor. Pale greyish brown, lighter on the sides, abdomen buff; back and sides with six indistinct parallel longitudinal streaks, produced by a short brownish line dividing each scale; fin-membranes minutely dotted with brown; anterior dorsal with a central transversal whitish waved band, and a similar at the base; second dorsal and caudal with 4 or 5 transversal series of oval whitish spots: and with a subterminal reddish white band; the posterior pointed part of this fin, as well as the outer half of the ventrals and pectorals, blackish. Iris pale golden. D 6—1/9, C 15⅔, A 1/8, V 1/5, P 19, Br. V. Inhabits *Sea of Pinang*. Total length: 3 inch. The head is elongated, ¼ of the total length, depressed; the breadth of the nape a little less than the depth, which equals ½ of the length of the head; the profile gently sloping: the cheeks and opercles tumid; the eyes are nearly vertical, occupying the second fourth of the head, and placed excessively close together; the muzzle pointed; the lower jaw slightly longer than the upper; the mouth very large, oblique, the angle situated beneath the posterior margin of the orbit. The teeth of both jaws are crowded, card-like, of unequal length, the external series shorter than the rest, distant, bent inwards. On each side of the symphysis of the upper jaw, on the internal series, is a pair of teeth in length exceeding all the rest. The anterior teeth of the inner series of the lower jaw are somewhat longer than the rest; the tongue is smooth flattened, crescent-shaped. The body is elongated, its greatest depth being about 6½ times in the total length. The scales are rather large, finely ciliated, with striæ converging towards the centre of the posterior margin. The longitudinal series, from the root of the pectoral to the caudal, contains about 38 scales. The height of the first dorsal is ⅛ of the total length; the fifth ray is slightly longer than the rest, and terminates in a short filament; the membrane is carried very close to the origin of the second dorsal, the height of which is ⅓ of the total length. In extent and height the anal is a little less than the former: the posterior extremity of both is pointed. The caudal, ventral and pectoral fins are a little pointed, of nearly equal length, ⅓ of the total. The species is not numerous: it appears to be closely allied to *Gobius bioccllatus*, Cuv. and Val. (XII. 73), but it differs in its dentition and the filamentous fifth ray of the anterior dorsal.

(3765) *Gobius apogonius*, Cantor. Back brownish, sides and abdomen buff, opercles minutely dotted with black. Back and sides with 5 or 6 parallel, sometimes interrupted, series of black spots; fin-membranes buff; on the anterior dorsal two elongated black spots, of which the posterior between the 4th and 5th ray; the second dorsal and anal fin with 2 or 3 transversal series of black stops, and with their free margins black; caudal edged with black with a number of somewhat irregular transversal series of black spots; ventrals with the extremities of the two central rays (the fifth) black. Iris pale golden, spotted with black. D 6—1/8, C 15/7, A 1/8, V 1/5, P 18, Br. V. Inhabits *Sea of Pinang*, Total length 2⅜ inch The general outline, the short robust make, and the large scales impart to this species a certain resemblance to the Genus *Apogon*. The head is about ¼ of the total length, depressed, sloping; the muzzle broad, rounded; the eyes are lateral, near the upper profile, occupying the second fourth of the head; their distance across the head, and that from the lower margin of the orbit to the angle of the mouth, equals the diameter of the eye, or one fourth of the length of the head. The jaws are nearly semi-circular, the lower slightly projects beyond the upper; the mouth is obliquely cleft, the angle situated under the middle of the orbit. The teeth of both jaws are velvety, the external series of the upper consists of a few distant teeth, slightly larger than the rest; in the lower jaw there is a similar internal series, of which the two nearest the symphysis have the appearance of small canines. The tongue is thin, narrow, crescent-shaped, and smooth. The profile of the forehead rises obliquely towards the first ray of the anterior dorsal, where the vertical diameter equals about ⅓ of the total length; from thence the arched profile of the back and abdomen gradually converge towards the last ray of the second dorsal and anal fins, the vertical diameter between which equals ⅙ of the total length, and such it continues to the root of the caudal. The height of the first ray of the anterior dorsal

fin equals one half of the greatest vertical diameter; the second and third rays gradually increase; the fourth terminating in a filament, slightly excedes the greatest vertical diameter of the body; but the sixth ray scarcely equals half the height of the first. The second dorsal and the anal fin are nearly opposite, on a backwards sloping level, their extent being somewhat less than $\frac{1}{5}$ of the total length. Their sixth, divided, rays, are the longest and equal about one-sixth of the total length. Their first and last rays are about $\frac{1}{9}$ of the total length. The distance between the anterior and second dorsal is about $\frac{1}{3}$ of that between the latter and the caudal fin. The latter is rounded, about $\frac{1}{4}$ of the total length. The pectoral fins are rounded, nearly as long as the caudal, and with the rays slightly filamentous. The ventrals are a little pointed, and scarcely exceed one half the length of the pectorals. The scales are generally very large, particularly on the crown of the head, and the opercles finely ciliated, and striated; their breadth double their length. The longitudinal series, from the root of the pectoral to the caudal, contains about 25 scales; the sides behind the second dorsal and the anal fins are covered by 5 vertical series. A few individuals were occasionally observed among the fishes taken in the stakes off the coast of Pinang. This species is closely allied to another from the estuaries near Calcutta: *Gobius sadanandio*, Buchan. Ham. (*Gangetic Fishes*, 52,366) among whose duplicate series of drawings there is a representation. In the number of rays and the large size of the scales both agree, and the black markings of the fins and the body are also nearly the same. But *G. sadanandio* is of a strikingly more elongated shape, the third ray of the anterior dorsal fin is the longest, and the fourth is shorter not terminating in a filament. *Gobius filosus*, Cuv. and Val, (XII. 78) appears also to be allied to the present species.

(3766) *Gobius acutipennis*, Cuv. and Val., Var. [XII. 80.] Brownish buff with some indistinct blackish coloured spots on the back and sides; fin-membranes bluish white, minutely dotted with black; the two dorsals and the upper third of the caudal with indistinct transversal series of blackish spots. Iris blackish silvery. D 6—1/12, C 17, A 1/13, V 1/5, P 22, Br. V. Inhabits *Sea of Pinang*. Total length: $3\frac{3}{8}$ inch. The rays of the first dorsal gradually increase towards the fifth, which terminates in a filament, in length slightly exceeding $\frac{1}{3}$ of the total. The second dorsal and the other fins are pointed; the length of the caudal is $\frac{1}{5}$ of the total; that of the head slightly exceeds $\frac{1}{6}$. In both jaws the teeth are placed in a single series; those of the upper are a little longer and more distant than those of the lower; there are no canines. *G. acutipennis*, Cuv. and Val. has 10 branched rays in the second dorsal and 11 in the anal. But in proportions and colours it closely agrees with the present.

(3767) *Gobius criniger*, Cuv. and Val.

Syn. Gobius criniger, Cuv. and Val., XII. 82.

Pale ochreous with faint silvery lustre; abdomen whitish; head and upper jaw black; three round black spots on the cheeks; a fourth larger at the posterior angle of the orbit; a similar on the operele; on the sides three large rounded black spots: the anterior behind the pectoral fin, spreading on the back; the second below the posterior part of the second dorsal, and the third at the root of the tail. Between these spots several smaller, irregular black marks. The fin-membranes whitish, that of the ventrals minutely dotted with black. That of the two dorsals and the caudal with rather large black spots; the free margin of the caudal and anal black. Iris pale golden, blackish. D 6—1/9, C $13\frac{3}{4}$, A 1/9, V 1/5, P 17, Br. V. Inhabits *Sea of Pinang*, New Guinea, Malabar. Total length $2\frac{3}{4}$ inch. The occiput and the opercles are without scales; the rest of the body with large ciliated, faintly striated scales, of which the longitudinal series from the root of the pectoral to the anterior part of the caudal contains about 34. The length of the head is about $\frac{1}{4}$ of the total. The second ray of the anterior dorsal is the longest, terminating in a filament; its length is double that of the greatest vertical diameter, or a little less than $\frac{1}{4}$ of the total length. The teeth are minute, velvety, of nearly equal length. This species appears not to be numerous at Pinang.

(3768) *Gobius Cyanoclavis*, Cantor. Greenish-grey, paler on the abdomen; the scales with a central azure spot, forming on the body from 5 to 8 longitudinal series; the operele and root of the pectorals with a few similar spots; anterior dorsal minutely dotted and clouded with brown; second dorsal black, pale at the base, upper margin orange, between the rays 4 to 5 white oval spots, forming transversal series; caudal similarly coloured, but with the upper half of the posterior margin orange; anal intenses, ventrals and pectorals paler black, the anterior margin of each of the anal branched rays accompanied by a blue streak. Genital papilla with an orange coloured apex. Iris golden, spotted with black; pupil strongly iridescent. D 6—1/10, C $17\frac{1}{6}$, A 1/10, V 1/5, P 19, Br. V. Inhabits, *Sea of Pinang*. Total length: 6 inch. The head is a little depressed, the profile slightly sloping, the length $\frac{1}{5}$ of the total; the breadth at the nape is contained $2\frac{1}{3}$ times in the depth, which exceeds one half of the length of the head; the cheeks are tumid; eyes obliquely oval, nearly vertical, situated nearer the posterior angle of the preopercle than the muzzle; their greatest diameter is about $\frac{1}{5}$ of the length of the head; their distance $\frac{1}{3}$ of the greatest diameter; the muzzle is bluntly rounded, the lower jaw slightly projecting beyond the upper; the gape is wide, the angle of the mouth is beneath the posterior margin of the orbit. The teeth of the

upper jaw are generally minute, but the anterior 4 or 5 on each side a little longer than the rest; the external series on each side of the lower jaw consists of 9 teeth, of which the two last towards the angle of the mouth are stronger, and much longer than the rest, and recurvous. These teeth M. Valenciennes compares with the fangs of venomous serpents. The other teeth are minute like those of the upper jaw. On the lower part of the margin of the preopercle appear five pores of which the two upper ones are a little larger than the rest. The scales of the nape, of the opercle and of the root of the pectorals are much smaller than those of the body which are very large, finely ciliated and striated. The longitudinal series from the root of the pectoral to the caudal contains about 32 scales. All the rays of the anterior dorsal terminate in filaments; the third is the longest, equalling nearly half the total length; next to that is the fourth ray; the sixth is the shortest, but all except the third, are liable to individual variations. The posterio dorsal and anal fins are pointed, increasing in height towards the last, double, ray, which is about $\frac{1}{6}$ of the total length. The caudal is contained $4\frac{1}{2}$ times, the pectorals and ventrals 6 times in the total length: all these fins are broad, and a little pointed. The species is of no uncommon occurrence: it is closely allied to *Gobius caninus*, Cuv. and Val. (XII. 16).

(3769) *Gobius Russus*, Cantor. Flesh or pale salmon-coloured; back blackish; on each side 4 or 5 large clouded blackish spots, the scales of which have a minute vertical lanceolate whitish spot in the centre; first dorsal whitish at the base and of the upper magin, with two transversely waved blackish bands, separated by a white, which surrounds a large black spot between the 4th and 5th rays; posterior dorsal whitish, minutely dotted with brown, and with two irregular transversal series of pale blackish, clouded, spots; rays of dorsals and anal flesh-coloured; membranes of caudal, anal, ventral and pectoral fins whitish, minutely dotted with brown. Iris pale golden, spotted with black. D 6—1/10, C 19$\frac{1}{2}$, A 1/10, V 1/5, P 18, Br. V. Inhabits *Sea of Pinang*. Total length: 4$\frac{3}{8}$ inch. The head is depressed, the profile slightly sloping from the eyes; the length equals that of the caudal, and is contained about 4$\frac{1}{2}$ times in the total length; the breadth at the nape is a little less than the height which is about $\frac{1}{4}$ of the total; the cheeks tumid; the eyes oval, lateral, situated on the profile, occupying a little more than the second fourth of the head, nearer the muzzle than the angle of the preopercle; the muzzle is broad rounded; the lower jaw a little longer than the upper; the gape is wide, oblique, the angle is situated beneath the middle of the orbit. The teeth are velvety; the 4 anterior on each side of the upper jaw are distant and longer than the rest. The external series of the lower jaw consists of five similar teeth on each side, the last of which is slightly recurvous, but in length scarcely exceeding the four anterior. The space between the nape and the anterior dorsal is naked; the rest of the body is covered with small ciliated, striated scales, which are indistinct and almost hidden in the skin. The rays of the anterior dorsal terminate in short filaments; the first is the longest, scarcely exceeding the vertical diameter at the nape, or about $\frac{1}{8}$ of the total length; the membrane closely approaches the posterior dorsal, which, as well as the anal, slightly increases in height towards the 9th branched ray, the length of which equals the first ray of the anterior dorsal. The caudal, ventral and pectoral fins are broad, slightly pointed; the length of the two latter is little more than $\frac{1}{7}$ of the total. The species is not numerous: it closely approaches *Gobius phalana* Cuv. and Val. (XII. 92).

Genus APOCRYPTES, *Cuv. and Val.* 1837. Scartelaos, *Swainson*, 1839 [By mistake characterised as being destitute of scales.] Ventral fins united as in *Gobius;* two dorsals; body elongated; caudal long, pointed (lanceolate); teeth pointed, distant, in a single series in both jaws, near the symphysis of the lower two teeth a little behind the rest; scales small.

(3770) *Apocryptes lanceolatus*, (Bloch-Schneider).

Syn. Eleotris lanceolata, Bloch-Schneider, 67, Pl. 15.
Gobius changva, Buchan. Ham. 41,365, Pl. 5. Fig. 10.
Apocryptes changva, Cuv. and Val. XII. 145.
Scartelaos calliurus, Swainson, II. 280.
Apocryptes changva, Bleeker: Verh. Batav. Gen. XXII. 36, 5.

Head, cheeks and opercles blackish olive, bluish beneath; back blackish olive; sides greenish or bright gamboge mottled with blackish; abdomen whitish or rose-coloured; dorsal fins minutely dotted with black. The rays of the second in some with brownish spots; in the young both are transversely waved with pale brown; caudal with alternate vermiculated brownish and without lines, and at the upper part of the root a black ocellated spot; anal, ventrals and pectorals buff or pale yellowish. Iris buff. D 5—1/30 or 31, C 17$\frac{1}{2}$, A 1/29, V 1/5, P 18, Br. V. Inhabits *Estuaries of Pinang, Malayan Peninsula, Singapore*, Batavia, Madura, Rangoon, Pondicherry, estuaries of the Ganges. Total length: 6$\frac{1}{8}$ inch. The species is numerous at Pinang.

(3771) *Apocryptes nexipinnis*, Cantor.

Slate-coloured, lighter on the abdomen; throat bluish white; fin membrane of the united dorsals and of the caudal minutely dotted with brown,

giving the fins a greyish appearance; anal and ventrals transparent, pectorals blackish grey, divided in the middle by a crescent-shaped transparent band, which expands over the lowest eight rays. Iris slate-coloured. D 6/26, C 17½, A 1/25, P 21. Br. V. Inhabits *Sea of Pinang*. Total length: 3⅜ inch. The head is depressed, gently sloping before the eyes; the breadth at the nape exceeds the vertical diameter by one third, and equals ⅓ of the length of the head; the latter is ¼ of the total length; the eyes are vertical, oval, occupying the third seventh of the length of the head; their distance is somewhat less than their diameter. The muzzle is rounded, the lower jaw slightly projects beyond the upper; the gape is enormous, almost horizontal; the angle of the mouth marks the anterior half of the length of the head. The anterior tooth on each side of the symphysis of the upper jaw is excessively long, curved and projecting beyond the lower jaw when the mouth is closed. At a distance from these canines commences on each side a single series of 12 to 14 smaller, distant teeth, placed almost horizontally, and arched downwards. The thin membranous upper lip covers all the teeth except the two foremost, and has a small downwards pointed lobe beneath the anterior angle of the orbit. The lower jaw has on each side a single series of 10 to 12 distant teeth, horizontally placed and bent upwards. The first on each side of the symphysis is placed a little behind the rest, and it is the smallest; the succeeding four gradually increase in length; the two last are the longest of the series, which terminates with the anterior half of the jaw, and, considerably in front of the teeth of the upper jaw. The tongue is very narrow, almost linear, short, smooth, rounded in front and tied to the floor of the mouth. It is of a buff colour, but the cavity of the mouth is inky. The scales of the nape are very small and deciduous, so as to make the part appear naked; they gradually increase in size towards the posterior part of the body, where they are very large. They are orbicular with about 16 striæ. The body is compressed, the profile gradually narrowing towards the tail. The first dorsal ray is situated at the second third of the total length: its height is about ⅓ of the vertical diameter at the nape; the succeeding, undivided, rays gradually increase towards the 5th, which, as well as the 6th are about ⅔ of the vertical diameter at the nape. The distance between the 5th and 6th, undivided, rays, and between the latter and the first branched ray is conspicuously greater than the distances between any of the preceding or following dorsal rays. The first branched ray is somewhat shorter than the 6th undivided, which produces a sinking in the upper margin of the connecting membrane, and indicates the transition from the undivided to the branched rays. The latter gradually increase in length towards the penultimate, which nearly equals the vertical diameter at the nape. The caudal is broad lanceolate, its length about ⅓ of the total. The first undivided ray of the anal is situated opposite the 3d branched dorsal; the height of the fin is slightly less than that of the dorsal. The papilla immediately behind the anus is short, conical. The ventrals are rounded, their length equalling the vertical diameter at the nape; the transversal diameter exceeding the latter by one third. The pectorals are pointed, their length ⅓ of the total. It is not numerous at Pinang. Although the dorsal fin is single, as it is in *Gobioides*, Lacepede, this species has the characteristic dentition of *Apocryptes*: it is in fact an *Apocryptes* with the two dorsal fins united, and as above observed, with the junction perceptible. The single character is of too little value to warrant the formation of a separate genus, particularly, as in *Apocryptes dentatus*, Cuv. and Val. (XII. 112) the membrane of the anterior dorsal is continued to the base of the second.

Genus TRYPAUCHENA, *Cuv. & Val.* 1837. Ventral fins united as in *Gobius*; the single dorsal, the caudal and anal united; on each side of the nape above the opercle a deep fossa.

(3772) *Trypauchena vagina*, (Bloch).

Syn. Gobius vagina, Bloch-Schn. 73, No. 20.
Gobioides ruber, Buchan. Ham., 38, 365.
Trypauchena vagina, Cuv. and Val. XII. 153. Pl. 351.
Trypauchena vagina, Swainson, II. 279.
Trypauchena vagina, Richardson, Report 1845, 206.
Trypauchena vagina, Bleeker: Verh. Bat. Gen. XXII. 37, 5.

Rose-coloured with light blue reflections, paler towards the abdomen which is whitish; eyes minute, barely preceptible, like two blackish points; fins transparent, colourless. D 6/47 to 49, C 17, A 1/49, V 1/5, P 17, Br. VI. Inhabits *Sea of Pinang*, Sea, estuaries and fresh-water of Bengal, Coromandel, Malabar, China Seas, Java, Madura, Balli. Total length: 8 inch. Not numerous at Pinang.

Genus AMBLYOPUS, *Cuv. and Val.* 1837. [Substituted for *Tænioides*, Lacepede 1800, the definition of which, M. Valenciennes observes, is incorrect, and not complete.] (Psilosomus, *Swainson*, 1839). Body elongated; ventrals like *Gobius*; dorsal, caudal and anal fins united; mouth vertical; in both jaws an external series of exposed, curved, distant teeth, longer than the rest; eyes very minute, hid by the skin, scarcely perceptible; no fossæ on the sides of the nape.

(3773) *Amblyopus hermannianus*, (Lacepede).

Syn. Tænioide hermannien, Lacepede, IV. 533.
Cepola hermanniana, Shaw, IV. 191.
Cepola cæcula, Bloch-Schneider, 241, Tab. 54.
Gobioide rubicundus, Buchan. Ham., 37, 365, Pl. V. Fig. 9.

Tænioides, Cuv. R. A. II. 244.
Amblyopus hermannianus, Cuv. and Val. XII. 159, Pl. 350.
Psilosomus, Swainson, II. 183.
Amblyopus hermannianus, Swainson, II. 279.

Head and back brownish ochre; sides brick-red, paler on the abdomen, fins reddish ochre, caudal in some blood coloured. D 6/44, C 15, A 1/45, V 1/5, P 15, Br. V. Buchanan Ham.: D 46, A 40, V 12. Cuv. and Val.: D 6/40, C 15, A. 1/37, V 1/5, P 15. Inhabits *Sea of Pinang*, Estuaries and fresh water of Bengal, Rangoon, Tranquebar, Peiho river. Total length: 1 ft. 2 inch. The height at the nape is from $\frac{1}{13}$ to $\frac{1}{17}$ of the total length; the length of the head is $\frac{1}{7}$ to $\frac{1}{8}$ of the total; the length of the pectoral fin is $\frac{1}{27}$ to $\frac{1}{29}$ of the total, and $\frac{1}{3}$ of that of the ventrals. It is of no common occurrence at Pinang.

Genus PERIOPHTHALMUS, (*Bloch-Schn.* 1801) *Cuv. and Val.* 1837. Profile rapidly sloping at an obtuse angle where the eyes are situated; the latter are very close to each other, provided with a lower lid capable of covering the eye. Ventral fins in some entirely united, in others partially at the basal half; pectorals muscular at the base, covered with scales and appearing as if supported on arms. Teeth of both jaws in a single series, more or less horizontally placed.

(3774) *Periophthalmus schlosseri*, (Pallas).

Syn. Gobius schlosseri, Pallas, Spicil VIII. Pl. 1. Fig 1—4.
Gobius schlosseri, Linné: Syst. 1201.
Gobius schlosseri Lacep. II.
Periophthalmus schlosseri, Bloch-Schn.
Gobius schlosseri, Shaw IV. 246.
Gobius schlosseri Raffles: Linn. Tr. XIII.
Periopthalmus schlosseri, Cuv. R. A. II. 245 (2)
Periophthalmus schlosseri, Bennett: Life of Raffles.
Periophthalmus schlosseri, Cuv. and Val. XII. 192.
Periophthalmus schlosseri, Swainson, II. 280.
Periophthalmus schlosseri, Bleeker, Verh. Bat. Gen. XXII. 39.
Ikan lásah, lísah, or leésah of the Malays. [*Lásah*, restless].

Upper part of the head and back blackish green or olive, cheeks and sides greenish gamboge, the scales with blackish edges and a large blackish spot at the upper angle of the opercle; throat and abdomen white. Interior dorsal shining reddish brown, the upper margin whitish; second dorsal: upper margin and basal half brownish white, in the middle a broad obliquely upwards turned black band; posterior part of the pectorals and caudal black; anal and ventrals whitish. Iris black with a narrow internal golden ring; eyes strongly iridescent. D 8—1/2, C $16\frac{6}{6}$, A 1/12, V 1/5, P 17, Br. V. Inhabits *Estuaries of Pinang, Malayan Peninsula, Singapore*, Amboina, Sumatra, Java. Total length: $16\frac{1}{2}$ inch. Some individuals have on one or both sides of the symphysis of the upper jaw a second internal, short series of two or three small teeth. At Pinang this species occurs in great numbers in the moat of Fort Cornwallis, which is filled by each tide from the sea. Like the other Gobies it is very wary and difficult to capture, but unlike most of the others, it is very fierce when taken, and is capable of inflicting rather severe wounds with the long hooked teeth.

Genus BOLEOPHTHALMUS, *Cuv. and Val.* 1837. Differs from *Periophthalmus:* in having all or the middle teeth of the upper jaw straight and strong; those of the lower jaw placed horizontally, all very fine, except two stronger than the rest, recurvous, and placed a little inwards; head more oblong than *Periophthalmus*; scales small or imperceptible; anterior dorsal fin with five rays; the base of the pectorals not in all species covered with scales.

(3775) *Boleophthalmus Boddaerti*, (Pallas).

Syn. Gobius boddaerti. Pallas, Spicil. Zool. VIII. 11, Tab. 2, Fig. 4,5.
Gobius boddaerti, Linné: Syst. 1201.
Electris boddaerti, Bloch-Schn. 66.
Gobius striatus, Bloch-Schn. 71, Tab. 16, (*Female*, Cuv. and Val.)
Russell LIV. Nettee Kunla Mottah.
Gobius boddaerti, Shaw IV. 238.
Gobioides boddaerti, Cuv. R.A.II.244 ().
Boleophthalmus boddaerti, Cuv. and Val. XII. 199.
Boleophthalmus boddaerti, Richardson, Report 1845, 208, 319.
Boleophthalmus boddaerti, Tem. et Schl. Fauna Japon. 118, Tab. LXXVI. Fig. 3.
Boleophthalmus boddaerti, Bleeker: Verh. Bat. Gen. XXII. 40, 5.

Lips, upper part of the head and the back blackish green; sides greenish gamboge; abdomen white; the sides from the second dorsal with 6 or 7 obliquely backwards directed blackish bands, (not reaching the abdomen); the whole body, pectorals and caudal with numerous verdigris spots; anterior dorsal pale brownish lilac with violet spots, the upper margin between the first four rays whitish second dorsal brownish, whitish towards the base, between the rays two or three transversal violet bands edged with white, forming irregular transversal series; caudal with blackish rays; anal and ventrals whitish; pectoral membrane blackish. Eyes black, strongly iridescent. D 5—1/24 to 26, C 16, A 1/25, V 1/5, P 19, Br. V. Inhabits *Estuaries and Sea of Pinang, Malayan Peninsula*, Madura, Borneo, Java, Sea of China and Japan, Moluccas, Bengal, Coromandel, Malabar. Total length: 5 inch. At Pinang the species is very numerous in the same localities as *Periophthalmus Schlosseri.*

(3776) *Boleophthalmus pectinirostris*, (Linne.)

Syn. Gobius pectinirostris, Linne: Chinens, Lagerstr.—Amoen. Acad. Dec. 1754.
Apocryptes chinenses, Osback: It. 130.—Amoen. Acad. IV, Pl. 3, Fig. 3.
Gobius pectinirostris, Linne: Syst. 1200.
Gobius pectinirostris, Lacep. II. 542.
Gobius pectinirostris, Shaw IV. 245.
Apocryptes pectinirostris, Cuv. and Val. XII. 150.
Boleophthalmus pectinirostris, Richardson Report 1845, 208.

Head and back greyish green, lighter on the sides; abdomen whitish; the whole body with minute blackish tubercles, and with metallic sky-blue or verdigris spots; muzzle, lips, throat and posterior margin of the opercle pale greenish black; anterior dorsal greenish black with numerous vertically placed lilac spots; posterior dorsal greenish black with 6 or 7 transversal series of elongated lilac, black-edged spots, which between the 8 posterior rays become larger, but rarer; caudal brownish black with transversal series of indistinct lilac spots; anal, ventral and pectoral fins brownish; the base of ventrals greenish black, the anterior scaly part of the pectorals with a blackish crescent-shaped margin. Iris narrow golden; pupil strongly iridescent. D 5—1/25, C 16⅔, A 1/25, V 1/5, P 20, Br. V. Inhabits *Sea coast of Pinang*, Canton. Total length: 6 inch. The length of the head is a little more than ⅓ of the total length, the height slightly exceeds the breadth and equals half the length. The vertical diameter at the anterior dorsal is ½ of the total length. The muzzle is rounded, the gape wide, the angle of the mouth is opposite the posterior angle of the orbit. The eyes are contiguous, situated a little behind the second fifth of the head; upper eyelid with tubercles; the lower membranes, hemi-transparent. The upper jaw has on each side of the symphysis three conical teeth, distant, and longer than the rest, of which there are upwards of 30 very minute, and distant, on each side. On the upper lip behind the canines appears a small flattened lobe. Each side of the lower jaw carries 30 to 34 horizontal, closely set teeth, which are long, almost setaceous, obliquely truncated at the apex. On each side of the symphysis, on a more inward level than the others is a stronger, conical, vertical tooth. The tongue is small, rounded, fleshy, and fixed to the floor of the cavity, and as well as the latter inky. The anterior dorsal commences a little behind the root of the pectoral; the four posterior rays are filamentous: the third, the longest, is little less than ⅓ of the total length; the fifth, a little shorter than the first, equals about the one half of the third; the membrane extends close to the posterior dorsal; the base of this fin equals the greatest vertical diameter of the body. The posterior dorsal slightly increases in height towards the 21st ray, which measures about ⅔ of the greatest vertical diameter of the body; the base of the fin is 3½ times its height. The caudal is a little pointed, the length little less than ⅓ of the total. The anal commences opposite the second branched ray of the posterior dorsal, the tract of which it follows, but its height is less by one third; the 23rd ray is the longest and less than one half of the greatest diameter of the body. The ventrals are infundibuliform, their length is about ⅕ of the total. Two thirds of the pectorals are covered with scales; their length is about ⅓ of the total; the naked portion of this fin is oval. The scales resemble those of *B. boddaerti*, increasing in size on the abdomen and posterior part of the body, deeply imbedded in the integuments, which are covered with numerous papillæ. Single individuals were observed at Pinang.

(3777) *Boleophthalmus viridis*, (Buchan-Ham.)

Syn. Gobius viridis, Buchan. Ham. 42, 45, 366, Pl. XXXII. Fig. 12.
Boleophthalmus viridis, Cuv. and Val. XII. 213.
Boleophthalmus histophorus, Cuv. and Val. XII. 210.
Scartelaos viridis, Swainson II, 280,

Head and back greenish; sides bluish-slate coloured; above the indistinct lateral line more or few distant black dots; in some a varying number of blackish vertical lines; the festooned lips, the throat and abdomen bluish white; dorsal fins greenish grey edged with black, the posterior one dotted with black: caudal similar, but the black dots forming a few undulating transversal lines; anal and ventrals pale rose coloured or whitish: pectorals greyish with a few scattered black dots. Iris pale golden. D 5—1/26 C 17, A 1/25, V 1/5 P 17, Br. V. Inhabits *Sea of Pinang*, Estuaries of the Ganges, Bombay, Surat. Total length: 5 inch. From comparison of a number of living individuals it appears that the deeper or lighter greenish colour of the back, and the absence or presence of vertical lines on the sides are but individual differences, perhaps influenced by age, sex, or habits. Buchanan Hamilton correctly observes "there are very minute scales on the body and upper part of the head." They are imbedded in the skin, distant, orbicular or slightly oval, and become larger towards the tail. On submitting a portion of the skin to 60 or 100 linear magnifying power, the scales may be seen distinctly enough. This species is very numerous at Pinang,

Genus ELEOTRIS, *Gronov.* 1763. General structure of *Gobius*, but the ventral fins are not united; branchiostegous rays six.

(3778) *Eleotris porocephala*, Cuv. and Val.

Syn. Eleotris porocephal, Cuv. and Val. XII. 237.

Head and back blackish brown; sides brownish white with clouded brownish spots; abdomen

brownish white minutely dotted with brown; anterior dorsal pale brownish; posterior dorsal and caudal darker with indistinct transversal series of brownish spots, their free margin whitish; anal, ventrals and pectorals whitish hemi-transparent. Iris golden, more are less spotted with black. D 6—1/8, C 17$\frac{6}{8}$, A 1/7, V 1/5, P 15, B. VI. Inhabits *Freshwater Pinang*, Freshwater Seychelle Islands, New Ireland. Total length: 5$\frac{1}{2}$ inch. The pore a little above the posterior nostril, and that immediately behind the orbit are indistinct in the two young individuals examined; the uppermost of the four pores on the posterior ascending margin of the preopercle is distinct, the other three less so, confluent, forming a short sulcus.

(3779) ***Eleotris ophioccephalus***, Kuhl and Van Hasselt.

Syn. Eleotris ophiocephalus, Cuv. and Val. XII. 239.

Head and back pale brownish black on a golden ground; sides with six parallel longitudinal brown lines; abdomen buff, minutely dotted with brown; dorsal brownish; the posterior and the caudal with indistinct transversal series of brownish spots, and with whitish margins; anal, ventrals and pectorals hemi-transparent, minutely dotted with brown. Iris golden blackish. D 6—1/8, C 17$\frac{5}{8}$, A 1/7, V 1/5, P 15, Br. VI. Inhabits, *Sea of Pinang*, Java. Total length; 5$\frac{6}{8}$ inch. From *E porocephala* the present species principally differs in its colours: the head appears a little more elongated, the scales of the crown somewhat larger, and the inferior margin of the preopercle has but a single rather indistinct pore, near the angle of the mouth. It appears to be of rare occurrence at Pinang.

(3780) ***Eleotris Butis***, (Buchan. Ham.)

Syn. Cheilodipterus butis, Buchan. Ham. 57.367.
(*Icon.*) Cheilodipterus butis, Gray. ILL. Ind. Zool. II. Pl. 93. Fig. 3
Eleotris humeralis Cuv. and Val XII. 246.
Eleotris humeralis, Bleeker: Verhand. Batav. Gen. XXII. 22. 5.

Reddish brown with dark central spots on some of the scales of the head and sides, and the latter with numerous vermilion spots; the two dorsals brownish at the base, transparent in the middle with the broad vermilion margins; caudal and anal black with vermilion margins; anal rays with similar spots; pectorals transparent; near the root, between the 8th and 16th ray, a large rounded black spot, above and below which a smaller vermillion spot, and a few others at the root of this and the ventral fins. Iris blackish golden. D 6—1/8, C 17$\frac{5}{8}$, A 1/8, V 1/5, P 18, Br. VI. Buchanan Hamilton gives by mistake 7 branchiostegous rays. Inhabits *Sea and estuaries of Pinang*, Estuaries of Bengal, Batavia, Samarang, Surabaya, Pasuruan, West Coast of Madura. Total length: 6 inch. It is readily recognised by the much depressed elongated head, the length of which is contained 3$\frac{1}{2}$ times in the total; the greatest verticle diameter of the body slightly exceeds $\frac{1}{6}$ of the total length. The opercle is a little pointed above the root of the pectorals, which, however, is less perceptible in the young than in the adult. Although Buchanan Hamilton points out the strong affinity of this species to the Gen. *Gobiomorus*, Lacepede, he was led to consider it a *Cheilodipterus*. His specimen from the Ganges, figured in his unpublished drawings, and later by Mr. Gray, was destitute of the vermilion spots of the body, which vanish in individuals inhabiting muddy estuaries. These spots as also the scarlet margins of the fins, become obliterated after death, when the black spot of the pectoral fins appears surrounded by two smaller yellowish-white ones, as described by M. Valenciennes. (Hist. Nat. des Poiss. XII. p. 186.) It is not numerous at Pinang.

(3781) ***Eleotris caperatus***, Cantor. Ground-colours, the vermillion spots of the body and the margins of the fins, the black spots at the root of the pectorals exactly resembling those of *Eleotris butis*. D 6—1/8, C 16$\frac{4}{4}$, A 1/8, V 1/5, P 21, Br. VI. Inhabits *Sea of Pinang*. Total length: 3$\frac{2}{8}$ inch. The crown of the head is apparently scaleless as far as the posterior margin of the orbit; it is depressed, but less elongated than *E. butis*, its length being contained 4$\frac{1}{2}$ times in the total; the opercles expansible and cleft as in *E. butis*. The muzzle is rounded, the gape nearly vertical, the angle of the mouth opposite the anterior part of the orbit; the lower jaw scarcely longer than the upper; the teeth minute, velvety, the external and internal series of both jaws distant, somewhat longer than the rest; the tongue small, flattened, rounded in front; the eye oval, comparatively larger than in *E. butis*, occupying the second fourth of the head; the distance between both is about one vertical diameter. The upper margin of the orbit forms a sharp arched crest, armed with minute, close, forwards pointing spines; the crest itself is continued obliquely downwards, but becomes spineless in front of the orbit, and there it separates the rostral cavity in which the two nostrils open, from a short crescent-shaped cavity, immediately below the anterior angle of the orbit. Along the upper margin of the somewhat pointed preopercle proceeds a short, but rather deep, horizontal sulcus, which farther follows the tract behind the supraorbital spinous crest. The greatest vertical diameter of the body, at the commencement of the anterior dorsal fin, is a little less than the length of the head. The scales of the opercles, cheeks and the nape are a little smaller than those of the body, which are a little broader than long. The longitudinal series from the root of the pectorals to the caudal contains about 34 scales. The length of the

pectoral fins equals that of the head; the other fins, as well as the genital papilla in shape and proportions resemble those organs of *E. bitis*. The similarity of colours and their distribution is so striking in both species, that they might be mistaken, but for the supraorbital spinous crest, the sulcated, and comparatively shorter head of *E. caperatus*. Two individuals were observed at Pinang, taken together in stakes with other fishes.

Subfam. ECHENEIDINÆ.

Genus ECHENEIS, ([*Artedi*,] *Linne* 1748), *Cuvier* 1817. With a flattened disk on the head, composed of a certain number of transversal laminæ, directed obliquely backwards, dentated or spiny on their posterior margin, and moveable so that by creating a vacuum between them, or by hooking on by the spines, they are capable of attaching themselves to various bodies such as rocks, ships, fishes, &c. Body elongated covered with minute scales; a single soft dorsal opposite to the anal; head perfectly flat above; eyes lateral: mouth, horizontally cleft, rounded; lower jaw projecting and as well as the intermaxillaries furnished with minute card-like teeth; a regular series of minute teeth like cilia along the margin of the upper maxillaries: branchiostegous rays eight; the stomach is a wide cul-de-sac; cæca six or eight; intestine ample, but short; air-vessel none.

(3782) *Echeneis naucrates*, Linne.

Syn. Echeneis neucrates, Linne: Syst. Nat. 1188.
Echeneis neucrates, Forskal: Descr. Anim. p. XVI. No 7.
Echeneis naucrates, Bonnat. Encyclop. Method. Ichthyol. Tab. 33. Fig. 124,
Echeneis neucrates, Bloch Tab. 171.
Echeneis neucrates, Shaw IV. 209 Pl. 31.
Echeneis neucrates, Russell XLIX. Ala Mottah.
Echeneis naucrates, Cuv. R. A. (Ed. I.) II. 228.
Echeneis neucrates, Bennet: Life of Raffles, 692.
Echeneis vittata, Ruppell: N. W. Fische. 82.
Echeneis naucrates, Richardson: Report 1845. 203.
Echeneis naucrates. Temm. et. Schl. Fauna Jap. Tab. CXX. Fig. 1.
Guddimi of the Malays.

(*Adult.*) Disk, fins, and ground-colour of body livid or lead colour of different shades; from the muzzle over the side of the head a broad bluish black band, in some more or less continued along the lateral line; in some the throat and posterior half of the body bluish black; in others livid patches on the sides and abdomen; upper and lower corner of the caudal with a crescent-shaped or triangular milk-white spot. Iris silvery bluish black. (*Young*). Of darker colours than the adult; the elevated angles of the dorsal and caudal milk-white as also the angular spots on the trapezoidal caudal. D 2/33 to 38, C 17½, A 2/33 to 38, V 1/5, P 21, to 23, Br. IX. Disks 23 to 26. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Atlantic on both sides, Red Sea, Indian Ocean, Bay of Bengal, Sumatra, Australia, Polynesia, Japan. Total length: 2 ft. 4 inch. Single individuals occur at all seasons in the Straits of Malacca. The Malays consider this fish to be powerful manure for fruit trees. (Low.: *Dissert. of Pinang*, 179).

Fam. BLENNIOIDÆ.

Genus PETROSCIRTES, *Ruppell* 1823. (Omobranchus, [*Ehrenberg*], *Cuv. and Val.* 1836. —Blennechis, *Cuv. and Val.* 1836). [*Blennechis*, Cuv. and Val.—"Branchiostegous membrane closed beneath and communicating externally by a small fissure above the base of the pectoral fins: dentition a modification of that of *Blennius*: lower incisors, attached to the anterior part of the jaw; on each side a long canine, in some species enormous, reclining; in others arched, and when the mouth is closed, fitting in a cavity on each side of the palate; dorsal undivided; tentacles absent in most." (Cuv. and Val. XI. 279).—Of the two species of *Petroscirtes*, described by Dr. Ruppell, *P. mitratus* is characterized as having in both jaws a single close series of the setaceous teeth; *P. ancylodon* as having in addition two small canines on each side of the upper jaw, and a very long one on each side of the lower. As M.M. Cuvier and Valenciennes admit both species in their Genus *Blennechis*, Dr. Ruppell's *Petroscirtes* claims priority.] Teeth setaceous, minute, in a single series; branchial opening very small, placed above the pectoral fins; dorsal single, with flexible, but not articulated rays; ventrals thoracic, with three rays.

(3783) *Petroscirtes variabilis*, Cantor. Head above and back light brownish olive; sides of the head and body yellowish; abdomen greenish yellow; from the orbit to the caudal a longitudinal blackish band, above which the head and body minutely dotted and clouded with black; dorsal yellowish olive, dotted with black, rays with more or less distinct blackish spots forming two or three longitudinal series; in some individuals a black spot between the points of the first and second ray; caudal yellow, base minutely dotted with black and in some with a central black spot; anal yellow minutely dotted with black, in some with black spots on the rays forming two or three longitudinal series; ventrals yellow; pectorals transparent. Iris bright yellow clouded with blackish; orbital margin olive. D 11/17 to 20, C 11½, A 17 to 21, V 3, P 15, B. VI. Inhabits *Sea of Pinang*, *Singapore*. Total length: 5 inch. The form of the body is elongated, gradually compressed from the head to the tail; the greatest vertical diameter of the body, in front of the anal, is ⅓ of the total; of which that in front of

the caudal is $\frac{1}{12}$. The vertical section at the occiput is nearly square, from thence the sides of the head are gradually compressed towards the truncated muzzle, the breadth of which is $\frac{1}{3}$ less than that of the occiput. The upper part of the head is flattened, gently declining to between the eyes, when it becomes arched and abruptly declining. The length of the head is $\frac{1}{4}$ of the total, the depth at occiput about $\frac{1}{3}$ of the length. The distance from the muzzle to the orbit is $\frac{1}{3}$ of the length of the head. The upper part of the orbit forms a part of the profile; the diameter of the eye is $\frac{1}{4}$ of the length of the head. The mouth is rather large: as the jaws are truncated in front, they consist of a central and two lateral portions. The central or transversal supports a single close series of minute setaceous trenchant teeth: those of the upper jaw are placed vertically; those of the lower, the shorter, horizontally. In the upper jaw their number varies from 30 to 40; in the lower from 32 to 50. The number appears to be independent of age: of two individuals measuring 5 inch. in length, one had $\frac{34}{36}$, the other $\frac{34}{36}$ incisors, while two others, about 3 inches in length, had $\frac{34}{40}$ and $\frac{30}{32}$. On each side of the lateral part of the upper jaw, a short distance behind the incisors, appears a small canine. A much longer canine, equalling the diameter of the eye, is placed on each side of the lower jaw immediately behind the incisors. When the mouth is closed each of the lower canines is received into a large oval cavity in the palate. Behind the canines the jaws are toothless. There is no tongue; under the throat are two excessively minute filaments. Just above and a little in front of the root of the pectorals appears a short crescent-shaped fissure, the opening of the gills. On the upper part of the head are several pores, of which one above the anterior part of each orbit, appears to be constant. The body appears to be naked with numerous minute pores secreting mucus. The lateral line proceeds from the posterior part of the opercle obliquely upwards to about the fifth dorsal ray, from whence it follows close to the base of the fin towards the eleventh ray, when it turns for a short distance obliquely downwards and suddenly terminates. The dorsal fin commences on a line with the posterior margin of the preopercle; the first ray is a little shorter than the rest, which are nearly equal, $\frac{1}{3}$ of the greatest diameter of the body. The dorsal, like all the other fin rays, are undivided, but the first 11 dorsal are simple, not jointed; the last one is connected by a triangular membrane to the posterior part of the back. The caudal equals the length of the head; when spread out, the posterior margin is rounded with the points of the rays exposed, but ordinarily the fin appears lanceolate. The anal commences opposite the twelfth dorsal ray; it resembles the dorsal, but the rays are a little shorter; the last one is connected by a membrane to the posterior part of the abdomen. The pectorals are rounded, $\frac{1}{5}$ of the total length. The ventrals consist of three rays, of which the anterior is the shortest; the central is the broadest, but its length equals the very thin posterior one, which is about $\frac{1}{8}$ of the total length. Single individuals occur at all seasons at Pinang. They resemble some of the *Gobioidæ* in their power of sustaining life for some time out of water, in their skipping movements, and in their habit of inflating the gill-membrane. The diaphragm is silvery white; the stomach capacious, generally expanded with minute crustacea; the liver small; the gall large, pyriform: the intestinal canal is simple, about the length of the fish; the air-vessel small, pyriform, silvery. This species is closely allied to *P. bankieri*, Richardson, which, however, is rapidly distinguishable by its larger eye ($\frac{1}{3}$ of the head) and by the third ventral ray being much shorter than the second. [*Ichthyology of the Voyage of H. M. S. Sulphur*, 136, Pl. LXIV. Fig. 8, 9.—*Report* 1845, 266.

Fam. LOPHIOIDÆ.

Genus ANTENNARIUS, (*Commerson*) *Lacepede* 1798. (Chironectes, *Chironectes*, Illiger. 1831, a genus of *Marsupialia*. *Cuvier*, 1817).

Head compressed with three free rays on the crown; mouth vertically cleft; opening of the gills small, round, behind the pectoral fins, in the posterior part of axilla. Tongue toothless. Intermaxillaries, lower jaw, vomer, palantines and pharyngeals with minute card-like teeth. Dorsal fin elongated.

(3784) *Antennarius raninus*, (Tilesius).

Syn. Klein: Miss. III Pl. 3, Fig. 4?
Lophius histrio, Var C., Bloch-Schn., 142?
Lophius histrio marmoratus, Bl. Schn. Ibid?
Lophius raninus, Tilesius: Mem. Mosc, XI. Pl. 16
Lesson: Voy. de la Coquille. Poiss. Pl 16, Fig. 2
Chironectes marmoratus, Cuv. and Val XII. 402.
Chironectes raninus, Richardson, Rep. 1845, 203.
Chironectes marmoratus, Temm. and Schl. Fauna Jap Pisc. 159, LXXXI. Fig. 1.

Ground colour of back, sides and fins yellow ochre, largely marbled with blackish brown, in which occur single darker spots; abdomen silvery yellowish-white with brown spots; the cutaneous filaments of the fins and back blackish, those of the sides pale yellow, those of the abdomen white. Iris pale brownish golden with distant radiating brown lines; pupil sinuate, black. D 3—12, C 9, A 8, V 5, P 10, Br. 7. Inhabits *Sea of Pinang*, New Guinea, Bombay, Japan. Total length 4½ inch. Yellow body is minutely granulated, and the first dorsal ray is excessively slender: it was absent in the larger of two individuals observed at Pinang.

(3785) *Antennarius hispidus*, (Bloch-Schn.)

Syn. Kochlfauter. N. C. Petrop. X. Pl. 8, Fig. 1.
Lophius hispidus Bloch Schn. 143, No. 6.
Lophius striatus. Shaw, Nat. Misc. V. Pl. 175.
Russell XIX. Kappa Mura Moia.
Lophius histrio, Linne, Russell.
Chironectes lophidus, Cuvier: Mem. du Mus. III. Pl. 17 Fig. 2.
Chironectes hispidus, Cuv. and Val. XII 407.

Pale reddish yellow (flankin colour), paler on the abdomen; head and back with transversal sooty brown stripes: those of the nape and back nearly transversal or slightly oblique, radiating obliquely downwards from the eye and from the tail; all the fins except the ventrals spotted with sooty brown; first dorsal ray yellowish alternately brown; the tuft of filaments longitudinally blackish and white; the few short filaments of the body, the lips, tongue, and cavity of the mouth pale yellowish. Iris pale burnished golden with radiating brown lines; pupil black, circular. D 3—12, C 9, A 7, V 5, P 10, Br. VI. Inhabits, *Sea of Pinang*, *Singapore*, Bay of Bengal. Total length: 9 inch. The body and fins are covered with small, closely set, dipartite spines which rise vertically from the skin. The lateral line is composed of larger somewhat distant spines, each terminating in 6 to 9 points; it commences from the muzzle, proceeds in an arch above the eye and continues following the slope of the back towards the posterior part of the second dorsal. A second, rather indistinct line of distant, larger spines is observed on the upper half of the upper jaw, and a third similar marks externally the posterior margin of the opercle. Here and there on the body, but particularly towards the anterior part of the abdomen, appear some short fleshy filaments. The larger individual was observed at Singapore in May 1840, a second, 4 inches in length, at Pinang in 1845 The stomach is conical, very capacious, occupying the entire length of lower part of the expansible abdominal cavity; the coats are very thick, leathery; the internal surface with numerous irregular folds. The duodenum, the widest of the intestines, receives the elongated ductus coledochus at a distance of about $\frac{3}{8}$ inches from pylorus. The length of the intestinal canal is double that of the fish. The liver is very voluminous, elongated; the gall bladder is like a pea, half imbedded in the liver; the spleen very minute. The air-vessel large, oval; the coats very thick.

(3786) *Antennarius commersoni*, (Lacepede).

Syn. Renard I. Pl. 43, 212?
Lophius commersonii, Lacepede I. 327.
Lacepede I. Pl. 14, Fig. 3?
Chironectes commersonii, Cuv: Mem. du Mus. III. 435, Pl. 18, Fig. 1.
Chironectes commersonii, Cuv. and Val XII. 426.

Bluish black. On the back, above the lateral line, and in front of the first articulated ray an oblique rose-coloured oval spot, within which a black ring; at the root of the caudal, above and below two similar smaller spots, and one on the side between the pectorals and anal fins. First very slender dorsal ray alternately rose-coloured and black, the tuft of filaments rather full, blackish grey. Rays of the dorsal, anal, pectoral and ventral fins black, the membranes inky with a rather broad submarginal rose-coloured band, edged with black. The points of the ventral rays rose-coloured. The caudal rays black; between the third and ninth, near the root, the black membrane has a transversal rose-coloured band divided in the middle by a black line. On the posterior part of the caudal a broad sub-marginal rose-coloured band, within which four somewhat undulating black lines, edged with black. Lips throat, tongue, and cavity of the mouth light bluish gray, dotted with black. Iris rose-coloured silvery, with six radiating black lines, pupil circular, black. D 3—14, C 9, A 7, V 5, P 9, Br. VI.? Inhabits *Sea of Singapore*, Isle of France. Total length: $5\frac{7}{8}$. The body and fins are covered with small black spines like those of *A. hispidus*, but there are no fleshy filaments. The lateral line is continued to the root of the caudal fin. The abdomen is very expansible. The present differs from the description given by Cuvier and Valenciennes in the position and number of the rose-coloured spots or ocelli, and the anal fin has one ray less, differences sufficiently insignificant to be considered individual. A single individual was observed at Singapore in May 1840.

Genus BATRACHUS, *Klein* 1744. Head broad; mouth widely cleft, lips frequently with numerous cutaneous filaments; anterior dorsal fin very small and almost hid by the integuments; pectorals supported by flat short arms; ventrals jugular with three rays of which the anterior is elongated, flattened like a sword-blade; teeth in the jaws, vomer and palate; posterior dorsal and the anal extensive, but low; sub-opercle as large as opercle, both terminating in strong spine; infra-orbitals none; branchiostegous rays six.

(3787) *Batrachus grunniens*, (Linne).

Syn. Seba III. Pl. 28, Fig. 4.
Cottus grunniens, Var. B. Linne: Mus. Ad. Fr. II. 65.
Cottus Grunniens, Linne, Var. B: Syst. 1209.
Cottus grunniens, Bloch. Pl. 179.
Cottus grunniens, Lacep. III. 232.
Batrachus, Bloch-Schneider, 42.
Cottus grunniens, Shaw IV. 256.
Batrachus grunniens, Cuv. R. A. II. 253. (2).
Batrachoides gangene. Buchan. Ham. 34, 365 Pl. XIV. Fig. 8.
Batrachus grunniens, Cuv. and Val. XII. 466.

Head above, back and sides light greenish or brownish olive, abdomen greenish or brownish white; head marbled and spotted with black; body with more or less distinct oblique and vertical broad bands, darker than the ground-colour

edged and spotted with black; fleshy filaments buff; fins of the ground-colour of the body, dorsals and anal indistinctly clouded with black or with very oblique blackish bands; caudal, pectorals and ventrals with blackish spots or narrow vertical bands. Iris narrow silvery olive, orbital part blackish. D 3—22, C 13½, A 18, V 1/2, P 23, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Java, Bombay, Gangetic estuaries. Total length: 10 inch. The length of the head is about ¼ of the total; the transversal diameter of the orbit is ⅛ of the length of the head. The eyes are placed nearly horizontally, their distance from the muzzle is one diameter, from each other it is somewhat less than two transversal diameters. The intermaxillary teeth are minute, placed in a double series, which reaches from the symphysis to opposite the eyes. A double series of stronger conical teeth occupies the vomer and palatal, and extends further back than the intermaxillaries. The lower jaw has a double series of strong conical teeth on the symphysis, but it becomes single in the branches of the jaw. The tongue is bony, small, flattened, elongated and so completely hid in the integuments that it cannot be perceived during life. The opercle terminates in two strong spines of which the superior points obliquely upwards and backwards, the lower is horizontal. The sub-opercle terminates in a single horizontal spine, in length equalling the lower one of the opercle. A number of fleshy filaments terminating in cilia are scattered over the head. One behind each eye, and at the angle of the mouth is longer than the rest. The greatest vertical diameter of the body equals the length of the head. The ventral spine is very short and by a membrane closely joined to the first ray which is the longer and undivided. The second ray is shorter and divided in numerous branches. Single individuals occur, but rarely, at Pinang. The natives attribute poisonous qualities to these fishes, and reject them even as manure. The creaking sound they emit has been noted by Buchanan. They are capable of living a considerable time out of their element.

Fam. TEUTHIDID.E.

Genus TEUTHIS, *Linne* 1766. (Siganus, *Forskal* 1775.—Centrogaster. *Houttuyn.*—Amphacanthus, *Bloch-Schneider* 1801.—Buro, [*Commers.*] *Lacepede,* 1803.) Body oval, compressed; mouth slightly cleft and little protractile; teeth minute, crenulated, in a single series; a horizontal spine in front of the dorsal fin; ventrals with two spines; an external and an internal, between which three rays; branchiostegous rays five, of which the lowest is dilated and hid in the isthmus.

(3788) *Teuthis java,* Linne.

Syn. Gronov. Zoophyl. 113, No. 352, Pl. 8, Fig. 4.
Teuthis java, Linn.: Syst. 1362.
Russell CII. Werabuah.
Teuthis javus, Cuv. R. A. II. 223, (2).
Amphacanthus javus, Cuv. and Val. X. 118.
Amphacanthus javus, Schlegel et Muller: Verhand. over de Nat. Gesch. (Amphacanthus) 10.
Amphacanthus javus, Bleeker: Verh. Batav. Gen. XXII. 5.
Ikan kitang of the Malays.

Head above, back and sides dark brownish neutral tint, paler towards abdomen; on the head and back numerous pale bluish grey rounded spots, which on the sides and chest become elongated, irregular, vermiculated; on the abdomen longitudinal and whitish; sides of the head metallic greenish yellow or sulphur-coloured; cheeks washed with brown; pectorals transparent greyish white; rest of the fins pale brownish grey closely dotted with brown, and washed with brown, pale orange and lilac. Iris pale metallic sulphur-coloured; orbital half dark brown or neutral tint. D 13/10, C 17$\frac{10}{1}$, A 7/9, V 1/3/1, P 18, Br. V. Inhabits *Sea of Malayan Peninsula and Islands,* Sunda, Java, Madura, Coromandel. Total length. 11 inch. The length of the head is a little more than ⅛ of the total, in which the depth at occiput is contained 3⅓ times. The greatest diameter of the orbit, which is a little oblique and falling beneath the widened crenulated anterior margin, is ⅓ of the length of the head. The greatest vertical diameter of the body is 2½ in the total length. The horizontal spine in front of the first dorsal has in the young of this and of the following species the point exposed; with age it becomes entirely hid by the integuments. In young individuals the length of the head is from 4½ to 4⅔ in the total; the greatest diameter of the orbit is 2¾ in the length of the head; the greatest vertical diameter of the body is 2⅔ in the total length. At Pinang small individuals are numerous at all seasons. As all the species of the present genus are supposed by the Malays of the Straits to be highly poisonous, they are not eaten, but set aside among offal of fish to be used as manure.

(3789) *Teuthis concatenata,* (Cuv. and Val.)

Syn. Amphacanthus concatenatus, Cuv. and Val. X. 127.
Kitang of the Malays.

Head above, back and anterior part of the sides above the lateral line blue purple; rest of the sides reddish yellow; abdomen reddish white; back and sides with numerous rounded brick-red spots becoming reddish yellow on the lower part of the sides; sides of the head reddish yellow bronze washed with brown; nostrils, infraorbitals and opercles brimmed with cobalt; pectorals transparent; rest of the fins pale brownish grey, closely dotted with brown, washed with pale reddish yellow and lilac; between the dor-

sal and anal rays some indistinct brown spots. Iris narrow, sulphur-coloured round the pupil; rest brown bronze. D 13/10, C 17½, A 8/9, V 1/3/1, P 17, Br. V. Inhabits *Sea of Pinang*, Isle of Buru, Batavia. Total length: 6⅝ inch. The length of the head is 4⅓ in the total, the depth at occiput 3½. The greatest oblique diameter of the orbit is 2½ in the length of the head. The outline of the head is convex, particularly between the eyes. The greatest vertical diameter of the body is 2½ in the total length. When the caudal fin is spread out, the posterior margin is nearly straight. Single individuals occur at Pinang at all seasons.

(3790) *Teuthis dorsalis*, (Cuv. and Val.)

Syn. Amphacanthus dorsalis, Cuv. and Val. X. 143.
Amphacanthus dorsalis, Schlegel and Muller: l. c. 10, 13, Tab. 2, Fig. 1.
Kitang of the Malays.

Head above and back pale brownish olive, lighter on the upper half of the sides; lower half and abdomen bluish white; immediately beneath the origin of the lateral line and in front of the pectorals pale reddish lilac; back and sides with numerous small oval bluish white spots; cheeks and opercles pale metallic sulphur-coloured; opercles edged with pale lilac; pectorals transparent; caudal pale brownish olive, minutely dotted with brown; rest of the fins greyish white, tinged with lilac, minutely dotted with brown. Iris yellowish white, orbital margin olive. D 13/10, C 17½, A 7/9, V 1/3/1, P 16, Br. V. Inhabits. *Sea of Pinang*, Batavia. Total length: 6 inch. The length of the head is 4⅓ in the total. The greatest, oblique, diameter of the orbit is ⅓ of the length of the head. The greatest vertical diameter of the body is ½ of the total length. At Pinang this species is numerous at all seasons.

Genus ACANTHURUS, *Forskal* 1775. (Harpurus, *Forster* 1778.—Aspidurus, *Lacep.* 1802.) Tail on each side armed with a strong moveable spine; head and body compressed; eyes elevated; mouth slightly cleft; teeth in a single series, trenchant, with crenulated margins; dorsal single; body covered with minute scales; branchiostegous rays five.

(3791) *Acanthurus xanthoplerus*, Cuv. and Val. Plate IV.

Syn. Acanthurus xanthopterus, Cuv. and Val. X. 215.

Young. Head and body violet brown, paler towards abdomen; the nostrils opening in a bright gamboge triangular spot, resting behind on the anterior half of the orbit, the apex towards the middle of the profile; dorsal fin bright yellow, minutely dotted with brown; along the base a cobalt blue longitudinal band, above which a second parallel lilac one terminating on the anterior third of the fin; a third and a fourth above each other: both bifurcating about the anterior half; upper margin black; anterior half of caudal white, the rest brown like the body; posterior margin broad, black; anal bright yellow minutely dotted with brown, with a cobalt blue basal band, above which four parallel lilac ones, external margin black; ventral spine and rays pale bluish black; membrane pale grey minutely dotted with brown; pectoral rays yellow, membrane transparent. Iris narrow, yellow round the pupil, next broad silvery white, orbital margin reddish brown. D 9/27, C 17½, A 3/25, V 1/5, P 17, Br. V. Inhabits *Sea of Pinang*, Seychelles. Total length: 5⅛ inch. The length of the head is 4½ in the total; the diameter of the eye is 3½ in the length of the head. The preopercle, opercle, scapular and humeral bones are distinctly radiated. In each jaw is a single series of 16 trenchant teeth: those of the upper appear somewhat larger and their margin has from 10 to 12 crenulations (Fig. 3. Magnif.); in the lower jaw the pair of teeth on the symphysis is longer than the rest, and the whole of the margin carries 10 crenulations: all the rest are shorter, truncated with about 5 crenulations. The greatest vertical diameter of the body (Fig. 2.) is 2½ in the total length. The whole of the head and body, the anterior half of the caudal and the base of the dorsal and anal fins, are covered with small elongated oval scales (Fig. 4. Magnif.), of which those of the body have the posterior part truncated with about 12 unequal cilia on the margin. The lateral line appears like a thread at the upper fifth of the body; it is slightly undulating, following the outline of the back, which is less arched than that of the abdomen, till it arrives between the terminations of the dorsal and anal fins. From thence it is at first a little downwards arched and then rises, so as to pass above the spine of the tail towards the caudal. Above and below the lateral line appear a number of short, excessively minute, backwards directed tubes. The length of the spine is less than the diameter of the eye; the anterior margin is sharp, the posterior rounded. The posterior margin of the caudal is slightly concave; the superior lobe a little longer than the inferior. The stomach is short, thick, gizzard-like; the gall very large. There are four cœcopyloric appendages. The intestinal canal is spirally folded, more than twice the length of the fish. A single young individual was observed at Pinang in March 1845. The fishermen asserted that it is of rare occurrence, and attains to a foot in length.

Fam. AULOSTOMATIDÆ.

Genus CANNORYNCHUS, *Cantor*. [Κάννη, reed; ῥύγχος, snout. Substituted for *Fistularia*, Linne, 1766, pre-occupied by *Fistularia*, Donati,

1750. (*Polypi*).] (*Equivalent to* Fistulari. *Linn.* 1766). Mouth tubular, elongated, depressed; jaws slightly cleft, nearly horizontal, with small teeth; head elongated from ⅓ to ¼ of the total length; body elongated depressed; scales invisible; behind the head, above and below, some bony appendages cover the anterior part of the head, dorsal fin single, and as well as the anal composed of undivided rays; branchiostegous rays seven.

(3792) *Cannoryuchus immaculates*, (Commerson.)

Syn. Russell. CLXXIII. Goorum.—Fistularia tabacaria, Lin.
Fistularia tabaccaria, White, Voyage Bot. Bay. P. 296 Fig. 2.
Fistularia immaculata, (Commerson,)Cuv. R. A. II. 267. (1.)
Fistularia commersonii. Ruppell: Neue Wirbelth. Fische, 142.
Fistularia immaculata, Richardson, Rep. 1845, 247.

Young. Head above light greenish grey; upper half of opercles greenish olive minutely dotted with black, lower half as well as the under surface of the head and the abdomen whitish; sides of the body light slate grey; the lateral line bordered beneath by a pale silvery bluish white line; fins greenish hyaline; caudal filament brownish olive. Iris narrow golden round the pupil; the rest blackish silvery. D 15, 16 or 17 C 13/5, A 14 or 15, V 1/5, P 15, Br. VII Inhabits *Sea of Pinang*, Indian Ocean, Coromandel, Mohila, (Red Sea.)

Length of the head,...	... ...	... 0 ft. 5½ inch
„ „ „ body to the root of caudal fin,		... 0 „ 8⅞ „
„ „ „ caudal filament,	...	... 0 „ 4⅝ „
Total length,.....		1 ft. 6⅜ inch.

The length of the head is ⅓ of the length of the body, measured from the symphysis of the lower jaw to the point of the caudal fin. The tubular mouth, to the anterior margin of the orbit, is 2¾ times longer than the rest of the head. The horizontal diameter of the eye is 9½ in the length of the head; the distance of the eyes across the forehead is ½ of the diameter; the narrow forehead is widened by a transparent membrane extending along the upper margin of the orbit, and giving it an elongated oval shape. From the sides of the occiput proceeds a sharp crest of minute spines to the præopercle; the posterior and anterior part of the orbit are finely toothed, and the latter part has a short broad spine above and below. On each side of the tubular mouth, appears a sharp ridge, the posterior half of which is armed with small forwards directed spines. The lower jaw is longer than the upper, with a round protuberance at the symphysis. Both jaws have a single series of small, somewhat unequal, reclining teeth. A similar single series appears on each of the palatals, and from four to six on the anterior part of the vomer. Between the intermaxillary series of teeth and those of the vomer is extended small crescent-shaped membrane. From the centre of the opercle proceed downwards two strong striæ and numerous finer ones radiate backwards. From the posterior part of the orbit radiate a number of lines backwards. Immediately behind the occiput commence a pair of elongated lanceolate bony plates, each contained about 5½ times in the length of the body, forming in the middle of the back a slightly raised line. Behind the pectoral fins appears a shorter lanceolate bony plate, the upper margin of which joins the former pair of the back; the lower joins a larger also lanceolate plate, which on each side covers the anterior part of the abdomen. The latter pair of abdominal plates are turned up at the sides at a right angle; their lower surface is honeycombed and the anterior half of their lower margin leaves a central open space on the abdominal surface. The length of the pair of abdominal plates is ⅔ of the dorsal. The length of the pectoral fins and the lobes of the caudal equal the horizontal diameter of the eye. The vertical diameter at occiput, as well as the greatest diameter of the body, is ⅘ of the horizontal diameter of the eye. The breadth across the occiput equals the latter diameter. A vertical section of the head is broad rectangular; one of the anterior part of the body, in front of the dorsal, is nearly triangular; behind the dorsal it is rhombic. The dorsal and anal fins commence opposite each other at the posterior fourth of the distance from the anterior part of the orbit to the point of the caudal lobes. The lateral line commences above the opercle; the anterior part, occupying the dorsal plates, is arched with the convexity towards the centre of the back, so that the lines of both sides describe the figure of an elongated hour-glass. At the termination of the lateral pair of bony plates the lateral line commences, following the centre of the side, above the bluish white line. The lateral line consists of a number of linear tubes, deeply cleft at both ends; behind the dorsal fin the tubes change to very short, sharp bony ridges, which to the touch appear like spines. The ventral fins are very short situated in the centre between the muzzle and the point of the caudal lobes. The length of the elongated central caudal ray appears to be proportionally longer in the very young individuals; in the largest it was divided in two. Four individuals were observed at different seasons at Pinang; [Another species of the present family: *Amphisyle soulata*, Klein, was observed in great numbers at Singapore in May 1840. From 1842 to 1845 none occurred at Pinang, nor were the fishermen there acquainted with the fish.] they were examined sometime after death, and none of them exhibited the lateral series of blue spots noted by Dr. Ruppell.

ORDER ANACANTHINI. Fam. PLEURONECTIDÆ.

Genus PLATESSA. *Cuvier*, 1817. In each jaw a series of trenchant obtuse teeth; frequently on the pharyngeals teeth like paving-stones; dorsal extending in front to above the upper eye, leaving, as well as the anal, a naked interval between themselves and the caudal; shape rhomboidal; most species have the eyes on the right side; [The terms *right and left*, or *dextral* and *sinistral* are applied to the species of this family, as to those of every other, while the fish is placed with the tail towards the observer, the dorsal fin upwards, and the anal downwards.] two or three small cœca.

Eyes and colour on the left side.

(3793) *Platessa russelli.*

(*Icon.*) Platessa russelli, Gray: Ill. Ind. Zool. Pl. 94. Fig. 2.
Ikan Siblah of the Malays.

Left side. Pale reddish or yellowish-brown; each scale with a vertical buff spot close to the dark brown posterior margin; opercle and anterior third of abdomen pale bluish or neutral tint. Iris silvery, coloured like the body. *Right side.* Buff or dust-coloured; opercle and anterior third of abdomen pale bluish. Fins transparent, coloured like the body, but paler, minutely dotted with brown; dorsal, caudal and anal with a few scattered indistinct brownish spots. D 70 to 73. C 15½. A 56, V 6, P 12, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore.* Total length: 1 ft. 1 inch. *Left side* The length of the head is 4⅓ in the total. The upper orbit occupies the second-fourth of the head, close to the profile of the back without encroaching upon it; it is oval; the horizontal diameter being ¼ of the length of the head, exceeds by ⅓ that of the lower rounded orbit. Both are separated by a very narrow sharp ridge. The vertical distance from the centre of the inferior orbital margin of the lower eye to the margin of the lower jaw is ⅓ of the length of the head. The posterior apertures of both nostrils are situated immediately in front of the orbits; they are rounded and larger than the anterior ones. Of the latter the upper one appears to be a small puncture about mid-way in front between both orbits. The lower anterior aperture is situated obliquely in front of the posterior, close to the margin of the left upper maxillary. The latter bone is narrow, widened and obliquely truncated at the lower extremity. The angle of the mouth scarcely extends to the anterior part of the orbits. The margin of the mouth is exclusively formed by the elongated intermaxillaries, to which are confined the teeth. The latter are conical, blunt, slightly inwards arched and placed in a single series, of which the anterior four or five of each side are a little larger and more distant than the rest, which are minute and placed closely together. The teeth of the lower jaw are longer, fewer, and all with intervals. The tongue is linear, smooth. The opercles and cheeks are hid by scales. The form of the body is oblong, the greatest vertical diameter, at the second-third of the total length, slightly exceeds ⅓ of the total The body is covered by upwards of 67 longitudinal series of scales, of which there are about 81 on a line between the gill-opening and the caudal. The scales are small rounded with about 15 radiating lines at the radical part; the posterior margin is closely ciliated. The lateral line consists of simple tubes It commences at the lower margin of the lower orbit, ascends in the shape of the letter S to the upper extremity of the preopercle, then slightly descends to above the posterior angle of the opercle, when it suddenly rises describing a short arch, terminating above the point of the pectorals. From thence it proceeds straight along the middle of the side to the point of the posterior margin of the caudal fin. The dorsal fin commences opposite the anterior angle of the upper orbit; the distance from the muzzle equals the horizontal diameter of the upper eye. All the rays, except the three last ones, are undivided, and with a single series of small scales along the anterior margin; the point of the rays project a little beyond the membrane, so as to give the fin a fringed appearance. The longest rays are contained 2¼ times in the length of the head: they are situated at the commencement of the posterior half of the fin, the distance of which from the caudal is ⅓ of that of the anterior ray from the muzzle. The root of the caudal is covered with small scales; the posterior margin is pointed in the centre, the two rays of which are the longest, ⅔ of the head. The posterior four or five anal rays are divided; the rest are simple and resemble the dorsal. The extent of the base of the anal is about ¼ less than that of the dorsal. The left ventral is situated a little nearer the gill-opening than the anal; the two first rays are undivided; the second, the longest, is ⅔ of the head, and extends to the second anal ray. The right ventrals is a little farther back, the first ray commencing opposite the third ray of the left fin. The two upper pectoral rays are undivided; the third, the longest, slightly exceed ⅔ of the head. Single individauls occur at Pinang, at all seasons. They are eaten by the natives.

Genus HIPPOGLOSSUS, *Cuvier*, 1817. Fins resembling those of *Platessa*: form generally more elongated; jaws and pharynx with teeth, in most species strong and sharp.

A.—Eyes and colour on the right side.

(3794) *Hippoglossus erumei.* (Bloch-Schneider.)

Syn. Pleuronectes erumei, Bloch-Schneider.
Russell, LXIX. Adalah.
Hippoglossus erumei. Cuv. R. A. II. 340. (2)

Hippoglossus erumei, Ruppell: Atlas 121.
Hippoglossus erumei. Ruppell: Neue Wirbelth, Fische, 84.
Ikan Siblah of the Malays.

Right side. Dull brownish or greenish-grey; anterior third of dorsal milk-white, minutely dotted with brown; rest pale bluish brown, dotted with brown and washed with black; caudal blackish with a broad vertical, whitish band at the base; anterior eighth of anal milk-white, rest like dorsal; pectorals and ventrals hyaline, the latter minutely dotted with brown. Iris silvery, sending a number of vermicular diverging threads over the circular black pupil. *Left side.* Brownish white, minutely dotted with brown. D 48 to 53, C 15/5, A 35 to 39, V 6, P 14 or 15, Br. VII. Inhabits *Sea of Pinang, Malayan Peninsula*, Coromandel, Bay of Bengal, Estuaries of the Ganges, Massauah. Total length: 1 ft. *Right side.* The length of the head is ¼ of the total. The upper orbit is placed horizontally on the upper surface of the head; its distances from the muzzle is ⅔ of its longitudinal diameter, which is ¼ of the length of the head. A little below, and in front of the upper orbit, on the left side of the muzzle, appears the posterior circular aperture of the left nostril: the anterior one is smaller, tubular and situated a little in front of the posterior. The right orbit is slightly shorter than the left, and is situated vertically on the left side of the head, bordering upon the upper maxillary. The circular pupils are protected by a number of vermicular silvery filaments which diverge from the upper margin of the iris. The distance between both orbits scarcely exceed ¼ of their diameter; each orbital margin is a little raised with a narrow intervening furrow. The apertures of the right nostril are situated immediately in front of the right eye, and resemble the corresponding of the left. The upper maxillary is elongated, widened and truncated bowel. The linear elongated intermaxillaries form the margin of the mouth, and have two series of long, distant, arched teeth, each with a minute barb on the posterior part of the point. The teeth of the external series are fixed, but those of the internal are moveable, and may be laid down like those of *Saurus nehereus*, (Buchan. Hamilton). The teeth of the lower jaw resemble those of the upper, but they are more numerous; those of the inner series are a little longer, and those near the symphysis have an indistinct double barb. On each side of the palate appears a single series of small pointed teeth, and in young individuals, upwards of 4 inches in length, four to six similar on the vomer, which, however, very early disappear. The tongue is minute and smooth; on each side of the root rises a small cluster of minute pointed teeth, and similar appear at intervals on the rest of the hyoid. The angle of the mouth is situated opposite the posterior part of the left orbit. The greatest vertical diameter of the body, at the second third of the total length, slightly exceeds ½ of the latter. The lateral line commences at the inferior margin of the lower eye, which it follows, and turning backwards over the upper margin of the opercle, it describes a low arch which terminates opposite the middle of the dorsal. From thence it proceeds straight along the middle, to the point of the posterior margin of the caudal. The line is a little raised, and is on each scale composed of three small tubes: a central, from which an upper and lower diverge backwards. The greatest vertical diameter contains from 55 to 57 series of scales; the lateral line, from the opercle to the root of the caudal, 69 to 71 scales. The scales are small rounded, with 12 to 15 radiating lines at the radical portion and indistinctly ciliated in the centre of the posterior margin. The dorsal fin commences behind the upper orbit at a distance of one longitudinal diameter, and terminates at an equal distance from the caudal. The 9 or 10 anterior rays are undivided; the longest, towards the middle of the fin, are 2½ in the length of the head; all have at their anterior margin a series of small scales. The anal is ⅛ shorter than the dorsal; the two first rays are undivided; in other respects it resembles the dorsal. The root of the caudal is scaly; the posterior margin is bluntly pointed in the centre, the two rays of which, the longest are ⅔ of the head. The right ventral is situated a little in front of the pectoral, much nearer the gill-opening than the first anal ray; the two first rays are undivided; the fourth, the longest, is 2½ in the length of the head. The left ventral is placed a little farther backward. The pectorals are pointed, ⅓ the length of the head. The stomach is very capacious, broad pyriform; the intestinal canal is simple, about ¼ of the total length. Single individuals occur at all seasons at Pinang, and are eaten by the natives.

B.—Eyes and colour on the left side.

(3795) *Hippoglossus erumei*, Var. A. Inhabits *Sea of Pinang.* This is simply a *reversed, sinistral variety*, necessary, however, to distinguish as such from a second, differing in colours. The present attains to the size of the dextral, but at Pinang it is of rarer occurrence. Individuals of equal length differ in no characters except in such as are necessarily the consequence of *reversion*, such, for instance, as the left ventral fin being placed a little anterior to the right.

(3796) *Hippoglossus erumei*, Var. B.

Syn. Russell, LXXVII. Neoora-Nalaka C.
Hippoglossus nalaka, Cuvier, R. A. II. 340 (?).

Left side. Ground colour pale brownish grey or white minutely dotted with brown; a broad brownish black vertical band, extending from the jaws over the sides of the head and body to the

root of the pectorals; two similar on the sides of the body, and a fourth over the posterior part of the body and the tail; and three last bands extending faintly over the corresponding parts of the dorsal and anal; anterior half of caudal whitish dotted with brown; posterior half brownish black; rest of the fins and eyes like *H. erumei*. *Right side*, like the *left* of *H. erumei*. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Coromandel. Except in colours and being sinistral, the present variety agrees in every other character with *H. erumei*. Russell, indeed, obseved the strong resemblance, but he imagined that in this variety the scales were smaller, and the lateral line carinated. Comparison of equal individuals of both shews no difference of the size of the scales, and the lateral line is equally raised in both. Russell describes the length as being six inches. Of a number of individuals examined at Pinang and Singapore none exceeded 6⅔ inches. It remains to be ascertained if this variety attains to the same size as *Var. A*, or if it is merely a transient livery of certain young individuals of *Var. A*.

Genus SOLEA, *Klein* 1748. Eyes and colour on the right side; mouth distorted on the side opposite the eyes; minute crowded teeth in the half of both jaws opposite the eyes, the other half toothless; form of the body oblong; muzzle rounded and generally projecting beyond the mouth; dorsal commencing opposite or a little in front of the upper eye; caudal separated from dorsal and anal.

(3797) *Solea humilis*, Cantor. *Right side*. Pale umber-brown, minutely dotted with black, and with numerous small blackish spots; an indistinct larger one close below the middle of the base of the dorsal, and a second at the posterior third; two corresponding spots near the base of the anal; membranes of the fins pale brownish buff dotted with black, rays pale umber; on the caudal some indistinct blackish spots; near the point of the pectoral an oval, and between the two lowest rays a linear black spot. Iris pale silvery. *Left side*. Pectoral, ventral and short filaments about the mouth brownish white, D 57, C 12⅘, A 42, V 5, P 8, Br. VI. Inhabits *Sea of Pinang*. Total length: 3⅘ inch. *Right side*. The form of the body resembles that of *Solea pegusa*. Yarrel, [Zool Journ. IV. 467, Pl. 16,—British Fishes: II. 260] but the vertical diameter is greater in the present. The length of the head is 5⅓ in the total. The upper orbit, the larger, is situated in the centre between the angle of the mouth and the corresponding part of the dorsal, but much nearer the muzzle; the horizontal diameter is ⅛ of the length of the head. The lower orbit is situated between the angle of the mouth and the posterior angle of the upper orbit, of which its horizontal diameter is ⅓. The distance between the orbits slightly exceeds the horizontal diameter of the upper orbit. The whole of the head is covered with little scales like those of the body rough to the touch. The tongue is minute, smooth, truncated triangular. The greatest vertical diameter of the body, at the end of the anterior third of the dorsal, is 2½ in the total length. On the diameter may be counted 69 series of scales. The slightly raised lateral line continues straight from behind the upper part of the opercle to the caudal, a little nearer the back than the abdomen. It contains 85 scales, each with a minute central tube. The scales of the head and body are small, elongated tetragonal, the posterior margin rounded. On the radical part appear about nine radiating lines, some of which are divided in two; the centre of the posterior margin has upwards of thirteen cilia, although very fine, yet sufficiently strong to make the scales appear rough to the touch. The fist dorsal ray commences on a level with the anterior angle of the upper orbit. The first nine rays are undivided; all are covered by an elongated pyramidal sheath of scales, consisting of two or three series, which extend to near the points of the rays, which project beyond the membrane. The longest rays, towards the middle of the fin, equal ½ the length of the head. The anal resembles the dorsal, but has only the four anterior rays undivided. The caudal is rounded, equal the length of the head. The pectoral is pointed, ½ the length of the head. The right ventral is very small, about ⅓ of the pectoral, and the last ray is connected by a membrane to the first anal. *Left side*. A little above and behind the symphysis of the upper jaw appears a small tubercle, through which is pierced a single minute nostril. The base of the dorsal as far as the nine first rays carries a few short soft filaments, some of which are scattered over the side of the head; they become more numerous and crowded towards the left angle of the mouth. This side of the jaws resembles the cipher 3, there being at the angle a small pointed tubercle, directed inward. The teeth are very fine, crowded and hid to the point in the fleshy lips. The left ventral is longer than the right and not joined to the anal. A single individual was observed at Pinang in October 1842.

(3798) *Solea ovata*, Richardson.

Syn. Solea ovata, Richardson: Report, 1845, 279.

Right side. Brownish ash-grey, minutely mottled with pale blackish, towards the base of the dorsal and anal three rounded, distant, black spots, edged with light grey; on the rest of the body a few scattered similar spots, also indistinctly ocellated; pectoral greyish at the base rest black; rest of the fins pale ash-grey minutely mottled with blackish. Pupil horizontally oval; iris pale silvery round the pupil; the rest ash-grey. *Left side*. Brownish white; opercles

and abdomen lead grey; filaments about the head white; fins buff. D 65, C 12½, A 48, V 5, P 9, Br. VI. Inhabits *Sea of Pinang*, China Seas, Canton. Total length: 3⅞ inch. *Right side.* The length of the head is ⅕ of the total. Both eyes are nearly equal, ⅛ of the length of the head; the upper one occupies the second-fifth; the lower is removed slightly farther back, and touches the upper lip; the posterior angle of both eyes are situated a little farther back than the angle of the mouth, the eyes are separated by a sharp rest, the diameter of which is scarcely ¼ of the horizontal diameter of each eye. The tongue and teeth resemble those organs of *S. humilis.* The greatest vertical diameter of the body, at about the middle of the dorsal is 2⅓ in the total length. On the diameter may be counted about 76 scales. The latter are rough to the touch; on the radical part appear upwards of 16 radiating lines, some of which are divided in two; the centre of the posterior margin is armed with from 9 to 12 fine spines. The lateral line proceeds straight in the middle of the side from the gill-opening to the caudal: it contains upwards of 95 scales, each with a minute central tube. The first dorsal ray commences opposite the anterior angle of the upper eye; the longest rays, towards the middle of the fin slightly exceed ½ of the length of the head. The anal resembles the dorsal. The rounded caudal is distinct, but united by a membrane to the dorsal and anal; its length is ⅕ of the head. The pectoral is elongated ⅝ of the length of the head. The ventrals are nearly equal, about ½ of the length of the head. *Left side.* Numerous filaments appear on the lower lip and the lower margin of the gill-cover. The left pectoral is but ⅓ of the right. Single individuals occur at Pinang at all seasons.

Sub Genus SYNAPTURA, *Cantor.* [Συναπτὸς, joined; οὐρὰ, tail. Substituted for *Brachirus*, properly written: *Brachyurus*, Swainson 1839, preoccupied by *Brachyurus*, Fischer, 1814. (*Mammalia.*)] (Brachyurus, *Swainson*, 1839.) General structure of *Solea*, but the caudal, dorsal and anal fins are all united.

(3799) *Synaptura commersoniana*, (Lacepede.)

Syn. Plenronecte commersonien. Lacep. III. Pl. 12. Fig. 2, (not IV. 656.)
Russell, LXX. Jerree Potoo A.
Solea commersoniana, Cuvier, R. A. II. 343. (1).
Brachirus commersonii, Swainson, II. 303.
Ikan ledah [*Ledah*, tongue,] of the Malays.

Right side. Greenish or brownish olive, darkest on the opercles, minutely dotted with brown; all the scales with a small verticle buff spot behind the cilia, giving a dusky appearance to the ground colour; pectoral black with buff margin; rest of the fins like the body but lighter; dorsal, caudal and anal with a narrow milkwhite edge within which a second sooty brown, composed by a series of single spots on the membranes; lips and pointed papillæ of the lower olive; mouth and opercles inside pale olive, closely dotted with black. Iris a silvery or golden green ring; the rest bluish black. *Left side.* Pectoral and ventral buff.

D 78 or 81.
C 12,..... *Right* V 5, *Left* V 4, P 6, Br. VI.
A 65 or 66,

155 or 159

Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Coromandel. Total length: 8⅝ inch. *Right side.* The length of the head is ⅐ of the total. The upper orbit is situated above the middle of the right upper lip at equal distance from the angle of the mouth and the muzzle; the greatest diameter is oblique, upwards and backwards is ⅛ of the length of the head. From the anterior angle of the upper orbit proceeds a short bony ridge which terminates close to the muzzle in a flat rounded point, with which the muzzle produces a short furrow. The lower orbit is situated immediately above the angle of the mouth, a little posterior to the upper one, and in a different position. The greatest diameter is oblique, downwards and backwards, scarcely shorter than that of the upper orbit. The distance between the anterior angles of both orbits equals their greatest diameter. The posterior aperture of the nostril is a little in front of the lower orbit; the anterior is a little farther in front, tubular or pierced through a small papilla. The lower right lip is fleshy with numerous pointed papillæ. The tongue is minute, linear, smooth. The teeth resembles those of *Solea humilis.* All the scales of the head, below the level of the upper eye are a little larger than those of the body; above that level, towards the origin of the lateral line, they are nearly double the size, and by far the greatest of all. The form of all is nearly rectangular, with the posterior margin rounded, with 8 or 9 fine spines, which makes the scales rough to the touch. At the radical part appear 3 or 4 radiating lines. The greatest vertical diameter of the body, at the commencement of the second third of the back, is ¼ of the total length. This diameter contains about 71 series of scales. The lateral line commences behind the upper part of the opercle and proceeds straight, a little nearer the back than the abdomen, to the caudal. It consists of about 167 minute central tubes. The first dorsal ray commences close to the muzzle, a little below the level of the anterior margin of the upper orbit. The rays, of which the first four are undivided, gradually increase in length to the last which is ⅓ of the length of the head. The caudal is elongated, terminating in a rounded point, ⅘ of the length of the head. The anal, all the rays of

which are divided, commences beneath the posterior part of the inter-opercle, between the two ventrals. The basal half of all three vertical fins are covered with minute scales, and the points of the rays project a little beyond the membrane. They are so closely connected, that the milkwhite outer margin is uninterrupted, and the shape of the fish resembles a broad point of a lance. The length of the pectorals is $\frac{1}{6}$ of the head. The ventrals are situated immediately in front of the anal, but on a little higher level; their length equals the pectorals. On the left side about the lower lip and the throat appear a number of short white filaments. The figure of Russell (LXX). is incorrect. The short arch above the upper eye is not produced by the lateral line, but by a bony ridge, and the caudal fin is too short and rounded, and distinct. His original was probably mutilated. Single individuals are of rather rare occurrence at Pinang.

(3800) *Synaptura zebra*, (Bloch).

Syn. Pleuronectes zebra, Bloch, Tab. 187.
Pleuronectes zebra, Linne; Syst. 1226.
Pleuronectes zebra, Shaw, IV. 305, Pl. 44.
Solea zebra, Cuvier, R. A. II. 343 (1).
Pleuronectes zebra, Bennet; Life of Raffles, 692.
Brachirus zebra, Swainson, II. 303.

Right side. Ground colour of head, body, dorsal, and anal ventral fins reddish white minutely dotted with brown; on the head and body upwards of 19 vertical sooty- or blackish-brown bands extending over the dorsal and anal; the bands double or in pairs, frequently confluent towards the tail; a reddish yellow or pale orange band over the root of the caudal and the last dorsal and anal rays; rest of the caudal black with several oval milk white spots; pectoral black; pupil iridescent, circular; iris pale golden, with four radiating blackish bars. *Left side.* Pectoral, ventral and filaments of the mouth and throat reddish white; opercle and abdomen bluish.

D 81 or 83.
C 16,.....*Right* V 5, *Left* V 4, P 7 or 8, Br. VI.
A 67 or 65

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Inhabits *Sea of Malayan, Peninsula and Islands*, Chusan, Macao, Bay of Bengal, Sumatra. Total length: 7 inch. *Right side.* The length of the head is $\frac{1}{4}$ of the total. The upper orbit is situated above the middle of the upper right lip, at equal distance from the muzzle and the angle of the mouth; the horizontal diameter is $\frac{1}{3}$ of the length of the head. The lower orbit is a little farther backwards, immediately above and behind the angle of the mouth: the horizontal diameter equals that of the upper; the distance between both is somewhat less. A slight downwards arched ridge proceeds from the anterior angle of the upper orbit to the muzzle. The nostrils, mouth and teeth resembles those of *S. commersoniana*, but the lower right lip presents no papillæ. The greatest vertical diameter, at the end of the anterior third of the body, is $3\frac{1}{3}$ in the total length; it contains upwards of 71 series of scales. The latter are all small, nearly rectangular, with 7 to 9 radiating lines at the radical part, and with as many spines at the posterior rounded margin. The lateral line in its course resembles that of *S. commersoniana*; it consists of upwards of 121 small central tubes. The dorsal commences opposite the anterior angle of the upper orbit, at a distance from the upper lip of $\frac{1}{3}$ of the length of the head, but not immediately from the upper lip, as represented by Bloch, and the copies of his incorrect figure. The anterior 26 to 28 rays are undivided; the last rays are the longest as well as the caudal and the last anal rays slightly exceed the length of the head. The caudal is broader and more rounded than in *S. commersoniana*, which in other respects the three united fins resemble. The pectoral is very pointed owing to the second upper ray being much longer than the rest, although it is but $2\frac{1}{3}$ in length of the head. The length of the ventrals is about $\frac{1}{4}$ of the length of head; they are placed as in *S. commersoniana*, but the distance from the first anal ray is a little greater. Single individuals occur at Pinang at all seasons.

Genus ACHIRUS, *Lacepede*, 1802. Resembling *Solea*, but destitute of pectoral fins; dorsal and anal distinct from caudal; eyes and colours on the right side.

(3801) *Achirus pavoninus*, Lacepede.

Syn. Achire provonine, Lacepede, IV. 660.
Pleuronectes pavoninus Shaw, IV. 310.

Right side. Ground colour of head, body and fins yellowish or pink-brown; the fin-membranes dotted with black; scales edged with dark brown; head and body with numerous larger and smaller rounded milkwhite spots, edged and minutely dotted with dark brown, and with a round soot-coloured spot in the centre; a few of the white spots confluent; base of dorsal and caudal with a series of spots like those of the body; the rest of these fins, the right ventral and the caudal with numerous smaller spots destitute of the brown central spot. Iris annular, golden; rest brownish. *Left side.* Head and body brownish white or buff; opercle and abdomen pale bluish; filaments of the head white. D 67, C $12\frac{3}{11}$, A 50, V 5, P 0, Br. *right* VI; *left* V? Inhabits *Sea of Pinang*. Total length: $7\frac{1}{3}$ inch. The length of the head is $6\frac{1}{3}$ in the total. The upper orbit is situated at the upper third of the head, at equal distance from the muzzle and the angle of the mouth; the horizontal diameter is $\frac{1}{4}$ of the length of the head. The lower orbit is situated vertically below the upper, at a distance of $1\frac{1}{2}$ diameter immediately above and behind the angle of the

mouth; it is a little larger than the upper orbit. Between the anterior angles of both appears like a pore the posterior aperture of the nostril; the anterior one is tubular, pierced through a small tubercle which is situated lower down, immediately above the centre of the upper lip. The jaws are equal; the mouth very little distorted to the left; the lips are fleshy. The right side is toothless, but on the left appear numerous, minute, setaceous teeth, so completely hid by the lips, that during life they easily escape observation. On the left side of the head and on the throat appear numerous small filaments. The tongue is minute, smooth, truncated triangular. The body forms a regular elongated oval; its greatest vertical diameter is a little less than $\frac{1}{3}$ of the total length; this diameter contains about 67 series of scales. The latter are small, oval. On the posterior margin appear some spines so excessively minute, that the surface does not appear rough to the touch. The rest of the circumference of the scales is divided by upwards of 55 backwards radiating lines. The lateral line commences from the upper margin of the opercle; at first it slightly descends, and then continues in the middle of the side to the caudal; it contains about 99 central tubes. The dorsal commences very close to the upper lip, opposite the centre of the distance between the eyes; all the rays divided; the anterior and posterior ones are a little shorter than the rest, which are about $2\frac{1}{2}$ in the length of the head. The anal resembles the dorsal, but the rays are a little longer. Both fins have their basal third covered with scales. Immediately above the latter scales, on both sides of the fins, in the centre between each pair of rays, appears a very distinct rounded aperture, the margin of which is a little raised, and the bottom of which is formed by a lamina of the fin membrane. From the upper part of each aperture proceeds a linear fold, which may be traced to the external margin of the fins. Commerson discovered a similar row of pores along the base of the dorsal and anal rays of *Achirus marmoratus*, Lacepede; [Lacepede, IV. 660.—*Pleuronectes marmoratus*, Shaw, IV. 310.] and later, Dr. Ruppell observed similar in *Achirus barbatus*, Geoffroy. [Ann. du Mus, I. Pl. XI.—Ruppell: Atlas, 122. Tab. 31, Fig. 2.] The caudal is scaly, rounded, $\frac{3}{4}$ of the length of the head. The right ventral is broad, rounded; all the rays are divided, $\frac{3}{4}$ of the length of the head; the fifth ray is throughout connected by a membrane to the first anal. The left ventral commences a little more backward; it is narrower and shorter, and not joined to the anal. A single individual was observed at Pinang in August 1843.

Genus PLAGUSIA, *Brown*, 1756. Dorsal, caudal and anal fins united; otherwise resembling *Achirus*. *Eyes and colour on the left side.*

(3802) *Plagusia Bilineata*, (Bloch.)

Pleuronectes bilineatus, Bloch. Pl. 188.
Pleuronectes bilineatus, Linne: Syst. 1235.
Russell, LXXIV. Jerree Potoo E.
Pleuronectes bilineatus, Shaw, IV, 317.
Plagusia bilineata, Cuv. R. A. Ed., 224. (3).
Plagusia bilineata, Ruppell, Atlas 123.
Plagusia dipterygia, Ruppell, ibid. 123, Taf. 31, Fig. 3. (*Young.*)
Pleuronectes bilineatus, Bennett: Life of Raffles, 692.
Plagusia bilineata, Ruppell: Neue Wirb. Fische, 84.
Plagusia dipterygia, Ruppell, ibid.
Plagusia bilineata, Swainson, II. 303.
Plagusia bilineata, Bleeker: Verh. Batav. Gen. XXII. 5.
Ikan ledah of the Malays.

Left side. Pale reddish brown; scales with metallic iridescent reflections, with a pale dark brown longitudinal line, and with a buff or whitish vertical line along the root of the fine spines: opercle bluish or neutral tint; fin-membranes hyaline; rays buff. Iris narrow golden round the circular pupil; rest blackish blue. *Right side.* Brownish white; opercle and abdominal cavity bluish.

D 96 or 97,
C 8 .....*left* V 5, *right* V 4, P 0, Br. VI.
A 70 or 73,

174 or 178.

Inhabits *Sea of Malayan Peninsula and Islands*, Coromandel, Bay of Bengal, Red Sea, Sumatra, Java, Madura. Total length: 9 inch. *Left side.* The form of this as of all the following species is elongated lanceolate. The length of the head is $4\frac{1}{3}$ in the total. The muzzle bluntly pointed; the distance to the anterior angle of the upper orbit is $10\frac{1}{2}$ in the total length; the muzzle terminates downwards in a remarkably long sickle-shaped process, which extends below the lower jaw to opposite the angle of the mouth, or in young individuals a little beyond it. The young are farther distinguished by their excessively minute right ventral fin. The description and plate of Plagusia dipterygia, Ruppell, offer no specific distinguishing character. The distance from the muzzle to the point of the sickleshaped process, its length, varies individually from $5\frac{1}{3}$ to $6\frac{1}{2}$ in the total length; in young individuals it is proportionally longer, slightly exceeding $\frac{1}{5}$. The upper orbit is situated in the centre of the head, above the middle of the upper lip; the horizontal diameter is $\frac{1}{4\frac{1}{3}}$ of the length of the head. The lower orbit is thrown farther back above the angle of the mouth; both are of about equal size, and their vertical distance but slightly exceeds the horizontal diameter. The left side of the jaw is toothless with fleshy pa pillular lips; in the right of both appear crowd-

ed fine setaceous teeth. A single nostril appears in front of the lower eye, close to the lip: the tongue is minute, rounded, smooth. The greatest vertical diameter of the body, at the commencement of the anal fin, equals the length of the head; on it appear about 44 series of scales. The latter are elongated oval; those of the body double the size of those of the head. The anterior margin carries upwards of 17 minute spines, rough to the touch; the radical part upwards of 60 radiating lines. A line between the gill-opening and the caudal contains about 85 scales. The lateral line commences at the muzzle, ascends a little above the upper orbit; from thence it is straight to near the upper margin of the opercle, where it makes a very short ascent, and then continues straight, nearly in the middle of the body to the caudal. Above the preopercle it gives off a short vertical branch, which again is divided in three principal branches: an upper which proceeds backwards to the margin of the opercle, a second obliquely downwards over the opercle, and a third, which following the anterior arch of the preopercle despatches a branch backwards to the lower part of the opercle, and terminates on the throat. Above the opercle the lateral line gives off another short branch which rises vertically, and divides in what is called the second lateral line of which the anterior branch proceeds near the base of the dorsal towards the muzzle, the posterior continues near the dorsal to the caudal. The dorsal commences far in front of the eyes at a short distance from the muzzle. The dorsal, caudal and anal rays are undivided, and nearly of equal length, $\frac{1}{8}$ of the head, with the points slightly projecting beyond their membranes. The left ventral is situated at the gill-opening, on a level a little above the anal; the first ray is very short and closely connected to the second; the rest gradually increase in length; the fifth is the longest, $\frac{1}{5}$ of the head and by a membrane throughout connected to the first anal. The stomach is capacious, broad pyriform; the intestinal canal simple, forming two circumvolutions; its length is less than $\frac{2}{3}$ of the total. Single individuals occur at Pinang at all seasons. They are of excellent flavour.

(3803) *Plagusia cynoglossa*, (Buchan Ham.) Var. A. [Syn. *Achirus cynoglossus*, Buchan. Hamilton, 132, 373. Marked *Achirus kukurjibha* in Buchanan's duplicate series of drawings. Inhabits, Bay of Bengal, mouths of the Ganges.]

Syn. Ikan ledah of the Malays.

Left side. Ground-colour pale reddish brown, posterior half of head and the body largely spotted and marbled with blackish brown; dorsal, caudal and anal rays brownish their membranes pale brownish transparent, minutely dotted with black; ventrals whitish. Iris golden, annular, rest bluish black. *Right side.* Brownish white; opercle and abdominal cavity pale bluish.

Var. B.

Left side. Differs from *Var. A* by having 7 or 8 vertical, blackish brown, distant bands not extending over the dorsal and anal; head and intervals with irregular blackish brown spots.

D 100 or 102,
C 10,.....V 4, P 0, Br. VI.
A 76 or 78,

186 or 190.

Inhabits *Sea of Pinang*. Total length: 6 inch. *Left side.* The length of the head is $5\frac{2}{3}$ in the total. The distance from the very bluntly pointed muzzle to the upper eye is $\frac{1}{7\frac{1}{2}}$ of the total length; the point proceeding downwards from the muzzle barely covers the symphysis of the lower jaw; its length equals the distance from the muzzle to the upper eye. Both eyes are excessively minute, like points. The upper one is situated at the anterior third of the head, opposite the middle of the upper lip. The lower is a little farther back, immediately above the posterior third of the upper lip. The distance between both is apparently two diameters. No nostril is distinguishable. The left side of the lips is not papillular; the right completely hides the minute teeth. The greatest vertical diameter of the body, in front of the anal, is $\frac{1}{3}$ in the total length; on it appear 31 to 33 series of scales. The latter are on the body comparatively large, elongated oblong, with about 17 minute spines at the posterior margin, and about 36 radiating lines on the radical portion. There are about 81 on a straight line between the gill-opening and the caudal. The lateral line with its ramifications, resembles that of *P. bilineata*. The length of the pointed caudal is $\frac{1}{2}$ of the head. The distance from the first anal to the first ventral ray equals that between the muzzle and the upper eye, which is nearly thrice that of these fins in *P. bilineata*. In other respects the fins resemble those of the latter species. At Pinang single individuals occur, but rarely, which in addition to their small size, makes them less valued as an article of food.

(3804) *Plagusia trulla*, Cantor.

Syn. Ikan ledah of the Malays.

Left side. Pale dark reddish brown; opercles much darker than the rest; in some individuals a series of short, distant, vertical bluish lines under the anterior half of the dorsal, and above the anterior third of the anal; scales with a dark longitudinal line; posterior margin buff; fins transparent pale brownish, minutely but faintly dotted with black. Iris annular golden; rest bluish black. *Right side.* Brownish white, opercles and abdominal cavity blackish blue.

D 109 or 111,
C 12,..... *left* V 4, *right* 0; P 0, Br. VI.
A 80 or 86,

201 or 209.

Inhabits *Sea of Pinang, Malayan Peninsula.* Total length: 1 ft. *Left side.* The length of the head is $5\frac{1}{4}$ in the total. The distance from the rounded muzzle to the anterior angle of the upper orbit is from $13\frac{1}{3}$ to $\frac{1}{14}$ of the total length. The point proceeding downwards from the muzzle covers the symphysis of the lower jaw; its length equals the distance between the muzzle and upper orbit. The latter is situated a little behind the anterior third of the length of the head, opposite the middle of the upper lip. The horizontal diameter is $10\frac{1}{3}$ in the head. The lower orbit is placed a little farther back, still considerably in front of the angle of the mouth; it is a little smaller than the upper; the vertical distance between both slightly exceeds the horizontal diameter of the upper. Immediately beneath the latter appears a small, but remarkably developed bony protuberance, or spine. A single aperture of the nostril appears a little in front of the lower eye above the lip. The lips are fleshy, but not papillular, otherwise the mouth, tongue and dentition resemble *P. bilineata.* The greatest vertical diameter of the body, towards the middle, is $4\frac{1}{2}$ to $4\frac{2}{3}$ in the total length. It contains 45 series of scales. For the size of the fish the latter are rather small, elongated oval, with about 21 radiating lines at the radical part, and 13 spines at the posterior margin, which is rough to the touch. A straight line between the opercle and the caudal contains about 117. The lateral line and its ramifications resemble *P. bilineata.* The distance between the muzzle and the first dorsal ray, and that between the first ventral and anal ray equal $\frac{1}{2}$ of that between the muzzle and upper eye. The length of the caudal varies from $2\frac{1}{3}$ to $\frac{1}{2}$ of the length of the head. There is but a single ventral, on the left side, connected by a membrane to the anal. But for the absence of the ventral fin, the figure marked *Plagusia abbreviata* in *Illustrations of Indian Zoology*, II. Pl. 94, Fig. 3, might be supposed to represent the present species. Individuals, although never in great numbers, occur at all seasons at Pinang, and are highly valued for their flavour.

(3805) *Plagusia grandisquamis*, Cantor.

Left side. Pale reddish brown; scales with metallic iridescent reflections, a central, dark longitudinal line, and the posterior margin buff; opercle and abdominal cavity bluish black; from above the opercle closely beneath the base of the dorsal a black band, gradually narrowing towards the caudal; from a little behind the abdominal cavity immediately above the base of the anal a similar black band joining the former at the root of the caudal; dorsal and anal pale brownish transparent, minutely dotted with black; caudal black, ventrals white. Iris annular golden, rest minutely dotted with black. *Right side.* Brownish white; opercle and abdominal cavity bluish black.

D 116,
C 10, V 4, P 0, Br. VI.
A 88,
214

Inhabits *Sea of Pinang.* Total length: $7\frac{1}{2}$ inch. *Left side.* The general form is narrow, elongated lanceolate, resembling *Plagusia lingva*, (Buchanan Hamilton.) The length of the head is $5\frac{1}{3}$ in the total. The distance from the oval muzzle to the anterior angle of the upper orbit is $\frac{1}{14}$ of the total length; the point proceeding downwards from the muzzle is broad, barely covering the symphysis of the lower jaw; its length equals the distance between the muzzle and the upper orbit. Both orbits are nearly equal; the upper one is situated at the second fifth of the head opposite the middle of the upper lip; the horizontal diameter is $\frac{1}{10}$ of the length of the head. The lower orbit is placed very little farther back than the upper. The interval between both is excessively narrow, a short linear septum; between the anterior angles of both appears a small pointed, triangular, bony protuberance. The nostril has a single aperture in front of the lower eye, above the upper lip. The lips are fleshy, not papillular; the excessively minute teeth on the right side are completely hid from view. The tongue is linear, smooth. The greatest vertical diameter, at the anterior third of the body, equals the length of the head. On it appear 17 series of remarkably large scales, of a broad oval form. The length of the largest is $\frac{1}{5}$ of the head, their breadth $\frac{1}{10}$; at the radical part appear upwards of 50 radiating lines; at the posterior margin 36 to 38 fine spines, rough to the touch. A straight line between the opercle and caudal contains 59 scales. The lateral line and its ramifications resemble those of *P. bilineata.* The dorsal commences at a distance from the muzzle of $\frac{1}{2}$ of that from the latter to the upper eye; the longest rays, as well as the pointed caudal, is $\frac{1}{3}$ of the head. The distance between the left ventral and the anal is $\frac{1}{2}$ of that between the muzzle and the upper eye, Both ventrals are nearly equal, $\frac{1}{3}$ of the head; the last ray of the left ventral is throughout united to the first anal. In other respects the fins resemble those of *P. bilineata.* A single individual occurred at Pinang in December 1842. The scales were deciduous, probably from decay. The fishermen were not acquainted with the species.

(3806) *Plagusia lingva*, (Buchanan Hamilton.)

Syn. Cynoglossus lingva, Buchan. Ham. 32, 365. [Marked *dexeiris* [illegible] in Buchanan's duplicate series of drawings.]
'Ikan ledah' of the Malays.

Left side. Reddish brown; the scales with golden iridescent reflections, a dark longitudinal central line, and the posterior margin buff; oper-

cle blackish blue; sides with distant rounded and irregular blackish brown spots; dorsal and anal pale brownish grey, transparent, minutely dotted with black; the dorsal immediately in front of the caudal, and the latter itself, black; ventrals white, Iris golden, annular; rest blackish blue. *Right side.* Brownish white; abdominal cavity blackish blue.

D 137,
C V 10, 4. P 0, Br. VI.
A 107.

254.

Inhabits *Sea of Pinang*, Bay of Bengal, Gangetic estuaries. Total length: 1 ft. *Left side.* The length of the head is $5\frac{1}{3}$ in the total. The distance from the oval muzzle to the anterior angle of the upper orbit is $11\frac{1}{3}$ in the total length; the point proceeding downwards from the muzzle projects a little beyond the symphysis of the lower jaw; its length equals the distance between the muzzle and the upper orbit. The latter is situated in the centre of the length of the head, opposite the middle of the upper lip; the horizontal diameter is $\frac{1}{4}$ of the length of the head. The lower orbit is placed farther back a little in front of the angle of the mouth; it is slightly smaller than the upper one. The vertical distance between the two equals the diameter of the upper. Between both appears a very distinct oval aperture, according to Buchanan Hamilton the posterior aperture of the nostril, which has another above the upper lip in front of the lower eye The mouth, tongue, and dentition agree with *P. grandisquamis*. The greatest vertical diameter, at the anterior third of the body is $6\frac{2}{3}$ in the total length. On it appear 31 series of elongated, irregularly oval scales with upwards of 37 radiating lines at the radical part. Those of the anterior part of the body have the centre of the posterior margin very finely ciliated, not rough to the touch; in the rest of the scales this margin is smooth and bluntly pointed. A straight line between the opercle and caudal contains about 100 scales. The lateral line and its ramifications resemble those of *P. bilineata*. The dorsal commences very close to the point of the muzzle, $\frac{1}{6}$ of the distance from the latter to the upper orbit; the rays slowly increase towards the caudal, the longest being $\frac{1}{3}$ of the head. The caudal terminates in a very sharp point; its length is $\frac{1}{2}$ of the head. The distance between the first, left, ventral and the anal ray is scarcely $\frac{1}{3}$ of that between the point of the muzzle and the upper orbit. The right ventral is smaller and so near the left, which is closely connected with the anal, that Buchanan Hamilton overlooked both. In other respects the fins resemble those of *P. bilineata*. Single individuals occur, but rarely, at Pinang.

(3807) *Plagusia potous*, Cuvier.

Syn. Russell, I. XIII. Jerree Potoo. D.
Plagusia potous, Cuvier, R. A. II. 344 (1).
Ikan ledah of the Malays.

Left side. Lighter or darker copper-red; the scale with strong metallic iridescent reflections; opercle and abdominal cavity pale blackish blue; fins transparent pale brownish, minutely dotted with brown; caudal blackish; ventrals whitish. Iris annular, pale golden; rest blackish blue; superior margin of the upper orbit and lower of the inferior with a buff crescent-shaped membrane *Right side.* Brownish white; opercle and abdominal cavity pale bluish.

D 126 or 127.
C 10,..... V 4, P 0, Br. VI.
A 94 or 95.

230 or 232.

Inhabits *Sea of Malayan Peninsula and Islands*, Coromandel. Total length: 1 ft. 2 inch. *Left side.* The length of the head is $5\frac{1}{4}$ in the total. The distance from the centre of the oval muzzle to the anterior angle of the upper orbit is from $11\frac{1}{3}$ to $\frac{1}{12}$ of the total length. The point proceeding downwards from the muzzle covers the symphysis of the lower jaw, or is a little shorter; its length equals the distance between the muzzle and the upper orbit. The latter is situated a little in front of the centre of the length of the head, opposite the middle of the upper lip; the horizontal diameter is $\frac{1}{11}$ of the length of the head. The lower orbit, in size equals the upper; it is placed little farther back, considerably in front of the angle of the mouth. The vertical distance between both equals the horizontal diameter. In front of the lower orbit, above the lip, appear two small apertures of the nostrils, separated by a narrow membranous septum; the lower is oval, double the size of the circular upper one, which opens under a small bony protuberance. The mouth, tongue, and teeth resemble those of *P. grandisquamis*. The greatest verticle diameter of the body, at the anterior third, is $5\frac{1}{2}$ in the total length. On it appear 23 series of oval scales, of which the largest are $\frac{1}{7}$ of the length of the head; their breadth $\frac{1}{14}$. The radicle part is marked with upwards of 46 radiating lines; the posterior margin with 36 to 38 very minute spines, barely perceptible to the touch. A straight line between the opercle and the caudal contains 69 scales. The lateral line and its ramifications resemble those of *P. bilineata*. The fins resemble those of *P. lingua*. The description of Russell gives 148 dorsal rays which probably is a misprint instead of 128. At all events there is a great discrepancy between the description and the plate which represents 165 dorsal and 155 anal rays. The form of all the fins is incorrect. At Pinang this species occurs, although never in great numbers, at all

seasons. It is of excellent flavour, and like *Plagusia trulla*, passes at European tables under the denomination of "Sole." With the exception of *Plagusia grandisquamis*, which was not observed alive, the other species are all distinguished for their tenacity of life. The fishermen at Pinang assert that some species of *Plagusia* shoal at certain seasons.

ORDER PHARYNGOGNATHI. SUBORDER PHARYNGOGNATHI ACANTHOPTERYGII.

Fam. SCAROIDÆ.

Genus JULIS, *Cuvier*, 1817. Head smooth, without scales; lateral line forming an elbow opposite the end of the dorsal fin.

(3808) *Julis dussumieri*, Cuv. and Val.

Syn. Julis dussumieri, Cuv. and Val. XIII. 478, Pl. 387.

Ground-colour of the head and body light green; abdomen greenish white; on the upper part of the head some vermillion spots; a broad vermilion band edged with deep blue from the eye to the angle of the mouth; a second obliquely over the cheek towards the angle of the mouth; a third on the preopercle; a fourth on the temple round the eye; a fifth along the upper margin of the opercle; a sixth, angular, on the upper half of the opercle; on the lower half a large vermilion spot; a seventh on the subopercle; each of the scales of the back and sides with a large central vermilion spot; in front of the vermilion root of the pectorals a large dark-blue spot; pectorals hyaline, the rest of the fins pale yellowish green; dorsal with a series of oblique vermillion lines along the base; a central brownish-lilac undulating line between the five first spines; between the fifth and sixth a large dark-blue spot; between the succeeding spines and rays a large triangular brownish lilac spot occupying the upper half of the membrane; upper margin vermillion; angles of the caudal with a triangular orange spot with a basal vermillion line; two indistinct vertical brownish bands in the middle, the whole fin with numerous small blue spots; anal with a series of oblique vermillion lines along the base; upper half brownish lilac, the three spines with vermillion points; first and second ventral rays vermillion. Iris narrow golden, next vermillion, orbital margin brownish green with a vermillion spot at the lower half. D 9/12, C 14½, A 3/12, V 1/5, P 16, Br. V. Inhabits *Sea of Pinang*, Malabar. Total length 4⅝ inch. The length of the head is 4½ in the total. The eye occupies the third-fifth of the head, and the upper third of the vertical diameter passes through it; the horizontal diameter is ⅕ of the length of the head. The greatest vertical diameter of the body equals the length of the head. The tooth on each side of the symphysis of the upper jaw is longer than the succeeding seven of the external series, which gradually decrease in length. At the angle of the mouth at some distance from the last tooth appears a strong obliquely downwards and forwards pointed tooth. Two teeth on each side of the symphysis of the lower jaw are longer than the rest, which are smaller than the corresponding ones of the upper jaw. The scales of the body are large, striated. A longitudinal series contains 26, an oblique 11. The lateral line consists of tubes, each with a smaller superior and an inferior tube branching off backwards. The anterior part of the line rises obliquely towards the sixth dorsal spine, the rest proceeds straight along the upper fourth of the body towards the ninth ray, when it declines a little and proceeds straight towards the caudal. The posterior margin of the latter fin is rounded. The last ray of the dorsal and the anal, and the first ray of the ventrals are elongated into a very short filament. The anterior anal spine is very minute. The figure of M.M. Cuvier and Valenciennes does not quite correspond to their very correct description. A single individual occurred at Pinang in June 1844.

(3809) *Julis mola*, Cuvier.

Syn. Russell, CXX. Sahnee Moia.
Julius mola, Cuvier, R. A. II. 258.
Sahnee moia, Cuv. an Val. XIV. 234.

Ground-colour of the head and body pale sea-green; abdomen whitish green; from the muzzle over the forehead along the base of the dorsal a dark brown longitudinal band; a second from the side of the muzzle through the eye along the middle of the side to the root of the caudals; the two bands in some consisting of two or three series of spots; on the upper part and sides of the head some irregular orange streaks: pectorals hyaline, red at the root; ventrals white; rest of the fins pale yellowish green; dorsal with an undulating pale blackish band along the base and a second along the middle; in some a black spot either between the fifth and seventh spine, or between the first and second; caudal with some pale bluish spots, and in some with a black spot at the root, and with pale blackish spots near the margin. Iris narrow golden, next vermillion; orbital margin dark brown. D 9/12 C 14⅔, A 2/12, V 1/5, P 15, Br. V. Inhabits *Sea of Pinang*, Coromandel. Total length 4⅘ inch. The length of the head is 3¾ in the total. The diameter of the eye, situated as in *J. dussumieri*, is ⅕ of the length of the head. The dentition and scales resemble those of the latter species. A longitudinal series contains 27, an oblique 13 scales. The lateral line proceeds straight along the upper fourth of the body towards the ninth dorsal ray, from whence it declines towards the middle of the side and proceeds straight towards the caudal. The line is composed of tubes, from each of which, anterior to the ninth dorsal ray, branch off backwards a superior and inferior smaller tube.

The greatest vertical diameter of the body equals the length of the head. The first seven dorsal spines are shorter than the rest, which makes the anterior part of the fin lower than the posterior. The stomach is a short elongated tube, slightly more voluminous than the intestinal canal which is thrice doubled upon itself. The length of both is $\frac{1}{3}$ of the total. The air-vessel is small, elongated conical, of a silvery colour. Single individuals occur, but rarely, at Pinang.

Genus SCARUS, Gronov. 1763. Jaws (intermaxillary and premandibular bones) convex, rounded, with teeth, arranged like scales, on their edge and anterior surface; lips single, fleshy; body oblong with large scales; lateral line interrupted; one inferior and two superior pharyngeal plates with teeth like transverse laminæ,

(3810) *Scarus psittacus*, Forskal.

Scarus psittacus, Forskal 29.
Scarus psittacus, Shaw, IV. 397.
Scarus psittacus, Cuv. R. A. II. 266 (1).
Scarus psittacus, Rüppell: Atlas, 77, Tab. 20, Fig. 1.
Scarus psittacus, Rüppell: Neue Wirbelth Fische, 28.
Scarus psittacus, Cuv. and Val XIV. 226
Petronason psittacus, Swainson, II. 226.

Young. Head above and ground-colour of the back and sides greenish light-blue; all the scales of the latter parts with broad orange margins, forming a net-work; cheeks, opercles, throat and abdomen reddish white; upper lip surrounded by a light blue streak; a second similar from the angle of the mouth obliquely upwards surrounding the lower half of the orbit; a third from the chin to the cheek; a fourth at the anterior margin of the preopercle obliquely backwards over the opercle; a fifth along the posterior margin of the preopercle; from the orbit radiate two upwards and two backwards; in front of the pectoral at the margin of the gill-opening an irregular, light blue spot; dorsal reddish orange; rays, upper and basul margin light blew; caudal membrane yellowish brown, base, upper, lower and posterior margin as well as the rays light blue; anal reddish orange, base and lower margin light blue; spine and point of the ventrals light blue; anterior half of the membrane orange, posterior half white? pectorals yellowish white, second ray light blue. Iris narrow golden round the pupil; rest greenish olive. D 9/10, C 13$\frac{3}{5}$, A 3/9, V 1/5, P 15, Br. V. Inhabits *Sea of Penang*, Red Sea. Total leagth: 10$\frac{4}{5}$ inch. The length of the head is 3$\frac{3}{4}$ in the total. The horizontal diameter of the orbit is 4$\frac{1}{2}$ in the length of the head. The verticle diameter at the occiput equals the length of the head; the greatest verticle diameter of the body sightly exceeds the length of the head. The body is covered by eight longitudinal series, each containing 23 scales. The lateral line consists of backwards branching tubes. The line continues on the third longitudinal series to the termination of the dorsal fin; a single tube then appears on the succeeding scale of the fourth series; the completing part of the line occupies the five posterior scale of the fifth longitudinal series. This species greatly resembles *Scarus harid*, Forskal, from which it differs in having the outline of the abdomen much more convex than that of the back, and in having the angles of the caudal much less elongated. The first of the undivided anal rays is very short and so closely adhering to the second, that it easily may escape observation. A single individual occurred at Pinang in May 1844.

Fam. GLYPHIDODONTIDÆ.

Genus TETRADRACHMUM, *Cantor*. [Τετραδραχμον, a coin, worth four drachms. Substituted for *Dascyllus*, Cuvier, 1829, re-occupied by *Dascillus* (scrib. *Dascylus*,) Latreille, 1796, (*Coleoptera*).] (*Equivalent to* Dascyllus, *Cuvier*.) Shape oblong; head obtuse; teeth velvety, the external series stronger than the rest, conical, pointed; preopercle toothed, lateral line terminating opposite the soft part of the dorsal fin; branchiostegous rays five.

(3811) *Tetradrachmum arcuatum*, (Linne).

Syn. Chætodon arcuatus Linne: Mus. Ad. Fr. I. Pl. 33, Fig. 5.
Chætodon arcuanus, Linne: ibid. Fig. 8.
Chætodon abudafur, Forskal, 65, No. 93.
Chætodon arcuatus, Linne: Syst. 1242.
Chætodon arcuanus, Linne: ibid. 1250.
Chætodon arcuanus, Bloch, Tab. 193. Fig. 2.
Lutjan aruane, Lacepede. IV. 720.
Chætodon arcuatus, Shaw. IV. 341.
Chætodon aruanus, Shaw. IV. 348.
Dascyllus aruanus, Cuv. R. A. II. 179(6).
Pomacentrus aruanus, Ruppell: Atlas, 39.
Dascyllus aruanus, Bennett: Life of Raffles, 688.
Chætodon araneus, Bennett: Ceylon, No. 17.
Dascyllus aruanus, Ruppell: Neue Wirbelth Fishe. 129.
Dascyllus aruanus, Cuv. and Val. V. 434.
Dascyllus aruanus, S. Muller and Schl. Verh. 21.
Dascyllus aruanus, Bleeker: Verh. Batav. Gen, XXXI. 1. Ged. 2. 5.

Alternately black and white; the anterior band black, occupying the space from the throat to the third dorsal spine, excepting the forehead, from between the eyes to the lips, which is white; next a second oblique whitish band bordering upon the root of the ventrals and the pectorals, and continuing along the sixth dorsal spine; next a black band, comprising the ventral fins to a little in front of the anus, over the sides, and over the seventh, eighth and ninth dorsal spine; next a whitish band from the second anal ray, not comprising the spiny portion which is black, over the body along the first dorsal ray; next a nearly

vertical black, comprising the rest of the anal rays, the anterior half of the narrow part of the body in front of the caudal, and the rest of the dorsal rays; the rest of the space in front of the caudal is whitish, the anterior half of the latter fins is black, the rest paler or grey; pectorals bluish-or greyish-white. Iris narrow silvery round the pupil, the rest bluish black. D 12/12, C 15$\frac{1}{6}$, A 2/12, V 1/5, P 16, Br. V. Inhabits *Sea of Pinang*, South Sea, Timor, Amboina, Indian Ocean, Bay of Bengal, Red Sea. Total length: 2$\frac{1}{8}$ inch. Three individuals were observed at Pinang from 1842 to 1845.

Genus. GLYPHIDODON, (*Forskal.*) *Lacepede*, 1802. Body compressed oval, and as well as the head covered with large scales; profile rounded; mouth small; teeth in the jaws in a single series, close, equal, narrow, trenchant and frequently notched; preopercle not toothed; lateral line terminating opposite the last dorsal ray.

(3812) *Glyphidodon rahti*, Cuv. and Val.

Syn. Russell, LXXXVI. Rahti Pota.
Glyphisodon saxatilis. Ruppell: Atlas, Fische, 35 ?
Chætodon tyrwhitti, Bennett: Ceylon, No. 25 ?
Glyphisodon rahti, Cuv. and Val. V. 456; IX. 507.
Glyphisodon rahti, Ruppell: N. W. Fische, 126.
Glyphisodon rahti, S Muller and Schlegel: Verh. over de nat. Gesch. 22.
Glyphisodon tyrwhitti ? } Richardson:
Glyphisodon rahti ? } Rep. 1845.253.
Glyphisodon cælestinus, Cantor: Catal. Mal Mamm. in Journ. As Soc. XV. [*Delphinus plumbeus.*]
Glypisondon rahti, Bleeker: Verh. Bat. Gen. XXI. 1 Ged. pp. 2, 3, 5.

Upper part of the head and the back as far as the dorsal fin greenish or bluish-black, rest of the back and upper half of the sides greenish yellow or gamboge, lower half of the sides, abdomen, cheeks and opercles bluish silvery, all the scales with blackish margins. In front of the dorsal a vertical black band; a second from between the six and seventh dorsal spine; a third from the posterior spines; a fourth from the soft dorsal fin; a fifth in front of the caudal; scales between the dorsal spines and rays yellow or greenish, membrane blackish-blue with a broad black margin; the scaly base of caudal yellow, the rest greenish-or blnish-black with a broad black posterior margin; in some a broad vertical black band behind the base, and the upper and lower margin black; the scaly base of the anal bluish silvery, the rest bluish black or grey; pectorals transparent bluish white, with a black spot of the upper part of the root. Iris golden near the pupil, the rest blue or black. D 13/13 or 12, C 15?, A 2/12, V 1/5, P 18 or 19, Br. VI. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore*, New Guinea, Celebes, Java, Ceylon, Bay of Bengal, Bombay, Red Sea. Total length: 6 inch. Not only are the ground colours liable to individual variations according to the yellow or bluish being the prevailing, but the verticle bands are broader or narrower, and the three middle ones are in some continued over the dorsal fin. In some the black bands are very indistinct or almost obliterated, as in the one figured by Russell, No. LXXXVI. in others a few distant black spots appear on the opercles and between the bands (*Chætodon tyrwhitti*, Bennett); the black spot of the pectorals is absent in some, in others it is a continued line along the root of the fin. All ages are subject to these variations. Young individuals are numerous at Pinang at all seasons, but adult ones are seldom seen. They are eaten by the natives.

SUBORDER PHARYNGOGNATHI MALACOPTERYGII.

Fam. SCOMBERESOCIDÆ.

Genus BELONE, *Cuvier*, 1817. Jaws forming an elongated beak, the upper part principally composed of the intermaxillaries, the base of the maxillaries; teeth in both jaws, those of the internal margin longer and more distant than the rest; those of the external margin small, pointed and closely set; lips none; under the symphysis of the lower jaw a short, soft, fleshy appendage; with one exception, no teeth on the vomer; pharyngeal teeth small conical; body elongated with small scales; bones of the skeleton green.

(3813) *Belone annulata*, Cuv. and Val.

Syn. Russell, CLXXV. Mahlah Kuddera.
Belone annulata, Cuv. and Val. XVIII. 447, Pl. 550.
Toda of the Malays.

Adult. Head above and back sea-green with steel-blue reflections, minutely dotted with black; lighter, silvery, on the upper half of the sides; lower half and abdomen silvery white; cheeks and opercles silvery; side of the upper mandible blackish olive, of the lower silvery, with a black line from the angle of the mouth along the base of the teeth; dorsal, caudal and pectorals membranes pale greenish grey, minutely dotted with black, particularly towards the margins; anal and ventrals white, their anterior part minutely dotted with black. Iris silvery, orbital margin black. *Young.* Head and back olive green; above the lateral line a narrow greenish silvery longitudinal band; opercles with a large black spot; lower mandible black; posterior two-thirds of dorsal black; on the middle of the caudal a large black spot. D 22 or 23, C 15$\frac{5}{8}$ A 21 or 22, V 6, P 13 or 14 Br. XV. *Young*: XIII?) Inhabits *Sea of Pinang, Malayan Paninsula*, Seychelles, Tongatabu, Celebes, Pondicherry, Vizagapatam. Total length: 2 ft. 6

inches. The young differs from the adult not only in colours, but in relative dimensions. In an individual, 6⅝ inches in length, the head is 3¼ in the total. The verticle diameter at occiput is ⅙ of the length of the head. The horizontal diameter of the eye is 7½ in the head, measured from the symphysis of the lower mandible, and 2¾ in the distance from the anterior margin of the orbit. The distance across the forehead is a little less than the diameter of the orbit. The posterior rays of the dorsal fin exceed by about ⅓ the length of the anterior ones. The abdomen crest is barely distinguishable. The tongue is fleshy, naked. In another, 11 inches in length, the head is a little more than 3⅛ in the total; the vertical diameter at occiput is 5½ in the head; the horizontal diameter of the eye is 8¼ in the head, measured from the symphysis of the lower mandible, and ⅓ of the distance from the anterior margin of the orbit; the distance across the forehead slightly exceeds the diameter of the orbit; the posterior dorsal rays exceed by ⅙ the anterior ones; the abdominal crest is distinct, particularly on the posterior fifth of the body; the margin of the tongue is studded with two or three series of minute polygonal bony plates, placed beside each other like mosaick; the black spots of the opercles snd caudal are no longer visible. In an individaul, 2 ft. 3 inches in length, the length of the head is 3½ in the total; the vertical diameter at occiput is ½ of the head; the horizontal diameter of the eye is ⅛ of the length of the head from the symphysis of the lower mandlble, and 3⅓ in the distance measured from the anterior margin of the orbit; the distance across the forehead exceeds by ⅓ the diameter; the posterior dorsal rays, although somewhat elongated, are but ½ the length of the second rays. [The figure of Russell is in this respect correct; but the last dorsal ray is placed too near the caudal. The distance between the two fins exceeds by ⅓ the length of the last dorsal ray.] Immediately in front of the caudal the abdominal crest is very sharp, but becomes less so at its termination on the anterior third of the caudal. The hyoid bone and the tongue are entirely covered with a mosaick of small polygonal rough bony plates. The internal surface of the lower mandible presents a structure, which if present in other species, has not been described. The middle where the two branches join each other, is raised and forms a bony ridge, commencing behind the symphysis and gradually widening towards its termination in front of the apex of the tongue. The upper surface of this ridge is flattened, but made uneven by numerous transversal sharp bars, or rather by one continued closely waved bar, forming a kind of grate. The ridge is separated from the teeth by a deep groove, intervening on each side, and is covered by the fine membrane lining the rest of the cavity. In the young it differs by having a comparatively smaller number of transversal bars. The corresponding surface of the upper mandible is smooth, with a longitudinal fissure. In the adult fish the two anterior branchiostegous ray are so very minute, that they may easily escape observation; in young ones they appear to be absent. At Pinang this species is numerous at all seasons, but large individuals are scarce. In several examined, both of the present and the following species, the stomach contained nothing but thick mucus. The fish is eaten by the natives, although it is very insipid.

(3814) *Belone caudimacula*, Cuvier.

Syn. Russell, CLXXVI. Kuddera A. *
Belone caudimucula, Cuv. R. A. 282 (2)
Belone caudimacula, Cuv. and Val. XVIII. 452.
Belone caudimacula, Bleeker: Verh. Bat. Gen. XXII. 5,
Toda of the Malays.

Head above and back yellowish green minutely dotted with brown; lighter, silvery on the sides; posterior half of the latter with a deep-blue longitudinal band, bordered beneath by a broader shining silvery one; abdomen white; sides of mandibles, cheeks and opercles silvery; dorsal, and in some the anal bright yellow, minutely dotted with brown along the rays; caudal yellow or greenish, minutely dotted with black, with a rounded bluish black spot in the centre near the root; ventrals and pectorals hyaline, the latter in some with a black spot along the root. Iris silvery, orbital margin bluish black. D 13, C 15⅔ A 16, V 6, P 10, Br. XII? Inhabits *Sea of Pinang, Malayan Peninsula*, Bombay, Aleppee (in fresh water), Coromandel, Gangetic estuaries. Rangoon, Canton, River Brunai (Borneo), Port Essington, North Australia. Total length: 1 ft. 1 inch. In an individual of the length given the head was contained 2¾ times in the total length. The vertical diameter at occiput was ⅕ of the length of the head. The horizontal diameter of the eye was 10½ of the length of the head, measured from the symphysis of the lower mandible, and ¼ of the distance from the anterior margin of the orbit. The abdominal crest becomes most distinct on the tail. The internal series of long sharp teeth appear proportionally shorter in this than in the preceding species. The tongue is smooth. On the inside of the lower mandible is a bony, grated ridge like that of the preceding species, and *Belone cancila* (Buchan. Ham.) is provided with a similar. Single individuals, all of nearly equal length, occur at Pinang at all seasons. They are eaten by the natives.

Genus HEMIRAMPHUS, *Cuvier*, 1817. Upper jaw very short, formed by the intermaxillaries; symphysis of lower jaw extended into a long point, behind which on the margins of both jaws a narrow band of small teeth; scales large, rounded, forming a carinated range on each side of abdomen; body and fins resembling *Belone*.

(3815) *Hemiramphus russelli*, Cuv. and Val.

Syn. Russell, CLXXVII. Kuddera, B.
Hemiramphus brevirostris. Cuv. R. A. II. 286 (1). [Cuvier refers this species to Russell No. CLXXVII, and to Willughby: Append. Pl. VII. Fig. 4, two distinct species according to M. Valenciennes, who therefore has changed the specific denomination.]
Hemiramphus brevirostris, Swainson, II. 297.
Hemiramphus russelli, Cuv. and Val. XIX. 32.
Toda pendek [*Pendek*, short. The Malays thus denominate all the species of *Hemiramphus*, to distinguish them from those of *Belone (Toda.)*] of the Malays.

Head above and back bluish black; lighter, silvery on the sides above the lateral line; rest of the sides, abdomen and opercles silvery with steel-blue reflections; fins hyaline; marginal half of dorsal and caudal minutely dotted with black; sides of lower mandible black. Iris silvery, orbital margin bluish black. D 17, C 15¾, A 13, V 6, P 12, Br. XIII. Inhabits *Sea of Pinang, Malayan Peninsula*, Coromandel. Total length: 10 inch. The length of the head from the apex of the intermaxillaries is ⅙ of the total measured to the point of the lower, longer, caudal lobe. The length of the lower jaw, from the apex to the angle of the mouth, slightly exceeds the length of the head, varying in different individuals from ⅕ to ⅙ of the distance to the point of the lower caudal lobe. The horizontal diameter of the eye is ¼ of the length of the head; the distance across the forehead equals 1½ diameter. The depth at occiput slightly exceeds ½ of the length of the head, and is but ⅔ of the greatest vertical diameter of the body, in front of the ventrals. The length of the pectorals is ⅙ less than that of the head, which is exceeded by ¼ by that of the lower caudal lobe. The upper caudal lobe is ⅔ of the lower. The ventrals are placed opposite the posterior third of the distance between the apex of the intermaxillaries and the root of the caudal. At Pinang this species is numerous at all seasons, but larger individuals occur at irregular intervals. They appear at European tables under the appellation of "Guard-fish."

(3816) *Hemiramphus georgii*, Cuv. and Val.

Syn. Hemiramphus georgii, Cuv. and Val. XIX. 37, Pl. 555.
Toda pendek of the Malays.

Young. Head above light greenish grey, minutely dotted with black, particularly on the intermaxillaries and about the occiput; back and sides towards the lateral line pale greenish grey; the margins of the scales minutely dotted with black; along each side a shining silvery band, divided in the middle by the lateral line, and edged above by a deep blue line; abdomen faint silvery white; opercles shining silvery with steel-blue reflections; lower jaw greenish grey, with a black marginal membrane; dorsal and caudal pale greenish grey; marginal half dotted with black; rest of the fins hyaline. Iris silvery; orbital margin bluish black. D 15 or 16, C 15¾, A 15, V 6, P 12, Br. XII? Inhabits *Sea of Pinang*, Bombay, Mahe. The length of the head from the apex of the intermaxillaries is 5⅓ in the distance to the point of the lower caudal lobe. The length of the lower jaw from the apex to where the teeth of both sides meet, varies individually from 3⅔ to 3½ in the total length. The horizontal diameter of the eye is ¼ of the length of the head; the distance across the forehead exceeds by ¼ the diameter. The arch of the roof of the orbits makes the middle of the forehead appear excavated. The depth at occiput is ½ of the length of the head. The band of teeth of the intermaxillaries is very narrow at the angle of the mouth, gradually widening towards the apex. The inner series of these teeth are somewhat longer than the rest. The lower jaw has but a single series of minute teeth, behind which the anterior half of the mouth is lined by a crescent-shaped black membrane. The length of the pectorals is [illegible] of the head. The ventrals are placed in [illegible] the posterior third of the distance between the occiput and a short [illegible] of the caudal. The [illegible] diameter [illegible] of the ventrals is a little more than [illegible] of the head. The caudal is but slightly [illegible]; the lower lobe, but little longer than the upper, is ¾ of the length of the head. The two anterior dorsal rays are undivided. M. Valenciennes counts 17 rays in this fine, but his figure gives 16. Single young individuals occur at Pinang at all seasons.

(3817) *Hemiramphus tridentifer*, Cantor.

Syn. Toda pendek of the Malays.

Head above, back and upper part of the sides light bluish green, minutely dotted with black, particularly towards the margin of the scales; along each side a shining silvery band, widening between the dorsal and anal: narrower in front of the caudal; the band edged above by a deep blue line, and longitudinally divided by the lateral line; rest of the sides and abdomen pale silvery white; cheeks and opercles shining silvery, the latter and the root of the lower jaw with strong steel-blue reflections; point of lower jaw with greenish blue minutely dotted with black, with a black marginal membrane, apex red sealingwax colour; dorsal hyaline, margin of the rays minutely dotted with black; anterior half of caudal pale greenish buff, posterior half, upper and lower margin pale blackish, rest of the fins hyaline. Iris silvery, upper half of orbital margin bluish black. D 13 or 14, C 15¾ A 14 or 15, V 6, P 13, Br. XII or XIII. Inhabits *Sea of Pinang*. Total length: 7 inch. The

length of the head from the apex of the intermaxillaries is $5\frac{1}{2}$ in the distance to the point of the lower caudal lobe. The length of the lower jaw from the apex to where the teeth of both sides meet varies from $6\frac{1}{2}$ to $6\frac{2}{3}$ in the total length. Measured to the angle of the mouth, the lower jaw is from $5\frac{1}{5}$ to $5\frac{2}{3}$ in the total length. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the flattened forehead equals the diameter. The depth at occiput equals $\frac{1}{2}$ of the length of the head. The teeth of both jaws are placed on narrow bands; in the centre of the lower jaw there is a very minute interval between the teeth of both branches. The teeth themselves are very minute, the internal series a little longer than the rest. Examined through a lens the apex of each tooth appears compressed, terminating in three minute points, of which the central one is a little longer than the two lateral. The intermaxillary forms a nearly equilateral triangle, each side of which is $\frac{2}{3}$ of the horizontal diameter of the eye; the band of teeth of the lower jaw is longer, arched or like a horse-shoe. The length of the pointed pectorals is $\frac{3}{4}$ of that of the head; the ventrals, slightly exceeding $\frac{1}{2}$ of the pectorals, are placed far forward: they commence in the middle of the distance between the anterior margin of the orbit and the root of the caudal. The vertical diameter in front of the ventrals is $6\frac{2}{3}$ in the distance between the gill-opening and the root of the caudal. The dorsal commences a little behind the posterior third of the distance between the occiput and the root of the caudal; the extent of the base is $\frac{3}{4}$ of the length of the head; the first and second ray undivided; the latter and the third are the longest, $\frac{5}{3}$ of the extent of the base. The last ray is a little elongated. The anal is placed opposite the dorsal, which it resembles in shape and extent. The caudal is but slightly cleft; the lower lobe equals the length of the head; the upper one about $\frac{1}{8}$ less. The scales are large, rounded; the vertical diameter of the part exposed is about the double of the horizontal. The abdominal crest is distinct. This species has several characters in common with *H. gernaerti*, Cuv. and Val., but it differs from that and from all the other species by its peculiar dentition. In *Exocoetus volitans*, Linn., the pharyngeal teeth before they become worn, are flattened and tricuspidate. Perhaps it may be inferred that the individuals of the present species are young, although the young of the preceding species have simple pointed teeth. They are numerous at all seasons at Pinang, and are eaten by the natives.

Genus EXOCOETUS, (*Artedi,*) *Linne* 1748. Pectorals excessively large; head and body scaly with a salient line on each side of the abdomen; head depressed; cheeks compressed; eyes large; intermaxillaries without pedicles, forming the edge of the upper jaw; dorsal placed opposite the anal; intermaxillaries with minute pointed teeth; pharyngeals with teeth as if paved.

(3818) *Exocoetus nigripennus*, Cuv. and Val.

Syn. Exocoetus nigripennis, Cuv. and Val. XIX. 108.

Head above, back and upper half of the sides ultramarine with purple gloss; lower half of the sides, abdomen, cheeks and opercles light silvery ultramarine, minutely dotted with black; dorsal, ventrals and pectorals black; pectoral rays silvery sky-blue; caudal yellowish white, at the root bluish dotted with black; anterior half of ventrals hyaline, posterior black, base blue. Iris silvery; orbital half bluish black. D 11, 12 or 13. C i $5\frac{3}{3}$, A 8, 9 or 10, V 6, P 15, Br. XI. Inhabits *Sea of Pinang*, China Sea. Total length: 3 inch. The length of the head is $5\frac{1}{3}$ in the total, measured to the point of the lower caudal lobe. The horizontal diameter of the eye is $\frac{1}{2}$ of the length of the head. The arch of the roof of the orbit makes the middle of the forehead appear excavated; the distance across the forehead between the posterior angles of the orbit slightly exceeds the diameter of the eye; between the anterior angles it is slightly less than the diameter. The depth at occiput, as well as the vertical diameter in front of the ventrals, is $\frac{3}{4}$ of the length of the head. The scales of the body are rather large, and so deciduous that few are in their places. The lateral line and the salient line on each side of abdomen can barely be traced. The teeth of both jaws are excessively minute and apparently confined to the central part. Each palatal has a single external series of minute teeth, and a few scattered over the surface, which appears like a fine file. The teeth are probably deciduous, and so minute that they cannot be seen in fresh specimens, and in dried ones only by means of a powerful lens. The pharyngeal teeth are tricuspid. The lower margin of the horizontal part of the preopercle is toothed. The length of the pectorals differs individually: they do not exceed $\frac{1}{2}$ of the head and body, (the caudal not included). The ventrals are $\frac{1}{3}$ of the total length; the lower caudal lobe is $4\frac{1}{2}$ in the total length, the upper one but slightly exceeds $\frac{1}{2}$ of the former. The intestinal canal is wide at œsophagus, gradually narrowing in its straight course towards the anus. Its length is scarcely $\frac{1}{2}$ of the total. The liver consists of a single small lobe. The white air-vessel is comparatively very large, thin, elongated, its length slightly exceeding $\frac{1}{2}$ of the total. The peritoneum is silvery, sparingly dotted with black. In the course of four years ten individuals were obtained at Pinang. They occurred singly and at irregular intervals, and varied from two to three inches in length.

Genus PANCHAX, *Valenciennes* 1846. [In 1836, Mr. McClelland placed some species of this genus in the family of Cyprinoidœ, and

formed a Subgenus of Poecilia, Bl. Schn. to receive them, viz. Aplocheilus, Ser. (Haplocheilus)—Mr. McClelland characterises the latter as follows: "Intermaxillaries fixed, apices of the jaws flat and directed upwards; five rays in the branchial membrane; fins transparent; a short dorsal placed opposite to the last ray of a long anal; the intestine and stomach form together a small tube scarcely longer than the body; the eyes placed on the edges of the head; the mouth directed upwards; a single row of large teeth inserted along the edges of the lips which are not protractile as in Poecilia: the caudal entire." (Asiatic Researches. XIX. Pt. II. pp 301 and 426). Of the preceding eleven characters only four are correct, but they are not sufficient to chracterise the genus, viz.: apices of the jaws flat; intestinal canal scarcely longer than the body; eyes on the edges of the head; caudal entire. The remaining characters are either partly incorrect or entirely so. The characters of Panchax, Valenciennes, although of a later date than Haplochilus, must therefore be adopted.] Maxillary bone thrown behind the descending branch of the inter maxillary, so that but the lower part contributes to form the angle of the mouth; muzzle broad depressed; gill-openings well cleft; dorsal small, placed far back opposite the anal; intermaxillaries and lower jaw with a narrow band of minute teeth of which the external series are longer than the rest and arched round the margin of the jaws, so as to appear like cilia; a narrow transversal band of minute teeth on the palate (vomer).

(3819) *Panchax panchax*, (Buchan. Ham.)

Syn. Esox panchax, Buchan. Ham. 211, 380, Pl. III. Fig. 69.
Apolcheilus chrysostigmus, McClelland, As. Res. XIX. II. 301, and 426, Pl. XLII. Fig. 2.
Aplocheilus panchax, McClelland ibid. 302.
Panchax buchanani, Cuv. and Val. XVIII. 383.

Head above, back and upper half of the sides pale silvery green, minutely dotted with black; lower half of the sides and the abdomen silvery white, in some individuals with orange coloured dots; on the occiput a small oval silvery white spot; sides of the head and upper half of opercles silvery green minutely dotted with black, lower half white; lower jaw and the throat immediately behind minutely dotted with black, so as to appear like two narrow arched black lines; rest of the throat yellow or white; dorsal hyaline or orange with a large rounded black spot occupying the basal half; in some individuals a small white spot in front of the dorsal, in others the upper margin black; caudal greenish grey minutely dotted with black, upper and lower margin orange edged with black anal hyaline edged and spotted with orange; ventrals and pectorals yellow. Iris reddish silvery with a blackish ring. D 9, C 15$\frac{1}{5}$, A 17, V 6, P 15, Pr. VI. Inhabits *Fresh water Pinang*, Bengal. Total length: 2$\frac{1}{2}$ inch. The length of the head is $\frac{1}{4}$ of the total; the depth at occiput is $\frac{1}{2}$ of the length of the head. The horizontal diameter of the eye is a little less than $\frac{1}{4}$ of the head; the distance across the forehead equals two diameters. The nostrils open laterally by two minute apertures placed above each other in front of the anterior orbital margin. There are no lips. The intermaxillaries are very protractile, and are slightly moveable up and down like a lid. Both the external and the internal series of the teeth of the jaws, are a little longer and more distant than the rest of the teeth. Behind the intermaxillaries appears a small crescent-shaped membrane. Behind the latter are some excessively minute teeth placed on a narrow band, which crosses the vomer and forms an arch parallel with the intermaxillary teeth. The tongue is small, fleshy, and as well as the cavity of the mouth dotted with black. The body is covered by 7 longitudinal series of proportionally large scales, with concentric lines and about 13 radical rays. There are about 30 scales in a series between the gill-opening and the caudal. No lateral line is visible, but on each of the anterior 6 to 8 scales of the third series, appears a central impression as if pricked with a needle. The dorsal commences opposite the posterior third of the anal. The ventrals have no filament. It is numerous at Pinang in ponds, paddy fields and ditches. The stomach and intestines form a continued tube, in length scarcely $\frac{1}{2}$ of the total. The peritoneum is silvery, dotted with black. The number of fin rays given by Buchanan and Mr. McClelland are incorrect.

ORDER PHYSOSTOMI. SUBORDER PHYSOSTOMI ABDOMINALES.

Fam. SILUROIDÆ.

Genus BAGRUS, (*Rafinesque,*) *Cuvier*, 1817. A band of velvety, or card-like teeth in both jaws; on the vomer a second, posterior band, either velvety or in a single series.

(3820) *Bagrus abbreviatus*, Cuv. and Val.

Syn. Bagrus abbreviatus, Cuv. and Val. XIV. 420.
Pimelodus abbreviatus, Kuhl and Van Hasselt, ibid.
Bagrus abbreviatus, Bleeker: Verhand. Batav. Genoots. XXI. 4.

Head above and back dark greenish olive, lighter silvery on the sides; abdomen silvery white; fins greenish grey; their membranes whitish at the base, the rest minutely dotted with black; adipose fin greenish olive minutely dotted with black; nasal cirri grey; maxillary black; both mandibular pairs white, Iris greenish

golden, blackish towards the orbit. D 1/7—1 (adipose), C $17\frac{4}{7}$, A 13, V 6, P 1/8 or 9, Br. IX.

Cirri: $\frac{4}{4}$

Inhabits *Sea and estuaries of Pinang*, Java. Total length 1 foot 6 inch. The length of the head is $4\frac{1}{2}$ in the total; the horizontal diameter of the orbit is $\frac{1}{5}$ of the length of the head; the distance of the eyes across the head two such diameters. The long helmet is finely shagreened to between the eyes, where its breadth is $\frac{1}{2}$ of its length; the occipital point is narrow triangular, occupying half the interval between the occiput and the dorsal spine, and receiving in a notch the point of the second interspinal. The mastoid and suprascapular processes form an elongated arch surrounding the opercle and nearly touching the humeral. The latter is elongated triangular, its length twice its height. The opercle is finely shagreened like the rest of the bones forming the helmet, and has besides some radiating lines. The greatest breadth of the head nearly equals its length, and also the greatest vertical diameter of the body, in front of the dorsal spine. The card-like teeth are disposed on narrow bands in the jaws and on the vomer. The nasal cirri extend to the preopercle, the maxillary to the point of the ventrals, the external mandibular to the point of the pectorals; the internal are one half of the external. The dorsal spine is rather slender, longitudinally striated, with teeth on the posterior margin, and two or three on the anterior near the apex. The length is $\frac{1}{4}$ of the first dorsal ray, which is $\frac{3}{4}$ of the length of the head. The adipose dorsal is as high as the anal, but of half the extent. Each lobe of the furcated caudal equals the head; in young individuals the upper one terminates in a short filament. The pectoral spine is longer and broader than the dorsal; the upper surface is lineated, the margin towards the rays is strongly toothed. At Pinang individuals occur at all seasons, but not in great numbers. They are eaten by the natives.

(3821) *Bagrus sondaicus*, Cuv. and Val.

Syn. Bagrus sondaicus, Cuv. and Val. XIV. 444.
Bagrus sondaicus, Bleeker: Verhandel. Batav. Genoots. XXI. 4, 14, 29 and XXII. 5.

Helmet dark olive bronze, (tubercles white,) lighter on the cheeks and opercles; back deep steel-blue with greenish reflections, the sides, to a little beneath the lateral line, lighter, silvery, with from 12 to 15 vertical bands reflecting steel grey or pale golden green; rest of the sides and abdomen silvery white; fins greenish grey minutely dotted with black; external half of pectorals, anal and the lower caudal lobe blackish; maxillary cirri black; external mandibular white at the base, rest black; internal maxillary white. Iris golden green, blackish towards the orbit. D 1/7—1 (adipose), C $15\frac{1}{7}$. A 17 or 18, V 6, P 1/10, Br. VI.

Cirri: $\frac{2}{6}$

Inhabits *Sea of Pinang, Malayan Peninsula*, Straits of Sunda, Java, Madura. Total length: 1 foot 9 inch. The length of the head is $\frac{1}{5}$ of the total, slightly exceeding the greatest vertical diameter of the body, in front of the dorsal spine. The breadth of the head nearly equals the length. The horizontal diameter of the orbit is $6\frac{1}{2}$ in the length in the head. The bones forming the helmet are granulated as far as the anterior margin of the orbit, but the small triangular truncated suprascapular is like the opercle smooth but radiated. The sides of interspinal form an angle with the centre part, and terminate behind in a blunt point. The interparietal is broad truncated or rounded behind; its length is $\frac{1}{4}$ of the rest of the helmet, its breadth about $\frac{1}{2}$. The humeral is pointed, granulated, triangular, its length $2\frac{1}{2}$ in the head. The teeth are strong, card-like. Those on the vomer are placed on two small oval spots; those on the palate on two similar but larger, all four forming one series, broader than the maxillary ones. The palatal teeth easily fall out, which renders the fish liable to be mistaken for a species of *Arius*. The maxillary cirri reach to the point of the pectorals; the external mandibular to the base of the pectorals; the internal are $\frac{1}{3}$ of the external. The dorsal spine is $\frac{1}{5}$ of the head, granulated on the anterior half of its sides; near the apex the anterior margin carries 4 or 5 small teeth, the posterior 6 or 7 similar ones. The point terminates in a short soft filament, which is easily torn off. The pectoral spine equals the length of the head; the anterior half of the external margin is granulated; the corresponding parts of the sides is lineated; the external margin carries near the point a few weak teeth, and similar appear along the internal margin. The point terminates in a soft filament, longer than that of the dorsal. The upper caudal lobe, a little longer than the lower, is $4\frac{2}{5}$ in the total length. The ventrals are $\frac{1}{2}$ of the pectorals. The extent of the adipose dorsal is $\frac{1}{3}$ of the anal. At the origin of the lateral line appear some minute elongated grains; the line itself consists of small tubes which become indistinct after it has passed the dorsal fin. This species is more or less numerous at all seasons. It is eaten by the natives and the air-vessels collected for the China market. M. Bleeker thinks it probable that *B. javensis*, Cuv. and Val. (XIV. 445) is identical with *B. sondaicus*. [Bleeker l. c., 4 (1)].

Genus ARIUS, *Cuv. and Val.* 1840. Palatal teeth on two distinct separate plates, in some species advancing on the lateral angles of vomer.

(3822) *Arius truncatus*, Cuv. and Val.

Syn. Arius truncatus, Cuv. and Val. XV. 64.
Arius truncatus, Bleeker Ver. Bat. Gen. 4.

Head above and back intense blue with silvery reflections, cheeks and opercles golden bronze: throat and sides golden; abdomen silvery white, sparingly dotted with black; fins greyish white minutely dotted with black; margins of dorsal and caudal black: in the adult the posterior half of the caudal and the anal pale lake; adipose pale greyish olive minutely dotted with brown; maxillary cirri black; mandibular pairs white. Iris golden dotted with black. D 1/7—1 (adipose), C $15\frac{1}{11}$, A 23 or 24, V 6, P 1/9, Br. VI.

Cirri: $\frac{2}{4}$

Inhabits *Sea and estuaries of Pinang, Malayan Peninsula,* Java. Total length: $11\frac{2}{8}$ inch. The length of the head measured to the point of the opercle is a little less than $\frac{1}{4}$ of the total, but to the posterior margin of the first interspinal it is $\frac{1}{5}$ of the total. The latter bone is narrow rectangular, its breadth being $1\frac{2}{3}$ in the length which is $\frac{1}{6}$ of the distance to the muzzle. The helmet is granulated and partially striated, its anterior two thirds divided by a longitudinal furrow commencing on the forehead on a level with the nostrils. The cheeks and opercles are veined, and the latter also indistinctly radiated. The anterior half of the head is much depressed, the muzzle rounded, truncated. The teeth of both jaws are on narrow bands, card-like and finer than the palatals, which are crowded on a small oval spot on each side. The cirri are slender: the maxillary ones reach to about the middle of the opercle; the mandibular pairs are nearly equal, $\frac{3}{4}$ of the former. The eyes are situated at the anterior third of the head, their horizontal diameter is in the young $\frac{1}{7}$ in the older $\frac{1}{8}$ of the length of the head; their distance across the forehead is about 4 such diameters. The vertical diameter at occiput is $\frac{1}{2}$ of the length of the head; that in front of the dorsal is a little less than $\frac{2}{3}$ of the head. The dorsal spine is strong, $\frac{3}{4}$ of the length of the head, equalling in length the first ray. The posterior margin and that part of the anterior nearest the apex are finely toothed, the rest is granulated. The pectoral spine is but $\frac{2}{3}$ of the dorsal which it otherwise resembles, but the teeth of the posterior margin are stronger. The pectorals and ventrals are nearly of equal length or about $\frac{1}{2}$ of the length of the head. The extent of the anal equals the greatest vertical diameter of the body; the length of the eighth and ninth rays is a little less than that of the ventrals. The extent of the adipose dorsal is $\frac{1}{3}$ of the anal, its height $\frac{1}{2}$ of the longest rays of the latter. The caudal is deeply cleft, the lobes equal, and their length, normally, like the dorsal spine. The lateral line follows the outline of the back at the upper third of the body; arrived at the base of the caudal it continues a short distance obliquely downwards over the three upper rays of the lower lobe. The line consist of little separated tubes, each with a minute downwards pointed process at the posterior part. The two superior branchiostegous rays on each side are very broad and exposed, so as to appear like a subopercle. The stomach is capacious, thin, containing remains of *Crustacea* and mud. The intestinal canal slightly exceeds double the total length. The air-vessel is small but very thick transversely divided in two compartments. The fish is held in esteem by the natives, but at Pinang it is of so rare occurrence that the air-vessel contributes but little to the general stock of Isinglass obtained from other species.

(3823) *Arius arius*, (Buchanan Hamilton.)

Syn. Pimelodus arius, Buchan. Ham. 170, 376.
Arius arius, Cuv. and Val. XV. 102.
Ikan Saludu or Surdudu.

Adult. Head above and back intense steel blue; cheeks, opercles and sides greenish golden or bronze; throat and abdomen white slightly dotted with black; dorsal greyish white minutely dotted with black; filament of the spine and the upper margin black; caudal yellowish white minutely dotted with brown; anal and pectorals white, external half so closely dotted with black as to assume that colour; ventrals hyaline, closely dotted with brown; adipose pale greyish olive with a large black spot, posterior margin white; maxillary cirri blackish; mandibular pairs white. Iris greenish golden, orbital margin blackish. *Young.* Dorsal, posterior half of caudal, middle of anal and base of adipose pale lake. D 1/7—1 (adipose), C $15\frac{5}{8}$, A 18 to 21, V 5, P 1/10, Br. V.

Cirri: $\frac{2}{4}$

Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore,* Pondicherry, Gangetic estuaries. Total length: 1 foot 10 inch. The length of the head is $\frac{1}{4}$ of the total. The helmet is granulated to the middle above the orbit. The first interspinal is rectangular nearly square, its length $\frac{1}{6}$ of the distance to the muzzle; the posterior margin is notched, receiving a broad point from the crescent-shaped second interspinal. The anterior two thirds of the helmet are divided by a broad longitudinal furrow. The interopercle and opercle are radiated, the point of the latter indistinctly granular. The horizontal diameter of the orbit is $\frac{1}{4}$ of the length of the head. The teeth of the jaws are card-like, on narrow bands. Those of the palate are granular, placed on two close oval spots. The maxillary cirri do not quite reach to the apex of the pectoral spine; the external mandibular pairs is $\frac{1}{5}$ shorter; the internal is $\frac{1}{2}$ of the external. The vertical diameter in front of the dorsal slightly exceeds the length of the head, and equals the length of the dorsal spine. The latter is very strong, the posterior margin of the anterior near the apex are toothed, the rest is coarsely granulated. To the apex is attached a soft filament,

seldom exceeding $\frac{1}{5}$ the length of the spine. The pectoral spine resembles the former, but it is slenderer, shorter by $\frac{1}{4}$, and without filament. The extent of the adipose is $\frac{1}{3}$ of that of the anal; its height $\frac{1}{3}$ of the length of the sixth and seventh rays, which is $\frac{1}{4}$ of the head. The caudal lobes equal the length of the head. The lateral line resembles that of *Arius truncatus*, but it keeps nearer to the middle of the body. At Pinang smaller individuals of this species are very numerous at all seasons. They form an article of food, and contribute more than any other of the *Siluroidæ* to the exportation of isinglass.

(3824) *Arius militaris*, (Linne.)?

Syn. Silurus militaris Linne: Syst. 1356.?
Arius militaris Cuv. and Val. XV. 114. Pl. 430.
Osteogeneiosus Bleeker: Verhandel. Batav. Genootsch. XXI. 49. [Osteogeneiosus, *Bleeker*, 1847, (Scrib. Osteogenenius.) Teeth on the anterior part of the palate disposed in two oblong arched group; two supra-maxillary bony, rigid cirri; branchiostegous rays five. Otherwise resembling *Arius*.]

Head above and back bottle-green bronze, lighter on the sides of the head and body: abdomen silvery white, anterior half minutely dotted with brown; dorsal and caudal pale greyish olive, minutely dotted with black, margin blackish; rest of the fins white; upper half between anterior four rays of ventrals dotted with black; upper surface of pectorals and posterior half of lower black, in the axilla a black spot along the root of pectorals; jaws and root of the long cirrus-like maxillary prolongation blackish bronze, rest of the latter reddish white; adipose fin greenish olive dotted with black, posterior margin white. Iris greenish golden dotted with black. D 1/7—1 (adipose), C 15$\frac{2}{3}$, A 21, V 6, P 1/10, Br. V.

$$\text{Cirri} \begin{matrix} 2 \\ — \\ 0 \end{matrix}$$

Inhabits *Sea and estuaries of Malayan Peninsula and Islands*, Sea and estuaries of Malabar, Coromandel; estuaries of Ganges and Irawaddy. Total length: 1 foot 6 inch. The length of the head is 4$\frac{1}{2}$ in the total. It is completely covered by smooth skin, and but a few granulations appear on the anterior part of the elliptic interparietal. The rest of the bone, like the opercles, is radiated; it occupies $\frac{1}{4}$ of the distance from the muzzle. The horizontal diameter of the eye is $\frac{1}{6}$ of the length of the head; the distance across the forehead is about three such diameters. The card-like teeth of the jaws are on broad bands; that of the upper one is the shorter, as it does not reach to the angle of the mouth, but terminates at the root of the bony cirrus-like elongation of the upper maxillary bone. The latter is slender, elastic, flattened with a shallow furrow on each side; its length equals the head; the anterior sixth is attached to the side of the head by a small triangular membrane which is, however, too short to admit of the bone being projected at a right angle. The palatal teeth are granular, placed in two separated groups of an irregular rhomboidal shape. The vertical diameter of the body, in front of the dorsal, is $\frac{3}{4}$ of the length of the head. The dorsal spine is slender, the lower half of the anterior margin is finely granulated, the upper half and the posterior margin are very finely toothed; it is a little shorter than the first ray which is $\frac{2}{3}$ of the length of the head. The pectoral spine resembles the dorsal and is but a little shorter. The extent of the anal is $\frac{1}{6}$ of the length of the body; the eighth, the longest ray, slightly exceeding $\frac{1}{2}$ of the extent. The extent of the adipose fin is about $\frac{1}{3}$ of the anal, but of nearly equal height. The caudal is slightly cleft, and the lobes a little round; their length is $\frac{1}{7}$ of the total. The lateral line resembles that of *Arius truncatus*. At Pinang single individuals occur at all seasons; they are eaten by the natives, and their air-vessels preserved.

Genus PIMELODUS, (*Lacepede*, 1808,) *Cuv. and Val.* 1840. Palate smooth, without teeth; six or eight cirri; with or without helmet.

(3825) *Pimelodus pectinidens*, Cantor.

Young? Head above and back yellowish green bronze, dotted with black; between the anterior points of the helmet an oval yellowish white spot, cheeks, opercles and sides of the body silvery; the two first minutely dotted with black; throat and abdomen white; fins, including the adipose, yellowish white; maxillary cirri black; mandibular pairs white. Iris golden minutely dotted with black. D 1/7—1 (adipose), C 15$\frac{2}{3}$, A 20, V 6, P 1/8, Br. IV.

$$\text{Cirri} \begin{matrix} 2 \\ — \\ 4 \end{matrix}$$

Inhabits *Fresh-water, Pinang*. Total length: 4$\frac{2}{3}$ inch. The greatest vertical diameter of the body, in front of the dorsal fin, is $\frac{1}{5}$ of the total length; from thence the profile descends in a nearly straight line to the rounded muzzle. To the point of the opercle the length of the head is $\frac{1}{5}$ of the total, but to the point of the interparietal bone is 3$\frac{3}{4}$. Above the head is depressed, transversely arched, its greatest breadth at the occiput is $\frac{1}{5}$ less than its length. The interparietal is triangular truncated, its length $\frac{1}{3}$ of the distance to the muzzle, its breadth at the base equal its length; the truncated apex is notched, receiving the point of the second interspinal. The whole of the helmet is finely granulated to above the posterior margin of the orbit. It is longitudinally divided by a furrow terminating a little behind the anterior half of the distance between

the muzzle and the dorsal. The suprascapular bone is narrow, pointed, and joins the equilateral triangular humeral. Both as well as the opercles are rough and striated. The sides of the opercle equals that of the preopercle and interopercle together. The cheeks are smooth. The mouth is large, the angle reaching to the posterior margin of the orbit; the fleshy lips completely hide the teeth; the upper jaw projects beyond the lower. In each jaw appears a single series of closely set, small, flattened teeth, resembling a fine comb. To the naked eye the apex of the teeth appears to be truncated, trenchant, but under a lens it is bluntly trilobate. The cirri are very fine: the maxillary reach to the preopercle, the mandibular pairs are so short as to easily escape observation. The nostrils open closely in front of the orbit. The latter occupies the second fourth of the head, a little nearer to the jaw than to the forehead; the greatest diameter, obliquely downwards, is a little less than $\frac{1}{4}$ of the length of the head. Of the four branchiostegous rays, the two upper ones are longer and broader than the lower. The dorsal spine is strong and nearly as long as the head, the two sides are striated, the lower half of the anterior margin is granulated, the upper half of this and of the posterior margin is finely toothed; the first ray is a little longer than the spine. The pectoral spine is a little shorter than the dorsal, which it otherwise resembles. The ventrals are $\frac{2}{3}$ of the length of the head. The extent of the base of the anal is $\frac{3}{4}$, the eighth ray $\frac{2}{3}$ of the length of the head. The adipose dorsal fin is placed opposite the middle of the anal; its base and length are $\frac{1}{2}$ of the latter. The posterior margin of the caudal is nearly crescent-shaped; the upper lobe slightly longer than the lower, is $4\frac{1}{2}$ in the total length. The lateral line resembles that of *Arius truncatus*. A single individual was observed at Pinang in August 1844. The yellowish white oval spot on the forehead is in some other *Siluroidæ* characteristic of immaturity. It may perhaps also be so in this species, notwithstanding the worn appearance of the trilobate teeth.

Genus CLARIAS, (*Gronov.* 1763,) *Valenciennes*, 1840. (Cossyphus, *McClelland*, 1843. Phagorus, *McClelland*, 1844.) [Sir John Richardson in this Report, 1845, p. 227, observes, that "*Cossyphus ater*, McClelland, (Calcutta Journ. IV. p. 403, Pl. 22, Fig. 3.) is apparently an injured example of this genus," (*Plotosus*, apud Richardson.) *Cossyphus ater*, McClelland, is founded upon a *mutilated specimen* of either *Clarias jagur*, (*Macropteronotus jagur*, Buch. Hamilton, 145, 374.) or upon a closely allied species, but more probably upon the former. Mr. McClelland later substituted *Phagorus* for *Cossyphus* (Calcutta Journ V. 225, *Errata.*)] Head with a long, granular helmit, formed by the cranial and suprascapular bones; the interparietal advancing on the occiput as a more or less soft lamina, supported by the occipital crest; card-like or granular teeth on the vomer; dorsal without spine; occupying nearly the whole of the back; anal less extensive; margin of pectoral spine minutely toothed; on each side two ramified branchial appendages; branchiostegous rays 9 to 11.

(3826) *Clarias Punctatus*, Cuv. and Val.

Syn. Clarias punctatus, Cuv. and Val. XV. 384.

Clarias punctatus, Bleeker: Verhandel. Bat. Genoot. XXI. 4, 17, 53.

Head, body, fins, and cirri blackish brown; with purple or lilac reflections; body either uniformly so or with large irregular lighter spots, with eight to ten vertical series, each consisting of four to six whitish dots, in number and distribution liable to individual variations; pectoral spine, throat, and abdomen as far as the ventrals, brownish white. Iris dark brown. D 70, C $17\frac{4}{4}$, A 51 to 53, V 6, P 1/8, Br. IX. $\frac{4}{4}$ Cirri— $\frac{4}{4}$

Inhabits *Estuaries and freshwater*, *Pinang*, Java. Total length: 10 inch. Measured to the apex of the interparietal, the head slightly exceeds $\frac{1}{6}$ of the total length, (to the point of the opercle it is $\frac{1}{8}$); the breadth between the gill-openings is $\frac{3}{4}$ of the length. The eye is situated at the anterior fourth, its horizontal diameter is $\frac{1}{9}$, and the distance across the forehead is $2\frac{1}{2}$ in the length of the head to the apex of the interparietal. The latter is triangular with the apex rounded, the base double the length, which is $\frac{1}{8}$ of the distance to the muzzle. In the centre of the helmet appear two ovoid apertures, covered by the integuments: the anterior is $\frac{1}{5}$, the posterior $\frac{1}{10}$ of the length of the head. The maxillary cirri slightly exceed $\frac{1}{4}$ of the total length, nearly reaching to the apex of the pectoral spine; the nasal are $\frac{1}{6}$, the outer mandibular $\frac{1}{5}$, and the inner mandibular $\frac{1}{8}$ of the total length. The teeth are card-like: those of the upper jaw on a broad band, reaching to the root of the maxillary cirri; those of the vomer and palate forming a narrow crescent. The dorsal fin commences at a distance from the apex of the interparietal, equalling $\frac{1}{7}$ of the length of the head. The pectoral spine is strong, like a sabre: the surfaces finely striated, the outer margin finely granulated with two or three teeth near the apex, the inner finely toothed; the length of the spine is $7\frac{1}{2}$ in the total; the first rays are a little longer. The ventrals are situated at the anterior third of the total length, in which they are contained $10\frac{1}{2}$ times. Between the anus and the anal fin appears a short conical appendage. The length of the caudal is $7\frac{1}{2}$ in the total. The stomach is a short rounded sac, the intestinal caudal is about

$\frac{1}{2}$ of the total length; the liver is divided in two short lobes; the left is again subdivided in two; the gall is oval, large; the spleen is small, flattened, oval. The posterior branchial appendage is large, nearly double the size of the anterior. This species is numerous at all seasons. It is eaten by the poorer classes of natives.

Genus PLOTOSUS, *Lacepede*, 1803. Body; elongated, terminating in a compressed point two dorsals, of which the second, caudal and anal united; head naked: strong conical teeth in the jaws and vomer; eight short cirri; behind the conical anal papilla a small ramified appendage.

(3827) *Plotosus Anguillaris*, (Bloch.)

Syn. Renard, I. Pl. III. Fig. 19. Sambilang.
Valentyn, No. 496, Ikan binara.
Silurus arab, Forskal, XVI. No. 36 ?
Platystachus anguillaris, Bloch, Tab. 373, Fig 1.
Plotose anguille, Lacep. V. Pl. III. Fig. 2.
Russell, CLXVI. Ingeelee.
Platystachus anguillaris, Shaw, V. 30 Pl. 99.
Kruscustern: Voyage, Pl. LX. Figs. 12 and 13.
Duperrey: Voyage, poiss. Pl. XXXI. Fig. 3.
Plotose ikapou, Lesson: Dict. Class. d'Hist. Nat. XV. 435.
Plotosus anguillaris Cuv. R. A. II. 297 (1).
Plotosus marginatus, Bennett: Life of Raffles.
Plotosus anguillaris, Ruppell: Neue Wirb. Fische 76.
Plotosus vittatus, } Swainson, II. 307.
Clarias anguillaris, }
Plotosus lineatus, Cuv. and Val. XV. 412.
Plotosus lineatus, Richardson: Report, 1845, 286.
Plotosus lineatus, Temm. et Schl. Fauna Jap. Pisc. 228. Pl. CIV. Fig. 3.
Plotosus lineatus, Blecker: Verh. Bat. Gen. XXI. 4, 17. 57.
Similang karong of the Malays.

Young. Head above and back blackish olive, lighter or copper coloured on the sides of the head and body; two white bands along the body: one from the muzzle above the eye along the back, a second, broader, from the maxillary cirrus, and in some a third from the ventrals; lips, throat and abdomen white; fins pale brownish olive or lake, dotted and edged with black; upper part of first dorsal with a black spot; anal papilla and ramified appendage crimson; nasal and maxillary cirri blackish; mandibular pairs white. Iris golden dotted with black. *Adult*. The lateral white bands indistinct. 1st D 1/4.—2d D, C and A 172 or 172, V 13 or 14, P 1/11, Br. XI or XII.—Cirri $\frac{1}{4}$. Inhabits *Sea and estuaries of Malayan Peninsula and Islands*, Isle of France, Society-and Friendly Islands, Japan, Philippines, China Seas, Amboina, Celebes, Java, Seychelles, Red Sea, Malabar, Ceylon, Coromandel, Western Australia. Total length: 10 inch. The length of the head is $5\frac{1}{2}$ in the total, its depth at occiput $\frac{1}{3}$ of the length. The horizontal diameter of the eye is $\frac{1}{6}$ of the length of the head; the distance across the forehead 2 such diameters. The greatest vertical diameter of the body, in front of the first dorsal, is $\frac{1}{6}$ of the total length. The maxillary and external mandibular cirri are equal, both pairs less than $\frac{1}{2}$ of the length of the head. The nasal and internal mandibular pairs are shorter. This species is very numerous at all seasons. In the stomach of those dissected was found *Modiola faba*, Benson, a very small bivalve inhabiting the Malayan estuaries.

(3828) *Plotosus albilabris*, Cuv. and Val.

Syn. Plotosus albilabris, Cuv. and Val. XV. 427.
Plotosus albilabris, Bleeker: Verh. Bat. Gen. XXI. 4.
Similang of the Malays.

Young. Head above and back blackish olive, lighter on the sides of the head (cheeks pale bluish), and of the body above the lateral line; beneath the latter, the throat and abdomen impure bluish white; lips pale blackish; body everywhere closely dotted with brown; pectorals blackish above, whitish beneath; rest of the fins pale greyish olive minutely dotted and edged with black; cirri blackish, root of mandibular pairs whitish; anal papilla and ramified appendage crimson. Iris golden dotted with brown. 1st D 1/4, V 13, P 1/9. Br, XII.—Cirri $\frac{1}{4}$ MM. Cuvier and Valenciennes count: 2d D 109, C 11, A 97, (total: 217). Inhabits *Sea and estuaries of Pinang, Malayan Peninsula*, Batavia. Total length: $6\frac{1}{8}$ inch. The length of the head is $\frac{1}{6}$ of the total; the depth at occiput little more than $\frac{1}{2}$ of the head. The horizontal diameter of the eye is $\frac{1}{6}$ of the head, the distance across the forehead two such diameters. The nasal cirri are a little longer than the head, the maxillary a little shorter and slenderer, the outer mandibular are $\frac{2}{3}$ of the latter, the inner pair slightly shorter. M.M. Cuvier and Valenciennes describe the maxillary cirri as $\frac{1}{3}$ shorter than the nasal, but the outer mandibular pair as long as the latter. All the teeth are strong, conical. The greatest vertical diameter in front of the first dorsal is $\frac{1}{7}$ of the total length. The dorsal spine is $\frac{1}{2}$ of the length of the head and but little shorter than the first ray. The pectoral spine is slenderer than the dorsal, the first ray slightly exceeds $\frac{1}{2}$ of the length of the head. The ventrals are $\frac{1}{3}$ shorter than the pectoral. The caudal is oval, rounded. The lips are fleshy and papillular. Minute papillæ appear here and there on the body. The conical anal papilla is rather large,

and the ramified appendage longer and with a greater number of branches than in *P. anguillaris*. At Pinang, the present species is less numerous than the former. The wounds of both are equally dreaded, and both are eaten by the poorer classes of natives.

Fam. CYPRINOIDÆ.

Genus CAPOETA, *Cuv. and Val.* 1842. Third bony dorsal ray toothed; a filament at the angle of the mouth; body compressed, covered with large scales.

(3829) *Capoeta macrolepidota*, Kuhl and Van Hasselt.

Syn. Capoeta macrolepidota, Cuv. and Val. XVI. 280, Pl 477, (*Young.*)

Adult. Head above brownish olive; back silvery greenish olive, lighter on the upper half of the sides, the rest and abdomen light golden; all the scales edged with pale brown, some with a pale dark spot at the root; the oblique series in front of the dorsal fin greenish olive, forming a dark obliquely backwards-directed band, interrupted by the lateral line; opercles and cheeks shining iridescent silvery; between the eye and the angle of the mouth a blackish blue triangular spot terminating in lines radiating towards the preopercle; lips and cirri minutely dotted with black; fin-membranes transparent; rays buff, minutely dotted with black: the three first dorsal, and the first pectoral blackish; caudal with a broad blackish brim above and below. Iris golden, upper orbital half black. *Young.* Differs from the adult in having the dark oblique band in front of the dorsal more distinct and reaching to the abdomen; cheeks uniformly silvery without any spot. D 3/8, C 19 5/5, A 2/5 or 6, V 2/8, P 16, Br. III. Inhabits *Freshwater*, *Pinang*, Java, Tenasserim. Total length: 11 inch. The length of the head is 4 1/6 in the total: the depth at occiput 2/3 of the length of the head. The eye, bordering on the profile, occupies the second fourth of the head, that being the length of its horizontal diameter; the distance across the forehead is 1 1/3 diameter. The opercles and cheeks are naked. Four large infraorbitals surround the orbit. From the temple round the lower margin of the orbit over the infraorbital proceeds a tube, which sends downwards several shorter ones. The openings of the nostrils are situated close in front of the eye: both are separated by a projecting fleshy septum. The lips and tongue are fleshy; on the symphysis of the lower jaw appears a small protuberance. Behind both jaws appears a crescent-shaped fold of the membrane lining the mouth. The small filament at the angle of the mouth is 2/3 of the horizontal diameter of the eye. The greatest vertical diameter of the body, in front of the dorsal, is 4 1/2 in the total length. The sides are covered by 7 longitudinal series of large rhombic scales, of which there are 27 or 28 on the lateral line. The latter consists of a simple tube on each scale, of which the anterior five of the series deviate obliquely downwards, the rest (on the third series from below,) proceed straight to the caudal. All the scales have from 4 to 10 backwards radiating lines. The first dorsal ray is excessively short; the third, the longest, is 3/4 of the length of the head and has a few minute teeth in the middle of the posterior margin; the caudal lobes equal the length of the head; the length of the anal and ventrals is 1/2 of the latter; the first ventral ray is short and very slender; the length of the first pectoral ray, which has a few teeth on the outer margin near the root, equals that of the first dorsal. The latter is represented a little too short in the otherwise correct figure of M.M. Cuvier and Valenciennes. At Pinang the fish is not numerous. It is of good flavour. It rises to insects, remains of which were found in the stomach. The length of the intestinal canal exceeds by 1/2 the total; the stomach as well as the intestines are very thin. The air-vessel is very large, thin, white, consisting of two elongated oval portions, of which the anterior is truncated in front.

Genus LEUCISCUS, *Rondelet*, 1554. Sub Genus LEUCISCUS, *Valenciennes*, 1844. Neither spines nor cirri; dorsal and anal fins short.

(3830) *Leuciscus rasbora*, (Buchan. Ham.)

Syn. Cyprinus rasbora, Buchan. Ham. 329, 391, Pl. II. Fig. 90.
Leuciscus rasbora, Cuv. R. A. II. 276 (2).
Leuciscus rasbora, McClelland: As. Res. XIX. 292 and 407.
Cyprinus (Leuciscus) rasbora, Cuv. and Val. XVI. 438.

Head above, back and upper part of the sides yellowish green, the root and edges of the scales minutely dotted with black; along the middle of the side a longitudinal golden stripe, bordered beneath by an indistinct bluish black one; lower half of the side and abdomen silvery pale yellow; cheeks and opercles shining silvery, the latter with blue reflections dotted with black; caudal pale yellowish dotted with black, posterior margin blackish; rest of the fins whitish transparent. Iris silvery, orbital margin bluish dotted with black. D 9, C 19 4/5, A 8, V 9 or 10, P 13, Br. III. Inhabits *Freshwater*, *Pinang*, Freshwater, Bengal, Upper Assam. Total length: 4 1/2 inch. The length of the head is 4 1/2 in the total. The eye is situated a little in front of the second third of the head, bordering on the profile, its horizontal diameter is 3 1/3 in the length of the head, the distance across the forehead is 1 1/4 diameter. The cavity of the mouth is minutely dotted with black. As observed by Buchanan, the lower jaw terminates in a point, surmounted by a small tubercle which fits into a corresponding notch of the upper jaw. But of a number

examined at Pinang none presented three prehensile knobs on the lower jaw, as described by Mr. McClelland in a specimen collected in Upper Assam by the late Mr. Griffith. The greatest vertical diameter of the body, in front of the dorsal, slightly exceeds the length of the head. The sides are covered by 7 longitudinal series of large rounded scales, each with a number of lines radiating from the root. A straight line from the gill-opening to the caudal contains 23. The lateral line proceeds obliquely downwards to near the termination of the pectoral fin, from whence it continues on the sixth, the penultimate series of scales, straight to the caudal. The first dorsal ray is situated a little behind the second half of the distance between the muzzle and the caudal, opposite the posterior ventral ray. The second dorsal ray, the longest, nearly equals the first pectoral ray, both are about $\frac{3}{4}$ of the length of the head. The lower caudal lobe, a little longer than the upper, slightly exceeds the length of the head. The first ventral and the second anal ray are nearly equal, a little shorter than the second dorsal ray. At Pinang this species is numerous in rivulets and in rice fields, when they are flooded.

Fam. SCOPELINOIDÆ.

Genus SAURUS, *Cuvier*, 1817. (Harpodon. *Lesueur*, 1825.—Laurida, [*Aristoteles*,] *Swainson*, 1839.—Triurus, *Swainson*, 1839.) Muzzle short; mouth extending far behind the eyes; edge of upper jaw entirely formed by the intermaxillaries; numerous pointed teeth in both jaws, on the palatals, tongue and pharyngeals, but none on the vomer; [*Saurus badi* has a few minute teeth on the vomer,] anterior dorsal a little behind the large ventrals; body, cheeks and opercles scaly; from 8 to 15 branchiostegous rays.

(3831) *Saurus badi*, Cuvier.

Syn. Russell, CLXXII. Badi Mottah.
Saurus badi, Cuv. R. A. II. 314 (1).
Saurus badimottah, Ruppell: Neue Wirbelth, Fische, 77.

Head above, back and sides above the lateral line dull greenish olive, or greyish green; rest of the body pale silvery white; cheeks and opercles pale silvery olive with rose-coloured and bluish reflections; dorsal rays pale yellowish, membrane hyaline minutely dotted with black; second dorsal pale flesh-coloured, anterior margin blackish; caudal yellowish, minutely dotted with black, posterior half blackish; anal and ventral rays pale yellowish, membrane hyaline; pectorals pale yellowish, posterior half blackish. Iris silvery olive. D 11 or 12—1 (adipose), C $19\frac{1}{2}$, A 10 or 11, V 9, P 15, Br. XII, XIII, or XIV. Inhabits *Sea of Penang, Malayan Peninsula, Singapore*, Coromandel. Total length: 1 foot. The length of the head is $\frac{1}{5}$ of the total. The horizontal diameter of the orbit is $4\frac{1}{2}$ in the length of the head; the distance across the forehead, as well as the distance from the orbit to muzzle, equals one diameter. The eye is covered by a broad, transparent adipose membrane with a circular pupillary aperture. The angle of the mouth is situated at the posterior third of the head. The teeth of both jaws are placed in 5 to 6 series, of which the internal one carries the longest and most distant teeth; the rest gradually decrease in length towards the external series of teeth which are minute, card-like and erect, not obliquely forwards pointed like the rest. With the exception of the anterior four or five anterior teeth of each palatal, the rest as well as the pharyngeals, hyoid and lingual teeth are all smaller and pointing backwards. On the vomer appears a double series of excessively minute pointed teeth, forming a short transversal line which unites the palatal series. The teeth of the vomer are deciduous, and may from their diminutive size easily escape observation. The vertical diameter at occiput is $\frac{1}{11}$, in front of the anterior dorsal $\frac{1}{7}$, and at the root of the caudal $\frac{1}{16}$ of the total length. The sides are covered by 11 longitudinal series of rounded, finely concentrically striated scales, with three radiating lines at the radical part. Each scale has a central rather obsolete keel. The lateral line occupies the sixth series which is a little nearer to the back than to the abdomen. It contains upwards of 60 scales, triangular, a little smaller than the rest, each with a small trifid tubercle in front of the central keel, which is sharper than that of the rest of the scales and forms a continued ridge. The latter becomes very marked behind the second dorsal, so as to resemble that of the *Scombroidæ*. The anterior dorsal occupies the middle of the back between the muzzle and the caudal; the second ray is the longest, $\frac{1}{4}$ of the length of the head; of which the extent of the base is $\frac{1}{7}$. The ventrals are placed in front of the preceding fin; the first ray commences in the centre between the muzzle and the first anal ray; the penultimate ray, the longest, is $\frac{2}{3}$ of the length of the head; outside the root of the fin appears an elongated scale, $\frac{2}{3}$ of the longest ray. The first anal ray commences opposite the centre, between the last dorsal ray and the root of the caudal; the second ray, the longest equals the extent of the base which is $\frac{1}{2}$ of the length of the head. The second small adipose dorsal is placed opposite the two posterior anal rays. The caudal is covered with minute scales; the upper lobe, which is generally a little longer than the lower, equals the length of the head. The length of the pectorals is $\frac{1}{2}$ of that of the head; in the axilla appears a short broad triangular scale. Single individuals occur at Pinang at all seasons. They are eaten by the natives, although they are reputed to be very insipid. *Saurus badi*,

Cuvier, belongs according to M. Valenciennes to a distinct genus, following that of *Saurus*, and M. Valenciennes has corrected the nomenclature as follows.

(3832) *Saurida*, Cuvier and Valenciennes, 1849. The palatals have on the inner side of the long band of teeth a small distinct group of sharp teeth, surrounded by minute asperities. The palatals consequently have two separate series of teeth, whereas in the genus *Saurus* they have but a single such. The internal ventral rays are not so elongated as those of *Saurus*; two oblong fossets on the sides of the palatals, but none in front of the velum palatinum, like those of *Saurus*.

(3833) *Saurida tumbil*, (Bloch.)

Syn. Salmo tumbil, Bloch, Tab. 430.
Russel: CLXXII. Badi Mottah.
Salmo tumbil, Shaw. V. 67.
Saurus badi, Cuv. R. A. 314. (1).
Saurus badimottah, Ruppell: Neue Wirbelth. Fische, 77.
Saurus argyrophanes, Richardson. Report 1845, 308.
Saurida tombil, Cuv. and Val. XXII. 500.

Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Siagapore*, Malabar, Coromandel, Vanikolo, Waigiou, Macao, Red Sea, Isle of France (Cuv. and Val. l. c.).

(3834) *Saurus trachinus*, Temminck and Schlegel.

Syn. Saurus trachinus, Temm. et Schl. Fauna Japan. Pisces, 231, Tab. CVI. Fig. 2.

Young. Head above, back and sides above the lateral line light greenish olive, rest of the body silvery white; above the lateral line three parallel light blue longitudinal bands: beneath the line three or four similar but paler bands, all commencing at the gill-opening, terminating at the root of the caudal; behind the posterior margin of opercle an oblique black spot terminating at the root of the pectoral; cheeks and opercles silvery light greenish olive, with light blue and rose-coloured reflections; caudal bright yellow; adipose dorsal pale yellowish olive; rest of the fins hyaline, anterior dorsal and ventral rays pale yellowish. Iris silvery light greenish olive. D 12 or 13—1 (adipose), C 19/9, A 15 or 16, V 8, P 12, Br. XII. Inhabits *Sea of Pinang*, Japan. Total length: 6 inch. The head bears a general resemblance to the Gen. *Trachinus*, Linne; the upper surface is scaleless, and like the infraorbitals full of minute radiating asperities; the central line of the head is smooth and forms a narrow sulcus between the orbital arched. The length of the head is 4¼ in the total length. The horizontal diameter of the orbit is ⅓ of the length of the head, the distance of the orbit from the muzzle is ⅔ diameter, of which the distance across the forehead is ½. The angle of the mouth is situated a little behind the anterior half of the head. In each jaw appear but two series of teeth; in other respects the dentition is similar to that of *S. badi*, but there are no teeth on the vomer. The subopercle, the largest, is rounded, membranous behind, and sends a narrow pointed process up between the triangular opercle and the narrow crescent shaped preopercle; the interopercle is triangular and but little smaller than the opercle. The vertical diameter at occiput is 6½, at the anterior dorsal ⅛, and at the root of the caudal 15½, in the total length. The body is covered by 11 longitudinal series of scales resembling those of *S. badi*, but those immediately behind the occiput have near the posterior margin some radiating short furrows. The lateral line occupies the fifth series, and contains upwards of 60 scales; those of the anterior half of the line consist of a small tubercle terminating in 4 to 8 digitations; the rest are simple, tubular. The line itself is much less raised than in *S. badi*. The first ray of the anterior dorsal is a little nearer to the muzzle than the last dorsal ray is to the root of the caudal. The third ray, the longest, is 7/11 of the head and equals the extent of the base, of which the posterior ray is a little more than ½. The ventrals are placed in front of the anterior dorsal; the first ray, the shortest, commences in the centre between the muzzle and the first anal ray; the sixth ray is the longest, equalling the third dorsal ray; the root of the fin is on each side enclosed by an elongated scale, ½ the length of the sixth ray. The first anal ray is placed much farther forwards than in *S. badi*: it commences in the centre between the first ventral ray and the root of the caudal. The rays are nearly equal, or about ⅓ of the extent of the base, which is but little shorter than the head. The minute adipose dorsal is placed at the posterior third of the distance between the last dorsal ray and the root of the caudal, opposite the posterior fifth of the anal. The caudal is but slightly cleft; each lobe equals the third dorsal ray. The pectorals are short triangular, slightly exceeding ⅓ of the head. The stomach is capacious, cylindrical, ¼ of the total length; its contents shrimps. The intestinal canal is a simple narrow tube, a little less than ½ of the total length; from pylorus commences a single series of 15 linear appendicula cœcopylorica, each about 1/12 of the length of the intestinal canal. Two individuals, of 5 and 6 inches in length, occurred together at Pinang in February 1845. The fishermen were not acquainted with the species. *Saurus trachinus*, Temminck et Schlegel, is the young of:

(3835) *Saurus myops*, (Forster.)

Syn. Lagarto, Parra, XVIII. Fig 2?
Salmo fœtens [Not *Salmo fœtens*, Linne (Cuv. et Val. XXII. 488.)] Bloch, Tab. 384, Fig. 2.

Osmere gallone, Lacep. V. Pl. 6, Fig. 1.
Salmo myops, Forster. Bl. Schn. 421.
Salmo truncatus, Spxi et Agassiz: Esp. et Gen. XLV.
Saurus myops, } Cuvier: R. A II.
Saurus truncatus, } 314 (1)
Saurus lemniscatus, (S. elegans. Gray,) Richardson, Report, 1845, 301.
Saurus trachinus, Temm. et Schl. Fauna Japon. Pisces, 231, Tab CVI. Fig. 2. (*Young.*)
Salmo myops, Forster. Descr. Anim. ed. Lichtenstein, 412, No. 303.
Saurus fasciolatus, Lesueur, Cuv. and Val. XXII. 489.
Saurus myops, Cuv. and Val. XXII. 485.

Inhabits *Sea of Penang*, Indian Ocean, Trincomalle, Pondicherry, Celebes, Amboyna, Sea of China, Macao, Japan, Atlantic Ocean, St. Helena, Isle of France, Martinique, South Carolina, Bahia, Brazil. (Cuv. and Val. l. c)

(3836) (Harpodon, *Lesueur*. [Founded upon a mistake pointed out by Cuvier, R. A. II. 314 (2)] Triurus, (*Swainson.*) [Preoccupied by *Triurus*, Lacepede, 1800, (*Muræoidæ.*) Mr. Swainson's Genus is founded upon Russell's No. CLXXI. Wana Motta, which is identical with *Harpodon microps*, Lesueur, quoted by Mr. Swainson as a distinct species.]

(3837) *Saurus nehereus*, (Buchanan Hamilton.)

Syn. Russell CLXXI. Wana Motta (*Adult*)
Osmerus ? nehereus, Buch. Ham. 209, 379, (*Adult.*)
Salmo (Harpodon) microps Lesueur: Journ. Philad. Acad. V. 41, Pl. III. (*Young.*)
Saurus ophiodon, Cuvier, R. A. II. 314 (*Adult.*)
Laurida microps, Swainson. I. 246, Fig. 49, (*Young.*)
Harpodon microps, Swainson, II. 288, Vol. 1. Fig. 49.
Triurus microcephalus Swainson, II. 288, (*Adult.*)
Bummaloh or Bombay Duck, Cantor: Journ. R. A. Soc. V. 168.
Royle: On the Prod. of Indian Isinglass, 65.
Saurus nehereus, Richardson: Report, 1845, 301,
Saurus ophiodon, Bleeker: Verh. Batav. Gen. XXII. 6.
Luli of the Malays.

To the Synonymes of *Saurus nehereus*, (Buchan, Hamilton,) add: *Saurus ophiopon*, Cuv. and Val. XXII. 490. Head above, back and sides light grey or dust-coloured, semi-transparent like gelatine, with minute starlike black and brownish dots; anterior part of abdomen pale silvery bluish; rest whitish; cheeks and opercles pale silvery bluish, dotted like the body; fins transparent, coloured like the body but more closely dotted, so as to appear pale blackish. Iris bluish silvery minutely dotted with black. D 12 or 11—1 (adipose), C 19$\frac{1}{2}$, A 14 or 15, V 9, P 11 or 12, Br. XXIV or XXIII. Inhabits *Sea of Malayan Peninsula and Islands*, Chusan, Woosung, Canton, Madura, Java, Sumatra, Tenasserim, Mouths of the Ganges, Vizagapatam, Bay of Bengal, Bombay, Malabar. Total length: 11 inch. Measured obliquely from the muzzle to the posterior angle of the opercle, the length of the head is $\frac{1}{6}$ of the total. The diameter of the eye is $\frac{1}{5}$ of the length of the head; the distance from the muzzle is 2 diameter; that across the arched forehead 4. The angle of the mouth is at the posterior fourth of the length of the head; the jaws are equal. All the teeth are excessively slender, recurvous, and, like those of some of the *Gobioidæ*, erectile, but not flexible. They may be raised or laid down in the manner in which Cuvier describes the teeth of his genus *Salarias*, like the keys of a Piano. Those of the jaws and some of the palatals have a single barb at the posterior margin of the point; a few of the former are arrow-shaped. In both jaws appear three series of somewhat distant teeth: the external consist of excessively minute ones, the second of longer, and the internal series of the longest of all. Those of the lower jaw are longer than those of the upper, particularly three or four on each side of the symphysis. The pharyngeal and palatals consist of two series. The fourth anterior tooth of each palatal is very long. The tongue is very short, linear, and covered with fine teeth, like those of the hyoid bone and the upper margin of the branchial arches. The opercles are membranous, diaphanous and appear all blended together. The branchiostegous membrane is narrow, but it projects behind the posterior radiated angle of the opercle. The branchiostegous rays are excessively slender and flexible like hairs, and they gradually increase in length backwards. The posterior ones may be seen through the lower part of the opercle. The nostrils open vertically in front of the anterior margin of the orbit; the anterior opening is the larger. The upper part of the head is arched from side to side, and cellular, covered by a thin membrane, and like the rest of the head and body by diaphanous, deciduous scales. The latter are of moderate size, oval with concentrical rings. The lateral line, a little nearer the back than the abdomen, is slightly raised or keeled, and consists of about 44 rectangular membranous pieces, covered with scales like the rest of the body. The line is continued over the central pointed lobe of the caudal, and this portion containing 6 to 8 additional membranous pieces. All the scales are diaphanous and flexible, and cannot but with difficulty be distinguished in the fresh fish. The vertical diameter at occiput is $\frac{1}{6}$, at the anterior dorsal $\frac{1}{8}$, at the root of the caudal $\frac{1}{13}$ of the total length. The anterior dorsal is placed in the middle of the back, at equal distance from the muzzle and the root of

the caudal. The third ray, the longest, is $4\frac{3}{4}$ in the total length; the rest gradually decrease; the last is a little more than $\frac{1}{3}$ of the third ray, of which the extent of the base slightly exceeds $\frac{1}{2}$. The first ventral ray is placed opposite the first dorsal ray, at equal distance from the muzzle and the last anal ray. The fin extends to the middle of the anal, its length being $\frac{1}{3}$ of the total. Outside the root appears a very thin elongated scale. The first anal ray is placed at equal distance from the last dorsal and the root of the caudal; the third ray, the longest, is $7\frac{1}{2}$ in the total length, and twice the length of the last ray; the extent of the base equals that of the anterior dorsal. The adipose dorsal is rather large, elongated and placed opposite the posterior third of the anal fin. The caudal is divided in three pointed lobes, of which the upper and lower are about $\frac{1}{6}$ of the total length; the central lobe, composed of the three elongated central rays, is either equal to, or a little shorter than the former two; almost the whole of the fin is covered with minute scales. The pectorals are falciform and extend in the young to the last dorsal ray, but they become shorter with age, and then vary from a little less than $\frac{1}{2}$ of to $3\frac{1}{2}$ in the total length. They appear to have no axillary scale. The peritoneum is silvery; the stomach elongated, pyriform, thin and capable of enormous expansion; the fundus is arched, and separated from the rest by a constriction. The intestinal canal is narrow, cylindrical, scarcely $\frac{1}{2}$ of the total length. At the pylorus appears a series of 22 gradually decreasing cœcal appendages. The liver and spleen are very small. The fish is of most voracious habits, gorging itself with its own species and other fishes of nearly its own size, and *Crustacea* (shrimps). It is frequently taken with the stomach and the jaws expanded with prey. It is very short-lived, more so than either of the two preceding species, and the whole body becomes at certain seasons brilliantly phosphorescent. In the Straits of Malacca it is at all times very numerous, although less so than it is at the Sandheads or in the mouths of the Ganges. Although very rich, it is a great delicacy immediately after it is taken. Salted and dried it is also highly valued, and in this state it occurs in commerce under the denomination of "*Bombay Ducks*," ("*Bummaloh*" in Bengal), large quantities of which are annually exported from Bombay and the Malabar coast to all parts of India.

Fam. CLUPEOIDÆ.

Genus CHIROCENTRUS, (*Cuvier* 1817) *Valenciennes*, 1846. Body compressed, elongated, with small deciduous scales; abdomen trenchant, but not toothed; dorsal placed far back towards the tail, opposite the anal; pectorals pointed; in the axilla a bony, triangular, elongated appendage; ventrals excessively small; intermaxillary and upper maxillary with a single series of pointed horizontal teeth, of which one on each side of the symphysis longer than the rest; an oblique series of 5 or 6 card-like teeth on the palatals; a small oval group of velvety teeth on the anterior pterygoid, and some on the ala major; on each branch of the lower jaw a single series of long, but unequal, teeth, compressed, trenchant, lance-shaped; a single series of minute conical teeth along the margin of the tongue, on the hyoid bone and the margin of the branchial arches. Branchiostegous rays eight.

(3838) *Chirocentrus dorab*, (Forskal).

Syn. Clupea dorab, Forskal. 72, No. 108.
Clupea dorab, Linne: Syst. 1409.
Clupea dorab Lacepede,
Esoce chirocentre, Lacepede, V. Pl. 8, Fig. 1.
Clupea dentex, Bloch-Schneider. 428.
Clupea dorab? Russell, CXCIX. Wallah.
Clupea dorab, Shaw, V. 175.
Chirocentrus dorab. Cuv. R. A. II. 426 (1).
Chirocentrus dorab, Ruppell: Neue Wrib. Fische. 81.
Chirocentrus nudus, Swainson II. 295.
Chirocentrus dorab, Richardson. Report, 1845 311.
Chirocentrus dorab, Cuv. and Val. XIX. 150, Pl. 565.
Chirocentrus dorab Bleeker: Verh. Batav. Gen. XXII. 6.
Paraug-Parang of the Malays.

Head above and back intense blue with sea green reflections; rest of the head and body shining silvery; fins hyaline, caudal and pectorals dotted with black; in some the caudal margins and the upper ray of the pectorals black; tongue black. Iris silvery; orbital margin bluish black. D 16 or 17, C $19\frac{7}{7}$, A 33 or 34, V 6 or 7, P 14 or 15, Br. VIII. Inhabits *Sea of Malayan Peninsula and Islands*, Zanzibar, Isle of France, Red Sea, Muscat, Malabar, China Sea, Isle of Buru, New Guinea, Celebes, Madura, Java, Sumatra, Coromandel, Bay of Bengal, Gangetic estuaries. Total length: 6 feet. The length of the head is $6\frac{1}{2}$ in the total; the depth at occiput $\frac{3}{4}$ of the length. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead $\frac{3}{4}$ of the diameter. The vertical diameter at the ventral slightly exceeds the length of the head. The lower caudal lobe is frequently a little longer than the upper, and exceeds by $\frac{1}{4}$ the length of the head. The fish is numerous at all seasons on the Malayan coast. Individuals six feet in length are at Pinang of rare occurrence. Although not eaten by Europeans, this fish is highly valued by the natives of the different countries where it is found. The Malays denominate it from the resemblance of the large teeth to their favourite chopping knife (*parang*) and they apostrophize it in a popular epigrammatic stanza ("pantun,") quoted

by Colonel James Low. (Dissertation on Pinang, &c. p. 181.)

Genus CHANOS, (*Lacep.* 1803) *Valenciennes* 1846. (Lutodeira, [*v. Hassel,*] *Ruppell*, 1828.) Mouth toothless; dorsal single; pectorals and ventrals enclosed by elongated scaly appendages; on each side of the deeply cleft caudal two scaly semilunar laminæ, each horizontally fixed to the upper and lowermost of the short, horizontal central rays; abdomen rounded; inside of œsophagus, lined by a spiral ridge the sides of which with numerous rounded papillæ, the margin with distant elongated papillæ; outside of œsophagus marked by a corresponding spiral linear impression; numerous appendicula cœcopylorica; intestinal canal very long.

(3839) *Chanos pala*, (Cuvier.)

Syn. Russell, CCVII. Palah Bontah. [In Mr Jerdon's memoir "*On the Fresh Water Fishes of Southern India*," in the *Madras Journal* Vol. XV. p. 344 the author refers a species of *Albula* ("*Butirinus maderaspatensis*, Jerdon") to Russell. No. CCVII. As the latter belongs to a genus very distinct from *Albula* (*Butyrinus*, vide infra), Russell's species cannot be identical with. "*Butyrinus maderaspatensis.*"]

Cyprinus (Leuciscus) pala, Cuv. R. A. II. 276 (1.)

Chanos nuchalis, Cuv. and Val. XIX. 197.

(*Adult.*) Head above and back glossy intense blue; sides above the lateral line lighter, silvery with green reflections, becoming paler immediately beneath the line; rest of the sides and abdomen silvery white; lips pale brownish; cavity of the mouth and tongue bluish white sparingly dotted with black; sides of the head shining silvery with lilac and rose coloured reflections; dorsal and caudal rays greyish white, and as well as their pale brownish membrane minutely dotted with brown; both fins broadly edged with blackish; the caudal semilunar laminæ pale horn-colour; pectorals and ventrals white, with the anterior half of their external surface powdered with blackish brown, their elongated scaly appendages shining silvery; anal white, anterior half sparingly dotted with black. Iris silvery, orbital half pale brownish. (*Young.*) Differs by the hyaline fins, of which the dorsal and caudal are but sparingly dotted with brown. D 15,C 19/8, A 11,V11,P 16,B.IV. Inhabits *Sea of Pinang, Malayan Peninsula*, Vizagapatam, Madras. Total length: 2 feet. The length of the head is 5¼ in the total; but in the very young 4¼. The depth at occiput is ⅓ of the length of the head. The eye, bordering upon the profile, is situated a little in front of the second third of the head. The horizontal diameter is 3⅓ in the length of the head. The distance across the forehead slightly exceeds the diameter. The thick adipose fold has a circular pupillary opening. In the young the eye is comparatively larger, the horizontal diameter slightly exceeding ⅓ of the head. The symphysis of the lower jaw carries a small rounded tubercle fitting into a corresponding notch of the upper, behind which is suspended a narrow crescent-shaped membrane. The small tongue is elongated and immoveable. The greatest vertical diameter, in front of the dorsal, is little less than the length of the head. The deepest portion of the body is covered by 26 longitudinal series of scales; the first six to eight scales of each series, of above as well as beneath the lateral line, are indeed somewhat larger than all the rest, but the size gradually decreases, and not abruptly, as represented in the figure of Russell. The latter is also incorrect in confining the larger and striated scales to the space *above* the lateral line, and the number of the longitudinal series is incorrect. The lateral line, composed of simple central tubes, declines towards the termination of the pectoral, from whence it continues straight on the thirteenth longitudinal series of scales to the middle of the caudal. It occupies 77 scales. The dorsal fin commences exactly in the middle between the muzzle and the root of the longest ray of the upper caudal lobe. The first three rays are undivided and gradually increase in length; the fourth, the longest, is ¾ of the length of the head. The upper margin of the fin is crescent-shaped, the last ray being elongated and nearly double the length of the penultimate. The base is enclosed between two series of elongated, obliquely set scales, of which there are thirteen on each side, gradually increasing in length so as to cover the lower half of the posterior rays. The caudal is deeply cleft, the lobes are 3½ in the total length; in one individual the uppor slightly exceeded the lower. The vertical diameter of the tail at the root of the caudal, is about ⅓ of the length of the head. Semilunar laminæ are closely pressed to the fin, with free convex margin towards the lateral line; the length of the straight margin or base is ⅘ of the horizontal diameter of the eye. In the adult the vertical diameter of the laminæ is ¼ of the diameter of the eye, but in the young it is less. The extent of the base of the anal fin equals its distance from the root of the caudal; the anterior ray is very small and, as well as the second and third, undivided; the last ray is the longest, terminating in a narrow point, its length ⅓ of the head. The base like that of the dorsal is enclosed between two series of elongated scales of which the last half covers the corresponding ray. The ventrals commence opposite the posterior half of the dorsal, or half-way between the first pectoral and the last anal ray. The first ventral ray slightly exceeds ½ the length of the head; the outer scaly appendage is nearly ⅔ of the first ray; the inner one is much shorter and broader, triangular. The pectorals commence

close to the abdomen, immediately behind the gill-opening; the first ray is about ¾ of the length of the head. The outer scaly appendage is very long, ¾ of the first ray; the inner one is broader and but half the length of the former. At Pinang single individuals occur at all seasons, and are highly valued for their very delicate flavour. The œsophagus is spindle-shaped, fleshy, exceeding half the length of the head by ⅓. The external surface is smooth, with a spiral, linear impression, corresponding to the internal spiral ridge, which makes 21 very oblique turns. The ridge is of a triangular form, both sides are divided by numerous backwards-directed linear ridges, each of which carries a great number of small, soft, pointed papillæ; the free margin towards the cavity of the œsophagus is smooth, but on that of the fourteen anterior turns appear some distant-pointed, backwards-directed papillæ, which are much longer than those of the sides. The stomach consists of two portions, of which the anterior is cylindrical, narrow at cardia, bent like a double horse-shoe, and then joins the short, pyriform posterior portion. The latter is very fleshy, hard, gizzard-like. Both portions are lined by 6 to 10 longitudinal rather large folds; towards pylorus the coats are very thick, forming there two rounded hard protuberances. The length of the stomach slightly exceeds 3¾ in the total. In one examined it contained some remains of vegetable matter, and green mucus. The duodenum is surrounded by numerous appendicula cœcopylorica, each of which divides in two or more portions, of which an iunumerable mass, extending about 1⅛ inches from pylorus, envelops the intestine. Those nearest the pylorus are the longest, about one inch in length. The intestines, throughout of nearly uniform diameter, form many circumvolutions; from pylorus their length is about 3½ times that of the fish; but including œsophagus and the stomach, the length of the entire intestinal canal is a little less than four times the total length of the fish. The liver and the spleen are very large, the former elongated single-lobed; the latter of a beautiful black with purple reflections. The air-vessel is very large, spindle-shaped, terminating behind in an elongated point; the anterior margin is straight with a short pointed process on each side. It communicates with the anterior portion of the stomach through a short canal proceeding from the anterior part of the lower surface. Its coats are very thin, white, covered by the black peritoneum. In a male, 2 feet in total length, the intestinal canal was of the following dimensions.

Œsophagus,	0	feet 2⅜	inch.
Anterior portion of stomach	0	„ 5	„
Posterior do.	0	„ 1⅛	„
Intestines,	7	„ 0⅜	„
	7	feet 9⅛	inch.

The description and figure of Russell, No. CCVII. *Palah Bontah*, establish beyond doubt the identity of the present species, which Dr. Ruppell believes to be identical with *Mugil chanos*, Forskal. The figure of *Lutodeira chanos*, Ruppell [Atlas, 18, Tab. 5. Fig. 1. Syn. *Mugil chanos*, Forsk, 74, No. 110.—*Mugil salmoneus*, J. R. Forster, Msc. IV. 14.—*Chanos arabicus*, Lacep. V. 399,—*Palah Bontah*, Russell, CCVII. —*Lutodeira indica*, Van Hasselt, apud Ferrusac] gives indeed the exact proportions of the fish observed at Pinang, and the anatomical details, the singular structure of the œsophagus and stomach of which Dr. Ruppell gave the first account, also correspond. But the length of the intestinal canal has been omitted, and till that is known, the identity cannot be decided. M. Valenciennes considers Russell's *Palah Bontah* to be distinct from *Mugil chanos*, Forskal, in consequence of the eight or nine oblique series of larger scales immediately behind the head. But, as observed above, Russell's figure is not correct; besides, it appears from references to Russell's figure of *Lutodeira chanos*, to M. Valenciennes' of *Chanos lubina*, (XIX. Pl. 567,) and lastly from inspection of a young individual of *Chanos tolo*, (Cuvier,) that also these species present behind the head a few series of scales a little larger than the rest. Leaving this character aside, the present species offers an anatomical difference from *Mugil chanos*, Forskal, [*Chanos arabicus*, Cuv. and Val. XIX. 187.] of which according to M. Valenciennes the intestinal canal, from pylorus, measures eight times the length of the body. As observed above, in the present species the canal is about 3½ times, and with œsophagus and the stomach, a little less than four times the total length.

(3840) *Chanos tolo*, (Cuvier.)

Syn. Russell, CCVIII. Toolelee,
Cyprinus tolo, Cuvier, R. A. II. 276 (1).
Chanos chloropterus, Cuv. and Val. XIX. 195.

Young. Head above and back intense blue, lighter, silvery with green reflections above the lateral line; the rest and abdomen silvery white; sides of the head shining silvery with lilac reflections; fins yellowish white, dorsal and caudal minutely dotted with black, giving the margins a blackish appearance. Iris silvery, orbital margin blackish. D 17, C 19⅜, A 10, V 11, P 15, Br. IV. Inhabits *Sea of Pinang*, River of Madepollam (Godavery). Total length: 4⅜ inch. This species greatly resembles *C. pala*. It differs, however, in the following characters. The dorsal fin is placed a little farther forwards, the first ray, undivided as well as the succeeding four, rises in the centre between the muzzle and the commencement of the upper caudal lobe. The ventrals also are situated a little more forwards; the first ray commences at equal distance from the first pectoral and the eighth anal ray. The

extent of the base of the anal is shorter than the space between the last anal ray and the root of the lower caudal lobe. In front of the dorsal fin the body is covered by 24 longitudinal series of scales, of which the lateral line occupies the eleventh from above. The scales of the oblique series behind the head are a little larger than the rest, which, although they appear smaller than in *C. pala*, are not so proportionally, nor does Russell's figure represent them so. The four caudal semilunar laminæ resemble those of the former species. A single young individual was taken in a fishing-stake off the coast of Pinang in March 1845. The fishermen asserted that it is an inhabitant of rivers, and but rarely enters the sea.

Genus ALBULA, (*Gronov.* 1763) *Valenciennes*, 1846. (Butyrinus, [*Commerson*] *Lacep.* 1808). Body fusiform, covered with numerous hard, firm scales, disposed in longitudinal series, one such before and behind the dorsal fin, (on the keel of the back) of a little larger scales; in the species here described they are not larger than the rest, head large, naked, above with the grooves between the keels of the bones appearing through the skin; eye with a thick adipose lid; muzzle conical, pointed, projecting far beyond the lower jaw; dorsal small, ventrals commencing opposite the posterior part of the latter; card-like teeth in the upper intermaxillaries and the lower jaw, on the vomer palatals and pharyngeals; small globular teeth on the spheroid, pterygoid, and hyoid bones.

(3841) *Albula erythrocheilos*, Cuv. and Val.?

Syn. Albula erythrocheilos, Cuv. and Val: XIX. 352, Pl. 540?

Head above and back blackish silvery; sides and abdomen frosted silvery, the edges of the scales shining; infraorbitals and opercles brilliant silvery; on each side of the yellowish white muzzle a short backwards and downwards directed black line, not, however, joining its neighbour on the lower surface; in the small groove containing the apertures of the nostrils a minute crescent-shaped black spot bordering the anterior half of the apertures; a gamboge line from the posterior part of the second infraorbital borders above the single series of scales and extends to the anterior margin of the preopercle; margin and cavity of the mouth white; dorsal rays yellow; their upper fourth blackish; membrane pale brownish dotted with black; caudal yellow, posterior margin blackish; anal silvery hyaline; ventrals hyaline, rays of the anterior half and the pectorals bright gamboge. Iris silvery, orbital margin pale golden. D 18 or 19, C 19 $\frac{8}{8}$, A 8 or 9, V 11, P 17 or 18.

Br. *left* XIV, *right* XIII.
or „ XVI, „ XV.

Inhabits *Sea of Pinang*. Total length: $9\frac{4}{8}$ inch. The length of the head is $4\frac{1}{2}$ in the total; the depth at occiput slightly exceeds half the length. The parietal protuberances and the posterior keels of the frontal bones are sufficiently developed to make the space between them appear hollowed; the sutures of the frontals and parietals form an acute angle in front of the eye; the frontals are slightly convex; the internal cavernous keels are sharp, so as to deepen the narrow central groove. The nostrils open a little behind the second half between the muzzle and the eye; they are situated in a small oval longitudinal groove, the upper and lower margins of which are raised, so as to form sharp keels, the upper one of which rises on the profile like a short arch. The eye occupies the middle of the side of the head, bordering on the profile, which is slightly arched by the lateral part of the frontal bone which forms the roof of the orbit. In front of the anterior part of the orbital margin of the frontal appears a narrow bone, analogous to the supraorbital of *Cyprinoidæ*. The horizontal diameter of the eye is $4\frac{1}{3}$ in the length of the head, of which the distance across the forehead is but $\frac{1}{4}$. The thick adipose fold covering the eye has a vertically elliptical aperture corresponding to the pupil which, however, is circular. In form the seven infraorbital bones and the opercles resemble those of *Albula macrocephala*, (Lacep). Between the cheek and the horizontal part of the preopercle appears a single series of 7 to 9 scales, but little smaller than those of the body. The tongue and teeth resemble those of the latter species. In the adult there are no teeth on the upper maxillary bone, but in an individual $8\frac{4}{8}$ inch in length, four small pointed distant teeth appeared along the margin of the left branch, and on the right two immediately behind the intermaxillary, and one tooth close to the angle of the mouth. A small accessorian maxillary appears at the posterior margin of each branch. The thin narrow interopercle is arched, with the convex margin downwards, occupying the sides of the throat. In four individuals examined the left branchiostegous membrane overlapped the right and presented one additional ray. Two measuring $9\frac{4}{8}$ inch, and one $8\frac{4}{8}$ inch in length, had 16 branchiostegous rays in the left, 15 in the right membrane. A fourth, $9\frac{4}{8}$ inch in length, had 14 in the left, 13 in the right membrane. The two or three anterior rays are short, linear, and not sabre-like as the rest, and as they are hid by the lax membrane, they may easily escape observation, unless they are brought to view by dissection. The greatest vertical diameter of the body, in front of the dorsal, is $\frac{1}{6}$ of the total length. The scales are disposed on 15 longitudinal series, and in general form resemble those of *A. macrocephala*, (Cuv. and Val. XIX. Pl. 573.) Examined through a compound microscope, (385 linear), the longitudinal striæ appear to be composed of horse-shoe-like protuberances,

not of bead-like strings, as in *macrocephala*. The lateral line occupies the ninth series; it follows for a short distance the gill-opening, and then continues straight in the middle of the side to the root of the caudal. It is composed of simple central tubes, on 72 to 78 triangular scales, somewhat smaller than the rest. All the fin-membranes are covered by minute oblong scales, either transparent or silvery. The dorsal fin commences a little in front of the centre between the muzzle and the root of the caudal. The central series of scales of the back are not larger than the rest, but on the contrary, somewhat smaller. The ventrals commence not behind the posterior dorsal ray, but opposite the 13th or 14th. In form all the fins resemble those of *A. macrocephala*, but the upper caudal lobe, equal the length of the head, is longer than the lower. In three individuals the difference scarcely exceeded $\frac{1}{8}$, but in a fourth the lower lobe was but $\frac{2}{3}$ of the upper one. The stomach is elongated cylindrical, capacious, very thin. It contained remains of small shrimps. Round the pylorus appear fourteen large appendicula cœcopylorica. The intestinal canal is simple, little more than half the total length of the fish. The other viscera resemble those of *A. macrocephala*. Four individuals were taken in February 1845 in fishing-stakes off the coast of Pinang. The fishermen, evidently not well acquainted with the species, asserted it to be of rare occurrence, and highly valued. Out of water it soon expires and becomes soft. This fish nearest agrees with *A. erythrocheilos*. It differs in the number of branchiostegous rays, but as M. Valenciennes drew up his description from a single specimen, and as the character is liable to individual variations, it is without actual comparison of specimens not sufficient to distinguish species, which so nearly resemble each other as those of the genus *Albula*.

Genus DUSSUMIERIA, *Valenciennes*, 1847. Form of the body resembling Gen. *Sardinella*, but the abdomen smooth, not toothed; fine teeth in the jaws, on the tongue, palatal and pterygoid bones; those of the two latter resembling a fine rasp.

(3842) *Dussumieria acuta*, Cuv. and Val.

Syn. Dussumieria acuta, Cuv. and Val. XX. 467. Pl. 606.
Tamban bulat of the Malays.

Head above, back and upper third of the sides deep glossy blue, bordered by a longitudinal band of pale copper-red; the rest of the head and body shining silvery; dorsal hyaline, minutely dotted with black along the base; caudal whitish or yellowish minutely dotted with black, posterior margin blackish; rest of the fins hyaline; jaws minutely dotted with black; symphysis of the upper jaw black; on each side of that of the lower a short dotted black line; tongue bluish, dotted with black. Iris silvery, orbital margin blackish. D 19 to 21, C $19\frac{1}{2}$, A 14 to 17, V 8, P 13 or 14, Br. XV. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Malabar, Coromandel, Bencoolen. Total length: 6 inch. The length of the head is contained $4\frac{3}{4}$ times in the total; the depth at occiput $2\frac{1}{3}$ in the length of the head. The eye, bordering on the profile, occupies the middle of the head; the horizontal diameter is $\frac{1}{3}$ of the length of the head; the distance across the forehead $\frac{3}{4}$ of the diameter; the thick adipose fold covering the eye has a small circular pupillary opening. The left branchiostegous membrane slightly overlaps the right, but the number of the rays of both is equal. The greatest vertical diameter in front of the dorsal is $5\frac{1}{2}$ in the total length. The scales are small, rounded and very deciduous. The dorsal fin commences at equal distance from the muzzle and the centre of the posterior caudal margin. Single individuals of this species occur at Pinang at all seasons, but numbers from June to September. It is highly valued for its delicate flavour, and passes commonly as a 'Sardine.' The latter denomination it shares, however, with *Clupeonia perforata*, (vide infra,) with which it is also confounded by the Malays under the common name of *Ikan tamban*. Both species have been prepared as 'Sardines a huile.'

Genus ELOPS, *Linne*, (1766) *Cuv. and Val.* 1846. (Megalops, *Lacepede*, 1803). Branchiostegous rays remarkably numerous; a single bony plate between the branches of the lower jaw under the branchiostegous membrane; gape very large; intermaxillaries short; maxillaries long, free; both, as well as the palatals, vomer, pterygoids, sphenoids, lower jaw, lingual and hyoid bones covered with fine velvety teeth; body elongated, and as well as the abdomen, rounded; above and below at the root of the caudal a more or less elongated, spine-like scale; pectorals and ventrals with an elongated scaly appendage; last dorsal ray in some terminating in an elongated filament.

(3843) *Elops saurus*, Linne.

Syn. The Pounder, Sloane: Hist. of Jamaica, 284. Pl. 251, Fig. 1.
Argentina machnata, Forskal, 68, No. 100.
Elops saurus, Linne: Syst. 1394.
Argentina carolina, Ibid. 1395.
Mugilomore anne-carolinæ, Lacep. V. 398.
Russell, CLXXIX. Jinagow.
Argentina machnata, Shaw, V. 129.
Argentina carolina, Ibid.
Elops inermis, Mitchill: Trans. Lit. and Phil. Soc. New York, I. 445.
Elops machnata, Cuv. R. A. II. 324 (!).
Elops machnata, Ruppell: Neue Wirbelth. Fische, 80.

Elops indicus, Swainson, II. 292.
Elops saurus De Kay: Zool. New York, III. 267 Pl. XLI. Fig. 131.
Elops machnata, Richardson: Report 1845, 311,
Elops machnata, Richardson: Ichthyol. Erebus and Terror, Pl. XXXVI. Figs. 3, 4, 5.
Elops saurus, Cuv. and Val XIX. 365.
Elops saurus, Bleeker: Verh. Batav. Gen. XXII. 6.

(*Young.*) Head above silvery green; back dark-blue, light bluish green on the sides above the lateral line; the rest of the body and head shining silvery; dorsal membrane yellowish white minutely dotted with brown, anterior margin black, and the anterior two thirds of the upper margin broadly brimmed with black; anterior half of pectorals and ventral gamboge, anal and caudal hyaline; the latter with the upper and lower margin blackish. Iris silvery. D 24, C 19$\frac{6}{6}$, A 17, V 15, P. 19; Br. *left* XXX, *right* XXIX,

Russell.	D 22,	C 28.	A 14,	V 14,	P 17,	Br. XXX.
Ruppell, ...	„ 23,	„ 19$\frac{6}{6}$,	„ 16,	„ 15,	„ 19,	„ XXVIII or XXIX.
Cuv. and Val	„ 23,	„ 31.	„ 15,	„ 15,	„ 18,	„ XXIX, or XXXV.
De Kay, ...	„ 24,	„ 20$\frac{6}{6}$,	„ 17,	„ 14,	„ 15.	
Richardson,..	„ 24,	„ 19$\frac{7}{5}$,	„ 17,	„ 14,	„ 17,	„ XXXII.

Inhabits *Sea of Pinang*, Isle of France, Java, Celebes, Madura, Red Sea, Coromandel, China Sea, Japan, Senegal, New York, New Orleans, St. Domingo, Martinique, Mexico, Surinam, Brazil. Total length: 11 inch. The length of the head is $\frac{1}{4}$ of that of the body, the caudal not included, or with the latter 4$\frac{4}{5}$ times in the total The length at occiput is $\frac{1}{2}$ of the length of the head. The eye bordering on the profile, occupies the second fourth of the head, the horizontal diameter is a little less than $\frac{1}{4}$ of the head; the distance across the forehead is a little less than $\frac{2}{3}$ of the diameter. The adipose fold surrounding the orbit forms a large circular opening, corresponding to the pupil. The left branchiostegous membrane overlaps the anterior half of the right. The elongated bony plate between the branches of the lower jaw exceeds by $\frac{2}{5}$ the horizontal diameter of the eye. The greatest vertical diameter, in front of the dorsal, is $\frac{1}{8}$ of the total length. The lateral line is composed of a simple central tube on each scale. It follows nearly the middle of the side, proceeding straight to the centre of the posterior margin of the caudal. The stomach of a solitary young individual, observed at Pinang in February 1845, contained remains of small Crustacea and Fishes.

(3844) *Elops Cundinga*, (Buchan. Ham.)

Syn. Clupea cyprinoides, Broussonnet: Decade. [M. Valencienes has fully exposed (XIX. 384) the confusion of the Indian and Amercian species by Brossonnet, Bloch, Gemlin, Bonaterre. Lacepede and Shaw, whose specific names are therefore inadmissible.]
Clupea cyprinoides, Joh. Forster: Spicil.
Clupea apalike. Lacepede, V. Tab. 13, Fig. 3.
Russell. CCIII. Kundinga.
Cyprinodon cundinga. Buchan. Ham. 254, 383.
Megalops filamentosus, Cuv. R. A. II. 324.
Megalops filamentosus, Swainson, II. 293.
Megalops indicus, Cuv. and Val. XIX. 388, Pl. 577. [*Elops indicus* preoccupied, being one of the synonymes of *Elops saurus*. Linne, (vide supra,)]
Megalops filamentosus, Jerdon: Madras Journ. XV. 344.
Megalops indicus, Bleeker: Verh. Batav. Gen. XXII. 6.

Head above dark olive; back blackish blue silvery; sides and abdomen frosted silvery with bluish reflections, the lateral line and the margins of the scales shining silvery, as well as the sides of the head; above the upper margin a large blackish silvery spot; centre-part of both jaws blackish; dorsal and caudal greyish, minutely dotted with black, margins as well as the last elongated dorsal ray blackish; rest of the fins hyaline, in some dotted with black, and the last anal ray blackish. Iris shining silvery, orbital margin blackish. *D 19 or 21, C 19$\frac{6}{6}$, A 26, 27 or 28, V 10 or 12, P 15 or 16, Br. *left* XXVI, *right* XXV.
or „ XXV, „ XXIV.

* Russell, ... D 18, C 26, A 25, V 9, P 15, Br. XXIII.
Buchanan, ... „ 19, „ 19, „ 26, „ 10, „ 15, „ XXV.
Cuv. and Val., „ 18, „ 30. „ 25, „ 11, „ 14, „ XXIV—XXV.

Inhabits *Sea and freshwater, Pinang, Malayan Peninsula*, Freshwater and coasts of Otaheiti, Isles of Tanna and Buru, China Sea, Port Essington, Polynesia, Madagascar; Rivers of Java, freshwater and Sea of Madura, Celebes, Malabar, Coromandel, Gangetic estuaries. Total length: 1 foot. The length of the head is 4$\frac{2}{5}$ in the total; the depth at occiput $\frac{3}{4}$ of the length. The horizontal diameter of the eye is 2$\frac{3}{4}$ in the length of the head, the distance across the forehead is $\frac{2}{3}$ of the diameter. The greatest vertical diameter, in front of the dorsal, equals the length of the head. The scales are disposed on twelve longitudinal series, of which the sixth carries the lateral line. The latter declines towards the dorsal from whence it continues straight to the caudal. In the adult it occupies from 38 to 41 scales, each carrying a rather indistinct central tube, from above and below which radiate backwards from six to eight fine branches. The left branchiostegous membrane partially overlaps the right. The elongated bony plate between the branches of the lower jaw slightly exceeds the horizontal diameter of the eye. Of the anterior dorsal rays the fourth or the seventh is the longest, about $\frac{2}{3}$ of the length of the head. The last dorsal ray is divided in two portions of which the posterior is again divided in two filaments, provided in front and behind with a narrow loose membrane. The filament in some reaches the root of the caudal but it is frequently much shorter, particularly in

old individuals. A young one, 4½ inch in length, differed in, contrary to the generality of fishes, having the eye proportionally smaller than the adult; the lateral line, occupied but 29 scales, each carrying a very distinct central tube with two or three short spine-like branches; the dorsal filament was very short, its length less than the longest of the anterior rays; the left branchiostegous membrane contained but 23 rays, the right one less, and the colour of the head and back were paler than in the adult. At Pinang single individuals are taken at all seasons in the fishing-stakes off the coast; but those inhabiting fresh-water are numerous. In both localities their food is small fishes and crustacea, but in the latter they also prey upon insects. Notwithstanding their numerous fine bones they are valued for their flavour, which loses nothing by their being introduced in tanks where they rapidly multiply and fatten. M. Valenciennes considers *Megalops setipinnis*, Richardson, [*Ann. Nat. Hist.* X. 493, and *Report*, 1845, 310.] to be identical with, and *M. curtifilis*, Richardson, [*Report*, 1845, 310.] to be the young of the present species.

Genus PELLONA, *Valenciennes*, 1847. (Platygaster, *Swainson*, 1839). Preoccupied by *Platygaster*, Latreille, 1809 (*Hymenoptera*). Teeth in the jaws, on the palate, pterygoid bones and on the tongue, but not in the vomer; body compressed; ventrals in front of the dorsal; anal elongated; abdomen strongly toothed; air-vessel communicating with œsophagus by a small tube inserted at the extremity of the stomach.

(3845) *Pellona affinis*, (Swainson).

Syn. (*Icon*). Clupea affinis, Gray: Illustr. Ind. Zool. I, Pl. 96.
Platygaster affinis, Swainson, II. 294.
Clupea (Ilisha) affinis. Richardson, Report: 1845, 206. Note.
Pellona grayana Cuv. and Val. XX. 315.

Head above and back greyish green minutely dotted with black; lighter, silvery above the lateral line; rest of the sides, abdomen, cheeks and opercles silvery; dorsal, caudal and anal yellow; the external half of the two former minutely dotted with black; rest of the fins hyaline. Iris silvery, orbital margin blackish. D 16, C 19½, A 50 to 52, V 7, P 15, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, China Sea, Bay of Bengal. Total length: 1 foot. The length of the head is ⅕ of the total. The horizontal diameter of the eye is 4½ in the length of the head; the distance across the forehead slightly exceeds one diameter. The greatest vertical diameter, in front of the dorsal, is 3¾ in the total length. The dorsal commences in the middle between the muzzle and the centre of the posterior caudal margin. The caudal lobes are equal: ⅙ of the length of the head. The anal commences opposite the posterior fourth of the dorsal. The small ventrals are situated opposite the second third of the distance between the muzzle and the root of the caudal. Smaller individuals of this species are numerous at Pinang at all seasons, and are consumed fresh or dried by the natives.

Genus RACONDA, *Gray*. [What has been published of this species appears to be confined to the figure in *Hardwicke's Illust. of Ind. Zool.* of *Apterygia ramcarate*, and a very short notice in *Zoological Miscellany*. But for the absence of the dorsal fin, the resemblance to *Pristigaster tartoore*, Cuvier, (Russell, CXCIII. Tartoore), is so striking, that it is not surprising, that M. Valenciennes should have considered the undescribed figure of *Apterygia ramcarate* ("*hamiltonii*," as quoted in *Hist. des Poiss.* XX. 333), to represent a mutilated specimen of *Pristigaster tartoore*. The following is Mr. Gray's description of Raconda russelliana: "*Silvery; Saugar Roads. A species distinguished from the want of the fin by the fishermen; there are two specimens in British Museum, neither shewing the slightest indication of that organ.*" (Zool. Miscell. l. c)] Dorsal fin none; rest like *Pristigaster*.

(3846) *Raconda russelliana*, Gray.

Syn. Raconda russelliana, Gray: Zool, Miscell. 9.
(*Icon*). Apterygia ramcarate, Gray: Ill. Ind. Zool. II. Pl. 92. Fig. 1.
Pristogaster (Apterygia) Swainson, I. 277.
Apterygia hamiltonii, Cuv. and Val. XX. 333.

Head above and back deep blue, upper third of the sides polished, copper-coloured; rest of head and body shining silvery with mother-of-pearl reflections. Behind the upper part of the opercle a black spot; caudal pale yellowish minutely dotted with black, particularly towards the posterior margin; anal and pectoral rays yellowish or white, membranes hyaline. Iris silvery, orbital margin blackish blue. D 0, C 19½ A 83 or 84, V 0, P 12, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Bay of Bengal, Mouths of Ganges. Total length; 8 inch. The length of the head is 6½ in the total. The horizontal diameter of the eye is 3½ in the length of the head; the distance across the forehead is ⅔ of the diameter. The eye occupies the middle of the length of the head, and is situated close to the concave profile without bordering upon it. The infraorbital is narrow, elongated much too short to cover the maxillary. The intermaxillaries are short, narrow, linear and fixed transversely across the muzzle. The upper maxillary bone is much longer and broader than in *Pristigaster tartoore*; when the mouth is opened it projects beyond the throat, and when closed it extends to opposite the posterior margin of the

orbit; the length is $\frac{1}{3}$ of that of the head, the breadth $\frac{2}{3}$ of the diameter of the eye; the upper extremity is obliquely truncated, the lower forms a rather long, slightly backwards arched point. The lower jaw projects a little beyond the upper, which the branches equal in breadth, but they are shorter. The teeth of both jaws are very minute and placed in a single series; the rest are velvety or like a fine file. The mouth is small; the tongue free, flattened, oval. The opercle is triangular with the posterior extremity rounded or less pointed than in *P. tartoore*. The pre-opercle is narrower, and scarcely broader than the arched sub-opercle and interopercle, which two latter are proportionally broader in the present species. The branchiostegous membrane is small; its two anterior rays short and slender; the posterior four broad and flattened. The profile of the head is concave, rising to a little behind the occiput, from whence the back gently declines towards the root of the caudal. The abdominal arch continues increasing towards the root of the anal, from whence the profile gradually ascends The greatest diameter of the body, at the root of the pectorals, slightly exceeds $\frac{1}{5}$ of the total length; at the occiput it is $\frac{1}{6}$; at the root of the caudal it is about $\frac{1}{3}$ of the length of the head. The lateral line commences high up from the supra-scapular bone, and continues close to the profile of the anterior third of the back when it suddenly terminates. Another fine line follows the upper fourth of the side to the root of the caudal. The scales are of moderate size, oval, excessively thin and so deciduous, that the exact number cannot be ascertained. The trenchant abdominal profile contains upwards of 38 spines. The caudal is deeply cleft, the lower lobe, longer than the upper, equals the length of the head. The distance from the muzzle to the anal is $2\frac{1}{2}$ in the total length. The extent of the base is $\frac{1}{2}$ of the total length, (in *P. tartoore* it is little more than $\frac{1}{3}$,) the length of the rays does not exceed the horizontal diameter of the eye. The first pectoral ray, the longest, is situated nearly in the centre of the vertical diameter; it is broad, sword-like, with distinct articulations; its length is a little less than the head. At Pinang individuals from 4 to 6 inches in length are numerous at all seasons, although less so than they are at the Sandheads and the mouths of the Ganges. The Bengal fishermen denominate the species "*Potassah-Fessah* or *-Phasah*." "*Fessah*" or "*Phasah*," as Buchanan Hamilton observes, is in Bengal a generic term, particularly applied to *Engraulis phasah* (Buchan.) and *E. telarah*, (Buch.) It is a heavy swimmer, and like the rest of *Clupeoidæ*, expires immediately on leaving its element. It is chiefly consumed in a dried state.

Genus CLUPEONIA, *Valenciennes*, 1847. Teeth on the tongue and pterygoid bones; palatals, vomer and jaws toothless. In the species here described a single series of 4 to 6 minute deciduous teeth appears on each side of the symphysis of the lower jaw.

(3847) *Clupeonia perforata*, Cantor.

Syn. Tamban nepis, or Tamban patul of the Malays.

Head above yellowish green; back and upper third of the sides bluish green with silvery reflections; muzzle and chin blackish; rest of the head and sides and abdomen shining silvery with rose-coloured and ultramarine reflections; dorsal bright yellow, upper half minutely dotted with black; a black spot over the root of the anterior four rays; caudal pale bluish green, posterior half minutely dotted with black; rest of the fins white. Iris silvery, orbital margin black. D 17 to 20, C $17\frac{2}{6}$, A 19 or 20, V 8, P 15, Br. V. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Sumatra. Total length: $5\frac{6}{8}$ inch. The general form is elongated, compressed; the abdomen slightly more arched than the back. The length of the head is $\frac{1}{5}$ of the total; the eye is placed a little nearer the muzzle than the gill-opening; the horizontal diameter is a little less than $\frac{1}{3}$ of the head, but equals the distance across the forehead. The muzzle is bluntly pointed, the lower jaw very little longer than the upper. The small tongue is elongated oval; in the middle a little behind the apex appears a single series of very minute pointed teeth; on the palatals they are numerous but distant; the four to six on each side of the symphysis of the lower jaw are less minute; all are deciduous. The vertical diameter at occiput is $\frac{3}{4}$ of the length of the head; the greatest vertical diameter of the body, in front of the dorsal, is $\frac{1}{4}$ of the total length. The dorsal is placed at equal distance from the muzzle and the root of the caudal; the extent of the base is $2\frac{1}{2}$ in the length of the head; the upper margin is falcated; the fourth and fifth, the longest rays, equal the extent of the base; the last ray is elongated, $\frac{1}{2}$ of the fifth ray. The caudal is deeply cleft; the length of the lobes slightly exceeds $\frac{1}{4}$ of the total length. The distance from the caudal to the anal equals the horizontal diameter of the eye; the extent of the base of the anal is $\frac{2}{3}$ of the head; the rays are $\frac{2}{3}$ of the diameter of the eye, but the last is a little elongated. The ventrals are placed opposite the middle of the dorsal, at equal distances from the root of the upper pectoral and the first anal ray; their length is $2\frac{1}{2}$ in the head. The length of the pectorals is $\frac{3}{4}$ of the head. The scales are very deciduous, thin, and large, their circumference nearly equalling the eye. They have excessively fine vertical lines, and besides three larger distant ones, traversing the whole height of the scales; parallel to the posterior margin appears an irregular series of minute oval holes. There are eleven series on each side, and about 45 scales between the gill-opening and the caudal. Single

individuals occur at Pinang at all seasons, but great numbers during June, July and August. They are of delicate flavour and pass in the settlements of the Straits under the denomination of 'Sardines,' in imitation of which they are sometimes preserved in oil. A resemblance to *Alausa argyrochloris*, Cuv. et Val. (vol. XX. p. 440) is farther increased by the impossibility of perceiving the teeth either in fresh state or in specimens preserved in spirits of wine. They require the aid of a lens to be distinguished in the skeleton. The general form, the yellow dorsal fin with a small black spot give the present species a certain resemblance to *Meletta venenosa*, Cuv. et Val. (vol. XX. p. 377). Some specimens of *Clupeonia perforata*, procured by W. T. Lewis, Esq. Assist. Resid. Councillor, Pinang, were accompanied by the following account of a phænomenon witnessed by that gentleman during his official residence at Bencoolen. In 1822 great numbers of what was supposed to be this identical species, presented the unusual appearance of having red eyes. Many natives after having eaten these fishes, were suddenly attacked with violent vomiting, which in cases where remedies were not immediately applied, was known within an hour to terminate fatally. At the same time such of these fishes with the ordinary silvery eyes, were as formerly eaten with impunity. This phænomenon reoccurred at Bencoolen during the seasons of 1823 and 1825, but not of 1824. It was surmised that the poisonous fishes had fed on a gelatinous substance which at that season exudes from the beautifully coloured coral reefs on that part of the coast of Sumatra. It is, however, more probable that the poisonous fishes were shoals of *Meletta venenosa*, an inhabitant of the Seychelles and the neighbouring seas, which happened in those seasons to visit Sumatra. M. Valenciennes describes this fish as being poisonous, and producing effects as noted above. In the Straits of Malacca *Clupeonia perforata* has never been known to produce bad effects.

Genus KOWALA, *Valenciennes*, 1847. Minute teeth in the jaws and on the pterygoid bones; tongue, vomer and palatals [Minute teeth, deciduous like the rest, appear on the palatals of the two species described.] toothless.

(3848) *Kowala thoracata*, Cuv. and Val.

Syn. Russell, CLXXXVI. Kowal.
Clupea kowal, Ruppell: Neue Wirbelth. Fische, 79.?
Kowala thoracata, Cuv. and Val. XX.363.

Head above and back deep blue with green reflections; upper third of the sides silvery sea-green; rest of the body, cheeks and opercles shining silvery with mother-of-pearl reflections; upper part of the opercle pale bluish dotted with black; dorsal and caudal pale yellow greenish, sparingly dotted with black, particularly towards the margin; in some individuals a vertical elongated blackish spot at the root of the five central rays; rest of the fins white. Tongue and inside of the mouth minutely dotted with black. Iris silvery, orbital margin black. D 19, C 19$\frac{4}{5}$, A 21 or 22, V 8, P 15, Br. VI. Inhabits *Sea of Pinang*, Coromandel, Red Sea. Total length: 5$\frac{4}{5}$ inch. The length of the head is $\frac{1}{4}$ of the body, $\frac{1}{5}$ of the total length. The horizontal diameter of the eye slightly exceeds $\frac{1}{3}$ of the length of the head; the distance across the forehead is $\frac{2}{3}$ of the diameter. The eye is covered by a thick adipose duplicature with a vertically elliptic aperture over the circular pupil; it occupies the middle of the distance between the muzzle and the posterior margin of the opercle, and borders on the profile. The figure of Russell represents the eye much too small, probably owing to the adipose fold having been overlooked. On the surface of each of the posterior frontal bones appear upwards of 11 backwards radiating lines. In the individuals examined at Pinang there appeared from six to eight teeth in the lower jaw, and some on the palatal and pterygoid bones, but none in the upper maxillaries, intermaxillaries, nor in the vomer. These teeth are so minute that they require to be seen through a lens in dried specimens, and they are so very deciduous that their number and position vary not only individually, but from side to side. The scales of the body are large, rounded, very thin and deciduous; those of the back and upper third of the sides have each upwards of 16 longitudinal striæ. The sides are covered by 11 longitudinal series of scales, of which there appear to be upwards of 45 in the longest series. There are 35 spines on the abdominal profile, the scales of which resemble in breadth those of the species of *Pellona*. The greatest vertical diameter of the body, in front of the dorsal, is a little less than $\frac{1}{4}$ of the total length. The dorsal occupies the middle of the distance between the muzzle and the root of the caudal; the fourth ray, the longest, equals the extent of the base, which is ^{1} of the greatest vertical diameter of the body. The fin his half covered by an oblique backwards rising series of scales which almost hide the last rays. The caudal is deeply cleft, the lobes exceed by $\frac{1}{6}$ the length of the head. The scaly anal rays are vey short; the last slightly elongated; the extent of the base is $\frac{1}{3}$ of the length of the head; its distance from the root of the caudal is $\frac{1}{3}$ of the extent. The ventrals are situated opposite the centre of the dorsal, exactly in the middle between the root of the first pectoral and anal rays; their length is $\frac{1}{3}$ of the head. The length of the pectorals is $\frac{1}{3}$ of the head. At Pinang single individuals are of rare occurrence.

(3849) *Kowala lauta*, Cantor.

Syn. Clupea kowal, *Clupea kowal*, Ruppell, vide *Kowala thoracata*, Cuv. and Val.

Temm. et Schlegel: Fauna Japon. Pisc. 235, Tap. CVII. Fig. 1.

Anterior half of the head above greenish grey dotted with black; posterior half and back intense glossy blue; upper half of the sides light golden green; rest of the body shining silvery with mother-of-pearl reflections; behind the upper part of the opercle a rounded yellowish brown spot dotted with black, from which proceeds along the upper fourth of the side a yellowish brown band, terminating at the upper fourth of the root of the caudal; cheeks and opercles shining silvery with golden and sky-blue reflections; the temples minutely dotted with black; dorsal bright gamboge, anterior and upper margin blackish; caudal pale greenish yellow, upper and posterior margin blackish; rest of the fins white. Tongue and cavity of the mouth minutely dotted with black. Iris silvery, orbital margin blackish. D 19, C 19$\frac{5}{6}$, A 16 or 18, V 8, P 15, Br. VI. Inhabits *Sea of Pinang*, Japan. Total length: 6 inch. In addition to the colours and the number of anal rays this species presents the following characters distinguishing it from *K. thoracata*. In the intermaxillaries and upper maxillaries appear single, widely spread, pointed teeth; in the lower jaw from 8 to 12 such very little larger; those on the palatal and pterygoid bones are more numerous, but also with irregular intervals, indicating that the teeth are deciduous. All are so minute that they cannot be seen in fresh specimens, and in dried ones but through a lens. The fifth dorsal ray, the longest, is less than $\frac{1}{2}$ of the greatest vertical diameter of the body, and equals the extent of the base of the fin; the last ray is a little elongated. The last anal ray is also a little elongated, and extends halfway to the root of the caudal. The ventrals are placed more forwards than in *K. thoracata*; the first ray commences opposite the second third of the dorsal, and its distance from the first anal ray exceeds by $\frac{1}{5}$ that from the root of the first pectoral ray. The sides are covered by 11 longitudinal series of scales, the longest series containing about 35 scales. The rest of the characters noted under *K. thoracata*, are precisely the same in the present species. Two individuals exactly similar, except in the number of anal rays, occurred together at Pinang in June 1844.

Genus ALAUSA (ALOSA, *Cuvier* 1817) *Valenciennes* 1847. Small deciduous teeth in the jaws; all other parts of the mouth toothless.

(3850) *Alausa toli*, Cuv. and Val.

Syn. Alausa toli, Cuv. and Val. XX. 435.
Ikan truboh or trubu of the Malays.

Adult. Head above, back and upper third of the sides light greenish grey or lead-coloured; the scales strongly iridescent silvery; their margins dotted with black; rest of the sides, abdomen, cheeks and opercles strongly iridescent silvery; dorsal pale lead-coloured, in some individuals sparingly dotted with black; caudal scaly, pale silvery; upper lower and posterior margin minutely dotted with black; rest of the fins white. Iris mother-of-pearl, orbital margin blackish, or: head and body, instead of silvery, shining reddish yellow brass coloured; fins pale reddish yellow. Iris brass coloured. *Young.* Like the adult, but with a more or less distant blackish spot behind the upper part of the gill-opening and an indistinct vertical blackish spot at the root of five central rays of the caudal; upper half of dorsal closely dotted, so as to appear blackish. D 18, C 19$\frac{5}{5}$, A 19, V 8, P 15 or 16, Br, VI. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Borneo, Java, Sumatra, Pondicherry, River Cavery, Bombay. Total length: 1 ft. 6 inch. The length of the head is contained 4$\frac{5}{6}$ times in the total; the diameter of the eye is $\frac{1}{6}$ of the length of the head; it occupies the upper third of the head; the distance from the muzzle is $\frac{1}{4}$ of the length of the head; the distance across the arched forehead is 1$\frac{2}{3}$ diameter. The thick adipose fold covering the eye has a vertically elliptical aperture over the pupil. The first dorsal ray is excessively short and situated the length of one diameter of the eye behind the anterior third of the total length. The fourth and fifth are the longest, 2$\frac{1}{3}$ in the greatest vertical diameter of the body, which is contained 3$\frac{1}{2}$ to 2$\frac{2}{3}$ times in the total length. The upper margin of the fin is falciform; the posterior ray a little elongated; the extent of the base is $\frac{1}{2}$ of the length of the head. The eleventh ray is exactly in the centre between the muzzle and the middle of the root of the caudal. The latter is deeply cleft; the lower lobe, a little longer than the upper, is a little less than the greatest vertical diameter of the body. The extent of the base of the anal slightly exceeds that of the dorsal; the last ray is a little elongated; the first ray is situated at equal distance from the root of the caudal and the last ventral ray. The first ventral ray is situated in the centre between the muzzle and the root of the caudal, opposite the second fourth of the dorsal; [M. Valenciennes refers Russell No. CXCV. *Kelee*, to the young of the present species, but the ventral fins are placed very far backwards, opposite the posterior fourth of the base of the dorsal. If therfore the figure of Russell is correct, it represents a species different from *A. toli.*] the length of the fin is $\frac{1}{3}$ of the caudal; that of the elongated, triangular scale $\frac{2}{3}$ of the longest ray. The pectorals extend nearly to the ventral; their length is $\frac{3}{4}$ of the head; the elongated auxillary scale is $\frac{1}{2}$ of the length of the fin. The sides are covered by 15 longitudinal series of scales, of which there are 39 or 40 between the gill-opening and the caudal. By these characters it may readily be distinguished from a closely allied species; *Alausa ilisha*, (Buchan. Ham.) [Syn.: Russell CXCVIII.

Palasah.—*Clupanoden ilisha*, Buchan. Ham. 243, 382, Tab. XIX. Fig. 73 (*Young.*)—*Alosah palasah*, Cuv. R. A. II. 320 (1).—*Clupanodon ilisha*, Taylor: Gleanings of Science, II. 171.—*Alausa palasah*, Cuv. and Val. XX. 432.—*Alosa palasah*, Jerdon: Madras Journ. XV. 345. (Excl. Syn. *Clupea indica*, Gray).—The number of fin rays is: D 19, C 19/8, A 19 V 8, P 14, 15 or 16, Br. VI. It has 19 longitudinal series of scales, of which there are 47 to 49 between the gill-opening and the caudal. Buchanan Hamilton gives: D 20, A 21, probably owing to his having counted the last double rays as single. Sir John Richardson quotes, not without doubt, a specimen in the British Museum as *Alosa Palasah*, Russell 198 ? (Report 1845, 306). Forty scales form a longitudinal row, and there are fifteen rows in height "the pectorals reach nearly to the ventrals, which are attached before the middle of the dorsal." These characters are sufficient to prove the species to be distinct from Russell's *Palasah*, while they agree with *Alausa toli*, Cuv. and Val. But Sir J. Richardson counts; D 16, A 18, P 15, V 9.] Small individuals are at Pinang very numerous during all seasons; larger ones less so, although by no means scarce. Like *A. ilisha* in Bengal, the present species is by the English of the Straits Settlements denominated: *Shad* or *Sablefish*, and is equally valued for its flavour. Both are, however, somewhat oily, very rich and bony. *Alausa toli* is remarkable as forming in the Indian Archipelago a distinct and important branch of fishery, principally for the sake of its roe. It is the kind of "*Shad*" to which Mr. Crawfurd refers as frequenting the great river Siak in Sumatra, and of which the dried roe, of enormous size, constitutes an article of commerce. (Crawfurd: *Hist. Ind. Archipel.* III. 440.—Royle: *On the Production of Isinglass*, 76). A description of the fishing of this species is given by the late Mr. Moor in *Notices of the Indian Archipelago*, &c. p. 29. "At Bukit Batu, [opposite to, and a little to the southward of Malacca.] a place on the main of Sumatra within the Strait formed by the island of Bankalis, exists an extensive fishery well known in this part of the world. The fish which is the object of it is called in the Malayan language: *Trubu*. The fish itself is sufficiently known in all the neighbouring seas but found with a roe only here, [That is to say, in shoals, for it is plentiful at Pinang, Malacca and Singapore.] which makes it certain that it repairs to this favoured place for the purpose of spawning. The *Trubu*, about a cubit long, is taken in 3 and 4 fathoms water on a mud bank. About 300 boats are engaged at all seasons in the fishery with the exception of four days during dead neap tides. The roes are an article of trade seaways, and the dried fishes are sent into the interior of Sumatra. The Rajah of Siak draws a revenue from this fishery of 72,000 guilders yearly, receiving a certain duty upon the quantity taken. From the rate and amount of this duty it is ascertained that the quantity of fish caught yearly amounts to between fourteen and fifteen millions. It seems a little remarkable that the spirit of European monopoly never should have fastened upon so promising an object of gain. The fishery, from its peculiar nature, is probably quite inexhaustible, and might unquestionably be prodigiously improved by European skill and industry, and this too not only without detriment, but probably to the great improvement of the revenue of the native prince, as well as the essential benefit of the surrounding population." In the Malayan Markets the roe is called "*Telur ikan*," the fish-roe "par excellence." Like the preparation of fermented fish and shell-fish: "*Balachan*," it is largely used by the Malays and Chinese to season and make their food palatable and it is no less a favourite relish with Europeans. W. T. Lewis, Esq. Resident Counsellor, Pinang, who has observed the process of preparation in Sumatra, describes it as follows. The fresh roe is thoroughly salted, and next partially dried, so as to retain a slight moisture, in which state it is by hundreds closely placed in casks, and thus exported. In our Malayan Settlements the price is from 3 to 4 Spanish Dollars per hundred. The dealers there export considerable quantities to China, after having taken the precaution to repack the roes between layers of salt, and to sprinkle them with arrack. To dress them, they are soaked for about half an hour in water, and then fried. As the roe appears in commerce, it is of an elongated flat shape, measuring from 6 to 8 inches in length, about 2 in breadth, and 3/4 of an inch in depth, of a deep amber colour. The single eggs are larger than those of *A. illisha*.

(3851) *Alausa Champil*, (Cuv. and Val.)

(*Icon.*) Clupea champil, Gray: Ill. Ind. Zool. II. Pl. 91, Fig. 5 and 6.
Pellona champil, Cuv. and Val. XX. 324.

Head above, back and upper third of the side pale sea-green, sparingly dotted with black; rest of the body and head silvery with lilac reflections; from behind the upper part of the opercle to the caudal a pale longitudinal lilac band, the upper margin of which pale silvery; dorsal, anal and caudal yellowish white, the two first with a black dot at the root of each ray; caudal minutely dotted with black; rest of the fins hyaline. Iris silvery with lilac reflections. D 16, C 19/8, A 18, V 7, P 11, Br. VI. Inhabits *Sea of Pinang*. Total length: 3 1/8 inch. The length of the head is 1/5 of the total; the horizontal diameter of the orbit is a little less than 1/3 of the length of the head; the distance across the forehead equals the diameter. The jaws are nearly equal; the length of the upper slightly exceeds the diameter of the eye. There

are no teeth in any part of the mouth. The greatest vertical diameter of the body, in front of the dorsal fin, is contained 3⅓ times in the total length. The sides are covered by 11 longitudinal series of scales, of which there are about 42 between the gill-opening and the caudal. The abdominal line carries 29 fine species. The dorsal commences a little in front of the centre between the muzzle and the root of the caudal. the fifth, the longest ray, is ⅔ of the length of the head and equal to the extent of the base. The upper margin is straight; the last ray a little elongated. The caudal lobes are equal, ¼ of the total length. The anal commences a little in front of the posterior fourth of the distance between the muzzle and the root of the caudal; the length of the longest rays, the 4th, and 5th, is ½ of the 5th dorsal: the extent of the base slightly exceeds that of the dorsal. The first ventral rays is situated opposite the first dorsal ray, a little nearer the first pectoral than the first anal rays; the length of the fin is ½ of that of the head. The length of the pectorals is ¾ of the head. Two individuals of equal length occurred together at Pinang in October 1843. Both strikingly resemble a drawing of Buchanan Hamilton's duplicate series, marked in Buchanan's hand writing: "*Clupea champil, B.*" This drawing is evidently the orginal of the indifferent copy in the *Illustr. of Indian Zool.*, which is the foundation of *Pellona champil*, Cuv. and Val. It is one of the few drawings which Buchanan has omitted to describe in his work upon the fishes of the Ganges.

Genus ENGRAULIS, (*Cuvier* 1817) *Valenciennes* 1848. Mouth cleft far behind the eyes; muzzle projecting, pointed; ethmoid bone advancing in front of the jaws; intermaxillaries soldered to the maxillaries, hid beneath the muzzle; vomer narrow with a few teeth on the anterior part; palatals and pterygoids narrow, bristling with minute teeth, or rough; gill-opening very large; body rounded or compressed like a knife-blade; abdomen trenchant or toothed.

(3852) *Engraulis brownii*, (Gmelin).

Syn. "Menidia, corpore subpellucido," Brown: Jamaica 141, Tab. XLV. Fig. 3.
Argentina, Gronov. Zoophyl. 112, No. 350.
Atherina japonica, Houttuyn: Act. Haarl. XX. 340?
Atherina brownii, Linne: Syst. 1397.
Atherina australis, White: Voyage. 196, Fig. 1.
Atherina (Clupea) Brownii, Bloch-Schneider.
Stolephore commersonien, Lacep. V. 382, Tab. XII. Fig. 1.
Clupea vittargenta, Lacep. V. 424, 458, 461, (*Excl. Syn.*)
Russel CLXXXVII. Nattoo.
Atherina menidia, Shaw V. 131.
Commersonian Atherine, ibid, Pl. 113, Fig. 1.
Atherina japonica, Shaw V. 132?
Engraulis (Stolephore commersonien), Cuv. R. A. II. (1817,) 175.(1). (1829, 321.(1).
Engraulis albus. Swainson II. 293.
Engraulis commersonianus, Richardson: Report 1845 308.
'Descript. of anim. 201, Fig. 149'? ibid, 305, 309.
Engraulis fasciata, Cuv. and Val. XXII. 43.
Engraulis brownii, Cuv and Val. ibid. 41.
Engraulis commersonii, Bleeker: Verh. Batav. Gen. XXII. 6.
Bunga ayer, or Badah of the Malays.

Head above light greenish grey, a large oval blackish spot occupying the posterior half: back pale sea-green or greenish grey; sides and abdomen transparent greenish buff, or grey with reflections of mother-of-pearl; from the upper third of the gill-opening to the root of the caudal a broad longitudinal silvery band; cheeks and opercles shining silvery, the latter above dotted with black; caudal pale yellow, dotted with black, rendering the posterior margin blackish; rest of the fins hyaline. Iris silvery, orbital margin blackish. D 14, 15 or 16, C 19⅓, A 20 or 21, V 7, P 15 or 16, Br. XI. Inhabits *Sea and estuaries of Malayan Peninsula and Islands*, China sea, New Zealand, Madura, Java, Sumatra, Bombay, Coromandel, Bay of Bengal, Gangetic estuaries, Isle of France, Australia, New York, Havanah, Jamaica, Vera Cruz, Martinique, Barbadoes, St. Christopher, Rio Janeiro. Total length: 6 inch. The head is ⅕ of the total length; the horizontal diameter of the eye is contained 3½ times in the length of the head; the distance across the forehead equals one diameter; the greatest vertical diameter, in front of the dorsal, is ⅕ less than the length of the head. The body is covered by 7 longitudinal series of deciduous scales, of which there are from 35 to 38 on the third series. On the anterior twelve scales of this series appears the lateral line which consists of a linear central tube, which disappears or becomes indistinct on the rest of the scales. The latter are diaphanous, rhomboidal, with their horizontal diameter ½ of the vertical. The dorsal commences nearly in the middle between the muzzle and the centre of the posterior margin of the caudal; the anal commences opposite the posterior third of the dorsal. The ventrals are situated in the middle between the pectorals and the anal. The caudal is deeply cleft; the length of each lobe equals that of the head. In the Straits of Malacca as in the mouths of the Ganges, this species is astoundingly numerous at all seasons. Two to three inches is the usual length, five to six are very rarely seen. In fine weather swarms may be seen swimming near the water's edge, and making very short leaps closely above the surface of the sea. As Russell observes they are highly valued for their delicate flavour when

fried. In Java, Sumatra and the Straits of Malacca, large quantities are preserved both for home consumption and exportation to China and India. The delicious condiment is famed under the denomination of "*Red-fish*," (*Ikan merah* of the Malays,) or "*Malacca fish*," and is used as a relish. The following mode of preparation, as practised at Bencoolen and Malacca, has been communicated by W. T. Lewis, Esq. Asst. Res. Counsellor, Pinang. After the heads have been removed, the fishes (those of middling size are preferred), are cleansed, salted (in the proportion of one to eight parts of fish), and deposited in flat glazed earthen vessels. In the latter they are for three days submitted to pressure by means of stones placed on thin boards or dried plantain leaves. The fishes are next freed from salt and saturated with vinegar of Cocoa Palm toddy, after which are added powdered ginger and black pepper (the latter mostly entire), and some brandy and powdered "Red rice." After having been kept for three days, a little more vinegar is added before placing the fishes in well closed jars or bottles. They should be kept four or five months before being used. The expense of a quart bottle of the condiment is about 30 Cents, the, selling price one Spanish Doller. "Red rice" is the variety of *Oryza sativa* called *glutinosa* (*pulut, orbras sepulut* of the Malays) steeped in an infusion of Cochineal. In the Straits Settlements red rice is imported from China, and sells at the rate of 10 Cents of a Dollar per lb. The Chinese settlers in the straits prepare a similar red condiment with slices of *Ploynemus indicus* and *P tetradactylus* and also prawns.

(SETIPINNA, *Swainson*, 1837.—TELARA *Val.* 1848.—*Anterior pectoral ray elongated filamentous*)

(3853) *Engraulis Breviceps*, Cantor. Head and body reddish golden or brass colour, back sparingly dotted with black; fins reddish yellow, like the body, but not metallic; anterior half of upper dorsal margin, and the posterior caudal margin broadly brimmed with black; posterior fifth of the anal margin equally so. Iris reddish golden. D 1/16, C 19$\frac{1}{3}$, A 63, V 7, P 13, Br, XVI—XVI. Inhabits *Sea of Pinang*. Total length: 9$\frac{4}{8}$ inch. The head is strikingly short; the distance from the muzzle to the upper part of the posterior margin of the opercle is contained 8$\frac{2}{3}$ times in the total, (measured to the occiput, it is $\frac{1}{1\frac{1}{3}}$ of the total.) The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead is a little less than two diameters. The greatest vertical diameter of the body, in front of the dorsal, is $\frac{1}{4}$ of the total length. The dorsal commences in the centre between the muzzle and the root of the caudal; the first soft ray is preceded by a short strong spine. The anal commences in front of the dorsal, opposite the second third of the total; the extent of the base of the anal is 2$\frac{1}{3}$ in the total. The upper caudal lobe is truncated. The ventrals are situated in the centre between the first ray of the pectorals and the anal. The first pectoral ray is a little less than 2$\frac{2}{3}$ times in the total length; it does not reach the middle of the anal. The second pectoral ray slightly exceeds $\frac{1}{4}$ of the first. This species nearest approaches *E. telara*, (Buchan. Hamilton). A single individual was observed at Pinang in August 1844.

(3854) *Engraulis taty*, Cuv. and Val.

SYN. Engraulis taty, Cuv and Val XXI. 60.

Head above and back greyish green or greenish slate colour, sparingly dotted with black; sides above the lateral line pale silvery green; the rest, abdomen, cheeks and opercles silvery; dorsal, caudal and anal yellow; ventrals and pectorals hyaline; in some the posterior caudal margin blackish. Iris silvery, orbital half bluish black. D 1/14, C 19$\frac{2}{3}$ A 52 to 56, V 7 P 16, Br. XIII—XIII. Inhabits *Sea of Pinang, Malayan Peninsula*, Malabar, Pondicherry. Total length: 6 inch. Measured to the upper part of the posterior margin of the opercle, the length of the head is contained 6$\frac{2}{3}$ times in the total, (to the occiput it is 9$\frac{2}{3}$ in the total.) The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead is 1$\frac{1}{3}$ diameter. The greatest vertical diameter of the body, in front of the dorsal, is 4$\frac{1}{3}$ in the total length. The dorsal commences a little in front of the middle between the muzzle and the root of the caudal. The anal commences opposite the centre of the dorsal; the extent of the base is 2$\frac{2}{3}$ in the total length. The ventrals are situated in the centre between the first pectoral and the fifth anal ray. The upper caudal lobe is truncated. The first pectoral ray is 1$\frac{4}{5}$ in the total length: it reaches to the posterior third of the anal; the second pectoral ray is 3$\frac{1}{2}$ in the length of the first. Single individuals occur at Pinang at all seasons, and are eaten either fresh or dried by the natives.

(THRISSA, *Rafin.* 1845.—*Maxillaries greatly elongated.*)

(3855) *Engraulis mystax*, (Bloch-Schneider).

SYN, Clupea mystax, Bl. Schn. 429, No. 14, Pl. 83.
Thryssa mystax, Cuv. R, A. II. 323 (3).
Thryssa mystax Richardson Report, 1845. 309 (*Excl. Syn. Clupea malabarica and Poorawah. Russell*, 189?)
Engraulis mystax, Cuv. & Val. XXI. 67.

Head above and back dark bluish green; lighter silvery on the sides above the lateral line; behind the upper part of the gill-opening a triangular spot, composed of horizontal, black, dotted lines, downwards increasing in length; rest of the sides and abdomen silvery white; cheeks and opercle silvery with golden reflections; dorsal and caudal whitish yellow, marginal half minutely dotted with black; rest of the fins whitish transparent. Iris silvery, orbital margin bluish black. D1/13, C 19$\frac{3}{5}$, A 37, 38 or 39, V 7, P 14, Br. XII.

Inhabits *Sea of Pinang, Matayan Peninsula, Singapore,* Bombay, Malabar, Coromandel, Gangetic estuaries. Total length: 8 inch. The length of the head is $\frac{1}{5}$ of the total. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead is $1\frac{1}{2}$ diamcter. The greatest vertical diameter, in front of the dorsal, is $\frac{1}{4}$ of the total length. The upper jaw extends beyond the root of the pectorals. The dorsal commences a little behind the centre of the distance between the muzzle and the root of the caudal fin. The caudal lobes are equal, pointed, and as long as the head. The anal commences opposite the posterior third of the dorsal; the extent of its base is contained about $3\frac{1}{2}$ times in the total length. The ventrals commence nearer the pectorals than the anal, their distance from the symphysis of the lower jaw is $2\frac{3}{4}$ in the total length. The pectorals are $\frac{1}{4}$ shorter than the head; placed in contact with the sides, their apex extends to the last ray of the ventrals. At Pinang single individuals occur at all seasons and are eaten by the natives. Sir John Richardson considers *Clupea malabarica,* Bloch. (Pl. 432.—Bl. Schn. p. 425) and *Poorawah,* Russell, CLXXXIX, to be identical with the present species. But according to the description of *Engraulis malabarica,* (Cuv. and Val. XXI. 63, Pl. 609) the upper jaw extends very little beyond the margin of the opercle, and does not extend as far as the pectoral, and the latter barely touch the root of the ventrals. The figure of *Poorawah* is scarcely correct enough, nor the description (Russell, p. 72,) sufficiently explicit to determine the species. Dr. Bleeker has described a new species under the inadmissible name of *Thryssa porava,* which he with doubt refers to *Poorawah,* Russell, CLXXXIX. (Bleeker: *Bijdrage tot Ichth. Faunavan Madura,* in: *Verh. Batav. Genoots.* XXII. p. 14.)

(3856) *Engraulis purava,* (Buchan, Hamilton.)

Syn. Russell CXC. Peddah Poorawah.
Clupea purava, Buchan. Hamilt 238, 382.
Thrissa (Pedda Poorawah) Cuv. R. A. II. 323 (3).
Thrissa megastoma, Swainson, II. 293.
Engraulis purawa, Cuv. and Val. XXI. 65.

Head above and back dark bluish green; lighter silvery above the lateral line; rest of the sides, abdomen, cheeks and opercles silvery; fins coloured like those of *E. mystax.* Iris silvery; orbital margin bluish black. D. 1/13, C $19\frac{3}{3}$, A 43, 45 or 46, V 7, P 14, Br. XII. Inhabits *Sea of Pinang,* Coromandel, Gangetic estuaries, Java, Madura. Total length: 8 inches. The length of the head is $\frac{1}{5}$ of the total. The horizontal diameter of the eye is contained $4\frac{1}{2}$ times in the length of the head, the distance across the forehead is $1\frac{1}{2}$ diameter. The greatest vertical diameter, in front of the dorsal slightly exceeds $\frac{1}{4}$ of the total length. The maxillaries are narrower and longer than in *E. hamiltoni,* where they reach to the root of the first pectoral ray; in the present species they reach to the root of the posterior pectoral ray. The dorsal commences a little in front of the centre between the muzzle and the root of the caudal; the anal commences in the centre of that space, opposite the middle of the dorsal. The extent of the base of the anal is $\frac{1}{3}$ of the total length. The caudal lobes are equal, pointed, and as long as the head. The pectorals are a little shorter. The ventrals are situated a little nearer the pectorals than the anal. At Pinang this species appears to be of uncommon occurrence.

Genus COILIA, (*Gray,* 1831.) *Cuv. and Val.* 1848. [*Zool. Misc.* 9.—Mr. Gray's characters are: "Body tapering, compressed; dorsal fin short, over the ventrals; anal and caudal fin united; pectoral fins small; rays five; three upper long and free; rest of the characters like *Thrissa.*"] (Trichosoma, Trichosomus, *Swainson,* 1839.—Chæfomus, *McClelland,* 1843.) Gape wide; gill-opening very open; muzzle projecting, supported by the ethmoid bone; upper maxillaries free, projecting beyond the opercle, and in some species reaching the root of pectorals; dorsal placed on the anterior part of the back; body elongated, compressed, tapering to a pointed tail; anal joining the caudal, elongated, low, but in one species tail shortened and caudal widened, rounded; above the pectoral two groups of filaments, parting from a common base; in general characters like *Engraulis* (*Thrissa*), but the anterior pharyngeals are more distinctly, though minutely, toothed.

(3857) *Coilia reynaldi.* Cuv. and Val.

Syn. Coilia reynaldi, Cuv. and Val. XXI. 81. (*Young*).

Adult. Pale golden throughout; head above and back sparingly dotted with black; from the middle of the gill-opening towards the tail a series of distant rounded spots of shining or burnished gold; in some individuals a second shorter series from the root of the pectorals to opposite the anterior third of the anal; fins reddish yellow; upper half of dorsal sparingly dotted with black, caudal and margin of the anal blackish. Iris golden, orbital half black; pupil circular, but the aperture of the adipose orbital membrane horizontally elliptic.

D $\frac{\text{IV}}{1/15}$, C 11, A 107, to 116, V 7, P—, Br. X. 11

Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore,* Rangoon. Total length: 7 inch. The length of the head is $\frac{1}{4}$ of the body, the caudal not included, or $6\frac{1}{2}$ in the total. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead is

1½ diameter. The upper maxillaries reach but halfway between the angle of the lower jaw and the root of the pectorals. The greatest vertical diameter, in front of the dorsal, is contained from 5½ to 5⅔ times in the total length. The dorsal, preceded by a short, strong spine, commences a little in front of the second fourth of the total length; the first divided ray (the fifth of the fin,) terminates in a filaments, which, however, from its slenderness is frequently broken. The ventrals are situated opposite the commencement of the dorsal, a little nearer the pectorals than the anal. The latter commences a little behind the dorsal, at the second third of the total length. The extent of the base of the anal is 1¾ in the total length, in which the distance from the muzzle is 2⅔. The four pectoral filaments are contained 3½ times in the total length and reach a little behind the commencement of the anal; the second ray is divided in two, the other three are simple. The length of the pectoral rays does not exceed ⅔ of the head. The caudal is pointed. At Pinang single individuals occur at all seasons, and like the rest of the *Clupeoidæ*, are eaten by the natives either fresh or dried.

Genus CHATOESSUS, *Cuvier*, 1829. Mouth small, without teeth; muzzle projecting; on the upper jaw a notch and a corresponding tubercle on the lower; the superior combs of first branchial arches unite with those of the opposite side, forming a pennated point under the palate; body short, deep, oval; in some species the posterior dorsal ray elongated.

(3858) *Chatoessus chacunda*, (Buchan. Ham.)

Syn. Clupanodon chacunda, Buchan. Ham., 246, 383.
Chatoessus chacunda, Cuv. and Val. XXI. 111.

Head above and back sea-green, minutely dotted with black; sides and abdomen silvery or pale golden; the centre of the scales of the upper third of the sides minutely dotted with black, forming five very pale blackish longitudinal lines; behind the upper part of the opercle a large black spot; cheeks and opercles golden; caudal yellow, sparingly dotted with black; rest of the fins hyaline whitish; dorsal dotted with black. Iris golden dotted with black. D 19, C 19¼, A 20, V 7, P 15, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula,* Moluccas, Java, Malabar, Gangetic estuaries. Total length: 6 inch. The length of the head is contained 4⅔ times in the total. The horizontal diameter of the eye is ¼ of the length of the head; the distance across the forehead slightly exceeds one diameter. The greatest vertical diameter, in front of the dorsal, is 2⅔ in the total length. The body is covered by 13 longitudinal series of scales, the horizontal diameter of which is about ½ of the vertical. A series between the gill-opening and the caudal contains from 36 to 39 scales. The dorsal occupies the last of the anterior half of the total length; the fourth ray, the longest, equals the extent of the base, which is ⅔ of the head; the last ray is ½ of the fourth. The caudal is deeply cleft; the posterior margin of each lobe is arched; the length is 3½ in the total. The first ray of the anal is placed at equal distance from the first ventral and the root of the caudal; the fin is very low; its extent equals that of the dorsal. The ventrals are placed opposite the middle of the dorsal. The pectorals are ¾ of the length of the head. Single individuals occur, but rarely, at Pinang.

SUBORDER PHYSOSTOMI APODES.

Fam. MURÆNOIDÆ.

Genus CONGER, *Cuvier*, 1817. (Muræne-sox, *McClelland*, 1843.) ["*Absence of tubular nostrils*" is given as a character distinguishing *Muræneso*x from *Conger*. The character, however, is incorrect, as in all the supposed species of Mr. McClelland the anterior apertures of the nostrils are provided with a tube, which is very distinct in the living fish.] The dorsal commences very near, or even above the pectorals; in all species known the upper jaw is the longer.

(3859) *Conger talabon*, Cuvier.

Syn. Russel, XXXVIII. Tala Bon.
Conger (Muræna) talabon, Cuv. R. A. 350. (4).
Muræenesox lanceolata, McClelland, Calc. Journ. Nat. Hist. IV. 409.
Muræenesox exodon, McClelland, ibid.
Muræenesox serradentata, (Russell, XXXVIII.) McClelland, ibid.
Muræenesox exodentata, McClelland, Calc. Journ. Nat. Hist. V. 180, Pl. VIII. Fig 4, and page 210, "*Pl. VI. Fig.* 3" (*erroneous reference*).
Muræenesox lanceolata, McClelland, ibid, 181 "*Pl. VI. Fig.* 3" (*erroneous reference*) and page 210, *Pl. VI. Fig.* 3" (*erroneous reference*).
Muræenesox serradentata, McClelland, ibid; 210.
Conger talabon, Bleeker: Verh. Batav. Gen. XXII. 6.

Head above, back and sides above the lateral line golden greenish- or brownish-olive, minutely dotted with black; upper lip, cheeks, opercles and lower half of the sides lighter golden olive; under lip, throat and abdomen milk-white; dorsal, caudal and posterior half of anal pale olive, transparent, minutely dotted and edged with black; anterior half of anal transparent white; pectorals transparent yellowish. Iris golden. Young individuals, frequenting estuaries, are of darker, less golden colours.

D 238 to 286,
C 9 to 11, } P 16, Br. XV.
A 151 to 129,
398 to 426

Inhabits *Sea and estuaries of Malayan Peninsula and Islands*, Coromandel, Tenasserim, Coast of Arracan, Bay of Bengal, estuaries of the Ganges, Sumatra, Java, Madura. Total length: 7 ft. 5 inch. The general form of the body is cylindrical, the anterior half slightly compressed, the posterior more so and tapering; the head is elongated conical, terminating in a narrow rounded muzzle near which in the upper jaw appears a wide notch, which receives the long conical teeth near the symphysis of the lower jaw. The length of the head, measured to the gill-opening, is $\frac{1}{6}$ of the body, not including the caudal, which latter varies from $\frac{1}{5}$ to $\frac{1}{7}$ of the length of the head. The distance from the muzzle to the anterior margin of the orbit varies from $3\frac{1}{3}$ times in to $\frac{1}{4}$ of the length of the head. The distance across the notch of the upper jaw is $\frac{1}{2}$ of the horizontal diameter of the orbit; between the anterior margin of the orbit it is $\frac{3}{4}$, between the posterior margins, it equals the horizontal diameter of the orbit. The latter is $\frac{1}{3}$, or a little less than $\frac{1}{3}$ of the distance from the muzzle to the anterior margin of the orbit. [In the larger, upper figure of the head in *Calc. Journ. of Nat. Hist.* V. Pl. VIII. Fig. 4, the eye is represented too small, and is placed too far back; in the smaller figure the eye is correctly placed, but the gill-opening is much too near the angle of the mouth. These disproportions materially affect the position of the dorsal and pectoral fins in the figure.] The latter margin is situated in front of the centre of the distance between the muzzle and the angle of the mouth, which distance is a little less than $\frac{1}{2}$ of the length of the head to the gill-opening. The anterior aperture of the nostrils is oval, provided with a short, yet very distinct tube; it is situated immediately above the lip, at the termination of the notch, a little in front of the centre between the muzzle and the anterior margin of the orbit. The posterior aperture is linear, or more elongated oval than the anterior, with the margin slightly raised, but not tubular; it opens a little in front of the eye at a distance from the anterior aperture equal to that of the latter from the muzzle. On each side of the crown of the head, a little farther back than the angle of the mouth, appears a transversal series of 8 to 10 pores; from the middle of each series proceeds forwards another shorter, longitudinal one, consisting of 3 to 5 pores. The distance from the muzzle to the angle of the mouth is one longitudinal diameter of the eye less than one half of the length of the head. The lips are thin, membranous, and closely adhering to the jaws. In the upper jaw appear three very close series of small conical teeth with the apex compressed and trenchant. The external series is excessively minute, and extends from the angle of the mouth to beneath the middle of the eye; the teeth of the second are about double the size of the former, with which they are in close contact, but they extend farther forwards to between the nasal apertures, where they coalesce with the external series of the teeth of the vomer; the third, internal, series consists of excessively minute conical teeth, distant among themselves and a little removed from the second series; they extend as far as the external series. Immediately in front of the notch the muzzle forms a small round space, the margin of which is armed with 4, 5, or 6 distant conical teeth, which are about $\frac{1}{3}$ of the diameter of the eye. From the middle of the muzzle commences a short single series of 6 or 7 small conical teeth; which, as they continue along the middle of the vomer, become distant, much longer, compressed towards the apex and with trenchant margins. The number of these teeth varies with age from 7 to 15, of which the longest are about $\frac{1}{2}$ of the diameter of the eye. In young individuals the two or three posterior ones are much compressed and tricuspidate. From the first long tooth commences a single close series of teeth which continue on each side of the vomer, but join each other a little behind the central series, which terminates between the eyes. The marginal teeth of the vomer are a little larger than the middle series of the jaw which they resemble in form. The lower jaw is much shorter than the upper: the symphysis is widened into a small rounded disk, on each side of which appear two or three long, distant, conical teeth, situated within the external series. The latter consists of much smaller outwards directed, distant, conical teeth, which beneath the eye decrease and become much closer. The middle series, headed by the longer ones behind the symphysis, consists of close, erect, conical teeth, with compressed trenchant apex. From beneath the eye the interval between the external and middle series is filled by a short series of minute conical teeth. The third internal series is also minute, and extends from the angle of the mouth to a little in front of the posterior half of the jaw. The tongue is small, elongated, and tied to the floor of the mouth; it extends to a little in front of the posterior third of the mouth. The vertical diameter at the occiput equals the distance from the muzzle to the posterior nasal aperture, or it is contained from $4\frac{1}{2}$ to 5 times in the distance from the muzzle to the gill-opening. The greatest vertical diameter of the body is $\frac{1}{3}$ of the distance from the muzzle to the gill-opening; the smallest, in front of the caudal, is $\frac{1}{4}$ of the latter. The lateral line commences from the side of the occiput, gently declining towards the end of the anterior fourth of the body, from whence it continues a little above the middle of the side straight to the caudal. It is composed of a series of tubes placed in pairs one above the other, none exceeding in length $\frac{1}{2}$ the diameter of the eye. Each lower tube sends two branches

obliquely downwards, and between these branches appears a pore. The dorsal commences a little in front of the gill-opening, at a distance from the base of the upper pectoral ray of $\frac{1}{8}$ of the length of that fin. The dorsal and anal rays are undivided. All the fins present the peculiarity of having double rays; they appear to be single, but are composed of two distinct ones placed transversely, and kept by the fin-membrane so closely in contact, that each pair can act like a single ray. The caudal is closely united with the dorsal and anal, from both of which it may be distinguished by its much slenderer, branched, rays; their length either equals or slightly exceeds that of the dorsal rays. The anus is situated in front of the middle, either at, or a little behind the end of the fifth-twelfth of the total length. The anal fin commences immediately behind the vent; the rays are $\frac{2}{3}$ of those of the dorsal. The pectorals are elongated, with branched rays; their length equals the distance from the muzzle to the posterior margin of the orbit. The skin is smooth and naked. The description and figure of Russell are sufficient, easily to identify the species, which Mr. McClelland has renamed *Muræsox serradentata* and described as having serrated teeth on the vomer. This error would appear to originate in a singular misinterpretation. Russell describes the jaws: "in both there are long crooked teeth in front, with a regular row of straight teeth in the upper jaw, *which is* rough on both sides like a file." Russell could not have chosen a more correct simile of the roughness of the upper jaw of the young individual he had before him, but he says nothing of the teeth being serrated. *Muræsox exodentata*, McClelland, differs in no one character from *serradentata*, but the description is inaccurate as far as concerns the dentition, the anterior aperture of the nostrils, and the lateral line. Nor is *Muræsox lanceolata*, McClelland, different from either of the preceding, but the dentition and anterior nasal apertures are incorrectly described. *Conger talabon* is in the Straits of Malacca, numerous at all seasons, but individuals exceeding 3 to 4 feet are less common. The Malayan denominations of *ikan ular*, (i. e. fish-snake,) and *malang* are indiscriminately applied to eels, all kinds of which are eaten by the natives. The heart is situated immediately behind the gill-openings. The œsophagus extends as far behind the latter as the distance from the muzzle to the angle of the mouth. The stomach is a narrow cylinder about $\frac{1}{5}$ of the total length, extending to the anus; the coats are thick and firm, with longitudinal folds on the internal surface. The intestine is a simple cylindrical canal, thinner than the stomach; the posterior part is a little tortuous, which makes it a little longer than the stomach. The liver is bilobate, very short, of a brownish yellow colour; it commences from the apex of the heart, and adhering to œsophagus, it terminates at the origin of duodenum, where the short, straight cystic duct enters. The gall-bladder is small, oval, of a greenish white colour. The spleen is short, linear, adhering to duodenum, of a pale crimson colour. The air-vessel is elongated, spindle-shaped, not exceeding the diameter of the stomach; it commences above the cardia, follows the stomach, but extends behind the anus in a cavity in the tail; the length is about $\frac{1}{3}$ of the total; the coats are very thin, transparent silvery white.

(3860) *Conger bagio*, (Buchanan Hamilton.)

SYN. Muræna bagio, Buchan. Ham. 24. 364.
Conger longirostris, Bennett: Life of Raffles, 692.
Muræsox tricuspidata, McClelland: Calc. Journ. N. H. IV. 409, Pl. XXIV. Fig. 1. a. b.
Muræsox hamiltonii, (M. bagio,) McClelland: Calc. Journ. N. H. V. 182, Pl. VIII. Fig. 3, and page 210.
Muræsox bengalensia, McClelland, ibid. 182.
Congrus tricuspidatus, Richardson: Ichth. of Sulph. 105, Pl. 51, Fig. 2.
Congrus tricuspidatus, Richardson, Report, 1845, 312.
Conger hamo, Temminck et Schlegel. Fauna Japon. Pisc. 262, Pl. CXIV. Fig. 2.

Colours exactly like those of *C. talabon*.

D 238 to 245,
C 9 to 11, } P 15 to 18, Br. XX.
A 198 to 211,

445 to 467.

Inhabits *Sea and estuaries of Malayan Peninsula and Islands*, Japan, Chusan, Ningpo, Canton, Coromandel, Bay of Bengal, Tenasserim, Gangetic estuaries. Total length: 5 ft. The general form resembles that of *C. talabon*, but it is less slender, the muzzle less elongated, the eye larger, the teeth of the vomer and some of those of the lower jaw are tricuspidate; the dorsal and anal extend farther forwards; the pectorals and caudal are shorter, and the branchiostegous rays more numerous. The length of the head, from the muzzle to the gill-opening, is contained from $6\frac{1}{2}$ to $6\frac{1}{3}$ times in the total length. The distance from the muzzle to the anterior orbital margin is $\frac{1}{4}$ of the length of the head. The distance across the notch of the upper jaw equals the horizontal diameter of the eye, which is $\frac{1}{3}$ of the length of the muzzle; the distance between the anterior margins of the orbits is $1\frac{1}{4}$, between the posterior margins it is two diameters. The eye occupies the third-eighth of the head; the anterior margin of the orbit is situated at the posterior third of the distance from the muzzle to the angle of the mouth; the length of the mouth is contained $2\frac{1}{2}$ to $2\frac{1}{3}$ times in that of the head. The anterior, tubular, aperture of the

nostril opens at the end of the anterior third of the distance between the muzzle and the eye; the posterior occupies the commencement of the posterior third of that distance. The pores of the crown of the head are very indistinct. The general distribution of the teeth resembles that of *C. talabon*, but the teeth themselves present the following differences. Those of the mesial line of the vomer are compressed, with trenchant edges and tricuspidate; the central cusp is much larger than that at the root of the anterior and posterior margin. They resemble the teeth of certain sharks, and are placed at intervals; more than from 5 to 7 are seldom present. Of the three longest, in the middle of the vomer, none exceeds $\frac{1}{2}$ of the horizontal diameter of the eye; their breadth is $\frac{1}{2}$ the length. Of the three single series on each branch of the lower jaw the external and internal are equally minute and close. The middle series are much larger, tricuspidate, compressed and trenchant. The tongue resembles that of *talabon*, but the upper lid between the notch and the eye is fleshy, and covered with minute pointed lobes of the skin, which resemble velvety teeth; otherwise the lips present no difference. The vertical diameter at the occiput equals the distance from the muzzle to the eye, $\frac{1}{4}$ of the length of the head, of which the greatest diameter of the body is $\frac{1}{5}$. The tail is more tapering than in *talabon* so that the vertical diameter in front of the caudal is from $\frac{1}{10}$ to $\frac{1}{12}$ of the greatest diameter of the body. All the fin-rays are double. The pectorals are rounded; their length is $\frac{1}{4}$ of the head. The dorsal commences more in front of the gill-opening than in *talabon*, at a distance from the root of the upper pectoral ray of from $\frac{1}{2}$ to $\frac{2}{3}$ of the length of that fin. The longest dorsal rays are $\frac{1}{3}$ to $\frac{1}{2}$ of the greatest vertical diameter of the body. The caudal is so closely joined to the dorsal and anal, that the rays cannot be distinguished but by their position; their length is about $\frac{1}{2}$ of the longest dorsal. The anus opens at, or a little in front of the end of the second fifth of the total length. The fin commences immediately behind the anus; the longest rays scarcely exceed $\frac{1}{2}$ of the dorsal ones. The description of *Muræna bagio*, a drawing in Buchanan's duplicate series thus marked in his own hand-writing, and comparison of individuals from the Straits of Malacca and Calcutta prove the identity of the species. Those from the latter locality are of a darker olive colour, and not golden like those frequenting the sea. Buchanan has observed the strong resemblance of *bagio* and *Talwo Paum*, Russell, No. XXXVI. p. 25. In the not very explicit description of the latter, the upper jaw is characterised as being "somewhat shorter than the lower," which, if correct, militates against the identity of the two. *Muræsesox tricuspidata*, McClelland, offers no character different from *bagio*, but the dentition is incorrectly described. Such is also the case with *Muræsesox bengalensis*, McClelland. Of Buchanan's drawing of *Muræna bagio*, (*Muræsesox hamiltonii*, McClelland,) an incorrect copy is given in *Calc. Journ. of Nat. Hist.* Pl. VIII. 3. [The drawing was first inscribed "*Opisuroides*," afterwards altered by Buchanan himself to "*Muræsophis bagi*." It represents the fish stretched, and thus correctly gives the proportions. In Mr. McClelland's copy above quoted the fish is doubled, by which some of the proportions are lost, and the apertures of the nostrils are incorrectly copied.] This species Mr. McClelland observes he never met; yet the short description of *Muræsesox bengalensis*, McClelland, differs from the former in no essential character, except in the number of fin rays, which comparison proves is liable to considerable individual variations in the present species as well as in *talabon*. Buchanan himself is doubtful about the correctness of his number of rays of *bagio*. *Conger hamo*, Temminck et Schlegel, from Japan, only differs in the colours of the body which above is greyish brown, and in having the iris silvery. In the Straits of Malacca young individuals of *Conger bagio* are as plentiful as *talabon*. Both are fierce and of voracious habits, preying upon fishes and crustacea, and their bite is dreaded by the fishermen. The anatomy of this species offers some slight differences from *C. talabon*. The heart is situated nearer the head, immediately above the gill-openings. The œsophagus extends but as far behind the latter as half the distance from the muzzle to the angle of the mouth. The cylindrical stomach extends to the anus and is $\frac{1}{5}$ of the total length, of which the intestine is $\frac{1}{3}$. The right lobe of the liver is a little larger than the left. The pearl-coloured coats of the spindle-shaped air-vessel are thick, not transparent; the length is contained a little more than $2\frac{1}{2}$ times in the total.

Genus OPHIURUS, *Lacepede*, 1800. (Leptognathus, [*Classif. of Fishes*, I. 221, Fig. 42; II. 334.] *Swainson*, 1838.—Ophithorax, [(Scr. Ophiothorax.) *Calcutta Journal Nat. Hist.* V. 173 and 212.] *McClelland*, 1844). Dorsal and anal terminating before reaching the end of the tail, which is without fins, terminating like a puncheon; posterior aperture of the nostril opens on the margin of the upper lip.

A. *With globular teeth.*

(3861) *Ophiurus baccidens*, Cantor.
Plate V. Fig 1. (Natural size.)

Head above and back dull greenish olive; lighter on the sides, dotted with brown; throat and abdomen greenish- or bluish white; fins pale olive-grey or white, dotted with brown; dorsal edged with black. Iris golden greenish olive; pupil horizontally lanceolate. D 259 to 271, A 167 to 180, P 17, Br. XXXIV. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*. Total

length: 3 feet. The general form is thick, heavy; the head broad, the muzzle short, depressed, pointed; the body cylindrical; the tail gradually compressed and tapering to a short point. The length of the head, from the muzzle to the gill-opening, is contained from 8½ to 8⅔ times in the total. The distance from the muzzle to the anterior orbital margin is ⅛ of to 6½ times in the length of the head; the eye, bordering upon the forehead and the lip, occupies the third-eleventh of the length of the head; the distance between the anterior orbital margins is 1⅓, between the posterior ones it is 2 horizontal diameters of the eye. The posterior orbital margin is situated a little in front of the angle of the mouth, the distance between which and the muzzle is contained 3⅓ times in the length of the head. On each side of the crown of the head, from between the eyes to the muzzle, appears a series of four distant pores; behind each eye are three such vertically placed on each side, on the occiput two, along each side of the upper lip five or six, and beneath each branch of the lower jaw six such pores. The upper lip is fleshy, and lax, and gives the symphysis a more rounded outline than it really has. On each side of the symphysis opens the anterior nasal aperture through a voluminous tube. The posterior apertures perforate the lower surface of the lip; they are linear, terminating obliquely outwards beneath the anterior orbital margin, and have a valve on the external margin: their length is ½ of the diameter of the eye. About midway between the anterior and posterior apertures appears a small pointed lobulet, and a smaller one immediately behind the posterior aperture. The middle of the lower surface of the point of the muzzle is occupied by a rounded cluster, (nearly of the size of the eye,) of globular teeth, like minute pearls, of which two or three in the centre are a little larger than the rest. A little behind this cluster commence the teeth of the middle line of the palate which resemble the former, and are arranged in the shape of a short dagger. On each side of the jaw is an elongated, pointed and backwards diverging band of teeth. They commence with a narrow interval from the handle of the dagger and are all globular, except a single series of minute pointed teeth along the internal margin of each band. The lower jaw is one diameter of the eye shorter than the upper, leaving uncovered the point of the muzzle with its teeth and the nasal tubes. The teeth resemble those of the upper jaw with a similar internal series of pointed ones; the band of each branch is separated by a narrow interval on the symphysis. The tongue is oval and tied to the floor of the cavity extending but little in front of the posterior third of the mouth. The vertical diameter at the occiput is ½, at the anus 8½, at the termination of the dorsal and anal $\frac{1}{16}$ of the length of the head. All the fin rays are double; those of the dorsal and anal undivided. The rounded pectorals are placed obliquely a little behind the gill-opening; their length is ⅓ of the head; the distance from the muzzle to the root of the upper ray is contained 8½ times in the total length. The dorsal commences above the end of the anterior third of the pectorals and terminates rather abruptly at a distance from the compressed point of the tail equal to the diameter of the eye; the largest rays do not exceed the distance from the muzzle to the anterior orbital margin. The anus opens two diameters of the eye behind the termination of the second fifth of the total length. The fin commences immediately behind the anus, and terminates opposite the dorsal which it resembles in length. The lateral line commences from the side of the occiput, occupying the upper third of the side till it reaches the anus, from whence it continues in the middle to the point of the tail. Beneath it is accompanied by a series of pores, one diameter of the eye distant from each other. This species is numerous at all seasons. In external appearance it resembles *O. cancrivorus*, Richardson (*Zool. Erebus and Terror, Fishes*. Pl. 50, Fig. 6,) but the latter is more slender, the teeth of the jaw and palate appear in front to coalesce; there are no pores behind the eyes, but four along each branch of the lower jaw. The heart is placed immediately behind the gill-openings. The apex of the heart is clasped by the bifid anterior extremity of the broad, thick, single-lobed liver which extends to cardia and pylorus; it is of a brownish lake colour; the small gall-bladder is almost entirely imbedded in the substance of the liver. Both cardia and pylorus are situated at the end of the second eleventh of the total length. The cylindrical elongated stomach extends to within a short distance from the anus; the anterior third portion is thick, muscular, with internal longitudinal folds; the rest of the sac is membranous, without folds, and widened at the transition. The duodenum is wider than the rest of the canal, the length of which is ⅓ of the total. The pale crimson spleen is short, linear, adhering to the duodenum. The silvery-white air-vessel is linear, spindle-shaped; it commences a little in front of the posterior half of the distance between the muzzle and anus, at the origin of the membranous portion of the stomach and extends but a little into the cavity of the tail. The latter terminates as far behind the anus as the anterior half of the total length. The cavity contains the bluish grey kidneys, which extend but a little in front of the anus, and the ovaries, which farther occupy nearly the whole length of the abdominal cavity, and extend to halfway between the pylorus and the heart. The oval are very minute, of a whitish yellow colour.

(3862) *Ophiurus boro*, Buchanan Hamilton. Plate V. Fig. 2, (Nat. size.)

Syn. Ophisurus boro, Buchan. 20, 363.

(*Icon.*) Ophisurus boro, Gray: Ill. Ind. Zool, I. Pl. 95. Fig. 1.
Ophisurus boro McClelland: Calc. Journ Nat. Hist. V. 185 211.
Ophisurus boro, Richardson, Report, 1845, 313.

Ground-colour whitish yellow; upper half of head and body, so closely dotted with black, as to produce a general blackish appearance; dorsal pale olive white, dotted and edged with black; anal white; pectorals pale yellowish olive dotted with black; abdomen white. Iris pale golden, dotted with black. D 315 to 328, A 205 to 244, P 13, Br. XXXI. [These are the greatest variations in individuals examined at Pinang and in Calcutta. Buchanan counts: "A 270?"] Inhabits *Sea of Pinang*, Estuaries of the Ganges. Total length: 2 feet $2\frac{4}{5}$ inch. The greater part of the body is cylindrical, of nearly equal diameter, but the posterior seventh is gradually compressed and tapering. The length of the head to the gill-opening varies from $9\frac{1}{2}$ to $10\frac{2}{5}$ times in the total; it appears constantly to be $\frac{1}{4}$ of the distance from the muzzle to anus. The latter is situated either at or a little in front of the end of the second-fifth of the total length. The horizontal diameter of the eye is $\frac{1}{17}$ of the length of the head. The distance from the muzzle to the anterior orbital margin equals two diameters, or the distance between the eyes across the forehead. The distance from the muzzle to the angle of the mouth is contained $3\frac{1}{2}$ times in the length of the head; the lower jaw is one diameter of the eye shorter than the upper. The nostrils, their lobulets, and the tongue resemble those organs of *O. baccidens*. Beneath the muzzle is a small rounded spot with globular teeth, some of which are larger than the rest, which are continued on an elongated pointed band along the mesial line of the palate. The broadest part of this band contains 4 to 5 series. The teeth of the upper jaw are somewhat smaller than the palatal ones, with which they do not coalesce; the broadest, anterior, portion contains about five series, of which the internal one consists of minute pointed teeth. The bands of the lower jaw have a linear interval over the symphysis, the broadest portion; the teeth resemble those of the upper jaw, but there appear no series of pointed teeth. From between the eyes, on each side of the crown of the head, proceed a series of four distant pores to the muzzle; behind each eye appear three, and there are other series along both jaws and across the occiput. The lateral line resembles in its course that of *O. baccidens*, but the line itself and the pores are more minute. The vertical diameter at the occiput is contained $3\frac{4}{5}$ times in the head; the greatest one of the body is $\frac{1}{3}$ of the length of the head; that between the termination of the dorsal and anal is 2 diameters of the eye, and constitutes the base of an equilateral triangle formed by the compressed tip of the tail. The dorsal, which is partly concealed in a deep groove of the back, commences at a little distance behind the apex of the pectorals, the distance from the root of the upper pectoral ray to the first dorsal varies from $\frac{1}{3}$ of to $2\frac{1}{3}$ times in the distance from the muzzle to the dorsal. The rays of the dorsal and anal fins are $\frac{3}{4}$ of the length of the pectorals which measure $\frac{1}{5}$ of the head. Single individuals are taken along the coasts of Pinang at irregular intervals.

B. With pointed teeth.

(3863) *Ophiurus grandoculis*, Cantor. Plate V. Fig. 3, (Magnified.) Ground-colour of head back and sides yellowish white, minutely and closely vermiculated with brown, and dotted with black, so as to produce a general brownish appearance, lighter on the sides; abdomen white; fins greyish white; minutely dotted with black; dorsal and posterior half of anal edged with black. Iris pale golden, dotted with black. D 251 to 258, A 152 to 167, P 15, Br. XXXI. Inhabits *Sea of Pinang*. Total length: 1 foot $6\frac{4}{5}$ inch. The head is elongated with a conical, somewhat bluntly pointed muzzle, the general form of the body resembles that of *O. boro*. The length of the head to the gill-opening is contained $11\frac{1}{2}$ to $11\frac{3}{4}$ times in the total, but $4\frac{1}{2}$ to $4\frac{2}{3}$ times in the distance from the muzzle to the anus. The eye is comparatively large, its horizontal diameter varying from $\frac{1}{11}$ to $\frac{1}{13}$ of the length of the head; the distance from the muzzle to the eye is two diameters; the eye itself occupies nearly the whole space between the lip and the profile; the distance across the forehead equals one diameter. The distance from the muzzle to the angle of the mouth is contained $3\frac{1}{2}$ times in the length of the head; the lower jaw is half a diameter of the eye shorter than the upper. The nostrils, labulets, pores of the head and of the lateral line, as well as the latter itself, resemble those of *O. boro*. The middle of the tip of the upper jaw has two close series of subulate teeth; in the young each series consists of 3 to 4, but one half of them appear to vanish with age, when those remaining become stronger and blunter. At a short distance behind these commence the double series of teeth of the mesial line of the palate; those of the anterior half are longer than the rest, and become subulate with age; on the posterior half the teeth are much smaller, and placed three deep. The teeth of the jaw commence on each side of those of the mesial line without coalescing with them; they are placed in a single series, are small, pointed or subulate. Those of the lower jaw are also in a single series, subulate, and they decrease from the symphysis, on which there is a toothless interval between the series of both branches. The tongue is small, elongated and tied to the floor of the mouth, of

which it occupies the posterior third. The vertical diameter at the occiput is ⅓ of the greatest of the body is contained 2½ times in the length of the head, while that between the terminations of the dorsal and anal equals the diameter of the eye and forms the base of the triangular tip of the tail, each of the sides of which is two diameters of the eye. The dorsal commences above the posterior third of the pectorals. The distance from the root of the upper pectoral ray to the dorsal is 4⅔ to 5 times in that from the muzzle to the dorsal; the general length of the dorsal rays is contained 5⅓ times in the head; but immediately before the termination of the fin, the rays suddenly increase in length, and are but 4¼ times in the head. Such is also the case with the anal, which resembles the dorsal. The anus is situated a little in front of the end of the third-fifth of the total length. The pectorals are elongated, ⅓ of the length of the head. Single individuals occur at all seasons at Pinang. The present species bears a general resemblance to *O. hijala*, Buchanan Hamilton, but in the latter the dorsal commences at a short distance behind the pectorals. [Buchan. Ham. pp. 20, 356, Pl. V Fig. 5 SYN. *O. hyala*, Cuv. R. A. II. 351. (1)—*O. puncticulata*, Swainson, II. 334.—*O. rostratus*, McClelland, Calc. Journ. Nat. Hist. V. 184, 211.—*O. hyala*, McClelland, ibid. V. 184, 185.—*O. hijala*, McClelland, ibid, V. 211. —*O. minimus*, McClelland, ibid. V. 185, 212, Pl. X. Fig. 3.—*O. caudatus*, McClelland, ibid V. 185, 204, Pl. XII. Fig. 3.—*O. rostratus* Richardson: Report, 1845, 313.—*O. hijala*, Richardson, ibid. 314.—With regard to the nomenclature of Mr. McClelland, it is necessary to observe that the duplicate series of Buchanan Hamilton's drawings contains a figure of this eel, marked in Buchanan's handwriting. "*Ophisuris rostratus*," which is evidently the same as Pl. V. Fig. 5, *O. hijala*, (*Fishes of the Ganges.*) In publishing the figure and the description, Buchanan chose to alter his manuscript name "*rostratus*" to "*hijala*." It is this, by Buchanan himself *cancelled, manuscript name* "ROSTRATUS," which Mr. McClelland has introduced as if it were a species distinct from *hijala*, and of which he says: "I have not met with it, but it is closely allied to *Oph. minimus*, from which it only differs in having a square muzzle."—*O. minimus*, McClelland, is characterised as having "the distance from the point of the muzzle to the eyes equals to 1-5 of the distance from the eyes to the pectorals." But in Mr. McClelland's figure (Pl. X. Fig. 3,) the former distance is *one-third* of the latter, exactly as represented in the outline of *O. hijala*, Buchanan, (Pl. V. Fig. 5. *Fishes of the Ganges.*)—Of *O. minimus*, McClelland, it is farther said: "the distance from the muzzle to the branchial apertures, is equal to the distance from these to the commencement of the dorsal." In the figure, however, the former distance slightly, yet perceptibly, exceeds the latter, just as it is represented in the figures of *O. hijala*, Buchanan Hamilton. In *O. caudatus* McClelland, the distance from the base of the pectorals to the dorsal is described as equalling half the distance from the pectorals to the end of the muzzle. In Mr. McClelland's figure, however, the former distance is represented as contained 2⅔ times in the latter.

(3864) *Ophiurus breviceps*, Cantor. Plate V. Fig. 4, (Magnified.)

Head above and back greenish olive, lighter on the sides of the head and body, everywhere minutely dotted with black: throat and abdomen greenish white; dorsal greenish white, dotted and edged with black; pectorals and anal greenish white dotted with brown. Iris pale greenish golden, dotted with black.

D $\begin{cases} 480, \\ 448, \end{cases}$ A $\begin{cases} 276, \\ 298, \end{cases}$ P 13, Br. XXXI.

Inhabits *Sea of Pinang*. Total length: 2 ft. 2⅞ inch. The head is proportionally very short, elongated conical, terminating in a narrow truncated muzzle; the eye small; the body cylindrical, suddenly deepening behind the anus, and slowly tapering towards the small blunt point of the tail. The length of the head is $\frac{1}{18}$ or a little less, of the total and contained 5¾ times in the distance from the muzzle to the anus. The latter is situated either in the middle of the third-eighth or a little in front of its termination. The horizontal diameter of the small oval eye is contained 13½ times in the length of the head; the distance across the forehead is 1½ diameter; that from the muzzle to the eye 2½ such diameters. The distance from the muzzle to the angle of the mouth is contained 3½ times in the length of the head. The upper jaw is a little less than one diameter of the eye longer than the lower. The nostrils and their lobulets, the pores of the head and the lateral line resemble those of *O boro*. The very minute whitish pores beneath the lateral line are placed at a distance from each other of two diameters of the eye. On the mesial line of the tip of the upper jaw appear two series, each consisting of three small pointed recurvous teeth. At a short distance behind the latter commences the series of the mesial line of the palate; the anterior teeth are a little stronger than the rest, and placed three deep, then two, and posteriorly in a single series of excessively minute teeth. On each side of the mesial series commences a single one of fine, pointed teeth, which is the internal series of the jaw; behind the posterior aperture of the nostril commences an external series of similar teeth. Those of the lower jaw resemble the latter, but they are throughout placed in a double series, except over the symphysis which is naked. The small elongated tongue is tied to the floor of the mouth; it is placed unusually far forwards and nearly extends to the

anterior third of the cavity. The vertical diameter continues uniform from the occiput to the anus, varying in two individuals examined, from $3\frac{1}{2}$ times in, to $\frac{1}{4}$ of the length of the head, while their greatest diameters of the two anterior thirds of the tail vary from $\frac{1}{2}$ to $\frac{1}{3}$ of the head. The vertical diameter between the termination of the dorsal and anal is but two diameters of the eye, forming the base of the equilateral triangular point of the tail. The small pectorals are from $\frac{1}{3}$ of, to $3\frac{1}{2}$ times in the length of the head. The dorsal commences above the apex of the pectorals. Its distance from the root of the upper pectoral ray equals the length of the pectoral fin, and is $\frac{1}{4}$ of its distance from the muzzle. The length of the dorsal rays is but $\frac{1}{5}$ of the head. The anal rays are a little longer. Two individuals occurred together at Pinang in November 1844. Although there was a difference of but $2\frac{2}{8}$ inch in length, the longer was out of proportion, the thicker.

Genus DALOPHIS, (*Rafinesque* 1810) *Swainson*, 1839. [Swainson: *Classif.* I. 221; II. 335.] No pectoral fins; gill-openings placed very low, towards the sides of the throat; dorsal and anal terminating before they reach the end of the tail, which is naked; body cylindrical, mouth small with minute sharp teeth; nostrils tubular; dorsal fin commencing a little behind the head; vent nearly central; upper jaw much longer than lower.

(3865) *Dalophis anceps*, Cantor.

Syn. Plate VI. Figs. 1, 2, 3 4.

Ground-colour of head, back and upper half of sides yellowish white, so sparingly dotted with brown as to acquire a greyish or dusty appearance; beneath the lateral line a pale bluish grey longitudinal band; abdomen white; dorsal and anal hyaline, the lower half of the former dotted with brown. Iris silvery; orbital margin black; pupil circular, black. D 251? A 151, Br. XXXI? Inhabits *Sea of Pinang*. Total length: 1 foot, 8 inch. The head is comparatively short, terminating in a short conical muzzle; the eye very minute; the body is slender, cylindrical, but widens suddenly a little before the termination of the dorsal and anal; the naked tip of the tail is slightly compressed and much blunter than the muzzle. The head, measured to the gill-openings, $\frac{1}{16}$ of the total length; it is contained $10\frac{3}{4}$ times in the distance from the muzzle to the anus, which is situated at the end of the fourth-seventh of the total length. The very minute eye is situated at the commencement of the second-eight of the head, nearly above the middle of the lip; its distance from the muzzle is a little more than $\frac{1}{3}$ of the head; the distance between both eyes is a little less. The distance from the muzzle to the angle of the mouth is contained $4\frac{1}{2}$ times in the length of the head. Between the muzzle and each eye, on the crown of the head, appear three distant pores and five similar on each branch of the lower jaw. The anterior nasal apertures are tubular and open on each side of the point of the muzzle; although very small, each tube is double the length of the diameter of the eye; there are apparently no lobulets; the posterior nasal apertures open through the lower surface of the upper lip, beneath the eyes, as in *Ophiurus*. Beneath the tip of the muzzle appears a double series, each of three very minute pointed teeth. At a short distance behind the latter commences the series of the mesial line of the palate; the anterior part is double, each side consisting of fine teeth which are longer than all the rest, the posterior part is single. The teeth of the upper jaw are minute, distant and placed in a single series, which commences a little behind the anterior teeth of the palatal series. The lower jaw is shorter than the upper; the symphysis is naked; the teeth are minute, pointed and generally in a single series, but near the symphysis appears on each side a short internal series, consisting of three minute teeth. The tongue is very minute, elongated and tied to the floor of the mouth; it does not extend beyond the angle of the mouth. From the occiput to the tail the vertical diameter is contained $3\frac{1}{2}$ times in the length of the head; the tail slowly increases in depth to a little in front of the termination of the dorsal and anal, where the vertical diameter suddenly attains its maximum, $2\frac{1}{2}$ times in the length of the head. Between the termination of the dorsal and anal the vertical diameter is contained $4\frac{1}{2}$ times in the head, and it forms the base of the bluntly conical tip of the tail, the upper and lower margin of which slightly exceed the base. Owing to the lowness and thickness of the dorsal fin-membrane its precise origin cannot be determined; apparently it commences at a distance from the muzzle of $\frac{1}{8}$ of the total length, but the rays cannot be distinguished before a little in front of the anterior third of the total. The general length of the rays is $\frac{1}{8}$ of the head, but it slightly increases above the sudden enlargement of the tail near the termination of the fin. The anal commences at a short distance from the vent and resembles the dorsal. The gill-openings are small, crescent-shaped and placed between the lateral line and the abdominal profile without bordering upon either; the distance from the apparent commencement of the dorsal exceeds by $\frac{1}{4}$ the length of the head or the distance from the muzzle to the openings. The lateral line commences on the anterior third, but descends at a short distance from the head to the middle of the side and thus continues to the tip of the tail; it consists of a succession of short upwards-arched tubes, apparently, without pores. The species described by Russell (No. XXXVII. *Manti Bukaro Paumu*), which according to Cuvier is identical with *Cæcula pterygea*, Vahl, [*Skrivter of Naturhistorie*

Selskabet. Kjobenhavn. III. Pl. XIII. 1, 2.—*Sphagebranchus pterygea*, Cuv. *R. A.* II. 353 (2).—*Dalophis orientalis*, McClelland: *Calc. Journ. Nat. Hist.* V. 213.] differs from the present by its much shorter thicker head, and by the anus being situated in the middle of the total length. A solitary individual of *Dalophis anceps* occurred at Pinang, with two of *Ophiurus breviceps*, in November 1844.

Genus MURÆNA, ([*Artedi*,] *Linne*, 1766,) *Cuvier*, 1817. (Gymnothorax, *Bloch-Schneider*, 1801.—Muræenophis, *Lacepede*, 1803.—Lycodontis, *McClelland*, 1844.—Strophidon, *McClelland*. 1844.—Thærodontis, *McClelland*, 1844.) Pectorals none; branchiæ open on each side by a small hole; opercles thin; branchiostegous rays slender, concealed under the skin; stomach a short sac; air-vessel small, oval, placed towards the upper part of the abdomen.

(3866) *Muræna thyrsoidea*, Richardson. Plate V. Fig. 5. (Nat. size.)

Syn. Muræna thyrsoidea, Richardson: Ichth. Sulph, 111, Pl. 49.
Muræna thyrsoidea Richardson: Report, 1845, 314.
Muræna grisea, Bleeker: Verh. Bat Gen. XXII. 11.?

Head, body and fins of darker or lighter pitch colour, so closely and finely marbled and dotted with white or yellowish white, as not to affect the general dark colour; abdomen lighter than the rest of the body. Iris pale golden, minutely dotted with black.

D, C, A } 569 to 611, Br. IX.

Inhabits *Sea of Pinang*, Canton, China Seas. Total length: 2 feet 2 inch. The form of the body is compressed, of nearly uniform depth. The length of the head to the gill-opening is contained from $7\frac{1}{2}$ to $7\frac{2}{3}$ times in the total, or about $3\frac{1}{2}$ times in the distance from the muzzle to the anus. The horizontal diameter of the eye is $\frac{1}{10}$ to $\frac{1}{11}$ of the length of the head; the distance across the forehead is $1\frac{1}{3}$ diameter; the distance from the muzzle to the eye is two such; that from the muzzle to the angle of the mouth is about $\frac{1}{3}$ of the length of the head. The anterior apertures of the nostrils open through two small tubes, situated on each side of the muzzle, at a distance from one another of one diameter of the eye. The posterior apertures are small, oval, with a narrow membranous edge; each is placed above the forepart of the orbit. On the upper lip appear on each side four distant pores, and on each side of the lower lip appear similar ones. Sir J. Richardson has traced scales before the gill-opening. Both jaws are of nearly equal length and armed with two series of teeth. Those of the outer series are minute, yet strong, pointed with trenchant edges, and the series of both sides are uninterrupted on the symphysis of the upper jaw. Those of the inner series are more distant, thicker and longer. On the mesial line of the upper jaw appear four or five longer, distant, subulate teeth, which gradually increase in length, and are moveable. The rest of the mesial teeth are minute subulate, headed by one longer than the rest, which are at first placed in a double, but terminate in a single series. Neither tongue nor lateral line are distinguishable. The vertical diameter at the occiput is contained $2\frac{1}{3}$ times in the length of the head The anus is situated half the length of the head behind the middle of the total length. The gill-opening is small, oval and placed obliquely, nearer the abdomen than the back. The dorsal commences three diameters of the eye in front of the gill-openings. The rays increase in length towards the posterior half of the tail where they are $\frac{1}{3}$ of the length of the head. The caudal is but $\frac{1}{7}$ of the head and so closely attached to the dorsal and anal that its origin cannot be distinguished. The anal commences a little behind the vent: it resembles the dorsal. All the fin rays are double, and hid in the membrane. This species greatly resembles *Muræna tile*, [Syn. *Muræenophis tile*, Buchan. Ham. 18, 163. (*Synon. excl.*)—*Lycodontis literata*, McClelland: Calc. Journ. of Nat. Hist. V. 186, Pl. VIII. Fig. 2—*Lycodontis punctata*, McClelland, *ibid.* 187, Pl. VII. Fig. 3.—*Strophidon literata*, McClelland, *ibid.* 215.—*Strophidon punctata*, McClelland, *ibid.* 215.—*Strophidon maculata*, McClelland, (*Muræenophis tile baim*, Buchan. MS.) *ibid.* Pl. VIII. Fig. 1.] (Buchanan Hamilton,) which, however, may be distinguished by a slightly differing dentition, by the vent being situated one or two diameters of the eye before the middle of the total length, and by its colours. Single individuals of *M. thyrsoidea* occur at all seasons at Pinang.

(3867) *Muræna sathete*, (Buchanan Hamilton.)

Syn. Muræenophis sathete, Buchan. Ham. 17, 363.
Lycodontis longicaudata, McClelland: Calc. Journ. of Nat. Hist. V. 187, Pl. VIII. Fig. 2.
Strophidon longicaudata, McClelland: ibid. 215.
Muræna sathete, Richardson: Voy. Erebus and Terror, 91.

Head, body and fins dark greenish olive, throat and abdomen greenish yellow.

D, C, A } ? Br. IX. [Mr. McClelland counts: D 484, A 394, (l. c. 187.)]

Inhabits *Freshwater and Sea of Pinang*, Gangetic estuaries. Total length: 7 feet $8\frac{1}{2}$ inch. The general form of the body is cylindrical to the posterior half of the tail, which is tapering

and compressed. The length of the head to the gill-opening is $\frac{1}{15}$ of the total or about $\frac{1}{5}$ of the distance from the muzzle to the anus. The horizontal diameter of the eye is $\frac{1}{12}$ of the length of the head; the distance between the eye is two diameters; that from the muzzle to the eye $2\frac{1}{2}$ diameters; to the angle of the mouth it is contained $3\frac{1}{3}$ times in the length of the head. The apertures of the nostrils resemble those of *M. thyrsoidea*. The jaws are nearly equal. The teeth of the upper jaw are placed in a single uninterrupted series; they are distant, pointed, with two or three in front of each eye longer than the rest, which are generally small. The teeth of the mesial line commence with a single series of three moveable conical teeth, of which the second is the longest of all; behind it appears a double series of very small conical teeth, which, however, soon coalesce into a single series; opposite the eye commences a single series of palatal teeth which are conical and long. Those of the lower jaw consist of an external series, which is single uninterrupted and formed of small distant conical teeth; on the anterior half of each branch appears an internal distant series composed of four long conical teeth, of which the anterior ones are placed at a little distance behind the symphysis. No tongue is distinguishable. The lateral line is marked by a series of minute white pores which follow the middle of the side to the caudal. The vertical diameter at the occiput is contained $3\frac{1}{2}$ times in the length of the head; in front of the anus it is $\frac{1}{3}$ of, but in front of the caudal it is one diameter of the eye. The dorsal originates far in front of the gill-opening, at the commencement of the posterior third of the head: the distance from the muzzle to the dorsal is $\frac{2}{3}$ of the length of the head, that from the dorsal to the gill-opening $\frac{1}{3}$. The dorsal rays are short, and hid by the membrane; their length does not exceed $\frac{1}{5}$ of the head, of which the caudal is about $\frac{1}{11}$. The anus is situated at the end of the fifth-thirteenth of the total length; the fin commences at a short distance behind the vent; the rays are a little shorter than those of the dorsal. A single individual occurred on the coast of Pinang in May 1845; a second, a little shorter than the former, was taken the following July, in fresh water.

Genus LEPTOCEPHALUS, *Gronov.* 1754. Head small and short; teeth numerous; pectoral fins and gill-opening very small; body compressed and very thin, tape-like; dorsal and anal fins small, united at the tail, forming a point. A species of this genus was found in the stomach of *Johnius diacanthus*, (Lacepede,) taken at Pinang. The effects of the process of digestion were such as but to admit the following characters to be ascertained. The colour was a semi-pellucid opal, exhibiting numerous, somewhat distant striæ, or backwards directed angles, above and beneath the lateral line; the iris was bluish silvery, the pupil circular black. The vertical diameter at the occiput slightly exceeded $\frac{1}{4}$ of the greatest one of the body, which was about $\frac{1}{15}$ of the total length. The head was small, with a short very pointed muzzle. The profile of the forehead was oblique, meeting the horizontal one of the lower jaw, which nearly equalled the length of the upper; the length of the head was contained $17\frac{1}{2}$ times in the total; the distance from the muzzle to the posterior circumference of the orbit was $\frac{1}{3}$ of the length of the head. On each side of the upper jaw appeared five forwards-directed, pointed teeth, and in the intervals between them four smaller, similar ones. Each branch of the lower jaw was armed with five teeth, somewhat longer, but resembling those of the upper jaw; minute teeth appeared in the intervals between the three anterior longer ones. The roots of the pectorals were all that remained, and were placed close to the abdominal profile, immediately behind the gill-opening. The origin of the dorsal and anal fins could not be traced. The total length of the fish was $4\frac{1}{8}$ inches. From the peculiar dentition the species might be named: *Leptocephalus dentex*. A species of *Leptocephalus* occurs in the Bay of Bengal as far as the Sandheads. [Mr. McClelland quotes the Genus *Leptocephalus* as exclusively inhabiting Great Britain. (*Apodal Fishes of Bengal* in *Calc. Journ. of Nat. Hist.* V., page 226.)]

Fam. SYMBRANCHOIDÆ.

Genus SYMBRANCHUS, (*Bloch-Schneider*, 1801.) *Cuvier*, 1817. (Unibranchapertura, *Lacepede*, 1803.—Ophisternon, *McClelland*, 1844.) [*Note.* "Ophisternon:" (*Scr.* Ophiosternum.) "*A single transverse opening under the throat common to both branchiæ. These consist of four pectinated combs on each side. Two bands of teeth on the edges of the upper jaw, 5 short cartilaginous branchial rays. Eyes small and placed on the muzzle, teeth disposed in bands on the sides of jaws.*" (McClelland: Calcutta Journal, Nat. Hist. V. 220.) Of the preceding characters the following are erroneous: "*two bands of teeth on the edges of the upper jaw,*" and "5 *short cartilaginous branchial rays.*" The upper jaw carries but a *single* band of teeth, and there are *six* branchiostegous, *bony* rays on each side. After these errors have been corrected, it is evident that *Ophisternon*, McClelland, is identical with *Symbranchus*. Mr. McClelland himself quotes the diffinition of *Symbranchus*, Bloch, immediately preceding that of *Ophiosternum* (l. c. 175), yet, he observes: "*their branchiæ are not described further than that the membrane contains six strong rays.*" (l. c. 157.) As Cuvier, however, has confined his definition to the differential character by which *Symbranchus* is distinguishable from *Sphagebranchus*, the simple inference from his silence concerning the branchiæ is, that both genera have the same number (four) on each side.] Differs from *Sphagebranchus*

[*Note.* Sphagebranchus (Bloch-Schneider 1801.) Cuvier, 1817. Differs from *Murœna* principally by the branchial apertures approaching each other under the throat; the vertical fins in several species commence to project near the tail; muzzle extended and pointed; stomach like a long cul-de-sac; intestine straight; air-vessel long, narrow and placed far back.] by the branchiæ communicating outside by a single aperture, pierced under the throat and common to both sides; pectorals none; vertical fins nearly entirely adipose; head thick; muzzle rounded; teeth obtuse; opercles partly cartilaginous; six strong branchiostegous rays; intestinal canal straight; stomach distinguished by its being a little wider, and by a pyloric valve; cœca none; air vessel long and narrow. [The Asiatic species, quoted in the following, have no air-vessel.]

(3868) *Symbranchus caligans*, Cantor. Plate VII. Figs. 1, 2, 3.

Syn. Balut of the Malays.

(*Young ?*) Head above and back impure lake-coloured with livid reflections, lighter on the sides and abdomen; throat pale livid; dorsal-, caudal- and anal- membranes pale carmine.

D 0)
C 10) Br. VI.
A 0)

Inhabits *Sea of Pinang*. Total length: $8\frac{2}{8}$ inch. The head is conical, depressed, with rounded muzzle, swelling towards the occiput; the body is cylindrical with the sides slightly compressed, of nearly equal diameter; the short, tapering tail is greatly compressed like a two-edged sword. The length of the head, from the muzzle to the gill-opening, is contained $8\frac{1}{2}$ to $8\frac{3}{4}$ times in the total. The eye, a minute black speck, is situated nearly opposite the middle of the lip; its distance from the muzzle is $\frac{1}{7}$ of the length of the head. That from the muzzle to the angle of the mouth is $\frac{1}{5}$ of the length of the head. The minute anterior nasal apertures are situated on each side of the muzzle; their margins are raised, not tubular. The larger, posterior apertures are situated obliquely above the eyes; they are of a lanceolate form, with the broader part in front of and on a higher level than the eye, and with the apex extending downwards and outwards to the supraorbital margin. The lips are membranous, the under one reverted over the lower jaw, which is very little shorter than the upper. The teeth are all blunt and minute, yet there is a perceptible difference in their length. Each branch of the upper jaw carries a series of excessively fine, almost setaceous teeth, which under the symphysis become crowded and form a small triangular figure. The base of both triangles is bordered by three teeth larger than the rest, and separated by a naked longitudinal interval. The palatal teeth are longer than the preceding and are placed in a single close series, uninterrupted on the vomer. The teeth of the lower jaw are a little stronger than the palatal, and appear truncated; both branches carry a single series; both coalesce on the symphysis where they expand in a semilunar band, three or four teeth deep. The fleshy tongue is elongated, conical, with rounded apex, extending to the symphysis; it is moveable by means of a lax frænulum. The margins are thickened, rounded, forming a longitudinal groove along the upper surface of the tongue. Between the upper extremity of the hyoid bone and that of the anterior branchial arch appears a small blind fossa, without sac, like that discovered by M. Johannes Muller in another Indian species: *Symbranchus immaculatus*, Bloch. (*J. Muller*; *Myxinoiden in Abhandl. der Konigl. Akad. der Wissensch. zu Berlin.* 1839. *Berlin*, 1841, p. 245). On each side of the pharynx is a small oval fleshy tubercle, behind which a second one studded with minute card-like teeth, and immediately behind the middle of the posterior branchial arch appear a few similar teeth, forming a short linear group accompanying the arch. The lax undivided gill-membrane is externally marked by some longitudinal furrows; the posterior margin is backwards arched and extends to the upper third of the side, the origin of the lateral line. The bony branchiostegous rays are short, but strong, compressed and of equal length; the four upper ones are separated by a short interval from the two lower, which are also placed farther from each other than the preceding. Of the four densely fringed branchiæ the posterior is the shortest, and closely connected to the third branchial arch by a membrane with a small oval aperture in the middle. The lateral line is a groove commencing at the angle of the gill-opening, and continuing a little nearer the back than the abdomen towards the anus; it proceeds along the middle of the side of the tail to the caudal. The greatest vertical diameter, at the occiput, is contained $3\frac{1}{2}$ times in the length of the head; at the anus $4\frac{1}{2}$. The length of the tail varies from about $\frac{1}{5}$ to $\frac{1}{6}$ of the total. The skin is naked and lubricated by mucus. The membranous dorsal commences opposite the anus, but is not distinct on the anterior third of the tail. The anal resembles the dorsal; the height of either scarcely exceeds $\frac{1}{4}$ of the vertical diameter at the anus. Both unite with the short pointed caudal, which contains ten minute, jointed, simple rays. A solitary, apparently young, individual occurred at Pinang in September 1843; a second, $6\frac{1}{8}$ inch in length, in February 1845. The distance from the gill-opening to the heart slightly exceeds the length of the head. The digestive canal is a little less than $\frac{1}{2}$ of the total length. The œsophagus and stomach form an elongated cylinder, which gradually widens towards the pylorus, which is internally marked by a valve.

The duodenum, which is narrower than the fundus of the stomach is situated in the middle of the digestive canal. The intestines form a simple cylinder, widening towards the rectum, without cæcopyloric appendages or circumvolutions. The liver consists of a very elongated single lobe with many transversal incisions; it commences from the bulbus arteriosus, and gradually widening extends to a short distance from anus; the colour is pale reddish brown. The gall-bladder is small, oval, of a pale bluish green; it is attached to the liver at a short distance in front of the pylorus, or nearly halfway between the muzzle and the anus. The spleen is elongated oval, smaller than the gall, and situated closely behind the pylorus. There is no air-vessel. *Symbranchus caligans* differs from *S. gutturalis*, Richardson, (*Ichthyol. Erebus and Terror*, 49, Pl. XXX, Figs. 14—17.) from Dampier's Archipelago, by its proportionally longer head, and shorter tail: in the latter species the head is $\frac{1}{11}$ of, the tail less than $\frac{1}{3}$ of the total length, and there are 7 caudal rays. From *Symbranchus immaculatus*, Blochus. [Bloch. XII. 77, Tab. 419, Fig. 1. (*Excl. Habit. Surinam.*) Syn: *Synbranchus immaculatus*, Shaw, IV. 36.—*Symbranchus immaculatus*, Cuvier, R. A. II. 354 (²) —*Symbranchus immaculatus*, Muller, Myxinoid. in Abh. der Konigl. Akad. Berlin, 1839, 245.—*Ophisternon bengalensis*, McClelland: Calc. Journ. Nat. Hist. V. 197 and 220, Pl. XI. Fig 1-2.—M. Johannes Muller, l. c. points out the error committed by Bloch, who considered *S. immaculatus* is which he received from Tranquebar, to be identical with another distinct species inhabiting Surinam. To avoid confusion, a specific name requires to be given to the Brasilian species. *S. immaculatus*, is numerous in the Hooghly, and appears daily in the Fish Bazars of Calcutta. Individuals exceeding 14 inches in length, are rarely seen, but they are said to attain to two feet. The description of this species given by Mr. McClelland under the name of *Ophisternon bengalensis* is defective and disfigured by the following errors. The eyes are represented as being "placed before and external to the posterior apertures of the nostril;" the branchial rays are said to be five and to be cartilaginous, and the maxillary teeth are described and figured as "forming a crescent in front under the apex of the jaw." The posterior apertures of the nostrils are pierced vertically between, not behind the eyes; a tangent of the posterior margin of the aperture continued downwards, touches the posterior orbital margin; but a tangent of the anterior margin of the aperture, if prolonged vertically, divides the eye. There are six, bony, branchiostegous rays, and the maxillary teeth of both branches do not coalesce in a crescent beneath the symphysis, but are separated, and terminate in two small triangles as described in *S. caligans*. In a number of individuals of *Symbranchus immaculatus* the length of the head varied from $9\frac{1}{3}$ times in, to $\frac{1}{12}$ of the total, and that of the tail from $2\frac{1}{8}$ to $3\frac{7}{8}$. As observed by M. Johannes Muller, this species has several anatomical characters resembling those of *Amphipnous cuchia*, (Buchan. Hamilton) Syn. *Dondoo Paum*, Russell: XXXV.—*Unibranchapertura cuchia*, Buchan. Ham. 16, 363, Pl. XVI. Fig. 4. (*Synon. exclus.*)—*Symbranchus cuchia*. Cuv. R. A. II. 354 (²). (*Synon exclus.*)—*Cuchia*, Taylor in Gleanings in Science, II. 173.—*Synbranchus cashia*, Swainson II. 336.—*Ophichthys punctatus* Swainson, *ibid.*—*Amphipnous cuchia*, Muller: Archiv. 15, 1840.—*Amphipnous cuchia*, J. Muller: Myxinoiden in Abh. Berl. Akad, 1839, 244, (Berlin, 1841).—*Cuchia*, McClelland, Calc. Journ. Nat. Hist. IV. 411.—*Pneumabranchus striatus*, McClelland: Calc. Journ. Nat. Hist. V. 192 and 219, Pl. XIII.—*Pneumabranchus leprosus*, McClelland, *ibid*, 195 and 219.—*Pneumbranchus albinus*, McClelland, *ibid.* 196 and 219. *Dondoo Paum*, Russelli XXXV. has been identified by the examination of a specimen in the collection of Mr. Walter Elliot, who obtained it from the Ankapilly Lake. The discovery of the lung-like sacs of this eel belongs to James Taylor, Esq. late Civil Surgeon of Dacca, and has been acknowledged by Mr. Johannes Muller. Although the treatise entitled: "*Apodal Fishes of Bengal*," has added nothing new to our knowledge of the anatomy and habits of the fish, no reference is made in it to Mr. Taylor's original communication in '*Gleanings in Science*,' (l. c.) Russell discovered *Amphipnous cuchia* in the Ankapilly Lake; Buchanan Hamilton observed the fish in rivers and ponds of the South East parts of Bengal, and Mr. W. Griffith in Assam. In December 1848 an individual was taken in the Chenaub near our camp at Ramnuggur, and in February 1849 another was taken in the Jehlum not far from our Camp at Chillianwalla. (Punjaub.)] the present also differs by a proportionally longer head, and shorter tail. Of a number of *S. immaculatus* examined, the majority had 5 caudal rays, few 3, 6 or 7. In *Ophisternon hepaticus*, McClelland, (Calc. Journ. Nat. Hist. 198 and 221, Tab. XI. Fig. 3-4) the eyes are said to be placed "a little before the posterior openings of the nostrils." Both description and figures are too defective to identify the species.

Genus MONOPTERUS, ([*Commerson*] *Lacepede*, 1700,) *Cuvier*, 1829. (Ophicardia, *McClelland*, 1844.) ["Ophicardia: (Scr. Ophiocardia)." Two broad bands of teeth on the upper and one on the lower jaw; a single transverse opening under the throat, diverging on either side to the gills, which consists of three slightly pectinate fleshy combs; no scales, five rays in each side of the branchial membrane. There is but one species known and this has no air-vessel." (McClelland: *Calc. Journ, Nat. Hist. V.* 175.) The charac-

ters by which *Ophicardia* is supposed to differ from *Monopterus* are the assigned single transverse opening under the throat, and the five branchiostegous rays :—both characters, however, happen to be erroneous, as "*Ophicardia phayriana*," like a *Monopterus*, has *two branchial apertures* and *six branchiostegous rays*.] With the two branchial apertures united under the throat in a transversal fissure, divided in the middle by a partition ; dorsal and anal only visible in the middle of the tail and uniting at its point ; teeth like those of a card in the jaws and palatals ; branchiostegous rays six ; branchiæ three.

(3869) *Monopterus javanicus*, Lacepede. Plate V. Figs. 6, 7, 8. (Nat. size.)

Syn. Monoptere javanais, Lacep. II. 139.
Unibranchaperture lisse, Lacep. V. 658, Pl. 17, Fig. 3.
Monopterus javanicus, Shaw, IV. 39.
Monoptere javanais, Cuvier, R. A. II. 354.
Monopterus javanensis, Swainson II. 336.
Ophicardia phayriana, McClelland : Calc. Journ. of Nat. Hist. V. 191, 218, Pl. XII. Fig. 1.
Monopterus lævis, Richardson : Voy. Sulph. Ichth. 116. Sir John Richardson has identified this fish with *Unibranchaperture lisse*, Lacep.
Monopterus cinereus, Richardson : *ibid.* 117, Pl. 52, Fig. 1-6. (*Synon eclus.*)
Monopterus ? (Symbranchus ?) xanthognathus, Richardson, *ibid.* 118, Pl. 52 Fig. 7 ?
Monopterus lævis, Richardson, Report. 1845, 315.
Monopterus cinereus, Richardson, *ibid.* 315.
Ophicardia xanthognatha, Richardson, *ibid.* 116 ?
Balut of the Malays.

(*Young.*) Head above, back and sides above the lateral line blackish brown with bluish reflections ; rest of the sides, throat and abdomen pale brownish blue ; fin membranes blackish. Iris pale golden, dotted with brown ; pupil circular black. Total length : $4\frac{5}{8}$ to $6\frac{3}{8}$ inch. (*Adult.*) Ground colour of head above, cheeks, back and sides above the lateral line reddish yellow ochre, or pale greenish yellow ; rest of the sides, throat and abdomen pale yellow ochre or buff ; head back and sides so densely spotted with blackish brown, as to leave but little of the ground-colour to view like single small spots ; cheeks, throat and abdomen with paler and fewer brown spots ; abdomen in some individuals not spotted ; lateral line of the ground-colour of the body. Iris light brown, with a narrow golden ring enclosing the pupil. [Specimens preserved in spirits of wine change the colours, and appear as described by Sir John Richardson. *Monopterus lævis.* "Corpore caryophyllaceo-brunneo immaculato, subtus pallidiori ; genis punctatis." —*Monopterus cinereus.* "The colour of the fish generally is lead grey, paler beneath, and thickly speckled on the back and sides with small points of hair brown. There are some pale streaks on the top of the head." (*Voy. Sulph. Ichth.* pp. 116, 117.) The drawing from which *Monopterus xanthognathus* was taken, has evidently been coloured from a living or fresh fish.] Total length : $10\frac{4}{8}$ to $20\frac{4}{8}$ inch. D 0, C 2, 3, 4 or 5, Br. VI. A 0. Inhabits *Sea of Penang, Malayan Peninsula*, Arracan coast, Sunda isles, China Seas (Hong-Kong, Canton, Chusan, Woosung). The general form of the fish is cylindrical, gradually tapering from the occiput, where the diameter is greatest, to the tail which is greatly compressed, like a two-edged sword, and tapers more suddenly than the body, terminating in a sharp point. The head is conical, swelling towards the occiput, the profile of which is more or less arched. Between the eyes the head is somewhat depressed, and the profile slopes towards the rounded depressed muzzle, which slightly projects beyond the rounded narrower apex of the lower jaw. Both individually and according to its age this species presents considerable variations in its external characters. The following have been found constant in a number of individuals of different size. The body is viscous and without scales. The eye is situated above the middle of the upper lip, almost bordering upon the profile : the form of the eye is oval, and it is obliquely placed, with the greatest diameter diverging backwards and downwards. The distance between the posterior margins of the eye is therefore greater than that between the anterior margins ; the distance from the eye to the muzzle, and that to the angle of lips are nearly equal. The anterior nasal apertures are very minute, with a slightly raised margin, but not tubular, and situated on each side of the muzzle ; the posterior ones open on the crown of the head ; although small, they are conspicuously larger than the anterior ; they are pyriform with the apex close to the centre of the supraorbital margin, and they are directed obliquely inwards, so that the distance between their fundus, which is a little beyond the anterior orbital margin, is less than that between the apex of both. The narrow lips are membranous, the upper one slightly, the lower very reflex ; their commissure is situated considerably less than half the distance between the muzzle and the gill-opening. The teeth are villiform, somewhat varying in length ; under a lens they appear conical, slightly recurvous, with a blunt apex. Those of the upper jaw form a narrow band, tapering towards the angle of the mouth ; at the symphysis the band of each limb forms a short linear process, separated by a linear naked interval. The palatal band resembles the maxillary, but both branches coalesce on the vomer

at an acute angle, and internally and externally the band is enclosed by a papillary fold of the membrane lining the palate, which gives the band the appearance of being broader than it really is. On each side of the pharynx, between the root of the posterior free gill-arch and the fourth appears a small rounded tubercle, studded with minute card-like teeth. Immediately behind the middle of the fourth, posterior arch, appears a short linear group of similar teeth. The teeth of the lower jaw resemble the rest; the bands of both branches taper towards the angle of the mouth; on the symphysis they either coalesce or are separated by a linear interval. Also this band is internally lined by a papillular duplicature of the membrane of that part of the mouth. The fleshy moveable tongue is elongated, tapering into a narrow flattened and rounded apex. The upper surface is papillular, like the roof of the mouth; the anterior half is flattened and thin, the posterior is thick, hollowed into a longitudinal channel between the two rounded margins, which Lacepede from the MS. of Commerson describes as two tubercles at the base of the tongue. Between the root of the upper extremity of the hyoid bone and the anterior gill-arch, but nearer the former, appears a small blind fossa, apparently without sac, like that of *Symbranchus*. The oblique gill-openings are almost confined to the abdominal surface, meeting at an acute angle on the throat; they are divided by a thin longitudinal septum, which does not, however, extend as far back as the angle of the gill-openings, and they consequently have the appearance of being single as in the Gen. *Symbranchus*. A fold, corresponding to the septum, appears on the external surface of the membrane. In the posterior half of each cavity appear three small, but slightly curved bony arches, with minute branchiæ. The fourth, posterior, arch is entirely hidden by the integuments. The branchiostegous rays are generally short, but unequal: the four upper ones are placed closely together, the two lower ones at some distance below the former; the second upper ray and the two lower ones are of nearly equal length, about double that of the remaining three. A linear groove marks the lateral line, which continues nearly in the middle of the side to the point of the tail. In specimens preserved in spirits of wine the contraction of the muscles produces another linear groove dividing the space between the back and the lateral line. All the preceding characters correspond to those of *Monoptere javanais*, Lacepede. The following are the characters which vary, not only according to age, but even in individuals of equal dimensions. The length of the head (measured from the snout to the hinder angles of the gill-openings,) varies from $\frac{1}{12}$ of, to $15\frac{1}{2}$ times in the total; the tail from $\frac{1}{4}$ of to $2\frac{2}{3}$ in the total length. Generally the head is proportionally shorter in the young, but the tail longer than in the adult. The distance between the eyes, across the forehead, is anteriorly about three-, posteriorly about four diameters of the eye. On the top of the head, on the uper lip and the throat appear some minute distant pores, the number of which varies individually. Of the three united fins the two are entirely membranous; the very small caudal encloses from two to five undivided rays, so very minute, that a lens is required to observe them through the semitransparent membrane. In adult individuals they are frequently not distinguishable. The dorsal commences a little behind the root of the tail, rising into a low arch above the middle of the tail and then gradually decreasing towards the caudal. The anal may be traced from the anus in the form of a raised line, sunk in a groove; on the posterior two thirds of the tail it forms a skinny hem, less elevated than the dorsal. Both are frequently very indistinct in individuals of all ages, and can then barely be distinguished by their semitransparency. Single individuals occur on the coasts of Pinang at all seasons. The constant characters occur in *Monopterus lævis*, Richardson, and in *M. cinereus*, Richardson; of the inconstant characters some are applicable to either.—*Ophiocardia phagriana*, McClelland, is described as having two short tubular nostrils at the extremity of the muzzle, and five branchiostegous rays. Both characters are erroneous, and the fish nowise differs from *M. javanicus*. —*Monopterus grammicus*, (Cantor,) [*Note*. Syn. *Symbranchus grammicus*, Cantor: Ann. and Mag. of Nat. Hist. IX. 30.—*Monopterus marmoratus*, Temminck et Schlegel: Fauna Japon.—*Monopterus marmoratus*, Richardson: Report. 1845, 315. This eel is numerous at Chusan in streamlets, canals and estuaries. As it is a favourite article of food, it is kept by the inhabitants of Chusan in large jars with fresh water. But it is capable of living a considerable time out of water. It is of voracious habits, feeding on smaller fishes,and it takes hooks baited with earthworms.] observed at Chusan and in Japan, presents the following differences. The head is contained about $10\frac{1}{2}$ times in the total length, the tail from $4\frac{1}{2}$ to 5, and in a japanese specimen it was about 7 times in the total. The head is consequently proportionally longer, and the tail shorter than in *M. javanicus*. The living individual examined in 1840 at Chusan had the head, back and sides above the lateral line of a reddish yellow ground-colour; the rest of a dark buff; the whole body covered with numerous black irregular lines, like inscriptions, leaving but little of the yellow and buff to view. In other external, and in anatomical characters they agreed with *M. javanicus*, and it remains to be ascertained if the above mentioned differences are constant, specific, or merely individual. The original of *M. xanthognathus*, Richardson

[*Voyage of H. M. S. Sulphur, Ichthyology*: 118, Pl. 52, Fig. 7.] is either *M. javanicus*, or *M. grammicus*, if the latter is a distinct species. In *Monopterus javanicus* the heart is situated at a distance behind the gill-opening of about 1½ times the length of the head. The digestive canal is about ⅔ of the total length. The œsophagus and stomach form a long canal, which gradually widens towards the pylorus, and is about ½ of the digestive canal; on the internal surface appper some longitudinal rugæ, which terminate at a short distance from the pylorus. The origin of the duodenum is internally marked by a very distinct valve, and externally by a considerable constriction. The coats of the stomach are perceptibly thicker than those of the intestines, which form a narrow cylinder without cœcopyloric appendages or circumvolutions, and widen a little towards the anus. The liver is linear, consisting of a single lobe, but subdivided by numerous small transverse incisions; it accompanies the stomach and terminates a little behind the pylorus.

ORDER PLECTOGNATHI.

Fam. BALISTISIDÆ.

Genus BALISTES, ([*Artedi*] *Linne*, 1748) *Cuvier*, 1817. Body compressed; in each jaw a single series of eight, generally trenchant, teeth; skin scaly or granulated, but not exactly osseous; anterior dorsal composed of one or more spines, articulated with a peculiar bone, fixed to the skull and furrowed to receive the spines; posterior dorsal soft, long, opposite to a nearly similar anal; ventrals none, but a pelvic bone suspended to those of the shoulder.

(3870) *Balistes conspicillum*, Bloch-Schneider.

Syn. Renard: I. 15, Fig. 88.
Baliste americain, Lacepede, I. 377, Pl. 16. Fig. 2.
Balistes conspicillum, Bloch-Schneider, 474.
Balistes bicolor, Shaw, V. 407, Pl. 168.
Lesson et Garnot: Voy. de la Coquille, Pl. 9.
Quoy et Gaimard: Uranie, Pl.——Fig. 1.
Balistes conspicillum, Cuv. R. A. II. 373, note.
Rhinacanthus conspicillum, Swainson, II. 325.
Balistesconspicillum, Richardson: Report, 1845, 201.
Balistes conspicillum, Temm. et Schl. Fauna Japon. Pisces, Tab. CXXIX. Fig. I. (*Adult.*)

(*Young from* 1 *to* 3 *inch. in length.*) Head above, back and upper half of the sides pale rust-coloured or reddish brown, with more or less distinct snuff-coloured, short, longitudinally undulating lines or spots; lower half of sides, throat and abdomen impure brownish white with pale brown patches; in some on the sides of the head and body a few distant white dots: fins brownish white; second dorsal, caudal and anal with large brownish grey or black patches. Iris pale frosted silvery minutely dotted with brown; in some with three or four indistinct radiating brown bars; orbital margin blackish. (*From* 3 *to* 6 *inch. in length.*) Yellowish-, reddish- or blackish-brown, back darker, abdomen lighter than the rest; sides, throat and abdomen in some individuals with more or less distinct rounded whitish spots; [In one individual, taken off the Natunas Isles, (4° N. L. 108° E. in the southern part of the China Sea,) the body was said to be covered with blood red spots; after having been preserved in spirits of wine, it appeared of a uniformly blackish brown.] and in others an indistinct whitish forwards arched band from eye to eye; pectorals transparent brownish grey with a blackish spot at the root; rest of the fins brownish black, darker than the body; the basal half of their membranes in some individuals with very indistinct whitish spots. Iris pale silvery round the pupil; rest black. D 3 – 23, 24 or 25, C 10/1, A 20, 21 or 22, P 14 or 15, Br. VI. Inhabits *Sea of Malayan Peninsula and Islands*, Japan, China Sea, Natuans, Indian Ocean, Mauritius, Madagascar. Total length: 6 inch. When the pelvic spine is withdrawn the general outline of the body is oval. The length of the head, from the muzzle to the upper part of the gill-opening, is contained 3⅓ times in the total length. The anterior angle of the orbit is situated close to the profile above the centre of the length of the head, of which the horizontal diameter is ¼; the distance across the slightly arched forehead is a little less than two diameters. Each nostril has two small tubular apertures situated a little in front of the anterior angle of the orbit; the anterior aperture is directed forwards, the posterior backwards. The mouth is small with fleshy lips. In each jaw appear eight obliquely truncated, trenchant teeth, gradually increasing in size towards the symphysis. In the teeth of the upper jaw the internal surface is larger than the external, elongated oval, flattened with a rounded impression at the anterior part. In young individuals the internal surface is finely transversely furrowed, but with age it becomes smooth. The internal surface of the teeth of the lower jaw is almost entirely hid by a small crescent-shaped membrane. The tongue is small, rounded, fleshy and tied to the floor of the mouth. The anterior dorsal commences a little behind the anterior third of the back, the caudal not included; the first spine is very thick, with the anterior rounded margin prickly; the sides are smooth, longitudinally striated; the length is less than ½ of the head; but in very young individuals it is proportionally a little longer. The second spine, which at the root is in contact with the former, is much slenderer, smooth, and but ⅓ of the anterior; it is easily laid down, and when it reclines, the an-

terior trigger-like spine spontaneously follows. The third, slender spine is placed at a distance from the second of twice its own length, which is $\frac{1}{2}$ of that of the former; it may be reclined either forwards or backwards in the groove of the back. All three spines are connected by a lax membrane. The distance from the first to the third spine equals the length of the former, and also the distance from the third spine to the posterior dorsal fin. The latter is nearly equilateral triangular. The anterior four rays, of which the first and second are undivided, rapidly increase in length; the fifth and sixth are the longest, by $\frac{1}{3}$ longer than the first dorsal spine; the succeeding rays gradually decrease; the last, which is undivided, equals the third spine. The sides of all the rays of this and the remaining fins are covered with minute spines. The extent of the base of the second dorsal equals the distance of this fin from the first dorsal spine. Its distance from the caudal eqauls that from the third spine. The caudal is broad with the posterior margin convex; the length is a little less than the longest dorsal rays. The anus is situated opposite the first dorsal ray; the anal fin commences opposite the fourth; the extent of the base is a little shorter than that of the posterior dorsal; in other respects the two are equal and terminate opposite each other. The length of the rounded pectorals as a little more than $\frac{1}{3}$ of the head. The pelvic spine protrudes but very little, and is but slightly protractile; externally its length equals that of the longest dorsal rays; the triangular dewlap has the anterior and posterior margins equal, but the base, from the root of the pelvic spine to the anus, exceeds by $\frac{1}{3}$ the two margins. The vertical diameter of the occiput equals the length of the head; that in front of the posterior dorsal is contained $2\frac{1}{2}$ times in the total length; when the pelvic spine is protracted the greatest vertical diameter is $\frac{1}{2}$ of the total length. The body is covered with rhomboidal prickly scales. At a little distance beneath the back and behind the pectorals, each scale is provided with a central, backwards arched, small but strong spine, forming longitudinal series, of which upwards of 20 may be counted between the posterior dorsal and the anal, 10 on the tail. At the lower part of the dewlap these spines appear in clusters of from three to five. The stomach is capacious, elongated; it contained remains of fish; (in several, of *Exocoetus nigripennis*, Cuv. and Val.) The intestinal canal is wide, contained about $1\frac{1}{3}$ times in the total length. The liver is large; the right lobe consists of two elongated portions; the left is broader and deeply cleft. The gall-bladder is large, ovoid, expanded with a whitish green fluid; the spleen is small. The silvery air-vessel is elongated oval, occupying the upper part of the abdominal cavity. At Pinang and Singapore this species is numerous at all seasons.

Genus MONACANTHUS, *Cuvier*, 1817. Scales small, covered with stiff asperities, close like velvet; extremity of the pelvis salient and spinous; anterior dorsal fin with a large prickly spine, and a second almost imperceptible.

(3871) *Monacanthus tomentosus*, Linne.)

Syn. Seba: III. Tab. XXIV. Fig. 18.
Gronov. Mus. Tab. VI. Fig. 5.
Balistes tomentosus, Linne: Syst. 1463. Distinct from *Balistes tomentosus*, Bloch, Pl. 148. which Cuvier refers to *Pira aca*, Marcgr. 154. Mr. Swainson quotes the species of Bloch, (Sw. II. 327.)]
Balistes tomentosus, Shaw, V. 401, Pl. 169.
Monacanthus tomentosus, Cuvier, R. A. II. 373 (2).

(*Young.*) Yellow; dewlap washed with grey; except the throat and dewlap, the rest of the body with numerous small rounded cobalt blue spots; first dorsal spine yellow with three blackish rings, membrane bluish white minutely dotted with brown; posterior dorsal, anal and pectorals yellowish, transparent; caudal rays whitish, membrane black. Iris pale golden, orbital margin blackish. D 2—31, C 10 $\frac{1}{1}$, A 28, P 12, Br. VI. Inhabits *Sea of Pinang*, Indian Ocean. Total length; $3\frac{1}{8}$ inch. When the pelvic spine is withdrawn, the outline of the body is elongated oval. The length of the head, from the muzzle to a little behind the orbit, is contained $3\frac{1}{5}$ times in the total. The eye is situated at a little distance beneath the first dorsal spine, and above the pectorals and gill-openings; the horizontal diameter is $\frac{1}{4}$ of the length of the head and equals the distance between the eyes. The nostrils, lips, teeth and tongue resemble those organs of *Balistes conspicillum*. The first dorsal spine rises above the eye; is moderately strong, slightly arched and serrated both on the anterior and posterior margin; it is a little less than $\frac{1}{2}$ of the length of the head: the second spine is very slender, like a bristle and flexible, $\frac{1}{2}$ of the length of the former. Their connecting membrane extends but little behind the orbit; its distance from the posterior dorsal equals the length of the first spine. The first four rays of the posterior dorsal gradually increase in length; the fifth ray, from which the rest very slowly decrease, is but little longer than the horizontal diameter of the eye; the extent of the base is $\frac{4}{5}$ of the length of the head; the distance from the caudal is $\frac{1}{3}$ of the extent of the base. All the rays of the posterior dorsal, the small and the pectorals are undivided and spinous on their sides. The caudal is elongated, with the posterior margin rounded; all the rays except the upper and lower, are divided; the length of the central ones is $\frac{4}{5}$ of the head. Although the anal commences a little in front of the posterior dorsal, the extent of its base is not longer; in

other respects it resembles the dorsal. The pectorals are rounded, $\frac{1}{4}$ of the length of the head. The point of the pelvic spine barely projects beyond the integuments: the spine is large, arched; $\frac{3}{4}$ of the length of the head; it is very protractile, forming the anterior margin of the triangular dewlap: the base of the latter equals this margin; but the posterior margin is shorter by $\frac{1}{3}$. The vertical diameter of the protracted dewlap is contained $2\frac{1}{5}$ times in the total; in front of the posterior dorsal it is $\frac{1}{2}$ of the total. The whole body has a downy appearance from being covered with minute prickles, rough to the touch; those of the tail are a little longer than the rest. A solitary individual occurred at Pinang in July, 1844.

(3872) *Monacanthus geographicus*, (Peron).

Syn. Balistes geographicus, Peron.
Monacanthus geographicus. Cuv. R. A. II. 373 (1), Pl. XI. Fig. 2. (*Young*).
Monacanthus geographicus, Swainson, II. 327.

Ground-colour pale greenish blue with scattered small brown spots; from the anterior part of the base of the posterior dorsal to behind the eye an oblique, undulating, lilac brownish band, edged with whitish, and with numerous small brown spots; a second similar from the middle of the base of the posterior dorsal to beneath the pectorals; a third from the posterior part of the latter fin and the tail to the anus; these bands are frequently interrupted or broken up, so as to make the body resemble a geographical chart of islands; from the anterior part of the orbit three or four short radiating brownish bands; first dorsal spine greenish blue, indistinctly annulated with brown; membrane pale lilac clouded and minutely dotted with brown; rays of posterior dorsal, caudal and anal pale greenish blue; their membranes pale brownish lilac transparent; basal half of dorsal with three or four parallel undulating brown lines; and with a dark brown net-work; anterior two thirds of caudal with numerous brown dotted lines, parallel to the posterior margin, near which 6 or 7 pale blackish lilac confluent lines; lower part of the dewlap pale whitish lilac with small brown spots. Iris frosted silvery, with indistinct radiating brownish bars. D 2—29, 31 or 32, C $10\frac{1}{1}$, A 29, 30, 31 or 32, P 13 or 12, Br. V. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula.* Total length: $8\frac{1}{2}$ inch. When the pelvic spine is withdrawn, the form of the body is nearly rhombic. The length of the head, from the muzzle to a little behind the orbit is contained $3\frac{1}{3}$ times in the total. The eye is situated at a short distance beneath the first dorsal spine; the posterior margin of the orbit is immediately above the gill-opening; the horizontal diameter of the eye is contained $4\frac{1}{2}$ times in the length of the head. The outline of the forehead is concave, ascending towards the first dorsal spine; angular from side to side; the horizontal distance between the eyes equals one diameter. The nostrils, lips, teeth and tongue resemble those organs of *Balistes conspicillum*. The four upper branchiostegous rays are slender like hairs, the fifth is broad, sabre-like, with the upper margin elongated; it appears like two soldered together; the first dorsal spine is strong and a little backwards arched; the anterior surface is rounded, longitudinally furrowed and very prickly; the posterior is smooth, with about 7 strong downwards directed thorns on each side; the length of the spine equals the distance from the muzzle to the eye. The membrane is very short and completely envelops the minute slender second spine. The furrow of the back is very short and not intended to receive the first spine, which can but partially be laid down, so as not to touch the back, by reclining the second. The distance from the first spine to the posterior dorsal fin is undulating, gradually ascending, and equals the distance from the muzzle to the first spine. All the rays of the posterior dorsal are undivided, with minute spines; the first is but little shorter than the second and third, the longest, which are $\frac{2}{3}$ of the first dorsal spine. The succeeding rays gradually decrease; the base is very sloping; its extent equals the distance from the first dorsal spine. The distance from the caudal is $\frac{1}{3}$ of the base. The anal fin is placed opposite to the posterior dorsal which it resembles. The caudal is broad rounded; in individuals from 5 inches in length and more, the upper, undivided ray, and the adjoining half of the second, divided one, project beyond the others, and form a kind of short filament. The length of the central rays are in young individuals $\frac{1}{4}$, in older $4\frac{1}{4}$. in the total. The pectorals are rounded, $\frac{1}{3}$ of the length of the head. The pelvic spine is strong, nearly $\frac{1}{4}$ of the total length, and very protractile. Near the scarcely projecting apex is a deep naked incision in the anterior margin, with five strong upwards directed thorns. At the incision there is no joint in the spine, but there is one a little lower down, so that the thorny apex of the spine is freely moveable both forwards and backwards. The figure in *Regne Animal* incorrectly represents the pelvic spine with two backwards moveable pieces. The dewlap is large, triangular, with the lower part arched, scaleless and half transparent; in it are enveloped upwards of 33 tendinous lines, the points of which slightly project beyond the margin; as many of them are divided, they have the appearance of rays. The shape of the expanded dewlap is in early age triangular; with age the posterior angle becomes truncated. The base of the triangle equals the length of the pelvic spine; the arched lower margin is by one third shorter. When the dewlap is expanded, the vertical diameter at the first dorsal spine is contained $1\frac{2}{10}$ times in the total

length; between the posterior dorsal and the anal it is $2\frac{1}{3}$. The whole body is covered with minute crowded, backwards directed spines; near the upper and lower margin of the tail appears a longitudinal series of four larger scales, each armed with a short but strong forwards arched spine. Individuals less than above four inches in length, present no trace of these spines. This species has lateral line, the course of which is distinguished by a line of spines a little larger than the rest. It commences the posterior margin of the orbit, ascending slightly towards the posterior dorsal, when it abruptly descends towards the middle of the side, and then continues straight to the caudal. At its origin it gives off a short vertical branch to the root of the first dorsal spine; a second above the orbit, and nostril towards the muzzle; a third along the lower margin of the orbit, where it subdivides in an upper branch which proceeds horizontally to the chin, and in a lower undulating obliquely downwards to the dewlap. At Pinang this species is numerous at all seasons.

(3873) *Monacanthus penicilligerus*, (Peron.)

Syn. Balistes penicilligerous, Peron.
Monacanthus penicilligerus, Cuv. R. A. II. 374 (2), Pl. XI. Fig. 3.
Chætodermis penicilligerus, Swainson II. 327.

Ground-colour pale whitish green, with numerous black lines; those round the orbit radiating, those of the rest of the head and the body longitudinal, undulating; side by side, behind and between the eye and gill-opening, two large round purplish black spots, both longitudinally divided by a band of brilliant ultramarine, through which passes one of the black lines of the body; behind the orbit a smaller purplish black spot, edged with pale blue, and three similar, vertically placed between the middle of the posterior dorsal and the anal; along the base of the latter fins, the dewlap and the caudal several irregular black spots; spines of the body hyaline; lips and filaments whitish red, the latter dotted and ringed with black; dorsal spine whitish grey with black spots; membrane hyaline, dotted with brown; fin-rays brownish white, membranes hyaline; those of the posterior dorsal, caudal and anal with numerous small rounded black spots placed in series parallel with the base of the fins. Pupil black, horizontally elliptical; iris golden bronze, with six radiating pale crimson bars. D 1—23 or 26, C $10\frac{1}{2}$ A 21 or 24, P 13, Br. V. Inhabits *Sea of Pinang, Singapore*. Total length: $6\frac{1}{2}$ inch. The form is rhombic, but appears shorter and broader than that of *M. geographicus*. The length of the head from the muzzle to a little behind the orbit, is contained $3\frac{1}{5}$ times in the total. The posterior margin of the orbit is situated nearly in the middle between the dorsal spine and the gill-opening the horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the horizontal diameter between both exceeds the diameter by $\frac{1}{3}$. The nostrils, lips, teeth and tongue resemble those organs of *Balistes conspicillum*. The upper branchiostegous ray is the longest, and closely attached to the second, which at its root appears to be double; the fourth is setaceous like the preceding, but a little removed from them; the fifth is broader than the rest, but less so than it is in *M. geographicus*. The dorsal spine is proportionally longer in young individuals; it is tetragonal, slightly arched backwards, and is armed with strong thorns on the four margins and it carries numerous long filaments like those of the body. It can but slightly be reclined; its length is less than $\frac{1}{2}$ of its distance from the muzzle; its membrane descends from the middle of the posterior surface, and extends to a little in front of the middle of the distance between the two dorsals. There appears to be no second spine. The interval between the dorsal spine and the first ray forms three slight undulations, and slightly exceeds the length of the spine. The length of the rays of the posterior dorsal differs but slightly; those in the middle, the longest, are $\frac{2}{3}$ of the spine. The extent of the base equals the distance from the muzzle to the dorsal spine. The anal commences opposite the 4th or 5th ray of the posterior dorsal, but it terminates opposite the latter. The distance of both from the caudal is $\frac{1}{4}$ of the extent of the posterior dorsal. The caudal is nearly rhomboidal; the length of the central ray is $\frac{1}{4}$ of the total. The pectorals are rounded, their length equals that of the longest rays of the posterior dorsal. The pelvic spine is very strong, less protractile than that of *M. geographicus*, but the jointed apex is more projecting; the dewlap is small, triangular, the anterior margin and the base equal the length of the caudal; the posterior margin is $\frac{1}{3}$ less. When the dewlap is protracted, the vertical diameter between the root of the dorsal spine and apex of the pelvic is contained $1\frac{2}{3}$ times in the total length; at the second dorsal it is $2\frac{1}{6}$. The body is very rough, covered with short strong spines, generally terminating in two, but frequently in more points, of which the posterior is longer than the rest and directed obliquely backwards. The spines of the body are disposed in longitudinal series; those of the head are smaller, crowded and not in series; those of the tail are different from those of the rest of the body. No lateral line is perceptible. The filaments of the body are rather long, varying from one to three diameters of the eye; they consist of a main trunk, tapering to a brush of fine branchlets, and from three to seven lateral branches, placed in quincunx, each subdivided in minor branches, with fine brush-like points. On the sides of the head and body the filaments are few and widely scattered; they appear in greatest number round the lips, on the forehead, on both

sides of the dorsal spine, in the interval between the dorsals, and on the margin from the chin to the apex of the pelvic spine. Two individuals, $3\frac{4}{8}$ and $4\frac{4}{8}$ inches in length, were observed at Singapore in May 1840, a third, $6\frac{4}{8}$ inch, occurred at Pinang in October 1844.

Genus ALUTARIUS, *Cuvier*, 1817. Body elongated, covered with minute close granules, scarcely visible to the naked eye; a single spine in the anterior dorsal fin; pelvis entirely hid beneath the skin and without the spinous projection of *Balistes* and *Monacanthus*.

(3874) *Alutarius obliteratus*, Cantor.

Balistes monoceros, Bloch, Tab. 147?
Balistes monoceros, Shaw, V. 399, (excl. Syn. *B. monoceros* Linné) Pl. 168?
Alutera: Bloch 147 Cuv. R. A. II. 374 (*) [According to Cuvier different from *Balistes monoceros*, Linné, Catesby 19. (*Regne Anim* l c.)
Alutera monoceros, Bloch 147, Swainson, II. 327?

(*Young*, $3\frac{1}{8}$ *inch in length*.) Head above and back pale blackish brown; upper half of the sides pale yellowish olive, with numerous half effaced, irregular, blackish brown spots; lower half of the sides, throat and abdomen light impure greenish yellow, pale silvery; first dorsal spine, membrane and caudal yellowish olive, the latter with three backwards arched, indistinct blackish bands, of which the anterior a little behind the root, the second in the middle, the third along the posterior margin; posterior dorsal, anal and pectorals pale transparent yellowish. Iris greenish yellow. ($7\frac{2}{8}$ *inch in length*.) Ground-colour darker; back with numerous oblique or vertical spots; sides of head, body and abdomen with similar larger ones of irregular form, all the spots of a pale, half-effaced, blackish colour; caudal rays yellowish olive, membrane hyaline, closely and minutely dotted with black; posterior margin blackish. D 2—46 or 47, C $10\frac{1}{1}$, A 47, 48 or 49, P 14, Br. VI. Inhabits *Sea of Pinang*. Total length $7\frac{2}{8}$ inch. The form is broad lanceolate, the abdominal profile a little more arched than the dorsal. The length of the head, from the chin to a little behind the orbit, is about $\frac{1}{3}$ of the total. The eye is situated in the centre between the first dorsal spine and the upper extremity of the gill-opening; the horizontal diameter is a little less than $\frac{1}{5}$ of the length of the head. The frontal outline gently slopes from the first dorsal spine to the muzzle; that of the throat is more oblique and continues in a moderate arch to the anus. The horizontal distance between the eyes exceeds that diameter of each eye by $\frac{1}{3}$. In front of the eye appear two tubular nasal apertures, contiguous and both directed backwards; the anterior is the larger and closed by a small membranous valve. The lips are very thin, membranous, and scarcely cover the teeth. The latter are very pointed; in other respects they as well as the tongue resemble those organs of *Balistes conspicillum*. The linear gill-openings are placed obliquely, with the upper extremity opposite the posterior margin of the orbit, the anterior extremity extends a little farther than the orbit; in its course the gill-opening deviates a little downwards from the corresponding profile of the forehead; its length exceeds by $\frac{1}{3}$ the horizontal diameter of the eye. The five superior branchiostegous rays are setaceous, gradually decreasing in length towards the sixth, which is the shortest, and broad, like a sabre. The first dorsal spine is rather slender slightly arched, tetragonal and armed with thorns on all four margins; the membrane is very small and completely covers the second spine. The latter is excessively minute, yet distinct. The length of the first spine equals that of the gill-opening; its distance from the muzzle is $\frac{1}{3}$ of that of the body, not including the caudal; from the posterior dorsal it is a little less. The latter interval deviates but slightly upwards from the horizontal. The second dorsal commences a little in front of the centre of the total length; it is generally low; the longest rays, towards the middle, equal the length of the gill-opening; the base is sloping, and equals the distance between the chin and the first dorsal spine. The interval between the last dorsal and root of the upper caudal ray is contained $2\frac{1}{2}$ times in the extent of the posterior dorsal fin, it equals the vertical diameter of the root of the caudal, but it is $\frac{1}{2}$ of the length of the latter. The anal commences a little in front of the posterior dorsal, and terminates a little farther back. In very young individuals the caudal is bluntly pointed, $\frac{1}{6}$ of the total length; in older ones it becomes rounded, and scarcely exceeds $\frac{1}{8}$ of the total. The rounded pectorals commence behind the lower half of the gill-opening, which latter they scarcely exceed in length. The greatest vertical diameter of the body, at the first dorsal spine, is $\frac{1}{3}$ of the total length; that at the first ray of the posterior dorsal is less by $\frac{1}{4}$. Four solitary individuals were at considerable intervals observed at Pinang. Shortly after death the spots of the body almost entirely disappear, and specimens preserved in spirits of wine acquire a pale dark slate-colour. They might be mistaken for *Alutarius berardi*, Lesson, [Voy. de la Coquille, Ichth. 107, Pl. 7. Syn. *Aleuteres berardi*, Richardson, Ichth. of Sulph. 132, Pl. 61, Fig. 1.—*Aleuteres berardi*, Richardson, Report, 1845, 202 and 318.—*A. cinereus*, Temminck et Schlegel: Fauna Japonica: Pisc. Tab. CXXXI. Fig. 1,] but the latter species is distinguished by a proportionally shorter head, a smaller eye; the anal fin commences a little behind the posterior dorsal, and the distance between the latter and the caudal equals the length of the caudal, and is consequently proportionally greater.

(3875) *Alutarius lævis*, (Bloch).

Syn. Balistes scriptus, Osbeck, Voyage, 1. 174?
Balistes lævis, Bloch. Tab. 414.
Balistes monoceros, Solander.
Balistes lævis, Shaw. V. 405.
Alutera lævis, Cuv. R. A. II. 374 (*)
Alutera lævis, Swainson. II. 327.
Aleuteres lævis, Richardson, Ichth. of Sulph. 131, Pl. 61. Fig. 3.
Aleuteres lævis, Richardson, Report, 1845, 202.

Ground-colour bright yellowish green olive; round and beneath the orbit, between the two dorsals, on the cheeks, throat and abdomen single short, longitudinal or oblique, ultramarine bands; the rest of the head and body with numerous distant rounded ultramarine spots; first and second dorsal spine, and their membrane, and the caudal rays yellowish olive, dotted with black; caudal membrane pale greenish white, densely dotted with brown and with four indistinct reddish brown bands, of which the anterior a little behind the root of the fin, the fourth on the posterior margin; rest of the fins hyaline. Iris golden bronze, orbital margin blackish. D 2—46, C 10½, A 49, P 14, Br. VI. Inhabits *Sea of Pinang*, Indian Ocean, Canary Islands, Carribean Sea, China Sea. Total length: 9⅝ inch. The form is elongated lanceolate, broader at the tail than at the muzzle. The length of the head is contained 3⅔ times in the total. The length of the head, from the chin to a little behind the orbit, is contained 3⅔ times in the total. The eye is situated between the first dorsal spine and the upper extremity of the gill-opening, a little closer to the former than to the latter; the horizontal diameter is ⅓ of the head. From the muzzle the profile gently ascends to the first dorsal spine, the corresponding profile from the chin to the anus, describes a gently rising arch, so that the outline of the head is elongated conical with the point truncated. The horizontal distance between the eyes equals two diameters. The nostrils, lips, teeth and tongue resemble those organs of *A. obliteratus*. The upper extremity of the oblique linear gill-opening is situated in the middle between the centre of the lower orbital margin and the root of the pectorals; the lower extremity extends to a little in front of the orbit; the length equals the horizontal diameter of the eye. The first dorsal spine is slender and flexible and covered with granules like those of the body; its length is ⅓ of its distance from the muzzle, which is contained 4½ times in the total length. The membrane is small completely hiding the minute second dorsal spine. The groove of the back is ⅓ of the length of the first spine which, however, does not sufficiently recline, so as to come in contact with the back. The interval between the two dorsals ascends gently backwards, and equals the distance from the muzzle to the anterior margin of the orbit. The posterior dorsal is low, the longest rays exceeding the horizontal diameter of the eye by ½; the extent of the base equals the distance from the muzzle to the first dorsal spine; the distance between the last dorsal and the root of the upper caudal ray equals the verticle diameter at the root of the caudal both are contained 2½ times in the extent of the base of the posterior dorsal. The anus is situated opposite the third ray of the posterior dorsal; the anal commences opposite the 6th, and extends farther back than the opposite fin, which it otherwise resembles. The caudal is very large, broad oval; the central rays, the longest, equal the length of the head. The rounded pectorals slightly exceed the longest dorsal rays. The verticle diameter at the first dorsal spine and at the first dorsal ray, equal the distance between the spine and the muzzle; in the centre between the two dorsals the diameter equals the head. A single individual was observed at Pinang in December 1842. Shortly after death the body became shining blackish, a shade lighter than the blue marks, which changed to intense bluish black.

(3876) *Alutarius barbatus*, (Gray.) Plate VIII. Fig 1.

(*Icon.*) Balistes (Anacanthus) barbatus, Gray: Ill. Ind. Zool. 1. Pl. 84, Fig. 2.
Anacanthus barbatus, Gray: Zool. Miscell. 8. [The following are Mr. Gray's character: "Anacanthus. Body long, lanceolate, compressed, covered with small scales; head produced, beak-shaped mouth small; under lip one bearded; pelvis produced, bag-like, with a single rather long spine in front; dorsal fin one long; anal long; tail long, lanceolate; most allied to *Alutera* (*les Aluteres*, Cuv.). "*Anacanthus barbatus*, Illust Ind. Zool. Pisc. t. 1. f. 2. Brown, rather paler beneath; under part of the jaws, body and ventral pouch whitish, marbled with black lines; anal fin produced a little beyond the dorsal fin; tail nearly half as long as the body, D 46, V 11, A 60, P 8? Singapore." (Zool. Miscell. 1831, p. 8.) Comparison of preserved specimens of this fish with the plate in the Illustr. of Ind. Zoology. leaves little doubt that the latter is an incorrect copy. The draughtsmen has overlooked the anterior dorsal fin and added a ventral spine and pouch. These two are the principal distinguishing characters of the Gen. *Anacanthus*. Both however, are erroneous: the fish is a true *Alutarius*, and the genus *Anacanthus* is inadmissible.]
Psilocephalus barbatus, Swainson, II 327. [Psilocephalus, Swainson, 1839 is a second genus founded upon the figure of *Anacanthus barbatus* in Ill.

Ind. Zool. It is thus doubly inadmissible being a synonyme of *Anacanthus*, and being founded upon erroneous characters.]

Dark bluish green slate-coloured; filament of the chin black; spine of the anterior dorsal pale bluish green, membrane hyaline, minutely dotted with black; posterior dorsal, anal and pectorals transparent brownish white, rays pale yellowish brownish yellow; caudal rays yellow, membrane black. Pupil black, horizontally oval; iris silvery.

D $\begin{cases} 1—44, \\ 1—47, \\ 1—50, \\ 1—51, \end{cases}$ C $8\frac{2}{2}$, A $\begin{cases} 65, \\ 61, \\ 62, \\ 59, \end{cases}$ P 9, Br. VI.

Inhabits *Sea of Pinang*, *Singapore*. Total length: $9\frac{3}{8}$ inch. The form of the body is narrow, very elongated, resembling the blade of a knife; the sides compressed, the abdomen nearly trenchant. The head is very elongated, gradually attenuated towards the muzzle; its length from the chin to a little behind the orbit is $\frac{1}{5}$ of the total, or very little more or less. The eye occupies the commencement of the posterior fifth of the head: it is situated beneath the spine of the anterior dorsal, close to, without encroaching upon the profile; the horizontal diameter is $\frac{1}{6}$, rarely $\frac{1}{8}$ of the length of the head; the horizontal distance between the eyes is but $\frac{2}{3}$ of their diameter. The two apertures of each nostril are minute, tubular, opening side by side immediately in front of the anterior margin of the orbit. The lower jaw is longer than than the upper, beyond which the rounded chin projects; the mouth is a small transversal cleft which opens vertically on the upper part of the muzzle; the lips are thin, membranous; the teeth, apparently 8 in the upper, 6 in the lower jaw, do not differ from those of the preceding species of *Alutarius*. To the chin is attached a vertical, soft, fleshy filament, tapering from the base into a sharp point, its length exceeds $\frac{1}{2}$ of the head. Between the branches of the lower jaw, from behind the filament to the lower extremity of the gill-opening, the skin of the throat is lax and forms a kind of narrow, slightly downwards arched dewlap. The floor of the mouth rises gradually towards the second third of the head, where the three very elongated branchial arches commence. The rest of the cavity is a very narrow tube which closely follows the gently backwards ascending profile of the forehead. No distinct tongue is visible. The gill-opening is linear, downwards arched and very oblique; commences beneath the anterior angle of the orbit, on a level with the root of the pectorals, the distance from which, as well as the length of the opening itself, but slightly exceeds the horizontal diameter of the eye. The branchiostegous rays are setaceous. The pelvic spine is narrow like the blade of a sabre, and in six individuals examined, so completely hid in the integuments, as not even to encroach upon the abdominal profile which is very slightly arched. Nor did they offer the least trace of a triangular dewlap, as represented in the figure Hardwicke's Illustrations. The profile of the back rises but little and slowly from the muzzle to the posterior dorsal, from the termination of which it gently descends; the abdominal outline is but little more arched. The anterior dorsal consists of a single spine placed above the pupil, in front of the pectorals; it is very slender, setaceous, covered with minute spines; in all individuals observed, it reclined in its dorsal groove, but might readily be raised; the membrane is small triangular, apparently without a second spine. The distance between the dorsal spine and the posterior dorsal fin is by $\frac{1}{4}$ shorter than that between the spine and the chin. The upper margin of the posterior dorsal is a little arched; the rays towards the middle are the longest, and equal the length of the spine; the extent of the base exceeds by about $\frac{1}{6}$ the length of the head; the interval between the last dorsal and the root of the upper caudal ray varies from a little less than $\frac{1}{2}$ of, to $2\frac{1}{3}$ times in the extent of the fin. The anal resembles the posterior dorsal, but it commences a little more forwards behind the anus, and is carried farther backwards, so that its extent at the base exceeds that of the former by $\frac{1}{4}$ or $\frac{1}{5}$, while its distance from the caudal is $\frac{1}{3}$ less than that of the former. The caudal is very elongated, lanceolate; the two upper and lower rays are, like those of the other fins, undivided; the margins of all rays have a series of microscopic spines. On each side of the root of the caudal appears a triangular pointed space, covered with minute hair-like spines, like the rest of the body. The length of the central rays vary in the different individuals from $2\frac{2}{3}$ times in, to $\frac{1}{3}$ of the total. The upper rays of the pectorals, the longest, slightly exceed $\frac{1}{4}$ of the length of the head. The body is covered with little rounded scales and has a fine velvety appearance from its being densely covered with minute, microscopic spines. The lateral line is so fine that it is hardly visible to the naked eye. Behind the orbit, at its origin, it sends two branches round the orbit, of which the upper one accompanies the profile to the muzzle, the lower ascends to a little in front of the eye and then proceeds parallel to the upper branch. The main trunk at first ascends obliquely, but soon descends with 3 to 4 short undulations to a little in front of the posterior dorsal, from whence it continues in the middle of the side and terminates at the apex of the scaly part of the caudal. The vertical diameter at the upper lips slightly exceeds $\frac{1}{4}$ of the length of the head; at the dorsal spine it is a little less than $\frac{1}{4}$; the greatest, between the two dorsals is $\frac{1}{5}$; at the root of the caudal it is a little less than $\frac{1}{6}$ of the head. The greatest horizontal diameter, or thickness of the

body, is a little behind the anterior dorsal fin, where it equals 1½ diameters of the eye; from thence it gradually decreases and becomes trenchant towards the tail like the entire abdominal part of the fish. A single mutilated individual was observed at Singapore in May 1843; five others, of which the smallest measured 8 inches in length, occurred at Pinang in the following November, in February and August and December 1844, and in June 1845. After death the colour of the body changes to a dusty pale reddish brown, dotted with black, the caudal membrane turns pale bluish grey; the arched lax skin of the throat shrivels up, so as scarcely to be visible.

Genus TRIACANTHUS, *Cuvier* 1817. With a kind of ventrals, each supported by a single large spinous ray, adhering to a not salient pelvis; anterior dorsal with three or four small spines behind a very large one; skin covered with crowded small scales; tail longer than in the other sub-genera.

(3877) *Triacanthus biaculeatus*, (Bloch.)

Syn. Balistes biaculeatus, Bloch, Tab. 148. Fig. 2.
Russell, XXI. Bowree or Abatoo.
Balistes, biaculeatus, Shaw, V. 415. Pl. 169.
Triacanthus biaculeatus. Cuv. R. A. II. 374 (5)
Triacanthus biaculeatus Bennett; Life of Raffles. 693.
Balistes biaculeatus. Bennett: Fishes of Ceylon, No. 15 *(Young.)*
Triacanthus biaculeatus. Swainson, II. 326.
Triacanthus biaculeatus, Richardson: Rep. 1845, 202.
Triacanthus biaculeatus, Bleeker: Verh. Batav. Gen. XXII. 6.

Head above and back pale blackish green, lighter on the sides above the lateral line; rest of the sides of body and head and abdomen frosted silvery; in some a faint blackish spot a little below the eye; first dorsal spine silvery blackish, the rest white; the basal half of the spines as well as the yellowish membrane black; ventral spines silvery white; rest of the fins pale yellowish in some the margins blackish. Iris pale golden, bluish black towards the orbit. D 5—24 or 25, C 14/1, A 19 or 20, V 1, P 14, Br. VI. Inhabits *Sea of Malayan Peninsula and Islands*, Indian Ocean, Ceylon, Bay of Bengal, Sumatra, Java, Borneo, Madura, Sumdawa, Celebes, Seas of China and Australia. Total length: 9 inch. The form is trapezoid, approaching the rhomboidal. The head is broad, pyramidal, tapering to an elongated muzzle; the length from the latter to the gill-opening varies from ¼ of to 4½ times in the total. The eye borders upon the profile; the anterior margin of the orbit is situated opposite the commencement of the posterior third of the head; the oblique diameter is ¼ of the length of the head; the distance of the eyes between the anterior angles equals the diameter, between the posterior angles it is ⅔ more. The two tabular apertures of each nostril are placed obliquely in front of the eye upon profile; the upper aperture is oval, larger than the lower, rounded one. The small mouth is surrounded by thick fleshy lips; each jaw has an external series of 10 trenchant teeth, of which the central ones are the largest; in the upper jaw appears a second transversal series of four tubercular teeth, of which the central pair are the larger; in the lower the corresponding series consists but of two tubercular teeth, immediately behind the pair on the symphysis. The tongue is small fleshy, oval and tied to the floor of the cavity. The gill-opening is linear, slightly oblique, situated immediately in front of the pectorals; the length nearly equals the diameter of the eye. The distance from the muzzle to the root of the first dorsal spine varies from ⅓ of to 3½ times in the total length. The spine is strong, covered to the apex with small bipartite or tripartite spines; in young individuals its length equals the greatest vertical diameter of the body, in older ones it is ¼ to ⅓ less. The second spine is much shorter, slenderer, and but slightly rough on the posterior margins; its length varies from ⅕ to ⅐ of the former; the succeeding rays gradually decrease in length, the last one varying from ⅓ to ½ of the second; the connecting membrane is a little shorter than the spines; the extent of the anterior dorsal slightly exceeds ½ of the distance from the first spine to the first ray of the posterior dorsal, which varies from ⅙ of to 5½ times in the total length. The posterior dorsal is low, gradually rising from the first, undivided, ray to the sixth, and then slowly decreasing; the longest ray is 1⅔ diameter of the eye; the extent of the fin nearly equals the length of the head; the distance from the root of the upper ray of the caudal varies from ¾ to ⅞ of the extent. The anal is falcated; it commences opposite the 9th or 10th ray of the posterior dorsal, and terminates opposite the last ray; the first ray is undivided, ½ of the second, the longest, which varies from 1½ to 2 diameters of the eye; the succeeding rays suddenly decrease to the 11th or 12th, from whence the remaining rays are but ¼ of the longest. The anus is situated immediately in front of the fin. The caudal is deeply divided in two pointed, or a little rounded lobes, of which the upper one is generally the longer, equalling the extent of the posterior dorsal. The pectorals are rounded, their length varying from 1⅓ to two diameters of the eye: they are placed immediately behind the gill-opening, opposite the first dorsal and the ventral spines, but nearer the latter. These spines are as strong, and rough as the first dorsal, but shorter, their length varying from ⅓ to a little

more than $\frac{1}{2}$ of the head ; each is attached by a short thick rough membrane to its respective groove on each side of the very elongated, flattened pelvic spine, which is covered with little scales, not different from those of the rest of the body. The latter are very small, sub-rhomboidal with the vertical diameter much longer than the horizontal. Each scale (Plate IX. Fig. 3. Magnified.) carries a single vertically placed crest, which is armed with from 4 to 15 excessively minute spines. The skin is rough to the touch in every direction. The hair-like lateral line commences behind the orbit, describing a wide arch which terminates opposite the posterior third of the posterior dorsal, from whence it proceeds in the middle of the side of the tail to the caudal. At its origin the line gives off the following branches ; a vertical, anastomosing in front of the dorsal spine with the one from the opposite side; a second along the supraorbital margin, in front of the nostril, along the profile to the muzzle ; a third along the infraorbital margin, obliquely undulating over the cheek ; a little behind the mouth it suddenly ascends to join the opposite corresponding branch ; a fourth descends a little in front of the gill-opening, beneath which it forms a short arch backwards, and then proceeds obliquely downwards to the middle of the ventral groove. At Pinang and at the Sandheads young individuals are excessively numerous at all seasons ; larger ones are rarely seen, particularly in the latter locality.

(3878) *Triacanthus strigilifer*, Cantor. Plate IX. Fig. 1 and 2. (*Young* ?) Head above and back pale sea green, changing to bluish white on the upper half of the sides ; lower half and abdomen frosted silvery white ; back and sides with a few orange spots of irregular form, viz. an elongated spot between the eyes towards the nostrils ; a second, broad rhomboidal surrounding the base of the anterior dorsal, and sending a vertical branch, with rugged margins, down to the gill-opening ; a third oblique spot from the third to the eleventh ray of the posterior dorsal ; immediately behind the mouth a vertically placed pair of small spots ; a pair of larger ones, of which the lower like a horse-shoe, on the cheek beneath the nostril ; beneath the eye a horizontal band to the lower part of the gill-opening ; in the axilla a short horizontal band, giving off an irregular branch towards and above the anal, and a longer arched one to opposite the middle of the posterior dorsal ; at a short interval another horizontal band terminating in the middle of the side, a little behind the posterior dorsal ; in the centre of the base of the caudal a small rounded spot ; on the posterior half of the tail a broad forwards pointed spot of bright yellowish green ; first spine of anterior dorsal pale sea-green, minutely dotted with black ; succeeding spines white ; membrane hyaline, minutely dotted and edged with black ; pectorals and ventral spines white ; rays of the rest of the fins yellowish white, membranes hyaline. Pupil horizontally oval, black ; iris light yellow golden, orbital margin greenish black. D 5—22. C 12½, A 16, V 1, P 13, Br. VI. Inhabits *Sea of Pinang*. Total length : 6⅝ inch. This species differs from the preceding by its more elongated, less deep form, by its larger eye, its peculiar scales, its longer second dorsal spine, its number of fin rays and colours. From the muzzle to the lower angle of the gill-opening the head is $\frac{1}{4}$ of the total length. The eye borders upon the profile, occupying the posterior third of the length of the head, of which the horizontal diameter is $\frac{1}{3}$; the distance between the anterior angles of the eye equals the diameter ; that between the posterior ones is $\frac{1}{4}$ longer. The nostrils, lips, teeth and tongue resemble those organs of *T. biaculeatus*, but the gill opening is proportionally shorter, being but $\frac{3}{5}$ of the diameter of the eye. The distance from the muzzle to the first dorsal spine is a little less than $\frac{1}{3}$ of the total length. The spine resembles that of *T. biaculeatus*, equalling the greatest vertical diameter of the body. The second spine is remarkably long, $\frac{1}{2}$ of the former, and the length of the connecting membrane corresponds ; the extent of the fin, and its distance from the posterior dorsal are the same in both species. The longest ray of the posterior dorsal is proportionally shorter, being $\frac{2}{3}$ of the diameter of the eye, but its distance from caudal is greater : it equals the extent of the base, which is $\frac{5}{6}$ of the length of the head. The falcated anal commences opposite the 12th ray of the posterior dorsal, and terminates opposite the last ray ; the longest ray slightly exceeds the diameter of the eye ; the extent of the base is proportionally shorter than in *T. biaculeatus*. The caudal is less deeply cleft almost crescent-shaped ; the lobes equal ; their length is contained 4½ times in the base of the posterior dorsal. The pectorals are rounded, their length slightly exceeding the diameter of the eye. The ventral spines resemble those of *T. biaculeatus* ; but the intermediate pelvic spine is in the present proportionally longer, and covered with larger scales, entirely different from those of the rest of the body ; their form is hexagonal with excessively minute spinous crests radiating to the margins. The scales of the body (Plate IX. Fig. 2. Magnified), although small, are perceptibly larger than in *biaculeatus*, and with their horizontal diameter longer than the vertical ; their form is nearly rhombic with from three to seven vertical or oblique crests, each of which is armed with three to seven excessively minute spines. Each scale thus resembles a small curry-comb, which makes the skin in every direction rough to the touch. The main trunk of the lateral line resembles that of *biaculeatus*, but it gives off an additional vertical branch to the middle of the root of the first dorsal spine, a little behind the anterior anastomosing one. The

two branches surrounding the eye can be traced no farther than the region of the nostrils; and the one in front of the gill-opening appears to terminate at the lower angle of the opening. A solitary individual occurred at Pinang in June 1845. Several years before, the existence of a second species of *Triacanthus* was positively asserted by fishermen who described it as being very rarely seen, and of a size somewhat smaller than *T. biaculeatus*.

Fam. OSTRACIOIDÆ.

Genus OSTRACIUM, (*Linne*, 1748) *Cuvier*, 1817. Head and body covered with bony, regular plates, instead of scales, soldered so as to form a kind of inflexible armour; the tail, fins, mouth and a kind of small lip covering the margin of the gill-opening are the only moveable parts, all passing through holes in the armour, also the greater number of vertebræ are soldered together; each jaw with 10 to 12 conical teeth; ventral fins and pelvis none; dorsal and anal small; branchiostegous rays six.

(3879) *Ostracium Cornutum*, Linne.

Ostracion cornutus, Linne: Mus. Ad. Fr. I. 59.
Ostracion cornutus, Linne: Syst. 1443.
Ostracion cornutus, Bloch. Tab. 133.
Ostracion cornutus, Bloch-Schneider 500.
Ostracion cornutus, Shaw, V. 423, Pl. 170.
Ostracion cornutus, Cuv. R. A. (I. Ed) II. 154 (c).
Ostracion cornutus, Bennett: Life of Raffles, 693.
Lactophrys [*Lactophrys*. Swainson, 1839. In *Nomenclator Zoologicus*, *Pisces*, p. 33, this Sub-Genus is by mistake written *Laetophrys*. while in *Addenda*, p. 3, *Lactophrys*, De Kay. 1842, is quoted as a distinct genus. In the Zoology of New York, III. 341, *Lactophrys* is quoted with the evidently accidental omission of the name of the founder, but the characters are those of Mr. Swainson. *Nat. Hist. of Fishes* &c. II. 324.)] cornutus, Swainson, II. 324.
Ostracion cornutus, Richardson, Report, 1845, 200.
Ostracion cornutus, Temm. et Schl. Fauna, Jap. Pisces Tab. CXXXI. Fig. 4, (*Young.*)
Buntal kumbang of the Malays.

Young. (Without spines; 1 inch in length.) Upper surface and sides pale greenish yellow, with a sky-blue central spot in some of the hexagons, and here and there with a single brown spot; abdomen light reddish yellow; generally with a single brown spot on the throat, and one or two on the anterior part of the lateral margin; fins hyaline. *Older.* Upper surface and sides pale greenish olive, minutely dotted with black; with a central sky-blue spot in each hexagon; abdomen yellowish white; fins transparent pale olive; caudal minutely dotted with black; posterior half blackish; spines buff, minutely dotted with black. Iris bright yellow, orbital margin orange or red; pupil obliquely oval, irridescent black. D 9, C 8½, A 9, P 11, Br. VI. Inhabits *Sea of Malayan Peninsula and Islands*, Chinese Seas, Canton, Japan. Total length: 6 inch. The form of the body is tetragonal, with the lower surface broader than the upper, and the sides concave. The length of the head is ¼ of the total. The forehead is at a nearly right angle with the vertex; the vertical diameter through the eye, the greatest of the body, is contained 3½ times in the total length; that through the gill-opening is a little shorter; at the termination of the armour it is 5½ times in the total length. The eye is situated close to the frontal angle; the greatest oblique diameter is ½ of the length of the head. Above each eye rises a subular, forwards, upwards and outwards directed spine, granulated at the base; the rest finely fluted; the length equals the head. The distance between the eyes across the vertex is excavate, a little less than two diameters. The nostrils have two minute, apparently papillular apertures, placed in a small, nearly vertical furrow close to the anterior angle of the eye. A little in front of the lower aperture appears a minute papilla. Each jaw has a single series of ten small conical teeth, almost entirely hid by the fleshy lips; the teeth are of a dark amber or chestnut brown; the four above the symphysis of the lower jaw are a little longer than the rest. The mouth is very small; the tongue is minute, fleshy and completely tied to the floor of the mouth; behind the tongue there is a small raised step, leading into a tunnel, on each side supported by the four branchial arches. The sides of the back are angular, a little contracted in the middle. A little in front of the dorsal, at the widest part of the back, appears on each side a small pointed tubercle, between which the distance equals the length of the head. The centre of the back is raised, so as to form a linear sharp keel which terminates in a small pointed tubercle in the middle between two lateral ones. The abdominal surface is both longitudinally and transversely arched; the greatest transversal diameter, about the middle, is contained 2¾ times in the total length. On each side of the termination appears a spine resembling the frontal ones, but pointed in an opposite direction and a little shorter. The armour is composed of pentagonal, hexagonal or heptagonal pieces with the margins finely toothed or ciliated. The pieces of the back and sides have each a tubercle in their centre, from which radiate a number of lines corresponding to the respective number of sides. On the pieces of the abdomen appear instead of lines a number of minute hemispherical tubercles. The dorsal fin is placed

at a short distance from the termination of the armour above; its length is $\frac{1}{2}$ of the head; the extent of the base is $\frac{1}{2}$ of the length. The length of the small naked tail is contained about $2\frac{1}{2}$ times in the elongated oval caudal fin. The rounded anal is situated above, yet between the posterior pair of spines, behind the dorsal which it resembles. The rounded pectorals are nearly $\frac{3}{4}$ of the length of the head. The smallest individuals examined measured 1 inch in length. They had no spines, but in their places appeared tubercles. The central and lateral tubercles of the back were comparatively more developed than in the adult. In the middle of the upper pupillary margin of the iris appeared a small notch. The smallest ones, provided with blunted spines half the length of the head, measured $1\frac{4}{5}$ inch in length. Young individuals are at Pinang numerous at all seasons.

(3880) *Ostracium tesserula*, Cantor. Plate VIII. Fig. 2 and 3. *Young.* Armour bright gamboge with numerous small black spots, not corresponding to the centre of the polygons, and fewer and more distant on the abdomen; tail bright gamboge with one or two black dots on each side of the root of the caudal; fins gamboge, a little paler than the body; pectorals with a single black dot at the root; caudal with the posterior margin pale blackish. Pupil transversely oval, black; iris bright gamboge, orbital margin orange; in the middle of the upper pupillary margin a small notch. D 9, C 8½, A 9, Br. VI. Inhabits *Sea of Pinang*. Total length: 2 inch. The general form is tetragonal. The back is elongated oval, arched from the occiput to the tail; in the centre appears a short longitudinal crest, on each side of which is a deep furrow, laterally bounded by the sharp angular margin. By these three crests the vertical section in this particular region becomes pentagonal. The profile of the forehead is nearly straight and steep. The distance between the anterior angles of the orbits is $\frac{1}{4}$ of the total length; the greatest breadth in the middle of the back is contained $2\frac{2}{3}$ times in; above the naked tail it is $\frac{1}{11}$ of the total length. The abdominal surface is both longitudinally and transversely arched, with a furrow along the angular margin; it is broader than the back, its greatest breadth, beneath the pectorals, varies from $1\frac{2}{3}$ in to $\frac{1}{2}$ of the total length. The sides are excavated with the lower margin projecting farther outwards than the upper; their greatest diameter is nearly in the middle and is contained $2\frac{1}{2}$ times in the total length; but the vertical diameter of the central crest of the back is a little longer, owing to the central convexity of the abdomen. The armour is composed of hexagonal pieces with very finely toothed or ciliated margins. From the centre of each hexagon radiate towards the margin six raised lines, of which the central, horizontal ones, join their neighbours, so as to form on the sides of the armour seven parallel, horizontally arched, lines, which form the bases of triangles produced by the other obliquely radiating lines. On the back and sides the triangles are very conspicuous, while the hexagonal outline of the component pieces can scarcely be traced. On the abdominal surface the reverse is the case. From the central tubercle radiate numerous fine lines; but the triangles are very indistinct. The length of the head is contained a little less than $3\frac{1}{2}$ times in the total. The eye is situated close to the profile, nearly in the middle between the gill-opening and the muzzle; the horizontal diameter is $\frac{1}{3}$ of the length of the head. The supraorbital arch forms a tubercular protuberance. The mouth, teeth, and tongue and nostrils resemble those of *O. Cornutum*, but there appears to be no nasal papilla. The dorsal is placed close to the termination of the armour; the upper margin slopes backwards; the anterior ray, the longest, is $\frac{1}{2}$ of the length of the head, of which the extent of the base is $\frac{1}{4}$. The anal is but little farther backwards than the dorsal, opposite the middle of which is placed the first ray; in form and length it resembles the dorsal. The caudal is elongated oval; its length $\frac{2}{3}$ of the head. The pectoral is broad, nearly triangular; the third ray, the longest, equals the caudal. This fish is of rare occurrence at Pinang. Of four individuals observed at irregular intervals, the length varied from 2 to 1 inch. They appear to be young individuals. The triangular partitions of the armour characterise *O. turritum*, [Syn. *Ostracion turritus*, Forsk. 5. 7, No. 113; —Bloch. Tab. 136;—Shaw. V. 425, Tab. 171; —Cuv. R. A. Ed. 1, II. 154;—Ruppell: Atlas, 5, and Neue Wirb. Fische, 61;—*Tetrasomus turritus*, Swainson, II. 323.] Forskal. Possibly the present fish may be the young of that species, prior to the appearance of the spines and the full development of the dorsal crest.

(3881) *Ostracium nasus*, Bloch.

Syn. Ostracion nasus, Bloch, Tab. 139.
Ostracion nasus, Shaw, V. 426, Pl. 171.
Ostracion nasus, Cuvier, R. A. Ed. 1. II. 154 (5).
Ostracion nasus, Swainson, II. 323.
Buntal panjang of the Malays.

Upper surface pale brownish or greenish olive, with numerous small rounded dark brown spots; sides lighter of either colour; in some the margins of the polygons dark brown; abdomen either uniformly buff with the margins of the polygons pale lilac, or pale reddish yellow with the nuclei of the polygons greenish white; the naked tail brownish olive, lighter on the sides, with numerous brown spots; beneath greenish buff; lips, margin of gill-openings and root of pectorals pale greenish olive with few brown spots; fins pale transparent greenish olive; a round brown spot at the root of each dorsal ray, and a few similar scattered over some of the cau-

dal rays. Orbital half of iris pale greenish olive with few brown spots, rest bright yellow with a blackish or orange ring; pupil black, circular. *Young.* With a few rounded brown spots irregularly scattered over the sides. D 9, C 8½, A 9, P 11, Br. VI. Inhabits *Sea of Pinang, Malayan Peninsula,* "Indian and American Seas," (Bloch.) Total length: 7⅛ inch. The form is nearly quadrangular, as the breadth of the abdomen but slightly exceeds that of the back and the height of the sides. The back is elongated lanceolate; from the nasal protuberance the profile gently ascends towards the middle of the back, when it slowly descends towards the tail, the whole forming a very low arch. From the occiput to near the dorsal the middle of the back is raised and forms a low triangular keel, on each side of which appears a shallow broad sulcus, outside bordered by the raised angular margin of the side. The triangular forehead slopes gently from the occiput and appears a little excavated owing to the broad protuberant supra-orbital margins. The breadth between the anterior angles of the orbit is ⅔ of the length of the head; between the posterior angles it equals the head; the greatest breadth, in the middle of the back, exceeds the length of the head by ¼, ⅕ or ⅙, according to the individually more or less projecting nasal protuberance; the breadth at the termination of the armour is a little less than half the breadth between the posterior orbital angles. The nasal protuberance is blunt, rounded. In individuals 6⅝ inch in length it scarcely projects beyond the mouth, immediately above which the profile rises vertically, and this portion measures ½ of the distance between the anterior angle of the orbit and the protuberance, which in them is ⅛ of the total length. In the largest individual, 7⅛ inch in length, the protuberance perceptibly projects beyond the mouth, from which the profile projects obliquely and exceeds ½ of the stated distance, which is ⅛ of the total length. The sides are but little excavated; their greatest vertical diameter corresponds to, but slightly exceeds, the greatest breadth of the back; it varies from 4⅙ to 4⅐ times in the total length. The length of the head, from the nasal protuberance to the gill-opening, is in younger individuals, with the protuberance but little developed, ⅕ of the total, in older ones it is contained 4½ times in the total. The eye is close to the profile; the posterior angle of the orbit is situated above the gill-opening. The greatest diameter is a little oblique, ascending backwards; it is contained 2½ times in the distance from the mouth to the gill-opening, and this proportion appears to be constant. But as the development of the nasal protuberance increases with age, so does the relative length of the diameter of the eye vary from 2½ times in to ⅓ of the distance, measured from the protuberance to the gill-opening. The nostrils, mouth and tongue resemble those of *O. tesserula.* Each jaw carries a single close series of from 9 to 11 conical teeth of a chestnut or brown colour. The six central teeth of both jaws are a little larger than the rest and their points become blunted with age. The armour is composed of pentagons, hexagons and heptagons, with ciliated margins. Not including the lateral half-series, on the back and sides appear five longitudinal ones; nine pieces from the gill-opening to the tail. The abdomen is covered by nine longitudinal series of which the central one is composed of 12 to 14 pieces. All are closely covered with minute bony tubercles, generally arranged parallel to the margins. The dorsal commences opposite the anus; the upper margin is rounded; the third and fourth ray, the longest, slightly exceed ½ of the length of the head; the extent of the base is ½ of the length. The anal commences opposite the last ray of the dorsal, which it in form and length resembles. The caudal is broad triangular with the posterior angles and margin rounded; the two central rays the longest, equal the head. The pectorals are broad triangular; the third and fourth upper rays are the longest, ⅗ of the length of the caudal. The length of the sides of the naked tail is ¾ of the caudal. Single individuals, or two or three together, were observed at Pinang at long and irregular intervals. In size they differed but slightly, the smallest being 6⅜ inch in length.

Fam. GYMNODONTIDÆ.

Genus DIODON, *Linne,* 1766. All the teeth united into a single one in each jaw; behind the trenchant margin of each a rounded part, transversely furrowed and forming a powerful apparatus of mastication; the skin armed with stout spines; no ventral fins.

(3882) *Diodon triedricus,* Cuvier.

Syn. Seba II. XXIII. 4.
Diodon triedricus Cuvier: Mem. du Mus. IV. 133.
Diodon triedricus, Cuv. R. A. II. 367 (1)

Head above, back and sides to a little below the gill-opening pale tortoise-shell brown; a transversal band composed of a large soot-coloured spot behind each pectoral, and a series of smaller spots across the back; a second similar but paler band in front of the dorsal; rest of the sides and abdomen yellowish white; fins whitish grey, minutely dotted with brown; all spines brown; their roots of the colour of the part they occupy. (*From a preserved specimen.*) D 12, C 9, A ? P 19. Br. ? [In *Mem. du Mus.* IV. Cuvier gives six, in *Regne Animal* five branchiostegous rays.] Inhabits *Sea of Pinang,* Total length: 6 inch. All the spines are compressed with the anterior margin convex, sharp and continued over the anterior, horizontally forwards directed root. The two posterior roots are placed at nearly right angles with the anterior. The roots are generally longer than the spines of which the longest ap-

pear on the sides of the back and body. Two longitudinal series of spines of the mesial line of the back, and three of the abdomen are shorter than the rest. There are three spines above the upper half of the orbit, three at the lower, and one at the angle of the mouth. The throat is naked, with a single small bony protuberance beneath the symphysis of the lower jaw. Between the eye appear three spines, viz. a central and the anterior one of the three supraorbital; between the pectorals across the back appear four spines. The upper part of the back carries four longitudinal series, viz. two central, each of eight, both terminating with an odd spine at a little distance in front of the dorsal fin, and two lateral series each of five spines, of which the anterior commences a little behind the pectoral fins, the posterior is situated between the dorsal and the caudal. This fish is of very rare occurrence at Pinang. The only one observed was a specimen which on account of its rarity had been kept preserved for several years, and was thus rendered unservicable for more minute examination.

Genus TETRODON, *Linne*, 1766. The jaws divided in the centre by a suture, so as to present the appearance of four teeth; two above and two beneath; the skin armed with small, slightly projecting spines; ventrals none.

I. Cuvier: *Regne Animal*, II. 368 (1). *Species with short head, capable of inflating themselves so as to attain a globular form. Entire body rough.*

A. *Immaculate.*

(3883) *Tetrodon immaculatus*, Lacepede.

Syn. Lacepede, I. XXIV. 1.
Russell, XXVI. Kappa.
Tetrodon immaculatus, Cuv. R. A. II. 368 (1).

Young. Head above and back pale greyish olive, lighter on the sides of the head and upper part of the body; abdomen pale yellow ochre; axilla and the smooth spot inside the pectorals blackish; the whole body minutely dotted with brown; spines white, those of the back with black points; pectorals, anal and dorsal pale transparent olive, base of the latter blackish; caudal pale brownish with single indistinct whitish spots; upper, lower and posterior margin black. Iris olive. D 10, C 9½, A 9, P 17, Br. V. Inhabits *Sea of Pinang*, Madras. Total length: 3⅛ inch. The length of the head, measured to the margin of the gill-opening, is contained 4¼ times in the total. The eye, bordering on the profile, is situated a little nearer the gill-opening than the muzzle; the horizontal diameter is ⅕ of the head; the distance across the forehead is a little less than 2 diameters. The double, contiguous nostrils are situated in front of the eyes; each aperture is pierced through a small papilla, and both appear like a minute simple tentacle. The jaws are nearly equal, the four teeth normal; the tongue is globular, fleshy, tied to the floor of the mouth. The dorsal is fan-shaped; the first, undivided, ray is situated a little behind the commencement of the posterior third of the back, the caudal not included; the extent of the base is ¼ of the head, of which the longest ray is ⅓. The first anal ray is situated behind the dorsal, at the commencement of the posterior fifth of the body; in shape and dimensions it resembles the dorsal. The caudal is broad with the posterior margin rounded; its length equals the head. The pectorals are broad and rounded, ⅓ of the length of the head. The lips, the throat, the space in front of the eyes, and that covered by the pectorals, and the tail from midway behind the dorsal, obliquely down a little in front of the anal, are all naked and smooth. The rest of the body is covered with crowded fine hair-like spines. A solitary young individual was observed at Pinang in September 1844. Russell observed but the mutilated specimen, which he described and figured.

B. *With black spots.*

(3884) *Tetrodon simulans*, Cantor. Head above and back light yellowish or greenish olive, paler on the upper half of the sides of head and body; head, back and sides with numerous rounded, irregular or confluent spots, blackish brown or olive or black; throat and abdomen white, sparingly dotted with brown; spines white, fins pale olive, transparent, minutely dotted with black; anterior half of caudal with three or four more or less distinct backwards arched blackish bands, posterior half blackish. Iris bright yellow dotted with black. D 12 or 13, C 8⅔, A 10 or 11, P 19 or 21, Br. V. Inhabits *Sea and estuaries of Pinang, Malayan Peninsula, Singapore.* Total length: 1 foot. The length of the head is contained 3¼ times in the total. The eye is situated in the middle of the head, bordering on the profile; the horizontal diameter is contained 5½ times in the length of the head; the distance between the anterior angles of the orbits is 2 diameters; between the posterior angles 2½ such. There are no nostrils, but close in front of the anterior angle of the orbit appears a flattened simple tentacle. The upper jaw slightly projects beyond the lower; the tongue resembles that of *T. immaculatus*. The rounded dorsal fin occupies the commencement of the posterior fourth of the back; the three first rays are undivided; the fifth and sixth are the longest, ⅓ of the head, and equal the extent of the base. The anal is placed opposite the dorsal, which it resembles, but the extent of the base is a little shorter, and but the two first rays are divided. The caudal is broad, with the upper, lower and posterior margins convex; its length is ⅔ of the head. The pectorals are broad, rounded; their length equals that of the dorsal. There is no lateral

line. The spines are rather long, fine and somewhat distant; above they extend from the between the eyes to near the dorsal; beneath from behind the throat to near the anus, which is situated a little in front of the anal. Young individuals of this species are at all seasons excessively numerous on the Malayan coasts. In general form and in distribution of colours, it bears a striking resemblance to *T. fluviatilis*, Buchanan Hamilton, [*Fishes of the Ganges* 6,361. Pl. XXX. Fig. 1.—*T. fluviatilis*, Cuv. R. A. II. 368 (1).] which latter differs in having distinct simple nostrils, in number of fin rays and other characters. The present belongs to the Sub-Gen. *Arothron*, Muller. [Arothron, *Müller*: "On each side a solid tentacle containing the large olfactorian nerve; an annular muscle round the eye, and a kind of eyelid." (*Abh. Berlin. Akad.* 1839, 252 (1). Berlin 1841.)]

C. *with black bands.*

(3885) *Tetrodon carduus*, Cantor.

Head above and back dark yellow ochre with a number of longitudinal, slightly serpentine black lines continued to the caudal; sides of the head pale ochre with irregular black spots; sides of the body pale lilac whitish with a few distant black spots, disposed so as to form 4 or 5 vertical series; abdomen very pale ochre; dorsal and ventral, pale transparent olive, minutely dotted with black; caudal rays reddish yellow, membrane whitish dotted with black, and with vermicular black spots; pectorals pale yellow, with a blackish narrow band along the base. Iris orange dotted with black. D 11, C $9\frac{1}{1}$, A 10, P 17, Br. V. Inhabits *Sea of Pinang*. Total length: 6 inch. The length of the head is contained $3\frac{1}{2}$ times in the total. The eye is situated nearly in the centre of the length of the head, bordering upon the profile; the horizontal diameter is $\frac{1}{7}$ of the head; the distance between the anterior angle of the orbits is nearly three diameters; between the posterior four. No nostrils appear, but their place is supplied by two small black tentacles, the one close above the other. The jaws are nearly equal, the teeth and tongue normal. The dorsal occupies the commencement of the posterior fifth of the back; it is fan-shaped, with the first ray undivided: the longest rays are $\frac{1}{3}$ of the head, or twice the extent of the base of the fin. The posterior margin of the caudal is convex; the longest rays are $\frac{1}{3}$ of the head. The anal resembles the dorsal; it commences, nearly opposite the middle of the distance between the dorsal and the caudal. The pectorals are rounded, their length equals that of the dorsal. The spines are rather long, very fine, hair-like and crowded. On the back they commence from between the nasal tentacula and extend to the caudal, in front of the base of which there is but a small naked space. The lips, the chin and the space inside the pectorals are also spineless. A single individual was observed at Pinang in December 1842. This species is nearly allied to *T. virgatus* Richardson (*Zool. Erebus and Terror*, 62, Pl. XXXIX. Fig. 8-9,) from which it differs in the dorsal being situated farther back; in the relative position of the latter fin and the anal, and in the greater number of black lines of the back. In the present the latter are twelve: in *T. virgatus* six. It is also allied to *T. meleagris*, Solander. [Syn. Lacep. I. 535.—Bl. Schn. 507.—*T. meleagris* Richardson: *Ichth. Sulph.* 122, Pl. 57 Fig. 1-3, and *Voy. Samarang* p. 19.]

D. *with pale Spots.*

(3886) *Tetrodon testudineus*, Linne.

Syn. Tetrodon testudineus, Linne: Amoen. Acad. I. 306, Tab. 14, Fig. 3.
Tetrodon testudineus, Linne, Syst. 1444.
Tetrodon testudineus, Bloch. Tab. 139.
Tetrodon testudineus, Shaw, V. 444, Pl. 178.
Tetrodon testudineus, Cuvier, R. A. II. 368 (1).
Tetrodon testudineus, Swainson, II. 328.

Young. Head above, back and upper part of the sides reddish brown with numerous rounded and elongated milk-white spots, minutely dotted with brown; rest of the sides and abdomen reddish yellow with a number of drawn brown parallel bands, downwards arched and increasing in length, interrupted, or two joined, towards the tail; caudal dark brown with numerous whitish spots; rest of the fins yellowish, transparent, blackish at the base. Iris reddish yellow dotted with black. D 10, C $8\frac{1}{2}$ A 10, P 15, Br. V. Inhabits *Sea of Pinang*, Indian Ocean. Total length: $3\frac{2}{3}$ inch. The length of the head is contained $3\frac{1}{2}$ times in the total. The eye, bordering on the profile, is a little nearer the muzzle than the gill-opening; its greater diameter, rising obliquely backwards, is $\frac{1}{5}$ of the length of the head; the distance between the anterior angles is two such diameters; three between the posterior. The nostrils have two small apertures, between which rises a small tentacle. The teeth and tongue are normal. The rounded dorsal is situated between the penultimate and posterior fourths of the back; the two first rays are undivided, the fifth and sixth, the longest, are contained $2\frac{1}{2}$ times in the length of the head, and they equal the extent of the base. The caudal is broad, with the posterior margin rounded; its length $\frac{3}{4}$ of the head. The first undivided anal ray commences opposite the termination of the dorsal fin, which it resembles. The pectorals are broad, rounded; their length is a little less than that of the dorsal. The spines commence immediately behind the upper lip, and terminate a little behind the dorsal, and immediately behind the anal, leaving the tail naked. In form they resemble those of *T. Carduus*. Single individuals, none of which exceeded the length stated, were observed at all seasons at Pinang.

(3887) *Tetrodon bondarus*, Cantor.

Syn. Russell, XXVII. Bondaroo Kappa.

Young. Head above, lips, lower half of the sides and abdomen very pale yellowish olive, minutely dotted with brown; back blackish olive; upper half of the sides brownish olive, with numerous rounded brownish-white spots, many of which are surrounded by a broad black ring, forming a kind of interrupted net-work; inside and behind the pectorals a large black spot, in which a bright yellow oval half-ring, cut by the axilla; a little in front of the pectorals a bright yellow oval spot, half hid by the black gill-cover; on the sides of the head a number of small brownish white spots, and a large black spot like an erect horse-shoe; on the throat a round black spot from whence a widely arched black line ascends to each pectoral; dorsal, anal and pectorals pale brownish olive, minutely dotted with black; caudal darker brownish olive with numerous indistinct whitish spots, and with a broad black band along the posterior margin. Iris bright yellow minutely dotted with black. D 10, C $9\frac{2}{1}$, A 9, P 18, Br. V. Inhabits *Sea of Pinang*, Vizagapatam. The length of the head is contained $4\frac{1}{5}$ times in the total. The eye borders on the profile and occupies nearly the centre of the distance between the muzzle and the gill-opening, but it is on a level above the latter and the pectorals; the greatest diameter, ascending obliquely backwards, is $\frac{1}{4}$ of the length of the head; the distance between the anterior angles of the orbit is $1\frac{1}{2}$ such diameters; between the posterior angles it is two such. There are no nostrils, but in their place appear two lanceolate black tentacula, of which the upper one is the longer, both joined at the base. The teeth and tongue are normal. All the fins are rounded. The first dorsal ray is situated a little behind the commencement of the posterior third of the nody, the caudal not included; the two first rays are undivided; the fifth and sixth, the longest, are contained $2\frac{1}{2}$ times in the head; the extent is $\frac{1}{6}$ less; the distance from the caudal is contained $5\frac{1}{2}$ times in the total length. The anal, [the position of this fin is correctly described by Russell, but his figure represents it in a much too advanced position,] is situated behind the dorsal, which it resembles; its distance from the caudal slightly exceeds $\frac{1}{7}$ of the total. The length of the caudal is $\frac{3}{4}$ of the head; that of the pectorals is a little less than the dorsal. The spines in form and position resemble those of *T. testudineus*, but above they commence from between the eyes. A single young individual was observed at Pinang in May 1844.

Sides smooth without spines.

(3888) *Tetrodon lunaris*, Cuvier.

Syn. Russell, XXIX. Kappa Koorawah.

Tetrodon lunaris, Cuv. R. A. Ed. 1, II. 148 (1).

Tetrodon tepa, Buchanan Hamilton, 10, and 362.

(*Icon.*) Tetrodon leiopleura Gray: Ill. Ind. Zool. I. Pl. 87 Fig. 2, (*Young.*)

Tetrodon lunaris, Ruppell: Neue Wirbelth. Fische, 59.

Physogaster [Physogaster, *Muller*, 1841. "With a hollow papilla in the nasal cavity not however, continued in a tube; lateral margin of abdomen raised into a soft keel from the throat to the tail, corresponding to a second superior keel on the sides of the tail."—*Physogaster* is inadmissible, as it has been applied by Latreille in 1833 to a genus of *Coleoptera*.] lunaris, Muller: Abb. Berl. Akad. 1839, 252 (1).

Tetrodon lunaris, Temm. et Schl. Fauna Jap. Pisc. CXXII. Fig. 1.

Head above and black green olive with a mixture of brownish, lighter on the upper third of the sides; rest of the latter to the abdominal keel, sides of the head and opercles white satin with a broad longitudinal band of shining yellow brass from the eye to the caudal; abdomen milk-white; fins yellow; posterior caudal margin blackish. Iris bright yellow brass-coloured, blackish towards the orbit. D 12, 13 or 14, C $8\frac{2}{1}$, A 11 or 12, P 16, Br. V. Inhabits *Sea and estuaries of Malayan Peninsula and Islands*, Coromandel, Bay of Bengal, Gangetic estuaries, Suez, Japan. Total length: 1 foot. The length of the head slightly exceeds $\frac{1}{4}$ of the total. The eye, bordering on the profile, is situated nearer the gill-opening than the muzzle, above the level of the former and of the pectorals; its longest diameter, ascending obliquely backwards, is $\frac{1}{3}$ of the length of the head. The distance between the eyes equals the diameter. The oval nasal cavity is situated midway between the eyes and the muzzle; each contains two small papillular apertures. The teeth and tongue are normal. The threadlike lateral line commences beneath the posterior part of the nasal oval cavity, descends a short distance nearly vertically, then proceeds horizontally over the upper part of the cheek; opposite the posterior part of the orbit it ascends obliquely to the upper margin of the opercle, between which and the posterior angle of the orbit it gives off a branch which describes an arch over the supraorbital margin. From the upper margin of the opercle the lateral line follows the profile of the back, a little above the lower margin of the spiny portion to a little in front of the dorsal, when it descends obliquely and then continues nearly in the middle of the tail, nearer, however, the soft abdominal keel than the profile of the back, and terminates at the root of the caudal. The soft abdominal keel commences from the throat and proceeds straight along the upper margin of the spiny portion of the abdomen to the lower part of the root of the caudal. The dorsal is situated a little behind the commencement of the posterior third of the

back; the two first rays are undivided; the second, the longest of all, is $\frac{1}{2}$ the length of the head; the posterior margin of the fin is nearly vertical; the extent of the base is $\frac{1}{2}$ of the length of the second ray; the distance from the caudal is contained $4\frac{1}{3}$ times in the total length. The first and only undivided anal ray is placed opposite the posterior half of the dorsal, which it resembles, but the extent is a little less; the distance from the caudal is contained $4\frac{1}{2}$ times in the total length. The upper and lower caudal margins are arched, but the former is a little longer than the latter; the third, or first divided ray from above is the longest, $\frac{3}{4}$ of the length of the head; the posterior margin is concave or crescent-shaped. The pectorals are broad, their posterior margin obliquely truncated; the second upper ray is the longest, $\frac{1}{2}$ of the length of the head. The spines are short, strong, crowded and deeply imbedded in the integuments. Above they commence from the space between the nostrils and terminate a little in front of the dorsal; laterally they extend but very little below the lateral line; on the abdomen they commence from a little behind the throat, are bounded above by the soft keel, and terminate with the anterior half of the body. In the figure of M. M. Temminck and Schlegel in *Fauna Japonica* the spines are represented more distant than they are in the individuals of the Malayan Seas and of the Bay of Bengal, and they appear above to commence from the occiput. In both the latter localities the species is at all seasons very numerous.

(3889) *Tetrodon oblongus*, Bloch.

Syn. Tetrodon oblongus, Bloch. Tab. 146,
Tetrodon oblongus, Shaw, V. 446.
Tetrodon oblongus, Cuv. R. A. Ed. I. 148 (1).
Physogaster oblongus, Muller, l. c.

Young. Head above dark brownish olive with numerous rounded brownish white spots; back and upper third of the sides brownish white, minutely dotted with reddish brown, and with upwards of 11 short dark brownish vertical bands, confluent on the back, and not extending beyond the upper third of the sides; rest of the latter and those of the head pale yellowish buff dotted with reddish brown; abdomen milkwhite; fins transparent yellowish buff, minutely and sparingly dotted with black. D 13, C $8\frac{2}{3}$, A 10, P 17, Br. V. Inhabits *Sea of Pinang*, Indian Ocean. Total length: $5\frac{6}{8}$ inch. The length of the head is a little less than $\frac{1}{4}$ of the total. The eye, bordering on the profile, is situated a little nearer the gill-opening than the muzzle, above the level of the latter and the pectorals; its horizontal diameter is $\frac{1}{4}$ of the head; the distance across the forehead two such diameters. Each nostril has two small papillular apertures. The teeth and tongue are normal. The posterior part of the opercle is naked terminating below in a sharp, downwards pointed angle. The elongated rounded dorsal is situated a little behind the commencement of the posterior third of the back; the anterior four rays are undivided; the sixth and seventh, the longest, are $\frac{1}{2}$ of the length of the head, of which the extent of the base is $\frac{1}{4}$; the distance from the caudal is a little less than $\frac{1}{6}$ of the total length. The anal commences opposite the third dorsal ray; the three anterior rays are undivided; the sixth, the longest, equals the corresponding dorsal; the posterior margin is vertical; the extent of the base is a little less than that of the dorsal; the distance from the caudal equals that of the latter. All three margins of the caudal are slightly arched; the length of the fin is about $\frac{4}{5}$ of that of the head. The pectorals are broad; the posterior margin is a little rounded; the first upper ray, the longest, is contained $2\frac{1}{2}$ times in the head. The very fine hair-like lateral line appears to commence from behind the occiput; at first it follows closely the profile of the back, when it descends obliquely to opposite the last dorsal ray, and then continues in the middle of the tail to the caudal. The abdominal keel is so little raised as scarcely to deserve the name; it commences behind the throat and rises in a low arch towards the pectoral fin, from whence it obliquely descends to a little in front of the anal, and follows the profile of the abdomen to the lower part of the root of the caudal. The spines are short and not very strong, but crowded; above they commence from between the nostrils and terminate a little in front of the dorsal; the opercles, except the posterior part of the opercle, and the abdomen to a little in front of the anus, are spinous; but the cheeks, lips, throat and the posterior part of the body, from between the anus and dorsal, are naked. A single individual was observed at Pinang in January 1844.

(3890) *Tetrodon dissutidens*, Cantor.

Syn. Russell, XXV. II. Kappa *(Young)*.

Crown and sides of the head and back satin reddish brown with purple reflections, lighter on the sides of the body, minutely dotted with reddish brown; back and sides with numerous large rounded spots, dark brownish or olive white; three or four blackish brown vertical bands, indistinct and spotted like the rest, viz. one between the eyes, a second behind the pectorals, surrounding the gill-opening; a third, not constant, between the latter and the dorsal; a fourth from the base of the dorsal; abdomen milk-white; the indistinct abdominal keel in some individuals light yellow; dorsal, pectorals and caudal transparent whitish olive minutely dotted with brown; posterior half of the caudal blackish; anal whitish. Iris bright yellow, minutely dotted with black towards the orbital margin. D 10, C $8\frac{1}{2}$, A 8, P 16, Br. V. In-

Syngnathus biaculeatus, Shaw, V. 453.
Syngnathus biaculeatus, Richardson, Report, 1845, 202.

Head and body pale seagreen: abdomen pale ochre or buff; in the middle of the sides of the rings of the body a large vertically oval spot, lighter than the general colour, edged with very pale vermilion; in some a few black dots, scattered along the sides of the abdomen; fins hyaline. Iris pale silvery green, dotted with brown. D 43 to 45, A 3, 4 or 5, P 21 or 22, Br. IV? Rings of the body 18, of the tail about 55. Total length: 9⅝ inch. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, China Seas, Philippines. The length of the head is contained a little less than 5½ times in the total; the distance from the posterior margin of the orbit to the gill-opening is nearly ¼ of the head; that from the symphysis of the lower jaw to the anterior margin of the orbit exceeds by ⅕ half the length of the head. The diameter of the orbit is ¼ of the length of the head. The distance across the forehead is a little less than one diameter. From the posterior part of the supraorbital margin rises a small, backwards directed thorn, which like the rest of the head is minutely honey-combed. A similar, but smaller thorn appears in the middle of the anterior and posterior margin of the orbit. The opercles are soldered together, and with numerous backwards radiating lines. The occipital crest is surmounted by 3 minute thorns. The body and tail, as far as the dorsal extends, are heptagonal; the rest of the tail is quardrangular, gradually tapering into a point. The greatest vertical diameter, halfway between the head and the dorsal, is about ¼ of the length of the head; the greatest horizontal diameter of the back is contained from 6½ to 7 times in the length of the head, while that of the abdomen varies from 2½ to 3 times in the head. The anus is situated as far behind the middle of the total length as ⅔ of the length of the snout. The dorsal commences on the 18th ring of the body, a little in front of the anus, and continues on the 10 anterior rings of the tail; the extent of the base is one diameter of the orbit shorter than the head; the dorsal and pectoral rays scarcely exceed ⅔ of the diameter of the orbit; the anal rays are about ½. Single individuals occur in the Straits of Malacca during all seasons.

Genus HIPPOCAMPUS, *Cuvier*, 1817. Trunk laterally compressed and conspicuously more elevated than the tail; the junctions of the rings are raised into ridges and their salient angles into spines; caudal none.

(3894) *Hippocampus manmulus*, Cantor. Plate XI. Fig: 1. *Young*. Pale greyish brown; sides and abdominal surface of tail pale yellowish. Length: 3⅝ inch. *Older*. Pale yellowish ochre; fins hyaline; dorsal with two longitudinal series of the blackish spots. Iris silvery bluish-grey. Length: 5 inch. D 19, A 4, P 17, Br.? Rings of the body 11, of the tail 36. Inhabits *Sea of Pinang*. The length of the head is ⅕ of the total; the distance from the symphysis of the lower jaw to the nostril is ½ of the length of the head, of which the diameter of the orbit is ⅓. From the middle of the supraorbital margin rises a small backwards directed spine; the distance between both is less than the diameter of the orbit. From the posterior margin of the orbit radiate numerous lines over the opercles. The occiput carries a crest, surmounted in front by a tubercle, behind by five minute spines; at the root of the pectorals, and on each side of throat appears a small backwards directed spine. The body is heptagonal, its greatest vertical diameter slightly exceeds ½ of the length of the head; the tail is quadrangular, tapering into a point. The anus is situated nearly in the middle of the total length, and opposite the middle of the dorsal. The latter occupies the 10th and 11th ring of the body, and the first of the tail; all three rings are arched, so as to appear like a crest from which the dorsal rises. The length of the rays is a little less than two diameters of the orbit; the extent of the base is ⅔ of the length of the head. The pectorals are a little shorter than the dorsal; the anal is about half the diameter of the orbit. One individual was observed at Pinang in September 1842; a second in January, 1844.

(3895) *Hippocampus comes*, Cantor. Pale XI. Fig. 2. Brownish buff; opercles bluish; round the orbit a few distant brown dots; fins hyaline. Iris silvery white with a number of short brownish lines radiating the pupil. D 16, A 4, P 17, Br.? Rings of the body, 11, of the tail, 33. Total length: 5 inch. Inhabits *Sea of Pinang*. The length of the head slightly exceeds ⅙ of the total; the distance from the symphysis of the lower jaw to the nostril is ⅜; the diameter of the orbit is ⅛ of the length of the head. All the spines of the salient angles are surmounted by oval or rounded tubercles. On the forehead between the eyes appears a single spine; on each supraorbital margin a similar, and between the two a pair of smaller ones; single ones also appear at the anterior and posterior margin of the orbit, and a pair a little beneath the lower margin. The occipital crest is surmounted by three spines, behind which rise five smaller ones forming a cluster like a coronet. At the root of the pectorals appear two, and a pair on each side of the throat. Over the opercles radiate some fine lines. The body is heptagonal; its greatest vertical diameter slightly exceeds the length of the snout to the nostrils. The tail is quadrangular, tapering into a point. The anus is situated nearly in the middle of the total length, opposite the posterior third of the dorsal. The latter occupies the 10th and 11th ring of the body and the first caudal; the length of the rays is 1½ diameter of the orbit, the extent of the base is contained about 3½ times

in the length of the head. The pectorals are a little shorter than the dorsal, and the anal is the shortest of all. A single individual occurred at Pinang in August 1844.

Subclass. SELACHII. Order: PLAGIOSTOMI. Suborder: SQUALI.

Fam. SCYLLIOIDÆ.

Genus SCYLLIUM, (*Cuvier*, 1829,) *Müller und Henle*, 1841. Anterior dorsal between the ventrals and anal; posterior between the anal and caudal; spiracles immediately behind the eyes; gill-openings equidistant: both posterior ones immediately above the pectorals; snout short, blunt; nostrils near the mouth, in some continued in a fissure to the margin of the upper lip; superior nasal valves covering the nostrils, so as generally to leave but a small rounded aperture at the external margin; nasal valves either separated by a larger or smaller piece soldered between their centre, or both united; in some in the middle of the external surface a projection, which occasionally extends beyond the lower margin of the valve; in others at the inferior margin of the nostril a smaller valve covered by the larger; mouth arched; teeth with a central point and one or two on each side; several species with the ventral fins united over the male appendages; scales trifid; oval resembling those of the Rays.

(3896) *Scyllium maculatum*, Müller und Henle.

Syn. Scyllium marmoratum, Bennett: Life of Raffles, 693 ?

(*Icon.*) Scyllium maculatum, Gray: Ill. Ind. Zool. 1. Pl. 98 Fig. 1.

Scyllium maculatum, Muller und Henle: Plagiostomen 5, Taf.

Scyllium maculatum, Richardson: Report, 1845, 193.

(*Young male.*) Ground-colour of the back white, of the sides, vertical fins and upper surface of horizontal fins light slate-blue, with numerous confluent rounded spots, of snuff colour, forming a kind of net-work; near the apex of the two dorsal, of the caudal and anal fins a transversal snuff-coloured band; abdomen, lower surface of pectorals and ventrals and the male appendages bluish white. Iris silvery slate-blue; pupil obliquely linear, black. Inhabits *Sea of Singapore*, Indian Ocean, China Sea, Canton. Total length: 1 foot 7 inch. The anterior dorsal is situated midway between the apex of the snout and that of the caudal; it commences opposite the termination of the ventrals. The posterior dorsal commences at an equal distance from the root of the ventrals and the apex of the caudal. The anal fin commences a little in front of the posterior dorsal, but it terminates before reaching the middle of that fin. The scales are trifid, with a central, flat, pointed keel, and with a minute point on each side. In time the scales become worn and subrhombic. A single young male was taken at Singapore in May 1840. Each male appendage measured 2⅛ inch in length.

Genus CHILOSCYLLIUM, *Müller und Henle*, 1837. Snout blunt; nostrils extending to the mouth; nasal valves separated, each carrying a filament; at the external margin of each nostril a considerable hem-like valve, which continues towards the upper fold of the angle of the mouth; under lip skinny, broad, separated from the throat by a transverse furrow; mouth slightly arched; teeth pointed, with one or two smaller points on each side; spiracles behind and below the eyes; at the posterior margin of each spiracle a projecting tubercle; fourth and fifth gill-opening near each other; dorsal fins placed in front of anal, the anterior dorsal behind the ventrals; pectorals and ventrals rounded, as also the anal and caudal; the anal, without anterior angle, is arched downwards, terminating behind in a point; lower margin of the caudal convex.

(3897) *Chiloscyllium plagiosum*, (Bennett.)

Syn. Russell, XVI. Bokee Sorrah (*Young.*)

Russell, Ra Sorrah, page 10 (*Adult.*)

Scyllium freycineti, Quoy et Gaimard. Freyc. 192 ? (*Young* ?)

Scyllium plagiosum, Bennett: Life of Raffles 693. (*Young.*)

(*Icon.*) Scyllium ornatum, Gray: Ill. Ind. Zool. 1. Pl. 98 Fig. 2. (*Young.*)

Chiloscyllium plagiosum, Muller und Henle, 18 (*Young.*) [Var. 3 and Var. 4, Müller und Henle, are founded upon two unpublished drawings of General Hardwicke. Both have evidently been taken from specimens in the infantile livery, and are no more constant varieties than Var. 2 and 3 of M.M. Müller und Henle.]

Chiloscyllium plagiosum, Var 1, Müller und Henle, 18. (*Young.*)

Chiloscyllium plagiosum, Var 3, Müller und Henle, 18. (*Young.*)

Russell: p. 10, "Vielleicht eine Varietat," Muller und Henle, 20. (*Adult.*)

Chiloscyllium plagiosum, Richardson: Report, 1845, 194.

Yu tokay of the Malays.

(*Newborn and very young.*) Ground-colour above white or buff, with numerous black transverse bands, preponderating over the ground-colour, which appears on the head and back like transverse buff bands, each with a transversal brown line in the centre. On the sides and fins the ground-colour is reduced to a number of rounded spots, each with a central brown dot. Lower surface of the body and horizontal fins whitish, of the tail pale blackish. Iris black, with a silvery line bordering the black pupil, which is linear and ascending obliquely backwards. Total length: 4 to 6⅛ inch. (*Older.*) Ground-colour ash-grey or isabella coloured, with (11, 12 or 13) pale brownish black transverse bands, broad on the back, narrower on the sides; the

margins darker than the bands, or with distant dark dots; fins with dark and light spots; abdominal surface whitish. Iris silvery ash-grey or isabella coloured. (Russell, XVI., *Bokee Sorrah.—Scyllium plagiosum*, Bennett.—*Var.* 1, Muller und Henle.) Or: Ground-colour ash-grey or nankin yellow with transverse brownish bands edged with black; within the bands double transverse rows of black dots; single such between the bands; on the sides and fins black rings, each with a central black spot. (*Scyllium ornatum*, Gray—*Var.* 2, Muller und Henle.—*Chiloscyllium plagiosum*, Richardson.—) Total length: 7⅛ to 14⅛ inch. (*Adult.*) Above uniformly ash-coloured or yellowish grey; whitish beneath. Iris silvery, of the ground colour. (*Ra Sorrah*, Russell.—"*Vielleicht eine Varietat*," Muller und Henle.—) Total length: 1 ft. 5 inch to 2 ft. 4 inch. Inhabits *Seas of Pinang, Malayan Peninsula, Singapore*, Indian Ocean, Seas of China and Japan (Richardson), Coasts of Brazil (M. und H.) The anterior dorsal fin commences immediately above the termination of the ventrals; the posterior dorsal commences as far from the anal as the extent of its own base. In young individuals the scales are narrow lanceolate and keeled; in the adult they are tetragonal or subrhombic, with a polished, not keeled, surface. In the young fish appears along the centre of the back a keel composed of scales larger than the rest; on each side, a little below the central keel appears a similar, which borders the upper third of the side. From the root of the ventral fins to the commencement of the anal appears on each side a third keel, which separates the sides from the abdomen. With age the dorsal keel becomes indistinct, but the others appear to vanish. In young individuals the male appendages do not extend beyond the anterior half of the inner margin of the ventral fins; in mature age their length is double that of the inner margin of the ventrals. The livery of the newborn and mature individuals is as constant as that of the intermediate age is liable to variations. The latter, which are but transitory garbs, have been described as constant and distinct varieties by M.M. Muller und Henle. Russell is the only observer who described the mature fish. There appears, however, to exist a constant variety, which is above of a uniform golden bronze colour, paler beneath, with reddish golden fins and with the iris of burnished gold. This Variety is rarely seen in the Straits of Malacca, at Madras [Walter Elliot, Esquire, possesses an adult male of this Variety, measuring 2 ft. 2⅛ inch in length,] and in the Bay of Bengal, as far as the 21st degree. In the Straits of Malacca the species is at all seasons excessively numerous.

Genus GINGLYMOSTOMA, *Muller und Henle*, 1837. (Nebrius, Ruppell) 1837. [Preoccupied by *Nebria*, Latreille, 1802 (*Coleopt*).] Snout blunt: nostrils extending to the mouth, with a short valve at the internal margin, from which proceeds a long cirrus extending to the mouth; a second short valve at the external margin of the nostrils; mouth convex; the folds of the angle of the mouth divided by a deep fissure in an upper and lower fold; the internal extremity of the lower fold separated from the skin of the under lip by a more or less deep, vertical furrow; teeth very numerous, upwards of ten close series, their base rhomboidal, with a central conical apex, with two to four gradually decreasing blunt points on each side; the fifth branchial opening almost hidden in the fourth; both situated above the pectoral fins; spiracles very minute, immediately behind the eyes; anterior dorsal fin opposite the ventrals; posterior dorsal partly in front of, partly opposite the commencement of the anal; the latter fin nearer the caudal than the ventrals, yet not immediately in front of the caudal; the latter with a trace of an inferior lobe; pectoral fins longer than in the rest of *Scyllioidæ*.

(3898) *Ginglymostoma concolor*, (Ruppell.)

Syn Nebrius concolor. Ruppell, Neue Wirbelth, 61, Taf. 17, Fig. 1. Ruppell. Chondropt: 2, Taf. 17 Fig. 2.
Ginglymostoma concolor, Muller und Henle, 22, Taf.

Young. Light brownish buff. Iris silvery light grey; pupil linear, oblique. Inhabits *Sea of Pinang*, Indian Ocean, Massauah (Red Sea). Total length: 2 ft. 5 inch. The anterior dorsal fin commences a little behind the origin of the ventrals, but extends farther back than the termination of the latter. The posterior dorsal commences a little in front of the anal and terminates a little in front of the termination of the latter fin. The scales are broad lanceolate or sub-rhombic with an indistinct central tubercle. The denticulations of the posterior margins are very indistinct, and the scales which are worn down have a polished granular appearance. In the upper jaw appear but three, in the lower four series of teeth, the central apex of which scarcely exceeds the lateral points which gradually decrease. During life the fish carries the tail much more erect than is represented in the figures of M.M. Ruppell, Muller und Henle. The length of the male appendages is less than one-half of the inner margin of the ventral fins. During life this species is distinguished by its beautiful light tint and by its proportions. A solitary young male was taken at Pinang in March 1845. It lived for about two hours in the air. The stomach contained remains of small *Crustacea*. The length of the intestinal canal slightly exceeded ⅓ of the total length of the fish.

Genus STEGOSTOMA, *Muller und Henle*, 1837. Mouth transverse and narrow; at the upper and lower jaw the integuments form two flattened rims, which carry the teeth; the latter

exhibit tripartite laminæ; the centrepiece between the nasal valves is much broader than the valves themselves, and forms a transverse thick rim over the mouth, which above and in front can be covered by this rim. The latter has a rounded free margin in which unite the anterior and posterior surfaces; the posterior, generally hidden, surface is scaly like the rest. The nasal valves are reduced to skinny hems which laterally enclose the central rim. The nasal valves terminate in a strong cirrus. The lower margin of the nostril has no valve. The folds of the angle of the mouth are short; the fossets deep. The head is highly arched and rounded. The cleft between the eyelids is very small, transversely oval, with sharp margins. The spiracles are vertical fissures behind the eye. The fifth branchial opening is hid in the fourth; the third, fourth and fifth appear immediately above the pectoral fins. The anterior dorsal is placed opposite the ventral fins, but extends somewhat in advance; the posterior dorsal is placed between the ventrals and the anal. The latter is placed immediately in front of the caudal. The latter is nearly throughout of uniform height, with the usual incision before the apex, and it is proportionally very elongated.

(3899) *Stegostoma fasciatum*, (Bloch)

Syn. Seba: Thes. III. 105, Tab. 34, No. 1.
Gronov. Mus. 1. 82. No. 136.—Zoophyl. 34, No. 147.
Le tigre, Brouss. 658.
Squalus fasciatus, Bloch. 113.
Squalus tigrinus, Linne: Syst. 1493 (*Young.*)
Squalus longicaudus, Ibid. 1496.
Zebra Shark, Shaw: Nat. Misc. 434.
Squale tigre, Lacepede. I. 249.
Squalus fasciatus, Shaw: V. 148. Pl. 148. (*Newborn.*)
Squalus fasciatus, Bloch-Schn. 130.
Russell: XVIII. Poollee Makum. (*Newborn.*)
La roussette tigree, Dict. des Sc. Nat. No. 33. Fig. 2.
Scyllium heptagonum. Ruppell: Neue Wirb. 61, Tab. 17. Fig. 1. (*Young.*)
Scyllium heptagonum. Ruppell: Chondropt. 1. Tab. 17. Fig. 1.
Stegostoma fasciatum, Muller und Henle, 24, Taf. (*Young.*)
Stegostoma fasciatum. Var. 1, Muller und Henle, 25, (*Young.*)
Stegostoma fasciatum, Var. 2, Muller und Henle, 25, (*Young.*)
Stegostoma fasciatum, Var. 3, Muller und Henle, 25, (*Mature?*)
Stegostoma carinatum, Blyth: Journ. As. Soc. XVI. 725, Pl. XXV. *bis*, Fig. 1. (*Young.*)
Yu tokay of the Malays.

(*Newborn and very young.*) Ground-colour above yellowish white with numerous broad black transverse bands, preponderating over the ground-colour, which on the head and fins is reduced to single rounded or oval spots; lower surface of the body and horizontal fins yellowish white. Iris black with a silvery line bordering the black linear pupil, which ascends obliquely backwards. (Russell, XVIII. *Poollee Makum.* — *Var.* 1, Muller und Henle).—Total length: 12 to 13 inch. (*Older.*) Ground-colour reddish or brownish yellow, more conspicuous than in the newborn, particularly on the fins, where the brown colour is broken up into numerous rounded spots, (on the pectoral fins one or two large rings, with a central spot;) transversal bands reddish brown, with broad snuff-coloured or black margins; in some the bands of the head and body with numerous dark brown rounded spots. Iris like the ground-colour, but silvery. (*Var.* 2, Muller und Henle.—) Total length: 1 ft. 10 to 3 ft.

(*Mature? Adult?*) Ground-colour whitish brown; head from behind the eyes, body and fins with numerous snuff-coloured rounded spots, which are somewhat indistinct on the fins. (*Scyllium heptagonum*, Ruppell.—*Var.* 8, Muller und Henle.—*Stegostoma carinatum*, Blyth.—) Total length: 3 ft. to 5 ft. 7 inch. Inhabits *Sea of Pinang*, Indian Ocean, Bay of Bengal, Jeddah. (Red Sea.) All the descriptions of this species have been taken from young individuals. According to Gmelin it attains a length of about 15 ft. The largest specimen quoted above is a female, collected at Madras by W. Elliot, Esq. The length of the body is 2 ft., of the tail 3 ft. 7 inch. the proportion of the latter is therefore less than in younger individuals, where the tail forms $\frac{2}{3}$ of the total length. The scales are rhombic, with a strong central keel and with 2 to 6 denticulations on each of the two anterior margins. In smaller individuals the scales are broad lanceolate, the central keel terminating in a sharp point, but the posterior margins are either not at all, or indistinctly denticulated. With age the seven raised keels become more distinct. Mr. Elliot has observed this species frequenting the shoals off the coast of Madras feeding on Molluscs. The stomach of several, dissected by him, contained large quantities of molluscous bodies, many of which with the opercula of different species of *Turbinidæ* attached. In a single young female, taken at Pinang in August 1845, the stomach contained remains of small *Crustacea*. Gmelin describes this species as feeding on *Crustacea* and *Testacea*. In a young individual 3 ft. in length, the male appendages did not exceed one half of the internal margin of the ventral fins. The varieties, described by M.M. Muller and Henle, are but individual variations of the infantile livery.

Fam. NYCTITANTIDÆ.

A, without spiracles.

Genus CARCHARIAS, (*Rafinesque*, 1810,) *Muller und Henle*, 1841. Snout flattened, more

or less rounded, moderately long. Nostrils in the centre between the mouth and the point of the snout, or nearer the mouth, at the lateral margin of the snout. Labial cartilage very minute or absent. Ovary of the embryo communicating with a kind of uterine placenta by means of plaited folds. Oviduct either smooth or flocculent.

Sub Genus SCOLIODON, *Muller und Henle*, 1837. Teeth of upper and lower jaw similar, but in the upper jaw appears an old central tooth, trenchant, with the point directed outwards, but not denticulated. The external part of the base forms a blunt protuberance, without or with a slight notch. Posterior dorsal fin placed either immediately opposite the anal, or above the posterior extremity of the latter. A distinct caudal groove above and beneath. Scales, minute, tricarinate. Oviduct of the embryo flocculent.

(3900) *Carcharias* (*Scoliodon*) *acutus*, Ruppell.

Syn. Carcharias acutus. Ruppell : Chondropt. 5, Tab. 18, Fig. 4.
Carcharias (Scoliodon) acutus, M. u. H. 29.
Carcharias (Scoliodon) acutus, Richardson : Rep. 1845, 194.
Yu of the Malays.

Head above, back, sides and fins lead-grey, or light bluish grey; beneath white. Iris light blue silvery, with a narrow silvery line bordering the black linear pupil. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Indian Ocean, Red Sea, Java, China Seas. Total length : 3 feet. The anterior dorsal fin is situated a little nearer the pectorals than the ventrals ; the upper and posterior margin join in a narrow elongated point. The posterior dorsal commences opposite the posterior half of the base of the anal ; both terminate in elongated points. The distance between the commencement of the ventrals and that of the anterior dorsal equals the distance from the commencement of the ventrals to that of the posterior dorsal fin. The fifth gill-opening is situated above the commencement of the pectorals. The scales are minute rounded, and with five, four or three keels. In young individuals the old central tooth is considerably smaller than the rest. Single individuals occur during all seasons in the Straits of Malacca.

Sub genus PRIONACE, *Cantor*. [πρίων, saw, ἀκή, edge.—Substituted for *Prionodon*, pre-occupied by *Prionodon*, Horsfield, 1823, (*Mam*). The characters given are those of M.M. Muller and Henle.] (*Equivalent to* Prionodon, *Muller und Henle*, 1841). Teeth of either upper jaw, or of both jaws, finely denticulated on both sides, oblique or straight, trigonal, or with a small apex on a broad base. In the upper jaw almost invariably an odd central tooth. Oviduct of the embryo smooth, not flocculent.

(3901) *Carcharias* (*Prionace*) *melanopterus* Quoy et Gaimard.

Syn. Squalus carcharias minor, Forskal : Descr. 20.
Squale requin, Lacep. V. 169, Tab. 8, Fig. 1.
Carcharias melanopterus, Quoy et Gaim. Freycin. Voy. Pl. 43, Fig. 1, 2.
Squalus ustus, Cuv. R. A. II. 388 (2).
Squalus spallanzanii, Lesueur : Journ. Acad. Philad. II. P. 2, 351.
Carcharias melanopterus, Bennett : Life of Raffles, 693.
Carcharias melanopterus, Ruppell : Chondropt. 3.
Carcharias (Prionodon) melanopterus, M. u. H. 43, Taf. (Teeth).
Carcharias melanopterus, Temm. et. Schl. Faun. Japon.
Carcharias (Prionodon) melanopterus, Richardson : Rep. 1845, 194, 317.
Carcharias (Prionodon) melanopterus, Bleeker : Verh. Batav. Gen. 6.
Ruppell : Neue Wirbelth. Fische. 63.

Head above, back, sides and fins lead-grey, or light bluish grey ; anterior margins of the fins (all the margins of the caudal), and point of the pectorals bluish black ; beneath white. Iris silvery grey with a blackish line bordering the vertically oval pupil. Inhabits *Straits of Malacca*, Red Sea, Waigiou, New Holland, Timor, Java, Sumatra, Madura, China Sea, Japan. Total length : 3 feet. In young individuals the teeth of the upper jaws have denticulated margins, but in the adult they are denticulated in both jaws. The teeth of the lower jaw are smaller and narrower than those of the upper. The anterior dorsal fin commences a little behind the termination of the pectorals ; the posterior commences a little in front of the anal and extends to the posterior third of the latter fin. The points of all three are but moderately elongated. The ventrals commence at the posterior third of the distance between the commencement of the pectorals and the anal. The male appendages are shorter than the internal margin of the ventrals. The fourth and fifth branchial openings are situated above the pectorals. The snout is short and rounded in some, moderately elongated and pointed in others. The scales are minute, with from three to five keels. Single individuals occur at all seasons in the Straits of Malacca.

Genus SPHYRNA, (*Rafinesque*, 1810), *Muller und Henle*, 1841. (Zygaena, *Cuvier*, 1817.) The anterior part of the head broad, flattened and laterally elongated ; nostrils situated at the anterior margin ; eyes at the lateral margins. Nasal valve a small triangular lobe at the internal margin of the nostril. No labial cartilage. Teeth of both jaws similar, resembling outwards pointing flattened pyramids, either trenchant or denticulated, with a section at the external margin of the base ; central teeth in both

jaws. Anterior dorsal nearer the pectoral than the ventrals; posterior dorsal smaller than the anterior, opposite the anal; incision of the caudal fin distinct. Oviduct of the embryos flocculent; ovary not attached to the walls of the uterus.

(3902) *Sphyrna zygaena*, (Linne.)

Syn. Libella, Belon, 61.
Zygaena, Rondelet, 389.
Gesner, Fol. LXXXII.
Libella, Salviani, 121, Tab. 40.
Aldrov. 408.
Jonston, Tab. VII. Fig. 8.
Willoughby: B. 1.
Ruysch: Theatr. Tab. VII. Fig 8.
Zygène, Dutertre: Hist. Nat. II. 207.
Zygaena seu Libella, Jacob: Mus. 16 Taf. VII. Fig. 5.
Jochfisch, Valentini: Mus. Taf. XXXII. Fig 5.
Zygaena, Ray, 20, 7.
Zygaena; Mus. Besler, Tab. XV. Fig 1.
Klein: Miss. III. 13, No. 1.
Zygaena, Linne: Mus. Ad. Fr. 52.
Stampella, Scilla: Tab. 28. Fig. 2.
Squalus zygaena. Brunnich: Ichthyol. Massil. 4, No. 8.
Piscis libella, Bonnan: Mus. Kirch. Tab. XXXVII. Fig. 20.
Squalus zygaena, Forskal: Descr. XVIII.
Zygene: Duhamel: Sect. IX. Pl. XXI. F. 3-8.
Gronov. Mus. I. 63, 139.—Zoophyl. 146.
Le Marteau, Brousson. No. II.
Squalus zygaena. Bloch. 117.
Martillo de Mar, Bru de Ramon. 1. 51.
Cornudo, Parra, Lam. 32.
Squalus zygaena, Linne: Syst. 1494.
Squalus, No, 4, Browne: Jam. 558.
Artedi: Gen. Pisc. 44, 7. Synon. 96, 7.
Le Squale marteau, Lacep. I. 257.
Le Squale pantouflier, Ibid. 260, Pl. VII. Fig. 3.
Squalus zygaena, Bl. Schn, 131.
Russell, XII. Koma Sorra. (*Young.*)
Squalus zygaena, Shaw. V. 354, Pl. 154.
Zygaena malleus, Risso: Ichth. 34, Hist. Nat. III. 125.
Sphyrna zygaena, Rafin: Ind. 46.
Squalus zygaena, Mitchill: Tr. Lit. and Phil. Soc. New York, I. 284.
Zygene marteau: Dict. des Sc. Nat. T. 32.
Zygaena malleus: Valenciennes: Mem. IX. 223. Pl. XI. Fig. 1. a. b.
Zygaena tudes, Val. Ibid. Pl. XI. Fig, 3. *(Very young)*
Zygaena malleus, Cuv. R. A. II. 393.
Zygaena tudes, Ibid. 394.
Zygaena lewisii. Griffith. Anim. Kingd. Tab. 53.
Zygaena malleus Yarrell: II. 406.
Zygaena malleus, Cantor: Quarterly Med. Journ. No, III. Calcutta. 1837, Fig. 1.
Zygaena tudes, Cantor, Ibid. Fig. II. and Transact. Med. and Phys. Soc. Calcutta: VIII. Pt. 2, Appendix, ccxj. Fig. I-II.
Zygaena malleus, Swainson: I. 134.
Zygaena malleus, Yarrell: Supplem. 61.
Sphyrna zygaena, Bonaparte: Faun. Ital. Fasc. 27.
Zygaena tudes. Agassiz: Recherches: III. Tab. E. Fig. 8, (Teeth.)
Sphyrna zygaena, Muller und Henle, 51.
Spyyrna tudes, Ibid. 53.
Zygaena malleus, De Kay: Zoology of New York, IV. 362. Pl. LXII. Fig. 205. (*Young.*)
Sphyrna zygaena, Richardson: Rep. 1845, 194.
Sphyrna tudes. Bleeker: Verhandel. Batav. Gen. XXII. 6.

Foetus. Head above, back sides and fins rosy white, with a greyish tinge along the back; beneath white. Iris silvery light blue; pupil circular black. Total length: 1 ft. $0\frac{7}{8}$ inch. *Young and Adult.* Body and fins slate grey; beneath white. Iris golden. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Coasts of France, English Channel, Mediterranean, Atlantic, Indian Ocean, Bay of Bengal, Java, Madura, China Seas, Japan, Brasilian Coast, Nantucket, Cayenne, South Coast of Australia. Total length: 10 ft. 9. inch. The anterior dorsal commences immediately behind the termination of the pectorals; the extent of the base is considerably less than $\frac{2}{3}$ of the length of the anterior margin; the upper and the posterior margins join in a narrow, not much elongated point. The posterior, much smaller dorsal commences opposite the root of the anal, but terminates a little before the latter; both fins terminate in an elongated narrow point. The distance from the commencement of the ventrals to that of the pectorals is a little less than the distance between the commencement of the ventrals and that of the caudal. The fourth and fifth branchial openings are placed above the commencement of the pectorals. All the teeth are trenchant, not denticulated; those of the upper jaw appear somewhat broader than those of the lower. The scales are very minute with five or six keels. In the adult the anterior margin of the head forms a nearly uninterrupted or slightly festooned arch till it reaches the nostrils, where there is a more or less deep notch. The posterior margin is nearly parallel to the anterior. The nostrils open near the external part of the anterior margin of the head. From the nostrils proceeds a fissure along the external third of the anterior margin of the head. The length of the head, from the angle of the mouth, is about $\frac{1}{3}$ of the breadth, or a straight line drawn between the eyes. The posterior margin of the head forms with the body an acute angle. Single individuals occur at all seasons in the Straits of Malacca. The largest examined was a female taken at Pinang in January 1845. In her were observed thirty-seven living young, of which

twenty were males, seventeen females. All were of the following dimensions :

Length of the head from the angle of the mouth,	1 5/8 inch.
„ „ lateral margin of the head,	1
Distance between the eyes,	3 3/8
„ from the angle of the month to anus,	4 3/8
„ „ anus to anal fin,	0 7/8
Base of the anal,	0 13/16
Height of do,	0 5/8
Distance from anal to caudal fin,	0 13/16
Length of the caudal,	4
Base of anterior dorsal,	1 3/8
Height of do.	2
Base of posterior dorsal	0 5/8
Height of do.,	0 7/8
Length of pectorals,	1 3/8
Breadth of do.,	0 9/16
Distance between the nostrils,	2 1/8
Distance between the angles of the mouth,	0 9/16

The foetus or very young differs from the adult in its more arched anterior margin of the head, and in the margin itself being more festooned. The length of the head is but little less than one-half of the breadth. From the nostrils proceeds an almost imperceptible fissure, and there is no notch in the anterior margin above them. The posterior margin of the head joins the body at a nearly right angle. (These are the distinguishing characters of *tudes*, Val.) The teeth of the foetus are barely perceptible to the touch. The lateral processes of the head are membranous ; but in each appear two narrow cartilaginous tubes, one containing the optic, the other the olfactorian nerve.

(3903) *Sphyrna blochii*, (Valenciennes.)

Syn. Bloch : 117.

Zygaena blochii, Valenciennes : Mem. du Mus. IX. Pl. XI. Fig. 2. (*Foetus.*)

Zygaena blochii, Cuv. R. A. II. 393(3).

Zygaena blochii, Bennet : Life of Raffles, 694.

Zygaena laticeps, Cantor : Quarterly Med. Journ. Calcutta, 1837, Pl 1, 2, 3, (*Young.*)

Zygaena blochii. Ibid. Fig, IV. (*Foetus*) and Transact. Med. and Phys. Soc. Calcutta, VIII. Pt. II. App. ccxi.

Zygaena laticeps, Swainson : I. 134, Fig. 11, and II. 318.

Zygaena blochii, Yarrell : Supplem, 64, Fig. 3, (*Foetus.*)

Zygaena laticeps, Ibid. Fig. 4, (*Young.*)

Sphyrna blochii, Muller und Henle, 54. 199. (*Young.*)

Zygaena blochii, Cantor in Ann. and Mag. of Nat. Hist. 1845. (*Adult and Foetus.*)

Spyhrna blochii, Bleeker : Verhand. Batav. Gen. XXII. 6.

Head, body and fins above bluish- or slate-grey ; beneath white or pale yellowish. Iris golden ; pupil circular, black. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore,* Bay of Bengal, Sumatra, Java, Borneo, Celebes, Madura. Total length : 4 ft. 4 inch. In all ages the head is remarkably broad. The breadth of the head is not only liable to slight individual variations, but also to more considerable variations according to age. In the foetus the length of the head, the distance from the angle of the mouth to the anterior margin of the head is about 1/4 of the breadth, or the distance between the lateral margins of the head. With age the length diminishes to about 1/6, which it has been found to be in the largest (adult ?) fish yet examined, a female 4 feet 4 inch in length. The variations will be perceived by the following admeasurements.

	Ft. In	Ft. In	Ft. In.	Ft. In	Ft. In.	Ft. It
Total length	4 4	3 8	2 2	1 11	1 1 5/8	1 1 1/2
Breadth of head.	2 1 1/2	1 9 1/2	0 10 5/8	0 8 3/8	0 6	0 4 7/8
Length of do.	0 3 7/8	0 3 3/8	0 1 7/8	0 1 5/8	0 1 3/8	0 1 1/2

A little more than the central third of the anterior margin of the head forms a large slightly undulating arch. At the termination of this arch appear the nostrils. In the foetus and the young the rest of the anterior margin is directed backwards, and the posterior margin joins the body at an acute angle. But in older individuals the anterior margin of the head, from the nostrils, is not directed backwards, and the posterior margin joins the body at a right angle The fins are placed as they are in *S. zygaena*, except the posterior dorsal which commences but little in front of the terminations of the anal. The following admeasurements were taken from the largest individual, 4 ft. 4 inch in length. She was a female captured at Pinang in September 1844.

Distance between the nostrils,	9 1/8 inch.
„ between the angles of the mouth,	5 2/8

She had eghteen living foetus, of which seven were males, eleven females. The lateral processes of the head were in all bent backwards and towards the sides of the body, so as to make the head resmble a broad arrow, as represented by M. Valenciennes. All the foetus were of the following dimensions :

Total length,	13 4/8 inch.
Length of the head,	1 2/8
„ lateral margin of the head,	0 7/8
Distance between the eyes,	6
„ from the angle of the mouth to anus.	5
„ anus to anal fin,	1 1/8
Base of anal,	0 7/8
Height of ditto,	0 5/8
Distance from anal to caudal fin,	0 6/8
Length of caudal.	4 3/8
Base of anterior dorsal,	1 4/8
Height of ditto,	2 4/8
Base of posterior dorsal,	0 5/8
Height of ditto,	0 4/8
Length of pectorals,	1 6/8
Breadth of ditto,	1 1/8
Distance between nostrils,	2
„ angles of the mouth,	0 7/8

In January 1845 another female occurred,

3 ft. 8 inch. in length, with fifteen living fœtus. Of these ten were males, five females, all of which measured one foot in length. Young individuals, upwards of 3 ft. in length, are very numerous at all seasons in the Straits of Malacca. In the Bay of Bengal, in 21° N., the species is of rarer occurrence. The young feed on crustacea, the older on fishes.

SUB-ORDER RAJAE.

Fam. SQUATINORAJOIDÆ.

Genus PRISTIS, (*Latham*, 1794,) *Muller und Henle*, 1841. (Pristibatis, Blainville, 1828.) Teeth of the saw generally uniform, flattened and trenchant, directed tolerably straight outwards, and commencing in front of the nostrils. Nostrils far removed from the mouth, with a long, narrow triangular valve at the upper margin; at the lower margin a hemlike valve. No cartilages at the angle of the mouth. Mouth transversal, straight. In the upper jaw a membranous transverse vale behind the teeth, with a straight margin. Teeth flattened, like paving stones. Upper eyelid without projection. Spiracles large, separated by a broad bridge from the eyes. Anterior dorsal partly opposite the ventrals. Both dorsals equal. Caudal short, with or without a lower lobe.

(3904) *Pristis semisagittatus*, (Shaw.)

Syn. Russell, XIII. Yahla (*Very young.*)
Squalus semisagittatus, Shaw, V. 361.
Pristis semisagittatus, Cuv. R. A. II 394 (3).
Pristis semisagittatus, Swainson, II. 319.
Pristis semisagittatus Muller und Henle, (*Young,*) 108, Taf. (Mouth and nostrils).
Ikan garagaji of the Malays.

Diluted yellow ochre; beneath whitish. Iris pale golden; pupil black, transversely oval. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Coromandel, Bay of Bengal, Mouths of the Ganges. Total length: 6 ft. 4 inch. The nostrils are situated very near the mouth and extend close to the margin of the snout; from their external angle proceeds a short fissure towards the margin of the snout. The transversal duplicature or valve behind the teeth of the upper jaw has a deep notch at the symphysis of the jaw, and the margin is fringed in young individuals, as described by M.M. Muller and Henle. But in older ones (3 ft. 6 inch. in length,) the margin is smooth. The two dorsal fins are of equal size and form, the superior margin is very concave, and terminates in a narrow elongated point. In young individuals they join at an acute angle. The anterior dorsal commences opposite the termination of the ventrals; the distance from the termination of the posterior dorsal to the commencement of the caudal exceeds by one-half the base of the dorsal. The posterior margin of the caudal is deeply excavated so as to form a lower lobe, but little smaller than the upper. On the tail there is a sharp keel where the abdomen joins the sides; the keel is particularly raised between the posterior dorsal and caudal. The male appendages are styliform and project silghtly beyond the inner margins of the ventrals, to which the anterior two-thirds are joined. The ventrals terminate in an elongated point. The external margin of the pectorals is concave. The anterior branchial opening is situated immediately beneath the commencement of the pectorals, the rest follow an oblique backwards and inwards direction. With the exception of the apex of the male appendages and the teeth of the saw, every other part of the body is covered with minute rounded or irregular scales, of unequal size. The back is rough to the touch in consequence of numerous tubercular scales, a little larger than the rest. All the scales have originally a minute central tubercle which, however, soon becomes worn. In the fœtus the lateral margins of the saw are smooth and not yet pierced by the teeth. At the base the saw is naked to within a considerable distance (from 3 to 5 longitudinal diameters) of the eye. The first two or three teeth on each side of the apex of the saw are placed regularly opposite each other, the succeeding ones are not so. One of the margins carries from 4 to 7 more teeth than the other. The greater number present on one side varies from 25 to 34. In very young individuals, such as have been described by Russell and M.M. Muller and Henle, upwards of 3 ft. in length, each tooth has at the posterior margin a notch which forms a small barb, behind which the base of the tooth becomes narrower. But in individuals of about 4 ft. in length the notch is nearly effaced, and the basal half of the tooth is much broader than the other tapering half, which appears, as if it had been filed. With age the teeth become broad at the base, with trenchant margins tapering to a rounded trenchant point. The anterior margin is arched and slightly directed backwards. The apical half of the teeth is slightly depressed. *Crustacea* form the food of the young, of which single occur in the Straits of Malacca at all seasons. Large individuals are seldom seen.

Genus RHINA, (*Klein*, 1745,) *Muller und Henle*, 1841. Snout rounded; spiracles immediately behind the eyes. Both the superior and inferior nasal valve extend to the inner angle of the nostril. Mouth deeply undulating. Teeth almost globular, not broader than long.

(3905) *Rhina ancylostomus*, Bloch-Schneider.

Syn. Rhina ancylostomus, Bloch-Schneider, 352. Tab. 72.
Rhina ancylostomus, Cuvier, R. A. II. 396 (3)
(*Icon.*) Rhina ancylostomus, Gray: Ill. Ind. Zool. II. Pl. 102, Fig. 2. (Teeth.)
Rhina ancylostomus, Swainson, II. 322.

Rhina ancylostomus, Agassiz: Tab. H. Fig. 3, 4. (Teeth.)
Rhina ancylostomus, Owen: Odontogr. Pl. 23 (Teeth.)
Rhina ancylostomus Muller und Henle, 110, (Very young.)
Rhina ancylostomus, Richardson: Report, 1842, 195.

Above earth-brown or deep skyblue; on the back, pectorals and caudal numerous distant whitish spots; beneath white. Iris pale golden: pupil black, transversely oval. Inhabits *Sea of Pinang*, Indian Ocean, Madras, China Sea. Total length: 7 feet. The distance between the nostrils exceeds the length of each nostril by about $\frac{1}{6}$. The distance of the nostrils from the margin of the head is $\frac{1}{3}$ of their length. The horizontal diameter of the eye, which slightly exceeds the vertical, is a little more than $\frac{1}{3}$ of the length of the nostril. The spiracles are nearly ovoid, their longest diameter $\frac{1}{2}$ of the length of the nostrils; their distance from the eye is about $\frac{1}{2}$ of its horizontal diameter. The pectorals, by far the largest of the fins, appear triangular and are nearly equilateral; the anterior convex margin is thickened, rounded and smooth; the posterior is straight and coarsely serrated. The branchial openings in position and form resemble those of *Pristis semisagittatus*. The anterior dorsal commences a little in front of the ventrals and terminates a little before the termination of the latter fins. The base scarcely exceeds one-half of the height of the fin; the anterior margin is convex, the two others nearly straight; the angles are acute. The posterior dorsal is scarcely smaller than the anterior, which it resembles in form; it occupies the centre of the distance between the termination of the anterior dorsal and the commencement of the caudal. The posterior margin of the caudal is deeply excavated, and there is a lower lobe but little smaller than the upper. The caudal keel commences beneath the posterior dorsal fin. The ventrals resemble the anterior dorsal in form and size, but the posterior margin is excavated. The male appendages extend as far as the termination of the base of the posterior dorsal. The outline of the base of each tooth is rhomboidal, with the horizontal diameter slightly exceeding the vertical. The external surface is globular, covered with minute transverse undulating furrows. The largest teeth are situated on the two protuberances of the upper- and the three of the lower jaw. Immediately behind the teeth of the upper jaw, appears a transversal duplicature or valve, with a smooth margin, but with a notch under the symphysis of the jaw. The valve, the palate and the flattened rounded tongue are all covered with scales like those of the rest of the body. They are very minute and consist of a triangular keel, rooted in the integuments, but projecting beyond them in an oblique backwards direction. Near the point the keel expands and presents a minute rhomboidal surface, so that the entire scale resembles the arm of an anchor with its fluke and peak. In many places the scales are worn down, become smooth and granular, and lose their original form. Larger and different scales are distributed in regular conspicuous crests. Of the latter there are two of on oval shape, placed obliquely, a little in front of and higher up than the eyes. Immediately behind this pair commences a second, each of which borders the supraciliar margin, and extends a little behind the upper margin of the spiracle. From each of the supraciliar crest proceeds a smaller narrower one downards, bordering the anterior part of the orbit. From the centre between the supraorbital crests commences the dorsal, the longest of all, which extends to opposite the termination of the pectorals. Each scapular region carries a superior and an inferior crest, both of which are narrow and placed parallel to the dorsal crest. The superior is $\frac{1}{3}$, the inferior $\frac{1}{6}$ of the length of the dorsal crest. A very short crest appears at the lower circumference of each spiracle. The crests are composed of single scales larger than the rest. All have a polygonal base from which rises a compressed thorn, from the apex of which numerous furrows radiate towards the base of the sides. On the snout, above and beneath, appear a number of pores. Opposite the spiracles, a little in front of the dorsal crest, the integuments are pierced by two large pores, placed side by side. The distance between these two is about one half of the distance from each to the nearest supraorbital crest. The following dimensions were taken from a male, measuring 7 ft. in length.

Distance from the apex of the snout to the mouth,	0 ft.	$6\frac{3}{8}$ inch.
„ from the mouth to the middle between the terminations of the pectoral fins, ...	1	6
„ from thence to the anus, ...	1	0
„ from the anus to the caudal, ...	2	$3\frac{3}{8}$
Length of the upper lobe of the caudal, ...	1	6
„ of the lower lobe of ditto, ...	1	$1\frac{1}{8}$
„ of the base of the anterior dorsal, ...	0	$5\frac{3}{8}$
Height of the fin, ...	0	$10\frac{3}{8}$
Length of the base of the posterior do.	0	$4\frac{7}{8}$
Height of the fin, ...	0	10
Distance between the anterior angles of the pectorals	3	$8\frac{1}{8}$
Length of the base of the pectorals, ...	1	$2\frac{5}{8}$
„ of the base of the ventrals, ...	0	$4\frac{5}{8}$
„ of the male appendages, ...	1	2
Breadth of the mouth, ...	0	7
Length of the supraorbital crests, ...	0	$8\frac{1}{8}$
„ of the dorsal crest, ...	1	4
Greatest diameter of the nostril, ...	0	$4\frac{5}{8}$
„ of the eye, ...	0	$1\frac{3}{8}$
„ of the spiracle, ...	0	$2\frac{1}{8}$

The description of M.M. Muller and Henle is taken from a very young individual. During four years three solitary individuals occurred at Pinang. According to Lord Arthur Hay and Mr. Walter Elliot they are of more frequent occurrence at Madras. Mr. Elliot, who has observed the habits of the fish, describes it as hugging the shore, moving slowly along the bottom. Hence the Tamil name: "*Mann Ulavi*," i. e. "Mud-skate." In some dissected, Mr. Elliot

observed fragments of *Crustacea* in prodigious quantities.

Genus RHYNCHOBATUS, *Muller und Henle*, 1839. Snout elongated, acute, with a tapering keel along the middle. The interval between the keel and the inner margin of the pectorals is membranous; spiracles immediately behind the eyes. Upper eyelid with a simple projection. Upper and lower nasal valve extend but halfway to the internal angle of the nostril; outside in front, at the upper margin of the nostril is a narrow hem. The undulations of the snout, particularly the lateral ones, are shallow. Teeth broader than long, with a transversal protuberance. A transversal arched row of pores on the abdominal surface of the scapular region.

(3906) *Rhynchobatus djeddensis*, (Forskal.)

Syn. Duham. Sect. IX. Pl. 15.
Raja dsiddensis, Forskal: Descr. 18.
Raja dsiddensis, Linne: Syst. 1511.
Rhinobate rhinobate, Lacepede, I. Pl. VI.
Raie bohkat, Lacep. I. 139.
Rhinobatus laevis, Bloch-Schneider, Tab. 71 (*Young.*)
Russell, X. Walawah Tenkee (*Young.*)
Raja djiddensis, Shaw. V. 319.
Rhinobate lisse: Dict. des Sc. Nat. 19.
Rhinobate laevis, Cuvier, R.A. II. 396 (1).
Rhinobate djeddensis, Ruppell: Atlas, 54. Taf. 14, Fig. 1.
Rhinobate djeddensis, Bennett: Life of Raffles, 693.
Rhinobatus djettensis, Ruppell: Neue Wirbelth. Fische, 68.
Rhinobatus duhamelii, Blainville: Faune. Fr. 148.
Rhinobatus laevis, Swainson, II. 322.
Rhynchobatus laevis, Mulier und Henle, 111.

(*Young.*) Above light greenish olive, pale yellowish- or reddish brown, with a downwards arched black band on the upper eyelid; a small black spot on each side of the point of the snout; a large oval black spot surrounded by several white (from 3 to 6) ones above the middle of the base of the pectorals, and with more or less numerous white spots on the pectorals and the sides, where in some they are disposed in longitudinal lines; sides of the snout, pectorals and ventrals in some tinged with carmine; beneath whitish. Iris golden; pupil transversely oval, black. (Bloch-Schneider.—Russell, X.—*Var.* 2, Muller und Henle.) *Var.* 3. Muller und Henle.—With numerous round spots on the snout, head, back, tail and pectorals. (*Rhinobatus djeddensis*, Ruppell.) (*Adult.*) Either uniformly coloured, or with indistinct spots; but without spots at the point of the snout, and without bands on the upper eyelid. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Indian Ocean, Bay of Bengal, Red Sea. Total length: 5 feet. Spiracles with two denticulations at the posterior margin. The length of the snout is a little less than $\frac{1}{7}$ of the total. The distance of the nostril from the lateral margin is $\frac{1}{4}$ of the length of the nostril. The distance between the anterior extremities of the nostrils is double the length of each nostril; the distance between the posterior extremities is a little less than the length of each nostril. The anterior dorsal commences a little behind the commencement of the ventrals, and extends a little farther back than the latter. The extent of the base is less than one half of the anterior margin. The posterior dorsal is smaller; its distance from the caudal is a little more than one half of the distance from the anterior dorsal. Both dorsals are similar, terminating in an attenuated point, but the posterior is much the smaller. The extent of their base is less than one half of their anterior margin. The pectorals appear triangular. The ventrals terminate in an attenuated point, which extends to the opposite point of the anterior dorsal. The posterior margin of the caudal is very concave; the lower lobe but little smaller than the upper. The lateral keel commences a little above the termination of the ventrals. The scales are very minute subrhomboidal or orbicular and imbricated; they carry from 3 to 6 keels. A number of small recurvous spines are at intervals distributed in lines. One such, the supraorbital, surrounds the anterior part of the orbit, and extends backwards to above the spiracle. Another, the dorsal, extends along the spine to the posterior dorsal. As in *Rhina ancylostomus*, there appear two conspicuous pores a little in front of the dorsal line. In young individuals these pores are less distinct. A little behind the occiput, on each side, appears a short backwards diverging line of spines. Each shoulder carries a second, a little longer, also directed backwards. In large individuals there is another line beneath the scapular. It consists but of two or three spines. The following dimensions were taken from a female 4 ft. $1\frac{6}{8}$ inch in length.

From the snout to the mouth,	0 ft.	$8\frac{5}{8}$ inch.
From the mouth to the anus,	1	3
From the anus to the caudal,	1	6
Length of the caudal,	0	8
Distance between the anterior angles of the pectorals,	1	$3\frac{1}{8}$
From the snout to the eyes,	0	$7\frac{5}{8}$
Distance between the orbits,	0	$2\frac{1}{8}$
„ between the internal angles of the nostrils,	0	$1\frac{7}{8}$
Breadth of the mouth,	0	8
From the point of the snout to the end of the base of the pectorals,	1	$6\frac{4}{8}$
Greatest breadth of the keel of the snout,	0	$1\frac{5}{8}$
Distance between the dorsals,	0	9
„ between the posterior dorsal and caudal,	0	$5\frac{4}{8}$
„ between the pectorals and ventrals,	3	

Single individuals occur at all seasons in the Straits of Malacca.

Genus RHINOBATUS, (*Bloch-Schn.* 1801)

Muller und Henle, 1841. Skull elongated in a keel, the interval between which and the internal margin of the pectorals is membranous; snout more or less pointed. The upper nasal valve consists, as in *Rhynchobatus*, of an external narrow elongated lobule, and an internal which is broader and shorter. The external lobule is narrow, but its rounded apex extends to the lower margin of the nostril, and does not project at an angle from the inner lobule. The external lobule is situated nearly in the middle of the upper margin of the nostril; the internal lobule extends more or less inwards. The lower nasal valve extends from the external angle more or less inwards. Spiracle and eye surrounded by a common fleshy wall. The upper eyelid carries in the centre a projection. The valve of the upper jaw has a fringed margin and is notched in the centre. The anterior part of the lateral margin of the disk has two slight undulations.

Subgenus RHINOBATUS, *Muller und Henle*, 1841. The upper nasal valve does not extend to the inner angle of the nostril.

(3907) *Rhinobatus* (*Rhinobatus*) *ligonifer*, Cantor. Plate XIV. (*Young?*) Keel of the snout, head, body and fins above greenish ash-grey; snout and abdominal surface white. Iris pale golden of the general colour; pupil broad cordate, black. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*. Total length: 1 foot $4\frac{6}{8}$ inch. This species greatly resembles *Rhinobatus thouini*, [*Raje thouin*, Lacep. I. Pl. 1, Fig. 3-5.—*Raja thouiniana*, Shaw: V. 318. *Pl.* 147.—*Rhinobatus thouin*, Cuv. R. A. II. 396. (2).—*Rhinobatus* (*Rhinobatus*) *thouini*, M. und H. 120.] but differs from the latter as described by M.M. Muller and Henle, in the following characters. The lateral margins of the snout, a little from the apex are deeply bent inwards, and near the apex they are similarly, but less distinctly, bent a second time. The apex thus somewhat resembles the figure 8. The keel is not smooth, but covered to the very point with small distant recurvous thorns, like those of the rest of the upper part of the body. The shallow furrow of the keel extends considerably in front of the eyes. Each spiracle carries two distinct denticulations. The pectinations of the nostrils vary from 85 to 90, (in *R. thouini* about 60). The teeth vary from 75 to 80 in a series (in *R. thouini* about 60). The scapular region carries an outer-, and a larger inner thorn. In *R. thouini* the inner thorn is the smaller of the two. The keel is most contracted a little in front of the eyes, the breadth being about $\frac{1}{15}$ of the length. From thence it slowly widens towards the 8-shaped apex, which is about $\frac{1}{4}$ of the length of the keel. The shallow lanceolate furrow commenees between the eyes and extends as far beyond them as the basal sixth of the keel. The posterior margin of the spiracle carries a smaller internal, and a larger external denticulation. The distance between the nostrils is one half of the length of each nostril, and it slightly exceeds the distance between the lateral margin of the head and the nostrils. The upper nasal valve extends as for as the inner third of the margin. The distance between the orbital thorns exceeds by $\frac{1}{3}$ the length of the orbit and spiracle together. The pectoral fins are rounded. The ventrals are subrhomboidal, terminating in an acute point; the male appendages are somewhat shorter than the inner margins. The posterior dorsal is very little larger than the anterior. The lateral keel commences a little behind the ventrals. The upper surface of the snout, body and fins is covered with small distant scales. They are all directed backwards, and resemble those of *Rhina ancylostomus*. The keel of the snout and the upper surface of the head are covered with minute thorns. Three to five larger thorns border the anterior margin of the orbit; two the inner margin of the spiracle. The largest thorns are placed at intervals along the spine of the back, and the line extends as far as the posterior dorsal fin. In front of the dorsal series appear two pores, as in *Rhina ancylostomus*. In each scapular region appears an isolated thorn, and outside of that a second smaller one. The thorns are all compressed, with a broad oval base with radiating lines. The lower surface of the snout is covered with minute somewhat distant scales, which are triangular, with the apex directed backwards. Those of the rest of the lower surface are nearly round, with an indistinct central tabercle. The abdominal surface of the scapular region is on each side marked by an undulating linear furrow. The cavity of the mouth and the large flattened tongue are covered with minute triangular scales. The membranous valve behind the teeth of the upper jaw has a large notch in the centre and a smaller one at each angle of the mouth. The margins of the smaller notches are fringed. The following dimensions were taken from a female 1 ft. $4\frac{6}{8}$ inch in length.

From the snout to the internal angle of the nostril,	$3\frac{6}{8}$ inch.
From thence to the mouth,	$0\frac{2}{8}$
From the mouth to the anus,	$3\frac{2}{8}$
From the anus to the point of the caudal,	9
Distance between the nostrils,	$0\frac{4}{8}$
Length of the nostrils,	1
Breadth of the mouth,	$1\frac{2}{8}$
Greatest breadth of the disk,	$5\frac{3}{8}$
Distance from the ventrals to the anterior dorsal,	$1\frac{6}{8}$
„ between the dorsals,	$1\frac{4}{8}$
„ between the posterior dorsal and the caudal,	$0\frac{6}{8}$
Length of the caudal,	$2\frac{2}{8}$

Solitary individuals occur during all seasons in the Straits of Malacca.

PLATYRHINA [Pre-occupied by *Platyrhinus*, Clairville, 1798. (*Coleopt.*)] SINENSIS, Muller und Henle, occurs, but rarely, at Singapore and Pinang.

Fam: TORPEDINIDÆ.

A. With two dorsal fins.

Genus NARCINE, *Henle*, 1834. Disk orbicular, elliptical or angulated, rounded in front and provided with a broad keel. Mouth small, protractile, surrounded by a circular skinny fold, which terminates above in the frænulum ["Bändchen"] of the nasal valve. Nasal valve straight, with a central projection, and sometimes with the lateral projections slightly elongated, making the valve trifid. A labial cartilage above and beneath. Teeth in quincunx, with a point in the middle. They project beyond the margin of the jaw like an elliptical plate. The lips not fixed to the jaws, but moveable. A membranous valve behind the upper jaw. Tail longer than the disk. The anterior dorsal behind the ventrals, smaller than the posterior. Spiracles immediately behind the eyes. Margins of the spiracles smooth.

(3908) *Narcine indica*, Henle.

Narcine indica, Henle : Narcine, 35, Taf. II. Fig. 2.
Narcine indica, Muller und Henle, 130.
Pari kubbas of the Malays.

Body and fins above light reddish brown or copper-coloured, with numerous larger and smaller chocolate-coloured spots, in young individuals broadly edged with silvery white. The spots generally circular, some oval, others confluent. Beneath whitish. Iris narrow golden; pupil triangular, with the apex downwards, black; margins of the spiracles flesh-coloured. Inhabits *Sea of Pinang*, Tranquebar. Total length: 1 ft. 6 inch. The disk has a pentagonal appearance and is but very little broader than long. The tail is slightly longer than the body. In very young individuals it is a little shorter than the body. The ventrals are not covered by the pectorals; their angles are acute, their anterior margin slightly concave. The male appendages project but slightly beyond the inner margin of the ventrals. The anterior dorsal commences opposite the termination of the ventrals. In the young the apex forms an acute angle, later it becomes rounded. The extent of the base is $\frac{1}{2}$ of the length of the anterior margin. The distance between the two dorsals equals that between the posterior and the caudal. Both dorsals are of similar form and size. The posterior margin of the caudal is very convex. The following dimensions were taken from a female, measuring $11\frac{1}{8}$ inches in length.

From the snout to the mouth, ...	$1\frac{6}{8}$ inch.
From the mouth to the anus, ...	$3\frac{6}{8}$
From the anus to the point of the caudal.	$5\frac{3}{8}$
Length of the disk....	$5\frac{2}{8}$
Breadth of the disk, ...	$5\frac{4}{8}$

Large individuals are at Pinang of rare occurrence, but younger, from 3 to 6 inches in length, are taken at all seasons. In or out of water they may be handled with impunity. Several species of fishes introduced in a jar filled with sea-water and containing a large *Narcine* shewed no consequences from the contact, nor did they appear to avoid the Torpedo. The food of this and the other Malayan *Torpedinidæ* consists of *Crustacea* and *Testacea*.

B. With one dorsal fin.

Genus ASTRAPE, *Muller und Henle*, 1837. Snout short without keel, generally similar to that of *Narcine*. Frænulum of the nasal valve with a cylindrical cartilage. Teeth pointed with a tetragonal base, but slightly projecting beyond the margin of the jaw. A membranous valve in both jaws. The solitary dorsal and the caudal rounded. Eyes close to the spiracles. The latter smooth.

(3909) *Astrape dipterygia*, (Bloch-Schneider.)

Syn. Raja dipterygia, Bloch-Schneider, 359.
Torpedo dipterygia, Var. Olfers. Torp 25.
Narcine dipterygia, Henle: Narcine: Taf. III. Fig. 2.
Astrape dipterygia, Muller und Henle: 131. (*Young.*)
Pari kubbas of the Malays.

Above dark greenish olive, with a large round whitish spot on each side at the posterior margin of the disk; anterior half of the ventrals whitish: a large round whitish spot on each side above the termination of the ventrals, a similar one on each side of the root of the caudal; dorsal and caudal blackish brown or black; beneath whitish. Iris golden; pupil circular black. In the very young (upwards of $4\frac{3}{8}$ inch in length) the ventrals are of a uniform colour like the ground-colour. Inhabits *Sea of Pinang, Malayan Peninsula, Lancavy Islands, Singapore*, Tranquebar. Total length: 8 inch. The disk is rounded, and as broad as long. It covers the anterior margin of the ventrals. The latter are tetragonal, with acute angles in the young, but later they become obtuse. The male appendages are strong and extend to opposite the termination of the dorsal. The latter commences at the posterior third of the length of the fish. The eyes are much smaller than the spiracles. The following dimensions were taken from a male $6\frac{1}{8}$ inch in length.

Length and breadth of the disk,... ...	3 inch.
From the snout to the mouth,... ..	$0\frac{5}{8}$
From the mouth to the anus, ...	$2\frac{2}{8}$
From the anus to the apex of the caudal,	$3\frac{2}{8}$

Single individuals occur in the Straits of Malacca at all seasons.

C. Without dorsal fins.

Genus TEMERA, *Gray*, 1831. ["Snout, mouth and membranous valve of the jaws as in *Astrape*. Tail without dorsal fin, short in proportion to the disk. Spiracles immediately be-

hind the eyes, smooth. Teeth flattened." (*Muller und Henle*, page 131.)] Body orbicular; ventral fins large, produced, nearly square; tail very short, and compressed, finned; dorsal fin none; most nearly allied to *Torpedo*, but differs in having no dorsal fin, in which character it is most nearly allied to *Narke* of Caup, a genus not noticed by Cuvier, which has only one dorsal fin, while *Torpedo* has two.

(3910) *Temera hardwickii*, Gray.

Plate XII, Fig. 1-2.

Syn. Temera hardwickii, Gray: Zool. Misc. 7. (*Young*)

(*Icon.*) Temera hardwickii, Gray: Ill. Ind. Zool. II. Pl. 102. (*Young.*)

Temera hardwickii, Muller und Henle, 131, Taf. Fig. 1, (Mouth and Teeth.)

Pari kubbas linchin of the Malays.

Above light yellowish brown; margins of spiracles flesh-coloured; whitish beneath. Iris golden; pupil transversely oval, black. In some the disk and tail above have large irregular white patches. (*Var.* 2. M. und H.) Inhabits *Sea of Pinang, Malayan Peninsula, Singapore.* Total length: 1 ft. 6 inch. The disk is nearly round, but the snout between the eyes appears truncated. The relative proportions of the length and breadth appear to be liable to slight individual variations. In some the disk is a little longer than it is broad, in others vice versâ. The eyes are as large as the spiracles. The ventrals are not covered by the pectorals. The following dimensions were taken from a female $4\frac{1}{8}$ inch in length.

From the snout to the mouth, ...	$0\frac{3}{8}$ inch.
From the mouth to the anus, ...	$2\frac{1}{8}$
From the anus to the point of the caudal, ...	$1\frac{5}{8}$
Length of the disk, ...	$2\frac{3}{8}$
Breadth of the disk,...	$2\frac{4}{8}$

She had four foetus, each $1\frac{1}{8}$ inch in length, in colour and form resembling the mature fish. But the vertical diameter is in the foetus proportionally greater. In the Straits of Malacca this species is at all seasons very numerous. The electric organs (Pl. XII. Fig. 1, *a. a.*) are of an elongated tetragonal arched form, and occupy the sides of the disk. They occupy the space between the snout and the abdominal cavity, their internal concave margin bordering the branchial apertures. The length of each is a little more than $\frac{1}{3}$ of the length of the fish, and each occupies a space about double that of the abdominal cavity. Each organ is composed of a number of pentagonal or hexagonal cells, filled with a transparent colourless fluid. The anterior and external margins are surrounded by a bundle of cartilaginous fascicles (*b.*) outside of which appears a long cutaneous nerve (*c.*) from which proceed at right angles a number of small branches towards the external margin of the pectoral fins. The abdominal cavity (*d.*) is remarkably reduced. The intestinal canal, from the entrance of the Ductus coledochus, measures $\frac{1}{4}$ of the total length of the fish. The liver consists of two large, elongated lobes. Beneath the anterior part of the right lobe appears the small oval gall-bladder. The small linear spleen is attached to the major arch of the stomach, close to the pylorus. Plate XII. Fig. 2 represents the brains, viewed from above. Immediately behind the spiracles (*a.* the left,) appear two branches of *Trigeminus*. The anterior (*b.*) proceeds along the anterior margin of the electric organ, the posterior (*c.*) also supplies the anterior part of the organ. The posterior part of the organ is supplied by two very large branches of *Pneumogastricus* (*d. e*). Many of these fishes are infested by minute *Entozoa*. They occupy the cellular tissue immediately beneath the integuments of every part of the body, the electric organs not excepted. It is a *Cysteocercus*, barely perceptible to the naked eye.

(3911) *Cysteocercus temerœ*, Cantor. (Pl. XII. Fig. 3.) Of a pyriform shape. From the oval bladder proceeds the conical, elongated neck, which terminates in a pore, surrounded by recurvous spines. The colour is hyaline with numerous brownish dots; the cavity of the bladder is pale greenish. The figure is magnified, as it appeared under $\frac{1}{20}$ single lens.

Fam. TRYGONISIDÆ.

A. Tail without spine.

Genus RHACHINOTUS, *Cantor.* [Ῥάχος thornbush; νῶτος back. Substituted for *Anacanthus*, Ehrenberg, 1837, pre-occupied by *Anacanthus*, Gray, 1831, (*Pisc.*) and *Anacanthus*, Serville 1832, (*Coleopt.*)] (*Equivalent to* Anacanthus, *Ehrenberg*, 1837.) Teeth flattened. Tail without radiated fin, but with a skinny hem beneath, or naked.

(3912) *Rhachinotus africanus*, (Bloch-Schneider.)

Syn. Raja africana, Bloch-Schneider, 367.
Anacanthus africanus, Muller und Henle, 157.

Above greenish white; beneath white. Iris golden greenish; pupil triangular, black. Inhabits *Sea of Pinang*, Guinea, Red Sea. The disk is rounded, a little narrower towards the tail than towards the slightly projecting pointed snout. A space about 4 inches in breadth, comprising the snout, forehead and the pectoral fins, is free from scales, but sparingly covered with distant thorns. The latter, of which none exceed $\frac{1}{8}$ inch in height, stand erect on a rounded or oval radiated base. The head from between the eyes, the back and the anterior two-thirds of the tail, (the latter above and beneath,) are thickly covered with small heart-shaped scales. Their surface is smooth, obliquely raised towards the apex, which is gene-

rally directed inwards to the mesial line of the body. Their margin is abrupt, with three or four concentric lines or strata. Between the scales are scattered a number of single thorns, the longest of which are about $\frac{3}{16}$ of an inch. Their base is stellate, with three to five roots fitting into the intervals between the nearest scales. The thorns are generally erect, but those of the posterior part of the back and of the tail are directed slightly backwards. On the upper part of the anterior fifth of the tail the thorns cease. The tail is compressed, gradually tapering to a narrow point, and densely covered with scales as far as the posterior third, where they become few and far between. The abdominal surface of the tail, as far as the thorns extend, is broad, convex; the rest is acute and presents a naked, indistinct, skinny hem. The abdominal surface of the body is smooth, naked.

Length from the point of the snout to the mouth,.....	0 ft.	$2\frac{6}{8}$ inch.
From the mouth to the anus,	1	$0\frac{5}{8}$
From the anus to the apex of the tail, ...	1	$7\frac{1}{8}$
Distance between the eyes, ...	0	$2\frac{5}{8}$
Greatest breadth of the disk,	1	4

A single female occurred at Pinang in Dec. 1843.

Genus TRYGON, (*Adanson*), *Muller und Henle* 1841. Disk oval or rhombic; tail as long as the body or longer, without hem, or with hems not extending to the apex. Mouth a little arched. Teeth with a central point or transversal tubercle, which in some is rough, with a more or less distinct transversal furrow in front and behind; the furrow of the lateral teeth becomes more distinct. The whole surface is more or less wrinkled. Membranous valve of the upper jaw with a straight, deeply fringed margin; a second posterior valve deeply notched. In the lower jaw behind the teeth appear generally several papillæ.

A. Tail without fin.

(3913) *Trygon uarnak*, (Forskal).

Syn. Raja ommes scherit, Forskal, Descr. IX.
Raja uarnak, ibid. 18. No. 16. b.
Raja uarnak, Linne: Syst. 1509.
Raja uarnak, Bloch-Schn. 364.
Pastinachus warnak Ruppell: Neue Wirbelth. Fische. 69. Taf. 19, Fig. 2. a. b.
(*Icon*). Trygon russelli: Gray: Ill. Ind. Zool. II. Pl. 100.
Trygon variegatus, McClelland: Calcutta Journal of Nat. Hist. I. 60, Pl. II. Fig. 2.
Trygon uarnak, Muller und Henle, 158.* } (*Adult*).
Trygon uarnak, Var. 1, Muller und Henle, 158. }
Trygon uarnak, Var. 2, 3, 4, Muller und Henle, 158 (*Young*).
Trygon uarnack, Richardson: Report, 1845, 197.

[* M.M. Muller and Henle, quote as synonymes: "Trygon uarnak, } Ruppell, Atlas, p. 51." "Trygon omeschcrit. }
The quotation, which has been repeated by Sir John Richardson, l. c., is a mistake. The two names occur neither in page 51. nor in the "Alphabetisches Verzeichniss" of Dr. Ruppell's Atlas.]

Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Indian Ocean, Red Sea, Bay of Bengal, Mouths of the Ganges, China Sea, Cape of Good Hope. (*Young*). Body above light redddish brown or greenish-olive, with numerous black spots, between which the ground-colour appears like a network; beneath whitish; tail brownish white with numerous black rings or transversal bands. (Disk 6 to 9 inch. broad.—*Var.* 2 and 4, M. u. H.) (*Older*). Brownish- or greyish- olive with numerous whitish spots; posterior part of tail in some with indistinct blackish or whitish rings. (Disk 3 ft. broad.—*Var.* 3, M. u. H.) (*Adult*). Uniformly brownish- or greenish- olive. Iris golden; pupil transversely oval. In the very young individuals the eyes are very prominent and project above the level of the spiracles. The skin is naked, and in the centre of the back appears but a single heart-shaped white tubercle. In a spotted individual, 9 inches broad, there is a second smaller heart-shaped tubercle behind the former, and the head and the sides along the spine of the back are scantily covered with minute distant heart shaped scales, which on the root of the tail are placed in a double longitudinal series. On the tail appear numerous very minute, distant thorns, which later disappear. In older individuals (upwards of 3 feet broad), the head, back and sides and the anterior half of the tail are covered with smooth orbicular scales, the intervals between which are filled with many smaller than the rest. The disk is a little broader than long. The distance from the point of the snout to the centre between the nostrils exceeds by one third the distance between the nostrils. The snout is more prominent in the young than in the adult. The tail is compressed towards the spine, the rest cylindrical, tapering to a thin point. Its length is about four times that of the body. On the lower surface appears a very indistinct skinny hem. The spine is situated at the termination of the anterior seventh or ninth of the tail. Its length is liable to considerable individual variations. The following dimensions were taken from a young male, (*Var.* 3, M. u. H).

From the snout to the mouth,	0 ft.	$3\frac{4}{8}$ inch.
,, mouth to the anus,.....	1	$0\frac{4}{8}$
Length of the tail,.....	5	$3\frac{5}{8}$
Greatest breadth of the disk,.	1	$10\frac{4}{8}$
Distance between the nostrils,	0	$1\frac{4}{8}$
,, ,, eye,.....	0	3

Distance from the snout to the eyes,	0 ft.	$3\frac{4}{8}$ inch.
Breadth of the mouth,	0	$1\frac{5}{8}$

Young individuals of this species are numerous at all seasons in the Straits of Malacca, but larger ones, with the body about 4 feet in length, are uncommon.

(3914) *Trygon imbricata*, (Bloch-Schneider).

Syn. Raja imbricata. Bloch-Schn. 366.
Russell, IV. Isacurrah Tenkee. (*Very young.*)
Cuv. R. A. II. 399 (3).
Trygon imbricata, Muller und Henle, 164.
Trygon imbricata, Bleeker: Verh. Batav. Genoots. XXII. 6.

Above lighter or darker brown; the tail in some lighter than the body; beneath white. Iris golden; pupil transversely oval. Inhabits *Sea of Pinang, Singapore, Malayan Peninsula*, Bay of Bengal, Java, Madura. The snout is acutely pointed; the disk is of equal length and breadth; the external and the posterior angle of the pectorals are rounded. The distance between the nostrils is less than one half of that from the snout to the centre between the nostrils. The tail is but little longer than the body. The head from between the eyes is covered with minute, somewhat distant scales. They are heart-shaped, of unequal size, with the apex directed towards the snout. On the back appears an irregularly oval patch of similar scales, with their points directed towards the tail. Between the occiput and the scapular region appear a series of single scales, larger than the rest. The anterior fourth of the tail is compressed and above covered with scales like those of the back, with a mesial line of distant lanceolate scales, which gradually increase in length towards the two spines. The anterior of the two spines is situated at the termination of the anterior fourth of the tail. It is a little shorter than the posterior, which is situated a little more backwards, and is about $\frac{1}{4}$ of the length of the tail. Behind the two spines the tail is naked and becomes very slender and tapering. Beneath it appears a very indistinct trace of a skinny hem. Single small individuals occur at Pinang at all seasons.

Breadth of the disk,	$5\frac{1}{8}$ inch.
From the snout to the anus,	$5\frac{2}{8}$
Length of the tail,	$7\frac{5}{8}$
From the snout to the mouth,	$1\frac{6}{8}$
„ to the eyes,	$1\frac{6}{8}$
Breadth of the mouth,	$0\frac{5}{8}$
Distance between the eyes,	$0\frac{7}{8}$
Length of the posterior spine,	2

(3915) *Trygon zugei*, Bürger.

Syn. Trygon zugei, Muller und Henle, 165. Taf.
Tyrgon zugei, Richardson: Report, 1845, 197.

(*Young.*) Above brownish yellow; caudal membranes black; beneath reddish white. Iris golden; pupil transversely oval. Inhabits *Sea of Pinang*, Indian Ocean, Sea of Japan, China. The snout is very prominent, acute. The anterior margins of the disk are straight, the posterior convex. The external angle of the pectorals is equidistant from the apex of the snout and the anus. The length of the disk slightly exceeds the breadth. The distance between the nostrils and the apex of the snout is contained $3\frac{1}{2}$ times in that between the apex and the centre between the nostrils. The distance between the eyes is $\frac{1}{3}$ of their distance from the point of the snout. The teeth have a transversal keel. The thin tapering tail is double the length of the body. The spine is situated nearly at the anterior fourth of the tail. Behind the spine appear a superior and inferior membrane. Both are low, the inferior longer than the superior. The body is naked, but on the dorsal column, between the occiput and the scapular region, appear 3 distant small thorns. Some distant, very minute thorns appear on the sides of the tail behind the spine. The latter is about $\frac{1}{6}$ of the length of the tail.

From the apex of the snout to the mouth,	$1\frac{7}{8}$ inch.
„ mouth to the anus,	$2\frac{2}{8}$
Length of the tail,	9
Distance between the nostrils,	$0\frac{7}{16}$
Greatest breadth of the disk,	$4\frac{2}{8}$
Distance between the eyes.	$0\frac{5}{8}$
Breadth of the mouth	$0\frac{7}{16}$

Single young individuals occur at Pinang but rarely.

Genus PTEROPLATEA, *Muller und Henle*, 1837. The disk is nearly or more than twice as broad as long. Tail short, generally shorter than the body, naked or with low fins. Mouth slightly arched. The teeth do not extend to the angles of the mouth; they carry one to three points. The upper membranous valve of the jaw is indistinct, without fringes. No papillæ in the lower jaw. The skin is smooth, or covered with tubercles.

(3916) *Pteroplatea micrura*, (Bloch-Schn.)

Syn. Trygon micrura, Bloch-Schn. 300.
Russell, VI. Tenkee Kunsul. (*Young.*)
Raja poecilura, Shaw, V. 291.
Trygon kunsua, Cuvier, R. A. II. 400(4)
Trygon poecilurus, Bennet: Life of Raffles, 694.
Pteroplatea annulata, Swainson, II. 319.
Pteroplatea micrura, Muller und Henle, 169.
Pteroplatea micrura, Richardson, Report, 1845, 197.

(*Very young.*) Above reddish- or bluish- brown, with numerous dark dots, or with distant indistinct light spots; beneath bluish- or reddish- white. (*Older.*) Above bottle-green, or bluish-brown; tail with black and white or rose-coloured rings;

beneath whitish. Iris golden, pupil transversely oval. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Bay of Bengal, Mouths of the Ganges, Red Sea, Sumatra, Java, Borneo, China Sea. The snout is little prominent. The anterior margin of the pectorals is a little longer than the posterior and slightly concave in the middle; the posterior is convex; the external angle is conical, the posterior obtusely rounded. In younger individuals the length of the disk, from the snout to the anus, is less than one half of the breadth of the disk, or the distance between the external angles of the pectorals. In older individuals the length is $\frac{3}{4}$ of the breadth of the disk. The distance between the inner angles of the nostrils is about one half of the greatest diameter of the nostril. The distance between the external angles of the nostrils is double the distance from their centre to the point of the snout, or their nearest distance from the pectoral margin. The teeth are tricuspidate; their central cusps are erect and longer than the lateral horizontal ones. In both jaws the teeth are confined to the central third, on each side of which in the upper jaw appears a notch corresponding to a minute prominence in the lower jaw. The depressed tongue occupies the whole breadth of the mouth. The margin of the spiracles carries no denticle. The body is naked. The ventral fins are elongated tetragonal, with the posterior angles rounded. The male appendages project beyond the inner margins of the ventrals, and extend to the root of the caudal spine. The length of the tail varies: in the very young it is shorter than the body; later it becomes a little longer than the body. It is depressed towards the spine, from thence it is cylindrical, very slender and tapering. It has no fins. The slender spine is situated at the anterior fifth. In the young, with the disk upwards of one foot in breadth, it is hidden in the integuments, and scarcely $\frac{1}{12}$ of the length of the tail. In a male, $15\frac{4}{5}$ inch in breadth, the spine is nearly $\frac{1}{13}$ of the length of the tail. The largest individual observed was taken in 1840 near the Island of Lantao, in the mouth of the Canton River; the disk measured 4 feet in breadth, 3 feet in length, and the tail 1 foot. The tail was armed with two spines situated close to each other; each about one inch in length. Single young individuals occur at all seasons in the Straits of Malacca.

Dimensions.

From the snout to the mouth, ...	$1\frac{5}{8}$ inch.
From the mouth to the anus, ...	$4\frac{3}{8}$
Length of the tail, ...	8
Distance between the inner angles of the nostrils, ...	$0\frac{3}{8}$
Greatest diameter of the nostrils, ...	$0\frac{6}{8}$
From the snout to the eyes,...	$0\frac{7}{8}$
Distance between the eyes, ...	$1\frac{7}{8}$
Breadth of the disk, ...	$15\frac{4}{8}$

Genus HYPOLOPHUS, *Muller und Henle*, 1837. Form of the body like *Trygon*. Tail beneath with a fin, not extending to the apex. Upper fin, absent. Differs principally from *Trygon* by the peculiar form of the mouth and the teeth. The centre of the lower jaw is pointed and projecting, and has on each side a forwards directed cavity. The margin of the upper jaw is excavated in the centre to receive the point of the lower jaw, and is very convex on each side. Teeth like paving stones, hexagonal, broader than long; in the upper jaw the teeth of the centre are small, those of the sides large; in the lower jaw they are nearly of equal size: the external ones smaller.

(3917) *Hypolophus sephen*, (Forskal.)

Syn. Raja sephen, Forskal: Descr 17, No. 16.
Raja sephen Lacep. I. 123.
Raja sephen, Bl. Schn. 364.
Russell III. Wolga Tenkee.
Raja sephen, Shaw, V. 288.
Raja sephen. Var. Shaw. V. 289.
Trygon sephen, Cuv. R. A. II. 399.
Trigon sephen, Ruppell: Atlas, 52.
Trigon forskalii, ibid. 53, Taf. XIII. Fig. 2.
Trigon sephen. Ruppell: Neue Wirbelth. Fische, 69, Taf. XIX. Fig. 5, (Teeth.)
Hypolophus sephen, Muller und Henle, 170.
Hypolophus sephen, Bleeker: Verh. Bat. Gen. XXII. 6.

(*Young.*) Above reddish brown; the scaly portion of the head, back and tail lead-coloured; tail behind the spine, and caudal fin blackish brown; beneath whitish. Iris golden; pupil transversely oval, black. Inhabits *Sea of Pinang*, *Malayan Peninsula*, *Singapore*, Bay of Bengal, Mouths of the Ganges, Red Sea, Indian Ocean, Java, Madura. The disk is rhombic, with rounded angles. In the very young the snout is more pointed than in the older. The external angles of the ventrals are acute, the internal obtuse. The distance between the nostrils is one half of their distance from the snout. The distance from the snout to the eyes exceeds by one third that between the eyes. The snout is above covered with distant tricuspidate scales. On the upper part of the head, back and on the root of the tail they are smooth, hexagonal, with their anterior and posterior margins denticulated and with a shallow cavity in their centre. Three large heart-shaped convex plates, placed longitudinally, appear on the scapular region. Of the three the central one is the largest, the anterior the smallest. The tail is from three to four times the length of the body. As far as the spine it is depressed, trigonal and tapering; the portion supporting the caudal is compressed and with minute lanceolate scales; the rest is very attenuated like a whip cord. The spine is situated a little behind the anterior third of the tail; its length varies from $\frac{1}{8}$ to $\frac{1}{3}$ of the tail. The caudal membrane commences beneath the root of the spine and continues beyond the

central third of the lower margin of the tail. Its height is less than that of the part of the tail to which it is attached. Single young individuals occur at all seasons in the Straits of Malacca.

Dimensions.

From the snout to the mouth,	$1\frac{5}{8}$ inch.
From the mouth to the anus,	$4\frac{3}{8}$
Length of the tail,	$26\frac{5}{8}$
Distance between the inner (anterior) angles of the nostrils,	$0\frac{5}{8}$
From the snout to the eyes,	2
Distance between the eyes,	$1\frac{3}{8}$
Breadth of the disk,	$7\frac{6}{8}$

Genus TAENIURA, *Muller und Henle*, 1837. Disk rounded. Tail not much longer than the body, depressed in front of the spine, compressed behind it, with a high inferior fin, which commences from the spine and extends to the apex of the tail. The upper margin of the tail carries frequently a low longer or shorter skinny hem, extending to the apex of the tail. The caudal spine a little in front of the middle of the tail. Nostrils approximated as in *Trygon*. Teeth flattened, with a transversal protuberance, or pointed. Mouth straight or undulating. Membranous valve behind the upper jaw straight; that behind the lower jaw without papillæ.

(3918) *Taeniura lymna*, (Forskal.)

Syn. Raja lymna, Forskal: Descr. 17, No. 15.
Raja lymna, Linne: Syst. 1511.
Raja lymna, Lacép. I. Tab. IV. Fig. 2-3.
Raie torpille, ibid. Tab. VI. Fig. 1,
Raja lymna, Bl. Schn. 364.
Raja lymna, Shaw V. 287.
Trigon lymna, Ruppell: Atlas, 51, Taf. 13, Fig. 1.
Trygon lymna, Cuv. R. A. II. 400 (2)
Trigon lymna,: Ruppell: Neue Wirbelth. Fische, 69. Taf. 19, Fig. 4. (Teeth.)

(*Icon.*) Trygon ornatum, Gray: Ill. Ind. Zool. I. Pl. 99.
Trygon lymna, Swainson. II. 313.
Taeniura halgani, Lesson in Duperrey: Voy, II. 100.
Taeniura lymna, Muller und Henle, 171. 197, Taf. (Mouth.)

(*Young.*) Above brownish bronze, with numerous oval and round ultramarine spots; from the scapular region on each side of the back a broad ultramarine band, continuing on the sides of the tail to the root of the spine; caudal fin pale brownish, the lower margin edged with black; beneath greenish white. Iris narrow golden round the pupil, the rest dark blue; pupil transversely oval, black. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, Indian Ocean, Red Sea, Timor, New Ireland.

Dimensions.

From the snout to the mouth,	$0\frac{6}{8}$ inch.
From the mouth to the anus,	$3\frac{2}{8}$
Length of the tail,	6
„ of the caudal spine,	1
Distance between the eyes,	$0\frac{4}{8}$
Breadth of the disk,	$4\frac{4}{8}$

This species is of rare occurrence in the Straits of Malacca.

Fam. MYLIOBATIDIDÆ.

Genus MYLIOBATIS (*Dumeril*, 1817) *Muller und Henle*, 1841. (Aetobatis, *Blainville*, 1828.) Snout pointed, composed by the united, anterior pectoral rays. Nasal valves united, with straight margin. Mouth transversal. Both jaws with straight margin. Teeth hexagonal, in the centre a series of broader teeth, backwards, increasing in breadth. On each side smaller, tetragonal plates resembling paving stones, fitting into the zig-zags of the central teeth. The teeth of the upper jaw longitudinally and transversely convex; those of the lower jaw flat, scarcely somewhat concave; teeth of neither jaw occupy the entire breadth.

(3919) *Myliobatis nieuhofii*, (Bloch-Schn.)

Syn. Aquilæ marinæ species, Willoughby, 6, Tab. X. Fig. 3 (App.)
Raja nieuhofii Bl. Schn. 364
Russell, VII. Mookarah Tenkee.
Raja fasciata, Shaw, V. 286, Pl. 143.[(3)
Myliobatis nieuhowii, Cuv, R. A. II. 401
Myliobatis aquila, Bonaparte: Fauna It. Fasc. II.
Myliobatis nieuhofii, Müller und Henle, 177.
Myliobatis nieuhofii, Richardson: Report, 1845, 197.
Pari klawar of the Malays.

(*Young.*) Above yellowish brown, with six or more narrow transversal bands of deep bluish purple; beneath whitish; tail blackish brown; posterior half with irregular white spots. Iris golden, pupil vertically elliptical. Teeth pale amber-coloured. Inhabits *Sea of Pinang*, Indian Ocean, Coromandel, Chinese and Australian Seas, Mediterranean. In the very young the apex of the snout is double the length of the nasal valve. The pectorals are sickle-shaped. The dorsal is triangular, commencing at the root of the tail, and not extending beyond the apex of the ventrals. The length of the body is contained $2\frac{1}{4}$ times in the greatest breadth of the disk. The body is naked, and the tail without spine. The tail exceeds four times the length of the body. A female, observed at Pinang in May 1845, was of the following dimensions.

From the snout to the mouth,	$0\frac{5}{8}$ inch.
„ mouth to the anus,	$2\frac{5}{8}$
Length of the tail,	$14\frac{4}{8}$
From the root of the tail to the dorsal,	$0\frac{2}{8}$
From the snout to the eyes,	$0\frac{3}{8}$
Distance between the eyes,	$0\frac{6}{8}$
Breadth of the nasal valve,	$0\frac{4}{8}$
Length of do.	$0\frac{2}{8}$
Greatest breadth, (between the external angles of the pectorals,)	$8\frac{8}{8}$

(3920) *Myliobatis milvus*, Valenciennes.

Syn. Myliobatis milvus, Muller und Henle, 178.
Pari klawar of the Malays.

(*Young.*) Above, pale fawn-coloured; on the head and back a number of distant anastomosing black lines, which on the anterior half of the root of the pectorals are arranged transversely, so as to make the ground-colour between them resemble very broad transverse bands; on the rest of the body, on the pectoral and ventral fins the black lines form an open net-work; the anterior margin of the pectorals, to near the apex, and the dorsal, pale fawn-coloured without black meshes. Anterior sixth of tail fawn-coloured, indistinctly ringed with blackish brown; rest of the tail black; abdomen white. Iris narrow golden round the pupil, the rest fawn-coloured; pupil heart-shaped, with the apex downwards. Teeth pale amber-coloured. Inhabits *Sea of Pinang*, Red Sea. The form of the body, teeth and fins is similar to that of *M. nieuhofii*, but the position of the dorsal fin differs. It commences farther behind the termination of the base of the ventrals, close to their apex, beyond which it does not extend. The male appendages are shorter than the corresponding margin of the ventrals; they are white, with a black longitudinal streak above. At its root the tail is greatly compressed, two edged, like the blade of an oar; the rest is slender like a whipcord; its length is $4\frac{1}{2}$ times that of the body. The tail has neither spine nor fin. The body is naked. A single young male was observed at Pinang in August 1846. It was of the following dimensions:

From the snout to the mouth, ...	$1\frac{2}{8}$ inch.
„ mouth to the anus, ...	$6\frac{3}{8}$
Length of the tail, ...	$46\frac{2}{8}$
„ from the root of the tail to the dorsal, ...	$1\frac{1}{8}$
Base of the dorsal, ...	$0\frac{6}{8}$
Anterior margin of do., ...	$0\frac{6}{8}$
Posterior margin of do., ...	$0\frac{3}{8}$
Distance between the eyes, ...	$1\frac{5}{8}$
Distance between the nostrils, ...	$0\frac{7}{8}$
Breadth of the mouth, ...	$0\frac{6}{8}$
Anterior margin of the pectorals, ...	$9\frac{5}{8}$
Posterior margin of the pectorals, ...	$7\frac{3}{8}$
Base of the ventrals, ...	$0\frac{4}{8}$
External margin of do., ...	$1\frac{2}{8}$
Internal do., ...	$1\frac{1}{8}$
Male appendage, ...	$0\frac{7}{8}$
Greatest breadth of the disk (between the external angles of the pectorals,) ...	19

Genus STOASODON, *Cantor.* [Στοὰ, arcade; ὀδὼν, tooth. Substituted for *Aëtobatis*, Muller und Henle, 1841, preoccupied by *Aëtobatis*, Blainville, 1828, which as observed, is a synonyme of *Myliobatis*. The characters given are those of M.M. Muller und Henle.] (*Equivalent to* Aëtobatis, *Muller und Henle*, 1841.) Snout acute, undivided. The lower margin of the united nasal valves deeply indented. The frænulum of the nasal valve is covered with papillæ which are transversely disposed in front of the upper jaw. On the dorsal surface of the nasal valve, near the external margin, a lobule with fringed edge. Lower jaw acute, projecting beyond the upper; upper jaw with a straight margin. The dental laminæ of both jaws form a series, without smaller lateral teeth; in the lower jaw the laminæ are arched and parallel to the margin of the jaw. The laminæ do not occupy the whole breadth of the jaw.

(3921) *Stoasodon narinari*, (Bloch-Schneider.)

Syn. Narinari, Maregrave, 176.
Ruysch: Thes. T. XXXIX. Fig. 6.
La raie aigle, Lacep. I. Pl. 6. Fig. 2.
Raja narinari Bloch-Schn, 361.
Russell. VIII. Eel-tenkee.
Raja guttata. Shaw. V. 285, Pl. 142.
Raja quinqueaculeata, Quoy et Gaim. Freycin. 200, Pl. 43, Fig. 3.
Myliobatis narinari Cuv.R. A. II. 401 (3)
Myliobatis narinari, Bennett: Life of Raffles, 694.
Myliobatis eel-tenkee. Ruppell: Neue Wirbelth. Fische, 70, Taf. 19, Fig. 3 (Teeth.)
Actobatis indica, Swainson, II. 321.
Myliobatis narinari, Agassiz: III. Taf. D. 1. 2. (Teeth.)
Myliobatis macroptera, McClelland: Calc. Journ. Nat. Hist. I. 60, Fig. 1, a. b.
Actobatis narinari, Muller und Henle, 179.
Actobatis narinari, Bleeker: Verb. Batav. Gen. XXII. 6.
Pari lung of the Malays.

Above greenish olive or greenish grey; a little behind the occiput and behind the anterior margin of the pectorals appear more or less numerous greenish-white rounded spots, edged with black; tail behind the spine black; abdominal surface of disk and tail as far as the spine greenish white; rest black. Iris greenish golden; pupil vertically elliptical. Teeth greenish white. Inhabits *Sea of Pinang, Malayan Peninsula, Singapore*, India Ocean, Red Sea, Bay of Bengal, Mouths of the Ganges Sumatra, Java, Madura, Brazil, Surinam. Greatest Breadth: 3 feet. The snout is conical and about $\frac{1}{4}$ broader than long, and not quite double the length of the nasal valve. The nasal lobule is broad conical. The shape of the disk resembles that of *Myliobatis milvus*. The dorsal fin commences near the termination of the base of the ventrals, but terminates at some distance in front of the apex of the ventrals. The latter are elongated, about thrice as long as broad. The male appendages do not extend beyond the corresponding margin of the fin, and are shorter in the young. The tail is trigonal as far as the spine, the rest is compressed and flagelliform. Its length is thrice or four times that of the body. The spine is situated immediately behind the termination of the dorsal; its length equals its distance from the anus. Some individuals are armed with a second somewhat longer spine, a little behind the root of the former. The dental laminæ of the upper jaw are very slightly arched; the anterior

margin of the external laminæ exhibits numerous vertical denticulations. The laminæ of the lower jaw are but $\frac{2}{3}$ of the breadth of those of the upper, but they are more convex, forming in the centre an obtuse angle. Single young individuals occur at all seasons in the Straits of Malacca. The following dimensions were taken from a young male, armed with two spines :

From the snout to the nostrils, ...	1 inch.
From the nostrils to the mouth, ...	$0\frac{4}{8}$
From the mouth to the anus, ...	$5\frac{6}{8}$
Length of the tail, ...	$33\frac{6}{8}$
Distance between the nostrils,... ...	$0\frac{5}{8}$
„ „ the eyes.	$1\frac{1}{8}$
Breadth of the mouth, ...	$0\frac{5}{8}$
Distance from the snout to the eyes,	$1\frac{1}{8}$
Length of the anterior spine, ...	$1\frac{2}{8}$
„ of the second do., ...	$1\frac{0}{8}$
Greatest breadth of the disk, ...	$11\frac{5}{8}$

Genus RHINOPTERA, (*Kuhl*) *Muller und Henle*, 1841. The snout deeply divided by a central incision. The cranial fins are not on a level with the pectorals, but lower down, and are fixed at the inferior margin of the root of the pectorals. The rays of the cranial fins commence farther back than the termination of the pectorals. The lower margin of the nasal valve is straight ; the external angle acute ; on each side of their dorsal surface a longitudinal fold. The teeth stand side by side in 3 to 5 rows of broad hexagonal plates which laterally decrease in size. Outside appear several rows of smaller teeth, which are not broader than long. They occupy the entire breadth of the jaw.

(3922) *Rhinoptera adspersa*, Valenciennes.

Syn. Rhinoptera adspersa, Muller und Henle, 183.
Pari daun of the Malays.

(*Young.*) Above pale fawn-coloured ; beneath white. (*Older.*) Above chocolate brown or greenish olive ; beneath white. Iris golden fawn-coloured ; pupil vertically elliptical. Teeth yellowish white. Inhabits *Sea of Pinang*, Indian Ocean. The teeth of both jaws are similar ; those of the centre row are hardly thrice as broad as long. The other rows gradually decrease towards the sides of the mouth. There are nine rows in the upper jaw, seven in the lower. The margin of the nasal valve is finely denticulated, its length is $3\frac{1}{2}$ times its height. The anterior margin of the pectorals is slightly convex ; the posterior concave ; the angles acute. The ventrals are tetragonal, considerably projecting beyond the pectorals. The dorsal commences at the termination of the ventrals, and extends a little beyond their apex. The tail is about 3 to $3\frac{1}{2}$ times the length of the body ; the anterior third is greatly compressed ; the rest flagelliform. At a short distance from the dorsal is situated a small spine, but little longer than the base of the dorsal ; a little behind it appears a second, scarcely longer than the preceding spine. In the young the back is smooth. In older individuals M.M. Muller und Henle describe the back as being rough from minute spines with stellate base. At Pinang this species occurs at irregular intervals, singly or a few together. The following dimensions were taken from a young female.

From the incision of the snout to the centre between the nostrils,.....	1 inch.
„ the nostrils to the mouth, ...	$0\frac{2}{8}$
„ the mouth to the anus, ...	$5\frac{4}{8}$
Length of the tail, ...	24
Breadth of the margin of the nasal valve,.....	$1\frac{4}{8}$
„ of the mouth,.....	$1\frac{1}{8}$
„ of the disk, ...	13
Length of the posterior margin of the pectorals, ...	$0\frac{7}{8}$
„ of external margin of the ventrals.....	$1\frac{2}{8}$
„ of each caudal spine, ...	$0\frac{4}{8}$

Fam. DICEROBATIDIDÆ.

Genus DICEROBATIS, (Diarobatus, *Bloch,*) *Blainville*, 1828. (Cephalopterus, [*Dumeril,*] *Risso*, 1810.[Pre-occupieb dy *Cephalopterus*, Geoffroy, 1809, (*Aves*).]—Cephaloptera, *Risso*, 1826). Mouth on the abdominal surface. Teeth of both jaws minute, flattened, like paving stones, of different forms. The rays of the pectorals extend closely to the skull. The anterior margin of the pectorals is convex from the skull behind the eyes to the apex. [*Cephaloptera*, Muller und Henle, page 184.]

(3923) *Dicerobatis eregoodoo*, (Cuvier).

Syn. Russell : page 5, No. IX. Eregoodoo Tenkee. R. (Dorsal view).
Cephaloptera eregoodoo-tenkee, Cuv. R. A. II. 402 (1).

(*Young* ?) Above intense purple, with blue and violet reflections ; at the apex of the dorsal fin a whitish rounded spot ; external margin of ventrals white ; upper (external) surface of the cranial fins, and side of the head behind the eyes white ; lower (internal) surface of the cranial fins silvery grey, of a chequered appearance, produced by the transverse divisions of the rays ; the apex and internal margin broadly brimmed with black ; beneath white ; tail, as far as the ventrals extend, white, rest black ; margin of the snout and both jaws black. Iris purple ; pupil vertical, resembling the figure 8, or two vertically placed balls. Inhabits *Sea of Pinang*, Coromandel. The inner half of the anterior margin of the pectorals is very slightly concave, the outer half convex ; the posterior margin is concave : the external and internal angles acute. The length of the pectorals, from their origin, above and a little behind the eye, to their internal angle, is about $\frac{2}{3}$ of the greatest breadth of the disk. The ventrals project but little beyond the

pectorals. The male appendages are about $\frac{1}{3}$ of the internal margin of the ventrals, slender and throughout attached to the margin. The tail slightly exceeds $1\frac{1}{2}$ times the length of the body; it is very slender, flagelliform, and nearly throughout tetragonal. The dorsal fin has the appearance of being triangular, but it has a posterior very short margin. It commences a little in front of the ventrals and terminates a little behind their termination. The apex of the dorsal hardly extends beyond the anterior half of the ventrals. The body is smooth to the touch. The upper surface of the head and the throat are perforated by numerous pores. At the posterior part of the back appear some very minute scales or spines, which resemble white dots. They are distant and offer no resistance to the touch. The tail is naked and without spine. The anterior margin of the head (the snout), between the cranial fins, is concave. The distance from the centre of this margin to the mouth is $\frac{1}{3}$ of the breadth of the mouth. The length of the cranial fins, from their origin a little behind the mouth to their apex, equals the distance between both fins across the throat. Both are parallel, not diverging, as they appear in M. M, Muller and Henle's figure of *Cephaloptera kuhlii*. They are turned upwards, their upper surface being longitudinally hollowed. The spiracles are very small, hid beneath the origin of the pectorals. The margin of the nasal valve is straight and covers nearly the whole of the upper jaw. The angles form a conical lobule. The narrow band of teeth extends in both jaws not quite to the angle, occupying the central $\frac{5}{7}$ of the breadth of the mouth. The teeth are uniformly minute, flattened, of a pentagonal shape, with backwards directed points. They have frequently two or three such points. They are generally twice broader than long, but in both jaws appear here and there a single tooth broader than the rest, as if composed of two or three teeth soldered together. The upper jaw has 80, the lower 95 rows of teeth, each consisting of 6, rarely 7. Behind the upper jaw appears a large membranous valve, the free margin of which is convex. There is no trace of a tongue. The equidistant gill-openings are arranged on two backwards converging lines. Each opening is of this figure ∽, the first being double the length of the fifth. The only individual examined, was observed at Pinang in February 1845. It was a male, apparently young, of the following dimensions:

From the centre between the cranial fins to the centre of the snout,	$3\frac{2}{8}$ inch.
From the centre of the snout to the mouth,	$1\frac{2}{8}$
„ the mouth to the anus,	11
Length of the tail,	$19\frac{2}{8}$
Distance between the nostrils,	$2\frac{7}{8}$
„ from the nostrils to the mouth,	$0\frac{5}{8}$
Breadth of the mouth,	$3\frac{5}{8}$
Length of the cranial fins,	$5\frac{1}{8}$ inch.
Distance between them,	$5\frac{1}{8}$
„ between the eyes,	5
Base (Length) of the pectorals,	$13\frac{3}{8}$
Breadth of do.,	$13\frac{1}{8}$
Base of the dorsal,	$1\frac{5}{8}$
Anterior margin of do.,	$2\frac{1}{8}$
Posterior „ of do.,	$0\frac{3}{8}$
Superior „ of do.,	$0\frac{7}{8}$
Length of the ventrals,	$2\frac{3}{8}$
„ „ „ first gill-opening,	$1\frac{4}{8}$
„ „ „ fifth do.,	$0\frac{7}{8}$
Distance between the first gill-openings	$3\frac{3}{8}$
Greatest breadth of the disk,	$30\frac{5}{8}$

The stomach is elongated cylindrical, half the length of the body; the intestines equal the length of the body. This fish agrees in several characters with Russell's *Eregoodoo Tenkee*, No. IX. R, (*not* No. IX. N, from St. Helena.) M. M. Muller and Henle express some doubt as to the identity of Russell's No. IX. and *Cephaloptera olfersii*, Muller, (*Plagiostomen*, page 185) from Brazil. According to the description of M. M. Muller and Henle, the latter differs from the present species in the following characters. In *C. olfersii* the distance of the mouth from the head is in proportion to the breadth of the mouth as 8 to 13: in the present species that distance is $\frac{1}{3}$ of the breadth of the mouth, or as 1 to 3. In *C. olfersii* the length of the cranial fins compared with their distance is as 8 to 11; in the present species both are equal. In *C. olfersii* the length of the pectorals, measured from their origin on the skull, equals half the breadth of the disk; in the present species their length is less than the breadth of the disk.—*No.* 208 *to* 210 *of Bengal As. Soc. Jour. October to December* 1849.

Works on Indian fishes. As some readers may be interested in the subject of Indian Ichthyology it may prove of use to enumerate the works in which Fishes of the Indian Seas and rivers are treated of. Most of those have been referred to in the foregoing pages, as Dr. Russell on the Fishes of the Coromandel Coast, 2 vols. folio, with plates; Dr. Hamilton Buchanan, "An Account of the Fishes found in the River Ganges and its Branches," 4to, with a volume of plates. Several of Dr. Buchanan's Fishes are figured in the late Gen. Hardwicke's Zoological Illustrations, according to Mr. McClelland. As. Res. XIX. p. 221; Bennett, on the Fishes of Ceylon; Mr. McClelland, on the Indian Cyprinidæ, As. Res. XIX. p. 217, Cantor on some Fishes of the Bay of Bengal, Journ. Royal Asiatic Society; Col. Sykes, on the Fishes of the Deckan, Transactions of the Zoological Society, Fische aus Caschemir, by M.M. Von. Hugel and Heckel; while many of the Indian Fishes, which are known to the French, are described in the Historie des Poisons of M.M. Cuvier and Valenciennes.

(3924) FISH, ARTIFICIAL HATCHING OF, In China, the hatching of eggs by artificial heat is well known, and extensively practised, as is, also, the hatching of fish. The sale of spawn for this purpose forms an important branch of trade in China. The fisherman collects with care on the margin and surface of water, all the gelatinous matters that contain spawn of fish, which is then placed in an egg shell, which has been fresh emptied, through a small hole, which is then stopped, and the shell is then placed under a setting fowl. In a few days, the Chinese break the shell in warm water (warmed by the sun); the young fish are then kept in water until they are large enough to be placed in a pond. This plan, in some measure, counteracts the great destruction of spawn by troll-nets, which have caused the extinction of many fisheries.—*Bonynge America, page* 165. See also FISHERIES.

(3925) FISH HOOKS.

Hamecons, FR. | Fischangeln. GER.

Are well-known instruments made of the best smooth, round, steel wire. In the United Kingdom they are manufactured chiefly at Redditch, in Worcestershire.—*Faulkner.*

(3926) FISH LIVER OIL. Is prepared chiefly on the Western Coast of India, although some is now made at Madras. The liver of the white shark is that generally used. The mode of preparing the best Cod liver oil, which is equally applicable to "Fish liver" is thus described.

"*Cod Liver Oil.*"—The proper season for preparing this oil is early in January when the livers are plump, firm, large, white, and full of oil—the livers are sometimes found diseased, and are specifically lighter than water, these should be rejected. Good livers should cut smooth, and not tear, when cut none of the substance should flow out in a half liquid state. The quantity of oil produced by livers depends much upon the time of the year. In the beginning of January 1000 livers were found by experiment to yield 37 Imperial gallons, and at the end of February an equal number only gave 23 gallons of oil. In the beginning of January 1000 livers of average size weighed 900 lbs. whilst in the last day of March the same number weighed only 575 lbs. The oil at these different seasons was equally pale, and the livers equally white, although much smaller and more flabby in the latter season. To prepare the oil—Wash the livers very carefully, first removing the gall bladders which adhere to them, and infuse them in rain or other water free from salt. Place them over the fire and never allow the heat to exceed 120 or 130°. On this head especial care must be taken, a higher degree of heat although yielding a larger product, communicates a rank fishy taste and smell and heightens the color of the oil, thereby rendering it disgusting to the Patient.—*M. E. of* 1855.

Medicinal—Seer Liver—Shark Liver and other Fish oils (used in cases of Rheumatism, Atrophy, Phthisis, Glandular swellings and all diseases of a strumous nature) were exhibited, of fine quality, from Mangalore, Tellicherry, Masulipatam and Pondicherry. The Oil is obtained from different fishes. Drawings of these would be interesting. There is an active demand for this article at all the Sea ports of the Western Coast, and the product has become of great importance as the Export Return shows. The preparations of fish oil is chiefly confined to Malabar and the Western Coast, whence it is exported to England in large quantities, the demand is also yearly increasing.

(3927) FISHMAWS.

Poota (large), Sozeelee (small), GUZ. HIND.

A term applied in oriental commerce to the air-bladder, sounds, or swims of certain large fishes, found in the Indian ocean. It is an article of luxury with the Chinese; and forms an important article of export from all the coasts. Small quantities of the superior kind are occasionally sent to England, from which it is supposed Isinglass is made. There are two kinds of fishmaws, distinguished by the terms *Poota* and *Sozeelee*, the difference consisting merely in the size—the latter being about one-fourth the size of the former. See AIR-BLADDER: ISINGLASS.

(3928) FISHING-NET FLOATS. Several light porous woods, such as *Gyrocarpus Jacquini* and *Salmalia Malabarica*; and the fruit of the Baobab are used as floats for fishing nets.

(3929) FISH ROW.

Meen chennay, TAM. | Sampa junna. TEL.
Mutchie ke undch, DUK. | *Ains. Mat. Med. p.* 154.

(3930) FISH SALTED. SALSAMENTA.

Curruadoo, TAM. | Kharie mutchie, DUK.
Ains. Mat. Med p. 154.

(3931) FLACOURTIA, the type of the order *Flacourtiaceæ*, was named in honour of Etienne de Flacourt, a director of the French East India Company, and the commander of an expedition to Madagascar in 1648, of which he gave an account. This genus is dicœcious; the staminiferous flowers have their stamens densely crowded, a hemispherical receptacle, and are glandless at the base; the pistilliferous flowers have the calyx 4-5-cleft, deciduous; the stigmas 4-9, each furnished with a longitudinal furrow above; the seeds long. The species are thorny shrubs, with whitish sepals and yellow stamens.

(3932) FLACOURTIA CATAPHRACTA. MANY-SPINED FLACOURTIA.

Panijala. HIND. | Panayala, DUK. BENG.
Taliputrie, BEN. | Talisha, SANS.
Gen. Med. Top. p. 211.

A fruit tree in gardens at Kotah. The *Flacourtia cataphracta* affords a popular medicine in Behar. The small leaves and shoots resemble

rhubarb in flavour, and are used as a gentle astringent in the dose of half a drachm in powder. An infusion of the bark in cold water is also employed as a remedy in hoarseness.—*O'Shaugh. page* 207. The young shoots and leaves of *F. cataphracta*, which have the taste but not the bitterness of rhubarb, are considered astringent and stomachic, and are prescribed in the Circars accordingly.—*Eng. Cyc.*

(3933) FLACOURTIA INERMIS has elliptical crenato-serrated leaves, with short axillary racemes of hermaphrodite flowers. It is an unarmed tree, attaining a height of 30 feet. It has reddish-purple berries of a pleasant acid taste. It is a native of the Moluccas, where it is also extensively cultivated for the sake of its fruit. There are several other species of *Flacourtia*, all of them yielding edible fruits.

(3934) FLACOURTIA RAMONTCHI has roundish ovate acute crenated leaves. This shrub attains a height of 8 feet, and is a native of the island of Madagascar, where it is called Ramontchi. The fruit, which is edible, is about the size of a small plumb, is red when ripe, at length becoming violet-coloured. It has a sweet and acid taste. There is a small island off the coast of Madagascar which is covered with these trees. This island is called by English sailors Plum-Tree Island: by the French, Isle aux Prunes.

(3935) FLACOURTIA SAPIDA, Roxb. FLACOURTIACEÆ. The Paneola Plum.

Pedda Canrew pundoo, TEL. | Bincha, DUK.

Pedda Canrew is the Telingoo name of a pleasant tasted fruit, the produce of a small sized tree a native of the mountainous parts of the Coromandel coast.—*Ainslie, p.* 230. *Flacourtia sapida* has elliptical leaves, serrated, bluntish at both extremities. It is a native of the mountainous districts of the East Indies. The fruit is about the size of a common currant, and of a red colour. The fruit is eaten by the natives, and the tree is called by the Telingese Pedda Canrew.—This fruit tree is generally cultivated about Calcutta, and grows to the size of a common plum: it resembles a gooseberry in appearance, the skin thin and shining and of a purple appearance. The tree is not common on the Western side of India, and only one or two are to be found in Bombay. The fruit there is not so large as in Calcutta, where it is common during the rains; it contains from ten to twelve seeds, and is both palatable and wholesome, and well worthy of more general cultivation. The tree grows to a large size.

(3936) FLACOURTIA SEPIARIA, Roxb.

Canrew pundoo, TEL. | Samla, SANS.

Canrew pundoo is the Telingoo name of a not unpleasant tasted, small fruit, which grows on a thorny, shrubby plant, found in the most uncultivated parts of the Coromandel coast. The Tamool appellation of this fruit is Sottay ela pullum, in Dukhanie it is called Jootay karoonday.—*Ainslie, p.* 222. The infusion of *F. sepiaria* is thought to be useful as a remedy for the bites of snakes.—*Eng. Cyc.*

(3937) FLACOURTIACEÆ OR FLACOURTIANEÆ, *Bixads*, a natural order of Plants belonging to Lindley's parietose group of Polypetalous Exogens. It has from 4-7 definite sepals cohering slightly at the base; the petals equal in number with the sepals, and alternate with them, sometimes wanting; the stamens hypogynous, equalling the petals, or twice as many or some multiple of them, and sometimes appearing as scales forming a nectary; the ovary roundish, distinct, sessile, or slightly stalked; the style absent or filiform; the stigmas equal in number to the valves of the ovary, more or less distinct from each other; the fruit 1-celled, sometimes indehiscent and fleshy, sometimes capsular, 4-5-valved, filled with a fine pulp inside; the seeds few, thick, usually enveloped in a pellicle formed by the withered pulp, the albumen fleshy, somewhat oily, the embryo straight in the axis, with the radicle turned to the hilum, and therefore usually superior; the cotyledons flat, foliaceous. This order consists of shrubs and small trees, with alternate simple coriaceous leaves on short stalks, and axillary many-flowered peduncles. The affinities of this order are with *Samydaceæ*, *Lacistemaceæ*, *Pangiaceæ*, and *Tiliaceæ*. They may be distinguished from all other plants by their unilocular fruit having their inside wholly covered with the placentæ. About 31 genera and 85 species are referred to this order. These plants are natives of the hottest parts of the East and West Indies and Africa. Three of the genera—*Flacourtia*, *Hydnocarpus*, and *Chaulmoogra*—yield plants used by man; few, if any, are cultivated for ornament. *Hydnocorpus* (from ὕδνον, a tuber, and καρπος, a fruit) has diœcious flowers, the staminiferous ones with 5 stamens, 5 sepals, the two outer ones being ovate, 5 petals with villous margins furnished with a scale on the inside; the berry is spherical, terminated by four reflexed tubercles. There is only one species of this genus, which is a tree about 30 feet in height, the *H. venenata* of Gærtner, and *H. inebrians* of Vahl. It is a native of Ceylon and of the Canarese forests. The fruit when eaten produces sickness, giddiness, and a dangerous form of intoxication. It is greedily devoured by fishes, which become stupified, but when taken in this way they produce poisonous effects as food. *Chaulmoogra* (*Gynocardia*) is a diœcious genus; the staminiferous flowers with a 4-5-lobed calyx, 5 petals with a scale at the base of each; the pistilliferous the same, except the stamens, the ovary superior, 1-celled, with numerous ovules, and 5 parietal placentæ, 5 styles; the fruit succulent, dry, 1-celled, many-seeded. *C. odo-*

rata has short-stalked, alternate, bifarious, drooping, lanceolate, entire, acuminate, smooth, exstipulate leaves, ·6 to 10 inches long, 1½ to 2½ inches broad. It is a native of Silhet. The seeds are employed extensively by the natives of India as a remedy for cutaneous diseases. In those cases they are applied externally; the testa being removed from the seed, the perisperm is beaten up with clarified butter into a soft mass, and applied to the part affected three times a day. The Indian names of this plant are Chaulmoogra and Petarkura. [PANGIACEÆ.] Other genera belonging to this order are—*Ryanæa*, named by Vahl after John Ryan, who collected plants in Guyana; *Patrisia*, named after M. Patris, who collected plants in Guyana; *Roumea*, after Phillippe Rose Roume de St. Laurent, an agent of the French government at St. Domingo, who was of great service to Poiteau, who travelled there; *Kiggelaria*, after Francis Kiggelar, a Dutch botanist of the 17th century; *Stigmarota*, *Melicytus*, *Erythrospermum Pangium*, and *Vareca*. (Don, *Dichlamydeous Plants*; Lindley, *Natural System*; Lindley, *Flora Medica*; Burnett, *Outlines of Botany*)

(3938) FLAGELLARIA INDICA, A species of flagellaria is often seen, in Tenasserim and is easily recognized by the tendril it puts forth at the end of its leaves.—*Mason.*

(3939) FLANNEL.

Flannelle, FR.; Flanell, GER.; Looee HIND.

A well-known, slight, loose, wollen, stuff, of various degrees of fineness.—*Faulkner.*

(3940) FLAX, LINSEED, *Linum usitatissium*, *Linaceæ*).

Atasee, SANS.	Mushina, BENG.
Atees, Ulsee, HIND.	Kutan, PERSIAN.

The flax plant is one of those which was cultivated by the earliest of the civilised nations of antiquity, which has continued to be so to the present time, and is becoming every day of still greater importance. We may see from the paintings in the tombs of Egypt, that it was early cultivated in that country; and we can also prove that it was so, from a microscopic examination of mummy-cloth. We read in the book of 'Exodus'[1] [[1] The word Pishtah undoubtedly refers to the Flax plant, of which the preparation for its fibre is so clearly represented in the Grotto of El Kab. The words *bath*, *butz*, and *sheesh*, which occur so frequently in the Scriptures, are supposed to indicate different kinds of Linen. But it has been doubted whether, in a language like the Hebrew, it is probable that so many names are applied to the produce of one plant, or whether it is not more probable that they refer to the products of different plants. Dr. Royle has ventured to think that Linen, Cotton, and Hemp were all known; and are mentioned—Cotton (karpas), in Esther i, 6. *Bad* is very similar to the Sanscrit *pat*. *Shesh* differs only in the aspirate from *husheesh*, which is one of the Arabic names of the Hemp; as Dr. Royle has pointed out in the respective articles in Kitto's Cyclopædia of Bibical Literature.] of the flax and the barley being smitten by the plague of hail in Egypt, and in 'Joshua' of the spies, who had been sent to report on the state of Jericho, being hid with stalks of flax. From many other passages, we know that the spinning and weaving of Flax were common occupations of the people in Palestine. Subsequently, it was much cultivated both by Greeks and Romans. In India, Flax has also been cultivated from very early times, but strange to say, for its seed only, and not on account of the fibre; which everywhere else is the principal object of attention. This is probably owing to India possessing, as one of its indigenous products, the Cotton plant, which requires only the bursting of its fruit to display an elegant and easily spun material, which can be obtained from the Flax only after considerable labour. We have lately seen how important the Cocoa-nut Palm, one of the princes of the vegetable kingdom, is, not only to the countries where it is produced, but also to those into which its products are introduced. The Flax plant, on the contrary, is one of the humblest of those which are cultivated, and yet it is hardly less important, though not particularly useful as an article of diet. Its slender stem, narrow leaves, and beautiful blue flowers, give it an elegant appearance. Its smooth and shining seeds have their external coating formed of much condensed mucilage, while the white kernel is gorged with oil, especially valued for its drying properties; and the refuse or oil-cake affords a nutritious diet for cattle. The fibre or Flax separated from the stem may be made use of for cordage, for coarse fabrics, or for the finest cambrics and lawns. Hence it is a principal object of attention in Russia and Poland, a highly successful culture in Belgium, carried on also in Germany, France, and Italy, the object of frequent legislative enactment in England, and of recent most successful cultivation in Ireland. Hence, also, it was re-established by the late Pasha Mahomed Ali in Egypt. It has been frequently recommended for culture in India on account of its fibre, as it already is in almost every part of that country for its seed. Upon consideration, it will no doubt appear remarkable that this small annual plant should be profitably cultivated over so great an extent of the globe, and in apparently so great a diversity of climate. But the fact is that the winters of these southern latitudes enjoy a temperature which nearly approaches that of the summers of more northern countries. Therefore, in Egypt and India, Linseed is sown in autumn, and the stalks harvested in early spring, even before the seeds have begun to be sown in the more northern places where it is cultivated. This winter culti-

vation of southern latitudes has probably given origin to the autumnal sowings of European latitudes. But this lowering of temperature is not all that the plant requires for the production of fine flax, as we shall immediately more particularly inquire. But the natives of India, who are more ingenious in their devices and more successful in their agriculture than is generally allowed, have adopted methods of culture, such as thin sowing, though intermixed with, or in drills as an edging to, other crops, which ensures them an abundant crop of the produce they desire—that is, the seed—which is large and plump; while the stems remain short, branch much, flower freely, and become loaded with bolls filled with the seeds, which abound both in mucilage and in oil. Notwithstanding the endeavours of successive English governments, the supply of home-grown Flax has never reached the extent required by their manufacturers. At present, it is considered the consumption is equal to 150,000 tons. About 70,000 tons were, for several years, annually imported: or more precisely, in the year 1831 46,820 tons: in the year 1843, about 72,000 tons were imported; but in 1853 no less than 94,000 tons, or an increase of about 31 per cent. in the last decennial period. If the 150,000 tons be valued at an average of forty, or, according to others, at fifty pounds a ton, the amount is enormous. To this must be added "£1,500,000, the value of 650,000 quarters of linseed, used as seed and for crushing purposes; and about £500,000, the cost of 70,000 tons of oil-cake, which England annually imports, in addition to that made at home, for feeding purposes. The quantity of Flax fibre necessary to supply the demand of the United Kingdom would consume the produce of 500,000 acres; while in Ireland, during the year 1852, only 136,000 were cultivated, and probably, not a fourth of that quantity in the rest of the kingdom." (Wilson.) The seed is imported from India, Egypt, Russia, Sicily, Prussia, and Holland; and the oil-cake from France, Germany, and the United States. Mr. Nichols says—"The quantity of Flax which ought to be cultivated in any locality, must, in some measure, be governed by the quantity of labour there obtainable. One acre in a hundred, and one in fifty, have each been named as a suitable proportion to be applied for the growth of Flax. In former times the farmer was by law required to cultivate one acre with Flax, out of every sixty acres occupied." And he further observes: "If the quantity of Flax grown be limited by the labour which can be obtained, so may the amount of obtainable labour be said to indicate the extent to which culture ought to be carried in any locality. It is calculated that an acre of good Flax, as it stands in the field, containing, say about fifty stone of fibre, will afford employment for from twelve to fourteen weeks to a man skilled in the several processes of its preparation." But it is not to men only that the Flax affords employment, but also to women and to children; as it is skill rather than strength that is required for many of the operations. Hence, its introduction is very desirable in suitable localities, where population is abundant. Success in culture will, therefore, depend on many considerations; as it is necessary to have a suitable soil and favorable climate; also, a sufficient population, with facilities for the sale and the transit of the produce. At present, Flax is produced over a very wide area, and there seems no sufficient reason why this may not be still further extended.

The flax plant and its products.—The Flax plant belongs to the natural family of Linaceæ, so named from the botanical name (Linum) of the genus to which it belongs. The species are found chiefly in temperate parts of the world, with a few in tropical regions; most are remarkable for the tenacity of the fibre of their inner bark. The native country of the Flax plant is unknown; but as it was cultivated by the earliest civilised nations, it is probably a native of oriental regions, from which it has travelled southwards into India and northwards into Europe.

Description of plant.—It is an annual, with long and slender but fibrous roots, which penetrate to a considerable distance into the soil, where this is loose and friable. The stem is smooth, simple, and erect; branched, or, as usually cultivated, branching only towards the top; from one and a half to three feet in height. It consists of a pith and woody part, with the layer of bast fibres covered with cuticle on the outside. The leaves are alternate, sessile, linear lanceolate, and smooth. The flowers, of a blue colour, are arranged in a corymbose panicle. The sepals or green outer leaflets of the flower are five in number, ovate, acute, slightly ciliated, nearly equal to the capsule in length. The petals, blue in colour and five in number, are obscurely crenate, comparatively large, and deciduous. The stamens are equal in number to the petals and alternate with them, having their filaments united together near their bases into a kind of ring. The ovary, or young seed-vessel, is divided into five cells, and is surmounted by five stigmata. Capsule, or *boll*, roundish, but rather pointed at the apex, divided into five perfect cells, each of which is again subdivided by an imperfect partition, thus forming ten divisions, each of them containing a single seed. These seeds are oval in shape, flattened or plump, smooth and shining, of a brownish colour externally, but sometimes white; always white internally: the seed-coat mucilaginous, and the kernel of the seed oily and farinaceous. Besides other species of the same genus, such as *L. perenne*, which affords a strong though coarse

fibre, and one difficult to separate from the woody matter, there are some varieties of the true Flax plant known; but these are much fewer than is the case with most other long-cultivated plants. Dr. Lindley, as already quoted by Mr. J. Wilson, in his paper on 'Flax; its Treatment Agricultural and Technical' (in 'Journ. Royal Agric. Soc.,' vol. xiv, p. 188, 1853), describes two different forms: 1. The *Linum humile* or *crepitans* (the Springlein or Klanglein of the Germans), a plant somewhat shorter and more inclined to branch than the other, and possessing larger capsules, twice as long as the calyx, which burst with considerable elasticity when ripe; its seeds, too, are both larger and of a paler colour. 2. The *Linum usitatissimum* or true winter flax (Winterlein of the Germans), which has smaller capsules, scarcely larger than the calyx, not bursting with elasticity, but firmly retaining their seeds, which are of a dark brown colour. The Indian plant, called *ulsee* or *tesee*, may be considered a variety which has acquired certain characters from the peculiarities of soil, of climate, and of long and peculiar culture. It is always short, probably not more than eighteen inches in height, much branched, loaded with bolls, which are filled with large, ovoid, plump seed. That this retains its character even in other situations, appears from a fact, of which Dr. Royle has been informed by Mr. M'Adam, the able secretary of the Society for the Promotion of the Growth of Flax in Ireland. The Society having imported some seed for experiment from India, found that the plant did not grow beyond fourteen or eighteen inches. But that it is also ready to change its habit, is evident from facts to be detailed respecting the experiments which have been made in India. He has also been informed that in a recent experiment made by Mr. Burn, in Sindh, with thick sowing and irrigation, it grew at once to upwards of two feet. He has no doubt that, with a repetition of the process of thick sowing for a few times, the Indian seed would produce plants with tall, straight, and little-branched stems, each with but comparatively few bolls and seeds. A perfectly white variety of Linseed is common in the Saugur and Nerbuddah territories, which was brought to the notice of the Agricultural Society of India by Col. Ousley. Seeds sent by him were distributed to different parts of the country by the Society. Mr. Finch, of Tirhoot, after two years, returned five maunds; and stated that three fourths of his crop were destroyed by caterpillars, while the common Linseed grown in the vicinity of the white, was left untouched by them. The useful products of the Flax plant consist of the seeds and of the fibre or Flax. Linseed, or the seeds of the Flax plant, are oval, pointed in shape, compressed with a sharp margin; brownish coloured, smooth, and shining on the outside, but white internally, and without odour. The outside has a bland, mucilaginous taste, in consequence of the skin of the seed being covered with condensed mucus. The white part, or almond of the seed, has an oily taste, from containing fixed oil, which is separated by expression. These seeds, analysed by Meyer, consist, in one hundred parts, of 15·12 mucilage (nitrogenous mucilage with acetic acid and salts, according to some), chiefly in the seed-coat, 11·26 fatty oil in the nucleus. In the *husk*, emulsin 44·88, besides the wax 0·14, acrid soft resin 2·48, starch with salts 1·48. In the *nucleus*, besides the oil, gum 6·15, albumen 2·78, gluten 2·93, also resinous colouring matter 0·55, yellow extractive with tannin and salts (nitre and the chlorides of postassium and calcium) 1·91, sweet extractive with malic acid and some salts 10·88. The condensed mucus which abounds in the testa of the seed is readily acted on by hot water, and a viscid mucilaginous fluid is formed, in which are two distinct substances; one completely soluble in water, analogous to common gum called Arabine by chemists; the other portion is merely suspended, and is considered to be analogous to the Bassorine, found chiefly in Gum Bussora, and in Cherry-tree Gum. Alcohol produces a white flaky, and acetate of lead, a dense precipitate in mucilage of Linseed. Linseed oil, which we have seen is contained in the kernel of the seeds, is obtained by expression, and may be either cold-drawn, or, as usually obtained, after the seeds have been subjected to a heat of 200°. The former, as in the case of cold-drawn castor oil, is paler, with less colour and taste than Linseed oil prepared with the aid of heat. This of a deep yellow or brownish colour, of a disagreeable smell and taste, specific gravity 0-932, soluble in alcohol and ether; differing from many other fatty oils, especially in its property of drying into a hard, transparent varnish—a peculiarity which is increased by boiling the oil, either alone, or with some of the preparations of lead. "The yield of oil from a bushel of East Indian seed is 14¾ lb. to 16 lb.; of Egyptian, 15 lb; of Sicilian, 14½ lb. to 15½ lb.; of Russian, 11 lb. to 13 lb.; of English or Irish, 10¾ lb. to 12 lb." Linseed oil, according to Sace, is composed of Margarine and Oleine in nearly equal proportions. But the oleic acid of Linseed differs from that of other fatty bodies. The anhydrous acid is composed of carbon 46, hydrogen 38, oxygen 5. The Margaric acid is as usual composed of carbon 34, hydrogen 33, oxygen 3. The Glycerine obtainable from Linseed oil in large quantities, is also similar to that procured from other fats. Linseed, after having had the oil expressed from them, are in the form of a flat mass, commonly called *oil-cake*. This being reduced to coarse powder, forms the Linseed meal which is so commonly employed for making poultices, though these are also formed of the simply

powdered seeds. Here it is evident, from the internal oleaginous and external mucilaginous parts being all ground together, and their properties elicited by hot water, an admirable mixture is produced for making a readily made emollient poultice. From the chemical composition, it is also evident how nourishing the Linseed is likely to be, and, indeed, from experience, is well known to be, for fattening cattle.

Report on the culture of flax in India. "India having at least, for centuries grown the Flax plant, on account of the oil yielded by its seeds (Linseed), the country was naturally been looked to as a source of Flax fibre; the supply of which was so greatly diminished by the war with Russia. [The following formed the substance of a Report prepared by Dr. Royle in August, 1854, and is printed nearly as it was written.] The Belfast Chamber observe, that "as India annually exports nearly 100,000 quarters of seed to Great Britain and Ireland, it has been calculated that the plants which produced this quantity of seed would yield, annually, at least 12,000 tons of fibre—value, say £500,000; all of which now goes to waste." Besides the above quantity of seed, much is also exported to North America and to other countries, and much is consumed in the country in the form of oil, while the cake is in some places employed in feeding their cattle. There can be no doubt, therefore, that the question is one of considerable importance, not only to England which requires such immense quantities of Flax fibre, but to India, which produces such enormous heaps of seeds, and is supposed to waste so much of valuable exportable material. But it does not follow that the production of fibre, is in proportion to that of seed. Indeed, we have often to check vegetation, in order to favour the production of flowers and fruit; while an undue growth of the parts of vegetation, that is, of the stem, branches, and leaves, is often obtained at the expense of the parts of fructification. The subject, however, has not escaped notice. The earliest attempt to produce Flax in India seems to have been made by Dr Roxburgh about the beginning of this century, as at that time, the East India Company having established a Hemp farm in the neighbourhood of Calcutta, he made many experiments on the substitutes for Hemp and Flax. He also cultivated Hemp and Flax in the Company's farm at Reshera, in the neighbourhood of Calcutta. Of Flax, he says, it is very generally cultivated during the cold season in the interior parts of Bengal and Behar. "Samples of the Flax have frequently been procured by the Board of Trade, and sent to England to the Honorable Court of Directors, so that it is from home we may expect to learn its properties. If the Flax has been found good, large quantities may be reared at a small expense, as the seed alone which the crop yields must be more than equal to the charges to render it profitable to the farmer." ('Obs. on Subs. for Hemp and Flax,' p. 17.) Dr. Royle, as long since as the year 1834, stated in his 'Illustrations of Himalayan Botany:' "In India the Flax is cultivated only on account of its seed, of which the mucilage is valued as a demulcent in medicine, and the oil in the arts; but the plant, which in other countries is most valued, is there thrown away; and others, such as *Hibiscus cannabinus* and *Crotolaria juncea*, are cultivated almost in the same field, for the very products which this would yield. It seems, therefore, worthy of experiment whether a valuable product might not be added to the agriculturist's profits, without much additional expense." And again, in the year 1840, the Author called attention to this subject, in his 'Essay on the Productive Resources of India' In the year 1839, moreover, a Company was established, by the influence of Mr. A. Rogers, at one time one of the Sheriffs of London, expressly for the growth of Flax in India. Money was subscribed; a Belgian cultivator and a Belgian preparer of Flax were sent out to Bengal, with both Riga and Dutch seed, and all the tools which are employed in the culture and preparation of Flax in Europe. A pamphlet, moreover, was published, in which full directions were given for the culture and preparation of Flax, and illustrated with figures of the various tools employed for this purpose. The subject was warmly taken up by the Agricultural Society of India, and a small committee appointed of members who took a special interest in the subject. The directions of the Irish Flax Society were printed in their 'Proceedings,' as well as those of Mr. Andrews from the 'Northern Whig.' Translations of plain directions were made into the vernacular languages, which, as well as models of the tools, were distributed. The Gold Medal of the Society was offered for the production of a large quantity of Flax, and smaller prizes for the natives. Experiments were made by several members of the Society, in different parts of the Bengal Presidency, as well as by the Belgian Farmers. Specimens of the Flax produced having been sent to Calcutta, comparisons were instituted between the samples produced by different individuals, and those from European and from indigenous seed. Mr. Deneef, the Belgian farmer, pronounced the samples worth from £44 to £60 a ton; and some that was produced from country seed and heckled, was thought worth £66 a ton. Some of the specimens sent to Liverpool, were valued at from £30 to £45; and those which were forwarded to Dr. Royle by the Secretary of the Agricultural Society, were pronounced by Mr. Hutchinson, of Mark Lane, to be worth from £40 to £45 a ton. The experiments were made chiefly near Burdwan, Monghyr, and Shahabad; but the best native seed was obtained

from the northern station of Saharunpore, and a white Linseed from the Saugur and Nerbuddah territories. A little Flax was also produced by Mr. Williams, at Jubbulpore, under the direction of Mr. Macleod. Mr. Leyburn gave as the result of his experiments near Shahabad, that the expenses of culture of a bigah of land, and the preparation of the fibre, amounted to Rs. 25 1 a. 3 p.; and the profits to Rs. 27 1 a. 5 p., supposing the four maunds of Flax produced to be worth £35 a ton. In consequence of a communication which had been received from the Honorable Court of Directors, Sir T. H. Maddock, at that time Secretary to the Government of India, addressed a letter to the Agricultural-Horticultural Society. In this the Society was requested, in order to assist the Government in determining on the measures proper to be adopted for improving the cultivation of Flax, to supply such accurate, detailed information as they may possess, or as they may be able to obtain. The Society accordingly prepared a report which contained everything that was known at that time on the subject of the cultivation of Flax in India. This was forwarded to the Government, and also published in their 'proceedings' for Nov., 1841. In this report, the Society took a very favorable view of the probabilities of the profitable culture of Flax in India. The Revenue Secretary to the Indian Government, on this, wrote (November 22d, 1841) to the Agricultural Society, that—"The cultivation of Flax can no longer be considered a doubtful experiment, since it appears from your report to have proved in many instances successful; and where successful, to be very fairly profitable. His Lordship in Council is therefore much inclined to doubt whether any bounty or reward from Government is necessary, or would be justifiable." Notwithstanding this favorable inference, the Flax Company did not go on with the cultivation; the various individuals who had taken up the culture did not proceed with their experiments, the several medals offered by the Agricultural Society seem never to have been claimed, and there are no appearances of the culture of Flax on account of its fibre in any of the places where the experiments were made. It is probable, therefore, that the success which appeared sufficient when the experiment was of the nature of garden culture, was not realised when on a greater scale. M. de Verinne, indeed, states that the experiment in the seasons of 1840-41 was a complete failure at Bullea, owing to too little seed having been sown, to the unusually dry weather at the late sowings, and to the improper time (the hot winds) in which the Flax was cleaned. Mr. Wallace, who had carried on the cultivation for three or four years at Monghyr, writes on the 8th July, 1841: "The crop has been in a great measure a failure this year. About one eighth the produce that a favourable season would yield." But in the year 1844, he again forwarded samples to the Agricultural Society, which were improved in cleanness and were also softer than the produce of former years, from the same cultivation. These were portions of several tons that had been grown at Monghyr, and which he intended shipping to Dundee, the port to which his last batch was sent. But Mr. Wallace added, with regret, that after several years' labour, with a view to establish Flax cultivation at Monghyr, and after having taught the art of dressing the article to many parties, the speculation must be abandoned unless the Government gave some encouragement. He therefore requested the assistance of the Society in bringing the subject to the notice of the authorities. It is stated at a subsequent meeting, that the Committee of the Society, after being furnished with further details respecting the cultivation, did not feel inclined to refer the subject to the Government. But neither the details referred to, nor the reasons of the Committee for their decision are given, and, therefore, we are unable to ascertain the real causes of failure after several years' trial. Mr. Henly, an intelligent merchant from Calcutta, having made some careful experiments on the culture of Flax, furnished Dr. Royle with the following account: "I have paid much attention to the fibres during my residence near Calcutta, and, not wishing to conclude from hearsay only, generally cultivated most things myself, having a large piece of ground available. I sent up to Baugulpore (an excellent *Flax seed* district), and obtained a considerable quantity of native-grown Flax straw, after the removal of the seed. I had it collected from various fields, so as to obtain an average. This material was in every instance too *bushy* for the proper production of fibre, and the yield was very trifling, and in fact worthless for manufacturing purposes. The bushiness arose from the practice of the natives, who grow several plants, as you are aware, at once, in the same field. The Flax plants were consequently planted too far apart for fibre-yielding purposes. Not yet fully satisfied on the question, I took a patch of land (three cottahs), the best I could pick out, fine, friable loam, fit for anything—it had been a cauliflower bed, and was therefore deeply spade-cultivated and highly manured—its last crop, cauliflowers, having nothing prejudicial to a Flax crop. I began very early in the season, had it turned up and laid for a fallow; two months after, again pulverized and weeded; and again—four times in all; with the addition of a large supply of fine old cow-dung. I had it now sown in the proper season, with the best Flax seed, very thickly planted, so as to draw it up as free as possible from lateral branches. Everything promised well. The field grew beautifully, and soon attained a height of three feet. I began to collect the crop, first, as

soon as the flower had completed its growth and the seed-vessels began to form; secondly, as soon as the seed-vessels had fully formed, and were filled with green, but immature seeds; and lastly, after the seed was fully ripe. I took great pains in water-retting the samples—generally removing them from the water rather underdone, for fear of occasioning weakness in the fibre from over-retting. In every instance, the quantity of fibre was small and weak, and very inferior to the samples of Flax deposited at the Agricultural Society's Museum, obtained from Jubbulpore, and other upper-country districts. No Indian Flax, however, which I have seen, equals in nerve and general good qualities those of European growths." As the above is no doubt a correct account of what occurs with the Flax plant in the moist climate of Bengal, of which the effects may perhaps have been aggravated by too great richness of soil; it might be inferred, that a different result would take place in the drier climate of the upper or North-West provinces of India. This is certainly the case, but though the product is different, it is not, from the shortness and brittle nature of the fibre, more suitable for the ordinary purposes of Flax. Mr. Hamilton, of Mirzapore, one of the up-country stations alluded to, "sent some bales of the stalks to Calcutta, for the inspection of the Belgians, and was told that the shortness of the stalks would prevent their manipulation." It is evident, therefore, that there is some difficulty in producing good Flax in India. This difficulty is, no doubt, the climate; while the native methods of culture are the most unsuited to the production of good fibre. Mr. M'Adam, Secretary to the Royle Flax Improvement Society, has in his Prize Essay on 'The Cultivation of Flax.' well observed "that a slow, steady growth is requisite for the quality and yield of fibre; also a temperate climate, that between the parallels of 48° and 55° being the best; and a continued supply of moisture from spring till autumn." He also observes that "the hot summers of Russia and of Egypt cause a dryness and brittleness of fibre, and prevent its retaining that elasticity, pliancy, and oilness which characterise the Flaxes of Belgium, Holland, and Ireland." But considered generally, it is not to be expected that a plant which attains perfection in Belgium, and is so successfully cultivated in the vicinity of Belfast, would succeed well in the hot and moist, but sometimes dry climate of Bengal. In fact, if the Flax was not one of those plants which, like the cereal grains and pulses, can be grown in the cold weather months of India, it could not be cultivated there at all. But with this culture, we have the anomaly, of the seeds being sown in autumn, [In Egypt, also, the seeds are sown about the middle of November, in the plains which have been inundated by the Nile, and plucked in about 110 days.] when the climate is still hot and the ground moist, and the plant has to grow while the temperature is daily becoming lower and the soil drier—no irrigation being usually employed with these winter crops, though dew begins to fall as soon as the ground becomes cooled at night. In some places, the crop attains perfection in about ninety days, is collected in January, the coldest month; in others, not until February or March, when the rapid rise of temperature is favorable to the ripening of seeds, but not to the production of fibre. Of all parts of India there are none that appear to Dr. Royle better suited to the growth of Flax than the Saugur and Nerbuddah territories, as the soil is rich and prolific, and the climate a medium between the extreme moisture of Bengal and the dryness of the North-West provinces. The Wheat of this district is considered superior to any seen in the English market, with the exception of what comes from Australia. The Gram (*Cicer arietinum*) and the Linseed are also of finer quality than any produced elsewhere in India; while the suitableness of the climate for the production of good fibre is proved by the length and strength of the Jubbulpore Hemp, as grown by Mr. Williams; as well as by the specimens of Flax which he has likewise grown. The Indian method of culture is certainly not suited to the production of fibre, but the seeds abound in oil. "The yield of oil from a bushel of Indian seed is from 14$\frac{3}{4}$ lb. to 16 lb.; of English or Irish, 10$\frac{3}{4}$ lb. to 12 lb." Therefore, it is evident that the Indian ryut succeeds in his object, as well as the Irish farmer, who grows the Flax plant for its fibre, but neglects to gather the seed: though this is not only a saleable product, but one which abounds in nutritious matter for his cattle, and would further afford the means of fertilising his fields. As it has been found difficult to persuade the Irish farmer to gather the double crop, I believe it would be hopeless to induce the Indian ryut to change a culture which is suitable for his purposes, without the aid of successful example in his neighbourhood. You might make him grow less seed, but I much doubt whether we should get him to produce any useful fibre; and without his co-operation it would be impossible to attain any considerable success. Indeed, the Agricultural Society of India have given it as their opinion, in one of their resolutions,—"That the culture and preparation of Flax in India, so as to be able to compete with the Flax of Belgium or Russia, can only be effected by practical European growers instructing native cultivators in the art; and, further, that an entire change in the mode of cultivation, as well as in the preparation of the plant, is necessary to produce the article in a proper state." It has, indeed, been made a question, whether a good supply of fibre and of seed can be procured from the same crops.

One gentleman, in reply to my inquiry, informed me (London, 4th July) that "it has been found impossible to preserve both seed and fibre, *i. e.*, for the better qualities of each; and that the plan pursued is simply to gather before the seed ripens, when the delicacy and softness of fibre form the desideratum, but to leave the plant standing until the fibre is dried and greatly injured, in order to secure the superior seed fit for sowing;" and this is the result of information collected after a residence of many years in the interior of Russia. Another gentleman replies to the same inquiry, from Belfast, on the 8th July: "It is not only quite practicable to have good seed and good fibre at the same time, but it is the universal rule in all countries except Ireland, where we have only been able to get the more intelligent farmer to abandon the wasteful practice of steeping the Flax stems without removing the seed. The finest Flax in the world is grown in Belgium, yet the seed is saved from it." But as there is no doubt, from the experiments of the Indian Flax Company, and from other more recent facts, such as the production of Flax as far south as on the Shevaroy Hills, at Jubbulpore, and near Lahore, that Flax can be produced in India, it seems desirable to ascertain whether it cannot, by careful culture and improved processes, be produced as a profitable crop in some parts of the country; because, it cannot be thought that that which is done successfully in Egypt, is impossible in every part of India;" and there can be little doubt that, in some places, at least, coarse Flax could be produced, as well as some for the paper-makers. The Messrs. Hamilton, of Mirzapore, propose, in 1854, attempting the culture of Flax, in the tract of land of which they have a grant, in the Goruckpore district, and considered a more favorable locality than any near Mirzapore. Dr. Royle suggested that Mr. Williams, at Jubbulpore, should be requested to make an experiment, to ascertain the quality of the Flax which may be produced in that locality, as well as the quantity obtainable per begah or acre; attempting at the same time to preserve the seed. Mr. Williams has already grown a little Flax, he is accustomed to the preparation of fibre, and the soil and climate are both, he conceived more favorable than in most parts of India. He also recommended that Dr. Jameson, the Superintendent of the Botanic Garden at Saharunpore, should be directed to make a small experiment, both in the plains and in the hills, in order to ascertain the same kind of facts respecting the Flax plant when grown according to European methods for the sake of the fibre. The Agricultural Society of the Punjab have attempted the culture, and the Secretary addressed a letter to the Court, requesting an opinion respecting the quality of the Flax which they produced.

Observations on experiments.—On reviewing the accounts and the results of the Indian experiments, it appears that though abandoned too soon in some situations, they were carried on for a sufficiently long period in others to allow of reliable deductions being drawn from them, if full information on all points had been supplied. The soil does not seem to have been complained of; but though drainage is essential in many parts of Europe, the power of irrigating will be found most useful in the East. The climate is obviously very different from what the plant meets with in Ireland, as not a drop of rain seems to fall from the time of sowing to that of reaping the crop; but heavy dews compensate for this deficiency during a part of the season. But as this dryness of climate prevails over a great part of India during the season of cultivation—that is, from the end of the rainy season to the beginning of the hot weather—it is evident that irrigation is necessary for such cultivation, and must not be too expensive. Perhaps the double monsoon of the Madras Presidency might in some localities afford a suitable climate, if the temperature is not too high. A perfectly appropriate climate, may no doubt be obtained at different elevations on the Himalayas, and in some of the mountainous ranges of the South of India; but European superintendence may not be available and the expenses of transit be too great. The Saugur and Nerbuddah territories appear favorable, from their more moderate climate; while some of the districts of the North-West, of Sindh, and the Punjab, may be found suitable, from the command of irrigation and the prevalence of a moderate temperature. The proportion of seed required having been ascertained by Mr. Deneef, we cannot but observe the unexpected results obtained from the sowing of some native seed—the Flax produced from Saharunpore seed having been considered to be of excellent quality, and, in Liverpool, to be the best of all the specimens sent. American seed was found to be suitable to the country; but it is remarked that when sown in a rich, it did not do so well, as when sown in a poorer soil. The whole question of what is the best seed for the untried soils and climates of new countries is one of considerable difficulty. It does not follow that seed from a rich soil and the most careful cultivation is necessarily the best transference to a poorer soil and drier climate; indeed, the converse would, in many cases, appear to be the more suitable course. But even in the case of Wheats, some from Australia and from the Nerbuddah, pronounced the finest in the English market, have never produced good crops in England, notwithstanding the most careful attention. Indeed, the most advisable course appears to be to grow the best native seed, and as thickly sown as is found to be suitable, for the express purpose of changing the branching nature of the plant, and then making

an exchange with the seed of other districts following the same course; in order to insure that interchange of seeds which is so beneficial for all kinds of crops, and is conspicuous in India in the indigo crops of Bengal being grown from the seeds of the North-West. In the directions for culture in Europe, we have seen that early sowing is necessary to produce good fibre, and late sowing for seed; but in India the reverse course is to be followed, for early sowing, in consequence of the high temperature, induces rapid but, from the dryness of the climate, stunted growth with an abundant production of seed; while later in the autumn the temperature is lower, the growth is slower, but the dews being heavy, there is greater moisture, and this with the slower growth, produces finer fibre. The early sowing is preferred by some, in order to save the expense of irrigation, but this must sometimes be with the sacrifice of the quality of fibre. With respect to the cost at which Flax can be produced in India, we find Mr. Leyburn stating that he gets four maunds of Flax, or 328 lb., from about one third of an acre of land, at a cost of £2 10s., or for about £17 a ton; and that this sold for £28 a ton in London; but we do not find that he proceeded with the cultivation. Mr. Deneef calculated the cost of Flax produced by him to be £32 a ton, with a profit of £8, which would afterwards amount to £14. Mr. de Verinne calculated the cost would be £31 a ton, with an average crop; though he did not get half the quantity. The cost of both is evidently too high, unless the finer qualities of Flax are produced. Mr. Wallace who continued the longest, and produced Flax at the cheapest rate —that is, from £12 to £15—ought to have succeeded, as he states that the expenses of cultivation were paid for by the seed. But we find him, as we have already stated, representing to the Agricultural Society that he should be unable to go on with the culture, from the discouragements he had met with, unless assisted by the Government. Though the difficulties are not specified, they must have been greater than appear from the published accounts, and therefore the facilities and the profit are not so great as they appeared to the Agri-Horticultural Society,—who thus unintentionally induced the Government of Lord Auckland to consider that public aid was not necessary. It is very evident that such experiments can only be made under the superintendence of Europeans, when, if successful, they may be adopted by natives. In repeating the experiments in more favorable situations, it would seem very desirable at first to ascertain as accurately as possible the quantity of produce of ordinary quality obtainable per acre, with good cultivation in a favorable locality, on an average of years, and then to endeavour to improve the quality. The profits of the two kinds of cultivation and preparation are not very dissimilar in Europe. Though manufacturers may require more of the coarser qualities of Flax, planters will of course grow that for which they can get the best prices; though it will be safest at first to reckon only on getting the prices of Russian or Egyptian Flax. We may proceed now to inquire where else Flax may be cultivated in India.

Culture in Saugur and Nerbuddah Territory.—It has been mentioned that the central province of the Saugur and Nerbuddah territories seems well adapted for the culture of Flax, from the nature of the soil and climate. Here, indeed, some Flax has already been grown by Mr. Williams. This being the result of a first experiment, on a small scale, is not, perhaps, calculated to give a fair idea of what is practicable, particularly as we are without any information respecting the mode of culture, or the kind or quality of seed which was employed. But Mr. M'Leod, now Commissioner in the Punjab, mentions in one of his reports, that the growth is very luxuriant there. The Flax is comparatively short, light coloured, and rather dry, and more like Egyptian than any other kind of Flax. It might be objected to the growth of Flax so far in the interior, that land-carriage for so great a distance would be an insuperable obstacle. But, as Mr. Williams finds it suit his purpose to send his now-famed Jubbulpore Hemp even to Calcutta, there seems no reason why Flax should not be equally able to bear the expenses of culture and of transit. In this direction, there is, moreover, an excellent road, described by the Cotton Committee of the Agri-Horticultural Society, 8th January, 1840. "From Jubbulpore to Mirzapore, on the banks of the Ganges, the great cotton-mart of the North-West provinces, a bridged and metalled road of 239 miles in length, equal to any in England, has been made by Government; at all the stations, the means of transport, and on the river, boats of every description, abound." This road is regularly kept up, and a toll levied at the base of the ghauts. The native princes have, however, without contributing to its expenses, diminished its utility by levying extra duties on the goods passing through their territories. (*v.* 'Journ. Agric. Soc.,' vol. viii, p. 115. [See also a letter by Montague Gore, Esq., to the same effect, in 'The Times,' in the summer of 1853.] There is a prospect, however, of these being remodelled. The most important consideration, nevertheless, is that of the climate. According to the concurrent testimony of different observers, as reported in Dr. Royle's work, on 'The Culture and Commerce of Cotton in India,' p. 311, &c., deficiency of moisture is seldom complained of; and there will, probably, be seldom any excess in the season when the Flax would be cultivated—that is, in the cold-weather months. Hence the chief difficulty in India will be diminished, if not entirely escaped.

Culture in the Madras Presidency.—Good Flax has been produced still further south, where elevation produces lowness of temperature accompanied with moisture of the atmosphere, as on the Shevaroy Hills and on the Neilgherries. Dr. Cleghorn, Secretary of the Agri-Horticultural Society of Madras, is well qualified to give the best advice on localities where experiments may most fitly be tried; and Professor Mayer is there, to give the benefit of his chemical investigation of the Flax plant and soil. Mr. M'Ivor, in charge of the Public Garden at Ootacamund, is well situated for making experiments on the growth of Flax in the cool and moist climate of the Neilgherries, if the culture should in other respects appear desirable. Linseed has long been cultivated in the Madras Presidency, though not to any great extent. Dr. Ainslie mentions the seed under the name of *Aliverei*, and states that in the southern parts of the Peninsula, the Moochie men and oil painters make use of Linseed oil. But we now find Linseed among the Exports: in the year 1850-51, there were exported 801 cwt of Linseed from Fort St. George, nearly all to the United Kingdom.

Culture in Bombay Presidency.—In the Bombay Presidency, Linseed is also cultivated, as in all other parts of India, and has of late years been exported in considerable quantities. We observe that in the year 1850-51, 59,076 cwt., and in 1852-53, 162,915 cwt.= Rs 4,86,460, in value, were imported into Bombay from the Concan; and that there were exported to the United Kingdom, in 1850-51, 50,102 cwt., valued at Rs. 170,112, and in 1852-53, 114,309 cwt.=Rs. 342,926 in value. We do not observe that any attempts have been made to grow Flax. It is probable that the low country along the coast may be too hot, and the country above the ghauts to dry; but of this those who are located in these parts can most correctly judge, if it should be thought desirable to make the attempt. Col. Sykes describes Linseed as generally cultivated in the Dukhun. The export of Linseed from Bombay is now estimated at an annual value of about four lacs of rupees, although five years ago it did not exceed one lac. This the Chamber of Commerce ascribes to the improvements on the Thulghaut road, and to the consequent reduced cost of conveyance in carts instead of on bullocks..

Proposed culture in Bundlecund.—An article has lately appeared in the 'Benares Recorder' (15th July, 1854), proposing the culture of Flax and of Hemp in Bundlecund; observing that "with less capital than what English merchants now expend in Russia, India can produce Flax which will not be inferior in fibre or colour to the Riga Flax. In Bundlecund the soil is almost free and unoccupied; and the land rent is also so low, that failure in the cultivation of either of these two products—Flax and Hemp—would be impossible. There are numerous hill streams with clear water, over the whole country, that would admirably serve the purpose of steeping." But the great uncertainty is the climate, which, like the parts of the Gangetic valley which have been alluded to, is very dry during the season of cultivation. But it is certainly worthy of inquiry, by those favorably situated for the purpose, whether, by irrigation, or by the aid of the dew which undoubtedly falls in the cold weather, this dryness might not be sufficiently obviated to allow of the production of good Flax.

Culture in the Northern Doab.—The most northern station from which any Flax was sent during the experiments of the Flax Society was Allygurh, in 27° and 28° of north latitude. Mr. J. Saunders, on the 26th July ('Proceedings,' p. 100) wrote that he had sent a sample of the Flax which he had grown on the banks of the Kote Nuddee. But he described it as prepared with very clumsy tools, and cost him about four rupees a maund for merely breaking; as to scutching, it has had none. The finest seed was, however, obtained from Saharunpore in 30° of north latitude—a locality with which Dr. Royle is well acquainted, but where no Flax is produced, and where the soil and climate are dry during the cold-weather months and season of cultivation; that is, from October to March, with the exception of some rain at Christmas time, often called the *chota bursaut*. The district has, however, enjoyed the advantage of canal irrigation for more than twenty years, under the superintendence of Sir Proby Cautley, greatly to the benefit of the country and people. This would give great facilities for Flax cultivation, and would not be expensive. The experimental culture which has been sanctioned to be made by Dr. Jameson in the Botanic Garden at Saharunpore, as well as in the Himalayas, will no doubt be carried on with his characteristic energy. The experiment will be useful from the information which it will undoubtedly afford for comparison with those which have been made in Bengal and Behar, as Saharunpore is situated near the north-western extremity of the Gangetic valley, and the temperature is such that there is every prospect of the plant being slow in growth, and that, with the aid of canal irrigation, the growth will be such as to insure sufficient length of fibre. Of the temperature in the cold-weather months we may judge from the following, deduced from Dr. Royle's observations while he was Superintendent of the Botanic Garden; from which it will be seen that November would be the fittest month for sowing, and the crop could be gathered in February or March, before the heat becomes great.

Mean Temperature. See Report on the Botanic Garden at Saharunpore, 'Journ. of the Asiatic Society,' vol. i.

Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.
74	64	56	52	56	67	78

In the Himalayas the season of cultivation is the same as in Europe; for there, as here, the winter months are too cold for the growth of plants—but the spring and summer temperature is exactly suited to the growth of an annual like the Flax plant.

Mean Temperature.

March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.
53	59	66	67	67	66	64	57	50.

As far as temperature is concerned, there is evidently a long period for cultivation, and different months might be selected for the purpose. But there is a great difference in the moisture of the different months, as the rains come on in the middle of June, and are excessive for three months. But it would be interesting to ascertain the effects of such moisture on the growth of a fibre like that of Flax. It is probable that the plant would require to be supported, to prevent its being laid.

Culture of flax in the Punjab.—The Punjab, so recently acquired, is already as settled as any of the older provinces, in consequence chiefly of the energy and intelligence of the Service being applied to devising methods of Government suitable to the people and country, instead of attempting to introduce English institutions among the foreigners who are unable to appreciate or to take advantage of them. In the Punjab, we see some of those who were fighting against us, now employed in the far East with our own troops; but many being necessarily left without employment, are ready to take to or return to agricultural pursuits. The vigorous measures which have been adopted, while they give security and freedom of communication, will also greatly facilitate agricultural pursuits; especially as some of the public works in course of execution are canals of irrigation. There, the Kote Kangra valley teems with Chinese Tea shrubs, the first of which were planted in the year 1848, that is, immediately after the conquest of these hills by Lord Hardinge; and the Tea which has been prepared from these plants is considered to be of the first class of China Teas, by such excellent judges as the Messrs. Thompson. The culture of Silk has lately been introduced by the Agri-Horticultural Society of the Punjab—the first specimens having been sent to Calcutta and to England, were considered to be naturally of good quality, but very indifferently reeled. Mr. W. H. de Verinne having been sent up by the Government with an establishment of silk-winders and reelers from Morshedabad, and some samples of silk of their winding having been sent to Calcutta and to the India House, the former was pronounced by Mr. E. Kilburn, on 1st September, as "requiring only a little more attention to rank with the product of the best Bengal Filatures," and which would have been worth in May about Rs. 12 8 per factory seer. The specimens sent to the India House were submitted to the Messrs. Durant, who gave a most carefully drawn up report, and pronounced them excellent specimens of Bengal Silk, but requiring a little more care; and worth from 14s. to 15s. a pound in London. Vigorous measures have in consequence been adopted for the prosecution of the culture by plantations of different kinds of Mulberry, besides the kind which is already common in the country, which, in the opinion of Mr. de Verinne, is almost equal to the Bengal Mulberry. It is probable that some difficulties may be experienced from the dryness of the climate in the plains of the Punjab; but there can be none in the hilly districts where the Tea plant is flourishing. Some of the native Wools also having been highly approved of, twenty-five Merino Rams have been imported by the Government from Australia, for the further improvement of the breed of Sheep. That some parts of the district are well adapted for the production of fibres, is evident from the Kote Kangra Hemp proving one of the strongest of known fibres. The Agri-Horticultural Society of the Punjab, therefore, have begun their experimental cultures in a very favorable locality, from the great variety of soil and of climate within the command of their members. If the Geography of Plants and of Animals is attended to, as well as the Principles of Culture in new situations, little doubt need be entertained respecting the success of the above cultures as well as of Flax. Though Linseed is so extensively produced throughout India, we hear nowhere of the fibre being valued and separated. But when we get to the confines of cotton-producing districts—that is, into the Punjab—we find that some Flax, prepared by the natives on their own account, is separated in the neighbourhood of Lahore. For we are told that the stalks of the Linseed plant yield a fibre, which is made into twine, and used for the network of their charpaes or native beds. This information was elicited in consequence of inquiries originated by Mr. Frere, the distinguished Commissioner of Sindh from his desire to promote the culture of Linseed in the province under his charge. The fibre, however, of the Linseed plant is separated in still more northern parts, as some seed of Bokhara Flax sown in England was found to be that of the common Flax. The inquiries made respecting the growth of Linseed in the Punjab elicited the following facts: On the Cis-Sutlej it is stated that three seers to a begah are sown broadcast when alone, or in drills; probably as an edging to other crops. Three maunds of Linseed considered a good crop. The stalks and husks considered refuse and useless. The seeds sell for 18 seers for the rupee to oilmen. A maund of seed yields of oil 10½ seers; of oil-cake 29½ seers. The oil sells for 5 and 5½, and

the oil-cake at 60 to 66 seers for the rupee. In the Jalindhur Doab, Linseed is cultivated, especially in the Khadir or inundated land of the Beas and Sutlej Rivers; but plants always small; seed sells for 20 to 30 seers for a rupee. It is also cultivated in the Sheerwul, or tract of country in which the soil is firm and covered by a deposit from the rains, with the subsoil always moist—ripens before barley, and generally before wheat. Linseed is also cultivated in the rich loamy soils of the Kangra district skirting the Himalayas, but chiefly in the eastern parts, on account of the seed, which sells for 20 to 100 seers for the rupee—Flax itself burnt. In the Punjab, sown with barley and mussoor (or lentils) in Katick (Oct. and Nov.), and is ripe in Cheyt (March and April); usually sown intermixed with the above crops, or in separate patches. Never irrigated, but grown along the Sutlej, in Khadir land, or that which is inundated during the rainy season, but never manured. In the Lahore division, it is grown chiefly about Sealkote and Deenanuggur, and is the only part where the fibre seems to be made use of, as it is stated that the stalks yield a fibre which is made into twine, and used chiefly for the network of their charpaes or native beds. The price of the seed is about Rs. 2 8 per maund. Few localities are stated to be well suited to it, and the seed was in little demand. Twine made of the fibre was sent, but no notice seems to have been taken of its quality. From the above details of cultivation, it is evident that though Linseed is very generally known, it is nowhere extensively cultivated, as is evident from the price of the seed, which is dear in comparison with that of Wheat. Some of the uses are well known; for instance, the oil is used as a drying oil, and the bruised seed, mixed with flour, is described by Major Edwardes as given as a strengthening food for cattle, and the oil-cake is no doubt employed for the same purposes; while the fibre is sufficiently valued to be separated in some, though burnt in most other places. It would seem much in favour of the production of good fibre that the growth is much slower than in the southern provinces of Bengal. The Society began some experiments on the culture of Flax, in the cold weather of 1853, with seed obtained from Saharunpore; that is, the same place from which the best seed was obtained in the experiments in Bengal and Behar, and which produced such good Flax. (*v.* p p. 176 and 182.) The samples were prepared under the superintendence of Corporal Keenan, of H.M.'s 10th Regiment. Of the opinion formed of these samples when sent to Calcutta, Mr. Wood, Secretary of the Chamber of Commerce, writes: "7th June, 1854. The general opinion regarding the Flax is very favorable. It is considered the finest that has been ever grown in the country; and that the cultivation of it might be encouraged." Some of the Special reports are as follow: Mr. Stalkartt writes:—"This Flax is decidedly the best specimen of this country's growth, and I should say a good merchantable article. It is very difficult to give a thorough report upon it, as we have none from Europe to compare it with. From the test it did not appear very strong, and from its smell I should say that oil had been used in the preparation; perhaps with an improved method it would have greater strength, as oil, generally speaking, deteriorates greatly the strength of Hemp and Flax. I would like to see it in greater bulk; a handful is not a fair sample." Report from Mr. Haworth.—"Although I am not a member of the Flax and Hemp Committee, I am glad to have had the opportunity of examining the sample forwarded to the Society by Mr. Cope. On the whole, I think, its preparation does great credit to Corporal Keenan; any shortcoming is owing to the finer heckles not being ready. I think the length of fibre is good; the colour of the greater part is bright and healthy—that portion shows good strength; there is, however, a small part of the sample of a dark dull colour, which, I think, is caused by over-retting, and that portion of the sample is, as might be expected, weaker than the rest. If the natives of this country could produce such Flax as this specimen under notice, from the immense fields now grown in Bengal for seed only, what an enormous amount would be added to the value of our exports." Mr. Stalkartt is a rope-maker, of the firm of Messrs. Harton and Co., of Calcutta, and wished ten maunds to be sent to him by the quickest transit—bullock-train and steam-boat—in order to see what he could do with it in his own business. He wished also for "a couple of maunds of the two," as he thought "it might be useful for the railway." Mr. Stalkartt's remark about oil being used in the preparation, is referred to by the Secretary of the Society, and contradicted, "as no oil was used." It is probably an accidental testimony to the softness of the fibre, which, in most of the Flaxes from warm countries, is found to be dry and hard. The Sub-Committee appointed by the Society to draw up a proposition for Flax arrangements, submitted the following—

Suggestions regarding the improvement in, and increase of, the cultivation of Flax, or Linseed plant, for the sake of its fibre.

1st.—It is to be made generally known that a premium, of Rs. 500, has been sanctioned by the Supreme Government of India, to be given for the largest area of land that may be appropriated, in the Punjab and the Cis- and Trans-Sutlej States, to the culture of Flax, during the seasons of 1854-55, being not less than 25 acres in any one village.

2d.—A second premium, of Rs. 350, has been similarly authorised, for the next largest area so

cultivated, being not less than 20 acres, in any one village, and—

3d.—A third premium, of Rs. 200, is to be granted for the third largest piece, being not less than 15 acres in any one village; that is to say, the Government will award the first premium to any one land-holder, or village community of land-holders, who may, in his or their own village, cultivate, for the production of Flax fibre, ground aggregating, in the whole, 25 acres, or as much upwards as the owners may choose. Moreover, the Government of India have sanctioned the purchase, on behalf of the Society, of the entire crop of merchantable Flax, including the fibre, if of the required length, that may be produced in the Punjab, and to pay for it at the current market rate of the Flax seed, with 25 per cent. added for the fibre. It is to be a condition that not less than sixty Company's seers of Flax seed, be sown on each begah, cultivated with a view to competition; and that the growers be informed that Government is prepared to purchase the whole of the seed, and likewise the fibre, if of the proper quality, on the terms above stated, but that the authorities be instructed not to purchase such produce unless it measure, in in the stem, three and half feet in length or more; that it be well dried, and the seed just on the point of ripening, but not so ripe as to allow of its falling out of the pod by the way.

The directions for cultivation are as follow: If the following instructions are strictly attended to, here is no doubt that the Flax will all be of the required length of staple. Not less than sixty seers of Flax must be sown, broadcast, that is with the hand, on each begah, as the thicker it is sown the longer will be the plant, and the more free it will be from branches, which are very injurious. The land must be thoroughly freed from weeds by repeated ploughings previous to sowing; it must be well manured with the richest manure procurable, such as is given to land for tobacco; be smoothed, and divided into beds as for wheat. The seed must be sown between the 1st and 5th November, but not later. The Flax land must be watered as frequently as wheat-land; and the fields must be kept perfectly free from weeds until the Flax is six or seven inches high. After that, no more weeding will be required. The land selected should be light loamy soil; Khadir land is the best. When the seed begins to show signs of ripening, the Flax must be pulled gently by the root, and laid on the ground to dry in rows. When thoroughly dry, it must be tied up in the bundles as large as a man can conveniently span with both hands, and it can thus be easily measured. The seed can be stripped off (rippled) on arrival of the consignment at Lahore, and the final price be arranged according to the current rate of Linseed in the Lahore market. That is, if the successful, or any other, competitor (all

Flax will be bought that is of the required length, whether a premium have been awarded for it or not), who may deliver Flax, yielding 125 maunds of Linseed, will, if, as at present, the nerik be Rs. 2 8 a maund, receive Rs. 312 8 for the seed, and 25 per cent., or Rs. 78 2, additional, as compensation for the fibre, or Rs. 390 10 in all. It is to be understood that successful competitors are to be paid for their crop as well as others; but that no cultivators are bound to sell, should they wish to dispose of their crop in any other manner. It might be explained to the ryuts, that those who are not successful in growing Flax of the required length, will find a ready market for the seed in Mooltan, whence it will be conveyed to Sindh for export to England. It is further strongly recommended, as a new feature in the proposed measures, for improving the cultivation of this important staple, that the Society be authorised to hire, on behalf of Government, from 30 to 40 begahs of land, in the immediate vicinity of their garden, for the cultivation of Flax, during the coming season, so as to admit of a comparison being drawn between the Flax grown by the zumeendars and the plant reared under probably more favorable circumstances. The seed required for each begah, the purchase of which, it is hoped, the Government will also sanction, will be one maund and a half (at a cost of about Rs. 4), and the land is obtainable at Rs. 20 per begah; for which the cultivators undertake to perform all agricultural operations, such as ploughing, watering, weeding, sowing, and reaping, *for one year*—a plan by which the grower can ascertain the expenses of his crop to a rupee. It is strongly recommended to the Meeting that, in confident anticipation of the sanction of the authorities to this measure, which anticipation they venture to rest on the past liberality of Government, and the great importance of the subject, and also on account of the advanced state of the season, the Secretary be, at once, empowered to make arrangements for obtaining land. The vigorous proceedings of the Agri-Horticultural Society of the Punjab, and the ready patronage of the Government, including the purchase of the produce, ought to produce some decisive results, if the soil and climate are found to be favorable; and of this there can be little doubt, from Flax having been produced there in 1853 and from the description given of it by the members of the Hemp and Flax Committee of Calcutta. The specimens stated to have been forwarded to the India House have not been received. But while the best method of culture will be ascertained by the Society in their own cultivation, it is to be feared that the length of stem required (three feet six inches) will exclude much of what may be grown by the ryuts. The extension of the culture will no doubt reduce the price of the seed,

and enable it to be sold at such rates as to allow of its becoming an article of export to Europe. The Society having included in these recommendations an application for some tons of the best Linseed (mentioning especially the Belgian) as well as some tools, to be sent them, this was approved of, and forwarded by the Indian Government, in August, 1854; but as it was obviously too late for any large quantity of seed to be sent in time for the sowings of this year, small quantities were sent out by the overland route for the sake of comparison with the native seed, and also some tools as specimens. But as it is extremely doubtful what kind of seed will answer best in the soil and climate of the Punjab, it has been thought preferable to send the seeds of different kinds—as Riga, Dutch, American, English and Irish.

(3941) *Culture of Flax in Sindh.*—The province of Sindh, about 360 miles in length, extending from 23° 37 to 28° 32 N., consists of a delta of extensive alluvial tracts, intersected by numerous canals and water-courses, which enable cultivation to be carried on by irrigation; thus making up for the deficiency of rain. Though the temperature of a great part of the year is high, it is probable that that of the cold-weather months may be sufficiently low to allow of the successful cultivation of Flax and Linseed, at the same time with the Wheat, Barley, and Oil-seeds which form the Rubbee or cold-weather crops of Sindh, as of most parts of India. Indeed Mr. Frere, the enlightened Commissioner of Sindh, wrote to the Board of Administration of the Punjab, to have inquiries made throughout that territory on the extent and nature of the Linseed cultivation therein—the result of which inquiry has been given in the preceding pages. A commercial gentleman, to whom were referred the specimens of the Punjab Linseed, and the prices at which it was sold, observes "that there as in Sindh, the culture of it is altogether upon so limited a scale as barely to supply local wants and judging from the Rs. $5\frac{1}{2}\frac{1}{2}$ per maund quoted as its sale price in Lahore, with cost of carriage to Kurrachee, 800 to 1000 miles, would stand us higher than the ruling rates in Bombay." "The quality of the Linseed" he considered "good and such as would command the highest prices in Mark Lane, which average about 48s. per quarter." Upon this, Mr. Frere justly remarks that "the present prices of an article, which is at present grown in small quantities merely for local consumption, afford no means of judging of the price at which it can be profitably grown in large quantities for exportation; and, looking at the way in which it usually flourishes in wheat-land in India, at the present prices of wheat, I feel little doubt but that it can be grown very cheaply in many parts of the Punjab and Sindh. The facilities which exist for water-carriage down the Indus will render its transport cheap; while great and constant demand exists for it in Bombay. "I think, therefore, that it is an article to which attention may be profitably directed in any district where it is desirable to discover articles of produce adapted for exportation." The Bombay Chamber of Commerce observe: "Linseed of the quality described as the growth of the Punjab would, under all ordinary circumstances, command a ready sale in this market, at from Rs. 3 4 to Rs. 3 8 per cwt. of 112 lb.; and during the greater part of the past year the price has been as high as Rs. 3 12." Dr. Royle has been favoured with a letter (dated 19th August, 1854) from Mr. Frere, in which he states that—"For the last two seasons attempts have been made, with very satisfactory results, to introduce the culture of Linseed into Sindh. It grows well in the ordinary wheat-lands, and under every disadvantage, there has been no failure traceable to soil or climate. I have no doubt but that, in a few years, it will become one of the staple articles of export." He also states that attention has begun to be directed to the fibre, and that Mr Harvey, who was in early life practically engaged in Flax farming in Ireland, and who has now been some years resident in Sindh, has commenced some experiments, and hopes to be able this season to send to this country some specimens of Flax grown in Sindh. In a previous page it was mentioned that Mr. Burn, who had been some years in Sindh, had seen some thick-sown Flax, growing there luxuriantly and of which he had no account of the seed. Some Europe seed, for the sake of comparison with the native seed, and some heckles which Mr. Harvey wished for, have been, at Mr. Frere's request, forwarded, by order of the Court of Directors, by the overland route to Kurrachee. There seems no doubt of success to at least the same extent as in Egypt, if the culture is persevered in until the proper methods of cultivation and of preparation have been carefully ascertained.

Exports of Linseed from India.—The large exports of Linseed from India have frequently been mentioned. It is desirable, therefore, to give some of the details. By these we may observe, that though comparatively a recent trade, the article is already known to other countries besides England. The first Export of Linseed was made from Calcutta by Mr. Hodgkinson,

In the year	1832,	to the extent of	10 bushels, and increased
„	1833	„	2,163 maunds.
„	1834	„	2,826 „
„	1837	„	32,327 „
„	1839	„	167,601 „
„	1850	„	765,496 „

As the details of this export may be interesting, we subjoin the following table of the Im-

ports of Linseed and Linseed Oil into, and Exports from, the three Presidencies:

Linseed Oil Imported (1850-51)	Into Calcutta.	Into Fort. St. George.	Into Bombay.
From United Kingdom ...	Rs. 7,984	—	—
„ Amsterdam	805	—	—
Linseed Imported—			
From Concan	—	—	Cwt. 59,076
Value	Rs. 8,739	—	Rs. 201,035

Linseed Exported (1850-51) from	Calcutta	Fort St. George.	Bombay.
To United Kingdom,	Ms. 298,005	Cwt. 797	Cwt 50,102
„ North America,	421,407	—	—
„ France,	44,986	—	—
„ Guam,	56	—	—
„ Rotterdam,	500	—	—
„ Mauritius,	60	—	—
„ New South Wales,	74	—	—
„ Trieste,	384	—	—
„ Penang,	24	—	—
„ Ceylon,	—	4	—
„ Concan,	—	—	10
Total	Ms. 765,496	Cwt. 801	Cwt. 50,112
Value	Rs. 1,530,902	Rs. 2,271	Rs. 170,539

But the commerce of Linseed has since then much increased; amounting in 1852-3, for Bombay, of Linseed imported, to 162,015 cwt., and of exported, to 114,379 cwt.

Quality of Linseed Oil of India.—It may appear remarkable that Linseed Oil should be imported into Calcutta, when so much Linseed is exported for the express purpose of yielding its oil. This is in consequence of the Linseed Oil of India being considered as not possessed of the full drying properties of the oil prepared in Europe. But there is no doubt, this is owing entirely to the Indian Linseed being expressed before the Mustard seed has been separated, with which it is commonly mixed, in consequence of the two plants being often grown together. Mr. Bowen informed the author that, when connected with one of the lighthouses in India, he had at one time under his charge some plate glass. This he made use of to separate the two seeds, by placing it on a slope: the round seeds of the Mustard rolled off, while the Linseed merely slipped down. These, when expressed, yielded as good drying oil as any he ever obtained from Europe. The same fact is confirmed by the following statements. In a report from Mr. W. Ewin, Branch Pilot, to Capt. W. Hope, Master-Attendant at Calcutta, he acknowledges the receipt of five gallons of Linseed Oil, made at the Gloucester Mills, situated below Calcutta. "I beg leave to say I painted my boat inside green with the above oil, without the assistance of turpentine, and it dried within the space of twenty-four hours; and do not hesitate to say, if the above oil agreeable to the master, be given, that it is equal to the Linseed Oil received from the Honorable Company's

Marine Yard, said to be Europe. "Sandheads, H.C.P.V. *Sea Horse*, 2d January, 1837." So Mr. W. Clark, commanding H.C.F.S.V. *Hope*, writes, 14th Dec., 1836: "I have to report, for the information of the Master-Attendant, in reply to his letter (No. 39) of the 7th ult., that I have painted the *Hope*, outside, with the Gloucester Mill oil on one side, and that supplied by the Naval Store Keeper on the other,—both laid on at the same time; and of the two I must give the preference to the former, in drying and bearing a better gloss."

Account of the quantities of Flax, Tow, and Linseed, imported into the United Kingdom during the year 1851, *distinguishing the countries whence they were imported, and the quantities brought from each.* (*M'Culloch's 'Com. Dict.'*)

	Flax & Tow.	Linseed.
	Cwt.	Cwt
Russia, ...	818,676	417 950
Prussia, ...	135,825	58,179
Hanseatic Towns, ...	14 925	2,352
Holland, ...	83,121	14,779
Belgium, ...	79,973	55
France, ...	3,802	36
Italy and the Italian Islands, ...	1,885	1,667
Egypt, ...	48,038	36,410
British Territories in the East Indies, ...	48	93,814
United States of America, ...	6	1,152
Other parts, ...	7,885	4,077
Total ...	1,194,184	630,471

(3942) FLEABANE, PURPLE.

Kalee-zeeree, Duk. Guz
Buckchee, Hind.
Kanana-iraka, Sans.
Caat-siragum, Tam.
Adavie zeela kara, Tel.

Are small dark-coloured, and extremely bitter seed, which are considered as powerfully anthelmintic; and are also an ingredient of a compound powder prescribed in snake bites by native practitioners. An infusion of seed is also given for coughs, and against flatulency.—*Ainslie.* These seeds are procurable in all Indian bazars.

(3943) FLINDERSIA, possesses a volatile oil. *F. Australis* is a native of Australia, and its wood is said to be not inferior to mahogany. *F. Amboinensis* is a native of the islands of Hitu and Ceram. The spiny part of the fruit is formed into rasps. It was on this account called by Rumphius *Arbor radulifera.*

(3944) FLINTS.

Pierre a fusi, Fr.
Feuerstein, Ger.
Chuchmuck, Guz. Hind.

A mineral composed almost entirely of silica. Few parts of the world are without it. It is used, when calcined and ground, in pottery; also for gun-flints, for which purpose the yellowish-gray flints are preferred.—*Waterston.*

(3945) FLORIKIN, OR FLOYERKIN.

Warroogoo koli, Tam.

This beautiful, speckled, greyish colored bird

which is common in almost every part of the Peninsula, is considered as a species of Bustard; it is reckoned, when dressed, a great delicacy by Europeans and gets its Tamool name from being usually found in the Warroogoo (Paspalum Frumentceum) fields.—*Ainslie's Mat. Med. p.* 297.

(3946) FLOUR.

Tringoo-pittay, CYNG.	Farina, LAT.
Bloem, DUT.	Flor de farine, PORT
Fleur de farine, FR.	Godhuma pishta, SANS.
Feines mehl, GER.	Flor, SP.
Atta. GUZ. HIND.	Godum-bay-mao, TAM.
Fiore, IT.	Godumapendie, TEL.

The meal of wheat finely ground, and sifted. —*Faulkner.*

(3947) FLOWERS.

A select list of popular Flowers cultivated at Madras.

A.
Ageratum.
Aster.
Allamanda.
Angeloen.
Antirrhinum.
Aphelandra.
B.
Balsam.
Begonia.
Bignonia.
Brugmansia.
Bulbs.
C.
Cactus,
Campanula.
Carnation.
Cereus.
Cockscomb.
Collinsia.
Chrysanthemum.
Convolvulous
Coreopsis.
D.
Dahlia.
Daisy.
Delphinium.
E.
Epiphyllum.
Eranthemum.
F.
Fuchsia.
G.
Gardenia.
Geranium.
Gloriosa.
Gloxinia.
H.
Heliotrope.
Hibiscus.
Honeysuckle.
Holyhocks.
I.
Ipomea.
J.
Jasminum.
Juniperus.
Justicia.
L.
Larkspur (see Delphinium.
Lobelia
Lophospermum.
M.
Marigold.
Maurandya.
Mimosa.
Mignonette.
Myrtle.
N.
Nasturtium.
Nemophila.
O.
Œnothera.
P.
Passiflora.
Pansy.
Petrea.
Petunia.
Phlox.
Poivrea.
Portulacca
T.
Thunbergia.
V.
Verbena.
Violet.

Jaffrey.

In addition to the above flowers, &c. we may add the fragrant smelling Maroodanie or Iveny (Lawsonia spinosa); the beautiful purple and fragrant Padriepoo, (Bignonia chelonoides) which is also a Pagoda flower; the sweet smelling Mara Malliepoo, (Millingtonia hortensis,) the produce of what is improperly called in English the Cork tree; and the Vatte Cheddie, (Justicia picta), a shrub admired for its beautiful, variegated, green and white leaves.—*Ains. Mat. Med. p.* 165. Mr. Fortune speaking of Foo chow foo says the celebrated fingered-citron, so common in the shops throughout China seems to be cultivated in great perfection in this part of the country, in fact, it appears to be its natural locality. The district round Foo Chow-foo seems to be the great Camellia garden of China, and in no other part of the country did he ever see these plants in such perfect health or so beautifully cultivated. The Ixoras and Hydrangeas are also particularly well grown and handsome, the latter invariably producing flowers of the deepest blue, much deeper than he had ever seen them in England. They are grown in a fine rich loam, which contains some chemical ingredient, and whichis the cause of their deep colour.—*Fortune's Wanderings, p.* 382. Early in spring the hill sides were covered with a beautiful Daphne with lilac flowers (Daphne Fortuni Lindley): Azalea ovata Lindl., certainly one of the finest and most distinct plants of this kind which he has introduced, also grows wild on the hills, and was in full bloom at this period. A fine new Buddlea (B. Lindleyana) had a most graceful appearance, as its long spikes of purple flowers hung in profusion from the hedges on the hill sides, often side by side with the well known Glycine senensis. Another plant, certainly one of the most beautiful shrubs of northern China, the Weigela rosea, was first discovered in the garden of a Chinese mandarin near the city of Tinghœ on this island. This spring, it was loaded with its noble rose-coloured flowers, and was the admiration of all who saw it, both English and Chinese. I have great pleasure in saying that all these plants and many others natives of Chusan are now growing in our gardens in England.—*Fortune's Wanderings, page* 317. In the hedges the last fading blossoms of the beautiful spring flowering Forsythia viridissima were still hanging on the bushes, with several species of wild roses, Spiræa Reevesiana, clematises, and Glycine sinensis, were just coming into bloom. But look a little higher up to that gorgeously painted hill-side, and see those masses of yellow and white flowers, what are they? The yellow is the lovely Azalea sinensis, with its colours far more brilliant and its trusses of flowers much larger, than they are ever seen in any of our exhibitions in Europe. The white is the little known Amelanchier racemosa. Amongst these and scattered over the hill sides, are other azaleas having flowers of many different hues, and all very beautiful.—*A Residence among the Chin. page* 27.

(3948) FLOWER BATTEN (76). A very hard, fine, close-grained heavy Ceylon-wood. Its polished surface shows a pleasing mottled pattern.

(3949) FLUOR SPAR, Derbyshire Spar, Native Fluoride of Calcium. A mineral found in great beauty and abundance in Derbyshire and other places. It is procured in cubic crystals of various colours, and in the Odin mine in detached masses, from an inch to more than a foot in thickness. This variety admits of being turned in the lathe into vases and other ornaments. Fluor-spar is also sometimes used as a flux for promoting the fusion of other minerals.—*Waterston. Foulkner.* Mr. Mason has a small specimen of bluish crystals of fluor spar, which the Burman, who brought it, said was found in the northern part of Province Amherst. As the mineral is often found in connection with lead, it is probable they will be found together in the Tenasserim Provinces.—*Mason.*

(3950) FLUGGEA VIROSA, Hamilton. *Syn.* Phyllanthus virosus, *Roxb.* p. 659. A middle sized tree in the Circar mountains, a large shrub in the plains; bark a strong astringent, intoxicates fish if thrown into the waters they inhabit. —*O'Shaughnessy, page* 552.

(3951) FŒNICULUM, a genus of Exogenous Plants belonging to the natural order *Umbelliferæ* to which the common herb called Fennel belongs. It was formerly considered a species of *Anethum*, but since the remodelling of the natural order *Apiaceæ* by Koch, it has been universally looked upon as a distinct genus. *Anethum* in fact belongs to the sub-division *Peucedaneæ*, with thin flat fruit, while *Fœnculum* forms part of *Seselineæ*, the fruit of which is tapering or very little compressed, and by no means flat. *F. vulgare*, is a biennial plant with leaves cut into hair-like segments, yellow flowers, and glaucous stems. The fruit is ovate, not quite two lines long, pale bright-brown, smooth, the ridges sharp with but little space between each, the lateral ones rather the broadest, terminated by a permanent conical disc. Common on chalky cliffs in the southern parts of England, and everywhere cultivated for the sake of agreeable aromatic quality of its leaves. Oil of fennel is obtained from the fruit. —*Eng. Cyc.*

(3952) FŒNICULUM DULCE, (Sweet fennel.) Seeds also afford a valuable essential oil, much used in medicine.—*O'Shaughnessy, p.* 360.

(3953) FŒNICULUM PANMORIUM.

Panmuhori, HIND.

Indian fennel seeds.—*Ben. Ph.* 208. *F. Panmorium* is cultivated in various parts of Bengal, under the name of Panmuhuree, or Mudhoorika in Sanscrit. Its fruit has a warmish very sweet taste, and aromatic smell, and is much used by the natives with their betel and in their curries. The root is white, nearly fusiform, and almost simple; the stem is erect, branched from the base to the top, from 2 to 4 feet high, the branches erect, round, and smooth, with a uniform pale-glaucous tinge and not striated. The umbels are terminal, rather concave, but not regular; the flowers small, bright deep-yellow, the petals long, ovate, with their points rolled in. The stamens longer than the petals. The fruit is used medicinally in India as a warm aromatic and carminative.—*Eng: Cyc.*

(3954) FŒNICULUM VULGARE, (Common fennel.) Europe. *Syn.* Anethum Fœniculum.

Shohie-keeray, TAM.

An essential oil is prepared in large quantities from the seeds. The odour of the entire plant is strong and persistent, that of the roots disappears on drying. The *essential oil of fennel* is clear yellow, easily frozen, lighter than water; sp. gr. 990. Fennel, used as seasoning by the natives, and by Europeans in garnishing is common in gardens, raised from seed.—*O'Shaughnessy, page* 360. In compounding *Confection of black pepper.* in India, forelecampane root (inula helenium), Dr. O'Shaughnessy recommends the substitution of the goonch root, Abrus precatorius. The Edinburgh Pharmacopœia uses liquorice root: and for the fennel seeds of the London preparation, the seeds of Panmuhori, or Sonf, (Fœniculum panmorium) are an adequate substitute.—*Beng. Phar. page* 273.

(3955) FOOD. The materials taken into the system of organised beings, and by which their functions are maintained, and out of which their bodies are formed, are called Food. Food in its widest sense is the raw material out of which plants and animals are manufactured. We shall confine ourselves here to the consideration of the food of animals, and of man in particular. The great cause of the necessity of a constant supply of new matter or food to the body is the waste of the materials of which the blood and organs are composed, during the performance of their functions. The result of this waste is seen in the form of the various excretions which are thrown off from the body by the skin, liver, kidneys, and bowels. We shall find, then, that the food, the blood, and the excretions, represent each other, that they contain substances of the same nature, and are all composed of the same ultimate elements. If we take a portion of human flesh or blood, and seek for its ultimate elements, we shall find that, on accurate analysis, they will yield the following elements:—

Carbon.	Potassium.	Aluminum.
Hydrogen.	Sodium.	Copper.
Nitrogen.	Calcium.	Chlorine.
Oxygen.	Magnesium.	Fluorine.
Sulphur.	Iron.	Silicon.
Phosphorus.	Manganese.	

Few or none of these elements occur in the human body in their pure form, but are combined variously with one another, forming compounds having very different physical properties and chemical relations. These elements may be divided, for physiological purposes, into two classes; the first four, carbon, hydrogen, oxygen, and nitrogen, being called Organic, whilst the remainder are called Inorganic elements. The first are called organic elements because they are found universally present in plants and animals, and because no animal cell and no vegetable cell can grow unless the whole of these elements exist. Hence, as they lie at the foundation of all organic existence, they are properly designated by this term.

The substances belonging to this group which enter into the food of man are cellulose, starch, sugar, and oil. Cellulose forming the external membrane of the cells of all plants is found in all food derived from the vegetable kingdom. It

has a composition almost identical with starch, but differs in being insoluble and indiffusible in water. There can be little doubt however that it is taken up extensively into the system in the food of the lower animals, especially of the *Herbivora*. When cells are very thick with cellulose they are indigestible, and this will account for many articles of food as carrots, turnips, radishes, uncooked vegetables, &c., not being readily digested. Cellulose is converted into starch by the addition of sulphuric acid, and it is not improbable that some change of this sort may take place when it is taken into the stomach. It is however seldom taken by human beings alone, although recommended by no less an authority than Benjamin Franklin, who showed by example that saw-dust pudding might be used as an article of diet. Starch enters very largely into the diet of man, and of the lower animals. It is distinguished from cellulose by its ready diffusibility in water. On this account it appears to be much more readily absorbed from the stomach or converted into the forms in which food is taken up into the system. Its property of uniting with water and forming with it at a high temperature a gelatinous mass, explains the change which takes place in boiling the flour of the grains in which it is contained. Starch is found in some plants in greater quantities than in others; it is however very generally found in perennial roots and rootstocks, in the stems and in the seeds of plants. There are few or no vegetables or parts of plants that are eaten that do not contain starch. It is found in turnips, carrots, potatoes, cabbages, parsnips, beans, peas, wheat, barley, oats, and the rest of the *Cerealia*; in chestnuts, walnuts, hazel-nuts, and all other seeds; in the apple, the pear, the plum, and cherry, and all other fruits. In many of these things however it is not the distinguishing alimentary ingredient, but it is often separated, and is used pure as an article of diet. The substances in which it occurs pure are arrow-root, sago, and tapioca. What is sold under the name of arrow-root, proper, in the shops, is a form of starch procured from the rootstocks of various species of plants belonging to the family *Marantaceæ*. See ARROW-ROOT. Although there is much difference in the price of arrow-root, its composition is always the same. Even the substance used to adulterate arrow-root, as potato and sago starch, are of the same composition; and though the appearance and flavour of the arrow-root may be impaired, its ultimate dietetical action is the same. Although arrow-root, sago, tapioca, and potato starch, are all composed of the same constituent, their flavour is very different; hence the preference given to arrow-root as an article of diet. This flavour depends on some peculiar principle which is produced in the plant from which the starch is obtained, and by very careful preparing can be entirely got rid of. Arrow-root is used for making cakes, puddings, and a thick gelatinous fluid in great request in the sick room. It is a property of starch to combine with water at a temperature of 180, and form a gelatinous compound. This property of starch renders it very useful in cookery, and seems to increase the digestibility of the starch itself. Arrow-root is frequently regarded as nutritious; but it will be seen that it is not nutritious in the proper sense of that word. Those foods can alone be called nutritious that contribute to the building up of the fabric of the body by adding those materials to the tissues which are being constantly removed by the wear of the body. Now starch does not perform this function, and is entirely consumed in the body in maintaining its animal heat. Arrow-root however and the other forms of starch, are frequently mixed with nutritious matters, such as milk and bread; and in this way the food into which they enter becomes nutritious. Another form of starch is Sago. It is starch obtained from the inside of the trunks of palms, and other trees. Many plants yield starch in their stems, which, on being prepared, is called sago by Europeans. The sago which is sold in the shops of England is principally imported from the islands of the Indian Archipelago, and is the produce of a palm called the true Sago-Palm, or *Sagus lævis*. There is however another palm belonging to same genus the *S. Rumphii* (the prickly Sago-Palm,) which yields the sago that is consumed by the natives of India. Sago is not generally so carefully prepared as arrow-root, and it is a much cheaper article of diet. Its ultimate action is perfectly the same as arrow-root. It is now often employed by starch-makers to procure the finer kinds of starch used by manufacturers. When thus prepared, it is used to adulterate arrow-root. Tapioca is another form of starch. It is brought to Europe from South America, and is the produce of a plant known to botanists by the name of *Janipha Manihot*. It is poisonous plant, and the Indians in the countries where it grows extract a posion from it, which they use to poison their arrows, before they obtain the starch. Cassava, which is eaten by the natives, is procured from the same plant, but is prepared in a different way from tapioca. The starch of tapioca does not differ in chemical composition from that of sago and arrow-root, and it is used in the same way, and for the same purposes. There are many other well-known plants which owe their dietetical properties to the starch they contain; amongst these we may mention the potato, the carrot, the turnip, the parsnip, the cabbage, the Jerusalem artichoke. From any of these starch might be prepared. The roots of *Arum maculatum*, though acrid, contain much starch. When cooked, the acridity of the plant is got rid of, and they are eaten with impunity.

These roots are employed in making the substances called Portland sago, which is the starch separated from the rest of the matter of the plant. This sago is used for the same purposes as the other kinds of sago. The roots of *Orchis mascula*, which is a common plant of our meadows, form the substance called salep. When it is boiled, it forms an agreeable article of diet, which, before the introduction of tea and coffee, was very generally used in this country. It is now almost entirely disused in Great Britain. Starch differs in some of its chemical and physical properties according to the plants whence it is obtained. In this way chemists have distinguished several kinds of starch. Inuline is a form of starch obtained from the *Inula Helenium*, a plant not uncommon in the English fields. Lichen-starch is another form, which is found in almost all kinds of *Algæ* as well as Lichens. This starch has the same power of thickening water at a high temperature as arrow-root and tapioca; and hence, when any of these plants are boiled in water, they form a thick mucilaginous decoction. The thickness of the fluid thus obtained, under the erroneous notion of its being nutritious, has led to the use of many species of sea-weeds and lichens as articles of diet. One of the plants of this kind, which has been used most extensively and is still largely employed, is the Iceland-Moss (*Cetraria Islandica*). It belongs to the family of Lichens, and is a native of the northern parts of the world. This and other lichens probably contain other dietetical secretions besides starch, as we find they are capable of supporting animal life. The Rein-Deer-Moss (*Cenomyce rangiferina*) is an instance of this. In the northern parts of the world as well as in mountainous districts this lichen grows in great abundance, and during the winter season is the principal support of the rein-deer. In spite of the extreme cold to which it is subjected this plant grows with vigour, and the rein-deer, in order to obtain it as food, is obliged to remove with its nose the snow with which it is sometimes covered for many feet. The Cup-Moss (*Cenomyce pyxidata*) of English moors belongs to the same genus as the rein-deer-moss, and is also used as an article of diet in the same way as the Iceland-moss. The tripe de Roche is another of these lichens which has been used as an article of diet. It has a melancholy interest attached to it, as it has so often formed the chief article of diet of our arctic navigators. Two species of lichens, the *Gyrophora proboscidea* and *G. erasa*, afford the Tripe de Roche. Although they are said to be nutritious, they are described as having bitter, nauseous, and purgative properties. Amongst the sea-weeds which have been used as articles of diet none is better known than the *Chondrus crispus*, which under the name of Carrageen-Moss, Irish Moss, and Pearl-Moss has been for a long time used in Europe. It grows on the rocky sea-shores of Europe; and when washed and dried, and then boiled with water, makes a mucilaginous decoction, which, like the same preparation of the Iceland-moss, has been recommended in consumption, coughs, diarrhœa, and other diseases. It has however no bitter principle, and is probably less tonic than the lichen. This and other sea-weeds have been occasionally had recourse to by the poor inhabitants of the sea-shores of Europe, more especially Ireland, when the ordinary corn or potato crop has failed. They contain however but little nutritious matter, and persons soon famish who live upon nothing else. There are certain forms of sea-weed which are often eaten as an addition to other kinds of food. There is in all of them a certain flavour of the sea, arising probably from the saline matter they contain, which renders them very objectionable to some persons as articles of food, and which will probably always form an objection to their general use. Of those which are eaten in various parts of England we may mention:—1. Laver, Sloke, Slokam (*Porphyra laciniata*). It is on all those sea-shores; and when employed as food is salted and eaten with pepper, vinegar, and oil. 2. Green Laver, Green Sloke, Oyster-Green (*Ulva latissima*). The *Ulva* is not so good to eat as the *Porphyra*, and is only had recourse to when the latter is not abundant. 3. Tangle, Sea-Ware, Sea-Girdles, Sea-Wand, Red Ware (*Laminaria digitata*). It is cooked by boiling for a long time, and adding pepper, butter, and lemon-juice. Cattle are fed on it when young in some parts of the British Islands. 4. Badderlochs, Hen-Ware, Honey-Ware, Murlins (*Alaria esculenta*). The part of the plant which is eaten is the thick middle rib which runs through the frond. It is sometimes called the Eatable Fucus. 5. The Dulse of the south-west of England is the *Iridea edulis* of botanists. It is eaten by the fishermen of the south-west coasts of England, who before eating it pinch it between red-hot irons. In Scotland it is cooked in the frying-pan. It is said to resemble in its flavour roasted oysters. 6. Dulse of the Scotch, Dellisk, Dellish, Duileisg, Water-Leaf (*Rhodomenia palmata*). The Highlanders and the Irish, before the introduction of tobacco, were in the habit of drying this weed and using it as a masticatory. The Icelanders use it as an article of diet under the name of the Sugar-Fucus. In the islands of the Mediterranean Archipelago it is employed as an ingredient to flavour soups, ragouts, and other dishes. Several other sea-weeds have been employed as food, but these are the principal that are at present used in Britain. In China the people are very fond of sea-weeds, and many kinds are collected and added to soups, or are eaten alone with sauce. One of these, the *Plocaria tenax*, is sometimes brought to England under the name of Chinese Moss. The de-

coction it makes is so thick that it is used as glue. The Corsican Moss, which has a reputation in medicine as well as a diet, is the *Plocaria Helminthocortos*, and is found on the coasts of the Mediterranean. Another sea-weed was recently imported into London under the name of Australian Moss; but although affording a very thick jelly, it tastes too strongly of the sea to be rendered pleasant by any kind of cooking. The next dietetical substance of which we have to speak is Sugar. Sugar is distinguished readily from starch by many properties. Sugar is soluble in water, whilst starch is only diffusible through it. Sugar is susceptible of fermentation, and of being converted into alcohol, which starch is not. Sugar has a peculiar sweet taste, whilst starch is insipid. It is on account of the solubility of sugar that we never, or very seldom, find it in plants in a solid condition. It is always dissolved in the water naturally contained in the plants in which it exists. Sugar is not so frequent a product of vegetable change as starch; but is, nevertheless, very generally found during some period of the growth of the majority of plants. Sugar, like starch, is not nutritious, but is taken into the system with the object of maintaining animal heat. Persons may even get fat on sugar, but the living tissues are not nourished by any of the carbonaceous productions of plants. It is true, that in countries where the sugar-cane is grown, slaves and their children, during the period of its gathering, partake of it in large quantities, and are nourished upon it; but the sap of the sugar-cane, and the cane itself contain other alimentary principles besides sugar, which assist in the nutrition of the body. Although there are various kinds of sugar, having a different composition, they seem all to act dietetically in the same way upon the system. The most common form of sugar in plants and that which is most frequently eaten in diet, is Cane-Sugar, so called from its being yielded by the sugar-cane. It consists of—

	Atoms.
Carbon	12
Hydrogen	9
Oxygen	9
Water	2

The other kinds of sugar which are eaten, are milk-sugar, $C_{24}H_{18}O_{18}+5HO$; and grape-sugar, $C_{12}H_{12}O_{12}+2HO$. It will be seen that cane-sugar resembles starch in its composition, and it is probably formed in the plant from that body. Although cane-sugar is found in the sugar-cane, the beet, and the maple, it is not so frequent in plants as grape-sugar, which is the form in which sugar is found in the fruits and other parts of plants which may be sweet. The sources of sugar, as an article of diet, are of course very various; it is only separated however from a limited number of plants. Of these the principal is the sugar-cane (*Saccharum officinarum*.) The sugar eaten by the inhabitants of France is principally obtained from the Beet (*Beta vulgaris*). In tropical countries it is obtained from the juice of palms, as from the Jaggary Palm (*Caryota urens*), the Cocoa-Nut Palm (*Cocos nucifera*), and others. It exists in the stems of all grasses, and is prepared in America from Maize (*Zea Mays*). The Birch (*Betula alba*) in England. and the Sugar-Maple in America (*Acer saccharinum*), also yield it in their sap. Grape-sugar, also called Glucose, is found in the fruits of most plants. It seems to act on the system in precisely the same way as cane-sugar. The result of the fermentation of grape-sugar is the production of Alcohol, which does not differ much in composition from sugar. The following is the decomposition:—

	C.	H.	O.
2 Atoms of Alcohol... ...	8	12	4
4 Atoms of Carbonic Acid.	4	0	8
2 Atoms of Water ...	0	2	2
One Atom of Grape-Sugar	12	14	14

Alcohol is taken as an article of diet in the forms of beers, wines, and spirits. Although resembling sugar in its composition, its effects on the system are very different. It acts on the nervous system as a stimulant and narcotic, and might perhaps be regarded as one of the medicinal forms of food. A question has arisen amongst physiologists as to the action of this substance on the system. Liebig, and with him many others, maintain that like starch and sugar and oil, the elements of the alcohol unite with oxygen in the system, and thus by combustion assist in maintaining animal heat. On the other hand Dr. Carpenter, and those who repudiate the use of alcohol in diet, maintain that it is not destroyed during respiration, and consequently does not promote animal heat any further than as it stimulates the heart's action. Alcohol when taken as an article of diet not only acts upon the nervous system, but on account of its chemical action on albumen exerts an injurious influence when taken in large quantities upon the mucous membrane of the stomach. It is thus that when indulged in, it becomes a source of indigestion, and lays the foundation of serious diseases. Taken in small quantities in the form of wine or beer, it seems to exert a favourable influence on the digestive function, and to belong to that class of foods to which spices and condiments are referred. Taken medicinally it is often capable of exerting powerful effects, on account of its rousing action upon the vascular system. It does not seem to be necessary to health, as there are many nations that never use it, and individuals, in countries where it is habitually taken as an article of diet, find their health not materially injured by debarring themselves from its use. The quantity of alcohol contained in fermented be-

verages varies very much. With regard to wines, when the juice of the grape contains large quantities of sugar in comparison with the water, and the fermentation is complete, then the alcohol is abundant, and strong wines are produced; whilst, when the sugar is in small quantities, or the fermentation is incomplete, weak or thin wines are the result. Ports and sherries are strong wines, whilst those of the Rhine are generally weak. Sweet wines are those in which all the sugar is not converted into alcohol. This is mostly the case with wines made from other fruits besides grapes. Hence the well-known sweetness of what are called British wines. This does not however arise from an imperfect fermentation, but from the acid contained in other fruits not being tartaric acid. One of the most remarkable properties of tartaric acid is that it forms an insoluble salt (the cream of tartar) with potash, which is generally found in fruits; and in wines made from the grape this salt falls to the bottom of the cask, forming the tartar or lees of the wine. But other acids, as citric, malic, and oxalic acids, are not thus precipitated from their solutions, and they remain in wines, giving them a very acid flavour, which would render them unpleasant, unless sugar was added to cover the acidity. Sweet wines are objectionable as articles of diet, on account of the sugar they contain, which, when held in solution in wine, seems more likely to decompose, and thus prove injurious to the system, than when taken in its pure form. In wines made from other fruits besides grapes, the acid is also liable to objection. Effervescing wines are those which are bottled before the fermentation is complete, so that a large quantity of the carbonic acid, which would be otherwise got rid of, is retained in solution in the wine, and escapes when the bottle is uncorked. Such is champagne. Effervescing wines are more liable to disagree with delicate stomachs than others, on account of their imperfect fermentation rendering them liable to further change in the stomach; and this state of change is probably communicated to the substances used as food contained in the stomach. The skins and stalks of the grapes, if not the juice, contain tannin. This substance is a powerful astringent, and its presence seems to be the cause of the astringent character of many red wines, as port, claret, and others. There is also a difference in the quantity of free tartaric acid contained in wines; and those which have the largest proportion of this constituent have an acid flavour. Some of the wines made from grapes are so sour as to be very unpalatable: this is more especially the case with the poorer white wines of the Rhine. The quality in which wines differ from each other most is what is called their bouquet, or flavour. It differs in wines made from different kinds of grapes, and differs in the same grape in different districts and in different seasons. It is well known that the vintage of one year produces a better or worse wine than that of another, and this depends on the development of the peculiar flavour of the wine. Liebig says that the bouquet is dependent on an acid which he calls œnanthic, and which, combining with the alcohol, forms an ether which gives the odour and flavour to wines. The quantity of alcohol contained in wines differs very much. The ports and sherries consumed in England contain the largest quantity. But then much of this is added. It is added in the form of brandy. Brandied wines keep best, but are not the best to drink. Unless wines are naturally strong, they will not keep without the addition of alcohol. Clarets, hocks, and Moselles, are seldom brandied. Some of the hocks do not contain more than seven per cent. of alcohol, whilst port and sherry contain twenty-five per cent. Ardent spirits, distilled liquors, differ from wine in their having been submitted to distillation after the fermentation, which produces the alcohol. Brandy is distilled from wine; and beech-kernels, or other vegetable matter containing oil of bitter almonds, are added to give it a flavour. All the parts of the plants belonging to the division of the order *Rosaceæ*, called *Amygdaleæ*, contain oil of bitter almonds. Rum is distilled from molasses or treacle in the West India Islands, and pine-apples are added to give a peculiar flavour. Gin is distilled in Holland, from rye; in this country from wheat, the grains of which are allowed to become saccharine, and then fermented. Juniper berries are employed to give the peculiar flavour to gin. Whiskey is distilled from wheat, barley, or oats, treated in the same manner as for gin. Nothing is added to flavour it; but the smoke of the peat, by the aid of which the distillation is effected in both Ireland and Scotland, gives a characteristic flavour to this liquor. Liqueurs belong to this division; they are distilled spirits containing large quantities of sugar, and are flavoured with all kinds of substances, as celery, bitter almonds, gentian, wormwood, &c. Beers, Ales, and Porters, differ from wines in the addition of a bitter principle, most frequently the hop, to the fermented liquor. The saccharine matter for fermentation is obtained through barley. The grain of barley is steeped in water, and allowed to germinate. When the starch of the grain is converted into sugar, it is submitted to heat, and malt is formed. The malt is placed in boiling water, and hops added; when cooled, the process of fermentation is allowed to take place, and the beer is completed. When the malt is slightly charred during the process of drying, it gives a dark colour to the beer. It is then called porter. These fluids vary much in strength and bitterness, according to the quantity of malt and hops employed. Beer is the safest of these beverages for habitual use; but even this may be indulged in too freely, and

disease may be the result. Of the various kinds of beer, that which is to be most commended, is the weak form of bitter ale, which is now so generally employed in the households of London and its neighbourhood. Beer acts as a tonic on account of its bitter principle, as well as a stimulant, and is frequently, on this account, found to be a valuable addition to the ordinary diet. The Oleaginous Group of foods is somewhat peculiar. They are taken in various forms from both the vegetable and animal kingdoms, and are known under the name of butter, oil, lard, suet, fat, &c. The following formula will express the composition of this class of bodies :—

Carbon	11
Hydrogen	10
Oxygen	1

It will be seen that the oxygen is in considerably less proportion than in the foregoing substances of this group, and we may consequently conclude that the hydrogen as well as the carbon is consumed in the system in maintaining the animal heat. This is an important point, as it frequently happens that the value of the heat-giving group of foods is estimated by the quantity of carbon alone. That oil has more power in maintaining animal heat than sugar or starch, is seen in the fact that it is eaten in larger quantities by men who live in cold regions than by those who live in the warmer parts of the earth. Just as we pass north or south from the tropics, man adds oil to his food according to the degree of cold to which he is exposed. Oil seems also to be deposited in the tissues of man and other animals as a course of combustible materials when these fail in their natural food. Thus the *Ruminantia* get fat in summer to supply them with their winter's store of fuel. Hybernating animals, which are fat when they commence their sleep, wake up quite thin. Their fat has been exhausted in maintaining their animal heat during hybernation. Oil performs another function in the system. It is very evident from its general presence in every tissue of the body that it has an action in connection with the development of the proteinaceous tissues. It seems to assist their development, to act as a kind of preparation for their growth. In this way its curative action in certain forms of disease may be explained. There is no doubt of the beneficial action of cod-liver oil in scrofulous diseases, and its action can only be explained on the above supposition. In connection with the use of cod-liver oil it may be stated that animal oils appear to be in a different physical condition of aggregation from vegetable oils, and are certainly more readily digested and appropriated by the system. The vegetable oils chiefly used as food are those obtained from the Olive (*Olea Europæa*) and the Almond (*Amygdalus dulcis*). Many seeds, as the Cocoa-Nut (*Cocos nucifera*), Almond (*Amygdalus*), Chestnut (*Castanea*), Walnut (*Juglans*), Hazel-Nut (*Corylus*), Brazil-Nut (*Bertholletia*), contain oil. The fat of animals is the great source of oleaginous food from the animal kingdom. We now come to speak of the Nutritious, Proteinaceous, or Nitrogenous articles of diet. The substance called Protein is the basis of these. It is the first element that appears in the development of the vegetable cell. It is consequently universally present in plants. It also constitutes the chief material of the tissues of animals. It assumes in both kingdoms various forms, and is called albumen, fibrine, and casein, according to its physical and chemical properties. Some animals derive this constituent of their bodies directly from the vegetable kingdom, as all the herbivorous and gramnivorous creatures; others derive it indirectly from the plant through the animal, as the various forms of *Carnivora*. Man obtains his supply of protein from both sources. As a sect has arisen of persons who deny the propriety of man's taking animal food, it may be well to examine the evidence on which his claim to be regarded as a flesh-eating animal rests. We shall dismiss the sentimental objection, that life ought not to be taken as unworthy of serious refutation, as every one must feel that for carnivorous animals to prey upon lower animals is a natural law. It will be gathered from the foregoing general remarks that food may be divided into two great classes—the heat-giving and the flesh-forming; and we now present a table of some of the more ordinary kinds of food, in which one or the other, or both, of these classes of substances are found mixed :—

Table of Composition of Food in 100 *parts.*

Food.	Quantity of Nitrogenous Flesh forming Ingredients.	Quantity of non Azotised Heat giving Principles.	Quantity of Mineral Matter.	Quantity of Carbon.
Milk	4·50	7·90	0.60	6·94
Butcher's Meat free from bone	22·30	14·30	·50	21·56
Bacon, Pork...	8·36	62·50	0·50	53·92
Fish	14·00	7·00	1·00	9·15
Flour	17 00	66·00	0·70	45·50
Barley Meal	14·00	68·50	2·00	40 50
Oatmeal	13·60	70·30	3·30	44·10
Indian Meal	10·71	72·25	1·04	36·41
Peas	23·40	60·00	2·50	35·70
Rice	5·43	84·65	0·52	36·00
Potatoes	1 41	22·10	1·00	12 20
Carrots	1·48	11·61	0·81	5·40
Turnips	1·64	10·00	1·62	5.20
Parsnips	2·10	17·70	0·80	8·68
Mangel Wurzel	1·60	12·26	1·14	5·50
Cabbage	1·75	4·05	2·20	2·65
Cocoa (nibs)...	9·56	85·76	2·70	68·56
Sugar	0·00	100·00	0·00	42·58
Suet, Fat, Butter... ...	0·00	100·00	0·00	79·00
Bread	6·83	48·65	1·51	25·19
Cheese	31·02	25·30	4·90	36·30
Beer	·85	9·17	0·20	4·33
Vinegar...				

Such a table as this will be found useful in constructing dietaries for large institutions, which are very often erroneously constituted, and a large waste thereby entailed. The table on the next page contains examples of dietaries, drawn up by Dr. Lyon Playfair, from various sources. This table accompanied an abstract of a lecture by Dr. Lyon Playfair on the 'Food of Man,' delivered at the Royal Institution in May 1853. The following extracts from this lecture will explain some of the valuable results obtained by Dr. Playfair:—"It was now admitted that the heat of the body was due to the combustion of the unazotised ingredients of food. Man inspires annually about 7 cwt. of oxygen, and about 1-5th of this burns some constituent and produces heat. The whole carbon in the blood would thus be burned away in about three days unless new fuel were introduced as food. The amount of food necessary depends upon the number of respirations, the rapidity of the pulsations, and the relative capacity of the lungs. Cold increases the number of respirations and heat diminishes them; and the lecturer cited well-known cases of the voracity of residents in arctic regions, although he admitted, as an anomaly, that the inhabitants of tropical climates often show a predilection for fatty or carbonaceous bodies. He then drew attention to the extraordinary records of arctic dietaries shown in the table, which, admitting that they are extreme cases even in the arctic regions, are nevertheless very surprising. "Dr. Playfair then alluded to the second great class of food ingredients, namely, those of the same composition as flesh. Beccaria in 1742 pointed to the close resemblance between these ingredients of flesh, and asked, 'Is it not true that we are composed of the same substances which serve as our nourishment?' In fact the simplicity of this view is now generally acknowledged; and albumen, gluten, casein, &c., are now recognised as flesh-formers in the same sense that any animal aliment is. "The old mode of estimating the value of dietaries, by merely giving the total number of ounces of solid food used daily or weekly, and quite irrespective of its composition, was shown to be quite erroneous; and an instance was given of an agricultural labourer in Gloucestershire, who in the year of the potato famine subsisted chiefly on flour, consuming 163 ounces weekly, which contained 26 ounces of flesh-formers. When potatoes cheapened he returned to a potato diet, and now eats 321 ounces weekly, although his true nutriment in flesh-formers was only about 8 or 10 ounces. He showed this further by calling attention to the six pauper dietaries formerly recommended, to the difference between the salt and fresh meat dietary of the sailor, &c., all of which, relying on absolute weight alone, had in reality no relation in equivalent nutritive value.

"Taking the soldier and sailor as illustrating healthy adult men, they consumed weekly about 35 ounces of flesh-formers, 70 to 74 ounces of carbon, the relation of the carbon in the flesh-formers to that of the heat-givers being 1 : 3. If the dietaries of the aged were contrasted with this it would be found that they consumed less flesh-formers (25—30 ounces), but rather more heat-givers (72—78 ounces); the relation of the carbon in the former to that of the latter being about 1 : 5. The young boy about 10 or 12 years of age consumed about 17 ounces weekly, or about half the flesh-formers of the adult man; the carbon being about 58 ounces weekly, and the relations of the two carbons being nearly 1: 5½. The circumstances under which persons are placed influence these proportions considerably. In workhouses and prisons the warmth renders less necessary a large amount of food fuel to the body; while the relative amount of labour determines the greater or less amount of flesh-formers. Accordingly it is observed that the latter are increased to the prisoners exposed to hard labour. From the quantity of flesh-formers in food we may estimate approximately the rate of change in the body. Now, a man weighing 140 lbs. has about 4 lbs. of flesh in blood, 27½ lbs. in his muscular substance, &c., and about 5 lbs. of nitrogenous matter in the bones. These 37 lbs. would be received in food in about eighteen weeks; or, in other words, that period might represent the time required for the change of the tissues, if all changed with equal rapidity, which is however not at all probable. "All the carbon taken as food is not burned in the body, part of it being excreted with the waste matter. Supposing the respirations to be 18 per minute a man expires about 8·59 ounces of carbon daily, the remainder of the carbon appearing in the excreted matter."

When human milk is examined, it gives the following results in every 1000 parts:—

Water	870
Butter	52
Sugar	63
Casein	10
Salts	5
	——1000

These five constituents of milk may be regarded as typical of all kinds of food, whether obtained from the animal or vegetable kingdom. Hence, we may class alimentary substances according as they are represented by one or other of these constituents of milk.—*English Cyclopædia.*

Examples of Dietaries.

	Weight in ozs. per week.	Nitrogenous Ingredients.	Substances free from Nitrog.	Mineral Matter.	Carbon.	Proportion between: Carbon in Flesh-formers.	Proportion between: Carbon in Heat-givers.	REMARKS.
Dietaries of Soldiers and Sailors.								
English Soldier,	378	36·15	127·18	4·92	71·68	1	3·66	Public Dietaries.
English Soldier in India,	261	34·15	103·19	2·39	66·32	1	3·58	
English Sailor (Fresh Meat),	302	34·82	102·89	3·17	70·55	1	3·70	
English Sailor (Salt Meat),	290	40·83	132·20	6·03	87·40	1	3·94	
Dutch Soldier, in War,	198	35·21	102·08	1·85	74·08	1	3·87	Mulder.
Dutch Soldier, in Peace,	383	24·52	106·80	4·15	70 77	1	5·32	
French Soldier,	347	33·24	127 76	4·62	85·25	1	4·72	Special Return obtained.
Bavarian Soldier,	242	21·08	102·10	3·32	62·45	1	5·47	
Hessian Soldier,	423	23·00	136·00	—	77·00	1	6·16	Liebig.
Dietaries of the Young.								
Christ's Hospital, Hertford,	216	17·16	61·27	2·47	39·18	1	4·21	Special Returns obtained.
Christ's Hospital, London,	242	17·27	76 82	2.84	46·95	1	5·02	
Chelsea Hospital, Boys' School,	245	12 89	93·28	5·93	57·67	1	8·29	
Greenwich Hospital, Boys' School,	231	18·43	86 73	2·62	52·87	1	5·29	
Dietaries of the Aged.								
Greenwich Pensioners,	269	24·46	122·21	3·54	72 43	1	5·46	Special Returns obtained.
Chelsea Pensioners,	332	29·95	112·64	4·65	78·03	1	4·80	
Gillespie Hospital, Edinburgh,	156	21·02	92·32	2·35	71·39	1	6·26	
Trinity Hospital, Edinburgh,	192	19·63	97·34	3·33	57·30	1	5·38	
Old Pauper Dietaries.								
Class 1,	—	20·21	88·61	3·27	54·30	1	6·95	The six dietaries recommended as equivalent by the Poor-Law Commissioners.
Class 2,	—	14·96	89·59	2·89	51·10	1	6·31	
Class 3,	—	15·78	99·88	3·91	55·43	1	6·50	
Class 4,	—	19·22	116·84	3·96	67·87	1	6·50	
Class 5,	—	15·49	96·51	3·58	54·72	1	6·53	
Class 6,	—	14·67	88 03	2·84	49·57	1	6·25	
Average of all English Counties in 1851,	—	22·00	99 00	—	58·00	1	4·85	Specially reduced from all the Unions in 1851.
St. Cuthbert's, Edinburgh,	175	14·80	89·37	3·31	46·98	1	5·85	Special returns.
City Work house, Edinburgh,	107	13·30	49·99	1·74	31.48	1	4·36	
English Prison Dietaries.								
Class 2. Males,	206½	15·28	111 85	3·46	59·23	1	7·13	Convicted Prisoners exceeding 7 days, but not exceeding 21 days
Class 3. Males,	276	18·26	123·60	4·05	67·53	1	6·81	Convicted Prisoners, Hard Labour, exceeding 21 days, but not more than 6 weeks.
Class 4, 8, and 7, Males,	271½	20·97	125·98	5·03	69·88	1	6·13	Convicted Prisoners, Hard Labour, above 6 weeks, and not more than 4 months
Class 5, Males,	326	20·29	130 57	4 23	73·31	1	6·65	Convicted Prisoners, Hard Labour, for terms exceeding 4 months.
Bengal Prison Dietaries.								
Non-labouring Convicts,	224	18·43	163·16	2·08	76·35	1	7·62	From information supplied from the India House.
Working Convicts,	296	28·16	191·12	2·97	91 07	1	5·96	
Contractors' insufficient Diet,	167½	12·70	135·95	1·30	61·03	1	8·88	
Bombay Prison Dietaries.								
All Classes of Prisoners not on Hard Labour,	182	28·00	101·50	2·08	68·81	1	4·52	
Prisoners on hard Labour,	224	35·63	128·80	2·45	87·22	1	4·50	
Arctic and other Dietaries.								These probably represent extreme cases mentioned by the following authorities:— Ross, 1835, p. 448. Parry, 1823, p. 413. Cochrane, p. 255. Saritcheff. Barrow, pp. 152, 258. Richardson, See 'Agric.' 'Cyc.' Article Diet.'
Esquimaux,	—	250·00	1280·00	—	1125·00	—	—	
Yacut,	—	999·00	640·00	—	966.00	—	—	
Bosjeeman,	—	574·00	268 00	—	555·00	—	—	
Hottentot,	—	424·00	400·00	—	604·00	—	—	
Agricultural Labourer, England,	163·6	26·64	106·57	1·10	74.70	—	—	Gloucestershire, Dorsetshire } See 'Agric. Cyclopædia.'
Agricultural Labourer, England,	114·6	20·39	72·46	1·18	51·72	—	—	
Agricultural Labourer, India,	318·0	14·02	138·27	2·41	61.54	—	—	Dharwar, Bombay—Return in Bombay Prison Dietaries.

FOOD PLANTS.

(3956) FOOD PLANTS. With a rapidly increasing population in all parts of the world, the production of bread is obviously an object of the first importance, to all classes and the vegetable substances, from which man derives his principal sustenance, necessarily occupy the main attention of the cultivator, while their products form a most important staple of domestic and foreign commerce. In the four years ending 1852, the annual quantity of corn, of various kinds, imported into the United Kingdom, exclusive of flour, and meal, rice, sago, &c. averaged 8,085,903 quarters. The flour and meal imported, omitting sago, arrowroot and other starches, averaged in the same period 4,143,603 cwts. annually.—The following lists of cereal grains and pulses, will give the names of the food plants cultivated in the Madras Presidency.

Botanical Name	*English Name.*	*Hindustanee Name.*	*Tamil Name.*
Hordeum hexastichon,	Barley,	Jow,	.....
Triticum aestivum,	Wheat,	Gihoon,	Goodoomay.
Eleusine coracana,	Raggy,	Natchnee ragee,	Kavaroo.
Oryza sativa, varieties,	Common rice, Black, Red,	Chawul, Paddy, &c.	Areesee,
Setaria italica,	Italian millet,	Kala-kangnee,	Tenney,
germanica,	German millet,	Kora kang.	
Panicum miliaceum,	Common millet,	Sawee, cheena warree,	Varugoo.
Pencillaria spicata,	Spiked millet,	Bajree,	Cumboo.
Sorghum vulgare	Great millet,	Jowaree,	Cholum.
Zea mays,	Indian corn,	Mukka Jowaree Boota,	Muka cholum.

PULSES CULTIVATED IN MADRAS AS FOOD FOR MAN OR BEAST.

Botanical Name	*English Name.*	*Hindustanee Name.*	*Tamil Name*
Medicago sativa,	Lucern,		
Trigonella fœnum graecum,	Fenugreek,	Maitee or meetee kee bajee,	Vendium.
Psoralea corylifolia,	Hazel-leaved psoralea,	Bawurcheen,	Karpooga Arisee.
Cicer arietinum,	Chick pea Bengal gram,	Chenna,	Cadalei.
Ervum lens,	Lentil,	Mussoor,	Mussoor purpoo.
Pisum sativum,	Common pea,	Buttani,	Puttani.
Phaseolus vulgaris,	French bean,	Bakla,	French beansoo.
Phaseolus lunatus,	Duffan bean,		
—— radiatus,	Green gram,	Haree moong,	Putcha payroo.
—— mungo,	Moong or monash	Marh,	Oolandoo.
Dolichos uniflorus,	Madras gram,	Kooltee,	Kolloo.
—— sinensis,	Chinese dolichos,	Suffeed lobeh,	
Lablab vulgaris,	Bullar,	Saim ka puttee,	Motchay cottay
„ „ var.		Suffed,	Vellay mochay.
Psophocarpus tetragonolobus,	Winged pea,	Pank ke mutur.	
Canavalia gladiata,	Sword bean,	Lal kudsumbah,	Segapoo Thumbetten
Cajanus indicus,	Pigeon pea,	Toor dhal,	Thovaray purpoo.
„ var,	Dholl,	Lal thour,	Segapoo Thovaray.
„ „		Pad ka thour,	Malay.

Exports from Madras, of Food Substances for 1853-54.

		Quantity.	Value. Rs.
Rice,	Qrs.	6,25,104	59,25,118
Wheat,	Qrs.	5,208	58,736
Coffee,	lb.	72,05,996	7,15,562
Sugar,	Cwt.	5,33,878	33,58,346
Tamarind,	Cwt.	5,438	11,156
Tabacco,	lb.	16,19,787	72,577
Cinnamon,	Cwt.	215	9,653
Cassia buds,	„	981	2,018
Nutmegs,	None.		
Mace,	None.		

FORESTS OF TIMBER IN INDIA.

		Quantity.	Value. Rs.
Cloves,	Cwt.	36	1,312
Pepper,	Cwt.	1,00,796	9,88,084
Cardamums,	„	3,318	3,24,295
Ginger,	„	25,991	1,23,353
Coriander seeds,	„	7,718	11,239
Arrowroot,	„	7,400	45,069
Sharkfins,		1,329	28,078
Fish Maws,		501	7,528

Plants cultivated for Food, Oil, &c., in Pegu.

Esculent Vegetables.

Solanum melongena, brinjal. Khayan.
Solanum lycopersica, tomato or love apple. Thayan-myai-bone
Amaranthus polygamus, green Bajee, for vegetable curry.
Amaranthus atropurpureus, purple ditto.
Ocymum vilosum, mint for ditto. Penzeing.
Hibiscus sabdariffa, red sorrel or roselle for curry. Chin-boung.
Hibiscus longifolius, another variety for ditto. Kazoon-o-u.
Batatas edulis, sweet potatoe. Myouk-nee.
Dioscorea purpurea, purple yam.
Dioscorea glabra, the smooth ditto.
Dioscorea rubella, the red ditto.
Dioscorea anguina, the snake ditto.
Jatropha manihot, the Cassava yam.
Hedysarum tuberosum, the Batraj ditto.
Arachis hypogea, the earth nut. Myai-bai.
Dolichos catjang, long or French bean.
Dolichos lablab, the Indian ditto.
Raphanus sativa, or radish. Moue-lah.
Trichosanthes anguina, the snake gourd. Pailin-moay.
Momordica charantia, or small ditto. Kyet-bin-ga.
Luffa pentandra, the five-cornered ditto. Tha-boot.
Luffa decandra, the ten-cornered ditto. Tha-boot-khawai.
Lageneria vulgaris, the cuddoo or bottle ditto. Boo-shin-sway.
Lageneria pipo, the pumpkin.
Lageneria melo-pipo, or squash.
Arum furfaraceum, scaly yam.
Cucumis usitata, large cucumber. Tha-khwa-gyee.
Cucumis sativus, common ditto. Tha khwa.
Cucumis citrullis, or water-melon. Hpayai.
Allium cepa, the onion. Kyet-thoon.
Capsicum purpureum, red pepper. Gua-yoke.
Capsicum minimum, small or bird's eye pepper.
Andropogon esculentum, or lemon grass.
Cannabis sativa, or bang. Baing.
Nicotiana, tobacco. Hsai.
Piper betel. Koon.

Oil Seeds.

Sinapis dichotoma. Moung-ugyeen.
Sesamum muralis. Huan.

Grains and Pulses.

Phaseolus mungo, green gram. Pai.
Eleusine corocana.
Zea mays, or Indian corn. Pyoun-boo.
Oriza sativa, or rice of numerous kinds. Htson.—*McClelland.*

(3957) FORESTS OF TIMBER IN INDIA. A vast extent of Forest land in Oude, situated on the East side of the Kowreala river, was described by Dr. Royle, as holding out the prospects of very valuable supplies by the year 1850, provided that means were adopted for preventing wanton destruction, and of allowing the young plants to grow up, and supply the place of those which are cut down; but what has been the result, is not known. Among the forests in our own provinces, Dr. W Wallich adverts particularly to those occupying the Islands of the Gogra, commonly called Chandnee Choke. He represents them as extremely important, and in every way deserving of being preserved for the

exclusive use of Government, and especially of being emancipated from the destructive depredations which are annually committed. The Sissoo and Saul forests of the Deyra Doon are also recommended to be preserved for the use of the service; though from these the facility of transportation is represented as not equal to that from the other quarters previously mentioned. But they are nevertheless as important for the stations in the north-west of India, as the forests of Oude and Gorukpore are for those in the south. The Coast of Malabar has long been famous for its forests, especially those of Teak, of which the timber has always been remarkable for its superiority to that of other places, and with which the dock-yards of Bombay, as well as of Calcutta, have been long supplied. The quantity, however, has of late diminished, from the forests being partially exhausted, and pains not having been taken to keep up a supply. The Teak was also long ago pointed out by Dr. Roxburgh as abounding on the mountainous parts of the Coromandel Coast and on the banks of the Godavery, above Rajamundry. It extends also far into Central India, though there it is very dwarfish in size. It was planted in the Calcutta Botanic Garden, and plantations were established at several places in the interior of the Bengal Presidency. A new supply was, however laid open, on the acquisition of the territories along the East Coast of the Bay of Bengal. The forests to the eastward of the Saluen river, in Martaban, when visited by Dr. Wallich, were very favourably reported on, for the supply of splendid Bamboos as well as of Teak, for the extent of forests, the size of timber, and the facility of procuring it, as the timber could be procured within two miles of the river. Teak is not generally considered of so good a quality as that of Malabar, probably owing to its being produced on an alluvial soil, while the former is the produce of a mountain range.—*Royle's Productive Resources of India.*

Forests of Pegu and Tenasserim, White Wood.—Eighty-five species are soft and useless, being only fit for fuel. Many of them however are valuable, either for their fruit, gums, oil-seed or spices; others, for their close and compact structures, are employed in the manufacture of small ware, as a species of *Nauclea* used for making combs, and two species of *Erythrina* yield the light charcoal employed in the manufacture of gunpowder. These light woods useless as timber, belong to the families of *Urticaceæ* (including more than twenty species of *Ficus*,) and *Sterculiaceæ*, *Laurineæ*, *Rubiaceæ*, *Myristicaceæ*, *Anonaceæ*, *Spondiaceæ* and *Bignoniaceæ*, with odd species from other families. The remaining white woods, twenty-five in number, valuable for their strength and closeness of grain, demand a more extended notice. Seventeen of these are fit for house-building, and eight, from the hardness and fineness of their grain, render them valuable as fancy woods for cabinet making.

Red-colored woods.—These are twenty-five in number, seven of which, from their strength and solidity, are adapted for the various purposes of house-building; seven, from the elegance of their grain and colour, are suited to the various purposes for which mahogany is used, and eleven are suited to the finer purposes of fancy cabinet work.

Yellow Woods.—These are three in number, hard and fine grained, and suited to fancy purposes.

Dark-brown Woods.—These are twelve in number, and are all valuable. Eleven are adapted for house-building, and probably for ship-building, and one for special purposes requiring great strength and hardness.

Black Woods.—These consist of four different kinds, all of which are valuable for their strength and hardness.

Light-brown Woods.—There are seven varieties of this colored wood, embracing all the timber of most value in the Province, exclusive of Teak. (*McClelland.*)

(3958) FORMICA, a genus of Insects belonging to the family *Formicidæ*. It is distinguished by having the foot-stalk of the abdomen composed of a single joint, the mandibles triangular, and denticulated at the edge. The females are destitute of a sting. This genus comprises about a dozen British species, the largest of which is the Hill-Ant or Horse-Ant, *F. rufa*. The neuters in this species are about one-third of an inch long, of a black colour, with the thorax, abdominal scale, and a large part of the head, red. It makes its large conical nest in the open ground in woods, &c., amassing together large quantities of sticks, straws, &c.—*Eng. Cyc.*

(3959) FORMICA INDEFESSA, an exotic species, is described by Colonel Sykes as being an extraordinary instance of the operations of instinct in so low a form of animal life. The fondness of these insects for sweet substances is very great, and their attacks on such things were resisted in every possible manner, yet although the table, on which the confectionary and sweets were, was placed with its legs in water and removed a short distance from the wall, they succeeded in reaching them, to the great astonishment of all, until the mode of access was discovered. Colonel Sykes says, "I observed an ant upon the wall about a foot above the level of the sweets; it fell, and instead of passing between the wall and the table and alighting upon the ground it fell upon the table." Others followed its example with similar success; and it was no longer a matter for doubt as to how they continued to swarm in such numbers about their favourite food, however carefully guarded.—*Eng. Cyc.*

(3960) FORMICIDÆ, an extensive family of Hymenopterous Insects, belonging to the section

Aculeata, and to the sub-section *Heterogyna* of Latreille, comprising the Linnæan genus *Formica*, or the numerous tribes of ants. The family is distinguished by the wingless state of their abortive females, by the great length of the basal joint of the antennæ in the females and the neuters, in which they are elbowed at the extremity of this joint, and by the first or the first and second joints of the abdomen being knotted; the upper lip of the neuters is large, horny, and perpendicular, falling between the jaws; the eyes are rounded, or oval and entire; the jaws are large in many of the species, the form of these organs varying greatly in many of the species. In their structural character the *Formicidæ* resemble the *Tiphiæ* and *Doryli* belonging to the section of the Sand-Wasps. The neuters are smaller than the males, and these are smaller than the females; the abdomen in the first and last of these sexes is composed of six segments, in the male of seven. The females and neuters are furnished with a sting in many of the species. Those species which have stings emit an irritating fluid into the wounds which they make, while the stingless species discharge a red transparent fluid on to the skin, causing painful blisters. The various genera of this family, according to Latreille, are:—*Formica*, *Polyergus*, *Ponera*, *Myrmica*, and *Atta*. This last genus differs from *Myrmica* only in having very short palpi; the head of the workers is generally very thick. *Acephalota* is the Visiting Ant of the West Indies. [ANT; FORMICA; POLYERGUS; PONERA; MYRMICA and ATTA.]

(3961) FORGET ME NOT.—Myosotis.

(3962) FOSSIL COPAL was first found in the Blue Clay at Highgate, near London; it occurs also at Wochlow in Moravia and on the Western coast of India. It occurs in irregular pieces or small nodular masses. Its colour is yellowish or dull brown; nearly opaque. Lustre resinous. Fracture conchoidal. Specific gravity 1·046. When heated it yields an aromatic odour, and melts into a limpid fluid; it burns with a yellow flame and much smoke. When strongly heated in contact with the air it is totally dissipated.—*Eng. Cyc.*

(3963) FOURCROYA GIGANTEA. Nearly allied to the Agave, is the Fourcroya or Seemay, Cathalay, this fibre is of 5 or 6 feet in length a little finer than the Agave fibre, but possessed of similar properties. Good samples were exhibited by Mr. Jaffrey from the Horticultural Garden; by the Bangalore Local Committee; the Madura Local Committee; and the Madras School of Arts. The plant is one of the largest of its class, the leaves often attaining the length of 10 feet, but it is not so abundant as the Agave, though as easily propagated.

(3964) FOX. The Fox of the Himalaya, makes a near approach to the European Fox, though considered to be of a different species.

(3965) FRAGARIA, ROSACEÆ. The Strawberry.—This plant multiplies itself from runners and suckers; the old plant, after it has ceased bearing, throwing them out. As soon as the rains have set in, these runners may be removed into a nursery bed, for their being more easily looked after, and should have the space of nine or ten inches allowed between them; they will throw out other runners, the whole of which may be separated and transplanted at the proper season. They thrive best in a light soil with good old stable and vegetable manure at first, and as soon as they show a disposition to flower, may have old goats' or sheep's manure added around each plant, a couple of double handsful being sufficient. In no part of the Deccan, should the plants be put out for fruiting before the close of the rains, the latter part of September being quite early enough. Suckers I planted for experiment at the commencement of August, grew to a good size, and did nothing for ten or twelve weeks but throw out suckers, which were continually removed, and after all fruited badly: the finest and most prolific crop were got from suckers put out in the beginning of October. Some strawberries were gathered in November from the plants put out in August, but they were so few as in no way to induce a trial of the experiment again. Varieties can only be procured from seed; and to procure the seed, select the finest ripe fruit, rub it on a sheet of paper, and dry it. When the rains commence, soak the seed in water, reject all that float, the remainder sow in baskets in a light loam, when they will be fit to remove in about six weeks, and should be put in other baskets four or five inches apart, and taken care of until ready to be transplanted into beds, where they are to remain. As these plants throw out suckers very fast, they must be constantly looked after, and removed unless you have a scarcity of plants. They will commence bearing in six months from the time of sowing the seed. You may, as soon as the rains have ceased, put your suckers that have rooted into square beds, each not less than one foot apart, five in a row: this will give you twenty-five in each bed—as many as can be easily looked after and gathered without trampling on the bed and thereby injuring the plants. When the earth is of a clayey consistence, Dr. Riddell has seen the strawberry cultivated on ridges. Some think this is a good plan, but he prefers the beds: however, it can be easily tried. It is sometimes necessary, in consequence of flooding the beds, to put tiles under the fruit to keep it clean, but it also attracts the notice of the birds: if straw or grass be used, then the chances are that white ants destroy your plants. This it is that makes some persons prefer the ridge system of growing, as they say the fruit is cleaner in consequence: all he knows is, that fine fruit may be grown either way; and if on ridg-

es, the same distance must be allowed between the plants as in beds—and even in the latter the plants may be put on raised cones of earth. The common vegetable manure is all that is required at first until near flowering, when a handful or two of goats' or sheep's dung should be put round the plant, opening the earth and scraping it together. Water during the evening and very early in the morning.—*Riddell.*

(3966) FRANCOA. FRANCOACEÆ. *Francoa Appendiculata.*—These are beautiful plants when in flower, and may be planted out in the open garden, they can be only cultivated by seed.

(3967) FRANKINCENSE, Species of Boswellia Serrata. Roxb.

Koondricum, TAM.	Coondoor, DUC.
Encens, FR.	

Frankincense, a resinous substance, the produce of the *Abies excelsa* (De Candolle), the *Pinus abies* (Linn.), Common Spruce-Fir, from which it either exudes spontaneously or more abundantly from incisions of the bark. When it first flows out it is liquid, but on exposure to the air concretes, and is collected during autumn and winter. It occurs in two states, in tears (*Thus*, or *Olibanum sylvestre*), and in large irregular lumps or compressed cakes. When recent the colour should be white, or only inclining to yellow, subdiaphanous, soft, tenacious and glutinous: by the action of time it becomes hard, and even friable, the colour having deepened into an orange hue. By the heat of the hand it softens, and by a higher temperature liquifies. It possesses a turpentine-like odour and taste. It is insoluble in water, but completely soluble in alcohol with the aid of heat. It consists of two kinds of resin mixed with oil of turpentine. By melting it in water, and straining it through strong cloths, it is deprived of much of its oil, when it is termed Pix Arida, or Burgundy Pitch. For the genuine Thus, or Frankincense of the ancients, see Boswellia; also Olibanum, as the substances distinguished by this name (derived from the Arabic Looban) were of different kinds, and procured probably from Africa and Arabia, as well as from India.—*Eng. Cyc.* The substance called Koondricum by the Tamools is very common in the Indian bazars, and is used as an incense in religious ceremonies, equally by the Hindoos and Portuguese Christians, being, though not quite of so grateful an odour, cheaper than Benzoin. It is supposed by the Mahometan Doctors, to be a species of Olibanum and they give the name of Coondoor to both; but it is very unlike Olibanum in its appearance; being always seen in pretty large, agglutinated masses, composed of light brown and yellowish tears, and having a strange stony kind of hardness when pressed betwist the teeth, whereas the Olibanum is in separate small roundish balls, or large grains which do not give the same sensation on being chewed, nay even stick to the teeth. The Koondricum is generally brought to this country from Madagascar from the coast of Borneo, and also from Pedir on the Island of Sumatra. The Vytians prescribe it when mixed with ghee in cases of Vullay (Gonorrhœa) they use it also in a certain bowel affection called Ritta Kaddapoo, which corresponds with our Flux when accompanied with blood.—*Ain's Mat. Med. p.* 16. The Frankincense of India, is the produce of a species of Boswellia.

(3968) FRAXINUS. The wax insect tree, of China, says Mr. Fortune, is a species of ash (fraxinus). It grows abundantly on the banks of ponds and canals in the province of Chekiang; and a small quantity of wax is also produced in this province. I was indebted to Mr. McCartee of Ningpo, for some beautiful specimens of the fresh insect upon the branches of this tree. This insect has been named *Coccus pela* by Mr. Westwood. When fully developed on the trees it has a most remarkable appearance, they seem as if covered with flakes of snow. The wax is an article of great value in Chinese commerce, and a small portion is exported.—*Fortune's Residence, page* 140.

(3969) FRAXINUS, FLORIFERA, *Syn.* Ornus florifera, Flowering ash Tree, mountains of the South of France. To these two species rotundifolia and F. florifera and probably also to other species, we owe the manna of the European druggists.—*O'Shaughnessy, p.* 434.

(3970) FRAXINUS ROTUNDIFOLIA. *Syn.* Ornus rotundifolia, round leaved manna ash tree, a native of Calabria and Sicily.—*O'Shaughnessy, paye* 434.

(3971) FRENCH BEANS from the Government Gardens Ootacamund. It is well known that the French Beans form the principal food of the French peasants and soldiers. These beans contain more nutritive matter than any other known vegetable product, and on that account are most desirable for the supply of troops. In France they are sold at from 2½d to 5d per lb. according to colour, the white kinds bringing the highest price. They could be produced on the Neilgherries, if grown in large quantities at about half the abovementioned price. Exhibited in order to call attention to this fact.—*Mr. McIvor.*

(3972) FRENCH POLISH consists of a resin or a gum-resin dissolved in spirit, and used for polishing flat surfaces. For this purpose it is made more fluid than the hardwood lacker, used in polishing turned surfaces, in order that it may spread easily and dry less rapidly; because the friction being derived entirely from the motion of the hand, more time is required than in polishing turned works. The recipes for making French polish are innumerable. Indeed, it is seldom

prepared in the same manner by two different makers. Some prefer it very thin, others tolerably thick; some, of one colour; some, of another; while others make it colourless or nearly so. The simplest method is to dissolve 1½ lb. of shell-lac in 1 gallon of spirits of wine without heat. Copal, sandarac, mastic, and gum arabic are sometimes used in various proportions, according to the fancy of the preparer. Some recommend 12 ounces of shell-lac, 6 ounces of gum arabic, and 8 ounces of copal, to 1 gallon of spirits of wine. A dark-coloured polish is prepared with 1 lb. of shell-lac, ½ lb. of benzoin, and 1 gallon of spirits; or 1½ lb. shell-lac, 4 ounces of guaiacum, and 1 gallon of spirits. Dragon's blood may also be used to give the required tint. The hardest and most durable polish is made with shell-lac and spirits without any other ingredients. It is usual to make the varnish thicker than is required for use, and to thin it down with spirit when being used. A tough polish is said to be produced from 1½ lb. of shell-lac, 4 oz. of seed-lac, 4 oz. of sandarac, and 2 oz. of mastic to the gallon of spirit; or 2 lbs. of shell-lac and 4 oz. of thus to the gallon. A light-coloured varnish may be made with bleached or white lac; but this darkens by exposure to light.—*Tomlinson.*

(3973) FRITILLARIA. Liliaceæ. *Fritillaria Imperialis.* These are bulbous rooted plants with very showy flowers, growing well in any light garden soil, the colours are various. They are increased by off-sets.

(3974) FROGS are eaten in China, by all classes. They are caught in a curious manner by tying a young and tender jumper, just emerged from tadpole life by the waist to a fish-line, and lobling him up and down in the grass and grain of a rice field, where the old croakers are wont to harbour. As soon as one sees the young frog, sprawling and squirming in the grass, he makes a plunge at him and swallows him whole, whereupon he is immediately conveyed to the frog-fisher's basket, losing his life, liberty, and lunch together, for the bait is rescued from his maw, and used again as long as life lasts.—*William's. Middle Kingdom. Vol. 2. p.* 48.—Frogs says Fortune, are in great demand in all the Chinese towns, both in the north and south, wherever I have been, and they were very abundant in Nantsin. They abound in shallow lakes and rice fields, and many of them are very beautifully coloured, and look as if they had been painted by the hand of a first rate artist. The vendors of these animals skin them in the streets in the most unmerciful and apparently cruel way which I have already described.—*A. Res. among the Chin. p.* 343. Frogs seemed much in demand. They are brought to market in tubs and baskets, and the vender employs himself in skinning them as he sits making sales. He is extremely expert at this part of his business. He takes up the frog in his left hand, and with a knife which he holds in his right chops off the fore part of its head. The skin is then drawn back over the body and down to the feet, which are chopped off and thrown away. The poor frog, still alive, but headless, skinless, and without feet, is then thrown into another tub, and the operation is repeated on the rest in the same way. Every now and then the artist lays down his knife, and takes up his scales to weigh these animals for his customers and make his sales. Everything in this civilised country whether it be gold or silver, geese or frogs, is sold by weight.—*Fortune's Residence in China, p.* 45.

(3975) FRUITS. In few natural products is India more prolific than in its fruits. The pine-apple, mango, mangosteen, jambo, tamarind, &c., are amongst the best known, besides an infinite variety of smaller fruits partaken by the natives, either dried or in their curries. To the north, and in the hill-districts, peaches, grapes, figs, &c., are both abundant and of good quality. In the south and central parts of Hindustan the fruits and vegetables in general use amongst the people are melons, gourds, cucumbers, water-melons, plantains, guavas, jujubes, custard-apples, and figs. In some of the hill-districts the wild raspberry and a species of gooseberry are found in great abundance and of good quality.

Fruits and seeds dried and used as Food in India.

Almonds, both *sweet* and *bitter*,	N. W, India and Bombay.
Apricots, (Khobanee,)	N.W. India, from Kunawur and Caubul.
Plums, (Aloo Bokhara)	N. W. India, from Caubul.
Raisins, (Monukka Kishmis Bedana,)	N. W. India, from Istaulik, &c.
Figs, (Unjeer)	N. W. India, from Caubul.
Dates, (Choohara,)	Bombay, from Persian Gulf.
Pistacio Nuts, (Pista)	N. W. India, from Caubul, &c.
Pine Nuts, (Neoza Chilghozal,)	Do. do. do.
Walnuts, (Ukrot,)	Do. and Himalayas and Cashmere.
Cocoanuts, dried Kernels, (Copra,)	Bombay, from Malabar Coast.

Dr. Faulkner observes, as, indeed, Dr. Royle has also observed, that large quantities of Apples, Pears, and other fruits are annually imported into all the North-Western parts of Hindoostan from Cabool and Cashmere. It admits of little doubt that these fruits could be cultivated to perfection in the Himalayan mountains, at altitudes of from six thousand to seven thousand feet above the sea, and an advantageous traffic in them established in the hills.—*Royle, Pro. Res.*

Wild Fruits of Pegu.—These are more numerous than the cultivated fruits, and may be considered under two heads, namely, green fruits, employed rather as esculent vegetables, and sub-acid fruits. Of the first, the fruit of the

Dillenia speciosa. Theet-foe.
Xanthochymus pictorius. Ny-an-gyee.

Sandoricum indicum Yan-sa.
Randia oliginosa. Wambula.
Mangifera attenuata. Kyain.
Soneratia apetala. Than.
Ficus macrophylla, F. glomerata, F. lanceolaria. Oung.
Calamus, Borassus, Cocus.

are used as an addition to curries. The sub-acid wild fruits, eaten only in their ripe state, are the berry of *Flacourtia cataphracta*, with much of the appearance and flavor of a plum.

Pierardia Sapoa, which resembles the *loquat*, but which grows in bunches like the *leechee*. It is equal to either of those fruits and might be greatly improved no doubt by cultivation. It is very plentiful in the Rangoon market from the end of April to the Middle of May. Kanuo-kuzza *Burmese.*
Garcinia Cowa, or wild mangosteen. Toun-thalai.
Spondias acuminata, or long Plum.
Spondias mangifera, the fruit is said to be pleasant, with a flavor like the mangoe. Kwai.
Ziyziphus jujuba. Hzee.
Mangifera oppositifolia, or wild mangoe Tan-thayet
Syzigium balsamicum, a purple berry, with a pleasant flavor.
Psidium pomiferum, a large yellow berry. Malaka.
Phyllanthus embelia, a large green berry, found in a dry state in the bazars. Hzee phoo.
Antidesma paniculata, small sour plum. Kyet-tha-hen.

To which may be added the albuminous seeds of *Morinda bracteata*, the bean of *Inga doneean*, the acorn of *Castanea indica*, and the seed of the *Jack*, which when roasted are articles of food; while an infusion of the fruit of *Elaeodendron orientale* is drunk by the Burmese as tea.—*McClelland.*

Table Fruits.—There is a great variety of fruits indigenous and exotic in the Tenasserim Territories, and to a native, who while a child eats a raw sweet potatœ with as must zest as a European would an apple, they are no doubt considered unsurpassable. The ancient Celts eat acorns, and the modern Californians still use acorn bread, and the Burmese and Karens eat fruits which are but little superior to an acorn. Some however, are thought to be delicious and are held in high repute; but in general they are much inferior to the fruits of temperate climates.—*Mason.* The only trees to the cultivation of which the Chinese pay any attention, are the fruit-bearing kinds; and in some places there are very fair orchards containing the Mango, Leechee, Longan; Wangpee, Orange, Citrons, and Pumelows. *Fortune's Wanderings, page* 22. There are, however, two fruits cultivated in Chusan which are of considerable excellence, the one is called *yangmai*: it is a scarlet fruit, not unlike an arbutus or strawberry, but having a stone like a plum in the centre, the other is the Kum-quat, a small species of Citrus, about the size of an oval gooseberry, with a sweet rind and sharp acid pulp. This fruit is well known in a preserved state by those who have any intercourse with Canton, and a small quantity is generally sent to England as presents every year. Preserved in sugar, according to the Chinese method, it is excellent. Groves of the kum-quat are common on all the hill-sides of Chusan. The bush grows from three to six feet high, and when covered with its orange-colored fruit, is a very pretty object.—*Fortune's Wanderings, page* 69.

The shaddock, plantain, and persimmon, are common, and several varieties are enumerated of each; the plantain is eaten raw and cooked, and forms no inconsiderable item in the subsistence of the poor. The pomegranate, carambola or tree gooseberry, mango, custard-apple, pine-apple, rose-apple breadfruit, fig, guava, and olive, some of them as good and others inferior to what are found in other contries, increase the list. The *whampe*, *lichi*, *lungan*, or "dragon's eyes," and *loquat*, are the native names of four indigenous fruits at Canton. The first resembles a grape in size. and a gooseberry in taste; the loquat (*Eriobotrya*) is a kind of medlar. The lichi looks like a stawberry in size and shape; the tough, rough red skin incloses a sweet watery pulp of a whitish color surrounding a hard seed. Grapes are plenty and tolerably good but the Chinese have not yet ascertained that they contain wine; at least none is made. —*William's Middle Kingdom, Vol* II, *page* 45.

(3976) FUCUS. Agar-agar is the Malay name for a species of marine alga, the Fucus sacchari-nus of botanists; growing on the rocky shores of many of the Malayan islands, and forming a considerable article of export to China by junks. It is esculent when boiled to a jelly, and is also used by the Chinese as a vegetable glue.—*Crawfurd Dic: page* 6.

(3977) FUCHSIA. ONAGRACEÆ. *Fuchsia hybrida.*—This is a beautiful genus of plants, and can only be cultivated during the rains and cold season, as they die off with every care taken, during the hot weather, they grow freely from slips, procurable at the Neilgherries, and may be sent to a great distance if packed either in a tin case, or bamboo, surrounded with damp moss, the soil in which they strike best is a light sandy loam, the slips until they have thrown out strong shoots, and leaves must never be exposed to the sun, and even then only early in the morning.—*Riddell.* It is much to be regretted that this splendid family of plants will not succeed on the plains.—*Jaffrey.*

(3978) FULLER'S EARTH.

Terre a foulon, FR. | Walkererde. GER.

A soft, dull, greasy kind of clay, usually of a greenish-brown colour. It is used in the fulling of cloth, from its property of absorbing oil and greasy matter. It is found in various parts of the South of England. Two kinds are distinguished; *yellow earth*, the best, employed for the finer cloths of Wiltshire and Gloucestershire; and *blue earth*, principally used in fulling coarser cloths in Yorkshire.—*Waterston. Faulkner.*

(3979) FUMARIA from the Latin *fumus*, smoke, in allusion to the unpleasant smell which it exhales; the French, with the same meaning,

call it Fumeterre, and hence our English word Fumitory), a genus of plants the type of the natural order *Fumariaceæ*. It has 4 petals, the upper one spurred at the base, 2 sepals, diadelphous stamens, fruit indehiscent and 1-seeded. There are about 12 species of *Fumaria*, which are smooth slender herbs, with small racemose white or purplish flowers.—*Eng. Cyc.*

(3980) FUMARIA OFFICINALIS, OR FUMITORY, is used as a bitter tonic, and diaphoretic in Europe. Ainslie under the head F. officinalis, gives the following synonymes—*Shatra*, Pers. and Duk.—*Pit-papra*, Hind. *Bucklutul-melic*, Arab. He states he found the dried plant in a druggist's shop in Trichinopoly, and that the Hakeems consider it diuretic. Among European practitioners, it was long regarded as a valuable tonic and alterative.—*O'Shaughnessy, page* 184.

(3981) FUMARIA PARVIFLORA has ovate sepals as broad as the corolla and about two-thirds shorter. It greatly resembles *F. officinalis*, but is smaller in all its parts. The flowers are of a pale-red colour. It is found in Kent, and is also very common in the East Indies, where it is used as a medicine. The leaves have a bitter taste, and Dr. Whitlaw Ainslie mentions it in his 'Materia Medica of Hindostan.' The Mohammedans employ it as a diuretic, and in maniacal cases. The plants of this order have watery juice, are common in the Himalayas from Nepal to Cashmere, and contain a bitter principle.—*Eng. Cyc. O'Shaughnessy.* Fumaria parviflora, (PITPARA), is considered to be identical with the χαπνος of the Greeks; it is much used in the Upper Provinces, mixed with black pepper, in the treatment of intermittent fevers.—*O'Sh.*

(3982) FUMITORY.

Bucklut ul-melic. ARAB.	Pit-papra, GUZ. & HIND,
Shahtra, DUK,	Shahtra, PERS.
Fumeterre, FR.	

This plant is a tonic, and is supposed to be useful in leprous affections. It is a common weed in English corn-fields; and like many other medicines, has had its day of good repute. It is procurable in most Indian bazars.

(3983) FUNGI.

Kana kuchoo, HIND.

Under this name botanists comprehend not only the various races of mushrooms, toadstools, and similar productions, but a large number of microscopic plants forming the appearances called mouldiness, mildew, smut, rush, brand, dry-rot, &c. Notice has been occasionally taken of these plants under their respective heads; in this place some general account will be given of them as a large natural order. The common field mushroom, the morel and truffle, are the species of this order most usually eaten. But several poisonous fungi so closely resemble the common mushroom, that the utmost caution is necessary in their use. No test whatever, whether botanical or chemical, can be relied on to distinguish the dangerous from the wholesome kinds. Special cultivation is the only sure mode of procuring the mushroom of invariably good quality—*O'Shaughnessy, page* 673. Dr. Hooker says that in conclusion, I shall beg to add a few words on the Fungi of the Himalayas, so far as they have at present been investigated. As regards these there is a marked difference, as might be anticipated from the nature of the climates between those parts of Tibet investigated by Dr. Thomson, and the more southern regions. The fungi found by Dr. Thomson were but few in number, and for the most part of very ordinary forms, differing but little from the produce of a European wood. Some, however, grow to a very large size, as, for instance, *Polyporas fomentarius*, on poplars near Iskardo, exceeding in dimensions anything which this species exhibits in Europe. A very fine *Æcidium* also infests the fir trees (*Abies Smithiana*), a figure of which has been given in the "Gardeners' Chronicle," 1852, p. 627, under the name of *Æcidium Thomsoni*. This is allied to the Hexenbesen of the German forests, but is a finer species and quite distinct. *Polyporus oblectans, Geaster limbatus, Geaster mammosus, Erysiphe taurica*, a *Boletus* infested with *Sepedonium mycophilum, Scleroderma verrucosum*, an *Æcidium*, and a *Uromyces*, both on *Mulgedium Tataricum*, about half-a-dozen Agarics, one at an altitude of 16,000 feet above the Nubra river, a *Lycoperdon*, and *Morchella semilibera*, which is eaten in Kashmir, and exported when dry to the plains of India, make up the list of fungi.—*Hooker's Himalay. Journal, Vol.* II. *page* 381. The region of Sikkim is perhaps the most productive in fleshy fungi of any in the world, both as regards numbers and species, and Eastern Nepal and Khasia yield also an abundant harvest. The forms are for the most part European, though the species are scarcely ever quite identical. The dimensions of many are truly gigantic, and many species afford abundant food to the natives. Mixed with European forms a few more decidedly tropical occur, and amongst those of East Nepal is a *Lentinus* which has the curious property of staining every thing which touches it of a deep rhubarb yellow, and is not exceeded in magnificence by any tropical species. The *Polypori* are often identical with those of Java, Ceylon, and the Philippine Isles, and the curious *Trichocoma paradoxum* which was first found by Junghuhn in Java, and very recently by Dr. Harvey in Ceylon, occurs abundantly on the decayed trunks of laurels, as it does in South Carolina. The curious genus Mitremyces also is scattered here and there, though not under the American form, but that which occurs in Java. Though *Hymenomycetes* are so abundant, the

Discomycetes and *Ascomycetes* are comparatively rare, and very few species indeed of *Sphæria* were gathered. One curious matter is, that amongst the very extensive collection which have been made there is scarcely a single new genus. The species moreover in Sikkim are quite different, except in the case of some more or less cosmopolite species from those of Eastern Nepal and Khasia : scarcely a single *Lactarius* or *Cortinarius* for instance occurs in Sikkim, though there are several in Khasia. The genus *Boletus* through the whole district assumes the most magnificent forms, which are generally very different from anything in Europe.—*Hooker Him. Jour. Vol.* II. *page* 382.

(3984) FURNITURE. The natives of India have been long celebrated for the great patience and fidelity with which they imitate the most elaborate details either of art or manufacture, but they are generally deficient in design, and the articles exhibited prove that much may still be done to infuse artistic taste and boldness of execution when the better principles of art are brought to bear upon this branch of industry. The following is a Tabular View of the woods used for furniture in Madras contributed by Dr. Cleghorn.

Common Furniture.	Carved and Ornamental Furniture.
1 Chitagong wood.	1 Ebony.
2 Teak wood.	2 Blackwood, *or* East Indian Rosewood.
3 Toon.	3 Satin wood.
4 Jack.	5 Kiaboca wood.

1. *The Chittagong wood* (*Chickrassia tabularis*) is more used at Madras in the making of furniture than any other wood. It is light, cheap and durable.

2. *The Teak* (*Tectonia grandis*) is probably the most durable of all timbers, it is very hard, and very heavy. It is extensively used for bullock trunks and for house and camp furniture, for which it is well adapted, as it does not split.

3. *The Toon* (*Cedrela toona*) resembles its congeners, chittagong wood and mahogany, and is very much used for furniture all over the Peninsula.

4. *The Jackwood* (*Artocarpus integrifolia*) is an excellent timber, at first yellow, but afterwards brown, when made into tables and well kept it attains a polish, little inferior to mahogany. In England it is used as well as satin wood for making backs of hair brushes, &c.

1. *Black Ebony* (*Diospyros melanoxylon*). This well known and much admired wood, lignum nigrum, non variegatum ? is very hard, heavy, and susceptible of a high polish. It is seldom obtained of great size.

2. *East Indian Blackwood or Rosewood*, is an excellent heavy wood, suited for the best furniture. It can be procured in large quantities, and of considerable size, the wood contains much oil. In large panels it is liable to split.

3. *Satin wood* (*Swietenia chloroxylon*) is hard in its character and when polished it is very beautiful and has a satiny lustre, it is much used for picture frames, rivalling the birds eye maple of America. It is occasionally used by cabinet makers for general furniture, but it is liable to split.

4. *Sandal wood* (*Santalum album*) is found in abundance in Mysore and Canara ; it is chiefly remarkable for its agreeable fragrance, which is a preservative against insects. It is much used in making work boxes, walking sticks, penholders, and others small articles of fine ornament but cannot be procured of a large size.

5. *Kiaboca wood* (*Pterospermum indicum.*) Is imported from Singapore It is beautifully mottled, of different tints, evidently produced by excrescences from the tree. The wood is chiefly used for inlaying or for making desks, snuff boxes, puzzles, &c.—*M. E. of* 1855.

(3985) FURS. Are the skins of different animals, covered, for the most part with thick fine hair ; the inner side being converted by a peculiar curing process, into a sort of leather. Furs, previously to their undergoing this process, are termed *Peltry*. The fur of the flying squirrel (Pteromys petaurista) is of such a very fine description, that we doubt not that it would excite much interest at home.

(3986) FUSTIC.

Gheelhout, Dut.	Legno giallo de Brasilio, It.
Bois jaune de Bresil, Fr.	Palo del Braasilamrillo, Sp.
Gelbholz, Fustick, Ger.	

A dye-wood, the produce of a large tree, (*Morus tinctoria*), Maclura tinctoria, a native of the tropical parts of America, and the West Indies. The wood is of a sulphur colour, and the yellow dye which it affords, though extremely durable when in combination with an aluminous base, yet being dull and muddy, is chiefly employed in compound colours. Fustic is obtained from Maclura tinctoria, or Broussonetia tinctoria, Kunth, a large and handsome evergreen tree, growing in South America and the West Indies. The wood is extensively used as an ingredient in the dyeing of yellow, and is largely imported for that purpose. Fustic, dye-stuff, the *bois-jaune* of the French, is the wood of the *Morus tinctoria*, a large tree growing in Brazil, Jamaica, and most of the West Indian islands. A concentrated decoction of fustic, deposits, on cooling, a yellow crystalline matter named *morine*. 1 part of fustic boiled in 10 of water for 15 minutes, gives a yellow decoction, which gradually deposits morine. The decoction is inodorous, slightly astringent and bitter, and precipitates gelatine. With protochloride of tin, and with alum, it gives yellow precipitates ; orange-coloured with acetate of lead ; yellow-brown with

acetate of copper, and dark olive with persulphate of iron. With sulphuric acid, it gives an orange-coloured precipitate, soluble in excess of the acid. It is reddened by nitric acid, and rendered paler by oxalic and by acetic acid. The yellow of fustic is said to produce several greens with indigo, with which it unites well. By the new tariff, fustic is admitted into the United Kingdom free of duty.—*Tomlinson.* The name appears to be derived from Fustet, the French name of a yellow dye-wood, the produce of Venetian sumach. A wood similar in colour and uses, but larger in size, having been subsequently imported from the New World, had the same name applied to it with the addition of Old, while the other, being smaller, is called Young Fustic; but these, so far from being the produce of the same tree at different ages, do not even belong to the same genus. Young Fustic, or as it is sometimes called Zante Fustic, is the produce of *Rhus cotinus* (*Anacardiaceæ*), a native of Italy, the South of France, and of Greece; much of it is exported from Patras in the Morea; and it also extends into Asia. It is supposed to be the *Cotinus* of Pliny, being still called Scotinoo near Valcimara. in the Apennines, where it is cultivated on account of its uses in tanning. The root and the wood of this shrub are both imported, deprived of their bark, and employed for dyeing a yellow colour approaching to orange, upon wool or cottons, prepared either with alum or the nitro-muriate of tin with the addition of tartar. The colour is a beautiful bright yellow, and permanent when proper mordants are employed. Only small quantities of this kind of Fustic are imported. Dr. Sibthorp was of opinion that *Rhamnus infectoria*, or *R. oleoides*, of which the berries are called French and Persian Berries, yielded the Fustic of commerce, and informs us that its yellow wood is called by the Greeks 'chrysoxylon.' He also thought that it was the *Lycium* of Dioscorides, but this has been shown by Dr. Royle to be a species of *Berberis*, of which genus all the species have yellow wood. Old Fustic, the 'Bois Jaune' of the French, is on the contrary the produce of a large tree, *Morus tinctoria*, the Dyer's Mulberry, of the natural family of *Urticaceæ*, a native of Tropical America and the West India Islands. The tree attains a height of 60 feet; the wood is yellow-coloured, hard, and strong, but easily splintered, and is imported in the form of large logs or blocks. The yellow, colour which it affords with an aluminous base, though durable, is not very bright. M. Chaptal discovered that glue, by precipitating its tannin enabled its decoctions to dye yellow almost as bright as those of weld and quercitron bark. The Fustic from Cuba is preferred, and fetches the highest price, varying from 8*l.* to 9*l.* 10*s.*, while that from Jamaica or Columbia varies from 5*l.* 10*s.* to 6*l.* 10*s.* per ton. The tree is figured by Sloane, and noticed by Maregrave and Piso. Browne describes it as a native of Jamaica, and deserving the attention of planters, as it is only propagated by birds, who are fond of its sweet roundish fruit. The several countries from which Fustic was imported, and the respective quantities received from each, were in 1836—

	Tons.
Italy and the Italian Islands ...	4
Ionian Islands	72
Morea and Greek Islands ...	18
British North American colonies	103
British West Indies	2053
United States of America ...	226
Mexico	172
Columbia	1913
Brazil	356
Total	4917

The quantity entered for home consumption in the United Kingdom was 1,731 tons in 1847, 1,653 in 1848, and 1,842 tons in 1849. Ninety one tons were shipped from Montego Bay, Jamaica, in the first six months of 1851. In 1850 the quantity imported into Liverpool was 9808 tons, of this 1771 tons were re-exported. (Simmonds, *The Commercial Products of the Vegetable Kingdom*, *page* 485). Of Fustic England imports from 1,500 to 2,000 tons annually. We derive our supplies from Brazil, Tampico, Puerto Cabello, Cuba, and Jamaica. The best is obtained from Cuba, for, while the common white fustic from Jamaica and the Spanish Main fetches only £5 10*s.* to 6£ 10*s.* the ton, that of Cuba realizes from £8 to £9 10s. the ton. *Simmonds, page* 446.

(3987) FUSTIAN.

Fustein; Dut. | Barchan; Pol.
Futaine; Fr. | Bumasea; Rus.
Barchent; Ger. | Fustan. Sp.
Fustagno, Frustagno, It.

A kind of cotton stuff, wealed or ribbed on one side.

G

(3988) GAB. Fruits of Dyospyros embryopteris, the size of a small orange; deep green, with a rusty dust; strongly astringent and mucilaginous.—*Irvine, Med. Top.*

(3989) GÆRTNERA RACEMOSA, Branching Gærtnera. Maltilata, Hind.

A fine specimen runs over some trees in the Dowlet bagh at Ajmeer. This is a fine and

fragrant flowered creeper, and very hardy.—*Gen. Med. Top. p.* 192. Wight in Icones, gives also G. Konigii.

(3990) GAILLARDIA PICTA. These flowering plants are chiefly from North America, grown in any garden soil, and may be increased by dividing the roots, common everywhere, the scent of some of the species is unpleasant.—*Riddell.*

(3991) GAJUBA. Leaves and triangular stalks of a small succulent plant, brought from Bombay, heating, and used as a purge.—*Gen. Med. Top. p.* 135.

(3992) GAJUR. Daucus Carota :—Carrot.

(3993) GALANGAL.

Colenjun, Guz. Hind. | Galgant, Ger,
Galanga, Fr. |

A brown tuberose root, with a faint aromatic smell, and pungent taste, like a mixture of pepper and ginger. Galanga, or Galangal, is usually supposed to have been introduced by the Arabs, but it was previously mentioned by Ætius. The Arabs call it Kholingan, which appears to be derived from the Hindoo Koolinjan, or Sanscrit Koolunjuna, indicating the country whence they derived the root, as well as the people from whom they obtained their information respecting its uses. The plant which yielded this root was long unknown, and it was supposed to be that of a Pepper, of an Iris, of *Acorus Calamus*, or to be the *Acorus* of the ancients. *Kæmpferia Galanga* was so called from its aromatic roots being supposed to be the true *Galangal*. The tubers of *Cyperus longus* were sometimes substituted, and called English Galangal. Two kinds, the large and the small galangal, are described; these are usually considered to be derived from the same plant at different stages of its growth, but Dr. Ainslie, in his 'Materia Indica,' insists upon the greater value of the lesser, as this is warmer and more fragrant, and therefore highly prized in India. It is a native of China, and the plant producing it is unknown. Dr. Ainslie does not prove that it is the *Galangal minor* of Europe. The Greater Galangal has long been known to be the produce of a Scitamineous plant, the *Galanga major* of Rumphius ('Herb. Amb.' 5. t. 63), which is the *Alpinia galanga* of Wildenow, and a native of China and the Malayan Archipelago. It is fully described by Dr. Roxburgh, in his 'Flora Indica,' vol. i. p. 28, ed. Wall. The roots, perennial and tuberous, like those of the ginger, were ascertained by Sir Joseph Banks and Dr. Comb to be identical with the *Galanga major* of the shops. This is cylindrical, often forked, thick as the thumb, reddish-brown externally, marked with whitish circular rings, internally lighter coloured, of an agreeable aromatic smell, and a hot spicy taste, like a mixture of pepper and ginger, with some bitterness. The stem is perennial, or at least more durable than those of herbaceous plants. When in flower, about 6 or 7 feet in length; its lower half invested by leafless sheaths. The leaves are two-ranked, lanceolar, from 12 to 24 inches long, and from 4 to 6 inches broad. Panical terminal, crowned with numerous branches, each supporting from two to five pale greenish-white and somewhat fragrant flowers in April and May in Calcutta, where the seeds ripen, though rarely in November. Several species of this genus have roots with somewhat similar properties. Thus *Alpinia alba* and *A. Chinensis* are much used by the Malays and Chinese; the former has hence been called *Galanga alba* of Kœnig; and the latter has an aromatic root with an acrid burning flavour. The fragrant root of *Alpinia nutans* is sometimes brought to England, according to Dr. Roxburgh, for *Galanga major*. Its leaves, when bruised, have a strong smell of cardamoms, and the *Cardamomum* plant is frequently placed in this genus, but has been described under Elettaria.—*Eng. Cyc. p.* 912. According to Dr. Honigberger (p. 278) the natives of Lahore are of opinion that the root of piper Betel (Pankejer) is what the Persians call Koolian, which is the Indian Galanga. Galanga root is a good deal used in China, and forms an article of commerce, fetching in the London market from 12s. to 16s. per cwt. in bond. Its taste is peppery and aromatic. Externally the color of the root-stocks is reddish brown, internally pale reddish white. 1,286 cwt. of Galangal root, valued at 2,880 dollars, was exported from Canton in 1850.—*Simmond's Comml. Product, p.* 418.

(3994) GALBANUM.

Barzud; Arab. | Galbanum; Lat.
Galbanum; Fr. | Beerzud Pers.
Mutterharz; Ger. | Khelbenah, Hebrew,
Bireeja; Hind. | χαλβανη Greek.
Galbano; It. |

Galbanum occurs in agglutinated plastic masses, mixed with seeds and fragments of leaves, of greasy aspect, adhering strongly to the fingers, by which it is quickly softened; white, brittle tears occur in the mass resembling pine resin; in odour this drug is analogous to ammoniacum; its taste is hot, acrid, and bitter. The essential oil is colourless, but becomes yellow by keeping it distilled from water; of a deep blue if distilled by direct heat. Water dissolves about a fourth of this drug, but deposits the greater part again; weak alcohol dissolves it altogether. Its properties are the same in kind as those of asafœtida, but it is much less powerful.—*O'Shaughnessy, page* 367. Though the drug called by this name is one of those which have been the longest known, the plant which yields it still remains undetermined, though it is stated by old writers to be a native of Syria. The Greek name Chalbane (χαλβάνη) is evidently the same as the Hebrew Chelbenah, by which the same substance is supposed to be al-

luded to in the book of Exodus. Arabian authors describe it under the name Barzud. The Persians call it Birzud, and give Birceja as its Hindoo synonym. That the same substance is intended, is evident from Khulyan and Metonyon as stated by Dr. Royle ('Illustr. Himal. Bot.,' p. 23), being given as its Greek synonyms, which are evident corruptions of Chalbane and Metopion, the names of this substance in Dioscorides. The plant yielding this substance is called Kinneh and Nafeel by Arabian and Persian authors, by whom it is described as being joined, thorny, and fragrant. Under the first name it is noticed in the original of Avicenna, but omitted in the Latin translation. D'Herbelot ('Bibl. Orient.') however states, that the plant yielding Galbanum is called Ghiarkust in Persia. These names are interesting only as showing that both the plant and gum-resin appear to have been familiarly known to both Arabians and Persians, and that therefore the former is probably a native of these countries, though usually stated to be only a native of Syria. But if so, it could hardly have escaped the notice of the numerous travellers who have visited that country.—*Eng. Cyc.* According to Dr. Royle, Galbanum is supposed to be the same substance as the *Chelbenah* of Scripture (v. Cycl. of Biblical Lit.), as this word is very similar to the χαλβανη of the Greeks, which was known to Hippocrates, and is described by Dioscorides, who gives μετωπιον as an additional name. Theophrastus had long previously stated that it was the produce of a *Panax*, Dioscorides of a *Ferula* of Syria. But this word had a wide geographical signification in ancient times. Arabic and Persian authors seem to have been well acquainted with the plant, as they give *kinneh* and *nafeel* as its names, and *barzud* as that of the gum-resin. D'Herbelot states that this is the same as the *pirzed* of the Persians, who call the plant yielding it *giarkhust*. But whatever the plant may be, it is unknown to botanists. Lobel attempted to ascertain it by sowing some of the seeds which he found attached to Galbanum, and obtained *Ferula Ferulago*, a native of North Africa and of Asia Minor, but which is not known to yield Galbanum; while *Bubon galbaniferum*, which is sometimes adduced, is a native of the Cape of Good Hope. The late Professor Don having found some seeds sticking to Galbanum, named the plant yielding them, though yet unknown, *Galbanum officinale*, belonging to the tribe *Silerinæ*, which is admitted in the London Pharmacopœia. But these fruits may, or not, be those of the Galbanum plant. Dr. Lindley has in consequence suggested another plant, of which he received the fruits from Sir John Macneil. This grows at Durrood, near Nishapore, in Khorassan, and yields a gum-resin of which a specimen seen by Dr. Pereira did not correspond with any known gum resin. Dr Royle has several such in his collection. Dr. Lindley has named the plant which is admitted into the Edinburgh Pharmacopœia. *Opoidia galbanifera*, tribe Smyrneæ. But there is equal uncertainty about all.—*Royle.* One plant, often described as yielding this long-known gum-resin, is *Bubon galbanum*, a native of the Cape of Good Hope, which Hermann describes as yielding spontaneously, by incision, a gummy, resinous juice, similar to Galbanum; but Mr. Don has observed that this plant possesses neither the smell nor the taste of Galbanum, but in these particulars agrees better with fennel; and its fruit has no resemblance whatever to that found in the gum. The fruit, commonly called seed, was early ascertained by Lobel to be that of an Umbelliferous Plant, broad and foliaceous, which he picked out of *Galbanum*, and having sowed, obtained a plant, which he has figured under the name of *Ferula galbanifera*. This has been lost or become confounded with other species; but it is probable that it was the plant yielding Galbanum, as Mr. Don has recently obtained fruit in like manner, and something similar, which he has determined to be allied to the genus *Siler*, but differing in the absence of dorsal resiniferous canals, and the commissure being furnished with only two. The carpels are about 9 lines in length and 4 lines broad, flat internally and somewhat converse externally. As the plant is still unknown, it is well worthy the investigation of travellers in the East, who might otherwise suppose, from the name, assigned from the seed, having been adopted in the 'London Pharmacopœia,' that the plant was as well known as its product.—*Eng. Cyc.* Galbanum is imported from India and the Levant, having probably been brought down the Persian Gulf. It is usually met with in masses of a brownish-yellow colour more or less translucent and shining, sometimes in small tears which are of a paler or even yellowish colour.—*Royle.* Three sorts of Galbanum are distinguished:—1. Galbanum in grains or tears; 2. Galbanum in masses; and 3. Persian Galbanum. The two former come from Africa, especially Æthiopia: the third sort from Persia. Galbanum in tears is most likely the spontaneous exudation from the plant; and that in masses, obtained by incisions. The first sort occurs in irregular generally oblong grains, mostly distinct, but sometimes agglutinated together, about the size of a lentil or small pea, of a colour verging from whitish into yellowish-brown, more or less diaphanous, opaque, or shining with a resinous lustre. The odour is strongly balsamic, and disagreeable. The taste is resinous, sharp, bitter, and disagreeable. Specific gravity, 1·212. It is partially soluble in alcohol, and the solution, as well as the strong white smoke which is evolved when Galbanum is melted in a platinum spoon, reddens litmus paper. It consists chiefly of resin, gum, volatile oil, and a trace of malic acid. Galbanum in masses consists of irregular

pieces of a yellowish or dark brown colour; the odour is stronger than that of the preceding kind, which, in its general characters, it much resembles, except that it can be procured only during the low temperature of winter. Geiger says that when this variety is pure, it is not to be reckoned inferior to the former. Persian Galbanum, being very soft and tenacious, is sent in skins or chests. It often contains many fragments of plants. Galbanum, like other umbelliferous gum-resins, is anti-spasmodic, expectorant, and externally rubefacient. It is inferior in power to assafætida, but usually associated with it in pills and plasters.—*Engl. Cyc. Vol.* II. *pp.* 911 *and* 912. Dr. McClelland says that the plant affording this article is not well known, but Dr. Ainslie, as quoted by Dr. Royle, states its Hindustani name to be *Kinneh-ke-gond*, and the latter author observes that a gum resin, known in India under the name of *Kinneh-ke-gond*, is afforded by an exudation from the bark of *Odina wodier*. Now this tree constitutes probably a larger proportion of the forests both in the Prome and Tharawaddy districts than any other, and if found to afford *Galbanum*, might be rendered an important addition to the resources of the Province.—*McClelland.*

(3995) GALEDUPA ARBOREA AND GALEDUPA TETRAPETALA. Both of these yield an oil expressed from the seed, called in Bengal *Kurunga ka-tel*, which is used for burning, as well as medicinally for external use as an embrocation. In Tenasserim and Pegu, they are both very common trees, more especially in the Prome district. The seed is large and might be collected in any quantity.—*McClelland.* Wight in Icones, gives also G. elliptica and G. piscidia.

(3996) GALEDUPA INDICA, PONGARHEED.

Kurmeja or Kenja, HIND; Ganaga, TEL.

A pretty large timber tree, from forty to fifty feet high, common all over the Indian Peninsula, in Bengal &c. Leaves deciduous at the end of the cold season, and in about a month are succeeded by the new foliage. It flowers during the hot season, and the seed ripens toward the close of the year. The wood of this tree is light, white and firm; it serves for a variety of economical purposes. Branches stuck in the ground grow readily, grass and almost every thing else grows well under its shade. The seeds yield an useful oil.—*Rohde M.S.S.*

(3997) GALEDUPA TETRAPETALA. The flowers of this yield a fine red dye.—*McClelland.* See G. ARBOREA.

(3998) GALEGA ORIENTALIS, LEGUMINOSÆ. These are tolerably ornamental plants, and as they form a bush of small size they require room when planted out, the colours are mostly blue and white.—*Riddell.* Wight in Icones gives Galega Heyneana, 388; incana, 371; pentaphylla, 370; spinosa, 372.

(3999) GALENA, LEAD GLANCE, LEAD ORE, SULPHURET OF LEAD.

Plomb sulfure, FR. | Bleiglanz, GER.

The richest ore of lead, and from which that metal is chiefly obtained. As met with in commerce it is in heavy, shining, black, or bluish lead-coloured cubical masses; having a great resemblance to the sulphuret of Antimony (*Guz. Hind.* Soormah), for which it is very frequently mistaken. Localities, the lead hills in Lanarkshire, and other places.—*Faulkner.* At the Madras Exhibition of 1857 a rich ore of Argentiferous Galena was exhibited from Martaban by Dr. Brandis, granular, or in minute crystals, with silver passing through it in thready veins. This ore assayed by Dr. Scott contains about 80 per cent of silver lead. The quantity of silver was found to vary in the portion examined from 70 to 300 ounces in the ton of ore. It is impossible therefore to say what its commercial value may be, unless an average sample were obtained, but if the ore exists in any quantity and of the same quality as that examined, it is a most valuable one, and would be well worth working by Pattenson's mode for separating the silver, as the process proves remunerative where only 7 ounces of silver can be obtained from a ton of metal. This is probably the ore referred to by the Rev. Francis Mason, A. M. in his publication on the natural productions of Burmah. Where he says the limestone of the Provinces probably contains large quantities of lead. In the valley of the Salwen there is a rich vein of argentiferous galena, which is reported to appear on the surface. A specimen that Dr. Morton sent to England for analysis, was said to be a very valuable Mineral, and destined to make a fortune for some one. Professor Mitchell in the certificate that he furnished Dr. Morton of the analysis, says it contains Lead, Sulphur, Silver, Gold, (traces) Lime, Magnesia, Iron, Silica, and Carbonic Acid. It is a sulphuret of lead or galena. The quantity of lead and silver appears to be considerable, but there was not sufficient of the mineral to estimate either." The ore is seen in the limestone precisely as galena is found in the limestone of the Mississipi, one of the richest known deposits of lead in the world. In a small hand specimen from Martaban, the amount of silver was found to vary in different portions of it, the per centage of lead being about 75. In the first trial the silver was found to amount to about 70 ounces to the ton of ore; bnt in the second to not less than 300 ounces in the ton, or a little less than 1 per cent. Mr. O'Reiley states that the carbonate of lead exists near the head waters of the Hoimgdaram. Another locality from which Galena is exhibited is the Dhone Talook Kurnool, from which Galena in very large blocks has been obtained; one piece measured about 18 inches in diameter and

weighed upwards of 3 Cwt. This ore carefully tested by Dr. Scott some years ago, was then found to contain from 53 to 70 per cent. of lead but no silver; it was also tried at the Mint and yielded a large per centage of Lead. It has been used for some years at the Madras School of Arts for glazing Pottery and answers well for that purpose, though it is found to succeed better when reduced to the form of minium, and then ground with Felspar and an Alkali. It was brought to notice by Captain J. G. Russell and occurs in large quantities and in blocks of great size in the vicinity of Kurnool. Its history is interesting. It was discovered accidentally by the late ex-Nawaub of Kurnool, in digging a well. He was at the time making warlike preparations and considering the discovery of much importance he surrounded the excavation with a wall for the purpose of concealing it and placed a guard over the entrance of the enclosure. The pit has now however been choked up as since the Kurnool territory has fallen into the hands of our Government, no outlay has been sanctioned to ascertain the extent of the lode and whether it would be worth while working it. The galena has been used in large quantities in the School of Arts for glazing common pottery and has been found of excellent quality. The reexamination of the first specimen of the Kurnool ore proved it to contain upwards of 1 per cent of silver, or 574 ounces in the ton, the quantity of lead and silver together being only 45 per cent which was occasioned by there being a considerable quantity of gangue disseminated through the portion examined. Another specimen, given by Colonel Cotton and also said to be from Kurnool, was found to contain 175 oz. 3 dwts. in the ton. Dr. Scott observes, "some years ago I examined a specimen of the Kurnool Galena and found it to be free of silver; and I have been consequently, until the present time, under the impression that it contained none. But the examination of the specimens in this year's Exhibition reveals the fact that at least some portions are very rich in the precious metal and this accords with the recent researches of Malagah and Durochet who have found that when Sulphide of Silver is associated with the Sulphides of other metals, it is *always* unequally distributed. It would appear therefore from the above facts that it would be quite impossible to calculate, with any approach to accuracy, from the examination of any given specimen, what would be the average yield of silver in a silver lead mine, until it is actually worked for the separation of that metal, considering however that nearly one half of the silver now in circulation in Great Britain is recovered from silver lead ores similar to the above, and seeing that it is found to be advantageous to separate the precious metal where it exists to the extent of only 6 ounces in the ton, it becomes evident that these ores must be of great value, provided they can be found in sufficient quantity. From recent information obtained from Kurnool it would appear that the Galena there occurs abundantly in all probability; therefore it would prove to be highly remunerative to work this mine, both for the lead and silver contained in the ores. Among the metallic ores holding the promise of being marketable, are a rich ore of galena or sulphuret of lead from Jungumrazpillay in the vicinity of Cuddapah. This ore is rich in silver, and is worked by the Natives on this account, but all the lead is wasted and the silver is obtained by a tedious, clumsy, and expensive process. Mr. H. L. Pattinson's new process for separating the metals by careful, slow-cooling and crystalization, is applicable to this ore.—*M. E. of* 1857.

(4000) GALEOPITHECUS, a genus of *Mammalia*, having relations to the *Lemuridæ* and *Cheiroptera*. It is often formed into a family, and is then called *Pleuroptera* or *Galeopithecidæ*. They are commonly known by the name of Flying Lemurs, and are sometimes called Flying Cats and Flying Foxes. They are generally arranged under the order Carnassiers, and some authors place them in the division *Cheiroptera*; but they differ from the Bats inasmuch as the toes of their anterior extremities, which are all furnished with sharp claws, are not more elongated than those of the hind feet, so that the membrane which occupies the interval between the extremities to the sides of the tail can hardly operate in executing more than the functions of a parachute. The dental formula is as follows:—incisors, $\frac{4}{6}$; Canines, $\frac{2}{2}$; Molars, $\frac{6}{6}\frac{6}{6}=34$. This is the formula given by M. Lesson; but Cuvier, in his 'Regne Animal,' states that the canines are dentilated and short like the molars. He states that the two upper incisors are also dentilated and much separated from each other; and that the six lower ones are split into narrow strips like combs a structure peculiar to this genus. Three species have been recorded;—1. *Galeopithecus rufus*, Geoff., Audubon (*Lemur volans*, Linn.); 2. *Galeopithecus variegatus*, Cuv., Geoff.; 3. *Galeopithecus Ternatensis*, Geoff.: but the general opinion seems to have been that one only, the *Lemur volans* of Linnæus, had been satisfactorily made out. In October, 1838, some specimens of Flying Lemurs were upon the table at a meeting of the Zoological Society of London; and in reference to them Mr. Waterhouse pointed out certain characters which appeared to him to indicate the existence of two species in those specimens. He remarked that in systematic works three species of the genus *Galeopithecus* are described, founded upon differences of size and colour. As regards the latter character, he had never seen two specimens which precisely agreed; and with respect to size, the dimensions given of two out of the three species are, he observed, evidently taken from extremely young

animals. Mr. Waterhouse then proceeded to distinguish the two species on the table, and proposed for them the specific names of *Temminckii* and *Philippinensis*. The first and larger species measured about two feet in total length, and its skull was 2 inches 11½ lines in length. The anterior incisor of the upper jaw is broad, and divided by two notches into three distinct lobes; the next incisor on each side has its anterior and posterior margins notched; and the first molar (or the tooth which occupies the situation of the canine) has its posterior edge distinctly notched. This tooth is separated by a narrow space, anteriorly and posteriorly, from the second incisor in front and the second molar behind: the temporal ridges converge towards the occiput, near which however, he observed, they are separated usually by a space of about four lines. This is probably the *Galeopithecus volans* of authors; but the identity cannot be said to be certain.—The second species, *G. Philippinensis*, was described by Mr. Waterhouse as being usually about 20 inches in length, and its skull as measuring 2 inches 7 lines in length. He observed that this species may be distinguished from *G. Temminckii* by the proportionately larger ears and the greater length of the hands. The skull too he described as narrower in proportion to its length, the muzzle as broader and more obtuse, and the orbit as smaller. The temporal ridges, he observed, generally meet near the occiput, or are separated by a very narrow space. The anterior incisor of the upper jaw is narrow, and has but one notch; the next incisor on each side is considerably larger, longer, and stronger than in *G. Temminckii*, and differs moreover in having its edges even: the same remark applies to the first false molar. In this species the incisors and molars form a continuous series, each tooth being in contact with that which precedes and that which is behind it. But Mr. Waterhouse concluded by observing that the most important difference perhaps which exists between the two species in question consists in the much larger size of the molar teeth in the smaller skull, the five posterior molars occupying a space of ten lines in length, whereas in *G. Temminckii*, a much larger animal, the same teeth only occupy nine lines. Several minor points of distinction existed besides those here mentioned. ('Zool. Proc.,' 1839; and see further 'Zool. Trans.,' vol. ii. p. 335.)—*Eng. Cyc.*

(4001) GALEOPSIS (from γαλῆ, a weasel, and ὄψις, sight, aspect, the mouth of the corolla gaping like that of a weasel), a genus of Plants belonging to the natural order *Labiatæ* or *Lamiaceæ*. It has the anthers approaching in pairs, opposite cells bursting by two valves transversely; the upper lip of the corolla arched, and the lower lip 3-lobed, unequal, with two teeth on its upper side; a tubular 5-toothed calyx, with equal teeth, or the two upper ones longest. The nuts are rounded at the end. The species of this genus are annual divaricately branched erect herbs, and rarely decumbent at the base. The flowers are red or cream-coloured, or varied with both these colours. This genus may be easily recognised by the peculiar formation of its anthers, which differs from any other of the *Labiatæ*.

(4002) GALEOPSIS TETRAHIT, the Common Hemp-Nettle, has a hipsid stem, thickened below the joints, with oblong, ovate, acuminate, serrate leaves. The calyx has tubular teeth, and a tube nearly equal. The tube of the corolla is as long as the calyx, and has an ovate upper lip. It is a native of cultivated ground throughout Europe and middle Asia.—*Eng. Cyc.*

(4003) GALIACEÆ, *Stellates*, a natural order of Exogenous plants called *Stellatæ* by Linnæus, and merged in *Cinchonaceæ* by the School of Jussieu. It consists of herbaceous usually square-stemmed plants, with a scabrous surface, verticillate leaves, and monopetalous flowers, with an inferior didymous fruit inclosing a couple of seeds containing an embryo lying in a great quantity of horny albumen. Some yield a dyeing substance in their roots, as the various species of Madder, but the greater part are useless weeds. One common British species of *Galium*, namely, *G. Verum*, is astringent, and was formerly used by farmers to curdle milk.—*Eng. Cyc. Vol.* II. *page* 916.

(4004) GALLINÆ, Gallinaceous Birds, the fifth order of the class *Aves*, according to Linnæus, who thus characterises it:—Bill (a reaping sickle, 'Harpa colligens') convex; the upper mandible arched over the lower; nostrils overarched by a cartilaginous membrane. Feet formed for running; the toes rough below. Body sebaceous, muscular, delicate (purum). Food: grain collected on the earth and macerated in the crop (ingluvies). Nest artless and placed on the ground; eggs numerous; food pointed out to the young by their parent. Polygamous. Analogous to the order *Pecora* in the class *Mammalia*.

(4005) GALLINSECTA. [Coccidæ.]

(4006) GALLS.

Afis, Arab.	Gallæ, Lat.
Masaka, Cyng.	Mazu, Pers.
Mayphul, Duk.	Galhas, Port.
Noix de Galles, Ger.	Mayuphul, Sans.
Gallapfel, Ger.	Agallas, Sp.
Maya, Majoophal, Guz. Hind.	Machakai, Tam.
Galla, It.	Machikai, Tel.

Galls are the Gemmæ morbidæ, the diseased buds or excrescences, formed by Diplolepis (or Cynips) Gallæ Tinctorum, on Quercus infectoria, *Oliv.* The Gall-Oak. Galls were known to Hippocrates, and are described by Dioscorides (i. c. 147) under the name κηκις, which the Indo-Persian writers have converted into *fikees*. They are the *afees* of the Arabs, and well known

in India by the name of *majoo-phul*. Galls are imported into England from Smyrna, being produced in Asia Minor; also from Aleppo, the produce of the vicinity of Mosul in Kurdistan. They are also imported into England from Bombay (sometimes to the extent of 1000 cwt.) having been first imported there from the Persian Gulf. Mr. Wilkinson, of the house of Wilkinson and Jewsbury, informs us that formerly, when he paid much attention to this trade, he observed that whenever the prices were low at Smyrna, the Galls came from Bombay, and *vice versa*; but the supply was never abundant from both sources in the same year. They are imported into Bombay from Basra (Bussorah), which is not a great deal farther from Mosul than is Aleppo. They are therefore most probably the produce, like Aleppo Galls, of Kurdistan and of other Persian provinces. Dr. Falconer, when travelling in the Punjab, was informed that Galls were produced on the Balloot Oak, *Quercus Ballota*. —*Royle*. In the Tenasserim Provinces, Oak galls can always be obtained of the native druggists, but they are all imported, although there are several species of oak indigenous.—*Mason*. A kind of gall has lately been imported from China. Dr. Pereira describes it in the 'Pharmaceutical Journal' under the name of Woo-pei-tze; they are of very irregular shape, more bulky than the common galls, and hollow, the external shell being only about $\frac{1}{32}$ of an inch in thickness, very brittle, and of a brownish-yellow colour. Mr. Doubleday says that the producing insect in this case is one of the *Aphis* tribe. They are extremely astringent, but have not yet been used in dyeing.—*Eng. Cyc.* Galls originate in the puncture of an insect, *Cynips gallœtinctoria*. The puncture is effected by the ovipositor of the insect, and an egg is at the same time deposited. An interruption in the ordinary functions of the tissues of the plant takes place at the spot where the egg is inserted; the consequence is an excrescence of vegetable matter, principally tannin, formed round the egg, which furnishes a nidus for the grub or larva when hatched. When this takes place the grub eats its way out through the side of the gall. Galls are produced on different species of Oak, as well as on some other plants, as the Tamarisk; Aleppo Galls, by the female of the above Diplolepis piercing the buds of *Q. infectoria* with its ovipositor, and there depositing its eggs. These producing irritation, cause the juice of the plant to flow towards the wound, and the subsequent enlargement of the part into the form of galls round the larva. This, when fully developed, escapes by a hole which it perforates in the gall after which the vitality of the excrescence either decreases or ceases altogether. The surface has irregular elevations or lines, with the interspaces generally smooth. Galls are devoid of smell, but have a disagreeably bitter taste, with a powerfully astringent action. The whole of their soluble matter is yielded to forty times their weight of boiling water; ether dissolves about half their weight, alcohol considerably more. They yield a fine black colour with any of the salts of iron, and are used in the preparation of writing ink. The quantity imported is annually about 700 tons. The infusion possesses all the valuable properties of the gall, as does an alcoholic tincture; but decoction is an objectionable preparation. For internal use the infusion is preferable to the powder, which, like all substances containing much woody fibre, irritates the stomach. Galls may be employed in powder to form an ointment, which with opium and camphor is of great service in painful hæmorrhoids. As a tonic in intermittent fever, and as an astringent in hæmorrhagic or other discharges, galls are occasionally employed. But the most extensive use is made of them in the arts, and as a chemical test. *Quercus infectoria*, now generally acknowledged to be the species producing the Galls of commerce, is a small tree or shrub, with a crooked stem, not above 6 to 8 feet high. Leaves on short stalks, 1—$1\frac{1}{2}$ inch long, ovate-oblong, with a few coarse mucronated teeth on each side; apex bluntly mucronate, rounded, and rather unequal at the base, smooth, shining on the upper side. Acorn solitary, obtuse, 2 or 3 times longer than its hemispherical scaly cup.—A native of Asia Minor; found by Capt. Kinnier in Armenia and Kurdistan.—Nees von E. t. 94. St. and Ch. 152. Besides the names applied from the places whence they are obtained, Galls are distinguished by their physical characters, as into Blue and White Galls. The Blue Galls vary in size, and are of a bluish-grey colour. They are gathered before the insect has become perfect, or worked its way out. Some of these are larger, and are called Green Galls from being of a greenish colour. They display on their otherwise smooth surface a number of bluntly-pointed tubercles, which would appear to be the apices of leaves stimulated into unnatural growth. The best are heavy, hard, shining, and break with a short flinty fracture. White Galls are so called from being of a lighter colour than the others, but still of a greyish or yellowish hue. They are distinguished by being perforated with a small round hole, that by which the insect had escaped. They are usually less heavy than the others, have a larger internal cavity, and are not so astringent. Both are easily reduced to powder, which is without odour, but with a simple powerful astringent taste. They yield their properties to water, which is the best solvent; also to Proof Spirit, and slightly to Alcohol and Ether. From 500 parts Sir H. Davy obtained 185 parts of matter soluble in water, of which he states 130 were Tannin, 31 Gallic acid with a little Extractive, 12 of Mucilage, &c. and 12 of saline and calcareous salts, the insoluble matter,

consisting chiefly of Lignin. But a larger portion of Tannin has been obtained by other chemists, as from 30 or 40 to 60, instead of the above 26 per cent. The little colouring matter in Galls makes them particularly valuable to tanners. *Tannin, or Tannic acid*, is usually described with Galls, as existing in them in large quantity, being generally obtained from them, though a constituent of many other astringents, as Oak bark, Catechu, &c. It is the type of astringents. Ordinary Tannin is amorphous, brownish-coloured, and consists of impurities united to the Tannic acid. Pure Tannin, or Tannic (being so named because its solution reddens Litmus and effervesces with Carbonates), is sometimes white, but usually with a yellow tinge, spongy, shining, without odour, but extremely astringent. It is most easily obtained from Nutgalls by the action of Ether. It is very soluble in water and in weak Spirit. When heated, it swells up, is decomposed, leaving bulky charcoal. It precipitates Gelatine from its solutions, and combines with the gelatinous part of skin, and thus forms leather. It forms precipitates (Tannates), most of which are nearly insoluble, with most metallic oxides, and likewise with alkalis and their Carbonates, including vegetable alkalies. The mineral acids, combining with the Tannic, also form precipitates in concentrated solutions. With Sesqui-salts of Iron it is well known to form a black precipitate (ink); the Tannin of Sumach, Catechu, &c., as has been frequently mentioned, forms a very dark green precipitate with the same salts: no effect is produced on the Proto-salts. Tannin is composed of $C_{18}H_5O_9$—3HO. *Gallic acid.* Though Galls are stated by Sir H. Davy to contain about 6 per cent. of this acid, a much larger quantity may be obtained from them, because it is formed by the conversion of the Tannic into Gallic acid by the absorbing of Oxygen from the atmosphere, Carbonic being given off. It is colourless, with an acid and astringent taste, and is usually seen in the form of a grey crystalline powder. It has an astringent taste, but is of no use in tanning. Galls are powerfully astringent; seldom given internally: Dr. Royle frequently prescribed from 10 to 20 grs. of the powder several times a day, or in infusion, in the obstinate chronic diarrhœas of the natives of India. The natives themselves prescribe them in intermittents. Its tincture is much used as a test for the salts of Iron. An infusion may be employed as a Gargle, Wash, or Injection, or as an antidote to poisoning by vegeto-alkalis; but the diluted Tincture affords a more ready antidote. —*Faulkner, Royle. Tomlinson. Eng. Cyc. Mason.*

(4007) GALMENDORA. A rather hard, very fine, but not close grained, heavy Ceylon, wood.

(4008) GAMBIER; UNCARIA. (Syn. NAUCLEA) GAMBIR. (*Roxb. Fl. Ind.* i. 517. *As. Res.* xi. 187.) See CATECHU.

Gambir, Mal.

Gambier is the Malayan name of the terra-japonica, and of the plant that yields it, the Uncaria gambier of botanists. It is a native of the islands of the Indian Archipelago, cultivated in the Calcutta Garden.—*O'Shaughnessy, page* 398. The plant is a straggling shrub, from eight to ten feet high, and an object of extensive cultivation. A gambier plantation generally extends to about 30 acres, and, when full grown, has the appearance of a coppice. The drug is the inspissated juice of the leaves, obtained by boiling to the consistence of a syrup, which is poured into moulds, and, when dry, cut into cubes of an inch and a half to a side. The leaves are pulled three or four times a year, and the plantation is exhausted in fifteen years, when it is abandoned, and new land had recourse to. In Singapore, where the cultivation was established on its first occupation, in 1819, there are 800 plantations; but the culture has been largely extended to the neighbouring continent. It is, however, carried on to a much greater extent in the islands of Batang, Bintang, and Linga. Although originally a Malay manufacture, it is at present almost wholly carried on by the Chinese, who conduct the cultivation of gambier in combination with that of black pepper, the refuse leaves of the former being found an useful manure for the latter. The gambier plant appears to be a native of all the countries on the shores of the straits of Malacca, but especially of the numerous islands at its eastern end. From the last, it has been immemorially exported to Java and the islands east of it, to be used as a masticatory, being one of the ingredients in the betel preparation. It does not seem to be a production of any of the islands of the volcanic band. Gambier contains from 40 to 50 per cent of pure tannin, and hence it has been of late years largely imported into Europe, to be used in the purposes of dying and tanning, the quantity imported yearly into England being not less than 6000 tons. This is one of the striking results of the freedom of commerce, and the progress of the arts among us.—*Crawfurd, Dict. page* 142. *Gambier* is an important article in commerce, and was formerly called Japan earth in Europe. Roxburgh quotes a description of its preparation and properties by Dr. Campbell of Bencoolen, to the effect that the Malays use the gambier with betel and areca, as *kuth* or catechu is employed in India,—that the young roots and leaves are sliced and bruised in water for some hours until a feculum is deposited, this is inspissated before the sun to a proper consistence and cast in moulds of a circular form. Dr. Roxburgh adds, that in other parts the extract is made by decoction of the leaves, and evaporation by fuel and solar heat, the product dried being cut into small thin cakes. Eight species of *Uncaria* are described by Roxburgh,

and twelve of *Nauclea*. The Gambier extract is described by M. Fee as the true or Indian kino. It is but little soluble in cold water or in boiling water; it is almost entirely dissolved by boiling spirit. It gives a rose-coloured precipitate with gelatine, and a deep permanent green with the salts of iron. It is rich in the tannic, but contains no gallic acid. Its uses in the arts and in medicine depend altogether on the presence of the tannic acid. Mr. Pereira on strong grounds denies that the gambier is one of the kinos of the druggists; Ainslie regards it as the *cutlacumboo*, one of the varieties of catechu of the Indian bazars; *cashcuttee* he considers to be the produce of the betel nut tree. In 1837-38, there were imported into Calcutta from Singapore, Penang, and Pegu, 3677 maunds of gambier, at a valuation of 15,916 rupees.—*O'Shaughnessy, p.* 398. The Gambier plant (Uncaria Gambier, Roxburgh, Nauclea Gambier, Hunter), was described by Rumphius under the name of Funis uncatus. Simmonds tells us it is a stout, scandent, evergreen shrub, which strongly resembles the myrtle. It is generally cultivated in the same plantation with pepper, as the leaves and shoots, after undergoing the process by which their juice is extracted, to furnish a kind of catechu, are found to be an excellent manure for the pepper vines. The leaves and young shoots of the gambier plant are collected as soon as they have attained a sufficient size, and boiled in iron pans until the juice acquires the consistence of treacle. The decoction is poured out into narrow troughs, dried, and afterwards cut up into small cakes, and packed in baskets for exportation. The gambier extract, which is of a yellowish brown color, and has the consistence of hard cheese, is much esteemed by the Malays for mixing with the preparation of betel, which they are in the habit of chewing; and considerable quantities have lately been imported into Britain where it is used for dyeing colours, and for tanning leather. The demand for gambier there is on the increase; and when better known to chemists, it will probably be found applicable to many other purposes than those to which it is at present applied. There were, in 1850, 400 gambier and pepper plantations on the island of Singapore; each measures or occupies on an average an area of 500 fathoms square, and employs eight to ten hands to cultivate and manufacture the gambier and pepper. There are some pepper plantations in addition, and they have been found to answer very well without any gambier being cultivated with them. Gambier cultivation is generally a losing undertaking, but it is adopted to obtain the refuse of the leaves for manuring the pepper vines, and also to employ the people in the plantations; it besides affords the proprietors the means of getting monthly sums to carry on the cultivation of pepper, which affords two crops yearly. There were formerly 600 plantations in Singapore, but the reasons already assigned, and the formation of spice plantations contiguous have caused the abandonment of all those near the town. Each plantation must have an equal extent of forest land to that cultivated with gambier and pepper, to enable the manufacture of the gambier to be carried on, and each gambier plantation, of 500 fathoms square, contains about 3,500 pepper vines, which yield on an average two catties per vine, or 70 piculs of pepper, and about 170 piculs of gambier annually;—a good plantation will, however, yield sometimes as much as 120 piculs of pepper, and 200 piculs of gambier, and a bad one as little as 40 to 50 piculs of pepper, and 60 to 80 piculs of gambier. Were it not for the enormous commission charged by the agents of these plantations, from whom the cultivators get all the advances, it would prove a profitable cultivation. The rates of commission charged generally are as follows:—Per picul of gambier, fifteen to twenty-five cents; per picul of pepper, thirty to forty cents; and if the price of the former is below one-and-a-half dollars, and the latter below three-and-a-half dollars per picul, a small reduction is made in the rates of commission. On every picul of rice supplied to the planters twenty to twenty-five cents commission is charged; this includes the interest of money advanced, which is never charged. A gambier and pepper plantation is valued or estimated at about 400 dollars on an average. The following is supposed to be a correct estimate, on an average, of the yearly expenditure and returns of a gambier and pepper plantation of 500 fathoms square, viz:—

EXPENDITURE.

	drs.	c.	men.	drs.	c.
Eight men at 3½ dollars and 7 Java rupees per month, wages for headman and labourers respectively	22	70	12	272	40
Five piculs of rice, including commission, say	6	80	12	81	53
Fish &c.	5		12	60	0
Boat or cart hire to carry rice and produce	1¾		12	21	0
				435	0

PRODUCE.

170 piculs of gambier, valued at 1 dollar 45 cents per picul, less 15 cents commission chargeable, nett	221	30	—	
70 piculs of pepper, at 4½ dollars, less 40 cents per picul commission, nett	287	0	508	0

Yearly profit, 73 dollars, or about £15.

Several gambier and pepper plantations have been abandoned in Singapore, partly from the ground being impoverished, but more particularly from the exhaustion of the forests adjacent to their estates. The exhaustion of the trees by yearly consumption deprives the planters of the necessary firewood which is used for the boiling down of the gambier. A gambier plantation gets exhausted in fifteen years, either from the want of firewood or the land getting impoverished. There are about 200 plantations at Johore, and the produce of gambier for the season of 1851 was calculated at 30,000 piculs. This shrub was, at one period, cultivated with success at Pinang

and other places to the eastward, but as Java was the principal market for the produce, and the Dutch had levied a duty of twelve Java rupees per picul on it, the cultivation at the former island did not repay its cost, and it was accordingly abandoned. Prices have been lately advancing, and the Chinese are talking of trying it again. The plant is partial to hilly land or slopes at the skirts of hills. Two hundred plants are usually placed on one orlong of land, being six feet asunder. They are raised from seed, and are topped to eight or ten feet, when the gambier is to be prepared. The Chinese dry the seed slightly, and sow in rainy weather. The seeds vegetate in forty days, and are planted out in the second or third month afterwards. At the expiration of fourteen months, the first cutting of the branches, with the leaves on, is made. These are put into a boiler, and when the juice has been extracted, the branches and refuse are thrown away, and the boiling is continued until the liquor has obtained the proper consistence, when it is put into shallow troughs, dried, and cut into slices for sale. The second cutting takes place eight months subsequently to the first. The plant now grows strong and admits of frequent cropping, and it will endure for twenty years. No manure is used, but the plantation is kept clean. Estimated cost of cultivating ten orlongs, about 13 acres, according to Colonel Low :—

	Spanish dollars.
Value of cleared land, ten orlongs... ...	200
Six laborers per annum	360
Quit rent	7
Boilers. firewood, and implements ..	20
Houses	50
Incidental	30
Total first year	667
Second year	397
	1,064

The six laborers on the plantation will, after the above period, be constantly employed in cutting and preparing the gambier: the average product will be 15 piculs monthly, which, at two dollars per picul, will be 30 dollars monthly, or 360 dollars per annum. This is the account obtained by collating different Chinese statements. The *Nauclea gambir* is placed by Jussieu under the natural order *Rubiaceæ*; it is a shrub attaining the height of six to eight feet, branchy; the leaves are ovate, pointed, smooth, waving, distinctly veined transversely underneath, of dark green color, and, when chewed, they have a bitter, astringment taste, leaving however, afterwards, a sweetish taste in the mouth, not unlike liquorice; the flower are aggregate, globular, composed of numerous florets, crowded on a globular naked receptacle: tubes of the corolla of a pinkish color; the upper part of the corolla fine, cleft, and of a greenish yellow color; the staminæ are five in number, and short; the pistil is longer than the corolla; the flowers are destitute of fragrance; the capsules (as correctly stated by Mr. Hunter) are stalked oblong, incrusted, and crowned with a calyx; tapering to a point below; two celled, two valved, the valves adhering at the apex, splitting at the sides; seeds very numerous, oblong, very small, compressed, furnished at both ends with a membranous pappus. The gambier plant is propagated either by seeds or cuttings, but the latter are preferred. It is cultivated to some extent at Singapore, but it is said that the gambier can be imported cheaper from the islands in the vicinity, more especially at the Dutch settlement at Rhio. The extract is used extensively by the natives of India, Eastern Archipelago, Cochin-China, and Cambodia, as a masticatory, wrapped up with the betel. There are three different qualities of extract; the first and best is white, brittle, and has an earthy appearance when rubbed between the fingers (which earthy appearance gave it the name of Terra Japonica, being supposed, at first, also, to come from Japan), and is formed into very small round cakes. This is the dearest sort, and most refined, but it is not unfrequently adulterated with sago; this kind is brought in the greatest quantity from the island of Sumatra. The second quality is of a brownish yellow color, is formed into oblong cakes, and, when broken, has a light brown earthy appearance; it is also made into a solid cube form; it is sold in the bazars in small packets, each containing five or six. The third quality contains more impurities than the preceding, is formed into small circular cakes, and is sold in packages of five or six in the bazar. The method employed in preparing the extract is thus correctly related by Finlayson :—"The leaves are collected three or four times a year; they are thrown into a large cauldron, the bottom of which is formed of iron, the upper part of bark, and boiled for five or six hours, until a strong decoction is obtained; the leaves are then withdrawn, and allowed to strain over the vessel, which is kept boiling for as many hours more, until the decoction is inspissated; it is then allowed to cool, when the catechu subsides. The water is drawn off; a soft soapy substance remains, which is cut into large masses; these are further divided by a knife into small cubes, about an inch square, or into still smaller pieces, which are laid in frames to dry. This catechu has more of a granular, uniform appearance than that of Bengal; it is, perhaps, also less pure." The younger leaves of the shrub are said to produce the whitest and best gambier; the older, a brown and inferior sort. There are other species of *Nauclea* indigenous to Singapore, but they do not produce any extract. Dr. Bennett has particularised four qualities of gambier :—1. Small round cakes, about the size of a small lozenge. Color pale, purplish, yellow-

ish white. 2. Cubes, in which shape it is principally imported into England, and square prisms, or oblong pieces. 3. Circular discs, or short cylindrical pieces. 4. Cubical amylaceous pieces, of a darker brown than the other kinds. Gambier is one of the most powerful of the pure astringents. The chief places of manufacture are Saik, Malacca, Singapore, and Rhio or Bintang. Bennett, in his "Wanderings," says there are 60,000 plantations of gambier on this island. After that of Rhio, the next best gambier is that of Lingin. That used by the Malays, with the leaves of betel, in the same manner as cutch in other parts of India, is the finest and whitest; the red being stronger tasted and rank, is exported to Batavia, China, and England, for the purposes of tanning and dyeing. It is frequently adulterated with sago powder, but it may be detected by solution in water. Large quantities of gambier are imported, under the corrupted name of cutch, into Calcutta, from Pegu. The quantity of gambier produced in Rhio, by the Chinese settlers, amounts to about 4,600 tons a year, about 2,000 of which are exported for the consumption of Java, the rest being sent to Cochin-China and other neighbouring countries. Two methods of obtaining gambier are described. One consists in boiling the leaves in water, and in inspissating the decoction; the other, which yields the best gambier, consists in infusing the leaves in warm water, by which a fecula is obtained, which is inspissated by the heat of the sun, and formed into cakes. The injudicious practice adopted by the Land Office in Singapore, of granting indiscriminate licenses, or "cutting papers" as they are termed, seems open to objection, and is driving many of the Chinese cultivators to the neighbouring island of Johore, where they readily obtain permission to cultivate, without obstruction, this important article of commerce. Parties of 300 or 400 at a time left in 1846. It appears that, under his permissive license, the squatter obtains permission to clear as much land as he possibly can, but the order does not define any extent beyond which no cutting should take place. The squatter clears as much land as the means at his disposal will allow, in the hope and expectation that the jungle contiguous to the cleared ground will be at his command for fuel—a supply of fuel, easy of access, and adequate to the number of plants grown, being indispensable to the culture and manufacture of gambier. When the time for gathering the leaves arrives, another squatter (perhaps from motives of envy or malice) obtains a "cutting paper," and commences clearing in close proximity to the already-formed gambier plantation; obviously depriving the owner of the fuel he has reasonably calculated upon. The established planter cannot of course eject the intruder from the land, since the latter possesses an equal right to it, in virtue of his "cutting paper," which, as it specifies no limits, leaves him the disposer or destroyer of the crop of the industrious planter. Instead of the present system, a better practice ought to be introduced, defining the boundaries to be included in a "cutting paper," and effectually preventing a trespass on the fuel-land of the industrious planter. This might easily be effected by specifying the number of acres, as well as the direction, in every clearing paper granted. The average produce of gambier in Singapore is between 7,000 and 8,000 piculs monthly. The ordinary price is about 1¼ dollars per picul. A deficiency of rain, labor, or other causes, will occasionally reduce the annual produce from 90,000 or 100,000 piculs, to 60,000 or 70,000, and this diminished supply will raise the market price of the article probably 35 cents per picul. But, in addition to the effect occasioned by a deficient supply, there are other causes in operation exercising a powerful influence in reducing prices. Gambier was first exported in 1830, from Singapore, to the extent of 2,587 piculs, at 4½ dollars per picul. As a rival to bark it failed at so costly a price to meet with encouragement; the culture and manufacture consequently declined until 1834, when 1,858 piculs were shipped to England at a somewhat lower rate. The demand then became active, the exportations were at first multiplied, then doubled every succeeding year, until they reached, in 1846-47 no less than 173,117 piculs. The price has gradually declined to 1¼ dollars per picul, at which rate it displaces its rival, bark. This price, however, is unremunerative to the grower, so that, unless more encouragement offers, the supply will decline. The number of Chinese employed in the cultivation, &c., of gambier and pepper in Singapore is about 11,000. Their rate of wages fluctuates with the price of gambier. If a picul of gambier realizes 1½ dollars, the monthly pay will be about three dollars; if gambier fetches two dollars, their pay will amount to four dollars in the month. The workmen who clean the plantation always receive a dollar less than those who cut and boil the gambier. A good deal of gambier seems now to be grown in Java, for 58,305 piculs were exported from that island in 1843. A small quantity is taken by the Chinese ports, but whether as a masticatory or for tanning and dyeing Simmonds is not aware.

VALUE OF THE TERRA JAPONICA IMPORTED INTO CEYLON.

	£		£
1840	611	1846	824
1841 ...	1,053	1847 ...	1,549
1842	768	1848	1,095
1843 ...	471	1849 —	896
1844	1,153	1850 — —	265
1845 ...	537	1851 —	386

In the Customs' returns of imports to this country, two articles are enumerated, under the separate names of cutch and terra japonica; the former is catechu and the latter the produce of the gambier plant. The imports of gambier

were, in 1836, 970 tons; 1837, 2,738 ons; 1838, 1,660 tons; 1839, 5,213 tons.

		Catch.	Terra Japonica.
		tons.	tons.
1848	Imported to the United Kingdom	1,186	5,823
	Retained for home consumption	765	5,102
1849	Imported	1,636	6,851
	Retained for home consumption	869	5,400
1850	Imported	1,172	4,585
	Home consumption	787	3,655
1851	Imported	2,401	4,783
	Home consumption	2,020	4,431
1852	Imported	2,236	3,244
	Home consumption	1,708	3,003

Catechu, imported under its Indian name of cutch, is brought over in bales or baskets of from one to four cwt., the price being £18 to £25 per ton. About 450 cwt. of terra japonica or gambier is annually imported into Hull from the East Indies. The imports of the two substances into Liverpool is about 900 tons. Gambier is only worth £13 to £14 the ton; a few years ago it fetched 26s. the cwt. The imports into the port of London average 1,500 tons annually. 4,679 bales, and 14,436 baskets of terra japonica were imported into Liverpool in 1851, and 14,000 bales and baskets in 1852. The imports of cutch were 10,290 bags, and 2,592 baskets, in 1851, and 11,873 bags and baskets in 1852; the prices, which were from 16s. 6d. to 18s. per cwt. for each article, in 1851, were rapidly run up in Liverpool, in 1853, owing to short supplies, to 25s. for gambier, and 22s. to 24s. per cwt. for cutch, or catechu.

EXPORTS OF GAMBIER FROM SINGAPORE, WITH THE OFFICIAL VALUE IN RUPEES.

		Piculs.	Value in Rs.
1840-41	Exported	79,508	457,560
„	Growth of Singapore	59,325	
1841-42	Exported	93,340	470,790
„	Growth of Singapore	47,696	
1842-43	Exported	148,746	548,281
„	Growth of Singapore	110,151	
1843-44	Exported	139,050	584,449
„	Growth of Singapore	121,191	
1844-45	Exported	157,654	539,978
„	Growth of Singapore	134,528	
1845-46	Exported	110,766	425,643
„	Growth of Singapore	75,797	
1846-47	Exported	173,117	591,943
„	Growth of Singapore	143,795	

The exports of gambier from Singapore were as follows:—

	To England.	To the Continent.	Total.
	piculs.	piculs.	piculs.
1849	134,546	6,121	140,667
1850	87,611	16,166	103,777
1851	68,365	11,639	80,004
1852	68,045	9,006	77,051

The exports of cutch from Pinang, in the last four years, have been:—1849, 3,693 piculs; 1850, 900; 1851, 4,143; 1852, 3,880; or, on an average, 197 tons.—*Simmonds.*

(4009) GAMBOGE,

Ossara rewund, Arab.	Gomma gutta, It.
Gokkatoo, Cyng.	Gutami-gutte, Cambogia, Lat.
Gutte-gum, Dut.	Gomarum, Port.
Gomme gutte, Fr.	Rong, Siam.
Gummigutt, Ger.	Mukki, Tam.
Ravundchenee-Seerah, Guz. Hind.	Passapoovenny, Tel.

Camboge or Gamboge, a gum resin may be found to be the produce of several species of plants belonging to the natural order Guttiferæ. The best gamboge is brittle and inodorous, of conchoidal fracture, orange-coloured, or reddish yellow, smooth, and somewhat glistening. Its powder is bright yellow. It may be resolved into resin and gum by the successive action of ether and water. The finest gamboge contains about 70 per cent of resin, sometimes termed *gambodic acid*, which forms numerous salts. Gamboge is used as a pigment, and in miniature-painting; also to tinge gold varnish. In medicine it is used as a drastic purge. It is sometimes improperly used by confectioners to colour liqueurs. An artificial gamboge, of very little value, is manufactured with turmeric and other materials.—*Tomlinson, page* 286. Its composition is as follows; number 1 being an analysis by Professor Christison of a commercial specimen from Ceylon; number 2 of a fine sample of common ditto:—

	1.	2.
Resin, or fatty acid,	78·84	74·8
Colouring matter,	4·03	3·5
Gum,	12·59	16·5
Residue,	4·54	5·2
	100	100

The average imports of gamboge into the port of London, during the past five or six years, have been from 400 to 500 chests of one to two cwt each.—*Simmonds.* Mr. Mason remarks that three works in his possession describe gamboge, each as the product of a different tree; a fourth represents all to be wrong, and a fifth suggests a different plant still. One refers it to *Cambogia gutta*, a plant which, as described by Linnæus, has probably no existence. He described a Ceylon plant, "and it is now quite evident," says Dr. Wight "that the character of the flower and ovary is taken from one specimen, and that of the fruit from a different one, owing to the imperfection of his specimens, and his not being aware, that the lobes of the stigma afford a sure indication of the number of cells of the fruit." Another, refers it to *Garcinia Cambogia*, but Dr. Wight says, that the exudation of this tree is "wholly incapable of forming an emulsion with the wet finger," a statement known to be correct. The tree is very common in the Tenasserim Provinces, but the bright yellow exudation it produces, is certainly not gamboge. A third, refers it to *Stalagmitis Cambogioides*, but Dr. Wight remarks: "The

juice of this tree differs so very widely in its qualities from good gamboge, that it can never be expected to prove valuable as a pigment." Dr. Graham has described a Ceylon tree under the name of *Hebradendron Cambogioides*, which is said to produce good gamboge; but no gamboge has ever been exported into the English market from Ceylon. Thus it would appear, to use the language of Dr. Wight, that "the tree, or trees, which produce the gamboge of commerce, is not yet known." Dr. Helfer, who was employed by government as a scientific naturalist in the Tenasserim Provinces, reported: "The gamboge of this country dissolves very little with water, and consequently does not yield a yellow emulsion as the common *guttiferæ*. It will never serve as a colour, but promises to give a very beautiful varnish." This statement was controverted by a writer in a local periodical at the time, who said he had obtained "fine gamboge of the very best description" from our jungles: in which he was no doubt correct, but he erred when he added, that it came from the "true *Stalagmitis Cambogioides*;" for that plant has a quinary arrangement of its flowers, while the arrangement of the flowers in those that produce gamboge, in these Provinces, is quaternary. The hills that bound the valley of the Tavoy river, on both sides, from their bases to their summits, abound with a tree which produces a bright gamboge. It is Roxburgh's *Garcinia pictoria*, which he knew produced gamboge, but which he said was liable to fade. As soon as Mr. Mason had satisfied myself of the identity of the trees by an examination of the inflorescense of the Tenasserim plant, compared with Roxburgh's description; he coloured a piece of paper, one band with this gamboge, and another with the gamboge of commerce; and subsequently exposed both to the weather equally for more than twelve months, but without being able to discover that one faded any more than the other. South of the mouth of Tavoy river, and throughout the province of Mergui, there is found on the low plains at the foot of the hills, and on the banks of the rivers, almost down to tide waters, another species of garcinia that also produces good gamboge. He has no doubt but it is the tree from which Dr. Griffith furnished Dr. Wight with specimens, and of which, the latter says, "I refer doubtfully to Wallich's *G. elliptica*." We will call it then *G. elliptica*, a species which Dr. Wight has on his list of "species imperfectly known." The foliation and female flowers are, however, very well described, and to complete the description, I may add, the male flowers are pedunculated, but the peduncles are short, and they might be characterized as sub-sessile. The anther, like those of the female flowers, are sessile, depressed or flattened above, and dehisce circularly. The ripe fruit is globose, and not furrowed. Neither Wallich, Wight, nor Griffith appear to have been at all aware that gamboge was a product of this tree. Dr. Wight, in a recent number of his Neilgherry Plants, says: "Two species of the genus garcinia are known to produce gamboge, most of the others yield a yellow juice, but not gamboge, as it will not mix with water." The species which he has described as producing gamboge, and to which Mr. Mason supposes he refers, are *G. gutta*, or *H. Cambogioides*, (Graham,) and *G. pictoria*, (Roxburgh) In its appearance to the eye, and in its properties as a pigment, Mr. Mason has failed to discover the slightest difference between the exudation of this tree, and the gamboge of commerce. The Burmese priests use it occasionally to dye their robes, the Karens their thread, and it serves equally well in colouring drawings. It is also used by the native doctors in medicine, but not extensively. Dr. Lindley, in his new work the Vegetable Kingdom, says: "The best gamboge comes in the form of pipes from Siam, and this is conjectured to be the produce of *Garcinia Cochinchinensis*." Now as *G. elliptica* is spread all over the province of Mergui, is it not probable that it also extends into Siam, and that the Siamese gamboge is the product, a part at least, of this tree? Specimens of the gamboge were sent up with the above communication to Calcutta, and the Secretary of the Asiatic Society wrote in reply: "Our best botanists here, consider that you have hit upon the true tree at last."—*Mason.*

Another gamboge tree has recently been found inhabiting the western Burmese territories. Both these seem to furnish an equally fine pigment. As it can be obtained in unlimited quantity, it might be introduced into European trade, if the natives learn how to collect it in a state of purity, and make it up in homogenous masses in imitation of pipe gamboge, the finest Siam variety. It seems to possess more coloring matter, more resin and less gum, than the ordinary gamboge of commerce. Gamboge owes its color to the fatty acid. The resin must be regarded as the chief constituent and is most abundant in that imported from Ceylon which contains about 76 per cent. and is therefore best adapted for painting. Gamboge also has its medicinal uses. *Xanthochymus ovalifolius*, according to Wright and Arnot, is the only plant in Ceylon that yields gamboge fit for the arts, is found in the Rangoon, Pegu and Tounghoo districts, but it is rather scarce. *X. pictorius*, which is very plentiful, also yields gamboge, but probably of a less valuable description, as also *Garcinia Cowa* or wild Mangosteen tree, which is likewise common. —*McClelland.* We are assured by the Rev. Mr. Mason, Mr. O'Reilly and other observers that the gamboge trees (G. elliptica) are dispersed through the forests of Burmah, in such numbers as to afford a considerable quantity of the exuda-

tion, did the knowledge of its value and the process of preparing it, exist with the natives, (Kareans) the tree is, however, felled indiscriminately with the rest of the forest, in the annual clearings which take place, and the article which forms a prominent item, in the rich exports from Siam, is on the eastern side of the border range utterly neglected and destroyed. The districts where the Burmese gamboge is produced, are nearly in the same latitude with Cambodia where the commercial gamboge of Siam is known to be produced. The Koorg or Wynaad gamboge tree has an extensive range, Dr. Cleghorn has seen it along all the higher parts of the Malabar Ghauts, extending fully 120 miles, from north to south, and in some parts it is very abundant. The produce for the most part, is made little use of, and the tree is considered of so small a value, that he has seen the supports and scaffoldings of bridges, &c., entirely composed of the *Garcinia pictoria*, though from the valuable observations of Dr. Christison, this gamboge "may be advantageously applied to any use to which the gamboge of Siam, is habitually put." This article is now coming much into use as a pigment, and as the exudation can be obtained in large quantity, it may be introduced into European trade, when once the natives learn how to collect it in a state of purity, and make it up "in homogeneous masses in imitation of pipe gamboge, the finest Siam variety:" This is imported in the bamboos, in which it is moulded, or in fragments of pipes—or in lumpy masses, but always homogeneous. The earliest notice of gamboge as a remedial agent, is contained in the rare and valuable work of Garcias ab Horto, Physician to the Viceroy of Goa, where he says, "magnaque apud incolas illius est laus in curationibus, &c." Again, in Ainslie's Materia Medica, second edition, I find that Dr. S. Dyer, when Garrison Surgeon at Tellicherry, transmitted this valuable substance to Dr. Roxburgh, but the specimens seem to have been impure. In a foot note to his account of this drug, Ainslie further remarks, "Colonel Wilks informs me that this yellow gum resin had been previously noticed by the pioneers of Lord Wellington's army." It is *surprising* that this product should have been so little attended to, as the value in London price currents varies from 3*s*. 6*d*. to 5*s*. per pound. The names of the trees producing the gamboge and kino, should be added to the list of trees protected from indiscriminate destruction, which list is at present confined to the teak, ebony, black-wood, and sandal-wood. In two papers, read before the Royal Society of Edinburgh, in March and December, 1836, Dr. Christison gave an account of the composition and properties of the gamboge of Ceylon, showing that in both respects it is identical, or very nearly so, with the more familiar gamboge of Siam, the only kind met with in European commerce, and proving that certain other gamboge oid exudations from *Garcinia Cambogia*, *Xanthochymus pictorius* and *Xanthochymus spicatus*, although they have been supposed closely to resemble ordinary gamboge, are really quite different in appearance, nature, and composition, as well as unfit for any of the well-known economic uses of that substance. Though desirous of extending these inquiries also to the analogous products of other plants of the same natural family, the *Guttiferæ* and more especially of examining the exudations, said to resemble gamboge, which have been observed by officers of the East India Company's Service—first, on a tree in the forests of the Wynaad, in the western part of Mysore—and, secondly, on one inhabiting the western Burmese territories, ceded to the Company after the last Burmese war, for a long time Dr. Christison's efforts to obtain the necessary specimens and information were unsuccessful. In the interval some advance has been made by Dr. Wight, of Madras, towards determining the nature and botanical source of the supposed Burmese gamboge. This branch of the inquiry is, perhaps, of more practical interest than any other. For the districts where the Burmese gamboge is produced are nearly in the same latitude with Cambodia, where the commercial gamboge of Siam is known to be collected; the two localities are even at no great geographical distance from one another; and hence, were a true gamboge found to be produced on the western coast of the Burman Empire, a strong presumption would arise that its tree is the same with the unknown gamboge tree of Siam. Upon this point Dr. Wight in a letter of the date of January, 1843, observes —"I have lately received flowering specimens of *Garcinia elliptica*, of which I have published a figure in my *Icones*, as the gamboge-tree of Tavoy and Moulmein, and not improbably of Siam. There was sent along with the specimens a very small quantity of the juice, which was quite emulsive, although in itself a very bad and dirty sample. On trial it could be used readily as a pigment; but the colour was bad, whether naturally so, or owing to dirt with which it was mixed, I could not make out. The specimen was too small for me to examine thoroughly. A further and better supply was promised me. But the gentleman who interested himself in the inquiry was shortly after removed from that coast; and there the matter dropped. All the other juices of the *Guttiferæ* I have examined are resinous and do not mix with water, in short are not emulsive." In the month of May of 1841, Dr. Christison at length received intelligence of the gamboge of the Wynaad, and soon afterwards authentic specimens, of small size, yet sufficient for determining its nature and leading properties. With these materials he made a short investigation without delay; and in December the results

were communicated to the Royal Society of Edinburgh. But he more lately received, additional information and specimens from Dr. Hugh Cleghorn, of the Madras Medical Service; who thus enables him almost to complete the inquiry. While residing not long ago at Cannanore, Mrs. Walker learned from a party of the Company's Engineers, that they had observed what seemed to be a gamboge tree in the jungles of the Coorg country. This party had been for some time employed, under the command of Captain Cotton, Lieutenant Francis, and Lieutenant Walker, in tracing a projected road from Mysore, through the unfrequented jungles of the Coorg Ghauts, towards the Malabar Coast. In these operations they had to "penetrate dense forests, abounding with trees producing vast quantities of gums and resins," and, among the rest, with the tree in question. Lieutenant Francis states, that this tree was seen almost everywhere on the route from Cannanore to the Ghauts of the Coorg country, and that at one place their encampment in the forest was quite surrounded by it. From this gentleman Mrs. Walker received a small specimen of the exudation, and he added the remark, that he "could not detect any difference between it and the colour-markers' gamboge in tint; but on putting the brush into the mouth, it does not burn as it ought to do." Dr. Cleghorn's observations were made last autumn, while accompanying in his professional capacity Captain Le Hardy, in the north-west district of Mysore, near Nuggur. He observes, in his first letter, dated from that place on the 3d March—"When accompanying Captain Le Hardy, in his annual tour, the gamboge-bearing tree was first observed near the north-western frontier of Mysore, as we were proceeding through an interesting, almost unexplored country, everywhere affording the most picturesque scenery, covered with jungle more or less dense, supplying abundant materials for the botanical traveller, and especially remarkable for the Gairsoopah Falls, where the river is precipitated over a vertical scarp 900 feet in height. * * The tree, which grows to an elevation of thirty or fifty feet, was met with along the tops of the Ghauts from Gairsoopah to Nuggur, a distance of fifty miles; and I understand it grows in greater abundance ten miles southward of this. It would appear that its range of elevation is between 2000 and 3000 feet, though it has also been seen sparingly on the sloping descent for some distance down the Ghaut. It is generally found in thick jungle, overtopped by the sago-palm and other forest trees of great height. The foliage is dense, the branches shoot out horizontally, two or three occasionally coming off in the same plane; and in general contour it reminds me in some measure of the box on a gigantic scale." In a subsequent letter, dated at Augoombee, 22d March, Dr. Cleghorn adds, that he found the tree in still greater abundance as he proceeded southward; and in another, dated a month later, he remarks, that on leaving the cool and humid range of the Western Ghauts, whose moist and shady slopes seem to afford a congenial climate, he lost sight of the gamboge-tree entirely. From a variety of accounts collated by Mrs. Walker, it has evidently an extensive range, having been met with by the engineer party along a tract of hilly country extending nearly 120 miles from north to south. It seems to flower during the rainy season of the monsoon; at the close of which the yellow juice is said to be exuded in greatest abundance. It is called in the Canarese language *Goorgeemara*, or yellow gum-tree. The specimens of the juice sent to Dr. Christison were all in the concrete state. Those sent by Mrs. Walker present, on a fresh surface, a tawny, brownish-yellow colour, and glistening waxy lustre, exactly like fine Siam gamboge; and they show a tendency to the conchoidal fracture. They are free of odour, and, in correct language, tasteless; but he has not found them destitute of acridity, as Lieutenant Francis did; for in a few seconds after testing a small portion an acrid impression was produced in the back of the palate, like what is occasioned by Siam gamboge. The Mysore gamboge is emulsive. Mrs. Walker's specimens are not quite so easily reducible to a fine emulsion with water as the superior qualities of that from Siam; but the subsequent specimens of Dr. Cleghorn seem to him not at all inferior in this respect to the best commercial gamboge. The emulsion presents the peculiar, brilliant, intense yellow hue of ordinary gamboge. When it is used as a pigment, he is unable to detect the slightest difference in tint from that variety. He put it into the hands of a skilful colourist, along with a specimen of the finest pipe-gamboge of Siam, of a quality seldom met with in the colour-shops; and he received an opinion that the Mysore gamboge was not so easily rubbed down, and that upon paper the tint presented the slightest possible shade nearer brown; but nevertheless that it appeared a superior gamboge, undistinguishable from the gamboge of the shops except on the most narrow inspection. In stating this opinion, it is necessary to add, that the standard of comparison had obviously been collected with the greatest care, while Mrs. Walker's specimen had not this advantage, analysis proving it to be not quite pure; and that the specimen from Dr. Cleghorn, which proved to be considerably purer, is evidently more emulsive. The analysis of these specimens was performed nearly in the same manner as that of the Ceylon and Siam varieties, of which an account was given in my paper in 1836. These were found to consist essentially of an orange-coloured resin,

very soluble in sulphuric ether; of gum, which is entirely and easily soluble in water, and of a little adhering moisture. But the Ceylon gamboge also contained more or less woody fibre, accidentally present, owing to want of due care in collecting it; and the inferior qualities of Siam gamboge contained varying proportions of ligneous fibre and starch, owing to adulteration with the flour, probably of some leguminous seed. Since this analysis was executed, the same subject has been taken up by Dr. Ph. Buchner, who examined specimens of Siam pipe-gamboge and common Ceylon gamboge, presented by me to Professor Liebig; and he found, besides the proximate principles observed by me, a trace of brown colouring matter in the Siam specimen, and about four per cent. of a similar principle in that of Ceylon. He found this substance both in Ceylon and Mysore gamboge. A fine sample of the former, prepared under Mrs. Walker's instructions when she resided at Colombo, contains three and a half per cent. of this matter, and has the following composition—

Resin, ...	74·8
Gum, ...	16·5
Colouring matter,...	3·5
Accidental Fibre, ...	2·2
Moisture, ...	4·0
	101·0

One hundred grains were used; the excess over which is owing to the obstinate adhesion of ether to the resin even at an elevated temperature. The colouring matter is obtained, after removal of the resin with ether, by acting on the residue with rectified spirit, and then evaporating off the spirit from this solution. The solution is colourless; but there is left a dark smoke-brown extractiform substance, which is soluble in water, and imparts to the water a brown tint. The Mysore gamboge, like that of Ceylon, is in a great measure soluble in sulphuric ether, to which it communicates a fine orange colour; and the solution yields, when evaporated, an orange-coloured resin, identical in appearance with that from Siam gamboge. From the residuum, rectified spirit, without acquiring any colour, removed a substance which was deposited on evaporation in the form of a dark smoke-brown extract, like that obtained from the gamboge of Ceylon. The matter unacted on by the spirit, immediately formed an emulsive solution with cold water, which, when evaporated, left an adhesive transparent substance, possessing the general properties of gum. Dr. Cleghorn's specimen left scarcely any residuum after the action of cold water; but that obtained from Mrs. Walker left about three per cent. of particles of fibre and sand. From an analysis of 20 grains of each sample, a quantity however scarcely sufficient to yield very positive results, the Mysore

gamboge seems to have the following composition—

	I.	II.
Resin,...	77·0	80 0
Gum, ...	14·0	14·0
Colouring matter, ...	5·0	5·0
Fibre and Sand, ...	3·0	0·5
Moisture, ...	Not determined.	
	99·0	99·9

This composition is essentially the same with that of Ceylon gamboge, but indicates more colouring matter, more resin, and less gum than in the gamboge of commerce. These differences, however, do not materially affect its emulsive property; and as for the brown colouring matter, this seems scarcely to injure the purity of its hue as a pigment; for the brown colour is not developed until the principle has been detached by alcohol, and dried under exposure to the atmosphere. It remains to inquire whether the Mysore gamboge possesses the remarkable effects of the Siam and Ceylon varieties on the animal body. [Since Dr. Christison's observations were made, Dr. Cleghorn employed the Mysore gamboge in the Jail at Shemogah, and has seen it used frequently in the Royal Infirmary of Edinburgh. The therapeutic effects were found to correspond exactly with those of the Siam variety, and the indigenous product is now regularly received at the Medical Stores of the Madras Presidency.—H. C.] Dr. Christison's supply would not allow of many trials being made of its virtues: but three grains, triturated with a little bitartrate of potash, produced one copious evacuation; four grains had the same effect. In another case four grains failed to move the bowels; and in another, five grains occasioned five profuse discharges. In every instance tormina and sickness were caused; and one person had several attacks of vomiting. The discharges were invariably very watery, yellowish, and abundant. This gum-resin, therefore, seems to exert the same action, attended with the same inconveniences, as ordinary gamboge. It is put to very little use in India. According to the inquiries from correspondents, the inhabitants of the district where it grows, are not acquainted with its action on the animal body. Neither is it used as a pigment. But Dr. Cleghorn was informed by "an intelligent native from Canara, that the juice of the tree is occasionally used for colouring cloth in the low country," though not above the Ghauts; and a concrete oil obtained from the seeds is used, both in lamps and in making curries. From the observations made above, however, it is probable, that this gamboge may be advantageously applied to any use to which the gamboge of Siam is habitually put. At all events, it is an equally fine pigment; and as it may evidently be obtained in almost unlimited quantity, it may be intro-

duced equally into European trade, once the natives learn how to collect it in a state of purity, and make it up in homogeneous masses in imitation of pipe-gamboge, the finest Siam variety. Respecting the botany of this subject, in 1836, Dr. Graham, came to the conclusion, that what is described above, under the name of Ceylon gamboge, is produced by a plant, of which Linnæus in the first instance, and afterwards Murray of Gottingen, had given an incorrect account in consequence of their having confounded two very distinct species under one description, and which Dr. Graham was led to view as a species of a new genus under the name of *Hebradendron gambogioides*. There can be no doubt of the error both of Linnæus and of Murray. But some botanists have considered Graham's characters of his genus as not sufficiently distinctive; and in particular Dr. Wight maintains that its characters are not such as to justify a separation of the species from the genus *Garcinia*. Both Dr. Royle and Dr. Lindley, however, have admitted Graham's genus. On the merits of this question, it may be simply observed, that if Dr. Graham's new genus be a good one botanically, it appears to be also a convenient one in respect of its products; for every true gamboge-bearing tree yet known, so closely resembles his plant, that there is a difficulty in establishing even specific distinctions between them. A very different species, the *Garcinia Cambogia* of Roxburgh, once supposed to produce gamboge, and indeed actually confounded by Linnæus with the true gamboge-tree of Ceylon, Dr. Christison has proved not to produce gamboge at all; its concrete juice being a very pale-yellow gum-resin, containing volatile oil, and not in the least degree emulsive. But the *Garcinia elliptica* (*Wallich*) of Tavoy and Moulmein, which certainly produces an exudation resembling commercial gamboge, approaches very closely in its characters to Graham's *Hebradendron*; as may be seen on comparing the drawings of both in Dr. Wight's *Illustrations of Indian Botany*, Table 44, and *Icones Plantarum Indiæ Orientalis*, Table 120. The chief differences are, that in the Ceylon plant the flowers are "apparently verticelled round the articulations of the branches where the leaves have fallen (Wight,)" while in the *G. elliptica* they are axillary and solitary; and that the leaves of the former are "obtusely attenuated at both ends, and vary from broad lanceolate to rhomboidal (Wight)," while in the latter they are "three times as large, obtuse, little attenuated at both ends, and shortly and abruptly acuminated." But the resemblance is even greater than Dr. Wight's description and drawings would imply; for in four specimens of the Ceylon plant which I have had an opportunity of examining, the old leaves are not all attenuated at the apex, but abruptly subacuminate; which character indeed, though neglected by Dr. Wight, has been introduced among the specific characters of *Hebradendron gambogioides* by Dr. Graham. In like manner the Mysore tree bears an exceedingly close resemblance to that species. The resemblance indeed is so close, that the gentlemen of the party who discovered the tree on the Ghauts of Mysore, consider it to be the same with the tree of Ceylon; and Dr. Cleghorn has communicated a letter on the subject from Dr. Wight, who, from incomplete data, however, seems inclined to the same opinion. But plants, growing in different countries so distant from one another, may be more safely regarded as belonging to distinct species until they are proved to be identical. And in the present case Dr. Christison apprehends they will be found to be distinct, as the following description may help to show—The botanical specimens consist of twigs without flower, but with fruit, and of detached fruit of full size, some dry, others preserved in brine; and Dr. Cleghorn has added a drawing by a native artist. The leaves are opposite, petiolate, elliptic-lanceolate, attenuated at the base, obscurely subacuminate, four inches and a half along, and two and a quarter broad when of full size, smooth, and somewhat coriaceous. The fruit, which is of the size of a cherry, is axillary, sessile, subrotund or slightly ellipsoidal, supported by a persistent calyx of four coriagous subrotund, ventricose sepels, and crowned by a persistent, four-lobed, prominent, irregularly tubercled stigma. It is four-celled, and each cell single-seeded. In all my specimens of fruit the seeds had aborted, so that I cannot describe them. Scanty as these characters are, they indicate several points of distinction between this tree and Graham's *Hebradendron gambogioides*. For the full-grown leaves of the latter are somewhat obovate, subacuminate, and much more coriaceous; the sepals of the persistent calyx are membranaceous; and the persistent stigma of the fruit is broader, as well as very flat, and each lobe presents a regularly beaded circumference, with a depressed centre. The two stigmata are represented on the drawing of the Mysore plant. It seems very probable that this plant is the same with the *Garcinia pictoria* of Roxburgh's *Flora Indica*, which was described from specimens and information supplied by Mr. Dyer of the Company's Medical Service, while he resided in the Wynaad, where the species described above, grows. The description of Roxburgh, so far as it goes, corresponds very exactly with the specimens sent to Dr. Christison and so does a drawing of a twig and detached fruit, which was presented by Mr. Dyer to Dr. Royle, and submitted to Dr. Christison's inspection by the latter gentleman. Roxburgh indeed observes, that the gamboge from this species sent to him by Mr. Dyer was inferior in quality, and when used as a pigment, proved

to be not permanent; while the Mysore gamboge in Dr. Christison's possession, is both brilliant at first when used on paper as a colour, and has remained quite permanent for fifteen months. But Dr. Royle informed him, that Mr. Dyer himself did not agree in opinion with Roxburgh, and ascertained that his gamboge is permanent in tint when employed as a water colour. If Dr. Christison be right in conjecturing the two plants to be the same, and Graham's new genus be a good one, the Mysore gamboge tree will constitute a third *Hebradendron*, and its name will be *H. pictorium.—Pharmaceutical Journal, for August*, 1846, *Vol.* VI. *No.* 2. At the Madras Exhibition of 1855, *Gamboge*, was exhibited from Goa, Malacca, Labuan, Coorg, Canara and Mysore; that from Malacca was the best, in pipes—the others from Mysore, &c. all in lumps, the results of a variety of modes of preparation—one specimen is full of air vesicles, and of a dark colour, damaged by being collected in rainy weather. The Indian peninsular specimens are known to be produced from *Garcinia pictoria*, and are of excellent quality. Mr. Maltby, Collector of Canara, states that "it is to be found in the greatest abundance along the whole line of the Western Ghats, and it is probable that, if the attention of the trade were directed to those provinces, it might become an important article of export." Gamboge in tears is exhibited from Labuan, it has a different tint, and is probably obtained from a different tree, *Garcinia Cochinchinensis*. A specimen from Malacca exhibited by Lieut. Evans, 51st N. I., was the finest pipe variety, all the others were in the form of lumps or tears. The series was very instructive, showing how much the commercial character of this product may be altered by trivial circumstances, the exudation being yellow, reddish, or brown, and of different degrees of solidity, according to the season of the year, and the method of manipulation. The peninsular Gamboge is a useful pigment, and an effective purgative, and has been lately added to the list of country medicines. It appears that the tree is so abundant along the crest of the ghauts, that the product may be obtained in very considerable quantities in the forest of Mysore, Malabar, and Canara. Apothecary Wrightman, collected this product with much care, in homogeneous masses without air vessels, and free of woody fibres or other impurities.—*M. E. J. R.* According to Simmonds, page 451, *Gamboge* is extensively used as a pigment, from its bright yellow color. There are two kinds known in commerce, the Ceylon and the Siam. The former is procured from the *Hebradendron Cambogoides*, Graham; a tree which grows wild on the Malabar and Ceylon coasts, and affords the coarsest kind. The pipe gamboge of Siam is said to be obtained from the bruised leaves and young branches of *Stalagmites cambogoides*. The resinous sap is received into calabashes, and allowed to thicken, after which it is formed into rolls. Several other plants, as the *Mangostana gambogia*, Gaertner, and the *Hypericum baccifer-um* and *Cayanense*, yield similar yellow viscid exudations, hardly distinguishable from gamboge and used for the same purpose by painters. The *Garcinia elliptica*, Wallich, of Tavoy and Moulmein, affords gamboge, and approaches very closely in its characters to Graham's *Hebradendron*. In like manner the Mysore tree bears an exceedingly close resemblance to that species. It is common in the forests of Wynaad in the western part of Mysore, and has been named by Dr. Christison *Hebradendron pictorium*. Another gamboge tree has recently been found inhabiting the western Burmese territories. Both these seem to furnish an equally fine pigment. As it can be obtained in unlimited quantity, it might be introduced into European trade, if the natives learn how to collect it in a state of purity, and make it up in homogenous masses in imitation of pipe gamboge, the finest Siam variety. It seems to possess more colouring matter, more resin and less gum than the ordinary gamboge of commerce. Gamboge owes its color to the fatty acid. The resin must be regarded as the chief constituent, and is most abundant in that imported from Ceylon, which contains about 76 per cent., and is therefore best adapted for painting. Gamboge has also its medicinal uses.—*Simmonds, p.* 451. Gamboge fetches, in the London market from £ 5 to £ 11 per cent, and the average imports from 1847 to 1852 were from 400 to 500 chests of one to two cwt. each.—*Simmonds, pp.* 639 *and* 640.

(4010) GAMBOGE BUTTER—GARCINIA PICTORIA (Roxburgh.)

Mukki-tilum, TAM. | Arasinagoorghy yennai, CAN.

The solid butter, contained in the seeds of the "Gamboge tree," a species closely allied to the G. purpurea which produces the "cocum butter" has attracted attention. The Gamboge tree grows abundantly in certain parts of the Mysore and Western coast jungles. The oil, which is procurable in moderate quantities, is prepared by pounding the seed in a stone mortar and boiling the mass, until the butter, or oil rises to the surface. Two and a half measures of seed should yield one seer and a half butter. In the Nuggur Division of Mysore, it is sold at the rate of As. 1-4 per seer of 24 Rs. weight, or at £36-6 per ton, and is chiefly used as a lamp oil by the better classes of natives, and by the poor as a substitute for ghee. The butter thus prepared does not appear to possess any of the purgative qualities of the Gamboge resin, but is considered an antiscorbutic ingredient in food. —*M. E. J. R.*

(4011) GANGES, VALLEY. Along the sandy shores of the Ganges valley the ever-present plants are mostly English, as Dock, a Nas-

turtium, Ranunculus sceleratus, Fumitory, Juncus bufonius, Common Vervain, Gnaphalium luteo-album, and very frequently Veronica anagallis. On the alluvium grow the same, mixed with Tamarisk, Acacia Arabica, and a few other bushes.—*Hooker, Him. Jour. Vol.* 1. *p.* 80.

(4012) GANJAH.

Kanub, ARAB.	Gindshee, JAV.
Ganja, BENG.	Gingi-lacki-lacki, MAL.
Mafuen, Chutsao, CHIN.	Ganjica, Bijeeah, SANS.
Ganja, DUK.	Ganjahchettoo, TEL.
Sjarank, EGYPT.	Ganja, TAM.
Ganza, GUZ. HIND.	See CANNABIS. HEMP:

The dried hemp plant which has flowered, and from which the resin (*see* churrus), has not been removed, is called *Ganjah.* The bundles of Ganjah are about two feet long, and three inches in diameter. The colour is dusky green, the odour agreeably aromatic, the whole plant resinous, and adhesive to the touch. Ganjah is used chiefly for smoking. The narcotic effects of the hemp plant are popularly known in the North of Africa, South America, Turkey, Egypt, Asia Minor, India, and the adjacent territories of the Malayas, Burmese, and Siamese. In all these countries, hemp and its products, are used in various forms, by the dissipated and depraved, as the ready agent of a pleasing intoxication.—*Faulkner.* The leaves or young leaf buds of the hemp-plants, are smoked by itself, or rubbed between the hands and added to tobacco, to increase its intoxicating powers.

(4013) GAO-LOCHAN, Gall stones, extracted from the gall bladders of dead cows: much used in medicine: also in charms; and in painting.—*Gen. Med. Top. p.* 136.

(4014) GARCINIA, a genus of Plants belonging to the natural order *Guttiferæ*, named in honour of Dr. Garcin, who travelled in the East Indies. It formerly consisted of few species, but no less than 21 are enumerated by Dr. Wallich, 10 of which he considers new. These are distributed over the islands of the Indian Archipelago, in the southern parts of China, in the Indian and Malayan peninsulas, in Assam and Silhet, with one species (G. Cowa) extending as far north as Monghir on the Ganges. They are all trees of considerable size, with opposite coriaceous shining oval leaves; numerous flowers, which are monœcious or dicœcious; in the male, stamens numerous, inserted on a large fleshy 4-lobed receptacle, anthers bursting longitudinally; in the female, stamens numerous but imperfect, ovary 4-10-celled, ovules solitary. The fruit fleshy and juicy, crowned with the peltate stigma, is edible in many of the species.—*Eng. Cyc.* Garcinia gambogia *G. Cowa, G. lanceæfolia, G. Kydia, G. pedunculata,* and *G. paniculata,* all yield a kind of edible fruit, but of these the last is most like the Mangosteen. From incisions made in the branches a yellow juice exudes, and soon concretes, having a close resemblance to, and in fact forming an inferior kind of gamboge; whence it has been inferred that the commercial gamboge is yielded by the species. Later investigations have proved the incorrectness of the opinion, and the true gamboge-tree of Ceylon has been determined to belong to a new genus named *Hebradendron. G. Zeylona, G. cornea,* and *G. pictoria* (the last also supposed to be a species of *Hebradendron*), all yield an inferior kind of gamboge.—*Eng. Cyc.* Dr. Wight gives Garcinia Cambogia, 960-1; conicarpa, 121; cornea, 105; cowa, 104; elliptica ? 12; Kydia, 113, 960-1; Kydiana, 113, 960-1; lanceæfolia, 103; Merguiensis, 116; paniculata, 112 papilla, 960-1; pedunculata, 114-115; pictoria, 102; Roxburghii, 104, 960-1.

(4015) GARCINIA, a timber tree, of this genus, the largest that Mr. Mason has seen of the genus garcinia, is in frequent demand for house posts in Tavoy.—*Mason.*

(4016) GARCINIA CAMBOGIA, Willd.

Koorka poolie, TAM. and MAL.	Velaitie umlie, DUK.
Wontay, CAN.	Woda Chintakaia, TEL.
	Racta Shrava, SANS.

Garcinia Cambogia has elliptic leaves tapering to both ends, terminal solitary flowers, yellowish corollas, an 8-lobed stigma, the berry 8-furrowed. It is a native of Malabar and other parts of the East Indies. It is a tall tree with a trunk as thick as two men can compass, with spreading opposite branches. The leaves are 5 inches long and half that in breadth. The fruit is about 2 inches in diameter, drooping on peduncles, 1 inch in length; the rind is thin, smooth, and yellowish, the pulp is yellow, succulent, sweet, and eatable. It is very common about Siam and Cambodia, where incisions are made in the bark, and a quantity of gum-resin, called Gamboge, flows out, and is exported to foreign countries. It is called by the natives of Travancore Gharka Pulli, and is therefore inferred to be the *Curca Pulli* of old writers. In Ceylon the fruit is called Goraka, and much used by the natives in their curries; when ripe it is said to form a fine fruit as large as the Mangosteen. Mrs. Colonel Walker, in her letters to Dr. Graham, describes the outer husk of the fruit as being prepared by the natives by taking out the pulp and seeds, bruising and then heaping it up until the whole is soft. It is then smoked and kept within the influence of smoke, being much used as a favourite ingredient in their curries and also for preserving, along with salt, a small kind of fish, which thus cured will keep for six or seven months. The name *Cambogia* is derived from the province Camboja, or Cambodge, whence it comes.—*Eng. Cyc.* This species of garcinia is known in Tenasserim as the yellow varnish tree, and has often been mistaken for the tree which produces gamboge. It is very abundant through-

out the Provinces, and the gum resin which it yields when dissolved in spirits of turpentine, affords a beautiful permanent yellow varnish for metallic surfaces.—*Mason.* Its pleasant tasted though acid fruit, is about the size of a small orange and is used by the inhabitants of Malayalum and Ceylon, for the same purposes that Tamarinds are on the Coromandel coast.—*Ainslie, page* 226.

(4017) GARCINIA CORNEA, has oblong elliptic leaves, solitary and umbellate flowers, lateral, terminal, and drooping; the stigma entire; the berry the size of a plumb. It is a native of the East Indies in the high remote mountains of Amboyna. The trunk of this tree is very lofty, but not very thick, it is covered with a black bark. The branches extend wide, and divide into many short branches, which have a pair of leaves at each joint, these are large, from 11 to 15 inches long and 4 inches broad, but on old trees shorter, smooth, firm, and shining. The flower rises between the upper leaves, drooping, having the form of a small rose, of a yellow colour. The fruit is crowned by the entire stigma, which appears like a wart. It is of a dusky-brown or smoky colour on the outside, and within it has a mucous pulp, in which lie a few seeds in the shape of a half-moon. It has a resinous smell when fresh. The wood is heavy, and very hard like horn; it is used for the handles of tools, and the young ones building, the old ones being too hard to work.—*Eng. Cyc.* Of this species there were two trees in Col. Kyd's garden, Calcutta, said to have come from Malacca, and to exudea yellow juice.—*O'Shaughnessy, pages* 235, 236.

(4018) GARCINIA COWA.

Toun-tha-tai, BURM. | Cowa, HIND.

Scarce, but found widely dispersed in the Pegue Forests,—yellow-wood, fit for fancy work.—*McClelland.* This tree is common near water in Kotah and Mewar and attains a very large size: yields a gum resin like gamboge; which however is not collected.—*Gen. Med. Top. page* 199.

(4019) GARCINIA ELLIPTICA. Dr. Griffiths collected specimens of *Garcinia elliptica* with his own hand in the province of Mergui; and yet remained ignorant that the tree produced gamboge, which cannot be distinguished from the best gamboge of commerce.—*Mason.*

(4020) GARCINIA ? GLUTINIFERA.

Panichekai marum, TAM.—*Ainslie.*

This is one of the very few trees admitted into his list that Dr. Wight has not myself seen and verified, and was introduced in the hope that some resident on the Malabar Coast, would favour him with specimens to determine its name and botanical relations.—*Wight.*

(4021) GARCINIA MANGOSTANA, Var.

Soolum poolie, TAM. | Mangosteen, MAL.

Soolum poollie is the Malayalum name of a variety of the Mangosteen; it is however, a very inferior fruit to that of the Eastern islands.—*Ainslie, page* 232. *G. Mangostana* is the most remarkable species, being the far-famed Mangosteen (Mangees, Marsden) of the Malays, reckoned one of the most delicious of all fruits, and not alone of the countries where it is indigenous, but, as Marsden says, "is the pride of the Malay Islands, and perhaps the most delicate fruit in the world." It is a native of the Malayan Peninsula and of the islands to the eastward of the Bay of Bengal, forming trees of considerable size, with a straight trunk and numerous spreading opposite branches forming an elegant conical head. The tree is considered one of the most ornamental in Batavia for gardens, also as affording an agreeable shade. Bontius compares their appearance to that of citron-trees. It is in flower and fruit a great part of the year, according to Roxburgh, but Marsden says "the returns of its seasons are very irregular." So wedded is it to its indigenous soil and climate, that the innumerable attempts made to cultivate it elsewhere have uniformly failed. Dr. Roxburgh says, "For these 35 years past I have laboured in vain to make it grow and be fruitful on the continent of India. The plant has uniformly become sickly when removed to the north or west of the Bay of Bengal, and rarely rises beyond the height of two or three feet before it perishes." The male and female flowers are sometimes on the same, but usually on separate trees. The germ is superior, rounded from 6- to 8-celled, with one ovule in each, attached to the middle of the axis. The ripe berry is spherical, of the size of a pretty large apple, having the surface even, and crowned with the permanent peltate 6- to 8-lobed stigma. The rind is thick, firm, though somewhat spongy, of a dull-crimson colour, sometimes compared to that of the pomegranate. Seeds as far as 8 in number inclosed in a very abundant soft fleshy envelope which is delicately white, forming the edible part of the fruit, described as delicious to the taste and as dissolving away in the mouth. It is also extremely innocent in its nature, as almost any quantity of it may be eaten without detriment, and persons sick of almost any disease are allowed to partake freely of it without inconvenience. The fruit before ripening is slightly acid. The rind is powerfully astringent, and its decoction is employed in dysentery and as a gargle in aphthæ of the mouth. The bark of the trunk and branches is also considered astringent, and said to be employed by the Chinese in dyeing.—*Eng. Cyc.* The Mangosteen has been introduced from Singapore into Bombay, but the fruit has never been brought to any perfection: probably if grafted

on the Brindoa, which is common in the Concan, (and several trees are found in Bombay,) it might be much improved. Dr. Riddell was informed by a friend, that the Mangosteen ripens (and is equal to the Penang fruit) in the Company's spice gardens on the hills near Courtallum.—*Riddell.* From the rind of the fruit Dr. O'Shaughnessy obtained small quantities of fine gamboge.—*O'Shaughnessy, p.* 235.

(4022) GARCINIA PEDUNCULATA (Tikul or Tikoor of Rungpore) is a tree 60 feet high; trees when 7 years old, 20 feet high, 25 inches in circumference. Flowers from January to March. Fruit ripens in hot season.—*O'Shaughnessy, page* 235.

(4023) GARCINIA PICTORIA. A native of the highest parts of Wynaad. Where the soil is a stiff whitish clay, where there is constant moisture from fogs or rain, the tree is tall, attaining the height of sixty feet. Samples of gamboge the produce of this tree have been found superior, while recent, to every other kind, but not so permanent in its effect as that from Siam.—*Rohde, M.S.S.* This gamboge tree, *Garcinia pictoria*, grows, Dr. Wight says, "on the highest parts of Wynaad," but the same tree grows at the foot of the hills in Tavoy, which border on tide waters.—*Mason.*

(4024) GARCINIA PURPUREA. WILD MANGOSTEEN. Nat. Kokum-Brindao.—A very elegant tree, of a conical form, branches drooping, leaves dark green; fruit round and smooth, size of a crab apple, when ripe of a purple colour throughout the inside; and of an agreeable flavour, it is much used at Goa for jellies and syrup, the tree grows to the height of thirty feet and is found in the Concan, and along the Malabar Coast. *Cocum oil*, or butter, is obtained from the seeds of the *Garcinia purpurea* and is used in various parts of India to adulterate ghee or butter. It is said to be exported to England for the purpose of mixing with bears' grease in the manufacture of pomatum. It is a white, or pale greenish yellow, solid oil, brittle, or rather friable, having a faint but not unpleasant smell, melting at about 95 degrees, and when cooled after fusion remaining liquid to 75 degrees.—*Simmonds.*

(4025) GARDENIA (named after Dr. Alexander Garden of Charlestown, South Carolina, a correspondent of Linnæus), a genus of Plants belonging to the natural order *Cinchonaceæ*. It has the calyx usually ribbed, with a tubular truncate limb divided into several lobes or teeth; the corolla funnel-shaped, or approaching salver-shaped, with a tube much larger than the calyx, and a contorted spreading 5-9-parted limb; the anthers 5-9, linear, sessile in the throat; the stigma clavate, bifid, or 2-toothed, with thick erect lobes; the dissepiments of the ovary 2-5, incompletely dividing it into cells; the berry fleshy, crowned with the calyx, with a papery or bony lining, incompletely 2-5-celled; the seeds immersed in fleshy parietal placentæ. The species are armed or unarmed trees or shrubs, with axillary or terminal, usually solitary, white and fragrant flowers.—*Eng. Cyc.* One of the species of Gardenia, is known as Cape Jasmine,—flowers highly scented, readily grown by cuttings, they thrive in any garden soil and only require a moderate share of water to flower abundantly, their colours are pink, white, and pale yellow, most of which are natives of India.—*Riddell.* Dr. Wight gives Gardenia arborea, 576; campanulata, 578; dumetorum, 580; enneandra, 574; gummifera, 576; Gardenia latifolia, 574, 759; longispina, 582; lucida, 575; montana, 577; turgida, 579; uliginosa, 397.

(4026) GARDENIA ARBOREA, is an unarmed tree with ovate-oblong leaves, terminal, almost sessile flowers, usually arranged in threes; the coralla with a filiform tube and a 5-parted limb; the berry drupaceous, smooth, containing a 4-5-valved shell. It is a native of the East Indies. The fruit is eaten by the natives of India. It is one of the most beautiful species of the genus, and deserves a place in every collection. There are about 50 species of *Gardenia*, which all bear elegant sweet-scented flowers. They thrive best in a mixture of loam, peat, and sand. Under the name of Cape Jasmines, double-flowered varieties of *G. florida* and *G. radicans* are extensively cultivated. Their flowers are very fragrant, and the best way of getting them to bloom freely is to set them in a close frame with a gentle bottom heat in the spring. In the winter they may be placed in the greenhouse. They may be increased by cuttings. (Lindley, *Flora Medica*; Don, *Dichlamydeous Plants.*)—*Eng. Cyc.*

(4027) GARDENIA CAMPANULATA, is a shrubby plant with short branches, spiny at the apex, the spines solitary; the leaves lanceolate, smooth, acuminated at both ends; the flowers on short pedicles in terminal and lateral fascicles; the limb of the calyx campanulate, with a short acutely 5-toothed border; the corolla sub-campanulate, 5-lobed; the berry, roundish, ovate. This plant is a shrub 5 to 10 feet in height, and is a native of the East Indies, in the forests of Chittagong. The berry is about the size of a golden pippin apple, and is employed by the natives of India as a cathartic and anthelmintic.—*Eng. Cyc.*

(4028) GARDENIA CORONARIA. This is an indigenous tree in Tenasserim which produces a profusion of flowers that are white in the morning, when they first open out, but which, on exposure to the sun, become quite yellow.—*Mason.*

(4029) GARDENIA DUMETORUM. RETZE. Emetic Nut.

Markarung kai, TAM.	Jonzulkie, PERS.
Mynphul, HIND.	Manga kaia, TEL.
Jowzal Kowsul, ARAB.	Madana, SANS.

This tree produces a nut about the size of a small nutmeg, containing numerous, sweetish tasted, strong smelling seeds. The Vyteans consider it as amongst their best emetics, and prescribe it, for that purpose (pounded seeds and all) to the quantity of a pagoda weight. An infusion of the bark of the root is given in Bowel complaints —*Ains. Mat. Med. page* 88. These nuts are officinal at Lahore, and in the neighbouring mountains where they grow.—*Honigberger, page* 279.

(4030) GARDENIA FLORIDA: CAPE JASMINE.

Gool Chand. HIND. Gundhuraj,

Both double and single varieties are commonly cultivated in gardens at Ajmeer; the foliage is beautiful and the pure white double blossom are elegant and fragrant.—*Genl. Med. Top. p.* 185. Most Tenasserim gardens, as well as many European, and American, are graced with this tasteful shrub. Its pure snowy blossoms, strongly fragrant, Loudon says, smell "like the narcissus;" and they contrast delightfully with the thick deep green foliage in which they are set. —*Mason.*

(4031) GARDENIA FORTUNIANA, is a most fragrant Chinese plant and now common in English gardens, to which it was introduced by the Horticultural Society in 1845.—*Fortune's Tea Districts, p.* 17.

(4032) GARDENIA GUMMIFERA. Gummy Gardenia, grows wild on the Hills in the Kotah jungles, the leaves and unopened blossoms being shrouded at the point in pure fragrant gum resin, said to be one of the sources of the Dikamully resin.—*Genl. Med. Top. p.* 185.

(4033) GARDENIA LATIFOLIA. BROAD-LEAVED GARDENIA. Papura, HIND.

Grows wild in the moist Kotah jungles and is also cultivated in gardens.—*Genl. Med. Top. p.* 185.

(4034) GARDENIA LUCIDA. Furnishes the Cumbee resin.

(4035) GARDENIA RADICANS, CAPE JASMINE. This favourite shrub is well worth all the care it requires, does little good in pots, and should be planted in a well manured flower bed or border which has been drained with sand, they require a soil more approaching to sand than clay and plenty of water; propagated by cuttings in boxes or seed pots during the rains. It is a native of China.—*Riddell.*

(4036) GARDENIA TURGIDA.

Nunjoonda marum, TAM.

Dr. Wight only knows this from small specimens, and is unable to say whether it is a tree or shrub, but believes the former; the wood which is hard and close grained, is useful in cases where small timber will serve.—*Wight.*

(4037) GARI-GOND. A light substance like the decayed cotyledons of a seed, or decayed, soft grains of the pith of wood, very bitter to the taste. The native druggists of India call it a foreign white gum: it is a purge, and given when vision is much obstructed from any cause: one massee with other ingredients is a dose.—*Gen. Med. Top. p.* 136.

(4038) GARLIC, ALLIUM SATIVUM, *Linn.* Bulbus, or Bulb, of the Common Garlic.

Soom, ARAB.	Bawung, JAV.
Kesun, BALI.	Allium, LAT.
Loshun, BENG.	Bavung-pootie, MAL.
Belluly, CAN.	Seer, PERS.
Soodooloonoo, CYNG.	Lasuna, SANS.
Lasun, DUK.	Ajo sativo, SP.
Ail. FR.	Vulla Poondoo, TAM.
Knoblauch, GER.	Velligudda, TEL.
Lussun, GUZ. HIND.	

A perennial plant cultivated for its roots, which consist of pungent acrimonious bulbs, and have a strong offensive smell and flavour. They are employed as a condiment, and as an ingredient in curries, pickles, chutneys, &c.; they are also used in medicine.—*Faulkner.* Garlic is the σκορδον of the Greeks, *Som* of the Arabs, and *Shumim* of Numbers, xi. 12. It has been used as an article of diet and likewise in medicine from very early times. Bulbs clustered, several enveloped in the same silvery skin. Stem about 2 feet high, leafy below the middle. Leaves glaucous, distichous, channelled above, obscurely keeled, acute. Spathe single, calyptiform, horned. Umbels bulbiferous. Flowers, if any, pink, red, or whitish, rather larger than the stamens. (*Lind.*) —Cultivated from early times in the East, and now in all gardens. Its native country unknown. —St. and Ch. 111.—*Royle.* The Garlic, Onion, and Leek are so well known as condiments, that it is unnecessary to dwell long on their properties, which indeed are so similar that it does not seem necessary that more than one of them should be retained in the Pharmacopœias. The Leek has been considered Diuretic and Expectorant: as an article of diet, it is rather indigestible, and apt to cause flatulence. The Onion is possessed of similar properties, but is somewhat more powerful, though less so than the Garlic. In its roasted or boiled state it is occasionally applied as a poultice to suppurating tumours or to sluggish ulcers. The Garlic, when applied externally, will act as a rubefacient; taken internally, it acts as a stimulant, and being absorbed, as an expectorant and diuretic, producing at the same time a disagreeable odour in the breath. It is sometimes employed as an anthelmintic in ascarides.—*Royle.* Garlic is common all over India, and may be grown from the seed or bulbs—the latter method

being most in practice. One of the bulbs is broken and the cloves taken out and planted in beds about four inches apart: no particular care is required, save watering and keeping clear of weeds. When the leaves dry and wither, then take up the roots and preserve in a safe place. —*Riddell.*

(4039) GARLIC OIL—ALLIUM SATIVUM.

Vellay poondoo, TAM. | Lussan-ka-teil, HIND.

A stimulating oil obtained from garlic bulbs by expression. It is prescribed internally by native practitioners to prevent the recurrence of intermittent fevers, and externally in paralytic and rheumatic affections.—*Faulkner, M. E. of* 1855.

(4040) GARNET.

Grenat, FR. | Granati, LAT.
Granaten, Granat-stein, GER. | Granatnoi-kamen, RUS.
Granate, IT. | Granadas, SP.

Garnet, a well-known precious stone, of which there are many varieties. Some of them are probably distinct species; but agreeing in form, and some other properties, they are classed together. This mineral occurs crystallised, massive, and granular. Garnet occurs abundantly in mica-slate, hornblende slate, and gneiss, and less frequently in granite and granular limestone. It is found sometimes in serpentine and lava. The best precious Garnets are from Ceylon and Greenland. *Grossularite* occurs in the Wilin River, Siberia, and at Tellemarken in Norway; green Garnets are found at Swartzenburg Saxony; *Melanite* in the Vesuvian Lavas; *Ouvarovite* at Bissersk in Russia; *Topazolite* at Mussa, Piedmont; *Aplome* in Siberia on the Lena, and at Swartzenburg. Garnets also occur in several parts of the United States. The Garnet is the Carbunculus of the Romans. The Alabandic Carbuncles of Pliny were so-called because they were cut and polished at Alabanda. Hence the name *Almandine.* The clear deep red garnets make a rich gem, and are much used for ornament. Those obtained from Pegu are most valued. They are cut quite thin on account of their deep colour. Cinnamon-stone is also used for the same purposes. Garnet when powdered is used for the same purposes as emery.—*Eng. Cyc.* Precious garnets, or almandins, in the form of pebbles, are often seen for sale among the Burmese; but it is not certain that any are found in the Tenasserim Provinces. Mineralogists say, the most beautiful come from Sirian the capital of Pegu. It is the carbuncle of the ancients. "In a creek on the Siamese side" of the Tenasserim valley, Dr. Helfer says "rubies are found. They are however of a very inferior description"—probably garnets. The common garnet is occasionally seen in the sands of the rivers, but it is not abundant.—*Mason.* At the Madras Exhibition of 1857, Garnets, Carbuncles and Ruby Garnets of very good quality, were exhibited from Nellore, Masulipatam and Bazewarah; but they are not nearly so large, as the Garnets from Mysore and Cuddoor shown at the Exhibition of 1855. The red variety of this gem is very generally diffused over India. Its geognostic position, is the hypogene or metamorphic schists, more particularly near their line of junction with plutonic rocks, or trap dykes; for instance, in the crystalline and metalliferous areas of Salem and Nellore, whence the finest crystals are procured, and sold by the Native merchants at an insignificant price. Colophonite is not uncommon in these tracts, as also in Mysore, the Neilgherries, the Carnatic, and other provinces of Southern India. It usually occurs in the granite, associated with the hypogene schists. That beautiful variety of dodecahedral garnet, called cinnamon-stone or essonite, has been discovered in the Neilgheries in the hypogene hornblende rock, near the Seven Cairns Hill, by Dr. Benza, where their number is such, he informs us, that entire portions of the rock are formed almost exclusively of them. The essonite and hornblende are in large separate crystals, imbedded in a paste of compact felspar and hornblende; the former is very liable to disintegrate, leaving, in falling out, small cavities in the rock. *Green garnet* is of rare occurrence: the only locality where Newbold discovered this gem was in the Salem district at Sankerydroog, lat. 11° 29' N., long 77° 58' E., associated with other green crystals in quartz veins, penetrating hornblende schist. The latter is associated with gneiss, garnet rock actinolitic schist, and altered limestone, thrown into disorder by the intrusion of a porphyritic granite. The green garnet is not found in considerable quantities. A mine of precious garnet occurs at Gharilpit, about eight miles south of Palunshah, in the Hyderabad country, in the detritus of a granitic rock, penetrated by trap dykes, and composed of mica, garnets, kyanite, quartz, and felspar. Dr. Voysey, who gives a description of this mine *July* 18, states that the precious garnets are found at the depth of eight or ten feet in the alluvium at the foot of the rock. The surface of the rock and soil were strewed with garnets in great profusion, but these were generally of a very coarse kind. The garnets when collected are gently pounded, and the bad ones broken: those which survive the blows are reckoned of good quality. In a river near the Munzerabad ghat in Mysore, the natives search for garnets, which are sold at one rupee each. They occur there as deposits from a hill of Mica schist which occurs higher up the river, which Captain R. Robert of the Engineers followed up, at the author's request.—*Madras Museum.* The garnet is classed amongst gems, but only one variety is of value, and inferior kinds are so plentiful, that, in some parts of Germany, they are even employed as a flux in smelting iron. In Southern India they

are almost universally employed by the cutler, the stone-mason, and others, as a substitute for emery, under which name the coarser garnets are sold in the bazaars. Unlike corundum, however, the hardness of which is only inferior to the diamond, and ranks ninth in the scale of hardness, the garnet is only 6·5 to 7·5 in degree. Garnets are of various colors, a circumstance due to the varying proportions and combinations of the three or four silicates of alumina, lime, iron and magnesia, of which they are composed. The precious garnets are of a clear, deep red, and on account of their depth of color are cut by the jeweller quite thin. It is this thin stone which is now termed the carbuncle and it is supposed to be identical with the hyacinth or essonite or hessonite. The varieties of garnet are:—1. Almandine or noble garnet. 2. Grossular garnet. 3. Cinnamon stone, hessonite or kaneel stone; romanzonite; hyacinth. 4. Common lime garnet. 5. Magnesia garnet. 6. Iron garnets. 7. Common iron garnet; rothoffite; alloclorite. 8. Melanite; pyreneite. 9. Colophonite. 10. Uwarorite. 11. Pyrope, almandine, hexahedral garnet. 12. Helvine or tetrahedral garnet. 13. Idocrase or pyramidal garnet. Dr. Voysey states (Asiatic Journal of Bengal, volume 11, para 404) that the precious garnets of Gharliput are found in the alluvium at the foot of the rock, at the depth of eight or ten feet, and that the garnets when collected are gently pounded and the bad ones broken, those which survive the blows being reckoned of good quality; garnets of a very coarse kind were strewed in great profusion over the surface of the rock and soil.—*Madras Museum Report.*

(4041) GARO. Ta-yau, BURM.

A tree that grows in the Moluccas, called *garo*, Linnæus has described as *Excœcaria agallocha*, which the Burmese call *ta-yan*. It is abundant near the sea, the juice is said to produce the most intense pain, and often blindness, if it enters the eye. From its power to produce blindness the Karens call it the "blind tree; and the natives are all of them so much afraid of it, that Mr. Mason has sometimes found it difficult to induce his boatmen to pull up beneath its shade. —*Mason.*

(4042) GARUGA PINNATA. *Terebinthaceæ*, Icon. 1594.

Curry vaimboo marum, TAM. | Kooruk, HIND.

A tree, leaves pinnate, deciduous; flowers of a yellowish white, in panicles covered with a mealy kind of white substance; fruit size of a small plum, used for pickling.—*Riddell.* It is a considerable sized tree with a round umbrageous head. Dr. Wight was not yet acquainted with the wood.—*Wight.*

(4043) GASTEROPODA, the third class of Mollusks, according to the system of Cuvier, who remarks that it is very numerous, and that an idea may be formed of it from the slugs and shell-snails.—*Eng. Cyc. Vol.* II. *page* 924.

(4044) GASTRODIA. The bulb of *Gastrodia sesamoides* (R. Brown), a curious herbaceous species of orchis, native of New Holland, is edible, and preferred by the aborigines to potatoes and other tuberous roots. Some of Mr. Simmond's accredited informants believe it might be turned to profitable account, but being a parasitic plant, it could scarcely be systematically cultivated. It flourishes in its wild state on loamy soil in low or sloping grounds. The first indication of its vegetation in the spring, is the appearance of a whitish bulb above the sward, of an hemispherical shape, and about the size of a small egg. The dusky white covering resembles a fine white net, and within it is a pellucid gelatinous substance. Again within this is a firm kernel, about as large as a Spanish nut, and from this a fine fibrous root descends into the soil. It is known in Van Diemen's Land, and other parts of Australia, by the common name of native bread. Captain Hunter, in his Journal of the Transactions at Port Jackson on the first settlement of the Convict Colony, speaks of finding large quantities of "wild yams," on which the natives fed, but the roots were not bigger than a walnut; therefore it was probably this plant.—*Simmonds.*

(4045) GAVIALIS. The Gavial. Jaws very long, subcylindrical, slender, rather dilated and convex at the end. Teeth, canines two, quite anterior, small; lower canines shutting into a notch in the edge of the upper jaw. Feet fringed; toes webbed to the tip. The cervical plates united to and forming a disc with the dorsal ones. Males with a large swelling in front of the nostrils. Native of Asia.—*Eng. Cyc. p.* 198.

(4046) GAVIALIS GANGETICUS, the Narrow-Beaked Corcodile of the Ganges, Edw., 'Phil. Trans.' Natural. Syst. Amph.; *Gavialis Gangeticus*, Gray, 'Synops Rept.;' the Gavial of the Ganges, Griff., 'Anim. Kingd.' The Gavial of the Ganges is supposed to be the largest of the living Saurians. The measurement of the largest mentioned by Messrs. Duméril and Bibron is given at 5 metres, 40 centimetres (17 feet 8 inches).—*Engl. Cyc. page* 205.

(4047) GEBANG PALM. The *Corypha gebanga*, Blume, is a useful tree, in Java, thousands of boys and girls are employed in fabricating its leaves into baskets and bags: thatch, and broad brimmed hats are made of them; fishing nets and hats are woven from their fibre and ropes manufactured from their stalks.—*Seeman.*

(4048) GECARCINUS (Leach), the name of a genus of Brachyurous Decapod *Crustacea*, known familiarly to the English as Land-Crabs, and to the French by the appellations of Tourlouroux, Crabes Peints or Crabes Violets, some of these terms being applicable not only to different

species, but to the same species at different ages, so that those various names cannot be depended upon as specific designations. The Land-Crabs, or Gecarcinians, inhabit the warm countries of the New and Old World, and Australasia; but as far as observation has hitherto gone, America and its islands seem to be the places where the form is most highly and most numerously developed. Thus much of the habits of the Land-Crabs of the New World. The late Bishop Heber, in his 'Narrative' gives an account of some Land-Crabs in India, living at a great distance from the sea, and obstructed by great obstacles in their passage to it. "The plain of Poonah," writes the bishop, "is very bare of trees, and though there are some gardens immediately around the city, yet as both these and the city itself lie in a small hollow on the banks of the river Moola, they are not sufficiently conspicuous to interrupt the general character of nakedness in the picture, any more than the few young trees and ornamented shrubs with which the bungalows of the cantonment are intermingled. The principal and most pleasing feature is a small insulated hill immediately over the town, with a temple of the goddess Parvati on its summit, and a large tank (which, when I saw it, was nearly dry) at its base. All the grass-land round this tank, and generally through the Deckan, swarms with a small land-crab, which burrows in the ground, and runs with considerable swiftness, even when encumbered with a bundle of food almost as big as itself. This food is grass, or the green stalks of rice, and it is amusing to see them sitting as it were upright, to cut their hay with their sharp pincers, then waddling off with the sheaf to their holes as quickly as their sidelong pace will carry them." Upon this passage Mr. Broderip observes, that when we call to mind the position of Poonah, and read of the neighbouring river and tank, we may feel inclined to ask whether the river or the tank might not be the scene of ovipositing; and, he adds, that it is not improbable that there may be a race of land-crabs appropriated to continental or even insular situations out of reach of the ocean, and that fresh water may be as necessary to their reproduction as sea-water is to the land-crabs of the West Indies. Such a supposition, he thinks, is in unison with the bountiful provisions of nature for the general diffusion of animal life. ('Zool. Journal,' vol. iv.—*Eng. Cyc.*

(4049) GECARCINUS CARNIFEX. This, according to M. Milne-Edwards, is the *Cancer Carnifex* of Herbst; *Ocypode cordata*, *Gecarcinus Carnifex*, and *Cardisoma Carnifex* of Latreille! and he cites also *Gecarcinus hirtipes* of Larmarck, as a synonym, but with a query.—Carapace very much elevated, and its surface very much curved from before backwards, but nearly horizontal transversely: its lateral edges marked by a projecting and elevated line. A small tooth behind the external orbitary angle. Four rows of spines upon the torsi; the lower not numerous. Pincers large on one side. Manus very large. Fingers touching nearly throughout their length. Length, 2 inches (French). (Milne-Edwards). It is found in the neighbourhood of Pondicherry. *Cancer Hydromus* of Herbst, in the opinion of M. Milne-Edwards, is evidently a species approximating closely to the preceding, if indeed it can be distinguished from it.—*Eng. Cyc.*

(4050) GECKOTIDÆ, a natural family of Saurian Reptiles, belonging to Gray's sub-order *Pachyglossa*, and the *Nyctisaura*. The following is a list of the species of Asiatic *Geckotidæ*, with the Localities they inhabit.

Ædura marmorata, the Marbled Ædura. North Australia.
Æ. rhombifer, the Lozenge-Spotted Ædura. West Australia.
Diplodactylus vittatus, the Yellow-Crowned Diplodactyle. Australia.
D. ornatus, the Beautiful Diplodactyle.
D. ocellatus, the Eyed Diplodactyle. West Australia.
D. marmoratus, the Marbled Diplodactyle. Australia.
D. bilineatus, the Two Lined Diplodactyle.
D. lineatus, the Lined Diplodactyle. Cape of Good Hope.
D. Gerhopygus, the Naked Diplodactyle.
Phyllodactylus pulcher, the Phyllodactyle.
P. tuberculatus, the Large-Tubercled Phyllodactyle.
Ptyodactylus Gecko, the Fan-Foot. Egypt.
Uroplates fimbriatus, the Famocantrata. Madagascar.
U. lineatus, the Sharp-Tailed Famocantrata.
Caudiverbera Peruviana, the Caudiverbera. Peru.
Hemidactylus trihedrus, the Triangular-Tubercled Hemidactyle.
H. maculatus, the Spotted Hemidactyle.
H. Brookii, Brooke's Hemidactyle.
H. depressus, the Groove-Tailed Hemidactyle.
H. verruculatus, the Warty Hemidactyle. Shores of the Mediterranean; Egypt.
H. fasciatus, the Banded Hemidactyle.
H. Mabouia, the Brazilian Hemidactyle. Brazil.
H. mercatorius, the Wandering Hemidactyle.
H. frenatus, the Streaked Hemidactyle. Ceylon.
H. Leschenaultii, Leschenault's Hemidactyle. Ceylon.
H. vittatus, the Streaked Cheeked Hemidactyle. Borneo.
H. Bellii, Bell's Hemidactyle.
D. Garnotii, Garnot's Doryure. South Sea Islands.
Platyurus Schneiderianus, the Platyure. Java.
Leiocerus ornatus, the Banded Leiurus. West Africa.
Crossurus caudiverbera, the Crossurus.
Boltalia sublævis, the Boltalia. India.
Peripia Peronii, Peron's Peripa. Mauritius.
Peropus mutilatus, the Peropus. Manilla.
Pheconyx Seychellensis, the Seychelle Gecko. Islands of Seychelles.
Pentadactylus Duvaucelii, Duvaucel's Pendactyle. India: Calcutta.
P. Leachianus, Leach's Gecko.
Gecko verus, the Gecko. India.
G. Reevesii, Reeve's Gecko. China.
G. Chinensis, the Japan Gecko. China and Japan.
G. Monarchus, the Amboyna Gecko. Borneo.
G. Smithii, Dr. A. Smith's Gecko. Prince of Wales' Island.
G. bivittatus, the Double Streaked Gecko.
Amydosaurus lugubris, the Sombre Gecko.
Gehyra oceanica, the Oceanic Gehyra. Islands in the Pacific.

G. Australis, the Swan River Gehyra. Swan River.
Ptychozoon homalocephala, the Fringed Tree-Gecko. Java.
Tarentola Mauriana, the Tarentola. Egypt.
T. Ægyptiaca, the Egyptian Tarentola. Egypt.
T. Delalandii, Laland's Tarentola. Madeira; West Coast of Africa.
T. Bornecnsis, the Bornean Tarentola. Borneo.
Phelsuma Cepedianus, Lacepede's Phelsuma. Mauritius.
Pachydactylus ocellatus, the Eyed Gecko. Cape of Good Hope.
P, maculatus, the Spotted Pachydactyle. South Africa.
P. elegans. the Elegant Pachydactyle, South Africa.
Sphærodactylus sputator, the Banded Sphærodactyle. South America.
S. punctatissimus, the Lined Sphærodactyle. Martinique.
S. fantasticus, the Black-Headed Sphærodactyle. South America.
S. nigropunctatus, the Black-Dotted Sphærodactyle. South America.
S. Richardsonii, Richardson's Sphærodactyle. America.
Naultinus pacificus, the Pacific Naultinus. New Zealand.
N. elegans. the Kakariki. New Zealand.
N. Grayii, the Long-Toed Kakariki. New Zealand
Eublepharis Hardwickii, Hardwick's Eublepharis. Penang, Chittagong.
Goniodactylus Finorensis, Boie's Angular-Toed Lizard. India.
G. alboangularis, the White-Throated Angular-Toed Lizard. South America
G. ocellatus, the Eyed Angular-Toed Lizard. Tobago
Cyrtodactylus, marmoratus, the Marbled Cyrtodactyle. Java. Philippine Islands
C. pulchellus, the Beautiful Cyrtodactyle. Singapore.
Heteronota Kendallii, the Bornean Heteronote Borneo
Phyllurus platurus, White's Phyllure. Australia.
P. Miliusii the Thick-Tailed Phyllure.
P. inermis, the Spineless Phyllure. Australia.
Stenodactylus guttatus, Wilkinson's Stenodactyle. Egypt.

(4051) GELATINE is a substance the production of which is limited to the animal creation. When the skin and membranous tissues of animals are boiled in water, the liquor, on cooling, forms a jelly. The bones, tendons, and ligaments, under a higher temperature, also yield a jelly, similar in appearance and in properties to the former, but less agreeable to the taste. The ordinary sources of gelatine are clippings of hides, hoofs, horns, feet of calves, cows, sheep, pigs, and various membranes. These are carefully cleaned, then subjected to long boiling, and the liquor strained, skimmed, and allowed to gelatinize: the resulting jelly is stiff and tremulous, and is called *size*. Sometimes the sources from which size is obtained are not so pure as the above, the refuse from the skins of horses, cats, dogs, the cuttings from parchment, vellum, and white leather, and sometimes the membranous parts of fish, being admitted into its composition. Size has an intolerably putrid odour, but it may be purified by the careful application of sulphurous acid. This is sometimes done, the size dried in thin layers, and so used as a substitute for isinglass. Without purification, size is cut into slices, dried, and sold as *glue*. *Isinglass* is the purest form of commercial gelatine. The best is prepared from the air-bladders and sounds of three or four species of sturgeon, inhabiting the Black and Caspian Seas, and their tributary streams. These tissues are cleansed, dried, and scraped, forming *leaf isinglass*; or they are twisted into various forms, and called *long* and *short staple*; or folded into packages, called *book-isinglass*. The manufacture is chiefly carried on in Russia, whence commerce receives the best article. The account given by Martius of the preparation of Russian isinglass is as follows: The swimming bladders of the fish are first placed in hot water, carefully deprived of adhering blood, cut open longitudinally, and exposed to the air, with the inner delicate silvery membrane upwards. When dried, this fine membrane is removed by beating and rubbing, and the swimming bladder is then made into different forms An inferior variety, called *ribbon isinglass*, is received from America. Isinglass is cut by machinery into the delicate filaments in which we usually see it sold. It is a colourless, inodorous substance, perfectly soluble in hot water. It is largely consumed as an article of food. The purest and whitest isinglass is required for domestic use, entirely free from unpleasant odour, and dissolving readily and completely in water. It forms a very transparent jelly, and is indispensable in the preparation of blanc-mange, ices, creams, and other delicacies for dessert. Inferior isinglass answers the purpose of fining beer, &c. A solid gelatine in thin plates and strings, has lately been introduced to answer the purpose of isinglass. The best is transparent, and is brought from France; it is prepared from the gelatine of bones by digestion in dilute hydrochloric acid and long boiling in water. It is much cheaper than isinglass, but it is inferior in nutritive power and digestibility, properties which are diminished by long decoction. The same may be said of another substance called *patent opaque gelatine*, which is prepared from the cuttings of skins, and is therefore a kind of glue. Sources from which these substitutes are procured are not the most agreeable; nor is it likely that in the more delicate preparations of the table they will ever take the place of isinglass. Jellies were formerly supposed to be exceedingly nutritive, and especially suitable for invalids; at present medical testimony leads to the opinion that they are less so, and even less digestible than the flesh or muscular part of animals. Isinglass is made in India, and has long been exported thence to China. In most cases it has a very unpleasant fishy odour, which renders it totally unfit for domestic use. Cod sounds, in the dried state, are brought from Scotland, and used as a substitute for foreign isinglass. *Diamond cement*, or white fish-glue, is made of isinglass dissolved in dilute spirits of wine or common gin. The two are mixed in a bottle loosely corked, and gently simmered in a vessel containing boiling water; in about an hour the isinglass will be dissolved, and ready for use. When cold, it should be an

opaque, milk-white, hard jelly: it is remelted by immersion in warm water, but the cork should be at the same time loosened. After a time a little spirit should be added to replace that lost by evaporation. But the best *isinglass glue* is made by first soaking good isinglass in cold water; when swelled, it is to be put into the spirit, and the bottle containing it set in a pipkin of cold water, which may be brought to the boiling point, when the isinglass will melt into a uniform jelly, free from lumps or strings. The addition of a little essential oil diminishes its tendency to become mouldy. *Glue* is a highly useful and important substance, and its manufacture is carried on upon a large scale, as follows: the parings of hides and pelts from the tanners' and furriers' with the refuse materials already enumerated for gelatine, are the substances from which it is extracted in Britain. These are first placed in a lime-pit, and when sufficiently steeped, they are carried in baskets to a stream of water and rinsed, after which they are placed on hurdles to dry. Whatever lime remains adhering to them is converted into chalk by the action of the air; and though lime would be injurious to the after processes, yet the presence of a small portion of chalk is immaterial. The pieces having been thus cleansed, the next process is the extraction of the gelatine from them by boiling. For this purpose they are placed in a widemouthed bag or net, made of rope, and spread open within a large iron caldron. A light framing of iron within the caldron, prevents the bag from sticking to its sides. Water is then added, and gradually brought to the boiling point; as the animal substances sink, fresh quantities are added, the whole being occasionally stirred up and pressed down with poles. The state of the substances is tested by occasionally taking out a portion, and setting it aside to cool: if a clear mass of jelly be produced, the boiling has been sufficient. The mouth of the bag is then closed by means of cords, and the bag is slowly hoisted by machinery until it rests against, or partly coils round a beam immediately over the caldron, which helps to press out the liquid. In this state it is left to drain. Meanwhile the contents of the caldron, if not strong enough for glue, can be further evaporated by continuing to apply heat. The contents of the bag are boiled a second and a third time for making size; and when the solutions are too weak for either glue or size, they are economically used instead of water. The last remaining refuse is sold for manure. Thus, every portion of animal substance is turned to profitable use. The glue in the caldron, when thick enough, is drawn off into a vessel called a *settling-back*, and maintained at a temperature which will keep it liquid. This gives time for the deposition of solid impurities, and for further clarification by the addition of such fining substances as the manufacturer may prefer. The glue is then run off into wooden coolers about six feet long, one foot broad, and two feet deep. Here it becomes a firm jelly, which is cut out by a spade into square cakes, each cake being deposited in a sort of wooden box, open in several slits or divisions to the back. The glue is cut into slices by passing a brass wire, attached to a kind of bow, along the slits. These slices are placed upon nets, (the marks of which are seen on the dry glue,) and stretched in wooden frames, and are thus removed to the glue-maker's field, where they are placed in piles, with proper intervals for the admission of air, each pile being roofed in, as a protection from the weather. The glue is turned two or three times a day, and for this purpose the roof is lifted off the pile, and the uppermost frame placed on the ground. The cakes are turned one by one, and then the second frame is lifted off and placed on the first. The operation is thus repeated until a new pile is formed near the spot where the old one stood, when the roof is replaced. During the drying the glue is more likely to receive injury than at any other period. In very warm weather the cakes are liable to become so soft as to lose all shape and unite with the frames, or they may even melt entirely, and flow away. A thunder-storm sometimes prevents a whole field of glue from hardening; while a thick fog may make it all mouldy. A brisk drying wind may harden it so suddenly as to render it unsightly and unfit for the market. A hard frost, by freezing the water in the glue, may cause it to crack in all directions, rendering re-melting necessary. Thus the manufacture has many vicissitudes to suffer, and can only be profitably and conveniently carried on in temperate and equable weather. The drying, however, is not entirely finished in the open air. When the glue is about three-parts dry, it is removed into lofts, where, in the course of some weeks or months, the hardening is completed. But as the surfaces of the cakes become mouldy and soiled, it is at length necessary to scour them with a scrubbing-brush and hot water, and set them up to drain. They are then finally dried off in a stove-room at an elevated temperature, which, when they are once solid, only serves to harden and improve them. After stove-drying the glue is fit for the market, where it is judged of by its strong dark colour, and freedom from cloudy or black spots when held to the light. The better sorts of glue are transparent, especially the thin cakes of the *Salisbury glue*, which are of a clear amber colour. The best glue swells without melting when immersed in cold water, and renews its former size on drying. The method of softening it for use is to break it into small pieces, soak 24 hours in cold water, and then melt slowly over a fire with frequent stirring. When prepared in this way it cools down into a stiff jelly, which requires only a little warming to fit it for use.

Glue must not be used in a freezing temperature. A strong compound glue is made by infusing common glue in small pieces with isinglass in spirits of wine, just sufficient to cover the mixture. Heat is then cautiously applied, and when melted, powdered chalk is added, making the whole of an opaque white. A strong glue, which will resist water, is also obtained by adding half a pound of common isinglass to two quarts of skimmed milk, and evaporating the mixture to a proper consistence. If gelatine which has been swelled in cold water be immersed in linseed-oil and heated, it dissolves and forms a glue of remarkable tenacity, which, when once dry, perfectly resists damp. Ordinary glue may be thus dissolved, and a small quantity of red lead, in powder, added. It appears from the observations of M. Schattenman, a glue-maker, (Annales de Chimie, 1845,) that fresh glue dries much more readily than glue that has been once or twice melted; and that dry glue steeped in cold water absorbs different quantities of water according to the quality of the glue; and the proportion of water so absorbed may be used as a test of the quality of the glue. It appears that fresh glue contains water of composition, or water more intimately united with the glue than water mixed with it in the process of melting, which admits of being readily disengaged by evaporation. The combined water of dry glue disappears in the course of successive meltings and solidifications to which glue is subjected. Glue in thin plates is usually of better quality than thick ones, even when made with the same kind of gelatine, because the thin plates admit of a more complete drying than the thick. In applying M. Schattenmann's test, dry glue is immersed for 24 hours in water at the temperature of about 60° Fahr. A jelly will thus be formed, the qualities of which will fairly represent those of the glue. For example: the finest ordinary glue, or that made from white bones, absorbs 12 times its weight of water in 24 hours, so that a plate weighing 3 grammes produces 39 of fine elastic jelly. Glue from dark bones absorbs 9 times its weight of water, and produces not quite so fine a jelly. The ordinary glue of Alsace or of Germany, made from animal refuse, absorbs 5 times its weight of water, producing a soft brown jelly, without elasticity and consistence, and falling to pieces when handled. The common glue of Bologne absorbs $3\frac{1}{2}$ times its weight of water. Well dried glue is much less hygrometric than badly made glues, or those made of inferior materials. The latter are liable to putrefaction. The water of composition seems to be injurious to the strength of glue, which increases in proportion to its dryness. *Marine glue* has no gelatine in its composition. It will be noticed in its proper place. Glue or gelatine has lately been applied, with great success, to the formation of moulds for casting. The difficulties attending the use of sand, clay, plaster of Paris, wax, &c. in forming moulds for casting, are very great where the objects to be repeated are complicated in form. About the beginning of the present century the Germans introduced the use of glue for making moulds, which was not employed in this country until about the year 1826, when Mr. Douglas Fox used it to take casts from anatomical preparations, calcareous concretions, vegetable substances, &c.; and in order to give greater elasticity to the moulds so obtained, and to keep them in a fit state for use during a long period, he mixed treacle with the glue: this, however, was found to discolour the surface of all white bodies, and its application being limited by this objection, the plan was abandoned. About the year 1844 attention was again called to this subject by the production in France of a series of casts in imitation of ivory; and about 1846 the Society of Arts, London, offered a prize which was awarded to Mr. Franchi for his specimens of casting in plaster composition in imitation of ivory. At the time the award was made, the nature of the material used by him was not known; but it has since proved to be pure gelatine, and owing to the skilful use of his material some exquisite electrotype casts deposited in the Geological Museum were obtained from objects greatly under-cut. Mr. Franchi has since found that he can obtain from a gelatine mould a cast in gelatine in relief without losing any of the sharpness of the original. This has enabled him to apply objects modelled on flat surfaces to cylindrical bodies, thus saving the labour and expense of modelling. One great advantage of gelatine moulds is, that casts without seams can be taken from them.—*Tomlinson.* The preparation of gelatine in the form of glue, from skins, &c., is well known in India, and described in the Persian works on Materia Medica under the name of ghur-ree-al-jallood, sureshum jild, and suress.—*Royle.*

(4052) GELIDIUM CORNEUM, according to some narrators, enters into the formation of the swallows nests of the Japanese islands.

(4053) GELOXIUM BIFARIUM.

Ilsai-than-bayah, Burm.

Is found in the Rangoon district, it seldom exceeds three feet in girth, and is only fit for house posts. Wood, white colored, adapted to every purpose of house-building.—*McClelland.*

(4054) GEM SAND OF AVA. Gem sand from the neighbourhood of Ava is sometimes one of the Shan articles of merchandize. It consists of small fragments of nearly all the precious stones found in the country, but garnet, beryl, and spinelle are its principal constituents, more especially the last, which seems to constitute more than three fourths of the whole mass. A single handful will contain specimens of every shade,

black, blue, violet, scarlet, rose, orange, amber yellow, wine yellow, brown, and white. Many retain their original crystalline forms, some have the fundamental form of the species, a perfect octahedron ; but many others have some of the secondary forms, among which it is not uncommon to see twin crystals reentering angles, formed by two segments of the tetrahedron truncated on the angles, and joined together by their bases.—*Mason.*

(4055) GENDARUSSA VULGARIS. Syn. Justicia gendarussa, Linn, *Roxb. Fl. Ind.* i. p. 128.

Caroo noochie. TAM.	Jugut mudun, BENG.
Kali shumbli, DUK.	Nela nirganda, SANS.

Common in gardens in India, and supposed by Roxburgh to be a native of the Malay islands. Flowers during the wet season. It is a shrub with dark purple or green smooth shoots, leaves short stalked, lanceolate, obtuse, smooth, with the rib and veins dark purple. Spikes terminal somewhat whorled, leafy at base, flowers reddish purple. Leaves and stalks when rubbed have a strong, rather aromatic odour. After being roasted they are given in chronic rheumatism by the native practitioners. The plant is also said to be emetic.—*O'Shaughnessy, page* 483. This indigenous species of gendarussa is often planted for borders around Tenasserim gardens.—*Mason.* Wight gives Gendarussa Tranquebarensis.

(4056) GENTIANA, a genus of Plants belonging to the natural order *Gentianaceæ*. It has a 4-5-parted calyx. The corolla is variously divided, twisted to the right in æstivation, often with accessory lobes between the principal ones, without depressed glands upon the petals. The filaments equal at the base ; anthers not changing. The stigmas are terminal on the ovary or style. The placentæ united with the endocarp and overspreading the valves of the capsule.—*Eng. Cyc. Vol.* II. *page* 954. Wight gives Gentiana pedicellata, 1328 ; verticellata, 600.

(4057) GENTIANA KURROO. Syn. Pneumonanthe Kurroo, Don. Royle's Illustrations, p. 278. Mussooree, Simla, and other parts of the Himalayas. The roots are used in the north of India, like the gentian.—*O'Shaughnessy, page* 459. Gentiana kurroo, is found in various parts of the Himalayas. It has a stem about 1-flowered, obtuse leaves, the radical long, lanceolate, those on the stems linear. The teeth of the calyx are long and subulate. The corolla is funnel-shaped, with an intense blue spreading 10-lobed limb, the principal lobes of which are ovate and acute, the intermediate ones scale-like teeth. The root is used like Gentian in the north of Italy.—*Eng. Cyc.*

(4058) GENTIANACEÆ, GENTIANWORTS, an extensive order of Plants belonging to the Monopetalous Exogens, and consisting of herbaceous plants, with opposite ribbed leaves, and flowers whose corolla is imbricated ; the stamens alternate with the petals ; the ovary superior, with two cells standing right and left of the axis of growth ; and seeds containing a minute embryo lying in a mass of albumen. They are generally considered to be in the closest alliance with *Scrophulariaceæ*, but it is possible that their resemblance to that order is one of analogy rather than affinity. Along with *Orobanchaceæ* and *Monotropaceæ*, they seem rather to belong to the albuminous group of Exogens, as has already been shown. The flowers of these plants are usually coloured with pure bright yellow, red, or blue, and in many cases they are on this account among the most beautiful of flowers ; but if we have a high development of form and colour in the majority of the species of this order, so we also have in the Guayana and Mexican plants belonging to the genus *Voyra* or *Leiphaimos* the brown leafless habit and low development of *Orobanche*. This order is famous for its bitterness, which seems to pervade all the species. *Gentiana* itself furnishes all the officinal kinds ; but *Erythræa centaurium*, a beautiful wild flower common in many parts of England, is advantageously employed by country people as a substitute : and the root of *Frazera Walteri* has been used as a means of adulterating the bitter Calumba-root. *Cherayta*, from East Indian plants, is remarkable for the pureness of its bitter. The whole plant is pulled up at the time the flowers begin to decay, and dried for use. There are 60 genera and 450 species of this order. This order extends over almost all parts of the world, from the regions of perpetual snow upon the summits of the mountains of Europe, to the hottest sands of South America and India. They however do not appear in the Flora of Melville Island ; and they form part of that of the Straits of Magellan. The most common genus is *Gentiana*, than which few genera display so full a series of colours in the flowers ; red, blue, yellow, and white are all exhibited in it, with many of the intermediate compound tints. For the properties of the genera of this order see CHIRETTA, CICENDIA, CHLORA, MENYANTHES, VILLARSIA, AGATHOTES.—*Eng. Cyc.*

(4059) GENISTA TOMENTOSA, *Henna* (*Lawsonia inermis*), is an important dye-stuff, and the distilled water of the flowers is used as a perfume. The Mahomedan women in Asia use the shoots for dyeing their nails red, and the same practice prevails in Arabia. In these countries the manes and tails of the horses are stained red in the same manner. The *Genista tomentosa* yields red petals used in dyeing, and containing much tannic acid.—*Simmonds.*

(4060) GEODORUM CANDIDUM and GEODORUM PALLIDUM are two terrestrial

species, members of the genus geodorum.—*Mason.* Wight gives also G. dilatatum.

(4061) GESNERIA. GESNERIACEÆ. Showy species of flowering plants mostly with scarlet and orange colored flowers, they thrive well in any light soil, and may be propagated by seed and cuttings.—*Riddell.*

(4062) GHEE, CLARIFIED BUTTER.

Nyee, TAM. and TEL.	Ghee, GUZ. HIND.
Gritthum, SANS.	Roghun, PERS.

In oriental commerce, is clarified butter, made generally from the milk of cows and baffaloes, and is an article of great importance in India, Arabia, and other Eastern countries, where it is used in the same manner as suet and oil are in England, France, &c. It is largely manufactured at Surat, Kurrachee, Jæffrabad, the Persian Gulf, &c.—*Faulkner.*

(4063) GIGARTINA LICHENOIDES. Ceylon moss.—*O'Shaughnessy, p.* 668.

(4064) GIGARTINA TENAX. The Chinese people collect this sea-weed on the coast to a great extent using it in the arts and also for food. Among these the Gigartina tenax is prepared as affording an excellent material for glues and varnishes. It is simply boiled and the transparent glue obtained is brushed upon a porous kind of paper called "shachi" which it renders nearly transparent. It is also used as a size for stiffening silks and gauze, and extensively employed in the manufacture of lanterns and in the preparation of paper for lattices and windows. This and other kinds of fuci are boiled down to a jelly by the islanders on the south and extensively used for food, it is known in commerce under the name of *agaragar.* —*Williams, p.* 275.

(4065) GILIA ACHILLIEFOLIA. POLEMONIACEÆ. These are beautiful annuals and of easy cultivation, may be grown either in the flower garden, or in pots during and after the rains, easily propagated by seed in any light soil. —*Riddell.*

(4066) GINGELLY OR SESAMUM OIL. (BLACK SEEDED VARIETY)—Sesamum orientale.

Nal ennai, TAM.	Meeta-tel, Til-ka-tel, GUZ HIND.
Munchie Noonay, TEL.	Kurit Schuk, PERS.
Meetha Till ka tael, HIND.	
Jiritch, ARAB.	

The oil expressed from the sesamum seed, which is much used by the natives of India as an article of diet and lighting. It will keep many years without becoming rancid, and for all purposes of medicine and pharmacy; when well prepared, is quite equal to the best olive oil. It is supposed that the large quantities of this oil exported from Bombay to England and France, after undergoing certain purifying processes, is returned to India in the shape of sallad, olive, or Lucca oil. Jingelly oil is largely exported from Bombay to England and France.—*Faulkner.*

(4067) GINGELLY SEED, SESAMUM SEED.

Sumsum, ARAB.	Taila, SANS.
Ellu, CAN.	Yellow, TAM.
Teel, Jingelly, GUZ. HIND.	Nowooloo, TEL.
Kunjed, PERS.	

The Sesamum is extensively cultivated in Southern Asia, for the oil expressed from the seed, which are slightly oval, small, tasteless and inodorous. There are two kinds distinguished, *black*, and *white* or *yellow*, which possess the same properties, and in commerce are met with both in a mixed and separate state. Gingelly seed is largely exported from England and France. This oil is perhaps consumed to a greater extent than any other by the Natives of India, and is second only to cocoanut oil in its importance as an article of commerce. It is extensively cultivated throughout the whole of the Madras Presidency, and has been exported as follows.

Gingelly Seed.

Year 1847-48.	Year 1848-49.
Qr. 17,518.....Rs 1 60,134	Qr. 8,594.....Rs. 1,02,723
Year 1849 50.	Year 1850-51.
Cwt. 1,44,125.....Rs. 299,412	Cwt. 2,27,775...Rs. 4,37,155
Year 1851-52.	Year 1852-53.
Cwt. 1,09,414.....Rs. 302,559	Cwt. 2,51,613...Rs. 5,31,634

Gingelly Oil.

Year 1847-48.	Year 1848-49.
Gl. 19,520———Rs. 14,766	Gl. 14,686———Rs. 11,535
Year 1849-50.	Year 1850-51.
Gl. 52,721———Rs 36,294	Gl. 77,262———Rs. 48,605
Year 1851-52.	Year 1852-53
Gl. 46,196———Rs. 26,722.	Gl 72, 607———Rs. 43,608

Of the gingelly seed exported in 1852-53 the United Kingdom received cwt. 12,713—Ceylon, cwt. 590—France, cwt. 2,87,225—Pegue, cwt. 741—Bombay, cwt. 113—Malacca, cwt. 33 and Travancore, cwt. 148. Of the quantity of oil (72,607 gals.) exported in the same year—gals. 42,043 were shipped to the United Kingdom—gals. 2,963 to Ceylon—gals. 4,232 to Mauritius and Bourbon—gals. 19,698 to Pegue—gals. 46 to Bengal—gals. 27 to the French (Indian) ports, and gals. 3,593 to Malacca.—*Mode of preparation.*—The great disparity of color observed in the specimens of this oil is attributed to the mode of preparation. The method sometimes adopted is that of throwing the fresh seeds, without any cleansing process, into the common mill, and expressing in the usual way. The oil thus becomes mixed with a large portion of the coloring matter of the epidermis of the seed, and is neither so pleasant to the eye, nor so agreeable to the taste, as that obtained by first repeatedly washing the seeds in cold water, or by boiling them, for a short time, until the whole of the reddish brown coloring matter is removed, and the seeds have become perfectly white. They are then dried in the sun, and the oil expressed as usual. This process yields 40 to 44 per cent. of a very pale

straw-colored sweet-smelling oil, an excellent substitute for olive oil. *Uses.*—In India, it is chiefly used in cookery, in anointing the person, for making soap, and for burning in lamps. In England, it is chiefly used for the manufacture of soap, and for burning in Table-lamps, for which it is better suited than cocoanut oil, owing to the lower temperature at which it congeals. *Price.*—Value in England (January 1855) £47.10 per ton. In different parts of Madras Presidency the price of this oil varies from Rs. 1 5 0 to Rs. 6 0 0 per maund of 25lbs. In S. Arcot it is procurable at Rs. 27 12 5 per candy. The prices per maund of this oil, at the undermentioned stations, for the quarter ending 31st October 1854, were as follows.

Arcot, ...	Rs.	3	8	0	Madura, ...	Rs.	5	8	3
Bangalore, ...	„	3	7	3	Mangalore, ...	„	4	1	8
Bellary	„	3	2	0	Nagpore, ...	„	1	12	0
Berhampore, ...	„	2	8	0	Palamcotta, ...	„	4	12	0
Cannanore, ...	„	6	0	0	Paulghaut, ...	„	3	7	0
Cuddapah, ...	„	2	13	0	Samulcotta, ...	„	2	10	8
Jaulnah	„	2	6	0	Secunderabad, ..	„	2	3	11
Jubbulpore, ...	„	1	5	0	Trichinopoly, ...	„	4	1	8
Madras, ...	„	3	14	0	Vellore, ...	„	3	14	0
Masulipatam, ...	„	3	0	0	Vizagapatam, ...	„	3	2	0

Second sort Gingelly Oil, erroneously called "Rape," (Kharasanee yelloo), is from the red seeded variety.—This oil which is expressed from a variety of sesamum differs but little from the one abovementioned. In Tanjore, it is procurable at Rupees 3 0 0 per maund. The following particulars concerning the two varieties of plant, yielding this important oil have been furnished by F. Copleston, Esq., Rajahmundry. Two varieties of Sesamum, are cultivated for the sake of the oil. The gingeley seed *par excellence* is the produce of the plant, which is sown in the month of March, after the rice crop, and is irrigated twice, once at sowing, and once afterwards. The seed which is *black*, and is called 1st sort gingeley, from the fact of its yielding the largest percentage of oil, ripens in May, and sells at the rate of Rs. 60 per candy of 500 lbs. The oil obtained from both varieties, sells at the same price, viz. Rs. 2 14 6 to 3 per maund of 25 lbs according to quality. Second sort gingeley is sown in June, and produces a red seed. The plant although a little larger resembles in most respects the former, it has, however, a somewhat longer leaf, and the flower differs a shade or two in color. A candy of 500 lbs. of this seed sells at Rs. 57 8 0. The price of the oil is the same as that of gingeley. This seed has of late been exported to France, in consequence of which the present price is double what it was three years ago.—*M. E of* 1855. It will have been seen that of this small annual plant there are two or three species. Sesamum orientale, the common sort; and S. indicum, a more robust kind, cultivated at a different season, both natives of the East Indies. S. indicum bears a pale purple flower, and S. orientale has a white blossom. It is the latter which is chiefly grown

and the seeds afford the Gingelie oil or suffedtil, already extensively known in commerce in the East. The expressed oil is as clear and sweet as that from almonds, and probably the Behens oil used in varnish, is no other. It is called by the Arabs "Siriteth," and the seed, "bennie" seed, in Africa. S. orientale is grown in the West Indies under the name of "wanglo." It is said to have been first brought to Jamaica by the Jews as an article of food. 1,050 bags of gingelly, teel, or sesame seed, were imported into Liverpool, in 1849, from the East, South America, and Africa, for expressing oil and 3,700 bags in 1850. There are two kinds of seed, light and dark, and it is about the same size as mustard seed, only not round. A hectare of land in Algeria yields 1475 kilogrammes of seed, which, estimated at 50 cents the kilogramme, amounts to 737 francs, whilst the cost of production is only 259 francs, leaving a profit of 478 francs (nearly £20). The oil obtained from this seed is inferior to good olive oil, but is better adapted for the manufacture of soap. This plant is not unlike hemp, but the stalk is cleaner and semitransparent. The flower also is so gaudy, that a field in blossom looks like a bed of florist's flowers, and its aromatic fragrance does not aid to dispel such delusion. It flourishes most upon land which is light and fertile. The fragrance of the oil is perceptibly weaker when obtained from seed produced on wet, tenacious soils. A gallon of seed seems to be the usual quantity sown upon an acre. In Bengal, *S. orientale* is sown during February, and the crop harvested at the end of May; but *S. indicum* is sown on high, dry soil, in the early part of the rains of June, and the harvest occurs in September. About Poonah it is sown in June and harvested in November. In Nepaul two crops are obtained annually; one is sown as a first crop in April and May, and reaped in October and November; the other as an autumn crop, after the upland rise in August and September, and reaped in November and December. In Mysore, after being cut it is stacked for a week, then exposed to the sun for three days, but gathered into heaps at night; and between every two days of such drying, it is kept a day in the heap. By this process, the pods burst and shed their seeds without thrashing. The seeds contain an abundance of oil, which might be substituted for olive oil; it is procured from them in great quantities, in Egypt, India, Kashmir, China, and Japan, where it is used both for cooking and burning. It will keep for many years and not acquire any rancid smell or taste, but in the course of a year or two becomes quite mild, so that when the warm taste of the seed, which is in the oil when first expressed, is worn off, it is used for all the purposes of salad oil. It possesses such qualities as fairly entitle it to introduction into Europe; and if divested of its

mucilage, it might perhaps compete with oil of olives, at least for medicinal purposes, and could be raised in any quantity in the British Indian Presidencies. It is sufficiently free from smell to admit of being made the medium for extracting the perfume of the jasmine, the tuberose, narcissus, camomile, and of the yellow rose. The process is managed by adding one weight of flowers to three weights of oil in a bottle, which being corked is exposed to the rays of the sun for forty days, when the oil is supposed to be sufficiently impregnated for use. This oil, under the name of Gingilie oil, is used in India to adulterate oil of almonds. The flour of the seed, after the oil is expressed, is used in making cakes, and the straw serves for fuel and manure. The oil is much used in Mysore for dressing food, and as a common lamp oil. From 200 to 400 quarters under the name of Niger seed are imported annually into Liverpool for expressing oil. Three varieties of Til are extensively cultivated throughout India, for the sake of the fine oil expressed from their seeds, the white seeded variety, the parti-colored, and the black. It is from the latter that the sesamum or gingeley oil of commerce is obtained. Sesamum seed contains about 45 per cent. of oil. Good samples of the oil were shown at the Great Exhibition from Vizianagram, Ganjam, Hyderabad, Tanjore, the district of Moorshedabad, and Gwalior. The gingelly seed is stated to be worth about £4 per ton in the North Circars. An oil resembling that of sesamum is obtained from the seed of *Guizotea oleifera* and *Abyssinica*, a plant introduced from Abyssinia, and common in Bengal. These, the ram til, or valisaloo seeds, yield about 34 per cent. of oil. The oil is generally used for burning, and is worth locally about 10d. per gallon. Black Til (Verbesena sativa) is known as kutsela or kala til, in the Deccan. It is chiefly cultivated in Mysore and the western districts of Peninsular India, as well as in the Bombay presidency. About 5,000 maunds are exported annually from Calcutta, 3,703 bags were imported into Liverpool in 1851. The price per quarter of eight bushels, in January, 1853, was from 30s. to £2; of teel oil, in tins, weighing 60 to 100 pounds, £2 to £2 4s.—*Simmonds' Comml. Products, page* 535. See SESAMUM.

(4068) GINGER.

Zingebel, ARAB.	Jasiaking also jait, JAV.
Jahetub, BALI.	Zingiber, LAT.
Soonty, CAN.	Alia, MAL.
Inghuru, CYNG.	Zunjebeel, PER.
Sont, DUK.	Gengivre, PORT.
Gingembre, FR.	Inbir, RUS.
Ingwer, GER.	Sunthi, SANS.
Adruck (green), Soont (dry), GUZ. HIND.	Jengibre, Agenjibre, SP.
Zenzero, IT.	Sukka, TAM.
	Sonti, TEL.—*Faulkner.*

The ginger-plant Zinziber officinale, belongs to the very useful natural order, Zinziberaceæ from which turmeric, East India Arrow-root and some other productions, are obtained. Ginger grows and is cultivated in the tropical regions of Asia, America, and Sierra Leone. The stem reaches generally three or four feet in height, and is renewed yearly, while the root which is the part known as ginger, botanically termed a rhizome, is biennial. The roots, or rhizomes, are dug up when about a year old; in Jamaica, this occurs in January or February, and after the stems are withered. They are well washed, freed from dirt, and in some cases, especially with the better kinds, the epidermis or outer coat is stripped off, and hence the division of ginger into white, scraped or uncoated and into black, unscraped or coated. In estimating the quality of ginger, a variety of particulars have to be taken into consideration as whether the rhizomes are coated or uncoated, their form, colour, and consistence. The rhizomes of ginger of good quality have no epidermis, are plump, of a whitish or faint straw-colour, soft and mealy in texture, with a short fracture, exhibiting a reddish, resinous zone round the circumference; the taste should be hot, biting, but aromatic. The rhizomes of ginger of inferior quality are frequently coated with the epidermis, are less full and plump often contracted and shrivelled; of darker colour, being of a brownish-yellow, of harder texture, termed flinty, and more fibrous, while the taste is inferior, and less aromatic. The principal uncoated sorts of ginger, according to Dr. Pereira, are:—

1. *Jamaica ginger*, imported in barrels holding one cwt. each. It is an uncoated, pale sort; and when of fine quality, occurs in large, bold, fleshy races, which cut soft, bright, and pale-coloured. Inferior samples are small in the race, darker-coloured, more or less flinty and shrivelled.

2. *Uncoated Malabar ginger*, new sort of Malabar ginger, Tellicherry ginger; Calicut ginger, Cochin ginger, "a pale uncoated sort imported in chests, casks, or bays, sometimes from Tellicherry, but usually from Calicut or Cochin." It resembles Jamaica ginger, both in external appearance and flavour; but has, externally, more of a brownish or reddish tint, it first appeared in English commerce about the year 1841.

3. *Uncoated Bengal ginger*, scraped Bengal ginger, new sort of Bengal ginger, Calicut sort of Bengal ginger, "imported in chests of about one and a half cwt. It is an uncoated sort, darker than Jamaica ginger; it is not so large as the uncoated Malabar sort, and is harder and darker." The chief coated gingers are:—

1. *Barbadoes ginger*, "imported in bags of about sixty or seventy pounds. It is a coated sort in short, flat races, which are darker coloured than Jamaica ginger, and are covered with a corrugated epidermis."

2. *Malabar ginger*, unscraped Malabar, old sort of Malabar ginger, common Malabar ginger;

Bombay ginger "imported from Bombay in bags or packets. It is a coated, dark, and small sort."

3. *Bengal ginger*, common Bengal ginger, old sort of Bengal ginger "imported in bags. It is a coated or unscraped dark sort, which cuts flinty and brownish, but is plumper and less wormy than common Malabar ginger."

4. *Sierra Leone ginger*, Africa ginger; "imported in casks or bags. It is a coated sort, the races being generally larger, less flat and less plump, than those of the Barbadoes sort, which in other respects they resemble. According to the authority above referred to, the uncoated ginger—viz. the Jamaica, uncoated Malabar, and uncoated Bengal—are assorted for commercial purposes according to their qualities, thus;—

1. Bold, soft, and bright ginger.
2. Smaller, but soft and bright.
3. Flinty and dark.
4. Shrivelled, and only fit for grinding.

The Barbadoes, African, and coated Malabar and Bengal ginger, are usually sold unassorted. Besides the two kinds of ginger above noticed, other descriptions occur. Thus what is called green ginger, is sometimes imported from Jamaica, it consists of soft and juicy rhizomes with buds, and appears to have undergone but little preparation beyond picking and washing. The young shoots put forth every spring by the perennial rhizome are used in the manufacture of the delicious preserved ginger (conditum zingiberis). These shoots are carefully picked, washed, scalded, scraped, peeled, and then preserved in jars with syrup. (Dr. P. Browne). "The finest preserved ginger is imported from Jamaica, usually in jars. Barbadoes preserved ginger is seldom brought over. The China preserved ginger is stringy. It is sometimes imported in the dried state. We have been informed that dried ginger of good quality, soft and mealy, may, by the following process, be converted into excellent preserved ginger: The rhizomes, selected with care are to be immersed for three or four weeks in very weak syrup, scarcely stronger than sugar-and-water, to which a small portion of the carbonate of potash has been added; this addition being made to give them a fresher and greener tint, and also to assist in softening them. As soon as the ginger has become sufficiently soft, it is put up in very strong syrup of white sugar.—*Hassell.* Ginger is cultivated to a small extent, in Tenasserim, and some of the Chinese make a ginger preserve of the green roots, in imitation of that which comes from China.—*Mason.* It grows in all parts of India: it is generally cultivated in gardens, being sown about the commencement of the rains, and taken up in eight or nine months, though sometimes left in the ground for the following year.—*Riddell.* Ginger is sown at the commencement of the rains in beds of about six feet square, and in a rich cultivated soil. The planting consists in dividing part of the green root, which the natives first soak in a mixture of cow-dung and water; it is then planted about two inches deep and about one foot apart; it requires a great deal of water, and to be kept clear of weeds. When the stalks dry, the ginger may be taken up, although it is sometimes left in the ground for a couple of years. It is better for remaining twelve months, and must be watered during the dry season.—*Riddell.* From an examination of the Analysis, made by Dr. Hassell of the gingers sold in London it appears:

1. That out of twenty-one samples of ginger submitted to examination, no less than fifteen, being more than two-thirds of the whole, were found to be adulterated.

2. That the substances detected were various in character, including sago-meal, potato-flour, wheat-flower, ground rice, Cayenne pepper mustard-husks, and turmeric powder,—these occurring in various quantities, but in the majority of cases constituting the principal part of the article.—*Food and its Adulteration, p.* 390. According to Simmonds, ginger is imported chiefly from the East and West Indies. It is also grown in China. In the young state the rhizomes are fleshy and slightly aromatic; and they are then used as preserves, or prepared in syrup; in a more advanced stage the aroma is fully developed, their texture is more woody, and they become fit for ordinary ginger. The inferior sorts, when dried after immersion in hot water form black ginger. The best roots are scraped, washed, and simply dried in the sun with care, and then they receive the name of white ginger. The rhizome contains an acid resin and volatile oil, starch and gum. It is used medicinally as a tonic and carminative, in the form of powder, syrup, and tincture. The root stocks Alpinia racemosa, A. Galanga, and many other plants of the order, have the same aromatic and pungent properties as ginger. The consumption of ginger is about 13,000 or 14,000 cwt. a year. Of 16,004 cwt. imported in 1840, 5,381 came from the British West Indies, 9,727 from the East India Company's possessions and Ceylon, and 896 cwt. from Western Africa. The difference between the black and white ginger of the shops is ascribed by Dr. P. Browne and others to different methods of curing the rhizomes; but this is scarcely sufficient to account for them, and he cannot help suspecting the existence of some difference in the plants themselves. That this really exists is proved by the statements of Rumphius ("Herb. Amb.," lib. 8, cap. xix., p. 156), that there are two varieties of the plant, the white and the red. Moreover Dr. Wight ("Lond. Med. Journal," vol. viii.) says that two sorts are cultivated in Jamaica, viz., the white and the black; and, he adds, "black ginger has the most numerous and largest roots."

The rhizome, called in commerce ginger root; occurs in flattish-branched or loded palmate pieces, called *races*, which do not exceed four inches in length. Several varieties, distinguished by their color and place of growth, are met with. The finest is that brought from Jamaica. A great part of that found in the shops has been washed in whiting and water, under the pretence of preserving it from insects. The dark colored kinds are frequently bleached with chloride of lime. Barbadoes ginger is in shorter flatter races, of a darker color, and covered with a corrugated epidermis. African ginger is in smallish races, which have been partially scraped, and are pale colored. East India ginger is unscraped; its races are dark ash colored externally, and are larger than those of the African ginger. Tellichery ginger is in large plump races, with a remarkable reddish in externally. Jamaica black ginger is not frequently found in the shops. The Malabar dark ginger is in unscraped short pieces, which have a horny appearance internally, and are of a dirty brown color both internally and externally. Ginger is imported in bags weighing about a hundred weight. The Malabar ginger exported from Calicut is the produce of the district of Shernaad, situated in the south of Calicut; a place chiefly inhabited by Moplas, who look upon the ginger cultivation as a most valuable and profitable trade, which in fact it is. The soil of Shernaad is so very luxuriant, and so well suited for the cultivation of ginger, that it is reckoned the best, and in fact the only place in Malabar where ginger grows and thrives to perfection. Gravelly grounds are considered unfit; the same may be said of swampy ones, for whilst the former check the growth of the ginger, the latter tend in a great measure to rot the root; thus the only suitable kind of soil is that which, being red earth, is yet free from gravel, and the soil good and heavy. The cultivation generally commences about the middle of May, after the ground has undergone a thorough process of ploughing, harrowing, &c. At the commencement of the monsoons, beds of ten or twelve feet long by three or four feet wide are formed, and in these beds small holes are dug at three-fourths to one foot apart, which are filled with manure. The roots, hitherto carefully buried under sheds, are dug out, the good ones picked from those which are affected by the moisture, or any other concomitant of a half-year's exclusion from the atmosphere, and the process of clipping them into suitable sizes for planting performed by cutting the ginger into pieces of an inch and a half to two inches long. These are then buried in the holes, which have been previously manured, and the whole of the beds are then covered with a good thick layer of green leaves, which, whilst they serve as manure, also contribute to keep the beds from unnecessary dampness, which might otherwise be occasioned by the heavy falls of rain during the months of June and July. Rain is essentially requisite for the growth of the ginger; it is also however necessary, that the beds be constantly kept from inundation which, if not carefully attended to, the crop is entirely ruined; great precaution is therefore taken in forming drains between the beds, and letting water out, thus preventing a superfluity. On account of the great tendency some kinds of leaves have to breed worms and insects, strict care is observed in the choosing of them, and none but the particular kinds used in manuring ginger are taken in, lest the wrong ones might fetch in worms, which, if once in the beds, no remedy can be resorted to successfully to destroy them; thus they in a very short time ruin the crop. Worms bred from the leaves laid on the soil, though highly destructive, are not so pernicious to ginger cultivation as those which proceed from the effect of the soil. The former kind, whilst they destroy the beds in which they once appear, do not spread themselves to the other beds, be they ever so close, but the latter kind must of *course* be found in almost all the beds, as they do not proceed from accidental causes, but from the nature of the soil. In cases like these, the whole crop is oftentimes ruined, and the cultivators are thereby subjected to heavy losses. Ginger is extensively diffused throughout the Indian isles, it being especially indigenous to the East, and of pretty general use among the natives, who neglect the finer spices. The great and smaller varieties are cultivated, and the subvarieties are distinguished by their brown or white colors. There is no production which has a greater diversity of names. This diversity proves, as usual, the wide diffusion of the plant in its wild state. The ginger of the Indian Archipelago is however inferior in quality to that of Malabar or Bengal. In the cultivation of ginger great improvement may be adopted and expense saved. The garden plough and small harrow should be used. The present mode of preparing the land for this crop in the West Indies, is by first carefully hoeing off all bushes and weeds from the piece intended to plant; the workmen are then placed in a line and, dig forward the land to the full depth of the hoe, cutting the furrow not more than from five to six inches thick. The land is then allowed to pulverise for a short time; you then prepare it for receiving the plants by opening drills with the hoe, from ten to twelve inches apart, and the same in depth, chopping or breaking up any clods that may be in the land. Two or three women follow and drop the plants in the drills, say from nine to ten inches apart. The plants or sets are the small knots or fingers broken off the original root, as not worth the scraping. The plants are then covered in with a portion of the earth bank formed in drilling. It requires great care and attention in keeping them clean from weeds until they attain

sufficient age. It throws out a pedicle or foot stalk in the course of the second or third week, the leaves of which are of similar shape to that of the Guinea-grass. Ginger is a delicate plant, and very liable to rot, particularly if planted in too rich a soil, or where it may be subject to heavy rains. The general average of yield is from 1,500 to 2,000 lbs. per acre in plants, although he has known as much as 3,000 lbs. of ginger cured from an acre of land. The planting season generally commences in Jamaica in February and March, and the crop is got in December and January, when the stalks begin to wither. The ginger is taken from the ground by means of the hoe, each laborer filling a good-sized basket, at the same time breaking off the small knots or knobs for future planting. A good scraper of ginger will give you from 30 to 40 lbs. of ginger per day. It is then laid on barbacues (generally made of boards) to dry. It takes from six to ten days to be properly cured. The average yield in weight is about one-third of what is scraped. When intended for preserving, the roots must be taken up at the end of three or four months, while the fibres are tender and full of sap. The ginger grown in the West Indies is considered superior in quality to that of the East, doubtless because more care is paid to the culture and drying of the root, but it is of less importance to commerce. The quantities imported from these two quarters is however becoming more equal, and Africa is coming into the field as a producer, 1545 casks and packages having arrived from the western coast in 1846. The annual average export of ginger from Barbados, between the years 1740 and 1788, was 4,667 bags; between 1784 and 1786, 6,320 bags; in 1788, 5,562 cwt. were shipped; in 1792, 3,056 bags and barrels. In 1798, so widely was the culture of this root diffused in Jamaica, that 20,933 bags, of one cwt. each, and 8,864 lbs. in casks were shipped. The exports may now be taken on an average at 4,000 cwt.; but, like all the other staple products of the islands, this has fallen off one-half since the emancipation of the negro population. In the three years which preceded the abolition of slavery, 5,719,000 lbs. of ginger were shipped from Jamaica. In the three years ending with 1848, the quantity shipped had decreased 2,612,180 lbs., as will be seen by the following returns:—

GINGER SHIPPED.

	lbs.		lbs.
1830 ...	1,748,800	1846 ...	1,462,000
1831 ...	1,614,640	1847 ...	1,324,480
1832 ...	2,355,560	1848 ...	320,340
	5,719,000		3,106,820

In 1843 there were shipped from Jamaica 3,719 casks and bags; in 1844, 3,692 casks and 1730 bags; in 1845, 3,506 casks, valued at £4 10s. each, and 1,129, bags, valued at £2 each, equal in all to £18,037. From the island of Hayti 8,769 lbs. of ginger were exported in 1835, and 15,509 lbs. in 1836. 39 packages of ginger were shipped from Barbados in 1851. In Maranham and one or two other provinces of Brazil, ginger of an excellent quality is grown, and a good deal is exported. It was very early an article of culture in South America. According to Acosta, it was brought to America by one Francisco de Mendoza, from Malabar, and so rapidly did its cultivation spread, that as far back as 1547, 22,053 cwt. were shipped to Europe. Southey, in his "History of Brazil" (vol. i., p. 320), says, "Ginger had been brought from the island of St. Thomas, and throve so well that in the year 1573, 4,000 arrobas of 25 lbs. each were cured; it was better than what came from India, though the art of drying it was not so well understood. Great use was made of this root in preserves, but it was prohibited, as interfering with the Indian trade in that wretched species of policy which regards immediate revenue as its main object." Ginger was worth in the London market 25s. to 60s. the cwt. in bond; middling and fine qualities, 80s. to 160s. The duty is 5s. per cwt.—Amount of imports of ginger into the United Kingdom, with the quantities entered for home consumption:—

	West India ginger.	Entered for home consumption.	East India ginger.	Entered for home consumption.
	cwts.	cwts.	cwts.	cwts.
1831	3,551	4,709	849	79
1832	5,947	5,795	2,508	213
1833	6,064	9,570	10,049	1,099
1834	9,913	9,918	10,004	1,638
1835	8,321	8,982	4,489	1,647
1836	10,226	6,304	13,589	3,524
1837	10,933	9,905	23,876	3,386
1838	13,366	9,944	25,649	1,431
1839	8,996	7,213	29,624	914
1840	5,381	7,935	9,719	1,568
1841	4,446	5,523	5,292	1,177
1842	4,671	5,068	3,680	1,956
1843	4,013	5,953	4,106	3,254
	casks, &c.	casks.	bags.	bags.
1844	4,619	3,128	5,101	6,964
1845	6,033	4,000	8,165	7,938

	Total ginger imported. cwts.	Returned for home consumption. cwts.
1845	24,370	15,937
1846	20,010	15,168
1847	12,995	9,744
1848	13,748	10,454
1849	28,015	12,880
1850	33,953	16,543
1851	35,678	19,855
1852	20,297	18,691

—*Simmonds, page* 418.

(4069) GINGERBREAD TREE OR DOOM PALM OF EGYPT is the Hyphæne Thebaica, and receives its name from its fruit having the

look and taste of gingerbread. It is stated by Dr. Lindley to produce the Bdellium. Its wood is used for various domestic purposes and its kernel turned into rosaries.—*Seeman.*

(4070) GINGER PRESERVE. Is imported into India solely from China, in cases containing half a dozen of jars each; the capacity of each jar being about five lb.—*Faulkner.*

(4071) GINSENG, GARANTOGNES.

Ginseng, DUT. FR. GER. IT.	Jinseng, SP.
Jansam, CHIN.	Orhota, TART.
Ginsao, PORT.	

Ginseng; in Chinese called *jin-sam*, is the dried root of the *Panax quinquefolia*. It is obtained in Tartary, and also in America, from which latter country some is exported to China. It is considered by the Chinese as a panacea, and no medicine or dose is regarded as complete without this forms an ingredient. All the ginseng growing in Tartary is the property of the emperor, and he sells a quantity yearly to his faithful subjects, who have the privilege to purchase it at its weight in gold! The co-hong were formerly compelled to purchase upwards of $140,000 worth annually, for which sum a few catties were given them. The roots are about the size and length of a man's little finger, and when chewed have a mucilaginous sweetness; and if good, will snap when broken. They should be sound, firm, and free from wormholes. The Chinese consider that which comes from Tartary to be the best, even when they can see no difference. When first brought from America, the profits were 500 or 600 per cent; but afterwards the price declined so much as at times to be hardly worth bringing. When the new tariff was first settled, the Chinese objected to a reduction of the imperial duties, but on a representation being made to H. E. Keying, the imperial commissioner, it was finally agreed by him, that without changing the tariff, the duty on every separate lot should be levied as if it was one fifth first quality, and four fifths second quality. This arrangement reduces the actual duty paid to 10t. 2m. or $14·17 per picul. Ginseng is clarified by being boiled and skinned, which operation renders the root somewhat transparent. Clarified ginseng varies in price from $60 to $100 a pecul; the crude, from $35 to $70 a pecul; five per cent, is allowed for loss in weight on this article, which is taken from the price agreed upon per pecul. In 1837, there were 212,898 lb. imported, at the value of $108,548. In some years there is much more than this amount; the average importation in 1842 and 1843 was 3000 peculs, at the average price of $48 per pecul. The trade is fluctuating and uncertain, and entirely in the hands of the Americans.—*Hon'ble Mr. Morrison.* Mr. Simmonds reports thus: he says that Ginseng as an article of commerce, is confined to our transatlantic neighbours, who have the monopoly of the supply to China. The root of Panax quinquefolium, the American ginseng, is much esteemed by the Chinese, for certain supposed beneficial effects upon the nerves, and for other presumed virtues; but our physicians have not discovered any proofs of its efficacy in Europe. The plant is an herbaceous perennial, growing upon the confines of Tartary and China, near the great wall. It is found wild, flourishing in moist situations, and attains the height of from two to three feet; it is also now produced largely in the northern, middle, and western states of the American union, particularly Virginia, Louisiana, and Pennsylvania, and a considerable trade is carried on with it to China. A variety of the plant was discovered, a few years ago, in the Himalaya mountains, and small quantities have been sent thence to Canton. It is also found growing in Canada. The root is about three or four inches in length, and one inch in thickness. It resembles a small carrot, but not so taper at the end, and is sometimes single, sometimes divided into two branches. The stem is striated, without branches, and of a red color near the root. The leaves, from four to six of which surround the stem where they form sheaths (bracteal), are simply pinnate. The flower stalk is long and green, the inflorescence a simple umbel. The fruit is a berry of a red color, and contains two seeds of the size of mustard seed. The officinal root differs in appearance, according to the country from which it is brought. In Korea and China it is white, corrugated when dry, and covered with a powder resembling starch. In Mandscharia and Dauria it is yellow, smooth and transparent, and when cut resembles amber. The taste of the root is bitter. Crude ginseng now sells in the Canton market at 70 to 80 dollars per picul of 133 lbs., and cured or clarified root at 130 to 140 dollars. The stem of the plant, which is renewed every year, leaves, as it falls off, an impression upon the neck of the root, so that the number of these rings or marks indicates the age of the plant, and the value of the root increases accordingly.—*Simmonds' Comml. Prod. p.* 436. Mr. Williams tells us that Ginseng is found wild in the forests of Liantung and Manchuria, where it is collected by detachments of soldiers and camp followers, specially detailed for this purpose: the regions where it grows are regarded as imperial preserves, and the medicine itself is held as a governmental monopoly. The importation of the American root at Canton does not interfere to a very serious degree with the imperial sales at the north, as the Chinese are fully convinced that their own plant is far superior, and its high price prevents much of it coming south. —*William's Middle Kingdom, p.* 284. In Tenasserim the Chinese shops have the famous ginseng always on hand, but the plant is not cultivated

(4072) GIRAFFA, (Camelopard of Pennant and authors), a genus of Ruminants, with persistent horns common to both sexes, comprising the tallest of the known quadrupeds. *Dr.* J. E. Gray makes this genus the type of the tribe *Giraffina*. Horns covered with a hairy skin with a tuft of hair at the tip. *Giraffa* has the following characters:—Lip not grooved, entirely covered with hair, much produced before the nostril; tongue very extensile; neck very long; body short; hinder legs short; false hoof none, tail elongate, with a tuft of thick hair at the end. *G. camelopardalis*, the Giraffe or Camel-Leopard is the only species. It is the *Cervus Cameloparadulis*, Linn.; *C. Capensis*, Geoff., Ogilby; *Camelopardalis Giraffa*, *a*, Sundevall; *Giraffa Camelopardalis*, Brisson; *Camelopardalis Giraffa*, Gmelin. There is a pale variety, which has the following synonyms:—*Camelopardalis Giraffa*, *B. Æthiopica*, Sundevall; *Camelopardalis Sennaarensis*, Geoff.; *Camelopardalis Æthiopicus*, Ogilby; *Camelopardalis*, Plin.; *Camelo-pardalus*, Jonst.; *Camelus Indicus*, Joust.; Gyraffe, Belon; *Tragus Giraffa*, Klein; Camelopard, Penn.; Kamel paard, Vosmaer; Giraffe—Thevet, Buffon, Levaill., Shaw, Lichtenst.; Giraffe, or Cameleopard, Harris.—*Eng. Cyc.*

(4073) GISEKIA PHARNACIOIDES. Lin.

Manalie keera, TAM. | Esikedunti koora, TEL.
Ainslie, p. 284.

The leaves of this weed are used by the natives in the preparation of dholl.—*Jaffrey.* Wight in Icones No. 1918, gives also Giseckia molluginoides and G. rubella.

(4074) GIVOTIA ROTTLERIFORMIS. EUPHORBIACEÆ.

Bootallie marum, TAM.

Dr. Wight says, it seems curious that this tree, so common in Southern India, has not yet been named in any work of systematic botany. I have not yet learned any thing regarding the timber: one carpenter here (Coimbatore) speaks disparagingly of it, but I do not consider him a trustworthy authority.—*Wight.*

(4375) GLACIERS, a French word received into our language, and which must not be confounded with Glaciere, which has a different signification. The glaciers, as defined by Saussure, are those eternal masses of ice which are formed and remain in the open air in the valleys and on the slopes of lofty mountains. In the Himalayas glaciers have been observed, and all the phenomena presented in Europe have also been found there. Glaciers are chiefly met with in the range to the north of Karakodrum and another group, apparently the largest accumulation of glaciers in the Kuenlen, was found at the environs of Sassar; but both much smaller than the groups near the Diamer to the North West, investigated by Mr. Adolphe Schlagentweit.—*H. and R. Schlagentweit No.* viii. Glaciers in the north-west Himalaya descend to 11,000 feet; but Dr. Hooker could not discover any in these valleys even so low as 14,000 feet, though at this season extensive snow-beds remain unmelted at but little above 10,000 feet. The foot of the stupendous glacier filling the broad head of the Thlonok is certainly not below 14,000 feet; though being continuous with the perpetual snow (or névé) of the summit of Kinchinjunga, it must have 14,000 feet of ice, in perpendicular height, to urge it forwards.—*Hooker Him. Jour. Vol.* II. *page* 57. Dr. Hooker made frequent excursions to the great glacier of Kinchinjhow. Its valley is about four miles long, broad and flat: Chango-khang rears its blue and white cliffs 4,500 feet above its west flank, and throws down avalanches of stones and snow into the valley. Hot springs burst from the ground near some granite rocks on its floor, about 16,000 feet above the sea, and only a mile below the glacier, and the water collects in pools: its temperature is 110°, and in places 116°, or 4° hotter than that of the Yeumtong hot-springs, though 4,000 feet higher and of precisely the same character. A *Barbarea* and some other plants make the neighbourhood of the hot-springs a little oasis, and the large marmot is common, uttering its sharp, chirping squeak.—*Hooker Him. Jour. Vol.* II. *page* 133

(4076) GLAM TREE BARK, from Borneo supposed to be the produce of a species of Artocarpus, furnishes a paper like bark much used in caulking the seams of vessels.—*Royle Fib. Pl page* 341.

(4077) GLAPHYRIA, a genus of Plants belonging to the natural order *Myrtaceæ*. The limb of the calyx is 5-lobed, petals 5, berry 5-celled many seeded; fixed to the axis, 2 rows in each cell. The species are small Indian trees, with alternate minutely-stipitate leaves, and few-flowered axillary peduncles.—*Eng. Cyc.*

(4078) GLAPHYRIA NITIDA is called by the Malays 'the Tree of Long Life,' probably from its maintaining itself at elevations where the other denizens of the forest have ceased to exist. It affords at Bencoolen a substitute for tea, and is known by the name of the Tea Plant. Various species of *Leptospermum* and *Melalena* bear the same name in the Australian colonies.—*Eng. Cyc.*

(4079) GLAPHYRIA SERICEA has lanceolate acuminated leaves. It is a native of Pulo Penang and on the west coast of Sumatra. The calyx, peduncles, bracts, and young leaves are silky; the petals and cells of ovarium 5 or 6 in number.—*Eng. Cyc.*

(4080) GLASS.

Kunnadie, TAM. | Glas, GER.
Ab-gee-neh, ARAB. | Kanch, Guz, HIND.
Sheesheh, PERS. | Vetro, IT.
Addhamoo, TEL. | Vitrum, LAT.
Glass, DUT. | Steklo, RUS.
Vitre, Verre, FR. | Vidrio, SP.

This well-known transparent, brittle body is formed by mixing together siliceous earth with an alkali, and subjecting them to a strong heat. Several varieties of glass are usually distinguished, the differences in them being produced by the proportion of the constituents, the nature of the alkali, the presence of foreign matter, or the process of manufacture.—*Faulkner*. Glass is one of those discoveries which could hardly escape being made by any people who employed furnaces to reduce metallic oxides; for the necessary ingredients must often have been present; and the heat was sufficient. Beckmann has observed, that the discovery of coloured glass must have followed very soon that of making glass itself. It is probable, however, that coloured glass was made previous to colourless glass. For it is difficult to find materials pure enough to make good glass and it would be some time before the original makers would find out the causes of discoloration. The natives of India seem to have been long acquainted with making different ornaments of glass: for instance, armlets and anklets, while rings of glass form a part of their warping reels. Small glass bottles are also made; but mostly of a more or less greenish colour. The green is called *kanch*, and the purer glass, *sisi*. It is probable that the extensive diffusion of oxide of iron in the Indian soil, which may have led to the discovery of iron, has prevented the making both of good glass and of good pottery. That this is not incompatible with a knowledge of the method of making imitation gems, seems proved by the same having been the case in the time of Pliny; who states that great value was set upon glass quite free from colour, which was called crystal. He also mentions artificial hyacinths, sapphires, and all kinds of black glass; and we know that the glasshouses of Alexandria were celebrated among the ancients. One of the simplest processes for making glass is that practised in the district of Behar. The saline efflorescence of the soil, which is an impure carbonate of soda, is collected and thrown into a cistern lined with clay. This is then filled with water, which is afterwards allowed to evaporate. When dry, the bottom of the cistern is found covered with a thick saline crust, the earth which was intermixed having subsided before the salt began to crystallize. This soda makes glass without any addition, as it still contains a sufficient portion of siliceous matter. They make blackish and greenish glass: a bright grass-green is made by the addition of oxide of copper; and a blue glass by the addition of *rung*. In Mysore the process is more elaborate. Powdered white quartz, one part, being mixed with prepared soda, six parts, is filled into a crucible capable of containing 5½ Winchester gallons. About fifty of these crucibles are placed in a furnace, and the fire kept up for five days, when a frit is produced, with which they make a black, green, red, blue, and yellow glass, by means of additions of oxide of copper, of an ore called *Kemudu*, and of a blue substance called *Runga*. What these are continues unascertained. Though the making of glass has made but little advance in India, the natives work up broken English glass even into barometer and thermometer tubes, &c. Glass globes, silvered in the inside, are made and though the mode of effecting this silvering is not mentioned, an amalgam of quicksilver is probably employed, as, on the application of moderate heat, the silvering becomes dissipated. An art similar to this has of late years been discovered in Britain.—*Royle Arts &c, of India, p.* 474. Ainslie tells us that Glass of an inferior quality was made in several parts of the Peninsula of India, particularly in the Mysore country, at Chinapatam and Muteodu, also at Vallatooroo in Tondiman's dominions, which are contiguous to the Tanjore territory. The manufacture however seems to be confined entirely to small phials and women's bracelets. (1) Above the Ghauts, Dr. Buchanan tells us the frit employed for making glass is composed of one part of fat quartz, and six parts of a kind of ill prepared soda (suja cara) (2). To give glass a green tinge, to the frit just mentioned are added a further quantity of prepared Soda, an iron ore called Carin Kulloo, another ore called Kemudu, (3) and a proportion of calcined Copper; all which materials being mixed and put into the crucible, and properly disposed in the furnace, the fire is kept up for nine days and nine nights. To give glass a red tinge, to the frit already mentioned are added an additional proportion of prepared soda and a quantity of the ore called Kemoodu, after which the whole are fused together for fifteen days and fifteen nights. To make blue glass, to the same frit are added a further proportion of soda, calcined copper, a quantity of powdered Carin Kulloo and a blue substance called Runga, which Dr. Buchanan supposes (but is not sure) may be smalis. To give glass a yellow colour Dr. Buchanan tells us that it is enamelled with the melted calces of the metals—Lead, Tin and Zinc. In Tondiman's country where glass rings appear to be made of a superior quality to those of Mysore, the frit is prepared by adding to fine river sand (Kolindoo manil) (Tam.), a very strong solution of an alkaline earth called Over Munnoo, which contains much Soda. This mixture is formed into lumps which are dried and then fused for many hours together to form the frit. In order to make glass a certain quantity of Poongkarum (an impure carbonate of soda) is added to the powdered frit, and the whole fused together for many hours. To give glass a blue tinge the glass makers add the Runga in the manner mentioned in speaking of the blue glass made in Mysore; they also sometimes though rarely add a calx of copper for the

same purpose. To give glass a black tinge, the glass makers add Warroogoo husks, and the iron ore called CarinKulloo which is also called Carpoo Kulloo. Glass bottles were formerly manufactured at Madras, under the scientific direction of Mr. Ryder, the Assay Master—*Ain's Mat.Med. p.*172. India seems to possess no slight advantages for the manufacture of the best qualities of Glass. As is well known the basis of all glass is Silica and Alkali, of which the former in the shape of common sand is to be met with almost every where, the latter is to be had cheaply and in abundance in most parts of Southern India. In the neighbourhood of Madras as well as in many other localities, the secondary materials also, indirectly essential to the manufacture of the best quality of glass, namely the fire clays used in the construction of the furnaces, are abundant and of very superior descriptions. Yet with all these advantages the natives do not appear to have advanced in the manufacture beyond the first and very rudest stages, and although it is one which, if successfully prosecuted, would probably meet with very extended encouragement, the manufacture of the commonest bottles is not yet practised. The chief defects of the native manufacture are the use of too large a quantity of alkali. In fact, in some cases, it is so much in excess that it might be tasted by applying the tongue to the article. The fault now remarked upon is probably connected with, and caused by another, that of the material being melted at too low a temperature and in too small bulk, and these again probably arise from the use of an improper furnace and an unsuitable kind of fuel. The native furnace is usually a rude hole dug in the ground coated with ferruginous clay, which tends to discolour the glass, and the heat is raised by the use of a bellows blast. Hence the temperature is confined to one point of the mass and is insufficiently diffused, while the body of metal under fusion being small, and the dome and sides above ground being thin, the heat is dissipated from them, and never attains body and elevation sufficient to admit of the mass setting and purifying itself, or of its being freed from air bubbles by the addition of the proper proportion of silica. What is required, is the preparation of the glass in larger quantities at a time, and with this view larger and more carefully constructed furnaces, on the reverberating principle, to be heated by coal; after this, that the process should be attended to more scrupulously, and the materials mixed by weight, instead of being thrown together by measure, as is too commonly the case at present. Country glass is usually made of Dhoby's earth a crude carbonate of soda with a mixture of a little potash and lime 60 to 70 parts, and yellowish white sand 30 to 40 parts composed of small fragments of quartz, felspar, iron and a trace of lime. The good bottle glass of Europe is made of

Sand, ...	58	
Sulphate of Soda, ...	29	per cent.
Lime, ...	11½	
Charcoal, ...	1½	

Sulphate of soda only contains 45 per cent of alkali so that 29 parts contain 13, while the carbonate of soda obtained from dhoby's earth, if we may judge from a specimen exhibited in another section, contains between 30 and 40 per cent of alkali, according to which the alkali used by the Natives would be to that employed in Europe in the proportion of 23 to 13.

The substances generally used by the Natives in colouring glass are as follows:—

Iron, which gives green, brown and black shades.
Manganese.....pink, purple, and black.
Copper,.....blue, green, and deep red.
Arsenic,.....white
Chromate of Iron,..... ,, a dull green.

All these materials are used in a very crude state, and the proportions measured in a most imperfect manner.— *Madras Exhibition Jury's Report.* Buchanan in his travels in Mysore gives an account of the manufacture of glass for Bangles (armlets worn by the natives). The glass is very coarse and opaque and much more of it is made than is there wrought into ornaments. Great quantities of it were brought by the *Bangle* makers from the Westward. It was of five colours, black, green, red, blue, and yellow, the first is most in demand. All the materials for making the glass are found in the neighbourhood. In the hot season the Soulie Munnoo or Soda in the form of a white earthy powder is found in several places near this on the surface of sandy fields. For the exclusive privilege of collecting it the glass makers paid 48 *Co.'s Pagodas;* they make it into cakes, the intention of making it into these cakes is probably to free it from earthy matter; but for making glass this is perhaps no advantage as the earth with which it is mixed is chiefly a quartzose sand, these cakes contain at least one half of their bulk of cowdung and from that cause are inflammable, they are prepared for making glass by being burned and of course afford an exceedingly impure alkali. The glass makers furnace there, is rather better than that of Chennapattana, but still it is exceedingly rude. The manufacturers say that when the army of Lord Cornwallis left *Seringapatam* they gathered with much pains a great number of broken bottles which they found where he had encamped, but after the expense of bringing the bottles to Mutsoda they found that their furnace was not sufficiently strong to liquify European glass. The bottles were then reduced to powder and mixed with alkali, but these materials produced only an useless white glass. Such

glass is therefore considered by them as useless as our cast iron, for neither of these substances are in a state upon which the fires of the natives have any effect. The furnaces are constructed on a high terrace which is built against the inside of the town wall and are in form of a dome or like an oven eight feet in diameter and about ten feet high. The oven is not arched but contracted above into a circular opening about 18 inches in diameter, by making the upper row of stones project beyond those below them. At the bottom of the furnace in the side opposite to the town wall is a small opening through which fuel is supplied, the crucibles are oblong and would contain about 5½ Winchester gallons: having been filled with the materials they are lowered down into the furnace by the aperture in the top by which also the workmen descend. They first place a row of the crucibles all round the furnace with their bottoms to the wall and their mouths sloping inwards, in this position they are secured by a bed of clay which covers the crucibles entirely, having only their open mouths exposed; above this row another is placed in a very similar manner and then a third and a fourth. The furnaces vary in size from such as can contain fifty crucibles thus disposed to such as contain twice that number. The fuel consists of small sticks which, having been gathered a year, are quite dry, a quantity having been put in the bottom of the furnace the workmen ascend and some burning coals are thrown upon the fuel by the opening below; the first fuel is added night and day until the time allowed for vitrifying the materials has expired, the fire is then allowed to burn out and the furnace to cool, afterwards the workmen descend and take out the crucibles, which must be broken to get at their contents.—*Buchanan's Mysore, p.* 371, *Vol.* III.

(4081) GLASS BEADS.

Munnie, TAM. | Kanch-ke-munkeh, DUK.
Bootirsacha, MALAY. |

Various coloured glass beads are brought for sale by the Lubbie stone merchants.—*Ainslie.*

(4082) GLAUCIUM PERSICUM. These are very handsome plants, and showy either in borders or patches: they require a moderate good soil, the plants not too near each other, and the seed sown at the end of the rains, they are natives of the South of Europe and Persia. The colours, red, orange, yellow and purple.—*Riddell.*

(4083) GLINUS TRIANTHEMOIDES.

Sharunnay-keeray, TAM.

A procumbent herb with fleshy leaves of a brownish color; used as spinach; a very abundant and troublesome weed.—*Jaffrey.*

(4084) GLOBE AMARANTH. GOMPHRENA.

(4085) GLOBBA CAREYANA. CAREY'S GLOBBA. On shady banks in the Tenasserim Provinces where violets are seen in England, the pretty orange-flowered globba is not uncommon.—*Mason.* Of this genus Wight in Icones gives Globba bulbifera, 2001; Careyana, 2002; marantinoides, 2001; ophioglossa, 2002; and Orixensis, 2002.

(4086) GLOBIOCEPHULUS RISSII. The Yellow Sea affords this species of Cowfish or round headed cachalot, which the Japanese capture, and other species of whales resort to the waters east of Manchuria. Seals have been observed on the coasts of Liantung, but nothing is known of their species or habits.—*William's Middle Kingdom, page* 258.

(4087) GLORIOSA SUPERBA. Lin.

Kartichey poo, TAM. | Cariari, HIND.

Kartichey poo is the Tamil name of the beautiful flower which is known in England by the appellation of the Superb-Lily. The large, flame-coloured, drooping flowers proceed from the upper part of the stalks. It is sometimes met with in our woods, on the Coromandel side of India, but is more common in Malabar and on Ceylon, in which last mentioned country, the bulbous roots are reckoned poisonous. Grows near Kunatcudu in the district of Coimbatore and in abundance a few miles from Trichinopoly.—*Ainslie's Med. Mat. page* 164. Gloriosa Superba grows wild in the Ajmeer hills in the rains.—*Gen. Med. Top. p.* 189. This beautiful lily is a creeper, and blossoms at the commencement of the rains: it is found in the beds of ravines and edges of rivers. The flowers are of a white, yellow and orange colour, the petals long and fringed. It lasts about eight days, undergoing various changes during that time. The root is a strong poison.—*Riddell.* One of the most curious flowers in the Tenasserim country is the gloriosa. "Gloriosa," says Loudon, "on account of the glorious colours of its flowers, and the elegance of their form. This is a splendid and curious genus." The flower, as large as a lily, hangs down, and the petals, stamens and style all turn and grow up like a flower turned inside out. Then to complete the oddity, the leaves prolong their extremities into tendrils, and the plant walks on its toes.—*Mason.*

(4088) GLOXINIA. GESNERACEÆ. These are handsome plants, the flowers of which are bell-shaped, purple, blue and white, they require a good light rich soil, and are propagated by seed, and stripping off the lower branches from the stem, they require to be well supplied with water.—*Riddell.* The varieties found at Madras are G. maculata and G. caulescens. Both succeed very well, if the roots are started into growth at the commencement of the rains. They require a rich soil well drained, G. caulescens propagated by leaves under glass. G. maculata by division of the roots, require treatment simi-

lar to dahlias for the preservation of the roots, they should not be grown in too large pots.—*Jaffrey.*

(4089) GLUE.

Colle, Fr. | Sirrisht, Guz. Hind.
Leim. Ger.

Is extracted from refuse animal substances, such as the parings of hides, hoofs, ears of horses, oxen, calves, and sheep, and used for cementing wood. When good, it is hard, brittle of a semi-transparent and deep brown colour, and free from clouds and spots.—*Faulkner.* Glue, of a superior kind is derived from the waste residue of animal tissues, which have served the operation of tanning at the Government Tannery, Hoonsoor, samples have been received from Ootacamund, prepared by Mr. Brophy, from bones and remnants of animals which have served as food.—*M. E. J. R.* Glue of a tolerably good quality is made by the Chinese from ox-hides, supplies the Chinese, themselves, and furnishes an article for export to India. See Gelatine.

(4090) GLUGA. This is the Broussonetia papyrifera of botanists, popularly called the paper mulberry tree, the same plant from which a kind of paper is made in China and Japan, and clothing in the islands of the Pacific. The Javanese are the only people of the Archipelago who manufacture a paper from the liber or inner bark of this plant, and this is by a process very similar to that by which the ancients manufactured papyrus. The raw material, however, is of a better quality, and the process of manufacturing it far less expensive; for the ordinary Javanese paper, instead of being costly, like the papyrus, is a very cheap commodity. Its colour is that of parchment; it is very tough, and, except that it is liable to be preyed on by insects, owing to the rice-water used in its preparation, it is very durable. The name of the plant, and the vulgar and polite names of the paper, "daluwang" and "dalambang," are all native Javanese words; and it may be concluded that the art of manufacturing paper from the gluga plant is a native one, and of long standing; for the few ancient manuscripts found in Java, and which, belonging as they do, to the times of Hinduism, cannot be of later date than the year 1478, that in which Hinduism was finally subverted. The Gluga is an object both of culture and manufacture, chiefly carried on in the province of Kadiri, once an extensive seat of Hinduism, and the parties conducting them are the Mahommedan priests: in this matter very likely the successors of the Bramins—*Crawfurd Dict. page* 143.

(4091) GLYCINE, SPEC.

Butwausa, Hind.

A very fine and prolific pulse much cultivated in the upper provinces of India, whence it was sent to Dr. Ainslie some years ago from Lucknow. It did not appear to be at all known to the cultivators on the Coromandel coast.—*Ainslie, page* 236.

(4092) GLYCINE SINENSIS.—Takes its name from glykys, sweet, the roots and leaves of most of the species being so. The colour of the flowers, which hang in racemes from the axils of the leaves, are violet, yellow, or purple, grown in any good soil.—*Riddell.* Fortune says, I here met for the first time, the beautiful Glycine sinensis wild on the hills, where it climbs among the hedges and on trees, and its flowering branches hang in graceful festoons by the sides of the narrow roads which lead over the mountains.—*Fortune's Wanderings, page* 66. At another place he says, a little later in the season, that is from the 20th of April to the beginning of May, another race of flowering shrubs and herbaceous plants succeed those I have named. The most conspicuous amongst them are Viburnum macrocephalum and dilatatum, with their large heads of snow-white flowers; Spiræa Reevesiana, and the double variety, which is more beautiful than the original species, Weigela rosea, now well known in Europe, Moutans of various hues of colour; Azaleas, particularly the lovely little "Amæna", Kerria japonica, the lilac and white glycines, roses, Dulytra spectabilis and Primula cortusoides. It will easily be believed that with such a host of Flora's beauties these Chinese gardens must be gay indeed. But perhaps the most beautiful sight of all is the Glycine sinensis, climbing upon and hanging down from other trees. I believe I noticed in my former works the fine effects produced by this climber when in such situations. I again observed numerous examples this spring, and cannot help drawing attention once more to the subject. The fine plant of this species upon the Chiswick garden-wall is much and justly admired; but imagine a plant equally large, or in some instances much larger, attaching itself to a tree, or even a group of trees entwining itself round the stems, running up every branch and weighing down every branchlet; and, in the end of April or beginning of May, covered with flowers, some faint idea may be formed of the fine effects produced by the glycine in its native country.—*A Residence Among the Chi. p.* 242.

(4093) GLYCYRRHIZA, a genus of Plants belonging to the natural order *Fabaceæ*, or *Leguminosæ*, consisting of herbaceous plants with pinnated leaves, small flowers in axillary spikes, and roots running very much in the soil in which they grow. The technical character of the genus is given by De Candolle thus:—"Calyx naked tubular, 5-cleft, bilabiate; the two upper lobes grow together beyond the others. Standard ovate-lanceolate, straight; keel 2-headed or 2-petalled, straight, acute. Stamens diadelphous. Style filiform. Legume ovate or oblong, compressed, 1-celled 1-4-seeded."—*Eng. Cyc.*

(4094) GLYCYRRHIZA GLABRA. (LIQUORICE.)

Jetimadh, HIND.	Meetha lukri, DUK.
Madhuka & Yastimadhuka, SANS.	Us ul soos, ARAB.
	Bikh-meketh, PERS.

A native of the South of Europe, Crete, and Candia, also of Cochin China. Liquorice root is most employed as an adjunct or corrective for other remedies, and it is often used in powder as an envelope for pills.—*O'Shaughnessy, page* 293. *G. glabra*, the common smooth Liquorice, has ovate rather retuse leaflets, somewhat clammy beneath, as well as the branches; stipules wanting; spikes or racemes of flowers pedunculate, shorter than the leaves; flowers, distant; legumes glabrous, 3 or 4-seeded It is a native of the south of Europe from Spain to Tauria, also of China, and is cultivated in France, Italy, Germany, and England for the sake of its roots. The flowers are of a pale blue colour. The name Liquorice, according to Du Theis, is said to be a corruption of the French word 'reglisse,' which is itself a corruption of *Glycyrrhiza*. The roots abound in a saccharine mucilaginous matter, which is slightly bitter, and readily soluble in water. A powder, and the well-known common extract, are prepared from it. The decoction in different forms is a common remedy for coughs.—*Eng. Cyc.*

(4095) GLYCYRRHIZA ECHINATA has oval lanceolate leaflets, mucronate, glabrous; stipules oblong, lanceolate; spikes of flowers, capitate, on very short peduncles; legumes oval, mucronate, 2-seeded, echinated by bristles. It is native of Apulia, on Mount Gardano, and in the northern provinces of China and of Tartary. The whole plant is glutinous to the touch. The root are horizontal, in taste like the Common Liquorice.—*Eng. Cyc.* This is sometimes called Russian Liquorice. It is found in Greece and Southern Russia, extending, it is said, into Tartary and Northern China.—*Sim's* Bot. Mag. 252; *Nees*, 328. Species of Glycyrrhiza no doubt also extend into Affghanistan, whence Liquorice-root *Jeteemadh* is imported into India. These species may, or may not, be distinct from the preceding.—*Royle.*

(4096) GMELINA, an Asiatic genus of Plants named after Gmelin, author of 'Flora Sibirica,' belonging to the Natural-order *Verbenaceæ*, of which only one species was formerly known, but five are described by Dr. Roxburgh, and a sixth (with some doubtful species) noticed by Dr. Wallich, in his 'Indian Catalogue.' The genus is characterised by having a small 4-sometimes 5-toothed calyx, the corolla large, obliquely campanulate, the border irregularly 4-parted, something like those of foxglove in shape, but mostly yellow in colour. Stamens 4, didynamous, with the anthers 2-cleft. Germ superior, 4-celled; cells 1-seeded; attachment sub-superior. Drupe with a nut, from 1- to 4-celled. Embryo erect, without perisperm. All the species of *Gmelina* form shrubs or trees, of which the latter are valued for their timber. They are found in the islands of the Indian Ocean, extending thence into the Malayan and Indian peninsulas. *G. Asiatica* and *G. parvifolia* are common in various parts of India, and *G. arborea* extends from Prome and Martaban even to the Deyra Valley, in 30° N. lat. The leaves of *G. parvifolia* are remarkable for rendering water very mucilaginous, and are employed medicinally in India; but *G. arborea* (Goombar and Koombar of the natives) appears to be the most valuable for its timber, as, besides being spread over a wide extent of territory, it attains great size. Dr. Roxburgh mentions it squaring into logs of from 18 to 24 inches, which are occasionally nearly 30 feet long. The wood resembles teak, the colour being the same; the grain rather closer, but it is somewhat lighter. It seems particularly valuable for situations where it is exposed to both the influence of air and of water. One experiment was made by placing part of an oustside plank in the river Hoogly, a few miles below Calcutta, "a little above low-water mark, exactly where the worms is thought to exert its greatest powers." Dr. Roxburgh states, that "after remaining three years in this situation, though examined from time to time, the piece was cut, with the view of carrying a specimen of it to England; and to my great joy, I found it as sound and every way as perfect throughout as it was when first put into the river." ('Fl. Ind.,' iii. p. 85.) In another experiment this wood remained good for seven years, while teak, similarly placed, required to be replaced after six years. Hence Dr. Roxburgh suggests experiments on and employment of this wood in ship-building.—*Eng. Cyc.*

(4097) GMELINA ARBOREA.

Coommy marum, TAM.	Gumar, or goomber, BEN.
Goomedee chettoo, TEL.	Jugam, Chookur, HIND.
Sewun, DUK.	Kyoonboe, BURM.

A large timber tree, growing in mountainous districts of Southern Asia. Leaves petioled, cordate and pointed; flowers in April and May, large, yellow, tinged with brown. The wood of the tree is used for making the cylinders of drums, &c.—*Riddell.* Wallich met with this tree on the Salwen, but it has never fallen under Mr. Mason's observation, and he is unacquainted with its native name. It produces, however, a useful timber, "not readily attacked by insects."—*Mason.* Dr. McClelland writing on the *Yellow Woods* of Pegu, says, there are three kinds fit for fancy work, and includes *Gmelina arborea*, as plentiful in the Pegu and Tounghoo Forests. It is a large and remarkably strong tough timber. Wood yellow, fit for fancy work.—*McClelland.* It is rather frequent on the Malabar coast. It is the *G. Rheedii* of Hooker in the Botanical magazine.—*Wight.* The wood is light

ale yellow colour, easily worked, and does not or warp, is used for picture frames, deck- mall boats, for making venetian blinds, ing boards, palankeen pannels, gram mea- &c. This tree deserves notice, it is very monly used in the Vizagapatam district, for foundation of walls and other purposes, ch require it to be submerged in water, where it is remarkably durable.—*M. E. J. R.* It is a very large timber tree, the wood of which much resembles teak and is very little affected by worms or the ordinary causes of decay. (*Fl. Ind.* vol. ii. p. 85.)—*O'Shaughnessy, p.* 486.

(4098) GMELINA ASIATICA. VERBENACEÆ, Ill. 174.

Nelacoomul vayr, TAM.	Nelacoomul. ROOT
Goomadoo also Nela Gooma die vayroo, TEL.	Gmelina Asiatica, LIN.
	Biddarie, SANS.

This plant rarely attains the size of a large shrub. It is very common on the Coromandel Coast. The root is mucilaginous and demulcent. —*O'Shaughnessy, p.* 486. Shrub small scolloped leaves and large yellow flowers armed with thorns, and forms an excellent hedge.—*Riddell.* Its root, which is mucilaginous and demulcent, the Vyteans reckon amongst those medicines which purify and sweeten the blood in cases of depraved habit of body.—*Ains. Mat. Med. p.* 94.

(4099) GMELINA PARVIFLORA.

Goomadi, TAM. Sheeri goomoodoo, HIND.

A shrub like the former, having dark orange coloured flowers.—*Jaffrey.* Its leaves slightly bruised under water render it mucilaginous, which property the water retains till the mucilage is decomposed by fermentation.—*O'Shaughnessy.*

(4100) GNAPHALIUM EXIMIUM.—These flowers possess the quality of retaining their colour long after being gathered, the stalk is covered with a whitish down, they are very hardy, both the annual and bienial, the colours are yellow, purple, crimson, yellow and white in North America, Africa and Egypt, and grow from two to three feet in height.—*Riddell.* Wight gives Gnaphalium hypoleucum, 1114; marcescens, 1115; Neilgherryanum, 478.

(4101) GNEMIUM GNETUM.

Bagu, MALAY.	Wagu, JAVANESE.

A coarse cordage is made from the fibrous bark of this tree, which is in extensive use by the people of the Archipelago.—*Crawfurd's Dict. p.* 26.

(4102) GNETACEÆ, *Joint-Firs*, a natural order of Plants belonging to the small class of Gymnosperms. The species consist of small trees very much branched, or of sarmentose shrubs with opposite or clustered branches, and thickened separable articulations. The leaves are opposite, entire, with pinnate veins, sometimes very minute and scale-shaped. The ligneous tissue of the wood is marked with circular discs. The flowers are monœcious or dicœcious; the stamens are contained in a 1-leaved calyx; the ovary is perforated at the apex, containing in a single cavity a solitary erect ovule; the ovule pointed by a style-like process, formed from the membrane of the nucleus; there is no trace of a style or stigma. The species of this family are natives of the temperate parts of Europe, Asia, and South America. *Gnetum* is an inhabitant of the hottest parts of India and Guyana. Some of the species of *Gnetum* are used as food. The seeds of *G. Gnetum* are eaten in Amboyna, and are roasted, boiled, or fried. The green leaves are cooked and eaten like spinach. The inside of the fruit of *G. urens* is lined with stinging hairs: the seeds are, however, eaten; the stem exudes a transparent gum, and when cut across yields a large quantity of transparent water, which is drunk. (Lindley, *Natural System of Botany.*)—*Eng. Cyc.*

(4103) GOAT. In Malay it has two names, Kambing and bebek, the last being oddly enough the name for the domestic duck in Javanese.—*Crawfurd's Dict., page* 143.

(4104) GOBIUS, a genus of Acanthopterygious Osseous Fishes belonging to the family *Gobioidæ*. All the species have two dorsal fins, scaly bodies, and a disc beneath the throat formed by the united ventral fins. By means of this disc they have the power of attaching themselves to rocks.—*Eng. Cyc.*

(4105) GODEPORE. A rather hard, fine, close-grained, heavy Ceylon wood.

(4106) GODETIA ŒNOTHERA. This is a very pretty single petalled white flower, blossoming only in the evening; and towards morning turns to a pink, when it closes and withers. A fresh succession of flowers continues many weeks, even during the hot season. Is propagated by seed, either in pots or beds. The seed may be sown in the rains—soil should be rich.—*Riddell.*

(4107) GOKEROO, PRICKLY FRUITED PEDALIUM.

Khusuke-kibeer, ARAB.	Ananeringie, TAM.
Æknerenchi, CYNG.	Yeanugapulleeroo. TEL.
Gokeroo, DUK. GUZ. HIND.	*Faulkner.*
Ghejasoodumoostra, SANS.	

(4108) GOKHRU, GOKHARA, TRIBULUS TERRESTRIS AND LANUGINOSUS, *Caltrops.* The seed, which is highly mucilaginous, as is also the whole plant, is cooling and demulcent, taken in water as a diluent. Very abundant and troublesome to the naked foot of the natives.—*Gen. Med. Top. p.* 135. Mr. Faulkner says they are prickly capsules, which, when agitated in water, renders it mucilaginous, in which state they are prescribed by native practitoners in dysuria, and gonorrhea. They are the produce of an annual plant growing generally on the Coromandel Coast. They are procurable in most Indian bazars.—*Faulkner.*

(4109) GOLD.

Zehab, Tibr, Arab.	Zir, Pers.
Guld, Dan.	Zloto, Pol.
Goud, Dut.	Oiro, Sp.
Or, Fr.	Oiro, Ouro, Port.
Gold, Ger.	Soloto, Rus.
Suna, Guz. Hind.	Swarna, Sans.
Oro, It.	Guld, Sw.
Aurum, Rex Metallorum, Lat.	Ponnoo, Tam, Soona, Duk. & Hindoob.
Mas, Mal.	Bungarroo, Tel

Gold is one of the precious metals. It differs remarkably from other metals, with a very few exceptions, in the fact that it is found in nature in its metallic state. It is occasionally found mineralised by tellurium. Native gold is Monometric, and occurs in cubes without cleavage, also in grains, thin laminæ, and masses, sometimes filiform or reticulated. The colour varies in shade, sometimes being a bright yellow, at others almost silvery-white, from the quantity of silver with which it is mixed. It is very ductile and malleable. Hardness 2.5 to 3. Specific gravity 12 to 20, varying according to the metals alloyed with the gold. Native gold usually contains silver, and in very various proportions. The finest native gold from Russia yielded—gold 98.96, silver 0.16, copper 0.35, iron 0.05; specific gravity 19.099. A gold from Marmata afforded only 73.45 per cent. of gold, with 26.48 per cent. of silver; specific gravity, 12.666. This last is in the proportion of 3 of gold and 1 of silver. The following proportions have also been obtained; 3½ to 1, 5 to 1, 6 to 1, 8 to 1; and this is the most common; 12 to 1 also is of frequent occurrence. Copper is often found in alloy with gold, and also Palladium and Rhodium. A Rhodium Gold from Mexico gave the specific gravity 15.5 to 16.8, and contained 34 to 43 per cent. of rhodium. Iron and copper pyrites are often mistaken for gold by those inexperienced in ores. Gold is at once distinguished by being easily cut in slices and flattening under a hammer. The pyrites when pounded are reduced to powder; iron pyrites is too hard to yield at all to a knife, and copper pyrites affords a dull greenish powder. Moreover the pyrites give off sulphur when strongly heated, while gold melts without any such odour. Native Gold is to a large extent obtained from alluvial washings. It is also found disseminated through certain rocks, especially quartz and talcose rocks, and it is often contained in pyrites, constituting the auriferous pyrites; the detritus affording gold-dust has proceeded from some gold-bearing rocks. Gold is widely distributed over the globe. It occurs in Brazil (where formerly a great part of that used was obtained), along the chain of mountains which runs nearly parallel with the coast, especially near Villa Rica and in the province of Minas Geraes; in New Granada, at Antioquia, Choco, and Grion; in Chili; sparingly in Peru and Mexico; in the southern of the United States. In Europe it is most abundant in Hungary, at Konigsberg, Schemnitz and Felsobanya, and in Transylvania, at Kapnik, Vorospatak, and Offenbanya; it occurs also in the sands of the Rhine, the Reuss, and Aar; on the southern slope of the Pennine Alps, from the Simplon and Monte Rosa to the valley of Aosta; in Piedmont; in Spain, formerly worked in Asturias; in the county of Wicklow in Ireland; and in Sweden at Edelfors. In the Ural Mountains there are valuable mines, also in the Cailles Mountains in Little Tibet. There are mines in Africa at Kordofan, between Dar-fur and Abyssinia; also south of Sahara, in the western part of Africa from Senegal to Cape Palmar; also along the coast opposite Madagascar between 22° and 28° S. lat., supposed to have, been the Ophir of the time of Solomon. Other regions in which gold is found are India, Malaca, China, Japan, Formosa, Ceylon, Java, Sumatra, and the Philippines. Until lately nearly all the gold of commerce came from Asiatic Russia and Mexico, but recent discoveries of gold in California and Australia have opened new and vast sources of supply. The particulars of the specie exported by the mail of the 20th January 1857, we subjoin; —Per Peninsular and Oriental Steam Navigation Company's Steamer 'Pera,' 19th Jan., 1857:— Bombay silver, £208,270; Ceylon, gold, £6882; Madras, gold, £1,000; silver, £10,000; Calcutta, silver, £141,175. Total, gold, £7882; silver, £359,445. Closing prices were, Consols for money 93½ ¾ and 93⅝, but for account they remained at 93¾ all day. Exchequer Bills ruled rather firmly, viz., at 2s premium, and East India Bonds under £1000 were also 2s premium. The New Three per Cents, brought 94⅛ ⅜, and the Reduced 93⅞ to 94⅛. We subjoin a statement (prepared by Messrs. Haggard and Pixley) of the export of bullion from London to the undermentioned countries during the six months ending 31st December 1856.

1856.	Gold.	Silver.	Total.	Total of Corresponding period last year.
	£	£	£	£
India (including Ceylon) ...	55,000	4,971,500	5,027,000	5,105,350
China and the Straits	54,980	2,753,300	2,808,200	1,696,910
Cape of Good Hope and Mauritius	9,000	3,500	12,500	5,980
Australia, Van Diemen's Land, and New Zealand	—	—	—	—
Hamburg, Belgium, and Rotterdam	1,970,900	740,700	2,711,600	1,095,660
France, via Boulogne, Calais, and Dunkirk	154,460	94,700	249,100	24,940
Peninsula and Mediterranean, with Constantinople and the Crimea	166,500	4,500	171,100	1,075,798
West Indies	161,600	—	161,600	383,060
Brazils	171,100	—	171,100	77,120
Africa	—	5,000	5,000	3,400
Total	2,744,000	8,573,200	11,317,200	9,402,210

During the entire year the total of specie shipped to the above countries reached £17,806,940, against £14,224,610 in 1855. These amounts do not include the large sums sent from the Mediterranean ports, which comprised during the twelve months £3700 of gold and £2,025,540 silver. Neither do they embrace the extraordinary amounts despatched via Folkestone and Dover

France, of which no accurate records are obtainable. In reporting on the state of the bullion market, they give the subjoined as the latest prices :—Bar gold, 77s 9d per oz. standard ; United States gold coin, 76s 4½d per oz ; bar silver, 5s 2½d per oz. standard ; five-franc pieces, 5s 0⅛d per oz. Gold and silver, but the latter principally, is largely imported into India. In a recent publication it was stated that, within the last five years, twenty-four millions of specie has been absorbed by Calcutta and Bombay alone.

		Bombay.	Bengal.	Total.
1851-52	Rs.	1,65,72,753	2,49,62,184	4,15,35,937
1852-53	„	2,23,05,796	3,49,66,251	5,72,72,047
1853-54	„	1,67,82,200	2,12,90,787	3,80,72,987
1854-55	„	67,87,340	64,08,606	1,31,95,946
1855-56	„	3,71,67,761	5,81,00,445	9,32,68,206
Total	Rs.	9,96,15,850	14,57,29,273	24,53,45,123

The drain towards China is almost as great, and both together cause a withdrawal of some seven millions a year from the currency of Europe. In connection with the above, it may be interesting to many to have the following :—

STATEMENT SHEWING THE AMOUNT OF GOLD

Imported from Calcutta into Madras, from 1st November 1855 to 31st Oct. 1856.				*Exported from Madras to Subordinate Ports, from 1st Nov. 1855 to 31st Oct. 1856.*			
Bullion. 1,63,950	Sovereigns. 2,50,685	Gold Mohurs. 19,885.	Total. 4,34,520.	Bullion. 11,625	Sovereigns. 54,840	Gold Mohurs. 750	Total. 87,215

The following, from the Editor, appeared in the *Madras Athenæum*. Our readers may have had their attention attracted by a paragraph, in our Bangalore news, inserted in our issue of Saturday last, announcing the discovery of a nugget of gold in the vicinity of Chittledroog,—and from the rapid changes of an Indian Society many may not be aware that the Madras Presidency, more than those of Bengal and Bombay, has been surveyed throughout its length and breadth by Buchanan, Voysey, Heyne, Turnbull Christie, Benza, Newbold, and Malcomson, all of whom reported the existence of gold in various parts of the country. There are now also in the Central Museum specimens of the matrix rocks and of the sands in which the gold is found, and specimens of rocks are being received said to be of similar structure to those of the gold tracts of California and Australia. As there may be many travellers or residents in the gold regions of this presidency, disposed to examine the mines and trace the gold to the quartz matrix in which it is found, we content ourselves with indicating the various gold localities. The Committee of 1832 who were appointed by this Government to report on Lieutenant Nicolson's proceedings, mention that— " Nearly the whole of the Province of *Malabar*, except that part immediately along the Coast consists of lofty mountains covered with dense forest or thick jungle. The principle chain more immediately connected with the present subject is formed of the *Koondah* and *Mookoorty* Hills to the south-east of *Calicut*, and *Neilgherries* to the east, and the *Wynaad* mountains to the north-east. These send off numerous lateral ranges between which are deep vallies in most places closely covered with forest. The most extensive of these is that of *Nelamboor* including nearly the whole of the *Ernaad* Talook, bounded on the east by the *Neilgherries*, on the north by *Wynaad*, on the north-west by a lateral range running south from the Ghauts called the *Wawoot* Hills, and on the south by the *Koondah* and *Mookoorty* mountains. From these on all sides innumerable mountain streams descend, and uniting near *Nelamboor*, form the *Beypoor* river, of considerable magnitude, which falls into the sea about eight miles to the southward of *Calicut*. The names of the different streams are particularized in a valuable paper on the gold mines by Mr. Sheffield. In the mountainous district of *Wynaad*, streams in the same manner descend through every valley and unite into large rivers which fall into the *Cavery* in the *Mysore* and *Coimbatore* countries. The whole of the mountains abovementioned seem to be of primitive formation. In the *Nelamboor* valley, so far as the observations of the Committee went, the prevailing rock is Gneiss, a kind of stratified granite. Above this in most places, is a species of clay-iron-stone, which from its softness, enabling it to be cut into the form of bricks for building, received from Dr. Buchanan the name of *Laterite*. It is what Geologists call the overlying rock of the whole country between the Ghauts and the sea to the westward, and many of the smaller hills are entirely formed of it. " When fresh dug it is perfectly sectile, but on exposure to the heat of the sun, and to the weather it becomes of considerable hardness. So far as the gold mines are concerned, it may be considered to be a deposit formed in the lapse of ages, from the gradual disintegration of the immense mountain masses in the neighbourhood ; in which process part of the precious ore may be supposed to have been washed down along with the earthy particles. However this may be, it is certain that gold exists more or less abundantly in the whole of the country on the western side of the Ghauts in every stream which takes its rise from the *Koondah*, *Neilgherry* and *Wynaad* mountains, and in the sands of the sea shore along the whole of *South Malabar*. It is throughout in the form of minute grains. One of the persons examined states that he had once or twice seen a piece as heavy as a gold fanam (about the 1-80th part of an ounce Troy), but in all the specimens examined by the Committee, the portions were infinitely smaller. The mines principally exist in the Ernaad, Wynaad, Neddinganaad, Koormenaad, Calicut, and Shernaad Talooks. Considering the length of time that gold has been regularly

collected in the river sands of nearly the whole of Southern India, it is somewhat surprising that no one has as yet traced the gold to its matrix in the higher lands on which the gold rivers rise. This is the more surprising because both Lieut. Nicolson, who during 1830, and 1831 and 32 was employed, with a body of pioneers, to ascertain the value of the gold mines in Malabar, then distinctly stated that he had traced the source of the gold to its matrix, in the rocks of the Coondah and Mokoorty Hills; in one of his later reports he mentioned that the miners in Malabar generally pursue the veins of quartz, and wash the portions of rock and earth composing them, from a belief that they are most productive. About ten years subsequent to this, the late Capt. Newbold remarked that it is where plutonic rocks come in contact with the primary schists that a greater tendency to metallic and silicious development is observed, and we find he writes that from the Himmalayas to Cape Comorin, in the Malayan Peninsula, Borneo, Sumatra, Assam, the Birman Empire, and in Hungary it is in veins of quartz, ferruginous quartz and their alluvium that we find gold to exist in the greatest abundance. The gold rocks now in the Central Museum show the same fact of quartzoze rocks being the matrix of the gold in Southern India. It is not clear how long these gold deposits have been known to the East India Company: but in 1793, Mr. Duncan, when Governor of Bombay, ordered a minute report to be made to him on the subject of the mines in Malabar, which still continue to be worked very industriously by the Natives of the country. Mr. Sheffield the Collector of that province, afterwards in 1831 made their existence known to Government, when he stated that gold dust weighing 11,449 fanams had been collected in a few of the talooks there: Government subsequently sanctioned Lieut. Nicolson's employment with pioneers to ascertain the value of the mines, and on his reports a committee was appointed on the subject. The authorities above referred to mention that gold is found in all the rivers of the Malabar province, from the stream which falls into the sea at Elatoor about 8 miles north of Calicut, and as far south as the numerous streams flowing through the Paulghaut valley, which at their junction about 15 miles below Paulghautcherry to the great Ponany river, and some of which reach the southern boundary between Cochin and Malabar about one hundred and ten miles to the south east of Calicut. The principal places and streams in Malabar where the gold seekers work their mines are as follows:

Ariabode river in Ernaad.

Aripanaad hill in Ernaad.

Alliporam river in Nedingenaad.

Arliporamboor river, a feeder of the Todakul river.

Arnakyum river disemboguing at Caralondy.

Beypore river.—Native gold is found in the beds of the several branches of this river which flow through the Nelamboor valley, before they all unite above Mambaat Angaddy.

Carampoya or Carambye river rises like the Ponapoya, q. v. with which it unites at Poolliumpara in Wynaad, and their united stream is then called Pamdy-paya, but this, on approaching the Ghauts, again divides into two streams and the main branch called in the Nelamboor valley, the Caramboe, rushes down the Alliumpully cherum.

Carcatode in the Ernaad Talook.

Caralondy or Kadaloondy on the sea beach in the Shernaad Talook.

Coodernapoya river, a feeder of the Beypore river.

Caracoorpoya river, descends from Devalla to the right of the road through the Carcoor pass to join the Poonapoya river, q. v.

Cholyode in Monanaad in Wynaad q. v.

Cacatode perhaps the same as Carcatode q. v.

Coorambal, see Neelamboor.

Catchapoora river in Ernaad.

Capul Mines p. 160 vol. xiv.

Carembat jungle near Carcoor p. 161 vol. xiv.

Cumballa Nullay, one of the Chulamally range close under Nellialum.

Devalla and its vicinity in Wynaad q. v.

Eddakara river in Ernaad p. 160 vol. xiv. M. L. S. Journal.

Goddaloor.

Iroopoonjay river in Calicut Talook lb.

Kanamanna river in Ernaad p. 169.

Karote, „ „ „ „ „

Rootakel, „ „ „ „ „

Kakatode, „ „ „ „ „

Kutchapoora, see Nelamboor.

Kutchambara on the bank of the Coodoora Poya river.

Killakumpoya river, rushes down from the Wynaad into the Nelamboor valley to join the Poonapoya which see.

Moondairy, see Neelamboor.

Manneecote, see Neelamboor.

Monanaad, in Wynaud q. v.

Moopeynaad, in Wynaad.

Manantoddy, in Wynaad q. v.

Mullialum.

Mambaat-angady, see Beypoor river.

Moothoota river in Ernaad Talook.

Morootingat river „ „

Mannakat, „ „

Marootheyl, „ „

Marootheyl, „ „

Mooryatha, „ „

Malapooram river in Koornenaad T.

Mambaat p. 167 vol. xiv. M. L. S. Journal.

Malabar, the matrix of the golden ore is supposed to be in the moutains and hills of Malabar, and even many elevated spots in the valleys of Nelamboor and Mookoorty, and immediate vicinity of Devalla and the Koondah and Neilgherry

mountains whilst that which is found in the beds of rivers and other mountain streams seems to be fortuitously brought down by the monsoon rains.

Nambalacutta, in Wynaad q. v.

Nillialum, in Mopeynaad, see Wynaad.

Nelamboor valley—the mines in that direction are innumerable: the principal ones however are in the thickest part of the jungle immediately under the Wynaad Hills and near the following villages belonging to the Teeroopaad of Nelamboor, viz.

Neelamboor viz. Goodrambat, Kutchapoora.

Moondairy and Maneecote p. 164 vol. xiv.

Park Meetil in Wynaad q. v.

Parparangaddy: the sands on the sea beach between Parparangaddy, Caralondy and Beypoor p. 154 p. 157 vol. xiv.

Pallay Kooth river in Ernaad Talook p. 169.

Pathillypaddom ,, ,, ,, ,,

Poolakottu ,, ,, ,, ,,

Pootoo Piryarate ,, ,, ,, ,,

Poonany in Moopeyanaad, see Wynaad.

Parparangady in the Shernaad Talook to Caraloondy and thence to Beypore—the sea beach between these places.

Poonapoya or Golden river that rises in the Paral Mallah N. E. of Mookoorty and forming part of the main chain of the Neilgherries. See Carampoya. The Poornapoya descends the mountains between Alliam Pullay and the Carcoor Cherrum and long before its formation with the Carrumbye, it receives both the Kellakumpoya and Caracoopoya.

Pooney Hill in Tiroowally Talook p. 169.

Poolyode ,, ,, ,, ,, ,,

Poonoor river in Koormenaad Talook ,,

Pooloowye river in Calicut Talook ,,

Poondaloor river in Nedingenaad Talook.

Teeroowalay or Teermoulay a hill near Mambaat Angady, about 150 feet above the level of the Beypore river, p. 156 and 160 vol. xiv. Teeroowambady division of Polwye, North of the Beypore river is a mountain stream which, descending the Ghauts to the left of the road through the Tambercherry pass, runs through the Tambercherry and Palwye districts and forms a junction with the great Beypore river between Pauroor and Sherwaddu, and opposite to Mapooram, in the Ernaad Talook.

Toodakul river a feeder of the Ponancy q v.

Tirompaddy river in Calicut, p. 169 vol. iv.

Varoor river in Ernaad.

Wynaad, above the Ghauts, gold is found in Parkmeetil, a higher table land, between Manantoddy and Nambollacotta, at a place called Chollyode in Monanaad and Nillialum and Ponany in Moopeyanaad, it is likewise found at Devalla and its immediate vicinity in Namballacotta, p. 156 vol. xiv. An officer of the Bombay Artillery, examined the gold districts in the Dharwar and Belgaum collectorates. Many years ago, the attention of the late Captain Newbold was drawn to that locality, when travelling through Damul, and those interested in the subject will find an account, p. 44 of vol. xi. of the Madras Journal, of the gold that he discovered there, in the bed of a rivulet at Sattoor, a few miles from Dhoni, in the Kupputgode range of Hills near Damul. Also in the sands of the *Hurti rivulet*, in the same range, a few miles to the South of *Gudduk*; and he mentions that gold likewise exists in the Kir talook of the Dharwar Collectorate, near Chick Mulgoond. The gold of the Kupputgode range seems mixed with silver, for he obtained a small button of that metal from the auriferous ore collected in the sands near Dhoni, and he subsequently discovered a grey silver ore in a fragment of quartz that he picked up there. There has not been recorded any account of the products of the washings of Malabar, but in washing the sands of the Kupputgode range, there remains a black sand (menachanite) which Captain Newbold supposed to be probably derived from the decomposition of the dykes of basaltic rock, or the greenstone and hornblende rocks in the vicinity. Further to the west, the same kind of black sand is mixed with the gold found in the bed of the river at the village of *Cananelly*, near Bellary, in the Ceded Districts, specimens of which and of the gold discovered there are now in the Madras Museum. Although it has been reported that gold has been detected in the Cuddapah Collectorate, we do not find any sufficient authority for the statement, and think it unlikely to have escaped the notice of Dr. Voysey, who mentions the fact of a large proportion of silver being found in the Sulphuret of Lead discovered 15 miles in a N. E. direction from the branch of the Penaar, South of Cuddapah. The only other places, therefore, in the Ceded districts, where gold is authoritatively mentioned as occurring, is at *Suttangul*, where Heynes at p. 342 of his Tracts describes it as having been discovered near Royacottah, not far from Pangampillay, near Hurrydroog. Although there seems no doubt that the gold in these auriferous rivulets is only washed down from their neighbouring hills, there has hitherto been no effort made in this country to trace the valuable ore to its matrix. Many years ago Captain Newbold suggested that the sands should be carefully examined every 40 or 50 yards, and the spot where the particles of gold no longer appear, most diligently explored, the subjacent rock laid bare, and if necessary an excavation made into it, but with our more perfect knowledge of the matrix of the ore, we would suggest that the explorer, hammer in hand, strike at once at the veins of quartz that traverse the rocks adjacent to the gold rivers, for we are not without hopes that the auriferous quartzes of these province would prove as productive as any in the world. In *the Hyderabad* Territories gold has

been mentioned as occurring at Goodaloor, or Godalore, on the Godavery, where the late Dr. Walker, at p. 184 of vol. xvi. of the M. Literary Society's Journal, mentions its occurrence, where the Ramghere and Cummumet Circars meet, and also in several nullahs that feed the Godavery from the south. Further north, in the Rajah of Berar's territories, Mr. Burr describes gold as occurring in many of the rivers in the Nagpore district, almost in the centre of India, and, at the same page, he gives the late Mr. Mason as his authority for stating that the natives obtain a little gold by washing in the streams near Vizagapatam. As we turn southwards, however, we do not observe mention made of any gold in the Masulipatam or Guntoor Collectorates, nor do the specimens of rocks from these districts in the Central Museum indicate the presence of the ore, there. In the Nellore Collectorate, however, we find Dr. Voysey mentions the occurrence of Copper in the veins of white quartz,—and at Callastry in the North Arcot Collectorate, he states that the quartz rock contains lead ore mixed with silver. As we proceed still more to the south, we enter again upon the gold districts of Madras Presidency; for gold, writes Mr. Burr, is well known to occur in *Coimbatore* and the southern declivities of the Neilgherry Hills. Capt. Newbold states, (vol. I. p. 514 of Sir Whitelaw Ainslie's Materia Medica) that gold was discovered by the late Mr. Mainwaring in the *Madura* district, where it occurs mineralized by means of zinc, constituting a blende which he thought resembled somewhat the Schemnitz blende of Hungary. The streams running through the Paulghaut valley, which unite about 15 miles below Palghautcherry and form the great Ponany river, are repeatedly mentioned as containing gold; and in June 1832 when Lieut. Nicolson was returning to the scene of his mining labours in Malabar, he visited, in his route, such spots as he considered likely to produce the mineral of which he had been in search so many months; and tidings of the existence of the ore are stated to have been found at *Darampooray*, at the foot of the *Shevaroy Hills*, at *Sattiamungalum*, *Donagancottah*, *Addivarum* or *Stremogoy* and *Metapollum*, and a very precise and scientific enquirer, lately arrived in Madras, has now in his possession the gold sands of Polygonuth, about 45 miles from Dindigul, and mentions that he has lately seen the natives washing for gold at the branch of the Cauvery, which runs past Darampooram. When describing the gold of the Kuppotgode range, Captain Newbold mentions the existence of the ore around the base of the Neilgherry and Koondah mountains, and in the Wynaad. Lieut. Nicolson, indeed, when working in Malabar 20 years ago, stated that he had fairly traced the strata that contain gold in the direction of the Koondah and Mookoorty Hills, but this report of his was subsequently found not to rest on solid data; the gold Commissioners attributing the error that that officer had fallen into, to his too sanguine disposition leading him to trust to the report of a native. We have noticed above, however, the existence of gold in the Carcoor Pass, and at Devalla: indeed specimens of the rocks, from the gold mines at the latter place, are now in the Madras Central Museum, and a gentleman of Madras lately brought with him a specimen of the gold rocks at Goondaloor, and Mr. Burr also, at p. 72 vol. xii. of M. J. S. J., mentions the southern declivities of the Neilgherry mountains as gold districts: Dr. Benza is however the only author we have met with, who states that gold has been found on the plateau of these Hills. "It is, he writes, in this kind of magnetic iron ore, particularly in the blocks below Gradation Hall, that I remarked on the quartz laminæ, small, brilliant, gold-coloured specks, precisely similar to those seen in the auriferous quartz veins in the rocks of the Malabar coast, specimens of which have been deposited by Colonel Cullen in the Museum of the Asiatic Society of Bengal. Does this appearance indicate the existence of gold particles in this ore? We know that in America, gold is occasionally found in the siderocriste, which is a species of quartz iron ore, like the one just described. It is the belief of some people, that owing to the similarity of the rocks, of the detritus, and of the quartz veins of the Malabar coast, and of these hills, gold may be found in the last, as well as in the former. The specimen of the earth I send is taken (No. 22) from an excavation made, some years ago, by an officer, who had been employed on the Malabar coast, for the purpose of ascertaining the existence of gold in the detritus of that coast. It is said that he found gold in the earth dug upon the side of one of the hills of the Dodabetta group, facing the cantonment." The quartzoze rock which Dr. Benza says contains the ore is now in the Madras Museum. We now come to the Mysore territories, the only portion of this Presidency requiring to be noticed, and we would particularly direct the attention of enquirers to the various localities in it that we may here point out, as well because of the long known general diffusion there of the precious ore, as because those who have most attentively examined the geology of the Mysore country regard its rocks as strongly indicative of gold being in abundance there. It is not known how long the natives have been working for gold at Baitmungalum just above the Ghats—but Heyne mentions that Captain Warren had learned the fact of the natives employing themselves, in their leisure, in working for the ore amongst the rocks and stones at that place and the same fact is repeated by Sir Whitelaw Ainslie and Dr. Clark, the latter of

whom remarks that gold was discovered in the eastern provinces of Mysore by Lieutenant Warren of H. M. 33d Regiment in 1802,—who found it in the small nullahs or ruts or breaks in the ground at Warrigum, a small village 4½ miles S. W. of Baitmungalum, also on the banks of the Palar river, and the Ponian near Caargory: from a load of earth near the last he obtained 3 sparkles of gold. He found gold also at *Marcoopium* 3 miles south of Warrigum, where there were mines worked by natives and which had also been worked by Tippoo. Heyne likewise (at page 41) states that gold has been found near the hills to the S. E. of Ooscottah, and Newbold describes gold as having been discovered by Captain Warren, near the Batterine Hills. These sites in Mysore we think might all be carefully examined, and the river ore traced to its matrix; the climate is less prejudicial to health than most of the other gold districts that we indicated above; and the reported recent discovery of a nugget may likewise contribute to stimulate to new sites. But we would more particularly request attention to the glacis-like slope at the foot of the Mysore hill facing the town, where a crumbling grey chlorite rock exists, as one that might be looked at. On the right hand side of the Mercara road, about two miles west of the town of Hoonsoor a whitish sand will be observed, which, if washed, gold may be detected in; and it might be looked for also between Yeddadora and Saligram, about 18 miles from Hoonsoor. The specimens now in the Central Museum of rocks from the gold districts of the Madras Presidency, consist of steatite and ferruginous quartz; and such rocks are abundant in Mysore and Madura. Indeed among the steatite and quartz specimens which the Rev. Mr. Muzzy contributed from the Madura district, there are several which closely resemble the specimens from the gold mines at Devalla and other places on the Western Coast. India has not much to boast of with regard to this metal; very little of it having hitherto been found in these provinces. Captain Hardwicke says, it can be obtained from sand, in the Sirinagur country, and we know it to be a product of Assam. (2) Captain Warren discovered a gold mine in Mysore in 1800, betwixt Annicul and Poonganore, but which does not appear to have been much attended to. The metal as far as I can learn, is disseminated in quartz, and also found in the alluvial soil. Gold too, I understand, was obtained in the Madura district, by the late Mr. W. Mainwaring, in a native sulphuret of Zinc (blende). Captain Arthur of the Corps of Engineers informed him that he found Native Gold in Mysore, disseminated in quartz, and also in an indurated clay: some specimens he observed crystallized, in minute cubes. Gold dust has been got in the bed of the Godavery, and in Malabar, in the bed of the river which passes Nelambur in the Ernaad district; it has moreover, been procured in very small quantities, in Wynaad, and in the sand of the Beypoor river, near Calicut. Though the sources are evidently numerous from which this valuable metal can be obtained in the Indian Peninsula, it would seem, from the little interest they have hitherto excited, that none of them promised to be very productive. In other Eastern territories, however, gold is met with in greater abundance. By Forest's account there is much of it in the island of Mindano: it is a produce of almost all the Philippine islands; also of Borneo, of Sumatra, of Pegu, of China, of the Burmah dominions, of Siam and of Thibet; but perhaps, in no part of the world, is it found in such quantity or with less trouble than in Cochin China; nay, it would appear, from the description of that kingdom which may be seen in the Asiatic Annual Register for 1801, that Gold there is almost taken pure from the mines, which are near the surface of the earth.—*Ainslie's Mat. Med. page* 54. Appended to a Memoir will be found accounts of the auriferous deposits ot Assam and the vicinity of Shew Gween in the Province of Martaban. The gold discovered in both localities is of considerable purity, the latter Mr. Oldham considers fully equal in value to the average quality of Australian gold. Though not quite so abundant as in California, yet there is perhaps, no mineral, except iron, more universally diffused over the Provinces, than gold. It is found in the lead near their northern boundary, it is washed from the sands of the Tenasserim on the south, and the streams that tumble from the high granite mountains between Yay and Monmagon, are constantly 'rolling down their golden sands' into the valleys around. It has been collected, in small quantities, in the tin deposits east of Tavoy. Mr. O'Riley found gold in the tin from Henzai, half a degree south of Yai, and "almost all the creeks," says Dr. Helfer, "coming from the eastern or Siamese side of the Tenasserim river, contain gold. The greatest quantity is obtained close to the old town of Tenasserim where people wash it, and obtain sometimes one anna's weight each, during the rainy season." The richest deposit of gold in the Provinces, is however, at the head waters of Tavoy river, where it is found in an alluvial or diluvial formation of red earth and pebbles, very similar to that in which gold is found in North Carolina. On the east side of the mountains, at the base of which this deposit rests, "the Siamese Government," says Dr. Morton, "have several hundred men permanently occupied, each of whom it is said, is expected to deliver one tickal (about one rupee and a quarter) weight of gold dust per annum,—The Burmese authorities in former times also employed people in this work at the streams on our side of the boundary, but

though the quantity then procured was greater than at present, this does not appear to have ever been considerable. The method adopted is that of digging a longitudinal excavation in the sand, and washing, from time to time the deposit found therein." Three or four years ago, the head native officer in Tavoy made an experiment at "the diggings" on Tavoy river, and by the washings, of nine days, obtained gold to the value of about ten rupees. This gold appears to contain a considerable proportion of silver. Mr. O'Riley says that the Assay Master at the Mint in Calcutta reported it.

Gold,.....	87.895
Silver,.....	9.241
Base metal,.....	2.864
	1,00,000

This metal, in sufficient abundance to be worked, is found in the Malay Peninsula, Sumatra, the Western and Southern sides of Borneo, the Northern and South-Western Peninsulas of Celebes, and in a few parts of the great Philippine islands of Luzon and Mindano. The produce of the Western side of Borneo, by far the largest, have been estimated as low as 52,000 ounces. and this by parties reckoning the Chinese population of the same country, most of it engaged in gold washing, as high as 125,000. On the other hand, Sir Stamford Raffles estimated the total annual produce of the Western part of Borneo as high as 225,335 ounces, which at the value of 3*l*. 17*s*. the ounce, would give a total value of 867,539*l*. Mr. Logan estimates the total produce of the Malay Peninsula at no more than 20,000 ounces. I have never heard of any attempt at estimating that of Sumatra, Celebes, or the two Philippine Islands.—*Crawfurd Dict. page* 144. In China, Gold is collected in the sands of the rivers in Yunnan and Sz'chuen, especially from the upper branch of the Yangtsze-kiang called Kinsha-kiang or Golden sanded river, from this product. The largest amount is said by Davis to come from Likiang fu near that river and from Yungchang fu on the borders of Burmah. It is wrought into personal ornaments and knobs for official caps, and beaten into leaf for gilding, but is not used as a coin, nor is much found in market as bullion. Silver is brought from Yennan, near the borders of Cochin China and the mines in that region must be both extensive and easily worked to afford such large quantities as have been exported during the last five years. —*Williams' Middle Kingdom, page* 144. Gold is found in many parts of the Japanese Empire, sometimes it is obtained from its own ore, sometimes from the washings of the earth or sand and sometimes it is mixed with copper. The quantity in the country is undoubtedly great. An old Spanish writer of the seventeenth century tells us that in his day the palace of the Emperor at Yedo, as well as many houses of the nobility were literally covered with plates of gold. In the beginning of the Dutch trade the annual export was £840,000 sterling and in the course of sixty years the amount sent out of the kingdom through the Dutch alone was from twenty five to fifty millions sterling. Silver mines are quite as numerous as those of gold. In one year the Portuguese, while they had the trade, exported in silver £587,500 sterling. Copper abounds throughout the whole Japanese group and some of it is said to be not surpassed by any in the world. The natives refine it and cast it into cylinders about a foot long and an inch thick. The coarser kinds they cast into round lumps or cakes. Quicksilver is said to be abundant, but this, so far as we know, has never been an article of export Lead also is found to be plentiful, but like quicksilver it is not been sent out of the kingdom. Tin has also been discovered in small quantities, and of a quality so fine and white that it almost equals silver, but of the extent of this mineral little is known, as the Japanese do not attach much value to it, and therefore have not sought for it. Iron is found in three of the provinces, and probably exists in others. The Japanese know how to reduce the ore, and the metal they obtain is of superior quality, of which they make steel unsurpassed in excellency. Coal :—"They have no want of coals in Japan," says Kœmpfer, "they being dug up in great quantities in the province of Sikusen and in most of the northern provinces." Dr. Siebold also speaks of coal as being in common use throughout the country, and on visiting one of the mines he saw enough to convince him that it was skilfully worked. For domestic purposes they convert the coal into coke. Viewed in the light of commercial intercourse between the two hemispheres, this coal is worth more than all the metallic deposits we have enumerated Native sulphur.—In a region so volcanic, this is, as might be expected an abundant mineral. In some places it lies in broad deep beds, and may be dug up and removed with as much ease as sand. A considerable revenue is derived by the government from sulphur.—*American Expedition to Japan, p.* 76.

Mr. Burr—p. 30 vol. XII. Madras Literary Society Journal.

Chairman's report, p. p. 353 and 357 of No. 35.

Lieut. General Cullen's letter to Chief Secretary to Madras Government, p. 4 printed 1846.

Sir W. Ainslie in Materia Medica vol. I p. 515 quoted in p. 43 vol. of Madras Journal of Literature and Science.

Dr. Clark at p. 120 vol. IX of Madras Literary Society Journal.

Mr. Sheffield, Lieut. Nicolson, Mr. Duncan Governor of Bombay, Dr. Buchanan, Sir Whitelaw Ainslie quoted in Gold Committee's report to Madras Government at p. 154 vol. XIV of Journal of Madras Literary Society.

Dr. Turnbull Christie Vol. XV p. 154 of Madras Literary Society Journal.

Newbold p. 44, Vol. XI of the Madras Literary Society Journal.

(4110) GOMPHIA AUGUSTIFOLIA, is a native of Ceylon and the continent of India. The root and leaves are bitter. It is employed in Malabar in decoction, in milk, or water, as a tonic, stomachic, and anti-emetic.—*O'Shaughnessy, page* 269.

(4111) GOMPHRENA GLOBOSA. GLOBE AMARANTH; Everlasting flower. Gomphrena. Amaranthaceæ. Globe Amaranth.

Gool mukhmul, HIND. | Jafferee Goondee, DUK.

Both red and white varieties cultivated in gardens.—*Gen. Med. Top. page* 187. Annual: common in most gardens. The native women wear the flowers in their hair. It resembles red clover.—*Riddell.* In the Tenasserim Provinces, the globe amaranthus is often cultivated by Karens and Burmans, as well as by Europeans. —*Mason.*

(4112) GOMUTO OR EJOO (*Arenga saccharifera*, Labill.; *Saguerus Rumphii*).

Anou, SUMATRA.	Makse, AMB.
Gomuti, ENG.	Seho, TER.
Sagwire, PORT.	Duke or Dok, JAV.
Iju or Ejoo, or See jee. MAL.	Cabo negro, SP.

The *Gomuto* or *Ejoo* fibre, so well known in Eastern commerce and as used in Eastern shipping, is hardly known in the Western world. It is, however, occasionally heard of by the name of "vegetable bristles." Though a portion of the fibres may be likened to stiff bristles, the greater part is more like black horse-hair. This is celebrated, in the countries where it is produced, both for its strength and for its imperishable nature, even when exposed to wet. It is supposed to be the same as the *Cabo negro* of the Spaniards of Manilla. The tree yielding it was described and figured by Rumphius ('Herb. Amb.,' i, p. 57, t. 13) under the name of Gomuto, or *Saguerus;* but the latter name being too similar to that of the true Sago tree, has been changed to *Arenga*, from the native name *Areng*, under which it was described by Labillardiere. The specific name has been given from the large quantity of sugar procurable from its sap by cutting the spadices of the male flowers. We thus observe that the tree is valuable for several very distinct, and all very useful products. It is described by Marsden, in his 'Sumatra,' under the name of *Anou*, as a Palm of "much importance, as the natives procure from it *sago* (but there is also another sago tree, more productive); *toddy*, or palm wine, of the first quality; *sugar*, or jaggary; and *ejoo*." Dr. Roxburgh, writing in the year 1799, says of it: "I cannot avoid recommending to every one who possesses lands, particularly such as are low and near the coasts of India, to extend the cultivation thereof as much as possible. The palm wine itself, and the sugar it yields, the black fibres for cables and cordage, and the pith for sago, independently of many other uses, are objects of very great importance, particularly to the first maritime power in the world, which is in a great measure dependent on foreign states for hemp." This Palm is to be found in all parts, from the Gulf of Bengal to all the Asiatic islands on its eastward, especially in low moist situations and along the banks of rivers. Dr. Roxburgh describes the trees (in 1810) which had been introduced into the Botanic Garden at Calcutta about twenty-four years before, as from twenty to thirty feet in height, exclusive of foliage or fronds, which rise from fifteen to twenty feet higher. These fronds or leaves are pinnate, and from fifteen to twenty-five feet long. The trunk is straight, at first covered entirely with the sheaths of the fronds or leaves, and the black horsehair-like fibres, called by the Malays *Ejoo*, which issue in great abundance from the margins of these sheaths. As the tree advances in age and size, these drop off, leaving an elegant, columnar, naked trunk. He further states that he had observed that each of the well-grown thriving trees produces about six leaves annually, and that each leaf yields about three quarters of a pound weight of these fibres, and, therefore, each tree about four pounds and a half. But some luxuriant trees yield at least one pound of fibre from each leaf. As these black fibres issue from the sides of the sheaths, they necessarily surround the stem, and may be cut off without injury to the tree. Even in commercial specimens, some may be seen covered both on the upper and lower surface with dense cellular membranes, having between them a mass of these black fibres. These are supported by thicker or whalebone-like fibres, which are attached to the thinner fibres by cellular tissue. These stiff fibres are employed in Sumatra as styles for writing with on the leaves of other Palms, &c., as mentioned both by Marsden and Bennett. These fibres are further described as stronger, more durable, but less pliant and elastic than those of the *Coir*; but they resist decay, and are therefore more fit for cables and standing rigging, but less fit for running rigging. "The native shipping of all kinds are entirely equipped with the cordage of the *Gomuto*, and the largest European shipping in the Indies find the advantage of using cables of it. It undergoes no preparation but that of spinning and twisting,—no material similar to tar or pitch, indispensable to the preservation of hempen cordage, being necessary with a substance that, in a remarkable degree, possesses the quality of resisting alternations of heat and moisture. The best *Gomuto* is the produce of the islands farthest east, as Amboyna and the other Spice Islands. That of Java has a coarse ligneous fibre; the produce of Matura is better. Gomuto is generally sold in twisted shreds or yarns, often as low as a Spanish dollar a picul, and seldom above two; which last price is no

more than one sixth part of the price of Russia hemp in the London market. Were European ingenuity applied to the improvement of this material, there can be little doubt but it might be rendered more extensively useful." Milburn, again, in his 'Oriental Commerce,' mentions the Ejoo as of all vegetable substances the least subject to decay, and that it is manufactured into cables, and the small cordage of most of the Malay vessels made of it: "it is equally elastic with coir, but much more serviceable, and floats on the surface of the water." These fibres are universally employed, in the countries where the trees are indigenous, for making cordage for their nets and seines, as well as for the rigging of their vessels, as also cables. These are described by all as remarkable for their tenacity and durability, and as not undergoing any change by exposure to wet, not even when stowed away in a wet state. In some experiments made by Dr. Roxburgh, some thickish cord bore 96 lb., and some smaller 79 lb.; while coir of the same size bore only 87 lb. and 60lb. respectively. Besides the above horsehair-like fibres, there is at the base of the leaves a fine woolly material (baree), much employed in caulking ships, as stuffing for cushions, and as tinder. Ejoo was sent to the London Exhibition of 1851, *via* Singapore, from Malacca, as separated from stiff fibres, and as prepared for manufacture or export, and prepared as sinnet or coarse line for making ropes or cables. The portion belonging to each leaf having apparently been cut off close to the sheath, and each measuring about three feet in breadth and two feet in length. The bundles of the coarse and fine fibres are about six feet in length, and about twelve inches in diameter, neatly tied up with split cane. Interspersed among the coarser, there are some finer fibres, something like black wool. The sinnet is coarse, but strong, and broke with a weight of 85lb., when coir of about the same size broke with 75 lb.; but the comparison is not very exact. Mr. Kyd, the celebrated ship-builder of Calcutta, possessed a cable made of the Ejoo fibre, which he had had for four years exposed to all weathers, and which raised the bow anchor of a merchant ship of 500 tons, buried in the sands of the Hoogly; in two previous attempts at which, three Russian hempen cables had given way. Besides making strong and durable cordage, the Ejoo fibre is no doubt applicable to a variety of purposes for which horsehair and bristles are now employed. *Fib. Pl. p.* 99. Seeman tells us that Gomuti is a horse-hair looking substance produced at the base of the petioles of the Arenga saccharifera, and is known by various names in the languages of the Archipelago. This fibrous substance is superior in quality, cheapness and durability to that obtained from the husk of the Cocoa-nut. It has great power in resisting wet, and is used by the natives of the Indian islands for every domestic and naval purpose to which cordage, is applied, a practice in which Europeans have of late years imitated them. The coarser parts are used as pens by all the tribes who write on paper, and as the arrows for blow pipes or arrow-tubes. The Gomuti, of all vegetable substances, is the least prone to decay, it is fastened like straw over the bamboo thatch: round the ends of posts placed in the ground: mixed with mortar: and is planted by the Burmese into ornaments of the arms, legs and neck. The Arenga saccharifera tree produces about six leaves annually, and each leaf yields from eight to sixteen ounces of clean fibres.—*Seeman.* See ARENGA SACCHARIFERA.

(4113) GOODIA LATIFOLIA. LEGUMINOSÆ. This genus of flowering plants are all natives of New Holland, colour of the flowers yellow, they never attain any great height, they may be raised from seed or cuttings, in a loamy soil.—*Riddell.*

(4114) GOOGULL FIBRE is supposed to be obtained from the Isora corylifolia, the Valumbrikaya of the Tamils.

(4115) GOOLAB, distilled rose water, prepared also in India, but largely imported from the Persian Gulf.

(4116) GOONCII. Roots of Abrus precatorius. An Indian substitute for liquorice.

(4117) GOONG.

Goong, Goonch, GUZ. & HIND.

A little red and black seed, obtained from the pod of a plant (*Abrus precatorius*), growing wild in Southern Asia and also met with in some parts of Africa and America. These seeds are used in India as weights by jewellers, and also for bracelets, necklaces, and other trinkets.—*Faulkner.*

(4118) GOOR, SACCHARUM OFFICINARUM.

Goor, Duk. | Bellnm, TEL.
Nullavellum, TAM. | Jaggary, ENG.

A very coarse kind of sugar obtained from the Sugar cane.—*Ainslie, Met. Med. pdge* 266.

(4119) GOORAKIEME. A soft, fine, but open-grained, light Ceylon wood.

(4120) GOORAKOO; Goodakoo or Goodak; called in Bengal Tambakoo, the name given in the Peninsula of India to the compound of tobacco for the *hookah*; from *goor* raw sugar and *akoo* Tel: leaf.—*Herklots.*

(4121) GONG OR LOO, a Chinese musical instrument, composed of a mixed metal, (said to be tin, copper, and bismuth), resembling bronze in appearance. It is in the form of a large flat basin, with a ridge; and, when beaten with a stick or mallet, covered with woollen cloth or twist, emits a strong reverberating sound. Its value is in proportion to the quantity of metal it contains.—*Crawfurd Dict.*

(4122) GOPI-CHUNDUN, an aluminous yellow earth, brought from the ganges at Hurdwar, to Ajmere, and used to mark the foreheads of those who worship Vishnu: also given in medicine.—*Gen. Med. Top. p.* 131.

(4123) GOROCHAMUN: BEZOAR.

(4124) GORDONIA FLORIBUNDA. A species of Gordonia is a conspicuous tree in Maulmain. It belongs to the same family as the tea plant, and the camelias of which the japonicas are such favorites, and is a member of the same genus as the American loblolly bay, and Franklinia, to which the flower bears a strong resemblance. Wallich has named the Tenasserim tree the abundant flowering gordonia, but there is some difference between the Tavoy and Maulmain trees; whether enough however to constitute different species, is doubtful. The Maulmain tree has leaves precisely like *G. obtusa* "with shallow serratures;" but the leaves of the Tavoy tree are quite entire. The Burmese have different names for them. The timber of Gordonia floribunda, and Gordonia integrifolia is called "itch-wood" by the Tavoyers, from the itching which its chips or bark occasion when brought in contact with the skin. Mr. Mason has often seen its compact timber used for house posts, and for rice mortars.—*Mason.*

(4125) GORDONIA WALLICHII, is their most common tree much prized for ploughshares and other purposes requiring a hard wood: it is the "Sing-brangkun" of the Lepchas, and in Sikkim ascends to 4000 feet. Oaks at this elevation occur as solitary trees, of species different from those of Darjiling. There are three or four with a cup-shaped involucre, and three with spinous involucres enclosing an eatable sweet nut; these generally grow on a dry clayey soil.—*Hooker Him. Jour. Vol.* I. *page* 157.

(4126) GOSSAMPINUS RUMPHII. ERIODENDRON ANFRACTUOSUM. White cotton tree. The white cotton tree does not grow spontaneously in Tenasserim, but is often planted, and the floss, which it yields abundantly, is preferred to the product of the red cotton tree.—*Mason.*

(4127) GOSSYPIUM.

Thoothee, TEL. | Pungee, TAM.
Kuppass, HIND. |

A genus of Plants belonging to the natural order *Malvaceæ*, common to both the Old and New World, and which, from the hair, or cotton, enveloping its seeds being so admirably adapted for weaving into cloth, is, after those affording food, one of the most important groups of plants. There can be no doubt that it is indigenous in America, as, besides the distinctness in species, specimens of cotton still attached to the seeds, as well as cloth fabricated from the former, have been brought by Mr. Cumming from the Peruvian tombs. Some of the cloth, consisting of chequered squares of black and white, very nearly resembles some modern patterns. Humboldt has moreover stated that it formed the only clothing of the natives of Mexico, and is one of the plants they most anciently cultivated. With respect to the Old World, the almost universal use of cotton as clothing in the East is well known; and as the species, so far as ascertained by botanists, appear to be Indian and Chinese, the historical investigation is interesting as proving an early communication between the civilised nations of remote antiquity. Though Rossellini incorrectly states that cotton was employed as mummy-cloth, it must have been known to the ancient Egyptians, as he found some of the seed in one of the monuments of Thebes. In later times, we learn from Arrian that muslin was exported from India to the Arabian Gulf, and from that country cotton was no doubt first made known to the rest of the world. The Sanscrit name of the Cotton-Plant is 'karpasi,' and the Hindoo 'kupas;' the cotton itself is in the latter language called 'rooi.' The former is interesting, as 'karpasus' occurs in the "Periplus' of Arrian, and is rendered by Dr. Vincent 'fine muslin.' It is derived from the Sanscrit 'karpasi,' from which probably, as indicated by the editor of 'Harris's Dictionary,' the Hebrew word 'karpas,' employed in the book of Esther (chap. i. v. 6), is also derived; so likewise the Latin 'carbasus.' Dr. Royle, in his 'Essay on the Antiquity of Hindoo Medicine (note, p. 145), infers, that as in the above passage of Esther, white, green, and blue hangings fastened to pillars of marble, are described in the court of the garden of the king's palace; the practice appears similar to what is now adopted in India, where calico curtains, usually in red and white stripes, and stuffed with cotton (commonly called 'purdahs'), are employed everywhere in India, and at Delhi even in the king's hall of audience. This consists of colonnades of pillars supporting a light roof in the court before the private apartments of the palace. On the outer rows of pillars these purdahs are suspended; hence, the author infers, we may understand the use to which were applied the rows of pillars in front of the palace in the ruins of Persepolis. Cotton was no doubt in later times cultivated and manufactured into cloth. Pliny (lib. xix. c. 1) states that Upper Egypt produces a small shrub which some call 'gossypion,' others 'xylon, bearing fruit like a nut, from the interior of which a kind of wool is produced, from which very white and soft cloth is manufactured. Had it been common in Egypt in the time of Herodotus, it could not have escaped him; as he says specially of the Indians, that they possess a kind of plant which, instead of fruit, produces wool of a finer and better quality

than that of sheep: of this the natives make their clothes. Nearchus describes the dress of the Indians as being made of flax from trees ('Library of Entertaining Knowledge,' Egypt. Antiq., ii. p. 125). Theophrastus (lib. iv. c. 9) clearly describes the cotton with leaves like the vine as being abundant in the Island of Tylos in the Persian Gulf. Heeren, in his work on the 'Commerce of the Ancients,' comes to the conclusion that these plantations of cotton in the Island of Tylos were the result of the commerce with India, the true country of the cotton. The inferences from these quotations of the original introduction of cotton from India into Egypt are in some measure confirmed by there being no species of *Gossypium* indigenous and peculiar to the latter country. In conclusion, it is necessary to refer to the facility with which cotton is distinguished from linen to controvert the assertion of Rossellini that it was always employed for mummy-cloth; as the result of numerous observations by Bauer, &c., with the most powerful microscopes of modern times, and every variety of mummy-cloth, has proved that it is invariably composed of linen, and not of cotton cloth. The one fibre is easily distinguished from the other; that of cotton having a flat tape or riband-like appearance, while the fibre of the linen has a round tubular and even-jointed structure. (Egypt. Antiq., 'Library of Entertaining Knowledge,' vol. ii. p. 182). The genus *Gossypium* is characterised by having a double calyx, of which the inner is cup-shaped, obtusely 5-toothed, the outer or involucre tripartite, with the leaflets united at the base, cordate, with the margins irregularly cut. Stigmas, 3-5. Capsules, 3- or 5-celled, many-seeded. Seeds clothed with wool-like hairs, or cotton. The species of *Gossypium* occupy naturally a belt probably exceeding the torrid zone in breadth, but in a cultivated state we have cotton now extending on one hand to the south of Europe, and Lower Virginia and even Maryland in the United States of America; while on the other we have it as far south as the Cape of Good Hope, and in America to the southern parts of Brazil. Within these limits it may also be seen cultivated at considerable elevations. Baron Humboldt mentions having seen it even at 9000 feet of elevation in the Equinoctial Andes, and in Mexico at 5500 feet. Dr. Royle states that it is cultivated in small quantities at 4000 feet of elevation in 30° N. lat. in the Himalayas. The localities suited for the production of cotton depend as much upon the climate as the soil, and also upon the specific peculiarities of the different kinds of cotton plants. That the production of cotton is so much influenced by external circumstances is not more remarkable than in many other cultivated plants; indeed, we might expect it to be more so from the susceptibility of its hairy development to the influence of situation. Humboldt has remarked that *G. Barbadense*, *G. hirsutum*, and *G. religiosum* flourish in a climate where the mean annual temperature is from 82° to 68°; but that *G. herbaceum* is successfully cultivated where, the summer heat being 75° or 73°, that of winter is not less than 46° or 48°. The cultivation of the cotton however does not depend so much on winter cold as on sufficient length of suitable summer heat. The thermometer in Upper Virginia is sometimes as low as zero of Fahrenheit in winter, and yet cotton can be cultivated during the long summer. It is remarkable that a genus so important for its product, and so long known, and with comparatively so small a number of species, should yet have these undetermined. The celebrated De Candolle states, that no genus more urgently requires the labours of a monograph from a careful botanist who could have the opportunity of seeing the species in a living state. The confusion has in a great measure proceeded from botanists absurdly neglecting the cultivated in their search for new species; and cultivators being incompetent or unwilling to distinguish varieties from species, frequently raising the former to the rank of the latter, because the produce, in which alone they are interested, happened to be more or less valuable. In the proceedings of the East Indian Committee there is an interesting letter from Mr. Spalding, where he informs us that the American cultivators confine their attention to such plants as are of annual growth. 1st. The Nankeen Cotton, introduced at an early period. This is abundant in produce; the seed covered with down, the wool of a dirty yellow colour, and usually low priced. 2nd. The Green Seed Cotton with white wool, which, with the former, is grown in the middle and upland districts, whence the latter is called Upland Cotton, also Short Staple Cotton, and, from the mode in which it was cleaned, Bowed Georgia Cotton. 3rd. The Sea-Island or Long Staple Cotton, which is distinguished by the black colour of its seed, and by the fine, white, strong, and silky long staple by which it is surrounded. This is grown in the lower parts of Georgia and South Carolina, near the sea, and on several small islands which are not very distant from the shore. The species admitted by botanists are not yet clearly determined. M. De Candolle admits 13 species, and notices others. Two have since been described by Dr. Roxburgh, one by Rœusch, and another in the 'Flore de Senegambie.' Of varieties Mr. Bennett says he knows more than one hundred kinds, and that they appeared to him never ending. Dr. Royle, the most recent author who has treated expressly of the species, admits eight species, in which are absorbed some of De Candolle's; while others are avowedly unnoticed for want of materials for satisfactory determination. But from his own observations, Dr. Roxburgh's 'Flora Indica,' as well as from Swartz, 'Observ.

Bot.' for the West Indies, and the specimens, though few, in the British Museum, it is probable that several of the cultivated species are correctly determined.

(4128) GOSSYPIUM HERBACEUM, Linn., which is herbaceous in temperate, and usually with bitriennial stems 4-6 feet high in tropical countries, is no doubt the *Xylon* s. *G. antiquorum*, and includes also the *G. Indicum* of Lamarck, which would indeed be the preferable name for this species. The younger parts of the stem, as well as the flower and leaf-stalks, hairy and marked with black spots. Leaves hairy, palmate, 3- (generally) 5-lobed, lobes broad and rounded with a little point, or in the woody varieties sub-lanceolate and acute, Stipules falcate, lanceolate. Flowers of a lively yellow colour, with a purple spot near the claw. Segments of exterior dentate, sometimes entire. Capsules ovate, pointed, 3- or 4-celled. Seeds free, clothed with finely-adhering grayish down under the short-staple white wool. This and its varieties are those chiefly cultivated in India. It has been procured from China and the Malayan Peninsula, and also from Egypt.

(4129) GOSSYPIUM PUNCTATUM, from Senegambia, is probably a variety. It is that cultivated in the Mediterranean region, and must have been the species taken to America from Smyrna.

(4130) GOSSYPIUM ARBOREUM, Linn. Stem arboreous, 15-20 feet, sometimes shrubby, young parts hairy, tinged of a reddish colour. Leaves palmate, 3- or 4-lobed, hairy, dotted with blackish spots of a dark green colour; lobes elongated, lanceolate, sometimes mucronate, sinus obtuse, glands one, sometimes three. Stipules oval-shaped. Flowers solitary, with short peduncles, red, with a yellowish tinge near the claws. Leaflets of the exterior calyx cordate, ovate, entire, sometimes dentate. Capsule ovate-pointed, 3- or 4-celled, seeds covered with a greenish coloured fur, enveloped in fine silky yellowish-white wool. This species is found in the island of Celebes and in every part of India. It is noticed among lists of the plants of Arabia, and also of Egypt. It is planted near temples and habitations of Faqueers in India, and is stated to be sacred to the Hindoo deities, and therefore employed only for making muslin for turbans. The species is marked *G. religiosum* in Heyne's 'Herbarium,' and one specimen of *G. Barbadense* is marked *G. arboreum* in the 'Linnean Herbarium.'

(4131) GOSSYPIUM RELIGIOSUM, Perennial. Stem 3-4 feet, branches and petioles a little velvety, hirsute towards the apex, and covered with black points. Leaves cordate, superior 3-lobed, inferior 5-lobed, deeply divided; lobes ovate-acuminate, entire, pubescent (some of the lower ones ovate-acuminate), one to three glands; stipules lanceolate, deciduous (cordate-acuminate, Roxb.) Flowers large, fulvous, peduncles short dotted; leaflets of the exterior calyx large, cordate-acuminate, deeply laciniate, hairy and dotted; capsule ovate-acuminate, dotted, 3- 4- or 5-celled; seeds black, covered with firmly-adhering short tawny fur under the long tawny-coloured wool. There is considerable confusion with respect to the species which should be called *G. religiosum*. The distinguishing characteristic of what is considered such at present is the having tawny-coloured instead of white wool. There are at least two distinct localities for this kind of cotton, one Siam, the other China. From the latter country it was introduced both into India and America under the name of Nankin Cotton. Dr. Royle is of opinion that two distinct species yield tawny-coloured cotton; one with small velvety-looking leaves and much dotted in every part, of which he has seen specimens from Macao, Tahiti, and Guzerat. The other is a much larger plant, with the general appearance and leaves of *G. Barbadense*, of which there are specimens in the 'East Indian Herbarium.' Mr. Wilkinson has brought specimens from Egypt of a rather tawny-coloured cotton, with brownish seed, free from fur, which he says is there called 'gotun' Hindee.'

(4132) GOSSYPIUM HIRSUTUM, Linn., Shrubby, about six feet high, young pods very hairy. Leaves, the upper undivided, cordate, acute; the lower 3- or 5-lobed; lobes ovate, acute (triangular, Roxb.), hairy on the under and smooth on the upper surface. Petioles very hairy, dotted with black spots; glands 1 or 2 to 3; stipules lanceolate (Cavanilles); corolla, base yellow, purplish towards apex (uniform yellow, Roxb.); exterior calyx ovate-acute, very hairy, cordate, 3-toothed (Cav. laciniate, Roxb.); capsule large, ovate-acute; seeds many, free, clothed with firmly-adhering green down under the fine long white wool. (Swartz.) This species is cultivated in Jamaica, according to Swartz; and would appear, from the description of the seed to be the Green-Seeded, Short-Staple, or Upland Cotton of the Americans.

(4133) GOSSYPIUM BARBADENSE. Stem shrubby, 6-15 feet, smooth; leaves, the upper 3-lobed, the lower 5-lobed; lobes ovate, acute, smooth, often pubescent on the under surface; leaflets of exterior calyx large, deeply laciniate; flowers yellow; capsule ovate, acuminate, smooth; seeds 8-12, free, oblong, black, and without any other pubescence than the long fine easily-separable cotton. Swartz describes this species as extensively cultivated in the West Indies: it is also the *G. vitifolium* of Cavanilles. Is one of the cultivated cottons of Egypt. It is more than probable that the Sea-Island or Long Staple Cotton is a variety of this species, as its seeds agree in character. More than this it is not possible to say, as, among the numerous collections which London contains, strange to relate, there are

none in which genuine specimens of cultivated cottons, properly named, can be seen; but it is to be hoped that travellers and naturalists will be induced to pay a little more attention to the products of a country, whether natural or the result of art, and deposit them in our museums, with the plants which produce them. Several other species, as *G. punctuatum*, from Senegal; *G. obtusifolium*, from Ceylon; and *G. peruvianum*, from Brazil, have been described; but Dr. Royle is of opinion that all the species of cotton may be reduced to four—*G. peruvianum* (*G. acuminatum*); *G. Indicum* (*G. herbaceum*); *G. arboreum*; and *G. barbadense*. For further information the reader is referred to the works quoted above, and to Royle's 'Illustrations of the Botany, &c., of the Himalayan Mountains.' COTTON, article.

(4134) GOSSYPIUM NIGRUM. This is an ornamental tall growing shrub generally cultivated in gardens on account of its dark red flowers;—from the staple of the wool being short although fine, it is not of much value.

(4135) GOUR. [BOVIDÆ.]

(4136) GOURD, a kind of fruit obtained from various plants of the natural order *Cucurbitaceæ*. In countries having hot and dry summers the different kinds of this fruit are held in high estimation, and are a valuable article of consumption, acquiring a very large size, abounding in nutritious matter, and being moreover very wholesome. The largest is the kind called Potiron Jaune by the French, which sometimes weighs above 2 cwt. All the most esteemed kinds belong to genus *Cucurbita*, the species of which are almost entirely destitute of the bitterness that renders other fruits of the same natural order unfit for food; thus the Vegetable Marrow is supplied by the *Cucurbita ovifera;* the Potiron by *C. maxima;* the Squash-Gourd, a very delicate sort, and perhaps the most agreeable of all when cooked in a very young state, by *C. melopepo;* and the Orange-Gourd by *C. aurantia*. Bottle-Gourds, which are bitter and dangerously drastic, are the fruit of *Lagenaria vulgaris;* while what is called the Colocynth-Gourd, a powerful purgative, is in reality a kind of melon, the *Cucumis colocynthis*. —*Eng. Cyc.* A coarse genus of the cucumber family, generally cultivated throughout the year, of comparatively little value as a vegetable, requires rich soil and plenty of room; it is not commonly known, that the young shoots of all the edible varieties of gourds are an excellent vegetable, used as spinach.—*Jaffrey*.

(4137) GOWDIE, a name for the fish called the Sword Dragonet. [CALLIONYMUS.]

(4138) GRAINS OF PARADISE are hot, acrid, aromatic seeds, produced upon the coast of Guinea, and used for medicinal and other purposes as stomachic and cordial stimulants. They are produced by the *Amomum Grana Paradisi* of Linnæus, and *Amomum grandiflorum* of Smith. [AMOMUM.]—*Eng. Cyc.*

(4139) GOUGHIA, a curious evergreen laurel-like tree, was found by Dr. Hooker at Chating in the Lachen valley of Sikkim. This fine plant was named (Wight, "Ic. plant.") in honour of the Hon'ble Capt. Gough, son of the late Commander-in-chief, and an officer to whom the botany of the Peninsula of India is greatly indebted. It is a large and handsome evergreen, very similar in foliage to a fine rhododendron, and would prove an invaluable ornament on English lawns, if its hardier varieties were introduced into this country.—*Hooker, Him. Jour. Vol.* II *page* 33. Wight in Icones gives Goughia, *Griffithiana*, 1877; and Neilgherrensis, 1878-79.

(4140) GOWLA.

Gowla, GUZ. HIND. | Gewla, TAM.

A brown coloured seed, about the size, and having much the same appearance as the coriander seed, but more oval. They have a pleasant, subaromatic and mucilaginous taste; and are considered by native practitioners as cordial and stomachic. They are imported into Bombay from the Persian Gulf, and are distinguished in the bazars either with or without shells, or more strictly speaking, husks.—*Faulkner*.

(4141) GRACILLARIA LICHENOIDES, One of the Algæ, highly valued in Ceylon.

(4142) GRACILLARIA TENAX, the Fucus tenax of Turner; about 27,000 lbs. are annually imported into Canton, from the provinces of Fokien and Tchi-Kiang, and sold for 6d. to 8d. the pound. The Chinese make it the basis of an excellant glue and varnish, and employ it chiefly in the manufacture of lanterns, to strengthen or varnish the paper and sometimes to thicken or give a gloss to silks or gauze. Mr. Neill thinks that the gummy substance called Chin-chou, or hai-tsai, in China and Japan may be composed of this substance. Windows made of slips of Bamboos and crossed diagonally, have frequently their interstices wholly filled with the transparent glue of hai-tsai.

(4143) GRACULA RELIGIOSA, (Linnæus,) the Mina-Bird, is the Beo and Mencho of the Javanese, Teeong of the Sumatrans, and is referred by Mr. Swainson to the *Sturnidæ*. Mr. G. R. Gray arranges it under the family *Corvidæ*, in the sub-family *Graculinæ*. M. Lesson places this bird next to the Rollers, and among the *Eurystomidæ*. It is found in Java, Sumatra, and the great Eastern Islands. Insects and fruits form the food of the Mina Bird which is easily tamed, and learns to whistle and talk with great facility. With the natives it is a great favourite in consequence. Marsden says of it, that it has the faculty of imitating human speech in greater perfection than any other of the feathered tribe.—*Engl. Cyc. page* 139.

(4144) GRAM.

Kooltees Chunna, Guz. Hind.

A name given in oriental commerce to the produce of two leguminous plants cultivated in India, chiefly used for feeding horses, cattle, &c. See Cicer and Dolichos.—*Faulkner.*

(4145) GRANADILLA. Passiflora quadrangularis. This luxuriant exotic from the Jamaica passion flowers, flourishes well on the Tenasserim Coast, and is very prolific. The smooth oblong fruit grows nearly as large as a cucumber, and contains a succulent pulp, which make a cooling delicious dish, and when prepared in tarts, can scarcely be distinguished from green apple. The Rev. Mr. Bennett of Tavoy, has recently introduced it among the Karens, by whom it is highly esteemed, and much sought for. It will no doubt soon be generally diffused through the Provinces, as it possesses all the attractive qualities of fine fruit, handsome fragrant blossoms, and when trailed over an arbor, a rich pleasing shade.—*Mason.*

(4146) GRAPES. Vitis vinifera.

Kodimoondric pullum, Tam.	Dracha pundoo. Tel.
Anub, Arab.	Booaangoor, Malay.
Dakah. Hind.	Vitis vinifera. Lin.
Junb, Arab.	Dracha, Sans.
Raisins, Fr.	Booangoor, Mal.
Trauben, Ger.	Uvæ, Lat.
Darakh, Guz.	Ungoor, Pers. and Duk.
Ungoor, Hind.	Uvas, Port.
Grappi, It.	Ubas, Sp.

Grapes grow in abundance in India, in private gardens, but no wine is made from them.—*Ains. Met.Med.p.*19. A well-known fruit produced from the Vine, which is cultivated in all warm and tropical climates—France, Spain, Portugal, and Italy, as well as some parts of Hungary and Persia, produce grapes which yield wine of various qualities and flavour. They are also extensively produced in various parts of India.—*Falk.* Vitis indica, produces beautiful clusters of round purple berries and a large grape which is very fair eating: it is not the common vine of Europe which nevertheless is probably this Himalayan plant, the *Vitis indica.* The origin of the common grape being unknown, it becomes a curious question to decide whether the Himalayan *Vitis Indica* is the wild state of that plant: a hypothesis strengthened by the fact of Bacchus &c. having come from the East.—*Hooker, Him. Vol.* II. *p.* 187.

(4147) GRAPHIC SLATE. A slate that "soils and writes," as Dr. McClelland described it is found east of Tavoy, and another and softer variety is found in Maulmain near Tremenheerite. They may be justly regarded as varieties of graphic slate.—*Mason.*

(4148) GRAMINACEÆ or GRASSES, are a very extensive and important natural order of Endogenous Plants, comprehending many of the most valuable pasture plants, all those which yield corn, such as wheat, barley, and maize, the sole source of colonial sugar in the sugar-cane, and the most fragrant of all plants in the form of Andropogons. Their structure is among the most simple of the perfect forms of vegetation; a stem clothed with alternate leaves whose stalks are universally thin, and constituting as many sheaths to guard the young and rapidly growing shoots, a few rudimentary leaves collected at the ends of the branches of inflorescence, and constituting flowers a very small number of stamens, and a single seed inclosed in a thin pericarp, are all that nature provides to enable these plants to preserve their race and to distinguish their numerous kinds from one another. Yet with such a simple apparatus, many thousand species are so precisely characterised that the natural order of Grasses is perhaps, one of the easiest to study and arrange, provided the task be commenced upon right principles. The floral leaves, called glumes, paleæ, and scales, offer a prodigious number of different appearances, according to the manner in which they are combined or modified; and the inflorescence, the number of stamens, the texture of the parts, or the relation of the sexes to each other, afford additional means by which the distinctive characters are varied. This is, no doubt, one of the wise provisions of Providence by which man is enabled to distinguish good from evil, the useful from the useless, the profitable from the unprofitable. For in no class of plants is it more necessary than in grasses to know how to choose between different species. For instance, most grasses are saccharine and nutritious to cattle, but the species of *Holcus, Bromus,* &c., are as frequently worthless. There is a great difference between the value of grasses for pasture; certain kinds suit the meadows, others marshes, others upland fields, and others bleak and sterile hills, where they furnish valuable food for sheep: these kinds will not grow indiscriminately, or are not equally suitable for different soils and situations, and it is therefore essential for the husbandman that he should be capable of discriminating between them. Some indicate the quality of soil: the species of *Dactylis, Holcus,* and *Bromus* are inhabitants of sterile land; the *Festucæ* and *Alopecuri* of better soil: while various *Poæ* and *Cynosurus* are found only in pasture-land of excellent quality. Most grasses are perfectly harmless, if not nutritious; yet the single species *Lolium temulentum* is a deleterious species in the midst of harmless *Lolia*; and *Bromus purgans* and *Festuca quadridentata* afford similar instances of this singular exception to ordinary rules. For these and similar reasons, classification, which at all times is so necessary, here becomes the very foundation of all correct knowledge, and it has accordingly very particularly excited the attention of systematic botanists from the time when the general term *Gramen* was broken up by Linnæus into a num-

ber of different genera. It is not desirable in this place to show by what degrees the knowledge of botanists upon this subject has advanced from the days of Linnæus up to the present time. Those who are desirous of gaining this information should consult Palisot de Beauvois' 'Agrostographie, published at Paris in 1812, and the subsequent writings of Brown, Kunth, Nees von Esenbeck, and Trinius. "The distribution of cultivated grasses is one of the most interesting of all subjects. It is determined not merely by climate but depends on the civilisation, industry, and traffic of the people, and often on historical events. Within the northern polar circle agriculture is found only in a few places. In Siberia grain reaches at the utmost only to 60°, in the eastern parts scarcely above 55°, and in Kamtschatka there is no agriculture even in the most southern parts (51°). The polar limit of agriculture on the north-west coast of America appears to be somewhat higher, for in the more southern Russian possessions (57° to 52°) barley and rye come to maturity. Only in Europe, namely in Lapland, does the polar limit reach an unusually high latitude. Beyond this dried fish, and here and there potatoes, supply the place of grain. The grains which extend farthest to the north in Europe are barley and oats. These, which in the milder climates are not used for bread, afford to the inhabitants of the northern parts of Norway and Sweden, of a part of Siberia and Scotland, their chief vegetable nourishment. Rye is the next which becomes associated with these. This is the prevailing grain in a great part of the northern temperate zone, namely in the south of Sweden and Norway, Denmark, and in all the lands bordering on the Baltic, the north of Germany, and part of Sibra. In the latter another very nutritious grain, buckwheat, is very frequently cultivated. In the zone where rye prevails wheat is generally to be found, barley being here chiefly cultivated for the manufacture of beer, and oats supplying food for the horses. To these there follows a zone in Europe and Western Asia where rye disappears, and wheat almost exclusively furnishes bread. The middle and the south of France, England, part of Scotland, a part of Germany, Hungary, the Crimea and Caucasus, as also the lands of middle Asia, where agriculture is followed, belong to this zone. Here the vine is also found, wine supplants the use of beer, and barley is consequently less raised. Next comes a district where wheat still abounds, but no longer exclusively furnishes bread, rice and maize becoming frequent. To this zone belong Portugal, Spain, part of France on the Mediterranean, Italy and Greece, further, the countries of the East, Persia, Northern India, Arabia, Egypt, Nubia, Barbary, and the Canary Islands; in these latter countries however the culture of maize or rice towards the south is

always more considerable, and in some of them several kinds of *Sorghum* (Doura) and *Poa abyssinica* come to be added. In both these regions of wheat, rye only occurs at a considerable elevation, oats however more seldom, and at last entirely disappear, barley affording food for horses and mules. In the eastern parts of the temperate zone of the old continent, in China and Japan, our northern kinds of grain are very unfrequent, and rice is found to predominate. The cause of this difference between the east and the west of the old continent appears to be in the manner and peculiarities of the people. In North America, wheat and rye grow as in Europe, but more sparingly. Maize is more reared in the western than in the old continent, and rice predominates in the southern provinces of the United States. In the torrid zone, maize predominates in America, rice in Asia; and both these grains in nearly equal quantity in Africa. The cause of this distribution is, without doubt, historical, for Asia is the native country of rice, and America of maize. In some situations, especially in the neighbourhood of the tropics, wheat is also met with, but always subordinate to these other kinds of grain. Besides rice and maize there are in the torrid zone several kinds of grain as well as other plants which supply the inhabitants with food, either used along with them or entirely occupying their place. Such are, in the new continent, Yams (*Dioscorea alata*), the Manihot (*Jatropha Manihot*), and the Batatas (*Convolvulus Batatas*), the root of which and the fruit of the Pisang (*Banana Musa*), furnish universal articles of food; in the same zone in Africa, Doura (*Sorghum*), Pisang, Manihot, Yams, and *Arachis hypogœa*; in the East Indies and on the Indian Islands, *Eleusine coracana*, *E. stricta*, *Panicum frumentaceum*, several Palms, and *Cycadaceæ* which produce the Sago, Pisang, Yams, Batatas, and the Bread-Fruit (*Artocarpus incisa*). In the islands of the South Sea, grain of every kind disappears, its place being supplied by the bread-fruit tree, the pisang, and *Tacca pinnatifida*. In the tropical parts of Australia there is no agriculture, the inhabitants living on the produce of the sago, of various palms, and some species of *Arum*. In the high lands of South America, there is a distribution similar to that of the degrees of latitude. Maize indeed grows to the height of 7200 feet above the level of the sea, but only predominates between 3000 and 6000 feet of elevation. Below 3000 feet it is associated with the pisang and the above mentioned vegetables, while from 6000 to 9260 feet the European grains abound: wheat in the lower regions, rye and barley in the higher, along with which *Chenopodium quinoa* as a nutritious plant must also be enumerated. Potatoes alone are cultivated from 9260 to 12,300 feet. To the south of the tropic of Capricorn, wherever agriculture is practised, considerable resemblance

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with the northern temperate zone may be observed. In the Southern parts of Brazil, in Buenos Ayres, in Chilli, at the Cape of Good Hope, and in the temperate zone of Australia, wheat predominates; barley however and rye make their appearance in the southernmost parts of these countries, and in Van Diemen's Land. In New Zealand the culture of wheat is said to have been tried with success, but the inhabitants avail themselves of the *Acrostichum furcatum* as the main article of sustenance. Hence it appears that in respect of the predominating kinds of grain, the earth may be divided into five grand divisions, or kingdoms—the kingdom of rice, of maize, of wheat, of rye, and lastly, of barley and oats. The first three are the most extensive; the maize has the greatest range of temperature, but rice may be said to support the greatest number of the human race."—*Schouw, in Jameson's 'Philosophical Journal.'* The uses of this most important tribe of plants for fodder, food, and clothing, require little illustration. The abundance of wholesome fæcula contained in their seeds renders them peculiarly well adapted for the sustenance of man; and if theCereal Grasses only, such as Wheat, Barley Rye, Oats, Maize, Rice, and Guinea Corn, are the kinds commonly employed, it is because of the large size of their grain compared with that of other grasses; for none are unwholesome in their natural state with the exception of *Lolium temulentum*, a common weed in many parts of England, the effects of which are undoubtedly injurious. *Bromus purgans* and *catharticus* are said to be emetic and purgative; *Bromus mollis* is also unwholesome, and *Festuca quadridentata* is said to be poisonous; *Molinia varia* is injurious to cattle; and some other species are supposed to affect the milk of cows which graze upon them. Among corn-plants not generally known may be mentioned *Eleusine coracana*, called Natchnee on the Coromandel coast, and Nagla Ragee, or Mand, elsewhere in India; *Setaria germanica*, yielding German millet; and *Panicum frumentaceum*. There are many other species. The value of grasses as fodder for cattle is hardly less than that of corn for human food. The best fodder-grasses of Europe are usually dwarf species, or at least such as do not rise above four or five feet from the ground. The most esteemed are *Lolium perenne*, *Phleum* and *Festuca Pratensis*; *Cynosurus cristatus* and various species of *Poa* and dwarf *Festuca*. The fodder-grasses of Brazil are of far more gigantic stature, and perfectly tender and delicate. In Australia the favourite is *Anthistiria australis*, or Kangaroo Grass; in India *A. ciliata* is also in request; but the most common Indian foddergrass is Doorba, Doorwa, or Hurryalee (*Cynodon dactylon*). Gama Grass (*Tripsacum dactyloides*) has a great reputation as fodder in Mexico; and attention has lately been directed to the Tussac Grass of the Falklands (*Festuca flabellata*), a species forming tufts five or six feet high, and said to be unrivalled for its excellence as food for cattle and horses. The fragrance of our sweet Vernal Grass is by no means confined to it; other species possess the same quality, which is connected with the presence of aromatic secretions, which have in part recommended grasses to the notice of medical practitioners. Sugar is a general product of grasses. It exists in great quantities in the Sugar-Cane (*Saccharum officinarum*). Maize so abounds in it, that its cultivation has been proposed in lieu of the sugar-cane. —*Eng. Cyc.* This very extensive and important natural order of Endogenous plants, comprehending many of the most valuable pasture plants, all those which yield corn, such as wheat, barley and maize, the valuable sugar-cane and the most fragrant of all plants in the form of Andropogons, although seemingly simple in structure, many thousand species are so precisely characterised, that the natural order of Grasses is perhaps one of the easiest to study and arrange, provided the taste be commenced on right principles. There are 291 genera and about 4000 species, arranged with 13 tribes. Among the grasses there are both land and water, but no marine plants, and their limit is the utmost range of the vegetable kingdom. Their dissemination has depended on the civilization, industry and traffic, of people, and often on historical events. The tropical grasses have broad leaves and acquire a great height, occasionally even assume the appearance of trees; some species of Bamboo being 50 to 60 feet high. For economical purposes grasses are often of much importance, and, as fodder for Cattle their value is hardly less than that of corn for human food, and perhaps the best grass in India for this purpose is the Hurryalee, Doorba or Doorva (Cynodon dactylon). In India the sum total of described grasses is 1300 species, and the following is a list of those said to be eaten by Cattle.

Botanical.	*Hindustani.*
Paspalum Scrobiculatum, ...	Kodu.
Panicum Miliaceum, ...	Chena-ghas.
„ Miliare, ...	Kungoo.
„ Commutatum, ...	
„ Halopus, ...	Jalgantee.
„ Setigerum, ...	Buragalgantee.
„ Colonum,...	Shama.
„ Frumentaceum, ...	Damra-shama.
„ Ciliare, ...	Makur-jalee.
„ Horsutum, ...	
Penicillaria spicata,...	Bajra.
Sorghum vulgare, ...	Jooar.
„ Saccharatum, ...	
Chrysopogon acicularis, ...	
Saccharum spontaneum,...	Kash.
Lipeo circis serrata, ...	
Andropogon martini, ...	
Anthistiria ciliata, ...	
Rottbollia glabra, ...	Buksa.
Cynodon dactylon, ...	Hurryallee. Durva Hind.
Dactyloctenium Ægyptiacum,... ...	
Eleusine Indica, ...	Aragum pillay Tam.
„ Egyptiaca, ...	
Phalaris arundomacea, ...	
Chloris barbata, ...	
Perotis latifolia.—*Cleghorn.*	

Pasture grasses of India.—In the provinces, besides grain, Camels and Elephants are fed upon the leaves of various trees. The Goats, Sheep, and Cattle, are pastured upon what are called the waste land, or the jungles of the villages; the last are fed also upon chopped straw, and the stalks of the joar (Sorghum vulgare), cut into small pieces; while Horses, besides grain, are fed upon grass brought in by men called grass-cutters, but who rather scrape off the ground the creeping stems and young leaves of the grass called Doob or Dhoorba or Hurryallee. This Doob-grass (Cynodon dactylon of Botanists), which grows throughout the year, is fortunately the most common species throughout India, and succeeds particularly well in the Northern parts where lawns and pastures of moderate extent are made by planting pieces of the creeping stems of this grass. It is also much used for forming a covering for the banks of rivers, ramparts, and esplanades. The high lands of the Ballaghaut also possess a grass of which cattle are amazingly fond, and which has so strong an aromatic and pungent taste, that the flesh of the animals, as well as their milk and butter, become scented with it. This species is allied to the Lemon grass, and is very abundantly diffused towards the North-west of India. There are, however, numerous other grasses common in India which cattle delight in; but the greater number of these flourish most in the rainy season. Their rapid growth, and the great height they attain, as well as their withered and dry nature towards the close of the year, soon however unfit them for pasture grasses. The inhabitants of many parts of India remedy this, by burning down the old and dried up grass, when the young blade shoots up and affords excellent pasturage. India being at one season deluged with rain, and at another parched up with heat, with only a few months of temperate climate, cannot be expected to possess any pasture grasses similar to those of European countries. But as grasses are among the most universally diffused of plants, we find some suited to every season, indigenous in all parts of India, and affording food for its various herbivorous animals. For the purpose of pasturing improved breeds of Sheep, the hills and table-land, from Coimbatore to Kandeish, and the frontier provinces from Gujarat to Hurriana and Saharunpore, seem alone suited. But the Himalayas, enjoying a temperate climate, and a European-like vegetation, have also abundant and excellent pasturage. During the rainy season, when the temperature is moist but equable, we have many grasses resembling those in the plains. These are associated with others belonging to European genera, which are able to withstand the winter's cold: so that throughout the year nearly, there is abundant pasturage in the neighbourhood of the Himalayan villages. Of this the inhabitants avail themselves, by driving their herds of cattle, and flocks of goats and of sheep, to different ranges and elevations, according to the season of the year. The sward upon these mountains is short and thick, and very closely resembles that which we meet with on the mountains of Scotland and Wales; while the Sheep are as much esteemed for their mutton as those fed in the plains upon grain. Dr. Royle, in his Illustrations of the Botany and other branches of the Natural History of the Himalayan Mountains, has stated that these grasses belong to such genera as Agrostis, Fox-tail grass, Cat's-tail, Meadow-grass, Fescue, Cock's-food, Bent-grass, Oat-grass, and others. Also, that many of the same species which are accounted the best pasture grasses in England are among those found in the Himalayas, as Cock's-foot grass; Annual, Narrow-leaved, and smooth-stalked Meadow-grass; Cat's tail or Timothy-grass, Purple Fescue-grass, which from its greater produce is considered preferable to that specially called Sheep's Fescue-grass. In the climate where these grow naturally, nothing would be easier than the introduction of any other of the superior pasture grasses of England; but this is hardly necessary where the natural pasturage is so good. These were so much valued by the Native Governments, that some of the pasture of the Sandstone-hills, south of the Kistnah river, where the lemon grass is found, were reserved for their own cavalry, or the right to cut and sell it was rented to the highest bidders. To improve the pastures or increase the quantity of fodder in the warm and moist parts of the plains of India, it will be necessary to have recourse to the grasses of other climates, as to those of the West-Indies and of South America. The Guinea grass and the Sott's grass of Jamaica are both highly esteemed in that island, while some of the pasture grasses of Brazil and of the banks of the Amazon, are described as being of a gigantic size, and at the same time perfectly tender and delicate. Closely connected with the subject of the pasture grasses is that of providing green food for horses, camels, and elephants, and one to which little attention has been paid, though the supply has much diminished in the neighbourhood of towns and large stations. To this Dr. Wallich called attention in his evidence before the Committee of the House of Commons in 1832, stating, that for any number of animals, either for conveyance or for consumption, any quantity of food might be produced in the utmost possible abundance in India, but suggested that a more ready and plentiful supply of food for elephants and camels should be provided by planting those trees (such as particular Indian fig-trees) which form the staff of life for them, and which are extremely easily cultivated. In the Madras Presidency, considerable exertions were made about the year 1796, in every where planting what was called the Bastard Cedar

(Guazuma ulmifolia) as green food for cattle.—*Royle's Productive Resources of India.* Rye grass and clover grow well in upland districts in India, and when sown fresh have been found to answer admirably on the Shervaroy, Pulney, Baba-Boodun and Neilgherry Hills. In Guzerat, the cultivators feed their cattle on the sweet stalks of the joari and bajri.—*Spry's Suggest. page* 46.

Guinea Grass.—This grass has been cultivated to a considerable extent in India and Ceylon with more or less success according to the care and attention bestowed on it. When well manured and kept clear of weeds it grows more luxuriantly and admits of being cut every six weeks or two months. A small patch, near Colombo, which, beginning with above three quarters of an acre, has gradually been extended to above an acre and a half, has now for seven or eight years supplied 3 or 4 milch cows and from 5 to 7 horses continually with all the grass required for their consumption and has latterly left a surplus which has been dried for bedding and hay. When first planted it frequently attains a height of even 9 feet and a stalk taken promiscuously from a small patch planted lately in Combaconum measured 10 feet 4½ in length, but when cut two or three times it grows thicker but not so high. It is exceedingly excellent feeding for horses and cattle, and is generally preferred by them to the ordinary country grass, though horses which are hard worked seem to prefer the dry grass roots supplied by the grass cutters. It should not be given to cattle fresh, but the supply for one day should be cut the day previous, and it should not be cut too close to the ground but the stalk ought to be left 7 to 9 inches high. It is a good plan to move the ground between the roots every time the grass is cut and the ground should be heavily manured after every three or four cuttings. It is very hardy and may be easily propagated. It requires abundant moisture but will not live in a soil which is at all marshy. It answers best planted in small tufts 1ft. 9 in. to 2ft. apart, which rapidly spread into stools from 6 in to 1ft. in diameter.—*In Literis M.S.S.* *Lucerne* has been successfully acclimated in the Dekhan, and has long been largely cultivated by natives for sale to Europeans and for their own cattle.—*Spry's Suggest. page* 63. Besides these, the celebrated Prangos Hay plant Grass was discovered by Mr. Moorcroft, in Tibet, and found by him to be employed as winter fodder for sheep and goats, and frequently for neat cattle. Mr. M., writing from the neighbourhood of Droz, describes the Prangos Hay plant as producing fatness in a space of time singularly short, and likewise as being destructive to the River Fluke; he therefore justly concluded that it would be an invaluable acquisition to any country, to the climate of which it was suited, as its highly nutritious qualities, its vast yield, its easy

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culture, its great duration, its capability of flourishing on lands of the most inferior quality and wholly unadapted to tillage, impart to it a general character of probable utility unrivalled in the history of agricultural productions. When once in the possession of the ground, for which the preparation is easy, it requires no subsequent ploughing, weeding, manuring, or other operation, save that of cutting and of converting the foliage into Hay."—(Moorcroft in a letter to W. Butterworth Bayley, Esq, formerly Chairman of the Court of Directors.) Various attempts have been made to introduce the Prangos Hay plant into Great Britain, but hitherto unsuccessfully; and it is probable it will only succeed, and be valuable in a climate similar to that where it is found indigenous. The Prangos is highly valued in the cold and arid region of Tibet, where it is indigenous, and which Mr. Moorcroft (v. p. 179) thought would be valuable as fodder for sheep and cattle in European countries. It is found in Tibet, and also most abundantly on Abatoong, a low trap hill in the valley of Cashmere; but there it was not so vigorous as in its Tibetan habitat. Though abundant in various directions, the Cashmerians do not esteem it of any value, and Dr. Falconer is of opinion that its importance has been much over-estimated, in consequence of its being the only food in many of the bleak and barren tracts of Tibet. In Cashmere, where far from a deficiency of herbage, there is actually a superabundance of pasture grasses, it is necessarily much less esteemed. The Prangos will, therefore, most probably be a valuable acquisition only in countries devoid of good natural pasturage, and of which the climate is favourable to its growth.—*Royle. Pro. Res.*

Joint Grass.—This, says Mr. Bonynge, is not a grass that is generally known in India. I never met with it in the South, North-West, or in Bengal. It grows in the Tartar country; generally in the margins of forests, where there may not be too much shade; a forest being partially cleared, it springs up in places where it perhaps never existed before, or if it did, not for centuries past. The grass will run to a length of some fifteen feet, and will rise, if there be any support, five or six feet; if not, will grow up some three or four feet by its own support. It is not a wiry grass: the joints are some six or eight inches long; with four or five blades of grass about the same length growing out from each joint. The joints near the ground are harder and brittle; those near the top, soft and juicy—with a luxuriant termination of soft blades, similar to those from each joint, but are softer and thicker. On my arrival in the country I found there were no cows, goats, or sheep. These I introduced, and at the same time a quantity of gram, upon which sheep are fattened in East India. After the arrival of the cattle they declined the gram, and I found on inquiry that they had been browsing on this

grass, and upon which they continued to feed. They all became as fat as if fed on the gram, (a kind of pulse,) which remained on hand, there being no use for it.—*Bonynge, America, page* 159. The principal of the Indian grasses, and perhaps the most generally diffused, is the Doob-grass (*Cynodon dactylon*), a creeping plant possessing much nourishing property in its long stems, no less than in its leaves. This endures the greatest elevation of temperature, as its roots penetrate far below the surface, and although during the dry monsoon giving no sign of life, it puts forth its tender leaves on the first approach of the rains. A very nourishing grass, possessing a powerful aromatic odour, is met with on the elevated lands above the Ghauts of the south, as well as in the north-west provinces. So strong are its aroma and flavour, that the flesh, milk, and butter of the animals feeding upon it become in time sensibly affected both in taste and smell. Upon the many slopes of the Himalayas there is found abundance of good nourishing pastures, admirably adapted to the requirements of cattle and sheep, and upon which many herds and flocks are reared when the dry season forces them from the plains below. Throughout the flat countries, and spread over vast tracts of indifferent soil, we meet with grasses, or rather herbage, in sufficient abundance, but generally either coarse and poor, or rank and distasteful to animals. In swampy or sterile plains these reedy grasses often fail to tempt even the coarse-feeding buffalo and rhinoceros; and it is a common practice amongst all the Indian villagers, at the end of the dry season, to set fire to these tracts, on which the long withered herbage readily ignites, and after the first monsoon showers furnishes a rapid and abundant supply of young sweet blades. In some parts of India, especially at the Presidencies, it is customary to cut grass for hay, as fodder for horses during the excessively dry months, but latterly artificial grasses have been introduced for this purpose. The Guinea-grass and Mauritius-grass are both admirably adapted for feeding cattle. The grasses so extensively diffused, and in differ- ferbivorous as pasturage for cattle and corn for ing impro sential for the continued existence of table-land, kingdom, are seldom thought of as the frontier prov rdage. Yet they were probably and Saharunpore. es which were converted into malayas, enjoyin le twisting between the hands pean-like veget and pliant stems of many of ellent pastura a rope, as is daily practiced the tempera hose of straw, and the rush- y grasses are formed of the twisted are associa e employed for thatching, gener screen-and-mat-making. ter's ate the presence of fibre tho bear at least a certain ressure. In these plants however, as well as in sedges and rushes, the fibre is not always separated from the rest of the vegetable matter, but the whole leaf or stem is dried, and used in its entire state. As the fibre, however, possesses the requisite degree of tenacity, it can be separated in the form of pulp and used for paper making. The grasses abound in India; in the plains are numerous species of genera little known in Europe; with the cultivation of rice, maize, joar, and many millets in the rainy season; and in the cold weather, of wheat, barley, oats, and millet; while in the Himalayas the pasture-grasses are many of them the same as in Europe, and the cereals are cultivated in the spring and summer, with some rice in the rains. In India several of the indigenous grasses are employed for making mats, baskets, ropes, sacks, nets and sails. Thus the *Moonja* of the natives (*Saccharum munja*) is collected after the rainy season and kept for use, as it is employed in tying up their cattle at night and for ropes for their Persian wheels. It is said also to be one of the grasses employed for making tow-ropes by the boatmen about Benares. The *Shur* or *Sara* of Bengal (*Saccharum sara*), or the Pen reed grass, Mr. Henley informs Dr. Royle is another species employed by the boatmen about Allahabad and Mirzapore, and esteemed as a tow-line for its strength and durability, even when exposed to the action of water. It is said to be beaten into a rude fibre and then twisted into a rope. Besides the above, the sacred grass of the Hindoos, the *dab* or *koosha* of the Brahmins (*Poa cynosuroides*), is also made into rope in North-West India. Other species of Saccharum are used for thatching and for screens, and some for making writing-pens and for arrows. The fibres of the *Khuskhus* or Vetiveyr are more remarkable for agreeable odour than for their tenacity, while the Bamboo, the most gigantic of grasses, might be enumerated with timbers rather than with fibres, though its split stems are often employed for making mats in India, and the young shoots for paper-making by the Chinese. Many others of the grasses might be converted into half-stuff for paper-makers, and have the great advantage of affording large quantities of a cheap material. The *Nul* or *Nar* of Bengal is described as being employed for making the mats known by the name of Durma, which are formed of the stalks split open. Dr. Stocks informed Dr. Royle that in Sindh the grass called *Sur*, which perhaps is *Arundo karka*, has its culms, *sur jo kanee*, made into chairs, and its flower-stalks beaten to form the fibres called *moonyah*. These are made into string or twine (*moonyah jo naree*), and into ropes (*moonyah jo russa*). Mr. Burns, of the Indus Flotilla, has mentioned that the boatmen of the Indus universally employed the Moonja (probably the above *Saccharum Munja*) as a towing rope and for the rigging of their vessels, in all places above Sukkur. But below that place Coir

rope is very generally employed, being better able, it is believed, to stand the action of salt water. The Moonja however, is possessed of great tenacity, as is evident from two-inch ropes, often fifty fathoms in length, made of its fibres, being sufficient for dragging their largest or 1200-maund boats up the Indus, and consequently against the full force of the stream, even round projecting points. The rope is also possessed of lightness, so advantageous for rigging, and is capable, also, of bearing, without injury, alternate exposure to wet and to subsequent drying; both qualities being essential for a tow-rope. Mr. Burns has also informed him that plants growing beyond the range of the overflowings of the river, or of the influence of the tides—that is, in the interior of the country, where, indeed, it grows in vast abundance—are possessed of the greatest strength. The upper leaves, about a foot or so in length, are preferred and collected. Having been made up into bundles, they are kept for use. When required for twisting into rope, they are first moistened in water, two men then, sitting opposite to each other, take one of these moist bundles and beat it alternately with mallets, until the loose cellular are separated from the fibrous parts. These are then ready for twisting into the ropes which are so extensively employed on the Indus. It is evident that a continuation of the same process, or the employment of the *Dhenkee* of India, would afford a very ample supply of half-stuff for paper-makers, and at a cheap rate.—*Royle Ind. Fibres page* 30. Griffith collected nearly one hundred different grasses in the Tenasserim Provinces, but Mr. Mason is not aware that the description of a single species has ever been published.

The Description of Grasses best adapted to different localities. The most nutritious Grass, indigenous to all parts of India, and when cultivated, of most luxuriant growth in the hottest time of the year, is Hurriallee; but as it will take two, or three years, before sufficient hay could be produced to supply each Horse with 3 lbs. a day for six months in every year, it would be a great saving to Government if Rumnah Grass land were allotted to Regiments. Although there are no Rumnahs available at Madras, the Horse of the Body Guard could (with His Lordship the Governor's permission) have the Grass growing in Guindy Park, as it remains untouched by the Antelope, and is fully equal to similar Grass issued to Horses up-country. I do not think Rumnah Grass grows at Bangalore, but as the "Hurriallee" thrives there to perfection I apprehend no difficulty in raising a supply of it at once. The 7th Light Cavalry have purchased no other Forage but *hay* for 1853-54, at 184 lbs. per Rupee, and if it be "Hurriallee," Saugor must be a more congenial climate for it than even Bangalore, where no more than 64 lbs. are obtained for a Rupee.

GRAMINACEÆ OR GRASSES.

The quantity of land required to raise Forage for 100 *Horses.* The produce of Grass will vary at each station, and depend entirely upon the soil and means adopted in its cultivation. I should however suppose—that after the first year four cawnies would yield sufficient hay for the use of 100 Horses, for six months in each year, at 3 lbs. per Horse. A piece of ground about 15 yards square, near the sick Lines of the Body Guard, were dug up, manured, and sown with Hurriallee roots, and without irrigation it produced three cuttings, weighing about 500 lbs. of hay, and Mr. Pritchard expected to get a much larger quantity after the rains this year.

The most advantageous means of cultivating Grass, as regards irrigation, manure, &c., and the proper Agencies to be employed in effecting the object in view with efficiency and economy.—It would be a saving of labour if Grass lands could be allotted near Regimental Wells, from which they could be irrigated, and the water now wasted after watering the Horses could go to supply them—but this I fear will not be practicable at all stations, either from want of ground or a scarcity of water during a very hot season, when some of the Wells become quite dry, or contain scarcely sufficient water for the Horses. No person in India has bestowed so much pains and perseverance in the cultivation of Hurriallee Grass, as Major Ottley, and we cannot do better than transcribe his Report to the Agri-Horticultural Society of Madras, and published in the Madras Journal of Literature for 1849, Vol. XV. Page 477. It is replete with most valuable practical information. Vellore, 17th July 1849. "No one in Vellore besides "myself has ever attempted its cultivation and "for three years I had little success, although, "the ground was dug, cleaned and manured to "the fullest extent, from pits 20 feet square, and "five feet deep of Cow-dung, at least a year old, "and all the watering was to little purpose for "it never exceeded six or 8 inches in height. At "the recommendation of a native, I mixed po-"tash to loosen the soil, but it had the effect of "destroying the roots, and to remedy this, I "covered the whole surface with about 9 inches "of light sandy stuff called wundul, taken from "the bottom of tanks, adding to it plenty of "dung. I planted again and the result was "most favorable. Rice land is clayey, and after "irrigating cracks and is more or less one sheet "of sun burnt brick, which precludes the roots "from bifurcating, or shoots springing up, the "condition of my ground will be best shown by "a return of 8 crops last year of as fine hay, as "can be produced in any part of the world, "averaging one ton a cawny. You have only to "give me 30 days law any month in the hot "season, to furnish a specimen to the extent of "4 tons. I find the roots after a year, get so "thick and matted, that the grass cannot grow

" more than a foot, in fact the upper surface can " only be compared to a coir rug: when this is " the case, it takes three days ploughing to get " rid of the superfluous roots, and although one " would fancy from the cart loads taken out, that " few roots would be left, still, in about 10 days, " with good flourish of manure which is thrown " previous to the last ploughing, it will be found " after levelling, ridges prepared 6 feet apart, and " watering by the pecottah, that the plot is as " green as ever, furnishing a good return, but " still better the second cutting. The dry weather " is more favourable to crops than the monsoons. " Too much wet is bad, and produces frequently, " myriads of caterpillars, that devour all but the " stem in a night or two. I only water twice. " Seed will answer very well, but roots of a pro- " per description throw almost a year in ad- " vance of them. I attempted three modes of " planting, first dibbling, sticking the roots up and " down, but this was too slow a process, so I in- " undated the ground like a paddy field, and " struck them into the mud, but neither plan an- " swers so well as making long furrows with a ma- " moty three or four inches deep, and laying the " whole root in lengthways, for, then every joint " or knot throws out a shoot. and covering them " prepares another trench so that two men cut " along at a great rate; the principal part of my " ground was really good for nothing and " took 12 to 14 men a year to dig and " clear an acre, for it was full of those hor- " rible knotty weeds that have long fibres, " under ground called " cango." I then dug " a number of holes 2 feet deep, 4 in diameter, " 5 feet apart and put into each 2 cart loads of " fresh cowdung, and covered them with wundul " and old manure, and, when the surface was all " properly prepared, and planted, I found that the " grass that grew over the pits to be most luxuri- " ant, when other parts seemed bare in compari- " son, although the produce throughout was splen- " did, this shows that the richer the soil, the bet- " ter the crop. Quicklime as a manure is ad- " mirable stuff; in proof of which I deposited a " cart load on the grass and threw a bamboo " mat over it, in the course of three weeks the " grass grew through the lime and mat, and it " was with force alone it could be removed. " Another experiment was to strew straw over " a bed that had been watered for the last " time and the grass rose much higher than " in parts where it was not applied. In May " and June I had excellent cuttings and the " compound is now like a sheet of paddy, I " take no pains to grow more than is want- " ed for my stud, nevertheless I can accom- " modate my friends with a little. From what " I have offered, it will be observed that it is " quite useless attempting to cultivate this kind " of grass, except in deep, rich, loose, mellow " soil, I manure from large pits that are always

" kept filled with cow dung and the tops cover- " ed with light earth to prevent evaporation " of chemical properties. This is mixed year- " ly with wundul, lime and a sprinkling of salt " and a good layer is spread over the plots, " and ploughed in as before stated, all this ex- " pense is thrown away without you have ca- " pacious wells at convenient positions, say, for " an acre and a half, to irrigate beds that must be " nicely prepared 6 feet broad and 30 long, with " a gentle slope, so that the water may flow over " them quickly, larger beds are only to ensure " loss of time, labor and water, and this bit of " information was taught at a considerable cost, " having had to diminish the size of all the par- " titions, three different times, for I found it took " all day to water the most trifling space, and, by " the means suggested, half an acre can be flood- " ed with a Pecottah and pair of bullocks in 8 " hours. The Bangalore hay is a melange of " all sorts, and I will back my garden against " any in Mysore for quality, quantity and length " of produce, at any season of the year, as I be- " lieve no man in India has ever taken the same " pains to bring this particular grass to perfec- " tion, and that for a period of 5 years. It is no " doubt a description of couch grass, for it is " equally difficult to extirpate, and the roots are " generally found a foot from the surface, and " the smallest particle left in the ground will " shoot up. I return the several papers and am " only sorry I have not had time to consider " the subject in the manner I should wish, so " excuse this hasty reply." (Signed) C. G. Ottley.

The subject of managing grass lands, if taken in its full extent, would far exceed the limits proposed in this Memorandum, in which I shall endeavour to give as briefly as possible, an outline of the various means whereby even the poorest soil may be rendered capable of adding something to the general stock of food necessary for the support of Government Horses and Cattle. Grasses are divided into a very large number of species, and these are extremely various, not only in their nutritive properties, but also in their time of ripening, their seeds, their habits, and the duration of their existence. The majority are annuals, but some of them appear to be perennials. The sum total of described Indian grasses is probably about 1300 species. One hundred and fifty is the number said by Wight and Griffith to have been obtained from the Peninsula of India, but only such as are eaten by cattle are here alluded to, and of these a list is given in Appendix A. In the way of systematic classification, we have as yet no text book for Indian grasses. Several eminent Botanists have commenced the task of arranging them, but either the materials have been insufficient, or life has been cut short before the completion of the work. I believe, however, that a monograph of the subject may shortly be expected from the pen of Colonel Munro, H.

M.'s 39th Regiment; and there is reason to think, from the manner in which Doctor Hooker mentions the work, that the want so long felt will be ably supplied. In this part of India, the vegetation of most plants is interrupted for a longer period by the dry season, than in Europe by the winter. The sandy tracts about Madras remain perfectly arid and parched for a greater part of the year; the dry season extending from March to October, only a little relieved by partial showers during the South West monsoon. This alternation of drought and heat, at one season, and of heavy rains, at another, necessarily precludes the pasture grounds of the Carnatic from attaining the verdant, flourishing condition observable in extra tropical countries: at the same time, however, the temperature of the cold weather admits of the production of a considerable quantity of serviceable grass. In England the subject has received great and deserved attention. In some places, hay grasses are cultivated, in some, those adapted for pasturage or for catchmeadows, while in other localities preference is given to varieties which yield early or late pasturage, or have the recommendation of being suitable to some peculiarity of the soil. In India, however, the subject has received no such minute consideration, although deserving accurate investigation and careful experiment. The pasture lands are every where left to nature: there is generally a right of common pasturage; and there is nothing to prevent the village cattle from roaming at discretion. The first step, therefore, towards the improvement of grass lands must be the establishing and keeping up a strong and sufficient fence.

Laying down Grass.—After the erection of a good fence, the next step to be taken in laying down pasture land, is to prepare, pulverize and clean it, and having brought the ground into good condition to apply manure.

Manure.—With respect to the manure best adapted for increasing grass crops, perhaps stable sweepings and the vegetable mould of decayed leaves mixed half and half, is the most serviceable. It is obvious that where there are mounted corps we can always command a large quantity of stable sweepings for pasture lands, and if care were taken to collect urine, and other drainage of stables and dung hills, this would be found even more efficient than solid manure. The urine should be preserved in tanks, which might be formed at a short distance, and the fluid conveyed in pipes would be found a most useful top-dressing; the tanks should be covered to prevent evaporation, and by applying them towards the end of the rains would be washed in without being carried away. If, however, fertilizers of this description are not procurable in sufficient quantities, recourse must be had to other manures; and the alluvial soil which forms the upper layer at the bottom of tanks will be found to answer well. The best season for the application of manure is just before or during the rains.

Foreign Grasses.—The next question that present itself is that of the introduction of foreign grasses. After consulting all the available records of agricultural experience on this matter, it appears that the best way to obtain good fodder at a moderate cost is to pay attention to the indigenous grasses of the country, which, by irrigation and judicious manuring, may be greatly improved—such grasses being always chosen as are suitable to the soil. The Durva or Hurryallee grass (Cynodon dactylon), unquestionably the best species which India possesses for forage, has been cultivated with great success at Vellore by Major Ottley, who has given an interesting account of this grass in the Madras Journal of Literature and Science, 1849, Vol, XV, p. 477, and a short description of it will be found in Appendix R. In upland districts rye grass and clover grow, and both these exotics, when sown fresh, have been found to answer exceedingly well on the Shervaroy, Pulney, Neilgherry, and Bababoodun Hills. The Guinea grass has been strongly recommended in Bengal.

Inoculating Grass.—In poor soils such as that of the Carnatic, grass seeds do not take so well as in rich land; and there is great difficulty in procuring a good sward. In this case recourse must be had to planting, or, as some call it inoculating grass. This is done by taking pieces of turf from the banks of a river or tank, and spreading them over the land to be laid down, after it has been prepared in the same manner as it would have been to receive the seed. The turf should be taken up in little square pieces, and spread over the surface of the ground, leaving small interspaces between each piece. A stone roller or a wooden beater should then be employed to press them into the ground. In a few days the interspaces will be found to be filled up, and a complete carpet of turf to be formed.

Paring and burning the surface of poor soils.—Before putting down the turf, poor stiff lands must be divided by ditches, ploughed in deep furrows, and exposed as much as possible to the wind and sun. Such soils may with careful culture and irrigation become permanent meadow land, but it is essential to get them into a sound state by most carefully clearing them of nuthgrass and weeds before laying down grass seeds, and subsequently by keeping the land free of coarse grass by hand weeding, Paring and burning the surface have been found useful, and if beneficial in the first instance, the operation may be repeated with advantage.

Conclusion.—The above must be considered only as an outline of the plan to be pursued in the cultivation of grass. It is impossible to predict the cost and probable improvement in each case, as these depend so much on local peculia-

rities. But by beginning, as recommended by Mr. Pritchard, on a small and experimental scale at first, and proceeding cautiously, new modes of lessening expense will be suggested, past errors will be avoided, and certain grounds of calculation will be obtained.—H. F. C. Cleghorn, *Professor of Botany*. The Cynodon Dactylon or Hurryalee Grass, of India, is considered the best for horses. Root creeping through the loose sand, with strong fibres at the nodes. Stem rarely exceeding six inches in height, creeping to a considerable extent, matted, very smooth. Florets, all on one side of the spike-stalk, awnless, purplish, and ranged in two close alternate rows. All the stems which lie near the ground take root, and by this means, though an annual plant, it increases and spreads very wide. It yields abundance of seed, of which small birds are very fond. It has been found very successful to allow the seed to ripen before the hay is cut, as it then propagates itself by seeds, in addition to the runners. This Grass is also found in Great Britain, but in that country its produce and nutritive properties are comparatively insignificant, while here it consititutes ¾ of the pasture. Respecting this Grass, Sir W. Jones observes (As. Res. Vol. 4, P. 242,) "that it is the sweetest and most nutritious pasture for cattle; and its usefulness, added to its beauty, induced the Hindoos, in their earliest ages, to believe that it was the mansion of a benevolent nymph. Even the Veda celebrates it, as in the following text of the A't'harvana: "My Durva, which rose from the water of life, which has a hundred roots and a hundred stems, efface a hundred of my sins, and prolong my existence on earth a hundred years."—*Dr. Cleghorn, Grasses.*

(4149) GRASS CLOTH OR CHINA GRASS CLOTH, is fabricated from the fibre of the Urtica nivea of Linnæus, the Boehmeria nivea of Gaudichaud. Though the beautiful fabric known as China Grass cloth has long been known, it is only in comparatively recent times that it has been ascertained to be manufactured from the fibres of the *Boehmeria Nivea*. It is met with bleached and unbleached. It is extensively used by the Chinese, being woven into narrow pieces and into handkerchiefs; the export being chiefly to India and the United States, many handkerchiefs being sent to the latter country.

(4150) GRASS OIL OF NEMAUR.

Roosa-ka-tel. HIND.

This valuable oil was first brought to notice by Dr. Maxwell in 1824, and was further described by Dr. Forsyth in 1826. The oil is obtained from the grass by distillation; 250 to 300 small bundles of the grass are placed in a boiler, covered with water, and distilled. About a seer of oil is obtained in the receiver. Dr. Forsyth describes it as volatile, extremely pungent, of light straw colour, very transparent, with a peculiar, rich and agreeable odour. Dr. Forsyth adds, that it is very highly esteemed by the wealthy natives for the cure of rheumatism, especially that of the chronic kind; two drachms of the diluted oil are rubbed over the pained part in the heat of the sun or before a fire twice daily. It causes a strong sensation of heat or pricking, lasting for two hours or longer. The natives also regard it as an efficacious remedy in slight colds. They anoint the soles of the feet with the oil, and it is stated that slight diaphoresis is thus produced. See *Trans. Med.* and *Phys. Soc.* iii. p. 219.—*O'Sh. page* 639.

(4151) GRATIOLA MONNIERIA, THYME LEAVED GRATIOLA. Lin.

Neerpirimie. TAM. | Jelabrimmi, SANS.

The jointed root, stalks, leaves and blue bell shaped flowers of this creeping plant, which is of the class Diandria and order Monogynia, are all used in medicine by the native practitioners who consider them as diuretic and aperient, and to be particularly indicated in that species of stoppage of urine which is accompanied with obstinate costiveness.—*Ains. Mat. Med. page* 94.

(4152) GREASE, for Railways. The mixture used by the East Indian Railway for axle-grease is this.

Tallow	50 lb.
Country Soap	20 ,,
Castor Oil	30 ,,
Water about	10 Gallons.

Melt the tallow in a large vessel, cut the soap in slices and put into the water when the latter is warm, when the soap is fully dissolved pour the water containing it into the tallow after which add the castor oil: *immediately* after the latter is added, take the mixture off the fire, and while it is cooling let it be stirred constantly till cool. The mixture may require a little more or less water according to the temperature of the weather.

(4153) GREEN COPPERAS, GREEN VITRIOL, SULPHATE OF IRON.

Sulfate de fer, FR.	latum, Salmartis, LAT.
Schwefelsaures eisen, GER.	Taroosee, MAL.
Heracussis, Hera-tootia, GUS. HIND.	Zunkur madnee, Tootiya-subz, PERS.
Solfato di ferro, IT.	Anna bugdie, TAM.
Ferri sulphas, Ferri Vitrio-	

Green copperas is of great importance in the arts. It is a principal ingredient in dyeing: in the manufacture of ink, and of Prussian blue; it is also used in tanning, painting, medicine, &c. When pure it is considerably transparent, of a fine bright, though not very deep, grass green colour, and of a nauseous astringent taste, accompanied with a kind of sweetness.—*McCulloch. Faulkner.*

(4154) GREEN SHANK. The Indian Green shank, has been separated from *Totanus glottis* by the name *T. glottoides*; and the lat-

ter name is adopted by Mr. Gould for the Greenshank of Australia. Upon comparison of fine specimens from Scotland and Norway with others obtained in the Calcutta provision-bazar, we can discern no difference whatever. The alleged *T. glottoides* is simply the bird in its winter plumage, in which it is less known in Britain than in its summer garb.

(4155) GREWIA, a genus of Plants belonging to the natural order *Tiliaceæ*, so-named in honour of Dr. Grew, celebrated for his work on the anatomy of vegetables. Though the family takes its name from the European genus *Tilia*, its species are distributed chiefly through tropical countries. *Grewia* now consists of upwards of 50 species of moderately-sized trees or shrubs, which have leaves resembling those of the elm, yellow or white flowers, and many of them pleasant-tasted subacid fruit. The calyx consists of 5 coriaceous sepals, which are coloured internally. Petals 5, each provided with a gland or scale at the base, inserted with the numerous stamens into the elevated receptacle; germ superior, generally 2-celled; style single; stigma 4-lobed; drupe with from one to four 1 or 2-seeded small nuts. The species of *Grewia* are found in the tropical islands and the hot parts of the Old World, extending west to the west coast of Africa, and south to the Cape of Good Hope. In India they are common in every part, both in jungly forests and the dry open plains; some of the same species extend from the southern to the most northern parts; a few even ascend the Himalayas to moderate elevations. Species are also found in Arabia and Egypt. The species of *Tiliaceæ* are noted for their mucilaginous properties, as well as for the remarkable tenacity of the inner fibre of their bark, as exemplified in the *Tilia*, or common European lime-tree: that of *Grewia oppositifolia* is employed for making ropes with in the Himalayas; and *G. elastica*, figured by Dr. Royle in 'Illustrations of Himalayan Botany,' t. 22, and called Dhamnoo by the natives, is valued for the strength and elasticity of its wood. Cattle are fed on the leaves of some species, as *G. didyma*, at moderate elevations in the Himalayas. The pleasant-tasted subacid fruit of several species is eaten by the natives of India, but principally used for making sherbet. *Grewia asiatica*, or *phalsa*, is that principally employed and cultivated in their gardens.—*Eng*: *Cyc.* Wight, in Icones, gives Grewia columnaris, 44; hirsuta, 76; *microcos*, 84; oppositifolia, 82; rotundifolia, *scabrophylla*, sclerophylla, 89; ulmifolia, 84; and umbellata, 83. Perhaps there is no tree more generally diffused throughout the Provinces than a species of grewia, whose terminal bunches of flowers may be seen on almost every knoll in the country. At Tavoy, when vessels require spars, they are usually furnished from a small tree which grows on the seaboard, belonging to the genus Grewia.—*Mason.*

(4156) GREWIA ASIATICA. Lin.

Fulsa pullum, Tam. | Fulsa, Hind.

Fulsa is, properly, a Hindoostani word, but is also used by the Tamools: it is the name of a small, pleasant sub-acid fruit of a handsome bush and is much prized by the Mahomedans, who prescribe it to cool the habit in fevers. Cultivated at Ajmeer, both large tree and small bush varieties: the large tree is very beautiful when in new foliage.—*Ainslie, page* 225. *Irvine.* This shrub is generally cultivated in most fruit gardens; it bears a dark purple berry, when ripe, containing one or two small stones. The fruit is generally made into sherbet by pouring boiling water on it, and when cool, adding sugar to the taste. The plants are generally cut down almost to the ground in November, and even the leaves are burnt round the stalks, after which the roots are opened and manured, and watered occasionally, when new shoots spring out, and the fruit is borne near the axilla of each leaf; when of a dark purple, they are ripe and fit for use: grown readily from the seed.—*Riddell.* At the Madras Exhibition of 1855, Dr. Riddell exhibited fibres of the Grewia asiatica, G. tiliæfolia and Maliope grandiflora, but they were coarse and indifferent. Grewia asiatica and G. tiliæfolia both yield a useful bast.

(4157) GREWIA FLORIBUNDA.

Myat-ya, Burm.

A very common tree throughout the Rangoon, Pegu and Tounghoo districts, but scarce in the Prome and Tharawaddy districts. The bark affords a coarse strong fibre, not much employed however by the Burmese. It is a good serviceable timber for all ordinary purposes of house-building. There are three other species of *Grewia*—*G. asiatica* is a large tree like *G. floribunda*, but not so plentiful. The other two kinds are small and comparatively scarce. Wood, white-colored, adapted to every purpose of house-building.—*McClelland.*

(4158) GREWIA HIRSUTA.

Javelliki, Tam.

A shrubby plant; fruit hairy, common in the jungles.—*Jaffrey.*

(4159) GREWIA SALVIFOLIA. The species of Grewia makes good walking sticks. The wood of Grewia salvifolia is also good for the same purpose, and the bark of many species yields good fibres.—*Madras Hort. Gard.* 44.

(4160) GREWIA SPECTABILIS AND G. HOOKERII.

Phet-woon, Burm.

Both very plentiful, and of a quality like the last mentioned. They attain a girth of about three to four feet and grow up tall and remarkably straight. They are found with Teak in the forests of Pegu and Tounghoo. Wood, white-colored, adapted to every purpose of house-building.—*McClelland.*

(4161) GREWIA TILIÆFOLIA.

Sadachoo or chadachy marum, also Thalathee marum, TAM.

A considerable tree, the wood is soft and easily worked, useful for inferior building and common purposes. Said to be unfit for cabinet purposes, for which in appearance it seems well adapted, on account of its hygrometric properties, which causes it to contract and expand, however well seasoned, with every change of the weather. —*Wight.* The wood is used for the same purposes as the Ben teak, for which it is often sold at Calicut.—*McIvor. M. E.*

(4162) GROSSULARIACEÆ, *Currant-Worts*, a natural order of Exogenous Plants, consisting of 2 genera and 95 species. The genera consist of shrubs, either unarmed or spiny. The leaves alternate, lobed, with a planted vernation, often with a membranous edge to the base of the petioles. Flowers in axillary racemes, with bracts at their base, rarely unisexual by abortion; the calyx superior, 4- or 5-parted, regular, coloured, imbricated, or somewhat valvate in æstivation; petals 5, minute-inserted in the throat of the calyx; stamens 5, inserted alternately with the petals, very short; ovary 1-celled, with 2 opposite parietal placentæ, ovules numerous, on short stalks, anatropal, style 2- 3- or 4-cleft. Berry crowned with the remains of the flower, 1-celled, the cell filled with pulp; seeds numerous, suspended among the pulp by long filiform cords, testa externally gelatinous, adhering firmly to the albumen, which is horny; embryo minute, with the radicle next the hilum. Nothwithstanding the great dissimilarity in the appearance of these plants and Indian Figs, the two orders were formerly confounded, and are still accounted by many writers conterminous, chiefly, on account of their both having inferior pulpy fruit and parietal placentæ. They are natives of the mountains, hills, and woods and thickets, of the temperate parts of Europe, Asia, and America, but unknown in Africa. In North America they are particularly abundant, and on the mountains of Northern India they contribute to give a European character to that remarkable region. In the tropics of Asia and the South Sea Islands they occur in the form of *Polyosma*, a genus which derives its name from the excessive fragrance of its flowers. To this order belongs the genus *Ribes*, of which the Gooseberry and Currant are different species. The Black Currant is tonic and stimulant and has fragrant glands upon its leaves and flowers. —*Engl. Cyc.*

(4163) GROUND NUTS, ARACHIS HYPOGÆA, OR HYPOCARPOGEA.

Bhoysing, GUZ. HIND.

Ground nuts are now extensively cultivated in the Concans on account of the oil which they afford. They are occasionally exported to England and France.—*Faulkner.* This very singular plant has frequently been confounded with others, partly through the carelessness of travellers, and by the improper use of names, which tended to mislead and confuse. Its common appellation, the earth-nut, has led to the conclusion that it was a species of nut, such as is known in England under the name of "pig nut," "hawk nut," and "ground nut." This, as well as the "earth chesnut," belongs to totally different genera. On the Continent and in the East Indies a similar confusion had long existed by the appellation of "ground pistachio," which caused the fruit to be confounded with the nut of the tree *Pistacia vera*. Some resemblance, on the other hand, existing between these—as well as from their being eaten by different nations, and used as an article of food, and also for producing oil—rendered the true description still more difficult. Botanists have however, well established the nature and character of all these plants. The Arachis "nut" partakes of the nature of the pea or bean of Europe, and is a low annual plant of the order *Diadelphia decandria* of Linn.; orginally from Africa, but now extensively cultivated in every quarter of the globe. It has been naturalised in Europe, and with the climate of the South of France it may be turned to good account. It has been said to be indigenous in Florida, Peru, Brazil, and Surinam; but the plant may be grown on a light sandy soil, under a moderate heat, equal to that of Italy or the South of France. The class to which it belongs approaches to the pea tribe; but its remarkable difference to this, as to the pulse we know as a bean, is the circumstance of its introducing its fruit or pod—if we may so call it—into the earth, for the purpose of ripening its seed. The Arachis, or earth-nut, has obtained its name from this operation. The flowers, leaves and stems, are produced in the ordinary manner we see in the pea tribe. When the yellow flower has withered and the seed fertilised, there is nothing left but the bare stem which had supported it. This stem, in which is the germ of the future fruit and pod, now grows rapidly in a curved manner, with a tendency to arrive shortly on the surface of the ground, into which it penetrates this now naked stem, and sinks into the earth several inches. It is in this obscure position that the fruit takes its ripened form, and is either gathered from its hiding place or left to the future season, when its time of rising into new existence calls it from what was thought its unnatural position. When mature, it is of a pale yellow color, wrinkled, and forms an oblong pod, sometimes contracted in the middle; it contains generally two seeds. The nuts or peas are a valuable article of food in the tropical parts of Africa, America, and Asia. They are sweetish

and almond-like, and yield an oil, when pressed, not inferior in use and quality to that obtained from the olive. The leaf resembles that of clover, and, like it, affords excellent food for cattle. The cake, after the oil is expressed, forms an excellent manure. The Arachis is usually sown in dry, warm weather, from May to June, and are placed at the distance of eighteen inches from each other. Insects are fond of them; and if the season is cold and unfavorable to them, or the growth retarded, they become musty and bad, or are eaten by insects. The mode of obtaining the oil is nearly the same as for other pulse or seeds; and under favorable circumstances the Arachis will produce half its weight of oil. When heated and pressed the quantity is very considerably increased. This oil is good for every purpose for which olive or almond oil is used. For domestic purposes it is esteemed, and it does not become rancid so quickly as other oils. Experiments have been made on its inflammable properties, and it is proved that the brilliancy of light was superior to that of olive oil, and its durability was likewise proved to be seven minutes per hour beyond the combustion of the best olive oil, with the additional advantage of scarcely any smoke. In Cochin-China and India it is used for lamps. It is known as Bhoe Moong or Moong Phullee in Bengal, and as Japan or Chinese pulse in Java. From China this plant was probably introduced into the continent of India, Ceylon, and the Malayan Archipelago, where it is generally cultivated. In South Carolina the seed is roasted and used as chocolate. The leaves are used medicinally. It is grown in Jamaica, and there called Pindar nut. That the culture of the Arachis in warm climates, or even in a temperate one, under favorable circumstances, should be encouraged, there can be but one opinion. And when it is considered that its qualities are able to supersede that of the olive and the almond, which are but precarious in their crops—to which may be added, that as a plant it is greedily devoured in the green state by cattle—how much may it not serve to assist the new settler in regions of the world which have a climate suited to it. It is known by various local names—such as *mani manoli* by the Spaniards, and has obtained also that of *cacahuete* in some countries. It has the additional term *hypogea* attached to it, which literally signifies subterranean. This is apt to mislead; for the plant grows above ground as other pulse, whereas only its seed and pericarp are inserted, after blooming, into the earth. Hence the better term *hypocarpogea*. It appears to form an important article of cultivation along the whole of the west coast of Africa, and probably on the east coast, on several parts of which it was found by Loureiro ("Flor. Cochin," p. 430). It was doubtless carried from Africa to various parts of equinoctial America, for it is noticed in some of

the early accounts of Peru and Brazil. 800 quarters of this nut were imported into Liverpool from the West Coast of Africa, in 1849, for expressing oil, and about half that quantity in 1850. Eighty to 90 tons of the expressed oil are now annually imported. The seeds contain about 44 per cent. of a clear pale yellow oil, which is largely used in India as food, and for lamps, particularly at Malwa and Bombay, &c. Two varieties are grown in Malacca, the white seed and the brown seed, and also in Java, in the vicinity of sugar plantations; the oil cake being used as manure. It is there known as katjang oil. This plant, which seems to be a native of many parts of Asia, has within the last ten years been much cultivated about Calcutta. The seeds contain abundance of fixed oil, have a faint odour, and very mild agreeable taste; 1,950 parts of seed, separated from their coverings and blanched, give 1,405 of kernels, from which, by cold pressure, 703 parts of oil are procured. The seeds are consumed as a cheap popular luxury, being half roasted, and then eaten with salt. The oil is calculated to serve as an efficient and very cheap substitute for olive oil, for pharmaceutical purposes. It burns with little smoke, with a clear flame, and affords a very full bright light, answering perfectly in Argand lamps. The oil cake affords, also, an excellent food for cattle. The ground nut has of late become of considerable importance as an article of exportation, by English houses; yet more so by French houses at Ghent, Rouen, and Bordeaux; some of whom have contracted with the merchants of the African colonies for large quantities, sending shipping for the cargoes. One house alone contracted for 60,000 bushels in the years 1844 and 1845. This nut oil is so very useful to machinery that the naval steam cruisers on the coast have adopted it. A ground nut oil factory exists in the colony of Sierra Leone; but from the want of steam power and proper machinery, and from bad management, together with the inferior attainments of the African artisan, when compared with the European mechanic, and their facilities in quantity or quality, there is abundant scope for improvement. The price in the colony is 4s. 6d. per gallon. It is capable of being refined so as to answer the purpose of a salad oil; the nut is prolific, and eaten by the natives and Europeans, boiled, roasted, or in its raw state; and frequently introduced at the table as we do the Spanish Barcelona nut at dessert. It grows in the rainy season, and is collected in the dry, and sold in the colony for one shilling to eighteen-pence per bushel, in goods and cash. Form of the nut, long, light shell, contains two kernels covered with a brown rind, when shelled white in appearance. It is a low creeping plant, with yellow flowers; after they drop off, and the pods begin to form, they bury themselves in the earth, where they come to maturity. The pod is

woody and dry, containing from one to three peas, or nuts, as they are called, hence the common names, ground-nut or pea-nut. They require to be parched in an oven before they are eaten, and form a chief article of food in many parts of Africa. From a narrow strip of land, extending about 40 miles northerly from Wilmington (North Carolina), comes nearly the entire quantity of earth nuts (known as pea-nuts) grown in the United States for market. From that tract and immediate vicinity, 80,000 bushels have been carried to Wilmington market in one year. The plant has somewhat the appearance of the dwarf garden-pea, though more bushy. It is cultivated in hills. The pea grows on tendrils, which put out from the plant and take root in the earth, where the nut is produced and ripened. The fruit is picked from the root by hand, and the vines are a favorite food for horses, mules, and cattle. From 30 to 80 bushels are produced on an acre. There are some planters who raise from 1,000 to 1,500 bushels a year.—("Hunt's Merchant's Magazine," vol. xv., p. 426.) The ground-nut is exceedingly prolific, and requires but little care and attention to its culture, while the oil extracted from it is quite equal to that yielded by the olive. Almost any kind of soil being adapted for it, nothing can be more simple than its management. All that is required is the soil to be turned over and the seed sown in drills like potatoes; after it begins to shoot it may be earthed with a hoe or plough. In many parts of Western Australia they are now grown in gardens for feeding pigs, the rich oil they are capable of yielding being entirely overlooked. In regard to their marketable value at home, Mr. Simmonds gives a copy of a letter of a friend received from some London brokers, largely engaged in the African trade:—"Wilson and Rose present compliments to Mr. N., and beg to inform him the price of African ground nuts is as under:—Say for River Gambia, £11 per ton here. Say for Sierra Leone, £10 per ton here. For ground nuts free on board at the former port, £8 per ton is demanded; these are the finest description of nut, the freight would be about £4 per ton; the weight per bushel imperial measure, and in the shell, is about 25 lbs." The following, also, is an extract from a letter written in 1842, by Mr. Forster (the present M.P. for Berwick), an eminent African merchant. Speaking of the staple of Africa, he says:—"I have lately been attempting to obtain other oils from the coast, and it was only yesterday I received from the hands of the oil presser the result of my most recent experiment on the ground nut, which I am happy to say is encouraging. I send you a sample of the oil extracted from them. They are from the Gambia. It is a pure golden colored oil, with a pleasant flavor, free from the frequent rancidity of olive oil." Since then the cultivation has gone on, and the exportation largely increased. The French also have entered into the trade, and several vessels are exclusively employed in exporting this product from the river Gambia, conveying it to oil factors on the continent, who extract its oil. Seeing then, the many advantages the cultivation of such a product bestows, and its adaptation to the soil and climate of Australia, I cannot refrain from expressing a hope that some of the influential landowners in the cultivated districts will give the matter their consideration. I am informed by an American merchant that he cleared 12,000 dollars in one year, on the single article of ground or pea nuts obtained from Africa. Strange as it may appear, nearly all these nuts are transhipped to France, where they command a ready sale; are there converted into oil, and thence find their way over the world in the shape of olive oil; the skill of the French chemists enabling them to imitate the real Lucca and Florence oil, so as to deceive the nicest judges. Indeed, the oil from the pea nuts possesses a sweetness and delicacy that cannot be surpassed. Advices from the West Coast of Africa to the 16th August, 1853, report that the ground nut season had closed; the quantity shipped during the season having exceeded 900,000 bushels. The yield has increased 20 per cent. each year for the last three years, and it is expected the increase will be still greater in the forthcoming season.—*Simmonds' Com. Pro. page.* 517.

(4164) GROUND NUT OIL, ARACHIS HYPOGEA. Manilla nut oil.

Vayreuddala-yennai, TAM.	Phullie-ka tael, HIND.
Manilla noona, TEL.	Boysing ka teil, HIND.
Willayetie-moong-kie-	

This valuable oil, which of late years has been exported to a large amount, is obtained by expression from the seeds of the Ground or Manilla nut, which is now cultivated to a considerable extent in most parts of the Peninsula of India. In the year 1848-49—37,000 gallons were shipped, but in the two following years the Exports exceeded 1,00,000 gallons. It has however fallen to 57,207 gallons in 1852-53. It does not seem to be consumed to any large extent in this country, although the nut itself is much eaten by the poorer classes. It is said to be used for adulterating gingely oil in North Arcot, where it costs from Rs. 1-8-0, to 2-12-0, per maund. In the Nellore District, the seeds are procurable at Rs. 1-8-0, per maund and in Tanjore about 200 acres are cultivated, producing annually 75 candies of oil at Rs. 2-6-0 per maund. The seeds yield about 43 per cent, of a clear straw coloured edible oil, which is an excellent substitute for olive oil, and makes a good soap. Its value in London in January 1855 was £47-10 per ton. The Madras Tariff, the Tanjore Local Committee and Lieut. Hawkes exhibit excellent specimens.—*Eng. Cyc.*

(4165) GROUND RATANS. The excellent walking sticks known to the English under this name, are made from the Rhapis flabelliformis which grows in Lin kin and Southern China.

(4166) GRINDSTONES. The Natives of India prepare a grindstone composed of shell lac as its basis, and corundum powder or other hard mineral as the grinding material. In Coimbatore persons of the barber caste are the manufacturers of these. The process is sufficiently rude. The stone being pounded and reduced to the form of fine grained gun powder is heated in a chatty. The lac is then added and the two stirred together until the mass is of the consistence of dough, when it is turned out and beat and kneaded into the required shape. There are only two articles used in its construction, but not using a mould, the operation is tedious and the finished article when completed, not by any means of first rate excellence. The principal objection to them seems to be the extreme hardness which renders them less effective than if the lac by a small admixture of a softer substance were rendered somewhat more yielding. Upon the whole as made there it is a rather rude but durable machine. It was stated that at the Hoonsoor farm, where pearl barley is prepared, English grind-stones for making it required frequent renewal, but that one of this description has now been in use 5 years. The stone used in Coimbatore is powdered coarse garnet sand, found in the beds of the neighbouring hill streams. The Corundum stones met with for sale in the bazars are usually small, generally more rounded and water worn on the edges, as if collected in the beds of mountain streams from among the pebbles they bring down. In making a Lac grind-stone simply of Gum Lac, and finely pulverized corundum stone, these are heated separately to facilitate their more perfect admixture and combination. They are then thrown into a mould and strongly beaten and kneaded to give compactness and expel all air bubbles.—*M. C.*

(4167) GRISLEA, a genus of tropical Plants belonging to the natural order *Lythraceæ*, or *Salicariaceæ*. The genus is characterised by having a tubular calyx, which is from 4- to 6-toothed; the petals, 4 to 6 in number, are inserted between the divisions of the calyx; the stamens, twice as many, arise from the bottom of the calyx, and have their long filaments extending with the style beyond its tube; the capsule is superior, 2-celled, many-seeded, and covered by the persistent calyx. The plants of this genus consist of shrubs, with opposite, very entire leaves, dotted on the under surface with dark-coloured glands. The peduncles are axillary and many-flowered; the flowers reddish-coloured. The species are not more than three in number, of which one, *G. secunda*, is found in the warmer parts of South America, and the others in India. *G. tomentosa*, the best known and most useful species, is found in the islands of the Indian Ocean, in China, and in every part of the continent of India, especially in the jungly tracts at the foot of its several ranges of mountains. In such situations its bright red calyx, retaining its colour till the seeds are ripe, gives the whole plant a very showy appearance, and points it out to the collectors of its flowers, which form an article of commerce. These are much employed by the natives of India for dyeing a red colour, and, having some degree of astringency, are also employed in Indian medicine. The plant is known by the names of Dharee, Dhaee, &c., and the flowers by that of Dhaeephool.—*Eng. Cyc.*

(4168) GRISLEA TOMENTOSA, Woolly Grislea.

Dhawn Phool, Hind.

Very ornamental both in foliage and blossom. The flowers are used in dyeing. This tree would do well in compounds. This is very distinct from the Dhan, which is the common firewood of Ajmeer. Though a rare tree in Ajmeer, the plant is very common in the Prome district, and flowers in April. It is not found in Tounghoo district. —*McClelland.* The red flowers of this plant are used for red dye. In the bazars of Bengal they are found in a dry state, under the name of Datoke. The petals are officinal at Lahore, where they are used as a dye, as well as a medicine. The red petals, contain much tannic acid. —*O'Shaughnessy.* These scarlet flowers generally come to Ajmere, from Kotah and Harowtie: are considered stimulating and given to women in labour. One seer costs four annas. The gum of this tree, called *dhaura* or *dhau ka gond*, is brought from Mewar and Harowtee, and is abundant, white in colour, like the katira and tragacanth gums, swells in water: in dying cloth it is applied to those parts that the dye is not wished to touch; it is eaten in "luddoo:" one maund costs ten rupees.—*Gen. Med. Top. p.* 133.

(4169) GUAIACUM OFFICINALE, Lignum Vitæ.

Gayac, Boissaint, Fr.	Lignum Vitæ, Lat.
Pockhaln, Ger.	Guayaco, Sp.
Guajaco, It.	

A lofty tree, a native of Jamaica and Hispaniola. Both the bark and wood are used as sudorifics in the treatment of gout, rheumatism, and chronic or secondary syphilis. It is asserted that a native of St. Domingo first made known to Europeans the sudorific virtues of this tree. The wood from its extreme hardness is much used for screws, presses, blocks, and pullies. The trunk of the guaiac tree is from 60 feet upward; in temperate climates the growth is exceedingly slow, not more than one line annually. The resin is obtained either by spontaneous exudation, or by taking a billet of wood with a

hole bored through its centre lengthwise, and setting fire to the upper end—the melted resin flows along the tube to a receiver placed beneath it. Internally taken, either wood or resin excites a sensation of warmth in the stomach, and dryness of the mouth and throat (Duncan). It increases the heat of the skin, accelerates the pulse, and proves diaphoretic, if the patient be kept warm, or diuretic, if the surface of the body is exposed to the air. In large doses Dr. Duncan says it acts as a purgative. Besides the diseases before mentioned, guaiac is given in cases of foul ulcers, hospital gangrene, thickened ligaments, mercurial ulcerations, and in various forms of scrofula. The wood is used in decoction, the resin in pills, emulsion, or tincture; 10 to 30 grs. may be given daily. Dr. Duncan states that half an ounce of the tincture with three ounces of water is a sudorific dose for an adult, if he attend to keep himself warm.—*O'Shaughnessy.* The wood is the weightiest timber known; is exceedingly hard and difficult to work; is externally of a blackish brown, and internally of a yellowish colour. It is well adapted for stampers and mallets, for friction rollers, castors, turnery ware: also for the sheaves of pulleys or blocks, a purpose for which it is extensively used. This wood is imported into Bombay from England, and is chiefly worked into sheaves for blocks.—*Faulkner.* This shrub has been lately introduced, into Madras and is found to thrive remarkably well, readily flowering and fruiting. In time, a supply may be available.

(4170) GUANA: IGUANA.

Zib, Arab. | Oodomboo, Tam.
Ghore-pore, Duk. | Oodoomoo, Tel.
Ghoda-sala, Sans.

The Guana of India is generally found about old walls, and ruinous buildings; it is about two feet long; the belly is protuberent; the tail long, round, and tapering: its back, tail, and throat are serrated; and its whole surface is covered with shining scales. The flesh is eaten by the Mahomedans of India, and in the West Indies, it is salted and barrelled for exportation. In India the body of the dried Guana is made into an electuary, with a certain portion of Ghee, and used as a strengthening medicine in consumptive complaints.—*Faulkner.* An animal oil is obtained from it.

(4171) GUANO, Huano. A highly concentrated manure, said to be an accumulation of the excrement of herons, flamands, and other birds, inhabiting the islands of Chinche, near Pisco, the coasts of Peru and Africa, &c. Different opinions, however, are entertained as to its exact nature and origin, many supposing that it is a peculiar mineral or earth. It is a dark yellow substance, of a strong odour, found in deposits of 50 or 60 feet thick and of considerable extent in the localities above mentioned.—*Faulkner.*

(4172) GUAREA TRICHILIOIDES. Bark a violent emetic and purgative.—*O'Shaughnessy, page* 346. Wight in Icones, gives G. Paniculata.

(4173) GUATTERIA CERASOIDES. *Anonaceæ*, Roxburgh C. 33. A moderate sized tree, wood white and close grained, at least as seen in a three or four years old branch. Dr. Wight had not seen it as it appears in the trunk.—*Wight.*

(4174) GUATTERIA LONGIFOLIA.

Thavathroo, Tam. | Asoka chettoo, Tel.

A very handsome, erect growing tree, wood soft and useless.—*M. E. of* 1855,

(4175) GUAVA TREE, White and Red, Psidium Pomiferum, Lin. P. Pyriferum.

Coia murum, Tam.

The wood of this tree, from being extremely close grained, tough, and compact, is preferred for making wooden mallets, and other things required to stand hard knocks.—*Ains. Met Med. page* 211. It is also used for wood engravings. In Tenasserim, the guava is planted perhaps more extensively than any other fruit tree in the country. Loudon has the most correct notion of the fruit. He says: "Most of the species are cultivated in the tropics for their fruit, which also ripens freely in this country, but is of little merit." The white guava is the species most usually cultivated but the red is not uncommon.—*Mason.*

(4176) GUAZUMA. A genus of the family Byttneriaceæ, the G. ulmifolia sometimes known as Bastard cedar Gunstock-tree introduced into Madras from South America and the G. tomentosa. G. ulmifolia presents, between its outer bark of sapwood—a fibrous mass about half an inch in thickness, richly impregnated with mucilage, which is extracted by macerating the fibrous mass, for twelve hours, in warm water, and is greatly employed in the West Indies for clarifying sugar. G. Tomentosa yields fibres. This Guazuma is employed in South America in clarifying sugar, as a Kydia is in India.—*Royle.*

(4177) GUAZUMA TOMENTOSA, K. (Abroma Guazuma, Willd). A native of South America and of the West Indies, and now common in gardens in India, where the wood is called the bastard cedar; the old bark is used in the West Indies as a sudorific; the young bark is very mucilaginous, employed for clearing sugar. The bark of the *Kydia calycina* (*Choupullea*, Hind.) a native of Coromandel, Nepal, and the Neilgherries, is used for the same purpose in this country.—*O'Shaughnessy, p.* 226. In the Dekhan it is rather a common tree, with small yellow axillary and terminal flowers, capsule woody, tubercled, about the size of a small plum.—*Riddell.* The tree is pretty common about Madras, evidently planted, the fruit is tubercled, about the size of a cherry, introduced by Dr. Anderson about 70 years ago.—*M. E. J. R.*

(4178) GUAZUMA ULMIFOLIA is a South American tree, which was introduced into India, and largely cultivated at one time in the Madras Presidency under the name of Bastard Cedar, as fodder for cattle. The fibres of its straight, luxuriant, young branches were submitted to trial by Dr. Roxburgh. The Byttneria Tribe, of plants to which this genus belongs, are by some botanists considered a distinct natural order, by others reduced to a section of Sterculiaceæ. They belong to Lindley's Malval alliance of Exogens, and are readily known by their petals being bagged at the base, their stamens partly sterile and petaloid, and their fruit covered with hooked spiny hairs. From Sterculiaceæ proper they differ by the presence of petals, and their stamens not being united into a column; from Malvaceæ by their 2-celled anthers and bagged petals; and from *Lasiopetaleæ* by their calyx not being coloured like a corolla, and their petals not rudimentary. The species are chiefly inhabitants of tropical countries. They partake of the mucilaginous inert properties of *Malvaceæ*. Their bark often yields a tough fibre fit for manufacture into cordage; and one species, *Theobroma cacao*, produces the seeds from which the buttery and somewhat bitter substance called cocoa is obtained, and which forms the basis of chocolate. The fruit of *Guazuma ulmifolia* is eaten by the Brazilians. Many of the species yield fibres which might be manufactured into cordage, as *Microlæna spectabilis* and *Abroma augustum*.

(4179) GUETTARDA SPECIOSA, Rubiaceæ. Lin.

Panneer poo, Tam.	Panneer poo, Tel.
Panneer ka pool, Duk.	Hima, Sans.—*Ainslie.*

A small tree: with large white fragrant flowers, in blossom throughout the year: the tree is sacred both to Siva and Vishnoo.—*Riddell.* Is extremely fragrant: Corals white and tube long. The tree itself is very handsome. *Ain.'s Mat. Med. p.* 158.

(4180) GUGAL KA GOND, Amyris agallocha. The tree is plentiful in the Ajmeer hills, yields a fragrant gum resin used in the sacred fumigations by the brahmins; the gum has a similarity to myrrh; used also in flatulencies taken in ghee: is one of the ingredients in the incense or "dhoop."—*Gen. Med. Top. p.* 135.

(4181) GUIA KHUTAI. A Bokharian Hakim presented Dr. Bonigberger with a hard, pitch-like plaster (on a small piece of red linen), which he pretended had been prepared in China, and which was capable of removing every kind of pain, simply by application. One and the same plaster serves for several cases. The form is square, three or four inches in diameter; each of them bears a Chinese Seal. According to the assertion of the Hakim its constituent parts are sweet oil and litharge, the latter, as an impalpable powder, is added to the former. The Bokharian doctor pretended that every pain without exception, must yield to its application. It should be applied as near as possible to the affected part; for instance, in headache, it ought to be applied on both temples or on the forehead, in ear-ache behind the ears; in carious toothache a small piece should be put into the hollow of the tooth. It acts as a rubefacient, without blistering.—*Dr. Honigberger, page* 282.

(4182) GUINEA GRASS. Panicum jumentosum. Guinea grass is grown by a few Europeans in Tenasserim, and it does as well as the indigenous species. See Grasses.

(4183) GUIZOTIA OLEIFERA. Verbisina sativa.

Ramtill, Hind.	Valasaloo, Tel.
Oochelloo. Tam.	

A seed equal to the shape of Black cummin seeds has no smell but oil manufactured from it.

The Oil.

Valeesaloo Noonay, Tel.	Kala Till-ka-tel, Hind.

This sweet tasted edible oil is plentiful in the Mysore, Vizagapatam and Ganjam Districts. It is used for nearly the same purposes as the Sesamum. It is procurable in the Nuggur Division of Mysore at Rs. 3 8 0 per maund, but is considered inferior to gingely oil.—*M. E. of* 1855.

(4184) GUJ PIPPUL. Fruit of Pothos officinalis. Guj-pipar, according to Dr. Irvine, is supposed to be the root of Borassus flabelliformis, brought from Cabul: is astringent, and is given in medicine, to promote digestion: one seer costs two rupees. The guj peepul or guj-pipar is the sliced dried fruit of Pothos officinalis.—*Genl. Med. Top. page* 135.

(4185) GUILANDINA BONDUCELLA: KUTKULINGA. East and West Indies; commoner in Bengal than Madras. The kernels are very bitter. Mr. Piddington has detected in the nuts oil, starch, sugar, and resin; further analysis is desirable. This substance is the commonest antiperiodic supplied in the list of Bazar medicines to hospitals in Bengal, and it is undoubtedly one of considerable utility, especially in convalescence from fever: I cannot speak of its qualities from any accurate observation, although like others I have used it a good deal among sepoys and jail prisoners with apparent benefit. Mr. Waring thinks but poorly of it. But many think differently and sub Assistant Surgeon Bholanath Doss of Ajmeer says a few doses of it with black pepper were sufficient to put a stop to the paroxysm. He sometimes gave 12 to 15 grs. three times during the day, at other times he gave 8 grs. every hour, leaving it off an hour, before the expected paroxysm. If it does not stop the paroxysm the first time it seldom fails the second. The common way of exhibiting this substance is to give of the nut finely powdered, and of black

pepper, each 6 to 20 grs. three times daily.—*Ind. Ann. Med. Sci. for April 1856, page 192.*

(4186) GULANCHA. Root and stem of Menispermum cordifolium; intensely bitter, transverse section very porous and radiated.—*O'Shaughnessy, Beng. Ph.*

(4187) GUL-GAJUBA. Flowers of gajuba from Bombay: cooling, in various mixed prescriptions: one seer costs two and a half rupees.—*Gen. Med. Top. p.* 136.

(4188) GULPISTA.

Buzgund. Guz. and Hind.; Gulpista, Pers.

A kind of gall produced on the Pistachio tree (*Pistacia vera*), a native of the South of Europe, and of Asia. They are imported into Bombay from the Persian Gulf, and are used in medicine by the natives of India.—*Faulkner.*

(4189) GUM TRAGACANTH, Gum Dragon.

Samagul-kateera, [illegible], Arab.	Kattera, Guz. and Hind.
Gommi astraganti, Fr.	Tragacantha, Lat.
Traganth, Ger.	Vadomocottay pisin, Tam.

A gum produced by a species of *Astragalus*, growing in Persia and Turkey. It is more costly than, and extremely different in many of its properties from Gum Arabic. The finest kind occurs in twisted, vermicular, rounded or elongated pieces, almost transparent, whitish, brittle, inodorous, with a slightly bitter taste. It is also found in large tears, of a vermicular form, a reddish colour, and mixed with impurities. It is used in topical dyeing, and in pharmacy for making powders into troches, &c.—*Waterston. Faulkner.*

(4190) GUM AMMONIAC.

Feshook, Ushek. Arab.	Ammoniacum, Lat.
Gomma Ammoniaque, Fr.	Semuugh-bil-Shereen, Pers.
Ammoniack, Ger.	Goma Ammoniaco. Sp.
Astruck, Guz. Hind.	
Gomma Ammoniaco, It.	

A concrete resinous juice obtained from a plant resembling fennel, found in the north of Africa, Arabia, Persia, the East Indies, &c. It has a bad and peculiar smell, and a bitter, nauseous, sweet, taste. The colour externally is yellow, and white internally. It is imported into Bombay from the Persian Gulf, and is chiefly re-exported to England. It is used in medicine.—*Faulk.*

(4191) GUM ARABIC.

Samagh Arabee, Tolh, Arab.	Arabee Goondur, Guz. Hind.
Gomme Arabique, Fr.	Gomma Arabica, It.
Arabische Gummi, Ger.	Kapitha, Sans.

Acacia, L. Gummi Acaciæ, E. Gummi Arabicum, D. Gum of various species of Acacia E., of A. vera, *Willd.* L.; of A. vera and A. arabica, D. Gum Acacia or Gum Arabic. Gum being an exudation from many trees, especially in warm and dry climates, must have been known from the most remote antiquity; and hence we find it mentioned by early Greek writers. It probably formed an article of commerce from Africa into Europe in ancient as it does in modern times. Gum being required for use in the arts as well as in medicine, large quantities are imported from the west and the east coast of Africa, from Egypt, Arabia, India, New Holland, and from the Cape of Good Hope. *Gum Arabic*, so called from being supposed to be produced in Arabia, is imported in immense quantities from Africa into Aden; none is collected and very little produced in Arabia. (Malcolmson.) It used to be produced in Upper Egypt and Nubia. M. Pallme describes the gum as being collected in Kordofan, especially in the district of Bara, in November, December, and January, it "is of the finest quality, and is erroneously named Gum Arabic;" from 10 to 14,000 hundred weight being conveyed on camels from Bara to Dongola on the Nile, whence it is conveyed to Cairo, and thence distributed to Europe. As the whole of the arid desert country is covered with Acacia trees, much is also conveyed to the ports of the Red Sea, and from thence to the opposite coast of Arabia, whence it is re-exported to Bombay, and from thence to this country. This is probably yielded partly by the *Acacia vera* and *A. arabica* mentioned in the Pharmacopœias, but chiefly by *A. Seyal*, *A. Ehrenbergii*, and *A. tortilis*. M. Pallme says that the Gum-tree of Kordofan differs materially in the shape of the tree, its leaves, and spines, from the Mimosa nilotica, that is, *Acacia vera*. Mr. Johnston, when near the Hawash, had given to him a lump of soft Gum Arabic, nearly a pound in weight, and of most agreeable flavour, like a green ear of corn. He mentions at the same time, that the trees were without exception the long-thorned Mimosa, and tall enough to ride under. It was probably the A. tortilis or A. Seyal. *Gum Senegal* is exported from Portendic, Sierra Leone, and the French settlements on the Senegal, being produced chiefly in the desert country to the north of the Senegal. *Acacia Verec* is stated by the authors of the Fl. de Senegambie to yield the pale and fine varieties, *A. albida* (*A. Senegal*, Wild.), and *A. Adansonii* the inferior reddish varieties. *A. Seyal*, *A. vera* and *A. arabica*, being found in Senegambia, probably also yield some of the gum exported from the western coast. *Barbary Gum* is exported from Mogador on the west coast of Africa, and is produced in a similar kind of country. It is an inferior kind, and, moreover, a mixture of two or three kinds. *Acacia gummifera* is thought to yield some of this gum. Jackson gives *attalet* as the name of the tree which produces gum. *East India Gum* is exported to Europe chiefly from Bombay, having been previously conveyed there from the coast of Arabia; so that it is chiefly of African origin. But some of Indian origin is also exported from

Calcutta by the name of Babool Gum, which is that of the *Acacia arabica*, and is of good quality, but Gum is yielded also by *Acacia serissa* and *A.* now *Vachelia farnesiana*, also by species of other genera. Gum is also imported from the Cape of Good Hope, yielded by *Acacia karroo*; and *A. decurrens* yields gum in New Holland. As space cannot be afforded for all, we will restrict ourselves to the description of the officinal species. ACACIA VERA. Willd. (*Mimosa nilotica*, Linn) A middling sized tree, with spines in pairs, straight, sharp, about a quarter to half an inch long. Leaves bipinnate, and as well as the branches smooth; these are covered with a reddish brown bark. Two pairs of pinnæ. Leaflets small, 8 to 10 pairs, oblong linear, with a gland between the pinnæ. Flowers in yellow, globose heads, from 2 to 5 in the axillæ of the leaves, and stalked. The legume is moniliform, short, straight and containing but few seeds. A native of Egypt and extending across Africa to Senegal. An astringent extract, known to the ancients by the name of ακακια, was prepared from the legumes of this and probably of other species. Dr. Royle obtained it in the bazars of India by the old name of *akakia*. ACACIA ARABICA. Willd. (*A. nilotica*, Delil.) Usually only a small, but growing to a tree 40 feet in height. Spines in pairs, usually short. Leaves bipinnate, with 4 to 6 pairs of pinnæ, with a gland between the first and between the last pairs. Leaflets from 10 to 20 pairs, minute, oblong, smooth. Flowers yellow, fragrant, in globose stalked heads, axillary and subternate. Legume stalked, moniliform, long and curved, compressed, contracted on both sutures between each seed. A native of Egypt, extending across Africa to the Senegal; found in Arabia and in every part of India.—*Roxb. Com. Pl.* II. t. 149. Gum, dissolved in water or in the form of a mucilage, is a very generally diffused principle of vegetables. It flows from the several Acacias in a liquid state, but soon hardens, and may be seen from a perfectly colourless substance to different shades of yellow, even on the same tree. It is in dry, semitransparent, roundish masses, of the size of a small nut, or larger, often in fragments, rugose at the surface, brittle, friable; fracture vitreous; without odour; of a mild, slightly sweetish, viscous taste. Sp. G. about 1·31 to 1·52. It is soluble in water, having a slightly acid reaction on litmus. The finer species are often separated after being imported, and form the picked or Turkey Gum; the inferior kinds are in larger or irregular pieces, of a deeper colour, more mixed with impurities, and less soluble. *Adulterations.* The inferior kinds of Gum are apt to be intermixed with the finer kinds of African Gum, especially when powdered; but in this state, starch also is apt to be added, but may be detected with Iodine. The following observations occur in the Juries' Reports of the Madras Exhibition of 1855. The term *Gum* properly speaking, is confined to those natural exudations, which solidify on exposure to the air, but are easily redissolved by water: they are often transparent, but vary in tint from white to reddish brown. Of the true gums, the only one which enters largely into commerce from the Madras Presidency is *Gum Arabic*, or East Indian gum: under this term, the exudation of a variety of trees is known to be included, and the variation in quality of many of the specimens is very remarkable. When insoluble in water, but soluble in alcohol, these exudations bear the name of *Gum Resins*, they are chiefly used in medicine. When soluble in spirit of turpentine, they are *Resins*, these are used for the most part in preparing dyes, varnishes, lacquers, sealing wax, &c. &c. Besides these two sorts, the *Elastic Gums* belong to this section. India rubber and Caoutchouc are the types of the latter, both of these substances rapidly rose in demand after their first discovery, and merchants anxiously look for new sources of supply. Recent inquiry has shown that caoutchouc is furnished of good quality, by a large number of milky juiced plants, belonging to different families (Sapotaceæ, Apocynaceæ, Moraceæ and Euporbiaceæ.) Assam, in particular, furnishes large quantities of India rubber from "*Ficus elastica*," whilst specimens are exhibited from Labuan of the "*Urceola elastica*" caoutchouc, and from the Peninsula of *Cryptostegia grandi-flora*. On the other hand, the supply of Gutta Percha from the Indian Archipelago is beginning to fall off. By a late account, a few isolated trees here and there occur, but they are scarce and Gutta Taban (as it is there commonly called,) will every year be more difficult to obtain, as the coast region is said to be pretty well cleared, and a long transport from the interior must, by augmenting the labour, increase the value of the article. Up to 1844, it was calculated by Mr. Logan, in the "Journal of the Indian Archipelago," that 270,000 trees had been felled—value of gutta percha 274,190 dollars —the value of each tree is thus on an average about a dollar. The difference in the appearance and properties of the gutta percha of the present day, is owing to its having become a manufactured substance with an intermixture of inferior guttas, added by the gum hunters to increase the weight.—*M. E. J. R.*

(4192) GUM, GHAUTTY OR INDIAN GUM; BABOOL GUM.

Ghautty Goond, GUZ. and HIND.

A substance, the produce of the Babool (which furnishes most of the gum found in the bazars), the Nim, Mango, Cotton, Wood-apple, and several other trees. This gum is not unfrequently mixed with, or substituted for, Gum Arabic. It can, however, be easily distinguished from Gum Arabic by its being more brittle

and less adhesive and gummy, and generally in smaller pieces. The trees which produce this gum, grow abundantly in the Deccan, from whence it is brought to Bombay, and exported to England.—*Faulkner*. The chief Gum Trees &c. of Southern Asia are:

Babool Tumma Gum, ...	(Acacia arabica).
Tangedu jigata, ...	(Cassia auriculata).
Kut or Kheir gum, ...	Acacia catechu.
Dirisana gum, ...	„ Sirissa.
Konda tanjedu jigata, ...	(Acacia xylocarpa).
Mutty pal.	Ailanthus Malabaricus.
Kalabanda jigata, ...	(Aloe perfoliata.
Meisakshi, ...	Amyris commiphora.
Cashew gum, ...	Anacardium occidentale.
Jilledu jigata, ...	(Calotropis gigantea).
Myrrh (inoor), ...	Balsamodendron myrrha.
Bdellium (googul), ...	Balsamodendron.
Olibanum (saleh gond), ...	Boswellia thurifera.
Boorooga gum, ...	Bombax malabaricum.
Pulas gum, Modugu gum, ..	Butea frondosa,
Palay caoutchouc, ...	Cryptostegia grandiflora.
Kuttimundoo, ...	Euphorbia kuttimundoo.
Wood apple gum, ...	Feronia elephantum.
Caoutchouc, ...	Ficus elastica.
Marri jigata, ...	Ficus indica.
Atti or medi jigata, ...	Ficus racemosa.
Dekamunnee, ...	Gardenia lucida.
Gamboge, ...	Gardenia pictoria.
Gutta percha, ...	Isonandra gutta.
Pachonthee, ...	Isonandra.
Vutta thamara	Macaranga indica.
Mamidi jigata	Mangifera indica.
Pogada jigata, ...	Mimusops elengi.
Moringa gum, ...	Moringa pterygosperma.
Assafœtida (hing), ...	Narthex assafœtida.
Devadaru jigata, ...	Phyllanthus turbinatus.
Kino, ...	Pterocarpus marsupium.
Somida jigata, ...	Swietenia febrifuga
Neredu jigata, ...	Syzygium jambolanum.
Gambier, ...	Uncaria Gambir.
Keekur gum, ...	Vachelia farnesiana.

Resins and Gum Elastics.

Amber, Kahroba, ...	Cutch, Assam and Kemaon.
Animi, ...	Bombay, from Africa.
Benzoin, Loban, ...	Straits, Sumatra.
„ a kind of, ...	Malabar.
Caoutchouc, ...	Ficus Elastica, Assam.
Copal, Soondroos, ...	Vateria Indica, Canara.
Dammer, Ral and Dhoonia,	Shorea robusta, Balasore, foot of Himalaya.
Deodar Oil, Kelon-ka-tel, Guggilam, ...	Cedrus Deodara, Himalayas.
Gutta Percha, ...	Isonandra, Singapore.
Mastic, Mustajee, ...	Bombay.
Mysakshi, ...	
Piney, Pandum, ...	Vateria Indica, Canara.
Resin, ...	Beerbhoom.
Theetsee, ...	Melanorrhœa usitata, Assam.
Turpentine, Gunda Biroza,	Pinus longifolia, Seharunpore.
Wood Oil, Gurjun, Dhoona-tel, ...	Dipterocarpus Turbinatus, &c., Chittagong.

(4193) GUM.

Gomme, Fr. | Gomma, It.
Gummi, Ger. | Goma, Sp.
Goond, Guz. Hind.

A term applied to several modifications of a distinct proximate principle of vegetables, of more universal occurrence than any other secretion by plants. Some of these modifications are termed *mucilage*. [When certain seeds or roots are infused in water at 160° or 180°, subjected to pressure in a linen strainer, and the liquor evaporated, the residue resembles gum. Bruised linseed treated in this manner may be made to yield a substance closely resembling Gum Arabic.] In fact, gum is the material usually prepared by plants for their own nutrition; in which state it is in solution; but when the bark is wounded either by the knife, by the puncture of insects, by disease, or by means of certain fungi, the solution escapes to the surface, thickens, and even becomes solid and pulverable. The gums are characterised by forming as viscid, adhesive, or mucilaginous solution with water, and by being insoluble in alcohol; so that the addition of spirits of wine to a moderately strong aqueous solution of gum causes the separation of a white precipitate or magma, in consequence of the alcohol combining with the water, and the gum, having nothing to hold it in suspension, falls down. Another characteristic of gum is its convertibility into mucic or saclactic acid by the action of nitric acid. There are two leading modifications of gum, one of which is represented by *Gum-Arabic*, and the other by *Gum-Tragacanth*; there are many intermediate varieties, amongst which *Cherry-tree Gum* may be distinguished. The different kinds of gums have been classed under the generic terms of *Arabine*, *Tragacanthine*, and *Cerasine*, from *cerasus*, a cherry-tree. Gum-Arabic is the produce of several species of acacia growing in Arabia, India, Upper Egypt, Senegal, &c. It occurs in rounded pieces, or *tears*, and in fragments, up to the size of a walnut, or larger: these are of irregular shape: the colour is either white, yellowish, or dark wine yellow; there is scarcely any odour and the taste is mawkish and glutinous; the sp. gr. varies from 1.30 to 1·50. It breaks readily into small irregular pieces, with an uneven vitreous facture. It dissolves almost completely in water; 100 parts of water at 212° Fahr. take up 19 parts of gum. The solution is, however, purer when made with cold water, and keeps better: it is sometimes used as a glaze or varnish, and for the purpose of giving a gloss and stiffness to ribands, calico, &c. The sp. gr. of the solution being greater than that of water many substances in a state of minute mechanical division which will subside in water, will not do so in mucilage: hence the use of gum in writing ink and in some paints, and in the pigments used in calico-printing, &c. When gum is sold in powder, it is often adulterated with starch the presence of which may be detected by tincture of iodine, which strikes a blue colour: or when cold water is used for the solution, the starch remains undissolved. Gum is highly nutritive, and is used in medicine as a demulcent. At an average of the 3 years ending 1842, the

gum-Arabic entered for consumption in the United Kingdom amounted to 18,176 cwts. a-year. *Gum Senegal*, from the island of that name on the coast of Africa, is largely used by the calico-printers instead of gum-Arabic. Gum-Tragacanth is the produce of certain species of *Astragalus*, growing in Asia Minor, Armenia, and Northern Persia. It is usually in the form of white or yellowish semi-transparent flakes, or curled vermicular pieces, which are very tough, and require, before they can be powdered, to be dried at 212°, when they lose about 10 per cent. of water, and become brittle. When steeped in water this gum swells into a bulky mucilaginous mass, which, when boiled with water, gradually acquires the appearance of a solution of ordinary gum. 100 parts of tragacanth yield 53 of arabine and 33 of tragacanthine, or *bassorine*, a mucilaginous substance forming the bulk of *Gum Bassora*, the remainder being water and oxalate of lime. Gum-tragacanth is used for some of the purposes to which gum-Arabic is applied. It is often sold in the shops as *gum-dragon*. Cherry-tree Gum, including that of peach and apricot-trees, and other species of *Prunus*, resembles inferior gum-Arabic in its external characters, but is only partially soluble in cold water. It differs from it in some of its chemical relations. Gum-Resins are vegetable secretions which are most abundantly and most perfectly produced in warm countries, from trees and shrubs of particular tribes of plants, but rarely from herbaceous plants, except the large herbaceous umbelliferæ, which yield the fœtid gum-resins. They either exude spontaneously, or from incisions made in the stem and branches. "When they first escape to the surface they are fluid, and of a light colour, but gradually harden and become of a deeper hue, either by the evaporation of some of their volatile oil, or by the absorption of oxygen from the air and the conversion of the oil into a resin. Some remain in a semi-liquid, viscid, state, such as *sagapenum* and *galbanum*, which are only pulverizable in winter. Most gum-resins possess a strong odour, (which in many instances is disagreeable, such as that of *asafætida*,) with a warm acrid taste, and by application to the skin for any considerable time, they cause redness and inflammation. Owing to their composition being a mixture of gum and resin, they are not completely soluble either in water or absolute alcohol, but are perfectly dissolved in proof spirit, which is much employed to prepare tinctures of this class of substances. The gum, being soluble in water, is capable for a time of holding the resinous portion suspended in water, thereby forming an emulsion, a state which admits of their administration, if used soon after being prepared; for by rest they separate. Many of them are soluble to a certain extent in acetic acid, especially when assisted by heat. The strong mineral acids char them, and produce chemical changes. "Many gum-resins are popularly termed *balsams*, a designation to which they have no title, as they do not contain benzoic acid." *Artificial Gum.* In the process of calico-printing and for stiffening different goods, an artificially prepared gum has for some years been employed. Starch or fecula is by the action of diastase, a peculiar azotised substance formed during the germination of seeds, converted into a gummy mucilaginous substance named *dextrine*. It is also known in commerce under the name of *British gum* and *torrefied starch*. The term *leiocome* has been applied by Payen to a modified dextrine, whiter and more soluble than can be obtained by torrefication. It is formed by moistening 1,000 parts of dry starch (potato starch is generally used) with very dilute nitric acid, consisting of 2 parts of concentrated acid and 300 of water: the mixture is divided into small blocks, which, when dried in the air, are rubbed down and exposed in a proper drying stove to a current of air heated to about 150° or 160°: the powder is afterwards well dried at a temperature not exceeding 230°. When well made it dissolves in cold or tepid water as easily as gum-Arabic. From a recent paper by M. Emile Thomas, quoted in the *Chemical Gazette*, it appears that artificial gum is manufactured in three distinct forms; viz. as a white, brilliant, pearly powder; as a syrupy solution; and in the form of exotic gum in greater or less perfection, either broken into small fragments, or made into rolls of various sizes. Dextrine is manufactured either by the use of acids or by means of the diastase contained in malted barley. When sulphuric acid is used, the dextrine is deliquescent, and the products often coloured: hence this acid is not used. Pure nitric acid is commonly employed for obtaining dextrine in the state of powder, as in M. Payen's process. Muriatic acid is also used for rendering the starch soluble, and it is then dried at a high temperature. The powder thus obtained is thrown upon a metallic sieve, and submitted to the action of a jet of steam, which moistens the dextrine so as to render it transparent without liquifying it: after this it requires very little drying. This process, however, requires more skill than can be expected of an ordinary workman. The process by diastase seems to be the most advantageous. The fecula is rendered soluble in vats heated by steam in such a manner that the temperature may be easily raised or lowered. The fecula is first mixed with 4 times its weight of water at about 122° Fahr. At one operation 600 lbs. of fecula are mixed with 1,200 quarts of water. The temperature must be kept at about 140° until the whole mass is converted into starch; 2 per cent. by weight of very white malted barley is then added, and also the mucilage produced from 1 per cent. of linseed. If a larger proportion of malt were used, the decomposition would be more rapid, but a larger quan-

tity of glucose would be formed, and the gum would be more coloured. The mucilage of linseed imparts tenacity to the gum. The mixture must be kept at about 120° or 140° until all the starch is again dissolved; the temperature should then be suddenly raised, taking care, however, not to exceed 167°, but keeping as near that temperature as can be in order to cause the diastase to act as powerfully as possible. The mixture is then to be well stirred until the decomposition is almost complete: this may be ascertained by testing with iodine, which ought to give a violet approaching to red, instead of the characteristic blue tint. During the decomposition the liquid must be kept constantly in motion: the operation lasts about an hour and a quarter; that is to say, a quarter of an hour for the formation of the paste, one for its dissolution, and the other three-quarters for rendering it soluble. The liquor is then removed from the decomposing vats, and left in pans to settle for from 6 to 18 hours, according to the external temperature. During this time a slight fermentation will be perceptible, but it must be checked by adding alum in the proportion of 10 grammes for every 25 gallons of liquid. By allowing this time for the mixture to settle, the colouring of the gum while being baked is avoided. When drawn off, the liquor will mark about 10° B: it is then evaporated by raising it very slowly to the boiling point, the perfect clarification being accelerated by checking the first boiling, as in refining sugar. This clarification is effected without any foreign agent, by the coagulation of the vegetable albumen contained in the malt and the linseed mucilage. The scum which rises to the top must be carefully removed. If the boiling be hastened, the gum will first become thick, and afterwards be coloured. When a solid pellicle of gum forms on the surface, the baking will be completed, at which time the syrup will mark about 35° B. If the gum is to be kept in a liquid form, the baking must be stopped at 30° while boiling, and the syrup be poured into well-closed vessels, previously rubbed with oil of turpentine, and the surface of the gum be covered with a thin layer of that oil. This method is tolerably successful in preventing fermentation. When it is desired to solidify the gum, the boiling syrup is poured into small flat tin vessels, placed upon a hot-air stove, kept at a temperature of from 104° to 122°. At the end of 24 hours the gum will acquire the consistency of jujube paste: it is then to be cut up with a pair of shears into small oblong pieces, and these are to be rolled out upon a polished table with a wooden roller, dusted with pulverized artificial gum, and afterwards placed upon wooden frames, and left for 3 or 4 days to dry. The artificial gum, thus prepared dissolves easily, and makes a very clear solution. —*Tomlinson.*

(4194) GUNNY.

Goonpat, Gooni, Pat, Guz Hind.	Gooni, Beng. Gooni, Tel.

A strong, coarse sack-cloth manufactured in Bengal, for making into bags, sacks, and packing generally. The material from which this article is manufactured is the fibre of two plants of the genus *Corchorus;* viz, *Corchorus olitorius*, and *Corchorus capsularis*, (*Beng.* Pat), both, but particularly the first, are extensively cultivated throughout lower Bengal. Besides a large domestic consumption of gunny, the whole rice, paddy, wheat, sugar, saltpetre, &c, of the country, as well as the pepper, coffee, and other foreign produce exported from Calcutta, are packed in bags or sacks made of this article; and which is put to similar uses all over India, and other places to which it is exported.—*McCulloch. Faulkner.* It is woven of various lengths and generally about 8 inches wide. Buchanan describes the process of growing the hemp and preparing the article in the neighbourhood of Bangalore.—*Rohde. M. S. S.* The sugar of India is brought to England in them, and they are very largely exported to America for packing their cotton. In the year 1850-51, the Gunnies and Gunny cloth exported from Calcutta were in number 9,035,713, valued at Rs. 2,159,782, two thirds of this amount being sent to North America, the Coromandel and Malabar coasts, Pinang and Singapore, besides this 58,950 gunny bags were exported from Madras and Bombay, re-exports to the value of half a lac of Rupees. The kind of cloth of which the Gunny bags are made, is called in Bengal, "*Chatu,*" in Tamil "*Koni,*" Tel. Goni also "Tat." It is of three different kinds, and is always woven in pieces from three quarters to one cubit wide, of which two or three are sown together, at the sides, into one piece, before offering it for sale. The first kind, intended for bedding is four to five cubits long, and from two and a quarter to three cubits wide, and sells at about 8 rupees per 100 pieces. Secondly that intended for covering bales of cloth is of the same dimensions, but is thicker than the former kind, and costs from 6 to 10 rupees per 100 pieces. Thirdly that intended for making rice and sugar bags, is five cubits long and one and a half, or one and a quarter cubit wide, and ten bags cost four or five rupees. On all the Eastern frontier, a great proportion of the women are clothed with coarse cloth, made from the jute.—See Corchorus.

(4195) GUNDUNA. Allium Porrum. Leek.

(4196) GUNPOWDER.

Krudt, Pulver, Dan.	Pulvis pyrius, Lat,
Buskruid, Dut,	Proch, Pol.
Poudre Fr.	Polvora, Port.
Pulver, Schiesspulver, Ger.	Poroch, Rus.
Baroot, Daroo, Guz. and	Polvora, Sp.
Polvere, It [Hind.	Krut, Sw.

A well known inflammable powder, which is composed of certain proportions of nitre, sulphur

and charcoal, reduced to a powder, and mixed intimately together.—*Faulkner.*

(4197) GUNTA BARINGA.

Sheerudek, TAM. | Ghentoo baruughie, TEL.
Cund baruughie, DUK. | Baruughie, SANS.

Gunta baringa is the root of a plant growing in the hills about Lamsingi to the W. of Vizagapatam. It is mentioned by Ainslie p. 112. (1st Ed. 4to,) under its Tamil name "chirudekku." (Honorable Mr. Elliot). The same drug is contained in the Canara and Travancore collections: the plant yielding these roots is unknown.—*M. E. J. R.* This root continues to be used in Southern India by native practitioners as a febrifuge. Ainslie says, "it is a small, knobby, somewhat warm and slightly bitterish tasted root which the natives prescribe in fever and catarrhs. From the word Paringhee, it is perhaps brought from some foreign country." From its low price Dr. Cleghorn is inclined to think this improbable and he is not without hopes of soon ascertaining to what plant it belongs. Of its absolute antiperiodic qualities nothing seems to be known with accuracy.—*Ind. Anns. Med. Sci. for April* 1856, *page* 397. An infusion or decoction of the leaves and tender shoots of this plant, the Vyteans consider as attenuant and diaphoretic: they are said to be slightly bitter and not unpleasant to the taste.—*Ainslie's Mat. Med. page* 112.

(4198) GURANYO ALOO. DIOSCOREA RUBELLA.—Red Sweet Yam. This is an oblong and red skinned root, tuberous, deeply tinged with red under the skin, but the colour does not penetrate deep; they are sometimes as much as three feet long in a rich light soil.—*Riddell.*

(4199) GURANYO ALOO LAL. DIOSCOREA PURPUREA.—Purple Yam. Root oblong; throughout of a lighter or dark purple, but always considerably deep in tinge. This colour is permanent.—*Riddell.* Zemmy kund. Dioscorea atro purpurea.—Another species. Tubers subrotund purple throughout, very large, of an irregular, smooth, roundish shape, and growing near the surface, so as to appear in dry weather through the cracks they make by raising the soil over them.—*Riddell.*

(4200) GUR-BATAS. Root of a climber brought to Ajmere from Delhi: has a bad smell: is considered astringent and cooling; much used in horse mesalihs: four seers for one rupee.—*Gen. Med. Top. p.* 135.

(4201) GURJUN OIL. GURJUN KA TEL.—Oleo-resinous liquid afforded by several species of Dipterocarpus: deep brown, transparent, of nauseous odour; sometimes thick and white.—See DIPTEROCARPUS.

(4202) GUTTA PERCHA. According to Dr. Montgomerie, this word is a pure Malayan one, *gutta* meaning the gum or concrete juice of a plant, and *percha* the particular tree from which this is procured. The *ch* is not pronounced hard, like a *k*, but like the *ch* in the English word *perch*. It is the concrete juice of a forest tree, a native of the shores of the Straits of Malacca, Borneo, and the neighbouring countries. The natives had themselves discovered its valuable properties before they became known to Europeans. They constructed whips, buckets, and vessels of various kinds out of the hardened juice, and thus excited the attention of travellers to a snbstance which has since been applied to a vast variety of domestic and scientific purposes in Great Britain. Their method of proceeding, however, has been of the most destructive kind, especially since the demand of a European market for this substance has had to be met. Instead of economising their treasure, as is done in the case of the caoutchouc, by tapping the tree and allowing its juice to ooze gradually from the incision, they fell the trees at once, and removing strips of bark at intervals, collect indeed a large quantity of sap at one time, but destroy all future supplies from that source. This wholesale destruction of the gutta trees, which are naturally slow of growth, must, if unchecked, necessarily involve the destruction of the traffic, which is now so brisk and advantageous in this article. To put any check upon these proceedings is said, moreover, to be extremely difficult; because each set of explorers, in searching after these trees, is more anxious for present profit, than for future benefit, to the trade. A very small quantity, comparatively speaking, is to be obtained by tapping, and it is evidently to the interest of the first comers to get a full supply of sap for themselves, without considering those who came after, and who might very probably cut down the trees if they had been spared previously. The first accounts which reached us of these trees were given by the late Dr. Montgomerie, of Bengal, who appears to have been the first person to notice the native use of this substance: this was in 1842. In 1843, Dr. D'Almeida presented a specimen of their inspissated juice to the Royal Society of Arts, and described some of the advantages which would accrue from its use. This communication led to no results; but another, made shortly after by Dr. Montgomerie, was more successful, so that by the united efforts of these gentlemen Gutta Percha was introduced to public notice, and soon told its own tale to manufacturers. They could not be blind to the advantages offered by a material possessing many of the properties of caoutchouc, with others in addition essentially its own. The abundance of the supply also encouraged invention, and in a very short time Gutta Percha was applied to multifarious uses, and became a valuable auxiliary in the arts. The tree which produces this substance is from sixty to seventy feet high, and three or four feet in diameter. Its foliage is of a pale green on the upper side, and

covered with reddish-brown hairs beneath. Specimens of the flowers and fruit are exceedingly difficult to be obtained. The tree flourishes luxuriantly in alluvial tracts, at the foot of hills, and forms in many places the principal part of the jungle in such situations. From a communication of Sir W. J. Hooker to the London Journal of Botany, it appears that numerous well-dried specimens of the Gutta Percha, though unfortunately without corollas, were sent to England, by Mr. Lobb, during his botanical mission in the East, accompanied by sections of the wood, which is peculiarly soft, fibrous and spongy, pale-coloured, and traversed by longitudinal receptacles or reservoirs, filled with the gum, forming ebony black lines. Application was then made to Dr. Oxley, of Singapore, for flowering specimens, and these were immediately supplied by him in the most obliging manner, and transmitted to England in a thin box, the top and bottom of which were made of sheets of the gum itself (now deposited in the Museum of the Royal Gardens at Kew.) From the more accurate knowledge obtained by means of these specimens, Sir W. J. Hooker was able to refer the plant to Dr. Wight's new genus of Sapotaceæ, called Isonandra, and to name the plant *Isonandra gutta*. After the natives have cut down the full-grown trees, they make rings in the bark at the distance of every ten or twelve inches, placing under each, as they make it, a cocoa-nut shell, or the spathe of a palm, as a receptacle for the milky sap which begins to flow immediately that the incision is made. The sap is collected in bamboos, taken to their houses, and boiled in order to drive off the watery particles, and inspissate it to the proper consistence. Boiling appears necessary when the juice is collected in large quantity, but when a small quantity is allowed to exude from a freshly-wounded tree, and is collected and moulded by the hand, it consolidates perfectly in a few minutes, and has all the appearance of the prepared articles. Gutta Percha when quite pure is greyish white, but it is generally brought to market of a reddish-brown hue. This is ascribed to chips of the bark, which fall into the sap and give it their colour, but in addition to this there are frequently other matters, such as saw-dust, purposely introduced as adulterants. Dr. Oxley, of Singapore, in an interesting description of this substance, first printed in a Singapore periodical, in the year 1847, states that the tree which yields Gutta percha was formerly very abundant on that island, but already all the large timber has been felled, and few and but very small plants are to be found. "The range of its growth," he says, "appears to be considerable, it being found all up the Malayan peninsula, as far as Penang, where I have ascertained it to be abundant, although as yet the inhabitants do not seem to be aware of the fact, several of the mercantile houses there having sent down orders to Singapore for supplies of the article, when they have the means of supply close at hand. The tree is also found in Borneo, and I have little doubt is to be found in most of the islands adjacent." Respecting the wholesale destruction of the trees, the same writer observes,—"The quantity of gutta obtained from each tree varies from five to twenty catties, so that, taking the average at ten catties, which is a tolerable liberal one, it will require the destruction of ten trees to produce one picul. Now the quantity exported from Singapore to Great Britain and the Continent, from 1st January 1847 to July, 1847, amounts to 6,918 piculs, to obtain which 69,180 trees must have been sacrificed. How much better would it, therefore, be to adopt the method of tapping the tree, practised by the Burmese in obtaining the caoutchouc from the *Ficus elastica*, (viz., to make incisions in the bark, placing bamboos to receive the sap, which runs out freely) than to kill the goose in the manner they are at present doing. True, they would not at first get so much from a single tree, but the ultimate gain would be incalculable, particularly as the tree seems to be one of slow growth, by no means so rapid as the *Ficus elastica*. I should not be surprised if the demand increases, and the present method of extermination be persisted in, to find a sudden cessation of the supply." The great peculiarity which makes Gutta Percha convenient and valuable for a variety of purposes is, that when plunged into boiling water, it becomes so soft and plastic as to be easily moulded into any desired form, and this form it permanently retains on cooling. It was the discovery of this fact which first led the Malays to fabricate it into whips, and subsequently into basins, jugs, shoes, traces, &c. The Medical profession soon became aware of its extreme value and applicability in the practice of surgery. Dr. Oxley early discovered it to be "the best and easiest application ever yet discovered in the management of fractures, combining ease and comfort to the patient, and very much lessening the trouble of the Surgeon." He also employed it for bougies, capsules, tubes for syringes, &c." Gutta Percha tubing has been found extremely useful for water service, and for the conveyance of sound. Its extraordinary strength fits it for the former use in a remarkable degree. A series of interesting experiments were made two or three years ago at the Birmingham waterworks, to ascertain the strength of tubes of $\frac{3}{4}$ inch diameter, and $\frac{1}{8}$ inch thickness. These were attached to the iron main, and subjected for two months to a pressure of two hundred feet head of water without being in any way deteriorated. In order to ascertain the maximum strength of the tubes, they were connected with the Company's hydraulic proofing pump, the regular load of which is 250 lbs. on the square inch. At this point they were unaffect-

ed, and the pump was worked up to 337 lbs., but to the astonishment of every one the tubes still remained perfect. It was then proposed to work the pump up to 500, but it was found that the lever of the valve would bear no more weight. The utmost power of the hydraulic pump, therefore, was ineffectual to burst these tubes. In the conduction of sound gutta percha is also found remarkably useful. Speaking tubes of this substance for the conveyance of messages are now fitted up in mines, railway stations, prisons, workhouses, hotels, and other large establishments. Partially deaf persons are found to appreciate its value: an ingenious apparatus for their use has been devised, including the distribution of the gutta percha tubing over a church or other large building, so that, by seating themselves at particular parts where these tubes terminate, such persons are able to hear distinctly the sermons or speeches delivered therein. Gutta percha is also brought to the aid of the architect in the ornamental work of the interior of houses. It appears to be admirably adapted for cornices and centres for ceilings, also for picture-frames, and many other uses to which plaster and papier machie have hitherto been applied. It has likewise been employed for door handles and plates, for knife handles, vases, baskets, &c., for the stopping of decayed teeth and for printing in relief. The clear, sharp impression it receives, and the toughness of the substance, have made it very useful in books for the blind, and in maps embossed for their benefit. In solution this substance is employed in waterproof clothing; mixed with caoutchouc and other substance it is made into a light, porous, spongy material, suited for stuffing or forming the seats of chairs, cushions, and mattresses. Springs of clocks, clasps, belts, garters and string, are prepared from the modification of the above mixture, while moulds and balls of gutta percha are produced of a hardness sufficient to bear turning in the lathe, like wood or ivory. A varnish may also be made in which gutta percha, being the principal ingredient, may be used to give a waterproof covering to other substances. Gutta percha dissolves at ordinary temperatures, and still better at a higher heat in sulphuret of carbon. The solution leaves behind on a glass plate a thin coating, possessing all the properties of gutta percha, unaltered. Paste-board boxes coated over with this may be made to hold water. Electrical experiments are aided by the use of gutta percha, for it has been found by Dr. Faraday to possess high insulating power. A letter from this distinguished philosopher, published in the "Philosophical Magazine," in March 1848, gives the following among other particulars;—"A good piece of gutta percha will insulate as well as an equal piece of shell-lac whether it be in the form of a sheet, a rod, or filament; but being tough and flexible when cold, as well as soft when hot, it will serve better than shell-lac, in many cases where the brittleness of the latter is an inconvenience. Thus it makes very good handles for carriers of electricity in experiments on induction, not being liable to fracture; in the form of thin band or string, it makes an excellent insulating suspender; a piece of it in sheet makes a most convenient insulating basis for anything placed on it. It forms excellent insulating plugs for the stems of gold-leaf electrometers, when they pass through sheltering tubes, and larger plugs supply good insulating feet for extemporary electrical arrangements: cylinders of it, half an inch or more in diameter, have great stiffness, and form excellent insulating pillars. Because of its good insulation, it is also an excellent substance for the excitement of negative electricity. It is hardly possible to take one of the soles sold by the shoemakers out of paper, or into the hand, without exciting it to such a degree as to open the leaves of an electrometer one or more inches; or if it be unelectrified, the slightest passage over the hand or face, the clothes, or almost any other substance, gives it an electric state. Some of the gutta percha is sold in very thin sheets, resembling, in appearance, oiled silk; and if a strip of this be drawn through the fingers, it is so electric as to adhere to the hand or attract pieces of paper. The appearance is such as to suggest the making of a thicker sheet of the substance into a plate-electrical machine for the production of negative electricity. Then as to inductive action through the substance, a sheet of it is soon converted into an excellent electrophorus; or it may be coated, and used in place of a Leyden jar, or in any of the many other forms of apparatus dependent on inductive action." The properties thus noticed could hardly fail to bring this substance into use in telegraphic communication. Being flexible, impervious to water, and possessing insulating power, it is the most efficient of all substances as a coating or tubing for the copper wire of submarine telegraphs. Thus it aids in producing the most marvellous annihilation of time and space our age has yet witnessed. Gutta percha has been analysed by Dr. Maclagan, who obtained as its per centage composition, carbon 86·36; hydrogen 12·15; the remainder 1·49, was most probably oxygen absorbed from the air during the process of purifying it, as the substance whilst heating on the vapour bath acquired a brown colour. Respecting the purification of gutta percha, Dr. Oxley gives a good hint to manufacturers when he says that gutta ought not to require an elaborate process: the simple boiling in water, and rolling out into sheets, whence all foreign matter can be easily picked off, is the only process he employs, and this he thinks would be generally sufficient, if manufacturers in giving their orders would take the precaution of requiring that the article should be strained through a cloth at the

time of its collection, and if they would encourage the natives to do this, by offering a somewhat higher price for gutta percha so prepared. A vast deal of trouble and expense might, in his opinion, be saved in this way, and the various processes rendered unnecessary, which have from time to time been suggested for the purification of gutta percha. The preparation of this substance for use is carried on on a large scale in the following manner ;—the lumps of gutta as they are received at the factory are first brought within the action of a vertical wheel, on the face of which are fixed three knives, which, as the wheel moves at the rate of two hundred revolutions, per minute, rapidly cut the lumps into thin slices, discovering whatever adulterating materials may be contained therein. The gutta thus torn up is not uniform in colour or texture, but it is rendered so by the subsequent operations. It is first softened by soaking in hot water (by which also the dirt and other impurities become separated from it) and then thrown into a rotating machine, where it is dragged asunder by jagged teeth and reduced to fragments. These fragments fall into water, which still further tends to purify them, and are then softened into a paste in hot water, kneaded, and rolled between heated cylinders, so that all parts may become thoroughly mixed and uniform. It may be then rolled out into sheets between steel rollers, or passed in the mass through heated iron cylinders, and made into tubes, or converted to the thousand purposes of ornament or use which we have briefly indicated. In the Great Exhibition, gutta percha was seen in a vast variety of forms, but none were more interesting than those which illustrated the successive stages of its manufacture. The original lump, the slices, the shreds, the kneaded mass, the sheets ready for use ; all appeared there. A very ingenious adaptation of the substance to making stereotype plates attracted much notice. A mould is taken by pressure of a page of type with woodcuts, in gutta percha ; from this mould a cast is obtained on a cylinder of gutta percha, and from this last the printing is carried on. An hour, it is said, suffices to make both mould and cylinder. See ISONANDRA; also PAUCHONTEE.—*Tomlinson.*

(4203) GUTTIFERÆ, Jussieu. (CLUSIACEÆ, Lindl.) Trees, rarely shrubs, sometimes parasitic climbers, abounding in yellow, resinous juice, branches opposite, often four sided. Leaves decussately opposite, coriaceous, shining, without stipules. Flowers perfect or polygamous, usually terminal, sometimes axillary, articulated with their peduncles. Calyx 2, 4 or 6 leafed, persistent. Petals equal in number to leaflets of the calyx, alternating with them or opposite, occasionally numerous. Stamens usually numerous, free, united into a ring, or tube, or into separate bundles. Disk fleshy, angled or lobed. Ovary one to 5 or many-celled. Ovules solitary or twin, erect or ascending, in a single-celled ovary, abou 4 or many attached to central placentæ. Stigm peltate or radiate. Fruit capsular, drupaceous or baccate. Embryo without albumen, straight The Guttiferæ are allied to Ternstrœmiaceæ an to Hypericineæ, and are found in the tropica parts of Asia and of America. Many of the spe cies yield a yellow, resinous juice like Gamboge useful both as a pigment and as a medicine. Th fruit of some is edible, the seed oily, and th wood hard and useful as timber.—*Royle.* Th *Guttifers*, are a small natural order of Exogenou Plants, inhabiting the hotter parts of tropica countries in both the Old and New World. Thei fruit is succulent, juicy, and in many cases re sembling a large apple or orange. The Mango steen (*Garcinia Mangostana*) is probably the mos delicious of any known ; but it has never beer seen in a fresh state in Europe, for the tree wil hardly exist out of its native, humid, heated atmosphere in the Indian Archipelago. The mos remarkable product of this order is an acrid purgative, yellow gum-resin. In one of its form this is the Camboge or Gamboge of commerce. This substance is well known as a yellow pigment, as also a purgative medicine. The plan which yields the Gamboge of commerce is stil unknown. The London College of Physicians in their 'Pharmacopœia' refer it to some species of *Garcinia*, others refer it to species of *Cambogia*, *Xanthochymus*, *Hebradendron*, and *Stalagmitis*. The East India Tacamahaca is yielded by a species of *Calophyllum*. The Butter o Tallow-Tree of Sierra Leone is the *Pentadesma butyracea*. The fruits of many species are esteemed, besides the Mangosteen. The Mammee Apple, or Wild Apricot of South America, is said to be very delicious. Its seeds are anthelmintic ; its flowers yield on distillation a spirit known as Eau de Creole, and wine is obtained by fermenting its sap. The large berries of the Pacourynva (*Platonia insignis*) of Brazil are highly prized on account of their delicious flavour. The fruits of several species of Garcinia besides the Mangosteen, are brought to table in the countries where they grow, but they are regarded as very inferior. The blossoms of *Mesua ferrea* are remarkable for their fragrance, and are sold in the bazars of India under the name of Nagkesur.—*Engl. Cyc. Vol.* II. *p.* 5.

(4204) GYMNEMA, a genus of Plants belonging to the natural order *Asclepiadaceæ*. It has a sub-urceolate 5-cleft corolla, the throat usually crowned by five scales or teeth inserted in the recesses between the segments of the corolla. The stamineous corona is wanting. The anthers terminate by a membrane, the pollen masses are erect, fixed by the base. The follicles smooth. Seeds comose, generally marginate. The species are usually twining shrubs, natives of the East Indies, the tropical parts of Australia, and Equinoctial Africa. The leaves are opposite,

membranous, and flat. The umbels interpetiolar and cymose. In the greater number of species the stamens are not usually naked, but are furnished with a gland-like body or fleshy tuft at the base of each filament.—*Eng. Cyc.* A dye of an excellent quality has been obtained from a twining plant, Gymnema (Asclepias) tingens. It is a native of Pegu but grown in Burmah, where a green dye is extracted from its leaves.—*Simmonds.* Dr. Wight in Icones gives Gymnema Decaisneanum, 1271; elegans, 830; hirsutum, 1271-72; lactiferum, 343; sylvestre, 1271-349; tingens, var. cordifolia, 593; tingens, var. ovalifolia, 592.

(4205) GYMNEMA LACTIFERUM, Cow-Plant, or Milk-Bearing Gymnema, has an erect stem, or rather twining; the leaves are on short petioles, ovate, bluntly acuminated, usually unequal-sided; the umbels many-flowered, shorter than the petioles; the throat of the corolla crowned by five fleshy tubercles; the tube furnished with double pilose lines running from the tubercles. It is a native of Ceylon, where the milk of the plant is sometimes substituted for cow's milk, and the leaves are boiled with food.

(4206) GYMNEMA TINGENS, is a native of Pegu. It has a twining glabrous stem, cordate leaves, acuminated to oval; the umbels or corymbs often twin, at first shorter than the petioles, and at length spirally elongated; the glands of the filaments one-half shorter than the stamens; follicles cylindrical, spoon-shaped; stigma simple, oval, mutic, crowning the tube of the corolla, and therefore exceeding the stamens. The flowers are largish, numerous, and of a pale-yellow colour. The calyx 5-cleft to the base. From the leaves of this plant a green dye is prepared by the Burmese. Seventeen species of this genus are enumerated, none of them of any particular interest. (Lindley, *Vegetable Kingdom*; Don. *Dichlamydeous Plants.*)

(4207) GYPSOPHILA Silenaceæ. Gypsophila Elegans. This is a genus of small creeping plants, flowers of various colours, and will grow in any common soil.—*Riddell.*

(4208) GYROCARPUS, a genus of Plants containing few species, but these few are widely distributed—one being found in South America on the mountains of New Granada and Caraccas, a second on those of the Coromandel coast, and two others in the tropical parts of Australia. *Gyrocarpus* has, in conformity to the opinion of Mr. Brown, been considered as allied to, and by some it has been placed in, *Lauraceæ.* Blume refers it to his new order of *Illigereæ.* Dr. Lindley considers it has belonging to *Combretaceæ.* The flowers are polygamous or hermaphrodite; the perianth superior, 4- to 8-fid; stamens 4, opposite to divisions of perianth; anthers 2-celled, with the cells opening by a valve from below upwards; drupe 1-seeded, having attached to it two long membranous wings, the prolongation of two divisions of the perianth as in *Dipterocarpeæ.* The embryo is inverse; the cotyledons twisted spirally. The American is so closely allied to the Asiatic species as to have been thought identical by Dr. Roxburgh. The latter grows to be a large tree with cordate leaves which are deciduous about the end of the rainy season; after which the flowers make their appearance in the cold weather, but are shortly followed by the new leaves. The wood of this tree is whitish-coloured and very light. It is preferred whenever procurable for making the catamarans, or rafts, on which the natives come off to ships through the heavy surf of the Madras coast.

(4209) GYROCARPUS JACQUINI.

Tanuka, Tel.

Grows to be a very large tree, is chiefly a native of the mountainous parts of the coast of Coromandel. Leaves deciduous about the end of the wet season. Flowers during the cold season when the trees are naked, the leaves come out soon afterwards. The wood of this tree which is white and very light, is employed to make catamarans (floats), when to be had, in preference to any other.—*Rox. Rohde, M.S.S.*

(4210) GYPSUM is one of the varieties of native sulphate of lime, and is so named from γῆ, earth, and ἕψειν, to concoct; *i. e.* formed or concocted in the earth. The structure is fibrous and earthy. It is widely distributed throughout the world, and was well known to the ancients, who applied it to many of the same uses for which it is valued at the present day. In England it abounds in the London and other clays, but its great repository is in the rock commonly called new red sandstone. Numerous quarries exist in that formation, and those of Derbyshire, South Yorkshire and Nottinghamshire are in high repute. The better sorts of Derbyshire gypsum are employed in the Staffordshire potteries, as an ingredient in certain kinds of earthenware and porcelain, and also in making moulds for such articles of pottery as cannot be shaped on the common wheel. The finest pieces of this gypsum are reserved for ornamental purposes, such as vases, small statues, &c., of which a considerable manufacture exists in Derby. Gypsum in this form generally bears the name of *alabaster*, [There is some doubt as to the derivation of this word, but it is supposed to be from α, without, and λαβον, a handle, referring to a vase or box without handles, for containing perfumes.] and is remarkable for its softness, purity of colour, and fragile character: once soiled, its purity cannot be restored by ordinary washing, and it is also extremely liable to crack. Articles of delicate workmanship in this material are therefore preserved under glass. Alabaster abounds in the tertiary strata of Montmartre, near

Paris, and sometimes it forms entire hills. In the Tyrolese, Swiss, and Italian Alps it is found upon the primitive rocks, often of the purest white, especially at Montiers, near Mont Blanc, and near the summit of Mont Cenis. Gypsum, when calcined and reduced to powder, can be brought to a pulpy mass by admixture with water, and is the well known *Plaster of Paris*. This mass very soon sets, or returns to the solid form, giving out, while in the act of doing so, a considerable degree of heat. Advantage is taken of this fact in the use of gypsum as a material for casting and taking impressions. The writings of Theophrastus and other Greek authors show that this use of gypsum was known to them. They distinguished two kinds of gypsum, the pulverulent and the compact; the latter was obtained in lumps, which were burnt in furnaces, and then reduced to powder. This powder, mixed with water, formed a cement for buildings, and was also used for taking impressions. Casts were taken in gypsum from the living face: from the moulds thus formed other casts were taken in wax, that soft material allowing any imperfections which had occurred in the plaster casts to be rectified. Gypsum was also employed in stucco work for wreaths, medallions, and other ornaments of ceilings, cornices, &c. The purest gypsum is required in making casts: the best part of the crystalline gypsum rocks of Newark is well adapted for that purpose. This should be quarried in dry weather, stacked under covered sheds, and conveyed to the place of manufacture in a perfectly dry state. Here it is sorted into two or three qualities, the central part of each block, which is the finest and best, being selected. The calcining ovens are heated with billet-wood, and the gypsum, previously reduced to small pieces, is thickly strewn on the floor of the oven to the depth of five or six inches. The door is then closed, and kept in that state for twelve hours, after which it is opened, but the gypsum is left for two or three hours longer. It is then placed in covered boxes, and finally ground between stones, and run through a lawn sieve. This process gives a gypsum fit for medal-casting, and other fine purposes. Gypsum in this powdered state may be preserved uninjured for any length of time, if perfectly excluded from the air, but as this is nearly impossible, it is better not to prepare a large quantity at one time. The quality of the powder may be tested by an experienced person, simply by squeezing it in the hand: if it cohere slightly, like wheat-flour, it is good; but if it fall to pieces immediately, it has been injured by damp. In the baking of the gypsum care must be taken not to overheat it, or it will assume the crystalline character of *anhydrite*, and not set on the addition of water. The specific gravity of anhydrous sulphate of lime (artificial) is 2·927. Alabaster is not so often used by the lapidary as by the sculptor, but its treatment, when employed by the former, varies somewhat from the general practice with harder stones; therefore we give a short abstract of the description furnished to M. Holtzapffel by the best lapidaries:—

In working alabaster to the required forms, the lapidary first employs the slitting-mill, which is a thin plate of iron fixed on a vertical spindle, and made to revolve with moderate velocity, the edge being charged with diamond powder, and lubricated with the oil of brick. The alabaster is then roughly ground at a *roughing* or lead-mill, which is a flat circular plate of lead, fixed on a spindle, and travelling on a horizontal plane: this is abundantly supplied with coarse emery and water by means of a brush. The alabaster is moved to and from the centre of the rapidly-revolving lap, until all the marks of the slitting-mill are removed, and the stone is reduced to a flat surface. The alabaster is then smoothed at the same mill with flour emery, after which it is removed to the *wood-mill* to be smoothed. This is a disk of mahogany used with flour-emery and water: it is more effective than the roughing-mill, because more elastic, and because the slight roughness of its face from the rubbing up of the fibres of the wood act more quickly and satisfactorily than metal. The alabaster is now ready for polishing, which is accomplished at a *list-mill* with pumice-stone and water; but as the list, which is wound on spirally, is very elastic, flat works must be lightly applied, or they will sink into the soft face of the list-mill, and become rounded at the edges. The polishing is completed at a leather lap, or thick piece of buff-leather, pasted on a wooden disk, and supplied with fine putty-powder and water. Sometimes the naked hand, and a little moistened putty-powder, are finally used for the last polish. Amber, coral, jet, malachite, steatite, turquoise, and some other substances, are treated in nearly, or exactly the same manner as alabaster. The cleaning of alabaster is effected as follows. The soiled object is immersed in cold spring-water for four or five days; the water is then changed, and a small quantity of lime is added, in which solution the alabaster is allowed to remain four or five days longer. It is then thoroughly rinsed, and exposed to dry in the open air. If the process fails on the first trial, it is repeated, and sometimes a third application becomes necessary. Earthenware-pans should be used, as wooden tubs stain the alabaster. Objects that consist of several pieces will be severed by this process, but can easily be re-united with plaster-of-Paris. The pores of the alabaster will also be opened, and it will exhibit its natural granular and sparkling appearance; but the more opaque effect can be restored by using putty-powder, applied with a rag or stick. Oriental alabaster is a compact substance differing materially from the above; it is a stalagmitic

carbonate of lime, of the same hardness as marble, and used for similar purposes. It is found of all shades, from white to brown, and sometimes veined with coloured zones. The magnificent Belzoni sarcophagus, purchased by Sir John Soane for 1,000 guineas, and exhibited at his museum, is of stalagmite. There are also fine specimens in the Egyptian Gallery of the British Museum.—*Tomlinson.* Extensive beds of crystalline and fibrous Gypsum and Selenite occur near Ennore, the Red Hills, Ootatoor, Tiagur, Madura, Bangalore, Masulipatam, Hyderabad, and other localities. These are not put to any use except in the vicinity of Madras. The substance can be purchased in most bazars in India under the name of *kulnar* and *kurpoora silasit*, and is used in small doses as a medicine, but the Natives do not appear to be acquainted with the uses of this mineral in taking casts, plastering and house decoration, or in manufacturing Keene's cement. The best qualities are from Ootatoor near Trichinopoly, the Chingleput District, Sadras, Ennore, the Red Hills, Nellore, Masulipatam and Bangalore. The only new localities for this mineral are Sadras, the Red Hills, and Nellore. It is now known to occur very abundantly in the Madras Presidency in two forms, the Fibrous and Crystalline Gypsums, both free from Carbonate of Lime, and well suited for the Manufacture of Plaster of Paris, for moulds, busts, statues or ornaments. The Fibrous Gypsum of Bangalore, Tiagur and Nellore are the thickest and best, it is not yet known in what strata they occur, as the accompanying Fossils have not yet been traced and the natives seem averse to show the localities for this mineral, though rewards of 20 Rupees have been offered for this information.—*M. E. of* 1857.—*Crystallized Foliated sulphate of lime.*—A fine transparent crystal of selenite in the shape of a parallelopiped was brought to Mr. Mason by a Burman, who said it was found in Amherst Province. —*Mason.* Granular Gypsum, is found near the banks of the Tenasserim in about latitude 13° 40' N. It is granular and friable, and does not correspond in appearance to ordinary specimens; but Dr. Morton, who analyzed it, pronounced it a decided sulphate of lime. A fine variety of fibrous gypsum, *Sulphate of lime, Shakoung*, (*Chinese*,) is seen in some of the China shops; but it is brought, the Chinese say, from China. They use it in medicine, and say "it is very cooling"!—*Mason.* Gypsum, is brought to Canton in abundance, from the North West of the Province, and is ground into powder, in mills. It is not used as manure by the Chinese, but mixed with oil to form a cement for paying boats after they have been caulked. The powder is employed as a dentifrice, a cosmetic, and a medicine, and sometimes, also, is boiled to make a gruel in fevers, under the idea that it is cooling. The bakers who supplied the English troops at Amoy, in 1843, occasionally put it into the bread to make it heavier, but not, as was erroneously charged upon them, with any design of poisoning their customers, for they do not think it noxious; its employment in colouring tea, and adulterating the ping fa, or powder sugar, is also attributable to other motives than a wish to injure the consumers.—*Williams' Middle Kingdom, page* 242.

H.

(4211) HABENARIA, a genus of Plants belonging to the natural order *Orchidaceæ*. This genus has a ringent hooded perianth, a 3-lobed entire spurred lip. There are three species natives of Great Britain, and Wight, in Icones, gives the following species of Southern Asia: affinis, 1707; cephalotes, 1711; crinifera, 926; decipiens, 1714; digitata, 1701; eliptica, 1706; fimbriata, 1712; foliosa, 1700; Heyneana, 923, 1703-4; Jerdoniana, 1715; Lindleyana, 922; longicalcarata, 925; montana, 927, 1714; ovalifolia, 1708; peristyloides, 1702; plantaginea, 1710; platyphylla, 1709; rariflora, 924; Richardiana, 1718; salaccensis, 922; trinervia, 1701; viridiflora, 1705.

(4212) HABENARIA ACUIFERA. This elegant species of habenaria is found in the Tavoy forests; and several other species of the same genus are scattered over the Tenasserim Provinces.—*Mason.*

(4213) HADIWICKE. A moderately hard, fine, close-grained, rather heavy Ceylon wood.

(4214) HÆMATITE, a name given to certain forms of the native Peroxide of Iron. When of a red colour it is called Red Hæmatite; and when brown, Brown Hæmatite.—*Eng. Cyc.*

(4215) HÆMATOXYLON, a genus of Plants belonging to the natural order *Fabaceæ* or *Leguminosæ*. It has 5 sepals united into a permanent tube. The petals, 5 in number, are scarcely longer than the sepals. There are no stamens; the filaments hairy at the base; the anthers without glands; style capillary. The legume is compressed, flat, lanceolate, acuminate at each end, 2-seeded; the sutures indehiscent; the valves bursting longitudinally.—*Eng. Cyc.*

(4216) HÆMATOXYLON CAMPEACHIANUM, Logwood, a tree common all over the West India islands. It is a low spreading tree, with a stem generally crooked and deformed,

seldom thicker than a man's thigh; the branches somewhat flexuose, terete, covered with whitish dots. In mountain and moist situations it is unarmed, but in the plains, or where the tree is stunted, it is furnished with spines below the leaves; the leaves 2 or 4 from the same point, (an irregular, tough, tubercular prominence,) pinnate, sometimes dividing in a bipinnate manner at the lowest pair of leaflets; the leaflets 4-paired, shortly stalked, obovate or obcordate; the racemes at first about the length of the leaf, afterwards, as the pods form, elongating; the flowers on pedicles half an inch in length, yellow, and slightly fragrant; the calyx deeply 5-parted; the lobes unequal, thrice membranous, purplish, deciduous; the tube short, green, and bell-shaped; the petals nearly equal, obovate, wedge-shaped at the base, scarcely longer than the sepals; the stamens alternately short, inserted (as also the petals) on the inside of the margin of the persistent tube of the calyx; anthers ovate; ovary lanceolate, compressed, 3-seeded; style projecting beyond the stamens and petals; stigma capitate, expanded; the pods compressed, flat, lanceolate, acuminate at both ends, 2-seeded, not opening at the sutures, but bursting longitudinally by a division passing down through both the valves.—*Eng. Cyc.* This tree has been lately introduced into India. It grows readily and seeds abundantly, but it remains to be seen whether it will attain a large size in this country. It is a promising tree and deserves attention.—*M. E. J. Report.* It is principally imported into Britain as dye wood, cut into short lengths. We chip, grind, and pack it into casks and bags, ready for the dyers, hatters, and printers' use, who esteem it as affording the most durable deep red and black dyes.—*Simmonds.* Logwood is noticed by Monardes for its medical uses. It is a powerful astringent, and may be employed as a substitute for kino, catechu, &c. In diarrhœa and dysentery the decoction is used with benefit.—*Eng. Cyc.* That grown in Jamaica is least valued, that of Honduras, Tobasco, and St. Domingo, fetches a somewhat higher price; but that imported from Campeachy direct, is the most esteemed. The annual imports into Liverpool are about 1,300 tons from Honduras, 100 from Tobasco and 1,800 from Campeachy.—*See Simmonds' Commercial Products, p* 484.

(4217) HÆMODORACEÆ. *Blood-Roots.* Under this name Dr. Robert Brown proposed, in the year 1810, to separate from the natural order *Iridaceæ* the genera *Hæmodorum*, *Conostylis*, *Anigezanthos*, *Phlebocarya Dilatris*, *Lanaria*, *Heritiera*, and *Wachendorfia*. He remarked that they are abundantly different, especially in being hexandrous, or in having the stamens, if only three in number, stationed opposite the petals, and in having the anthers opening on the side next the stigma; the habit was moreover different. This distinguished botanist mentioned in connection with his new order, without actually adding it *Xiphidium*. The latter genus has more recently been introduced along with *Hagenbachia* as an undoubted member, notwithstanding its having a superior ovary. All the species have equitant leaves, and perennial fascicled fibrous roots or bulb-like cormi; and there is also a general appearance of wool upon their flowers, in some cases to such an extent as to bury all the outer surface. The order may be considered a connecting link between *Iridaceæ* and *Liliaceæ*. One species, *Dilatris Heritieri*, yields a dyeing matter in its rhizoma. The species occur in North America sparingly, and at the Cape of Good Hope; several are described from the temperate parts of Australia, and some occur in Brazil and the Mascana Islands. The natives of Swan River live on the roots of some plants belonging to this order, especially of *Hæmodorum paniculatum* and *H. spiratum*, which are mild and nutritious when roasted, but acrid when raw. One of the most intense bitters known is *Aletris farinosa*. There are 13 genera and 53 species.—*Eng. Cyc.*

(4218) HAIR.

Hair, Dut.	Pelo, It.
Poil, Fr.	Pelles, Lat.
Haare, Haahaare, Ger.	Pelo, Sp.
Ball, Guz. Hind.	

Goats hair is largely exported from Bombay to England. It is much coarser than wool, and also inferior in other respects.—*Faulkner.* Bristles from the wild Boar and hair from the tail of the Elephant, are in use in India.

(4219) HAIR POWDER.

Poudre a poudrer, Fr.	Polvere di cipri, It.
Puder, Ger.	Polvos de peluca, Sp.

Hair powder is generally made from pulverised starch, and perfumed with various scents.—*Faulkner.*

(4220) HALCYONIDÆ, a family of Birds belonging to the Fissirostral Tribe, of the order *Insessores*, or Perching Birds, according to the system of Mr. Vigors. This family includes the beautiful birds known by the name of Kingfishers. The following characters are assigned by Mr. Swainson to the *Halcyonidæ*:—Wings rounded, not formed for rapid flight. Feet very feeble. Toes in pairs. He makes the family consist of the following genera and sub-genera:—Genus *Tamatia*, comprising *Tamatia*, Cuvier; *Capito*, Vieillot; *Lypornix*, wagler; *Monasa*, Vieillot; and *Brachypetes*, Swainson.—Genus *Halcyon*, Swainson, including *Dacelo*, Leach; *Halcyon*, Swainson; *Syma*, Lesson; *Todirampkis*, Lesson; and *Ceyx*, Lacepede.—Genus *Alceda*, Linnæus, comprehending *Alcedo*; *Ispida*, Swainson; *Tanysiptera*, Vigors; *Alcyone*, Swainson.—Genus *Lamprotila*, Swainson.—Genus *Galbula*, Linnæus (Brisson, we suppose, is meant; Linnæus [illegible] each genus.)—*Eng. Cyc.*

(4221) HALDIA MOORA. SINGIA MOORA. Roots brought to Ajmere mixed with haldi; they are acrid and poisonous, and are carefully separated.—*Ainsl. Med. Top. p.* 151.

(4222) HALENIA.

(4223) HALICORE, DUGONG.

Duyong, MALAY.

The Dugong is an inhabitant of the narrow seas of the Eastern Archipelago. Professor Owen denominated the Dugong of the archipelago *Halicore indicus*, in distinction from that of the northern coast of Australia, at a time when the former had not been ascertained to frequent (as a Dugong of some kind is now known to do) the Malabar coast and Gulf of Calpentyn in Ceylon; but it still remains to be proved that this is the true Malayan Dugong, however little reason there may seem to doubt it,—as there might equally have seemed little cause to suspect the distinctness of the *Halicore*.

(4224) HALL. A very soft, coarse, open-grained, light Ceylon wood, adapted only for very inferior work, and where durability is not required.

(4225) HALIOTIDÆ, a family of Gasteropodous *Mollusca*, to which the shells commonly called Ear-Shells, or Sea-Ears, belong. Mr. Swainson, in his first series of 'Zoological Illustrations,' observes, when writing on the Small-Holed Californian Ear-Shell (*Haliotis Californiensis*, 1820-21), that "the definitions given by conchologists up to that time were so imperfect that they had left our knowledge of these shells nearly the same as in the time of Linnæus. Seventeen species only are enumerated in Mr. Dillwyn's work; although thirty-four have fallen within my own observation during the last few months." Under the appellation *Stomatia*, he thus characterises the genus:—Shell pearly within, mostly coloured externally; suborbicular or long, generally ear-shaped and depressed. The spire, in most species, prominent, but not produced nor elongated; sometimes very small, marginal and inconspicuous. Aperture mostly longitudinal, in some species nearly orbicular, in others much elongated, always very large; its edges entire, united at the upper part, and scarcely modified or altered in form by any postion of the last volution. Volutions from two to four. Muscular impressions two, seldom distinct, nearly marginal, and in the open part of the shell. Mr. Sowerby goes on to state that *Stomatia* appears to be related to *Haliotis*, and is therefore rightly placed by Lamarck among his Macrostomes. One of its species is arranged by Linnæus, he adds, as a *Haliotis*, under the name of *H. imperforata* (Gmel). Mr. Sowerby does not pretend to discuss the question of their resemblance to Lamarck's Turbinaceæ; but only observes that in general form some of them approach very nearly to some of Lamarck's Monodontes. The *Stomatiæ*, he states in conclusion, are marine, and he says that all the species he has seen were brought from the East Indies and Australia. *Stomatia* has been found at a depth of seven fathoms, adhering to *Meleagrinæ* and corals. The following genera are referred by some writers to *Haliotidæ*, *Broderipia*, *Scissurella*, *Pleurotomaria*, *Murchisonia*, *Trochotoma*, *Janthina*.—*Eng. Cyc.*

(4226) HALISPONGIA. According to the structure and composition of the numerous species of Sponges, they may be divided into genera. If, in accordance with the observations of Dr. R. Grant, we consider sponges in three groups, one having a horny tubular structure, another containing calcareous spiculæ, a third containing siliceous spiculæ, we may adopt the three generic types, *Spongia*, *Calcispongia*, and *Halispongia*, of De Blainville. *Halispongia* is thus characterised;—Mass more or less rigid or friable, of irregular figure, porous, traversed by winding canals, which end in openings scattered over the surface; substance subcartilaginous, supported by simple siliceous spiculæ. The species exhibit various external forms, encrusting, branching, or foliaceous Dr. Fleming includes them under the title *Halichondria*.—*Eng. Cyc.*

(4227) HALMENDORA. A hard, fine, close-grained, heavy Ceylon wood.

(4228) HALMILILE. A rather soft, though fine, but not very close-grained, heavy Ceylon wood.

(4229) HALORAGACEÆ, *Hippurids*, a small group of Exogenous Plants, many of which inhabit watery places, and all of which have minute inconspicuous flowers. In consequence of the calyx being superior, the embryo without much albumen, and some of them having four petals, they are often considered to form a peculiar section of *Onagraceæ*, or if separated from that order, are at least stationed in the immediate vicinity of it. Upon this supposition, they are looked upon as an imperfect condition of the Onagraceous type, bearing the same relation to it as *Sanguisorbeæ* to *Rosaceæ*, *Chamælaucieæ* to *Myrtaceæ*, or *Mimoseæ* to other *Fabaceæ*. But in the present uncertainty regarding the true affinity of many natural orders of plants, we must not consider this a settled point. On the contrary, it is not improbable that *Haloragaceæ* constitute an imperfect form of the great Epigynous group of Exogens, of which *Onagraceæ* are only one of the members. What renders it peculiarly difficult to determine the real affinity of this little group is, that as it is now constituted, it offers striking modifications of development both in the organs of vegetation and those of fructification. While *Haloragis* has a stem with a complete vascular organisation, and regularly con-

structed leaves, *Myriophyllum* has its vascular system reduced to a rudimentary condition, and in some of the species the leaves themselves appear only in the form of filiform ramifications; and in *Hippuris*, the development of the vascular system of both stem and leaves is still further reduced. In like manner in the flowers, *Haloragis* has four petals, eight stamens, four stigmas, and four cells to the ovary; *Proserpinaca* has no petals, three stamens, three stigmas, and three cells to the ovary; and *Hippuris* has no petals, one stamen, one stigma, and but one cell to the ovary. This latter genus is a common plant in the marshes and meadows of England, where it is vulgarly called Mare's-Tail. Damp places, ditches, and slow streams in Europe, North America, Southern Africa, Japan, China, Australia, and the South Sea Islands are the resort of this order.—*Eng. Cyc.*

(4230) HAMAMELIDACEÆ, *Witch-Hazels*, a very small group of woody Exogenous Plants, characterised by having a superior calyx, a definite number of stamens half of which are usually sterile, a 2-celled ovary, and an embryo in the midst of horny albumen. There are only three genera in the gardens of England, *Hamamelis*, *Trichocladus* and *Fothergilla*. Some of the species are large forest-trees, affording good timber, but nothing is known of any other useful property in the order. The order is related to *Bruniaceæ*, *Cornaceæ*, and *Saxifragaceæ*. The species come from North America, Japan, China, and the central parts of Madagascar and South Africa. The kernels of *Hamamelis Virginica* are oily and eatable. The leaves and bark are very astringent, and also contain a peculiar acrid essential oil.—*Eng. Cyc.*

(4231) HAMAMELIS CHINENSIS, a plant hitherto only known as a native of China though it grows on the Jyntia Hills; this, the *Bowringia*, and the little *Nymphæa*, are three out of many remarkable instances of our approach to the eastern Asiatic flora.—*Hooker, Him. Jour. Vol.* II, *page* 318.

(4232) HAMPALEDE, a rather soft, fine, though open grained, heavy wood, of Ceylon.

(4233) HAMS.

Hammen, Dut.	Proscintti, It.
Jambons, Fr.	Presuntas, Port.
Schinken, Ger.	Okoroku, Rus.
Ham, Guz. Hind.	Jamones, Sp.

The thighs of the Hog cured, smoked, and dried.—*Faulkner.*

(4234) HAMAYOON. In the vicinity of Delhi is the ancient yet well preserved Mookubah or tomb of the Emperor Hamayoon. It is upwards of 300 years old, and all that seems to bear features of decay is the external coating of cement.—*French's Tour, p.* 14.

(4235) HANDKERCHIEFS. Handkerchief pieces form a considerable article of manufacture and traffic in Southern India. At the Madras Exhibition of 1857, Handkerchiefs, colored, Madras; red, Sydapet; and from Ventapollam, were much admired for the harmony and richness of the colors, and the superiority of texture.—*M. E. J. R.* Putcha Ramalinga Chetty sent from Nellore Handkerchiefs (pocket), Jean Cambric Muslins, *watered*, (Rajabundar) and what is called unbleached Drill, but it was good Jean. These manufactures deserved unqualified approbation, especially the watered Cambric, which was exceedingly well done. The Cotton Fabrics of Nellore were most interesting, excellent in quality and of great variety from the coarsest material to that which is very superior, and deserved in the opinion of the Jury marked notice. —*M. E. J. R.*

(4236) HANDKERCHIEFS OF SILK, are manufactured chiefly in Bengal and are known in the market as "Bandanah," "Korah," and "Chapah." They are generally figured and of different colours. They are exported chiefly to the Burmese Territories and sold at from 1½ to 5 Rupees each. Those of Madras manufacture are ordinary, always red in colour and chiefly used by the inhabitants. The coloured handkerchiefs manufactured at Ventapollem on the coast, which are well known in foreign markets, are deserving of notice. These were formerly highly prized for their superior qualities and colours, but they have been driven from the markets by the Madras and Pulicat manufactures, which the community prefer for their superior qualities and colours. Handkerchiefs of Madras of these superior kinds are sold at 1¾ rupee each, and inferior sorts at 4 annas to 12 annas; the colour of the last description is very perishable. The ordinary colour of the Madras Handkerchiefs is red. Almost all the natives, Mahomedan and Hindoo, prefer them to those of other countries. Handkerchiefs Silk, for the Head. The principal site of their manufacture is Seringapatam in Mysore; they are of superior quality and of red and pink colours, they are in squares of 6 cubits, and are in consequence of their gold lace borders, sold at 35 to 100 Rs. each.

(4237) HANS-RAJ. Paraisoo-oosa. Leaves of a common plant found near water at Ajmeer; are heating and febrifuge.—*Gen. Med. Top. p.* 137.

(4238) HAR, Harra, from Terminalia chebula, and other species, three in number, comprise all the discarded myrobalans of our old pharmacopæias. The myrobalans as brought into Cashmere from Delhee and Harowtee, Hindustan and the Dukan, are of four kinds namely; *Gurul harra.*—Astringent and purgative: used in mesalihs: given in medicine to children: four seers for one rupee. *Juwal harra.*—Used in the same way: eight seers for one rupee. *Chaipel harra*, used only in dyeing, ten seers for one rupee. The whole are

much used in dyeing. According to the size of the myrobalan, its value augments, so that a very large one may be worth one hundred rupees or more, the natives believing that the very large ones have the virtue of causing purging by being merely retained in the hands.—*Genl. Med. Top. p.* 186. The Har or Harra, is, says Dr. Irvine, one among the articles of the native materia medica than which none is more vaunted. It is considered to possess wonderful general deobstruent and purgative qualities &c. &c., while those who thus belaud it, are apparently not aware that this is the chebulic myrobalan (Terminalia chebula) of English pharmacopæias of the sixteenth century and long since deservedly neglected.—*Genl. Med. Top. p.* 153.

(4239) HARDWARE.

Iseukramvarer, DAN.	Chincaglio. IT.
Yzerkramery, DUT.	Quincalharia, PORT.
Clinquaillerie, Quincaillerie, FR	Mjeloizchnue towarii, RUS.
Kurze waaren, GER.	Quinquilleria, SP.
Looah-kam, GUZ. HIND.	Jarnkram, SW.

Includes every kind of goods manufactured from metals, comprising iron, brass, steel, and copper articles of every description. Birmingham and Sheffield are the principal seats of the British hardware manufacture; and from these places immense quantities of knives, razors, scissors, gilt and plated fire-arms, &c., are supplied, as well for exportation to most parts of the world, as for home consumption.—*McCulloch, Faulkner.*

(4240) HARDWICKIA BINATA.

Acha or Alti marum, TAM.

This elegant tree is found indigenous on the mountains on the Coast of Coromandel, where it grows to a large size and yields a timber of an excellent quality for a variety of uses.—*Rohde. M.S.S. Hardwickia binita* is a most elegant leguminous tree, tall, erect, with an elongated coma, and the branches pendulous. These trees grow on the hills of the Soane valley in a shallow bed of alluvium, enclosing abundance of agate pebbles and kunker, the former derived from quartzy strata.—*Hooker. Him. Jour. Vol.* I. *page* 50.

(4241) HARMALA RUTA. PEGANUM HARMALA. Ruta sylvestris.

Harka, CAN.	Viragu, TAM.
Kodar, HIN.	Arkalu, TEL.

Grows plentifully at Lahore. The ruins of the old city are covered with this weed and Asclepias gigantea. The former (called Hoormul) is, at Lahore, looked upon as the plant devoted to the Pariahs (the inferior cast, the sweepers) yet though a Sikh or Hindoo, would not touch Hoormal; the seeds are in common use among the natives who therewith fumigate the rooms of the wounded. The natives fancy that a person suffering from any discharge, as hœmorrhoids, the monthly courses, &c., is unclean, and that the exhalation proceeding from such person may be prejudicial to the wound, therefore it is customary on the entrance of every stranger to strew a few grains of hoormal upon a charcoal fire. The natives (with the exception of Sikhs and Hindoos) use these seeds internally against weakness of sight and retention of urine.—*Dr. Honigberger, page* 284.

(4242 HART'S EAR, [illegible]DER LEAVED CACALIA. Cacalia kleinia.

Lisanul-Saur, ARAB.	Irminakullie, TAM.
Gowzahan, GUZ. HIND. PERS.	Yenapootoo nalikeh jemmoodoo, TEL.

These leaves resemble the tongue of the cow (hence its Asiatic name), the stalks are prickly, and covered with white spots. While fresh, the leaves have a strong smell like hemlock; and are given by native practitioners in the form of decoction in rheumatism, syphilis, leprosy, and in all other cases in which sarsaparilla is usually employed by European doctors. It is brought to Bombay from the Persian Gulf, and is procurable in most native druggists' shops throughout India.—*Faulkner.*

(4243) HASSELTIA, a genus of Plants belonging to the natural order *Apocynaceæ*. It has a 5-parted permanent calyx; a corolla with the tube contracted in the middle; the throat naked; the limb campanulate, 5-parted, contorted. The stamens are inserted in the throat. Anthers large, cuspidate, callous at the back, adhering to the stigma; the ovary double, surrounded by a fleshy ring; styles 2; stigma clavate; follicles 2, distinct, and long; seeds with a stipitate coma at the lower end.—*Eng Cyc.*

(4244) HASSELTIA ARBOREA is found in Java, near Tjampiam. It is a handsome tree, with oval leaves, rather acute at each end, smooth above, paler and a little downy on the under side. The flowers are large, yellowish-white, in axillary fascicles. In Java the milk obtained from the trunk by incision, mixed with honey and reduced with boiling water, is employed as a powerful drastic for destroying the tape-worm; it is however apt to produce inflammation of the intestines, and in some cases has proved fatal. Lindley, *Flora Medica.—Eng. Cyc.*

(4245) HATS.

Hoeden, DUT.	Cappelli, IT.
Chapeaux, FR.	Koola, PERS.
Hute, GER.	Schlopu, RUS.
Toopee, GUZ. HIND.	Sombreros, SP.

Are well-known coverings for the head, made of various forms and sorts of material. They may, however, be divided into two great classes; viz. those felted, or made of fur, wool, silk, &c.; and those made of straw.—*McCulloch. Faulkner.*

(4246) HAY.

Hovi, Dut.	Fieno, It.
Foin, Fr.	Fœnum, Lat.
Hew, Ger.	Heno, Sp.
Ghans, Guz. Hind.	

Any kind of grass, cut and dried for the food of horses, cattle, &c.—*Faulkner.*

(4247) HAZEL NUT.

Bindick, Beng.	Avellane, Lat.
Noisettes Aveilenes, Fr.	Fendook, Pers.
Haselnusse, Ger.	Avellaas, Port.
Fendook, Guz. Hind.	Avellanas, Sp.
Naccinole, Aveline, It.	

The fruit of different species of *Coryli* or hazel. The kernels have a mild, farinaceous, oily taste, ageeable to most palates. A kind of chocolate has been prepared from them; and they have been sometimes made into bread. They are grown in England, France, Portugal, but chiefly Spain. They are also produced abundantly in the Himalayas.—*McCulloch.* Hazel nuts are imported into Bombay from the Persian Gulf.—*Faulkner.* According to the English Cyclopædia, the Hazel-nut is the fruit of the wild bush of *Corylus Avellana*, unchanged and unimproved by cultivation. It differs from the domesticated varieties only in being smaller and rather more hardy.—*Eng. Cyc. Vol.* III. *page* 31.

(4248) HEAD CLOTHS, COTTON, or Roomals, are manufactured in the Madras Districts: they are always in squares of 5½ and 6 cubits with Lace Borders and are always Red Coloured, printed with white spots. These are worn by Hindoos as turbands and are valued at from 8 Rupees to Rs. 250.

(4249) HEAVY SPAR. Sulphate of Baryta. *F.* Sulfate de Baryte. G. Schwefelsaures Baryt. Sulphate of Baryta (Ba O, S O_3=117), or Heavy Spar, is more abundant as a mineral than the Carbonate. The finest specimens have been obtained from Dufton in Cumberland: Dr. Royle found it on the Himalayas, near the Convalescent depot at Landour. (*v.* Illustr. Himal. Bot. p. xxxiii.) *Prop.* Heavy Spar may be found massive or crystallized, of a foliaceous or lamellar structure; white-grey, or with a reddish hue; often translucent; heavy: Sp. Gr. 4·41 to 4·67; without odour or taste; insoluble in water. Its crystals are often bevelled tables or flat prisms of six sides, and may be divided into right rhombic prisms.

(4250) HEBENSTREITA. Selaginaceæ.—This is a genus of undershrubs the flowers white, grown in common garden ground.

(4251) HEBRADENDRON, a genus of Plants belonging to the natural order *Clusiaceæ*. It was established by Professor Graham of Edinburgh, for the Gamboge-Tree of Ceylon. The gamboge of commerce is known by the names of Ceylon and Siam gamboge. The gamboge of Siam is in cylinders, either solid or hollow, usually called pipes: it is supposed to have this form from being so rolled, or from being poured into the hollow of bamboos, according to Lieutenant White, in his 'Visit to Cochin China.' It is usually of the best quality, but Mr. Pereira has shown that some very impure is occasionally in the form of pipes. As this pipe-gamboge is usually exported from Singapore, it has been doubted whether it was actually the produce of Siam; but specimens from Mr. G. Swinton, which were sent to him direct from Siam, when he was chief secretary of the Indian government, as the produce of that country, are identical with the best pipe-gamboge of commerce. The only information respecting its preparation which we possess, is that given to Kœning by a Catholic priest, who officiated as such to the Catholics of Cochin China, and who stated that the inspissated juice obtained from breaking the leaves and young shrubs, as well as the fragrant lignum aloes, is given as a tribute to the king of Siam by the Christians residing there. The tree must therefore be common, and probably near inhabited places, and therefore very likely to be *Oxycarpus Cochinchinensis* of Loureiro (now referred to the genus *Garcinia*), who names it from its acid fruit, and describes it as cultivated in Cochin China. Specimens of a plant, something similar to this in the form of its leaves, given by Mr. Malcolmson, were collected by him in Rangoon, which he thought might be the gamboge plants, as it contained a yellow purgative juice in the rind of its fruit. Dr. Graham thinks that the Siam plant may be a nearly allied species of the same genus as the Ceylon plant. The Ceylon gamboge is usually considered inferior; that which forms an article of commerce no doubt is so; and we have been informed by one of the principal merchants of Ceylon that, finding the gamboge there very cheap, he had been induced to purchase and send it to England, but had not been able to sell it from its inferior quality. No doubt however some of very excellent quality is produced in Ceylon by the tree which has been called *Hebradendron cambogioides*, and Mrs. Colonel Walker describes it as "brilliant and excellent," and "as good for water-colour drawings as any she ever used." Dr. Graham ascribes its inferiority to want of care in preparing the article for market; though it is yet doubtful whether the Ceylon gamboge of commerce is all yielded by this tree; but Mrs. Walker on one occasion, in passing through a forest of these trees, saw all of them with the bark cut off in various places. Dr. Christison has shown that there is all but an identity of composition with that of Siam; and its medicinal effects are precisely the same, as proved in Ceylon by Dr. Pitcairn, and by Drs. Graham and Christison in Edinburgh. The plant, though new named, is far from being new. Dr. Graham considers it to be identical with the *Carcapuli* of Herman, the

Cambogia gutta of Linnæus, the *Garcinia morella* of late authors, and the *Stalagmitis cambogioides* of Moon's 'Catalogue of Ceylon Plants.' The last name might have been retained, as it was originally intended for it, had it not been discovered by Mr. Brown that the specimens in the 'Banksian Herbarium' collected by Kœnig, and from which Murray's character of the genus and species was established, consist not of one, but of two distinct plants, the flowers of *Xanthochymus ovalifolia* being stuck by sealing-wax upon a branch of what appears to be this Ceylon plant. The genera *Stalagmitis* and *Xanthochymus* are therefore one genus, as was previously inferred by Cambessodes, who has retained for it the former, as the prior name. The genus *Hebradendron* has diœcious flowers, the male having the calyx membranaceous, 4-sepalled, persistent; corolla 4-petalled; stamens monadelphous; column 4-sided; anthers terminal, opening by the circumcision of a flat and umbilicate terminal lid. The inflorescence of the female tree is similar to that of the male, the flower white and a little larger, with a germen precisely in miniature of the fruit, and surrounded (like it) with several (ten?) abortive stamens. The berry is many (4-) celled; cells 1-seeded, surrounded at the base with some free abortive stamens, crowned by a lobed and muricated sessile stigma; cotyledons fleshy, united; radicle central, filiform; trees with entire leaves.

(4252) HEBRADENDRON GAMBOGIOIDES, (Graham.) *Syn.* Cambogia Gutta, L Mangostana Morella, (Desroup.)

Gokatu, or Kana goraka, Cing.

The species called *H. cambogioides* forms a moderate-sized tree, with the leaves obovate, elliptical, abruptly sub-acuminate; the male flowers clustered in the axis of the petioles on short single flowered peduncles; sepals yellow on the inside, yellowish-white externally; petals yellowish-white, red on the inside near the base; berry about the size of a cherry, round, with a firm reddish-brown external coat and sweet pulp; ripe in July. It is called in Ceylon Kana (eatable) Goraka. *G. cambogia* is called simply Goraka. The gamboge is used by the natives both as a pigment and medicinally. Mrs. Walker describes it as being collected by cutting pieces of the bark about the size of the palm of the hand early in the morning. The gamboge oozes out in a semi-liquid state, but hardens on exposure to the air, and is scraped off by the collectors next morning. This tree is found in various parts of Ceylon, but not very abundantly near Colombo. In a tour through different parts of the island, Mrs. Walker writes: "We found the Ceylon Gamboge Tree several times in forests distant from the habitation of man, which proves the tree to be indigenous." Colonel Walker writes to Dr. Wight, that "it is found in great abundance along the western and eastern coast in the neighbourhood of Battocola, but it also grows inland, where it could not have been planted by the Dutch. Its favourite abode seems to be low sandy ground, as about Kanderaane, Negombo, and towards Chilaw; also 100 miles inland, at so high an elevation as 2000 feet above the sea." *Garcinia elliptica*, a native of Silhet and *G. pictoria*, of the Wynaad district, are thought to be other species of this genus. Besides the above species there is probably another belonging to the same genus, or to the same group of a larger genus, which appears to yield a very good kind of gamboge. It is the *Garcinia pictoria* of Roxburgh.

(4253) HEBRADENDRON PICTORIUM of Lindley and other botanists. It is a tall tree, about 60 feet high, of a conical shape, and very full of branches. The bark is pretty thick, scabrous and ramous on the outside, of a dark ferruginous colour, intermixed with many yellow specks, and through its substance, particularly on the inside, considerable masses of gamboge are found. The young shoots are somewhat angular, smooth polished, of a deep green colour. The leaves are opposite, short petioled, oblong, ventricose, rather acute, entire, smooth on both sides, and of a firm texture, from 3 to 4 inches long, by 1½ or 2 inches broad. The calyx consists of two unequal pairs of concave obtuse leaflets, permanent. Petals 4, oval, longer than the calyx. Anthers from 10 to 15, oblong, 2-lobed, and seemingly fertile. Ovary superior, round, 4-celled, with one ovule in each, attached to the axis a little above its middle. The berry is the size of a large cherry, oval, smooth, very slightly marked with four lobes, crowned with the sessile 4-lobed verrucose permanent stigma. Roxburgh says he received frequent samples of the gamboge of this tree from a correspondent at Tellicherry, and uniformly found it, even in its crude unrefined state, superior in colour while recent, but not so permanent as that from China. The tree grows on the highest parts of Wynaad in India. (Lindley, *Flora Medica*; Royle, *Materia Medica.*)

(4254) HEDERA, a genus of Plants belonging to the natural order *Araliaceæ*. The calyx has an elevated or toothed edge. The petals 5 or 10, not calyptrate and cohering; stamens 5 to 10: styles 5 to 10, converging or consolidated: the berry 5 or 10-celled.—*Eng. Cyc.* Dr. Wight gives H. acuminata 1062; Jackiana, 1062; (P.) obovata, 1011-12; (P,) racemosa, 1015; (P.) rostrata, 1013-14; trifoliata, 307.

(4255) HEDERA HELIX, Ivy, is a common plant all over Europe, clinging to trees and walls. It has a stem climbing with root-like fibres; leaves coriaceous, smooth, shining, 5-angled, or 5-lobed, the upper or old ones ovate and acute; umbels simple and downy; leaves austere and bitter: berries bitter, aperient, and emetic. It is mentioned as a sudorific, and was once reputed to prevent drunkenness and to dissipate the ef-

fects of wine. The berries are black at maturity. The flowers are yellowish, and appear late in the season, and, in consequence, are much resorted to by bees and flies when little other food is to be had. It is found commonly wild in England, and is dispersed through many distant parts of the Old World, lying between the Canaries and Europe on the west, and the northern parts of China on the east. In the Canaries it acquires its largest size, being what is called in English gardens the Irish or Giant Ivy, which grows so much faster than the European form. In the north of India, and indeed occasionally in Italy, the berries, instead of being black as with us, are bright yellow, and it is supposed that this is more particularly the *Hedera* of the Roman poets. The leaves vary much in form, and there is a kind which never runs or creeps upon other plants, but merely forms a compact bush.

(4256) HEDERA UMBELLIFERA is a native of Amboyna. It has a shrubby unarmed stem; leaves on long stalks, lanceolate acuminate, distantly serrated; peduncles 16, trifid and umbellate; partial umbels capitate, roundish. It yields a blackish or dull-brown resin with a very powerful aromatic camphorated smell. It is called 'Sarura' in Amboyna. There are 50 species of Ivy enumerated, all of which are of easy culture.—*Eng. Cyc.*

(4257) HEDYCHIUM, SCITAMINEÆ.—Garland Flower, Wight gives Hedychium, (Vol. VI flavescens, page 15) cernuum, 2011; coronarium, 2010; 2008-9; scaposum, 2030; venustum, 2012. A very fragrant species of hedychium with long narrow petals, and an epiphytic habit is often seen in Tavoy. The species is not described in any books to which Mr. Mason had access. —*Mason.*

(4258) HEDYCHIUM CORONARIUM.—The garland flower, a species of hedychium, but regarded by Europeans as a lily, is much cultivated by both natives and foreigners. The yellow and white varieties are both common. "This to me," says Roxburgh, "is the most charming of all the plants of this natural order that I have met with; the great length of time it continues to throw out a profusion of large, beautiful, fragrant blossoms, makes it particularly desirable."—*Mason.* These plants are natives of India, and only require a light rich soil: the flowers are fragrant, colours, orange, scarlet, yellow and white; they are increased by dividing the roots.

(4259) HEDYCHIUM SPICATUM. The root is called *seer, ruttee, kupoor kuchree;* the plant, *idhuoul,* Hind. The root is fragrant, warm, and aromatic. Royle, to whom is due the merit of tracing the true source of the root, thinks it may probably be the *ritte,* or *lesser galangal* of Ainslie.—*O'Shaughnessy, page* 652. Capoor kutchery is the root of this plant which grows in China, it is about half an inch in diameter, and is cut into small pieces and dried for exportation; has internally a whitish colour, but externally it is rough and of a reddish color; it has a pungent and bitterish taste, and a slight aromatic smell. It is exported to Bombay, and from thence to Persia and Arabia; it is said to be used in perfumery and for medicinal purposes, and also to preserve clothes from insects.

(4260) HEDYOTIS. An attractive purple-flowered shrub, a species of hedyotis is multiplied in some sections of Tenasserim.—*Mason.* Dr. Wight in Icones gives Hedyotis (A.) affinis, 1030; (D.) articularis, 1028; deltoidea, 1033; (D.) Lawsoniæ, 1026; Deschenaultiana, 1039; (A.) monosperma, 1031; plantaginifolia, 1029; racemosa, 312; ramosa, 822; (D.) stylosa, 1027; (D.) verticillaris, 1029.

(4261) HEDYSARUM. (from ἡδύσαρον, the Greek name of the *Coronilla Securidaca*), a genus of Plants belonging to the natural order *Leguminosæ.* It has a 5-cleft calyx, with the segments linear-subulate and nearly equal; the corolla with a large vexillum, and obliquely truncate, keel much longer than the wings; the stamen is diadelphous; the legume of numerous flat, orbicular or lenticular, regular 1-seeded joints, which are connected together in the middle, and therefore the sutures are convex on both sides. The species are herbs or under-shrubs, with unequally pinnate leaves, axillary with simple peduncles, and bearing racemose spikes of large, purple, white, or cream-coloured flowers. The old genus *Hedysarum* has been subdivided into many smaller genera. The saintfoin, *H. onobrychis* of older writers, now forms the genus *Onobrychis,* which differs from *Hedysarum* in the legumes consisting of many joints, not of one joint, as in that genus. *H. lineare* is used in Cochin China as a stomachic, and *H. alpinum* is used in Siberia for the same purpose. The *H. sennoides* of Willdenow, now *Ormocarpum* sennoides, has a root which is used in India as a tonic and stimulant. The *H. Alhagi* of Linnæus is the *Alhagi Maurorum* of recent writers. It is a spring shrub, and from its branches exudes a sweet substance like manna. *H. tuberosum* of Roxburgh, *Pueraria tuberosa* of De Candolle, grows in the Circar Mountains. The roots are used by the natives as poultices for swellings of the joints.—*Engl. Cyc. Vol.* III *p.* 55. Of the genus Hedysarum, Dr. Wight, in Icones, gives the following species alopecuroides, 290; auriculatum, 298; biarticulatum, 419; bracteatum, 268; cephalotes, 373; collinum, 272; crinitum, 411; diffusum, 409; Gangeticum, 271; gyrans, 294; hamosa, 284; lagenarium, 299; lagopoides, 289; latifolium, 270; Neli,—tali, 405; patens, 407; pictum, 411; procumbens, 408; pulchellum, 418; purpureum, 406; quinqueangulatum, 293; recurvatum, 374; reptans, 291; sennoides, 297; strobiliferum, 267; triflorum, 292; tuberosum, 412; vespertilionis, 285; viscidum, 286.

(4262) HEDYSARUM ALHAGI, Lin.

Juansa, Hindoo.

Juansa is the Hindoo name of a prickly bush of which Tatties are sometimes made in Upper Hindoostan.—*Ains. Mat Med p.* 176.

(4263) HEDYSARUM JUNCEUM, Rush-Stemmed Hedysarum. Grows in vast quantities in Shekhawattie and elsewhere, near Jaepoor, the small branches are sweet and eaten by camels and other cattle. This becomes a considerable bush, and has no thorns.—*Gen. Med. Top. p* 205.

(4264) HEDYSARUM LINEARE is used in Cochin China as a stomachic, and *H. alpinum* is used in Siberia for the same purpose. The *H. sennoides* of Willdenow, now *Ormocarpum sennoides*, has a root which is used in India as a tonic and stimulant. The *H. Alhagi* of Linnæus is the *Alhagi Maurorum* of recent writers. It is a spiny shrub, and from its branches exudes a sweet substance like manna. *H. tuberosum* of Roxburgh, *Pueraria tuberosa* of De Candolle, grows in the Circar Mountains. The roots are used by the natives as poultices for swellings of the joints. All the species of the genus *Hedysarum* may be cultivated. They thrive in a light rich soil; the perennial sorts may be increased by dividing the roots; and the seeds of the annual species should be sown in an open border.

(4265) HEDYSARUM SENNOIDES. Moorungy Root. Willd.

Caat Moorangy vayr, Tam.	Adivie Moonga vayroo, Tel.
Junglie Moonghie ke jurr. Duk.	Kanana (shigroo,) Sans.

This root, which possesses a considerable degree of warmth, is prescribed, as a tonic in certain cases of fever, it is also supposed to be a valuable remedy in rheumatic affections of long standing given in decoction. With the bark of the root, ground small, and mixed with Gingilie oil, is prepared a liniment which the Vyteans recommend as an external application in paralytic complaints and in lumbago.—*Ain's. Met. Med. page* 74.

(4266) HELENIUM MEXICANUM. Most of the species are well adapted for borders, they are tallish growing plants, and all with yellow coloured flowers, grow in any common soil, natives of North America chiefly.—*Riddell.*

(4267) HELIANTHEMUM, a genus of Plants named from ἥλιος, the sun, and ἄνθος, a flower, because the flowers open with the rising of the sun, and fall with the setting of the sun in the evening. This genus belongs to the natural order *Cistineæ*, or *Cistaceæ*, and the species were at one time included under the genus *Cistus*, but they differ materially in their characters. There are about 150 species enumerated, which are distributed in various parts of the world. They are chiefly found in the south of Europe, the north of Africa, and a few species in America. The calyx consists of 5 sepals, the 2 exterior ones small or wanting, 5 deciduous petals, numerous stamens, and 3-valved capsules. The flowers are yellow, red, or white, and are very elegant; none of the species possess any available property in the arts or medicine, but they are extensively cultivated on account of their very beautiful and ornamental appearance.

(4168) HELIANTHEMUM BREWERI is a British plant. It has obtuse obovate leaves, without stipules; racemes without bracts.

(4269) HELIANTHEMUM CANUM, the Hoary Sun-Rose, is distinguished by its shrubby appearance, without stipules, and having terminal bracteated racemes. The flowers are yellow and small. It is a native of the south of France and Germany, and is rarely found in Great Britain.

(4270) HELIANTHEMUM GUTTATUM, is an erect herbaceous plant with oblong lanceolate or linear leaves, the racemes without bracts, and the stigma subsessile. The flowers are yellow, with a deep red spot at the base of each petal, it is a native of France, Italy, Spain, Portugal, and Turkey, and is found in Anglesey and Jersey in Great Britain, but is a very rare plant.

(4271) HELIANTHEMUM POLYFOLIUM is found in Devonshire and Somersetshire. It is a hoary plant, with stellate pubescence; the leaves opposite, ovate-oblong, or oblong-linear; the sepals tomentose, inner ones obtuse. Almost all the species of *Helianthemum* are elegant plants, of hardy growth, and easily cultivated. They grow best in Britain. They are generally used for planting on rock-work, soil, common garden.

(4272) HELIANTHEMUM VULGARE, the Common Rock-Rose, is a procumbent shrub, with stipules, bracteated racemes, the style larger than the ovarium, and bent at the base. The flowers are yellow, and bloom from May to September. It is a native of Europe, and is found in Great Britain in dry hilly pastures. There is a very beautiful variety with double pale yellow flowers, which is much cultivated by florists. The stamens, if touched in the sunshine, spread slowly, and lie down upon the petals.

(4273) HELIANTHUS ANNUUS: Sun Flower.

Suraj mukhi, Hind.

Very common in gardens.—*Gen. Med. Top. page* 206.

(4274) HELIANTHUS TUBEROSUS: Jerusalem Artichoke. Cultivated in gardens. —*Gen. Med. Top. page* 206.

(4275) HELICIDÆ, a family of Gasteropodous *Mollusca* to which the land Shell-Snails are referred. The *Helicidæ* are most widely diffused over the surface of the earth; scarcely any countries but those where the climate is surpassingly rigorous are without some species

the family. Many of the shells are strikingly autiful in form and colour, and these are most the inhabitants of intertropical countries. me of the genera (*Achatina*, for instance) at- in a very large size, and lay eggs in proportion, *elix aspersa*, the common Garden Snail, is stributed over a large portion of the globe. It found, for instance, at the foot of Chimboraço, the forests of Guyana and Brazil, and on all e coasts of the Mediterranean in Europe, Asia, d Africa. *Helix pomatia* has been naturalised Britain, and is still found in some countries. ıe first importation is attributed by some to r Kenelm Digby. Merrett mentions it as a itish inhabitant before his time. A moist and ther warm state of the atmosphere seems most ngenial to this family. To avoid great, dry heat ey get under stones, under old trunks of trees, ıves, &c., and some of the species will burrow to the earth for protection against it. A shower ll bring them forth in such numbers sometimes, e smaller species especially, as to induce the lief in some cases that it has been raining ails. Most of the species hybernate. Utility Man.—The *Helicidæ*, from their voracity, are ry injurious to the agriculturist and horticul- rist; but there can be no doubt that the larger ecies are good food. We know that they were favourite dish with the Romans, who had their Cochlearia,' where they were regularly fatten- with new wine boiled down and meal (sapa et rre, &c.) (Pliny, 'Hist.,' lib. ix. c. 56.) *Helix matia* is used as food in many parts of Europe ıring Lent, and the snails are kept in an escar- toire (snaillery), which is generally a large ace boarded in, having the floor covered half a ot deep with herbs, where the animals fatten. any are familiar with the passage in Pliny (loc. t.), who, on the authority of Varro, relates the credible size to which the art of fattening had ought the snails. There must, one should ink, be some mistake in the text, which says— Cujus artis gloria in eam magnitudinem per- icta sit, ut octoginta quadrantes caperent sin- ılarum calices." Pennant, referring to this and Varro ('De Re Rustica'), says, "If we should edit Varro, they grew so large that the shells some would hold ten quarts! People need not mire the temperance of the supper of the unger Pliny ('Epist.,' lib. i.; Epist., xv.), ıich consisted of only a lettuce a-piece, three ails, two eggs, a barley cake, sweet wine and ow, in case his snails bore any proportion to ose of Hirpinus."

(4276 & 4277) HELLEBORUS NIGER, OR LACK HELLEBORE. *Syn.* Melampodium.

Katuroum, SANS.	Kherbeck, ARAB.
Kalikootkie, DUK.	Kerbeck seeah, PERS.
Kherbeck, Kurbec- aswad, ARAB.	Cuddoo, Kali Koot- kie, GUZ. & HIND.
Calurana, CYNG.	Helleborus Niger, LAT.
Kali-kootkie, DUK.	
Neiswurtel, DAN.	Kherbeck Seeah, PERS.
Hellebore, FR.	Katurohina, SANS.
Schwartz Neisswar- gel, GER.	Kodagaroganie, TAM.
Hellboro, PORT.	Katookaroganie, TEL.

Under the native names two kinds of hellebore are brought from Nepaul and the Red Sea, and which are commonly met with in the Indian bazars They are much used by farriers, and occasionally by native practitioners as a powerful cathartic in maniacal and dropsical cases. The roots of one kind occur in pieces of four to six inches, are black all through their substance, externally of a grapish colour, with numerous joints. The second variety is in similar pieces, but of a whiter colour internally. Black hellebore is indigenous to the Alps, Pyrenees, and Apennines, and is also cultivated in Great Britain. White hellebore grows in Switzerland, and the mountainous parts of Germany. The roots of both plants are used in medicine.—*Faulk.* Under these native names two kinds of Hellebore root are brought to India from Nipal and from the Red Sea, and are commonly sold in the bazars; they are much used by farriers, and occasionally by the native practitioners as a powerful cathartic in maniacal and dropsical cases.—*O'Shaugnessy, page* 168.

(4278) HELICHRYSUM MACRANTHUM. Many of this genus are much admired for their very lasting and brilliant colours, they grow well in a rich soil and are easily cultivated by cuttings taken off at the joint. Some species seed freely and are found very abundant at the Cape of Good Hope.—*Riddell.*

(4279) HELICTERES ISORA. SCREW PLANT. Lin.

Maror-phalli, HIND.	Merowrie, HIND.
Valumbirikai, TAM.	Avertunnie, SANS.
Avurtunnie, SANS.	

This is a singular looking, contorted capsule, consisting of five fibres closely twisted in the shape of a screw. It is of a various length, from one inch to two and a half. A liniment is prepared with the powder of it, which is supposed to be a valuable application in cases of offensive sores inside of the ears. The Teloogoo name of the Valumbirikai, is Noollie tudda. Rheede says the juice of the root is a powerful stomachic. See Hort. Mal.—*Ain's. Mat. Med. page.* 112. The powder of the fruit has also been used in griping pains of the bowels, but solely because the twisted fibres of the capsule were considered to stamp it as a remedy, according to the ancient doctrine of signatures.—*O'Shaughnessy, p.* 228.

(4280) HELICTIS (Gray), a genus of *Mammalia* belonging to the order *Carnivora*. The species inhabit eastern Asia, and have the general appearance and colouring of *Mydaus*, combined with a dentition resembling that of *Gulo* or *Mustela*, but differing from both the latter genera in the large internal lobe of the upper carnivorous

tooth. The genus is thus characterised by Dr. Gray :—

Incisors (primores) $\frac{6}{9}$: canines (laniarii) $\frac{1-1}{1-1}$; molars $\frac{5-9}{5-6}$

Head elongated, feet short; soles of the feet nearly naked to the heel; toes 5—5; claws strong, the anterior ones long and compressed. Tail cylindrical and moderate. There are two species, *H. moschata* from China, and *H. Nepalensis* from Nepaul.

(4281) HELIOPHILA. CRUCIFERÆ.—A genus of pretty annuals, natives of the Cape of Good Hope, colours, purple, blue, violet and white, raised by seed, in pots, and may afterwards be placed out in borders.—*Riddell.*

(4282) HELIOTROPE. [BLOOD-STONE.]

(4283) HELIOTROPE. H. PERUVIANUM. —Should be grown in a soil more approaching to sand than clay, easily cultivated in pots, or the flower beds, propagated by cuttings in sand under glass. They require to be protected from the hot winds.

(4284) HELIOTROPIUM, (from ἥλιος, the sun, and τροπή, a turning), a genus of Plants belonging to the natural order *Ehretiaceæ*. It has a salvershaped corolla, with the throat usually naked, but in some species bearded; the segments of the limb furnished with a single fold or a tooth between each; the stigma sub-conical; the carpels 4, 1-celled, combined, closed at the base, without any manifest receptacle. The species are annual or shrubby plants, with alternate leaves, and circinate spikes of small blue or white flowers. Wight gives, in Icones, Heliotropium brevifolium, 1389; Co-romandelianum, 1388; linifolium, 1391; Malabaricum, 1387; marifolium, 1390; Rottleri, 1392; scabrum, 1389-90; supinum, 1387; tenue, 1391; Zeylanicum, 892, 1386.

(4285) HELIOTROPIUM INDICUM. INDIAN TURNSOLE.

Hattee shoora, BENG. | Srihastini, also Bhoo. roomdi, SANS.
Siriari, HIND.

Plant slightly bitter, juice of the leaves applied to painful gum-boils and to repel pimples on the face—also used in inflamed or excoriated tarsi. A very common plant. In Jamaica it is used with castor oil to relieve the pain of scorpion stings, and in the treatment of hydrophobia—*O'Shaughnessy, page* 497.

(4286) HELIX (Linnæus), a genus of Pulmoniferous *Mollusca*, embracing the various forms of animals called Snails. The following are the characters of this genus:—Shell spiral, opaque, or translucent, solid or thin, more or less globose, in some discoid, smooth or sculptured; surface variously coloured, but seldom covered with a polished epidermis; mouth lunated, thickened within, simple or toothed; peristome frequently reflexed. Animal moderately large in proportion to shell: head with four developed tentacles; mantle not reflected on shell; tail lanceolate and never truncate; foot often ample; tongue with the edge teeth serrate. (Forbes and Hanley.) The species of this genus, at the approach of winter, or in very dry weather in summer, recede into their shell, and secrete a quantity of mucus, which forms a covering over the aperture. This thickened matter, which the animal has the power of throwing off by producing fresh mucus within, is called an 'epiphragm.'

(4287) HEMEROCALLIS, a genus of Plants belonging to the natural order *Liliaceæ*. It has a campanulate corolla, seated on a cylindrical tube; the stamens are bent down; the capsule is 3-edged; the root is composed of thick fibres; the leaves are scattered, linear; the flowers are large, yellow, or yellow-brown. The species are called Day-Lilies. *H. flava* is a native of Germany, and *H. fulva* of Italy. Several species are cultivated in our gardens, as *H. disticha* from China. *H. Sieboldii* from Japan, *H. speciosa*, and *H. graminea.*

(4288) HEMEROCALLIS FULVA. NARCISSUS OF INDIA.

Nurgus, Gool-nurgus, HIND.

Cultivated as a flower (Brown Day Lily.) The Narcissus fistulosus is also cultivated in European gardens.—*Gen. Med. Top. page* 189.

(4289) HEMIDESMUS INDICUS. *Syn.* Periploca Indica, *Willd.* Asclepias Pseudosarsa, *Roxb. Fl. Ind.* ii. 39.

Vern. Ununtamul, HIND. and BENG.

This is common all over the Indian peninsula. The root is long and slender, with few ramifications, covered with rust-coloured very fragrant bark, the odour remaining after drying, and strongly resembling that of new mown hay. The roots of this plant have been long employed on the Madras coast as a substitute for sarsaparilla, and have been also used in England and very highly spoken of. Dr. O'Shaughnessy's trials were numerous and satisfactory. Its diuretic operation is very remarkable; two ounces infused in a pint of water, and allowed to cool, was the quantity usually employed daily, and by such doses the discharge of urine was generally trebled or quadrupled. It also acted as a diaphoretic and tonic, and so increased the appetite that it became a most popular remedy in his hospital, the patients themselves entreating its administration and continuance. The taste and smell of the infusion are balmy and sweet; he used it with the most decided benefit in numerous cases of the description in which sarsaparilla is generally given; indeed he considers the activity of his medicine to be much more decided than that of sarsaparilla itself. The ununtamul can be purchased in Calcutta of good quality at from two to four annas the seer. No good analysis has yet been made of this drug. A volatile acid is described by Mr. Garden of London as having been obtained from

the *Smilax aspera*, under which name it is thought H. indicus became the subject of his experiments. This is however as yet doubtful.—*O'Shaughnessy, page* 456. Indian substitute for Sarsaparilla ; occurs in bundles, about a foot and a half long ; smell fragrant, enduring ; fracture white ; boiled in water, vapour very agreeable.

(4290) HEMIONITIS CORDIFOLIA. MULE FERN. In Tenasserim, near the sea shore, a species of mule fern with cordate fronds is sometimes seen.

(4291) HEMP.

Kinnub, ARAB.	Canape, IT.
Hamp, DAN.	Bhanga, Gangica, SANS.
Hennip, DUT.	Bung, PERS.
Sunn, DUK.	Konapli, RUS.
Hauf, GER.	Canamo, SP.
Sunn, GUZ. HIND.	Hampa, SW.
Konope, POL.	Chauvre, FR.

The Indian plant has been generally thought to be a species entirely distinct from the European one, but Roxburgh, Royle, O'Shaughnessy, and Hamilton assume that the *Cunabis sativa* and *indica* are identical.—*Faulkner*. Cannabis (in Greek κάνναβις, and in Latin also Cannabis,) is a genus of plants belonging to the natural order Cannabinaceæ. The cannabis sativa is the only species known ; it is said to be a native of Persia, and is certainly wild, according to Roxburgh " among the hills and mountains north of India, as well as common everywhere in the gardens of the natives throughout Asia." It is now universally distributed over the north of Europe. Herodotus, iv. 74, describes it as growing in Scythia, north of the Danube, a country which he had visited. We must from this conclude that the plant is really a native of north and east Europe. If a person remains for any length of time amongst a plantation of young hemp, head-ache and vertigo are often the result, in hotter countries these effects are much more violent, a kind of intoxication being speedily produced. Oriental nations have taken advantage of this to add another to the list of intoxicating drugs, which they contrive to substitute for the forbidden wine of western people. The powdered leaves mixed with some kind of aromatic are infused in water and drunk, when a drowsy ecstatic feeling comes on, which is said to be much more agreeable than that produced by opium. The leaves are also mixed with tobacco for smoking. The two chapters of Herod., iv. 74, 75, are curious as to its intoxicating effects, &c. The drugs obtained from hemp are called bang, haschish, and cherris : gangika, ganja, kinnab, subjah, majah, are other names for it. The seeds of hemp abound in a thick mucilage, and are used medicinally for the preparation of emulsions : a useful oil is obtained from them by pressure. The hemp develops its active properties more in warm climates, hence for medicinal purposes it is brought into England from India under the name of *Cannabis indica*. —*Engl. Cyc. page* 759. We have already noticed, under the head of cannabis the scientific relations of the plant, and restrict this article to its commercial relations. In various notices of Indian fibres we frequently meet with the word *Sunn*, as indicating a particular kind of Indian fibre. Sometimes we find it called *Indian Hemp*, and we may often see *Hemp* enumerated as one of the exports from India. At other times we may see either the same or another fibre mentioned by the name of *Brown Hemp*. Now these various names are sometimes applied to the fibre of one or of two different plants, or are employed to distinguish the fibre of three distinct plants all of which are grown for their fibres, and have been, and might be exported from India, though only two of them are now usually to be found among the exports from that country. Hence, to avoid ambiguity, it is necessary to notice the plants to which these several names are correctly applicable.

The true Hemp (*Cannabis sativa*) the subject of the present article is everywhere cultivated by the natives in the plains of India, not on account of its fibres, but for its intoxicating leaves and their secretions. In the Himalayas, however, the fibre is separated for economic purposes, and was exported from India to England during the last war, but it has not been so for many years.

The fibre of the *Sunn* or *Taag* (*Crotalaria juncea*) is often called Indian Hemp, but incorrectly. It is the kind most generally cultivated all over India on account of its fibre, and is that usually mentioned in the exports from Calcutta under the name of Hemp, but also as Sunn. The plant may be distinguished by its flowers being of a bright yellow colour, and of the form of the Pea and of the Laburnum, while the leaves are entire and lanceolate.

The *Ambaree* (*Hibiscus cannabinus*), *Mesta paut* of Bengal, and *Palungoo* of Madras, is also very generally cultivated all over India, and exported of very good quality from the west side of that country. Its leaves are both entire and lobed, its flowers are large, and in shape resemble those of the Mallow, the Hollyhock, and the Cotton plant, of a sulphur-yellow colour with a dark brown centre. The fibre of this plant is, like that of Jute, sometimes called *paut*, and also *Indian Hemp*. It is often confounded with that of the Sunn, as it is one of the kinds of Brown Hemp of Bombay, though the two plants differ much from each other.

In the exports from the different Presidencies of India, it is very difficult to distinguish these different kinds of fibre, inasmuch as the same name, Hemp, is applied to the exports from all the three Presidencies ; but we believe, speaking generally, that the *Sunn* (*Crotalaria juncea*) is chiefly exported from all the three

Presidencies, and one kind of Brown Hemp (*Hibiscus cannabinus*), along with the other kind, *Taag*, from Bombay.—*Royle Fib. Pl. p.* 352. There has a great increase taken place in the commerce of Indian fibres and a tabular statement has been given of the exports of fibrous substances from the three Presidencies. In subsequent pages, the detailed exports of Coir and of Jute have been separately given, and *Ambaree* or *Hibiscus* fibre, has been noticed under both heads. In Britain, Jute has not hitherto been separated from the others; though it will be so in future reports. In the following table, therefore, the details of the Exports of Indian substitutes for Hemp are given, consisting chiefly of Sunn (Crotalaria); but some Hibiscus, and perhaps a little of Dhunchee, may be included.

Exports.	Hemp (Sunn).	Canvas bolts.	Hemp Twine.	Log lines
From Calcutta—	Mds.			
To United Kingdom, ...	5,641	—	137	—
„ North America, ...	1,885	—	1,593	—
„ Hamburgh, ...	80	—	—	—
„ Mauritius, ...	12	348	490	85
„ New South Wales, ...	17	150	1,097	653
„ Cape of Good Hope, ...	—	15	—	—
„ Guam, ...	—	102	—	—
„ Pegu, ...	—	272	447	69
„ Coast of Coromandel,...	—	314	1,225	15
„ Coast of Malabar, ...	—	728	2,987	39
„ Penang, Singapore &c.	—	68	868	437
„ Ceylon, ...	—	—	407	74
„ China, ...	—	—	50	—
	Mds.			
Total.... ...	7,635	1,997	10,301	1,372
	Rs.			
Value.... ...	15,276	12,672	93,284	9,716
From Madras—	cwt.			Gunny bags (of Sunn?)
To United Kingdom, ...	294	—	—	—
„ Indian French ports. ...	—	—	—	27,750
„ Arabian and Persian Gulf,	75	77	—	—
„ Ceylon, ...	—	—	—	25,000
„ Maldives, ...	—	60	—	—
„ Pegu.	—	—	—	3,500
„ Bombay, ...	1,709	333	—	—
„ Cape of Good Hope, ...	—	—	—	2,700
„ Travancore, ...	17	—	—	—
	cwt.			
Total...	2,095	470	—	58,950
	Rs.			
Value. ...	10,577	3,711	—	6,644
From Bombay—	Hemp & Hemp Rope. cwt.			
To United Kingdom, ...	7,851	—	—	—
„ African Coast, ...	16	—	—	—
„ Arabian and Persian Gulf,	2,925	—	—	—
„ Guzerat.	500	—	} 144	—
„ Other Home ports,... ...	85	—		—
„ „ Foreign ports, ...	—	—	65	—
	cwt.			
Total. ...	11,856	—	209	—
	Rs			
Value ...	73,483	—	1,503	—

In a late Minute, published by the Madras Government (19th September, 1854) for the express purpose of directing attention to the fibrous productions of that presidency, the exports are given as valued at the following sums, in the respective years from 1847 to 1852, excluding Coir and Coir rope. The year selected above, in consequence of the published accounts of the three Presidencies being complete, is that in which the exports were the smallest.

	Hemp.
1847-48	Rs. 19,819
1848-49	„ 23,242
1849-50	„ 23,076
1850-51	„ 10,577
1851-52	„ 46,683

Among the Imports of the three Presidencies, we find Cordage and Canvas; but excellent cordage is now made in Calcutta, both by Messrs. Thompson and by Messrs. Harton, as evidenced by the specimens which both sent to the Exhibition of 1851. Some of the canvas also is of excellent quality, as that sent from Travancore. Europe Canvas is generally preferred in India, though much dearer, that is, Rs. 24 5 6 per bolt of thirty-nine yards each, and country Canvas being only Rs. 16; because the former is so much more durable, and therefore cheaper in the end. But there is no doubt that some of the India Canvas is of much better quality than others; and it is desirable to ascertain where the best qualities are made, as well as of Twine and of Cordage; for though much depends upon manufacture, something is due to the fibre, and not a little to the soil and climate where the plant is grown. Bombay, from its insular situation, requires both its Imports (some by sea, others by causeway) and Exports to be noticed. Among the Imports we find Canvas, 9367 bolts, from the United Kingdom, Calcutta, Malabar, and Canara; Gunny bags, 2,729,407, from Calcutta, Malabar, Canara, and Concan. The first are no doubt made of Jute; but the others, probably, of Sunn. Hemp, 57,126 cwt. from Malabar and Canara, Concan, Guzerat, Goa, and the Arabian and Persian Gulfs. This probably includes both *Sunn* and *Ambaree*, or Crotalaria and Hibiscus fibre. Twine, 9738 cwt. from the United Kingdom, Calcutta, and Guzerat; Fishing Nets from the Concan, probably made of Conkanee Hemp; and Grass cloth from China. Of these, we find among the Re-exports, some Hemp, Canvas, Gunnies, and Twine, as well as China-grass cloth.—*Royle Fib. Pl. page* 298.

We now proceed to our notice of the true Hemp.

Bhanga, Ganjica, Sans.	Kinnub, Arab.
Ganja, Hind.	Bung, Pers.

Though, as we have seen, many fibres are known in commerce under the name of Hemp, the true Hemp plant is the *Cannabis sativa* of botanists. Its fibre is so generally employed for cordage in Europe, that the value of all other fibres is estimated there, not so much

from their intrinsic properties, as from their greater or less resemblance to Hemp, and especially to Russian Hemp. There is every reason for believing that the plant is of Eastern origin, while there is no sufficient reason for thinking that the climate of Europe is so peculiarly suited to the production of its fibre, as to exclude those of its native climes. Especially where attention is paid to the places where the plant is grown on account of its fibre, and these distinguished from the others where it is cultivated for its resinous and intoxicating secretion. For the latter purpose the plant requires exposure to light and air and these are obtained by thin sowing, while the growth of fibre is promoted by shade and moisture, which are procured by thick sowing. By the celebrated Jussieu, the Hemp and the Hop plants were placed in the same natural family (*Urticeæ*) with the Nettles. In more modern works, they are either continued as a tribe of the same family, under the name of *Cannabineæ*, or these containing only the genera *Cannabis* and *Lupulus* are separated into a distinct family, under the same or a nearly similar name. These two plants are closely connected in properties, as in structure. The Hop (*Humulus lupulus*), besides a bitter, secretes a resinous principle: Hop bines abounding in fibre, have often been proposed to be turned to useful account, for cordage or paper, but as yet to little extent. The Hemp plant likewise secretes a resinous principle in its leaves, on which account these, as well as the *churrus* collected from off the young tops of the stem and flowers, is highly esteemed in all Eastern countries, on account of its exhilarating and intoxicating properties. Among the Arabs the Hemp has a variety of names, as "the increaser of pleasure," the cementer of friendship," &c. By its name of *Hasheesh* it is often mentioned in the works of travellers in Egypt, Arabia, and Syria; while the name of *Bhang* is not less celebrated in the far East. The Hemp is a dicœcious (occasionally moncœcious) annual, from 3 to 10 feet high, according to soil and climate. Root white, fusiform, furnished with fibres. The stem erect; when crowded, simple; but when growing apart, branched even from the bottom, angular, and, like the whole plant, covered with fine but rough pubescence. This stem is hollow within, or only filled with a soft pith. This pith is surrounded by a tender, brittle substance, consisting chiefly of cellular texture, with some woody fibres, which is called the *reed*, *boon*, and *shove* of the Hemp. Over this we have thin bark, composed of fibres, extending in a parallel direction all along the stalk. These fibres consist of delicate fibrils, united together by cellular tissue, and all covered by the thin membrane or cuticle. The leaves are opposite or alternate, on long petioles, scabrous, digitate, composed of from 5 to 7 narrow, lanceolate, sharply serrated leaflets, of which the lower are the smallest, all tapering at the apex into a long entire point. Stipules subulate. *Males* on a separate plant. Flowers in drooping, axillary, or racemose panicles, with subulate bracts. Perianth 5-parted; segments not quite equal, downy. Stamens 5; filaments short; anthers large, pendulous, 2-celled; cells united by their backs, opening by a longitudinal slit. *Females* in a crowded spike-like raceme, with leafy bracts. The perianth consists of a single, small, spathe-like sepal, which is persistent, acuminate, ventricose at the base, embraces the ovary, and is covered with short brownish glands. Ovary subglobular, 1-celled, with one pendulous ovule. Style short. Stigmas 2, elongated, glandular. Nut ovate, greyish-coloured, smooth, covered by the calycine sepal, bivalved but not dehiscing, and inclosing a single oily seed. Seed pendulous. Testa thin, membranous, marred at the apex with a coloured hilum. Embryo without albumen, doubled upon itself. Radicle elongated, turned towards the hilum, and the apex of the nut separated from the incumbent plano-convex cotyledons by a small quantity of albumen. The cultivation of Hemp in India obtained very great attention from the Court of Directors, and instructions were sent to the Governments there to encourage its growth, as well as that of other cordage plants. As the natives of India employ between forty and fifty different kinds of plants for the fibre which they yield, fitted for this purpose in different degrees, the subject of investigation was sufficiently extensive, and received great attention from Dr. Roxburgh. It is in general supposed that it can only be successfully cultivated in European regions, though there is every reason to believe thst it is originally a native of Asia, and even that its Greek and Latin name *Cannabis* is derived from the Arabic *kinnub*. It is well known to be common in Arabia and Persia, as well as in every part of China and of India, and likewise in Egypt and Turkey; but in all these countries it is valued chiefly, if not only, for yielding an intoxicating drug commonly called *bhang*. In European countries, it is on the contrary cultivated only on account of its ligneous fibre, so extensively employed in the manufacture of the strongest ropes, and of coarse but strong kinds of cloth. Hemp is cultivated in almost every part of Europe for home consumption, but only in large quantities for export in Russia and Poland, though the finest quality of Hemp comes from Italy. French Hemp is also much esteemed, as well as that grown in both England and Ireland; Hemp is cultivated in almost every province of Russia, but in the largest quantities in the interior, beyond Moscow, as well as nearer Petersburgh, and in the Polish provinces which belong to Russia. The soil must not be over rich nor too sterile, of moderate depth, and friable. The time of sowing varies from the middle of May

to the end of June; by some it is recommended not to be sown until the latter end of June, as frosts are very injurious to its growth. The season of reaping is from the end of August to the end of September, and it is therefore between three and four months in a state of vegetation; the male plants being pulled some weeks before the female. The Russian summer though short, is regular while it lasts, and the temperature sufficiently high to bring it to full perfection. That the northern latitudes of Russia are not essential for the successful cultivation of Hemp, is, however, evident, from large quantities which are grown in the southern climate of Italy, both in Bologna and Romagna, and along the banks of the Po, as well as in the neighbourhood of Naples. The Italians have a saying, that 'Hemp may be grown everywhere, but it cannot be produced fit for use, either in heaven or earth, without manure.' The climate of Italy, it is well known, is remarkable for its clearness, regularity, dryness, and warmth, and that irrigation is essentially necessary for much of its agriculture. The Italian Hemp is fine, soft, light-coloured, and strong, as well as long in the staple, and it is important to remark that it brings the highest price in the English market as, for instance, it sells for 50 shillings per cwt. when the best Russian sells at 47 shillings for the same quantity. If we compare the summer temperature of the northern with these southern situations, we shall not find so great a difference as we might be led to expect by considering only their latitudes, or their mean annual temperatures. Thus Petersburgh and Moscow, in N. latitude 59° 56 and 56° 45, have mean summer temperatures of 62° 09 and 67° 10, of Fahr., while Milan and Rome, in N. latitude 45° 28 and 41° 53, have summer temperatures of 73° 04 and 75° 20. "Without entering into details, it might be inferred as probable, that as Italy grows Rice, and so many other plants of India, so might the latter cultivate a plant like the Hemp, which succeeds so well even so far south as Naples, and which requires only a few months to bring it to perfection; and this even if India did not already possess it. But so far from this being the case, the reverse is the fact; and it is well known that no plant is so commonly cultivated in so many parts of India as the true Hemp plant, which is there called *ganja*, but which differs in no respect from the European plant, though the natives employ it only for the purpose of yielding *bhang*. But cultivated for this purpose, instead of being sown thick, as it ought to be when intended for cordage, it is sown thin by the natives, who afterwards transplant the young plants, and place them at distances of nine or ten feet from each other. The effect of this is to expose them more freely to light, heat, and air, by the agency of which the plant is enabled to perfect its secretions in a more complete manner, and the bhang will consequently be of a more intoxicating nature. The fibrous and woody parts at the same time attain a greater degree of stiffness and solidity, as is found to be the case with timber trees similarly exposed. The Hemp plant, thus grown, will branch much. It may be small in dry situations, and large in rich and moist ones, but in either case its fibres are found, both in Europe and India, to be rougher, stiffer, and more difficultly separated from the woody part than is desirable, but seed is produced in larger quantity and of better quality. This mode of cultivation has, moreover, the disadvantage of being more expensive, from taking up more space than is desirable when the plants are required to yield the best quality of fibre for cordage. Plants, when grown in moist situations, in shade, or set thickly together, are well known to run into leaf, shoot up, and to become more lax in texture, while their secretions are imperfectly formed, as is exemplified in the growing of Lettuce, Celery, &c. Hemp and Flax, when cultivated for their fibres, are sown thickly together, and they shoot up into long, wand-like plants, which are much less branched than when freely exposed. Air and light having less free admission, and heat having less influence in evaporating the sap, the effect is to produce a longer fibre, which is at the same time soft and pliable, as well as more easily separated, and in larger quantity on the same space, than when they are set widely apart. "The natives of India also sow their *Sunn* and *Jute* very thickly together when, for the sake of their fibres, they form the exclusive crop. The effect is to produce a long and flexible fibre, though this is not sufficiently strong to form a good substitute for the true Hemp. This might be cultivated in suitable situations in India, in a manner similar to that adopted in Europe, or like that practised with its substitutes in India. The effect would undoubtedly be to produce a sufficiently long fibre, which would also be softer and more pliable, at the same time that it retained a great portion of its original strength, and probably in as large a quantity as is yielded by the *Sunn* plant. Thus an article might be produced, which, judging from the Italian samples, might enter into competition with the Russian product, and, at all events, afford much more valuable cordage than the several (usually considered) inefficient substitutes which are so extensively cultivated in India, and which, imported into this country, sell only for 15 to 20 shillings per cwt., at the same time that the Russian, Polish, and Italian Hemps are selling for 42 to 50 shillings per cwt. "The difference in price would appear a sufficient inducement to attempt the culture of the true Hemp in India, especially as there could be no doubt respecting its growth, as it is already so common in every part of that country,

d requiring, if anything, only a little modifi-
tion of its properties. This could be ensured,
ost probably, by a change in the mode of culti-
tion. Dr. Roxburgh, as long since as the year
00, thought Rohilcund and the neighbouring
lls suited to the cultivation of Hemp. Dr. Royle
s seen it in great abundance, in a wild state, in
e Deyra Doon, and also in the Khadir land of
eSaharunpore district, especially along the upper
rt of the Doab Canal, and where it was chiefly
lued for its leaves, being made into *bhang* and
hjee, and the stems, when dried up, being
rnt for firewood. "There would be little diffi-
lty in cultivating this plant in the low *Khadir*
id, where it is wild; nor in converting it into
erchantable Hemp. For the natives of the
ighbourhood already make use of it partially
r the manufacture of ropes; and the inhabitants
Malabar are said by Dr. H. Scott to employ
e Hemp for making their fishing nets. The
tives of the Himalayas likewise possess the
ant, from which though they prepare an
toxicating drug, which they call *churrus*,
ey likewise value it for its ligneous fibre,
om which they prepare a coarse kind of
oth, which they send into the plains for
aking very durable *grain-sacks*, as well as the
rongest ropes (called *sel*), for crossing their
vers This fact, though not generally known, is
entioned by Kirkpatrick in his account of Nepal,
id was ascertained by General Hardwick, in his
sit to Srinuggur, as well as by Dr. Royle, when
avelling in the Himalayas ('Illust.,' p. 333).
e also obtained specimens of the rope and cloth
hen travelling there. The plant he saw in a
ry luxuriant state at least ten or twelve feet high,
the Himalayas, at elevations of 6000 and 7000
et, especially in the neighbourhood of buffalo-
eds. In such situations and near villages it
ould no doubt be easily cultivated to a great
xtent, and yield a valuable and profitable pro-
uct. "The Hemp could likewise be cultivated
the plains at two seasons of the year; that is,
aring the rainy season, as is now the case, but
kewise along with the cold-weather cultivation,
hich is so similar to that of the summer culture
European countries. But experiments require
be made and specimens procured in order to
etermine which season is most proper for
e culture of this plant in order to yield
emp of the best quality. "Hill people
ight no doubt easily be obtained for preparing
e Hemp according to their own method, and
aching the people in the plains, who are already
actised in the art of preparing *Sunn*. It would,
owever, be desirable to procure, if practicable,
e assistance of some European (and such might
e found among the soldiery) who had seen and
actised the preparation of Hemp in this coun-
y. The several papers sent to the Agri-Horti-
ltural Society of Calcutta, were published in
ol. viii. of their 'Transactions,' and in vol. i. of

their 'Journal.' These were from Majors Swet-
enham and Corbett, Captains Kirke and Huddle-
ston, and from the distinguished naturalist, Mr.
Hodgson. The substance of the last two we
here republish, as containing much of the inform-
ation on culture contained in the others, while
Major Corbett and Capt. Kirke give valuable in-
formation respecting the cost and the expense of
conveyance to Calcutta; which will be immedi-
ately noticed.

Extracts from a Report on Hemp Cultivation, &c., in British Gurhwal, by Captain H. Huddleston, 14th July, 1840.—There are two kinds of Hemp, "*Bhang*" indigenous to the Himalayas; —that called "Khur-Bhunga," or Jungle Bhang, growing wild throughout the whole of these Hills in all situations, and attaining a very considerable height during the season of the periodical rains, is of no use whatever, for the very insignificant quantity of "churrus" (the inspissated juice of the leaves obtained from the plant by rubbing between the hands) does not remunerate even the poorest class for the trouble bestowed upon it, and as it does not yield a fibre that can be turned to any use, I need not of course make any further remarks regarding it. The real Hemp, or cultivated kind, is grown chiefly on high lands, and principally on the northern faces of the mountains, in well prepared and abundantly manured soils close to villages, or in recently cleared lands by burning the primeval forests, the soil of which from the accumulated decomposed vegetable matter of years, is rich enough to ensure the superior growth of the plant and an abundant crop without any manure for one season. No irrigation is ever resorted to, and very little is produced under an elevation of 3000 feet, the heat of the valleys being detrimental to its quality, and the plant appears to flourish best at elevations of from between 4000 to 7000 feet. The middling district situated between the "Pindur" to the north and the "Nyar" or "Samee" rivers to the south, and centrically with regard to the province of Kumaon and Gurhwal may be termed the chief Hemp-producing districts of British Gurhwal. The fields nearest to villages, as being the easiest for manuring, and the culturable wastes with a rich soil of accumulated, rotten vegetation, or recently cleared forest lands, being those in which the Hemp plant is alone cultivated to advantage with respect to its quality. The culture of "Bhang" or Hemp, as practised in this district, is as follows: After the ground has been well cleared and prepared, the seed is sown, towards the end of May, or early in June, at the rate of 20 or 25 *pathas*, equal to about 26 or 33 seers (from 52lb. to 66 lb. avoirdupois) per beesee, which latter is the common denomination now used in Gurhwal, and very near equal to an English acre. During the early growth of the plant the ground is kept free from all weeds, and

the young plants are thinned, leaving a few inches, between each, and until the crop has attained a good height, the ground is kept clean from all rank vegetation—after which it attains to the height of twelve and fourteen feet, and is cut in September and November. Of this cultivated Bhang there are two kinds, the plant called *Goolanya* or *Goolbhanga* which produces seed (the female), and the one which only flowers, but has no seed; and this latter is called "Phoolbhang" (the male), from which the best sort of Hemp is prepared; the plants being cut a month or six weeks earlier, and producing a stronger and superior fibre to the other. On the stalks being cut green, they are dried for several days in the sun, by being piled against the walls of the terraced fields until they become quite brown. The plants have the seed extracted by rubbing between the hands, which produces the "Churrus," and this is scraped off and made into rolls for sale. The leaves also are pounded, from which "Ganjah" and "Subzee" are manufactured in small quantities. When the stalks are sufficiently dry they are tied up into bundles, and steeped for fifteen or sixteen days (eight days, Swetenham) in tanks or running streams, being kept under water by pressure—on being taken out they are beaten with wooden mallets, and dried again in the sun, when the fibre is stripped off from the thickest end of the stalk, and after being again beaten, this fibre is made up into twists for sale and manufactured into sackcloth for wear, bags, and ropes. The total money return from the produce of the cultivation of the Hemp plant would be considerable, if there were any demand for exportation, though the average return even now is amply remunerating to the grower, and were it not from the well-known dislike which the Hill people have to extra labour, it would be more extensively cultivated than it is. The limited cultivation at present, however, supplies the wants of the population for sackcloth, bags, and ropes, nearly the whole of which, in considerable quantities, is consumed in the district—the lower classes of the Gurhwal population dressing themselves in the cloth manufactured from the Hemp, and this still encourages the cultivation in a great measure. The average return per beesee (or English acre) may be stated as follows:—three seers (6 lb.) of churrus, value Rs. 6 (or twelve shillings); four maunds (or 320 lb.) of Hemp, value Rs. 8 (sixteen shillings); and about thirty to thirty-five seers (60 to 70 lb.) of seed, yielding about five seers (10 lb.) of oil, value R. 1 (two shillings). Giving a total of Rs. 15 per beesee. The seed sells generally at 20 *puthas* per rupee, or from twenty-seven to thirty seers (as this wooden measure varies in different places) and the seed being light, I have found that the average weight of each patha is about one seer and five chittacks. The Hemp sells at 2 rupees a maund amongst themselves, and the Dooms (or lowest class of the agricultural community) are the chief cultivators of the plant. When Dr. Rutherford held a contract for the supply of Hemp to the Honorable Company, and also made extensive purchases of it with other staple articles of produce of the Hills on his own account, the cultivation of Hemp was very considerable indeed in this district; and in case of any demand being again created, immense tracts would no doubt be sown with it, provided the same plan of advances to cultivators were adopted. The plan adopted by Dr. Rutherford appears to have been thus: advances through his agents to the landed proprietors and individual cultivators were made during the early part of the year, stipulating for the Hemp being delivered at their own doors at 4 rupees a maund, and the carriage during the cold season to the marts of Kotedwarra in Gurhwal, and Chilkeea in Kumaon at the foot of the Hills (where Goomashtas or agents were ready to receive the Hemp), being defrayed extra—which did not, I imagine, on an average exceed a rupee a maund—so that the raw material was and is capable of being delivered at those marts for 5 rupees a maund; and as only a few miles further of land carriage would be required to ship the Hemp into boats on the Ganges or Ram Gunga for transit to Calcutta, this would not, I should think, double the cost of it.

Hemp Cultivation in Nepaul, by H.B. Hodgson, Esq. Mr. Hodgson states, that the cultivation is peculiar to the Northern districts of Nepaul, but only, as he suspects, because the tribes inhabiting them are less scrupulous than the people of the great valley, and other Central and Southern tracts; for, at least in the valley, the plant flourishes greatly, if properly tended, as Mr. Hodgson has proved in his own garden; and the spring crops of the valley are almost choked with *spontaneous* growth of Hemp, which, however, being uncultivated, is stunted and virtueless. The Northern districts (popularly called Cachar) are nevertheless the prime seats of culture, and there alone is the plant manufactured into rope or cloth; though the edible extracts are sometimes prepared nearer to and around Katmandhoo. The season of sowing Bhang seed in Nepaul is from Chyett to Bysack (March to April). Damp soils, comprising black earth, are fittest for this crop. Before ploughing the field, sufficient manure is to be sprinkled over it, then completing the work of the plough, the seeds are to be sprinkled, and having broken the clods into dust, the field is to be made even. In seven or eight days after sowing the seeds, the plants came up, but their rapidity of growth and their size and strength depend on the abundance of the rains or artificial watering. If the plants be very thick, they must be thinned, so as to stand

three inches distance from each other. They flower and fruit in Sawun (July); and at the beginning of Bhadoon (August) are in their full growth; but while yet succulent and in flower, they are to be cut, with the exception of some seed plants, which are not to be reaped till October. It is the bark of the young but full-grown or Sawun plants, which is soft, that is used for making Bhangela. That of the old or October plants is hard and not suitable for manufacture. After the plants have been cut off at the ground, they must be placed in the sun for eight or ten days or until they be dried sufficiently. They must then be steeped in water for three days, and on the fourth day the plants must be taken out of the water and peeled. The peelings are to be washed and put in the sun; and when quite dried, they are ready for manipulation. They are then to be torn into thin threads with the nails of the hands; next twisted with a spinning-wheel (Tikuli) and when the threads are thus prepared, they are to be boiled with ashes of wood and water in a pot, for four hours, and to be washed again for the purpose of whitening. This is the way of preparing Bhangela thread, out of which blankets are woven. One *mana* (half a kutcha seer) of seed is sufficient for a ropini of land (one fifth of Badshahi bigah), which produces ten or twelve loads of bhang. Hemp grows equally well on slopes or flats, and near the tops as well as on the sides of the mountains, if not too low. But a moist rich soil is indispensable. The plant attains to a height of eight to ten feet, and should be cut when the flower is falling and the seed forming.

Hemp Culture in the Plains of India.—Though the production of Hemp in the Himalayas, and in the low lands at their foot, is chiefly contemplated, that of its culture in the plains may also be mentioned. This was attempted by Dr. Roxburgh, and though probably in the least favorable situation in India, yet with some success; as he observes: "In many parts of Bengal, particularly where the land is so low as to remain humid through the dry season, Hemp thrives luxuriantly during the cold season; at Soonamooky it did well on a sandy soil, manured with dung from stables. Prolonged immersion much injures the quality of the Hemp, the rainy season is therefore preferable for the cultivation and maceration of the plant, and we must content ourselves with one crop in the year, for it is a very false, though prevailing notion, that the fertile fields of Asia produce at least two crops annually. The burning heats of Asia, while they last, are as unfavorable for vegetation as the frosts of winter are in Europe." And in Wisset it is stated: "A native, who had an opportunity of observing the mode of cultivating and preparing the Hemp raised by Mr. Douglas, at Rishera, has offered to the Board of Trade to contract with them for supplying a very considerable quantity, I believe 500 maunds (about 17 tons), of properly dressed Hemp next season, at the rate of ten sicca rupees per maund (this is equal to 300 sicca rupees, or, at 2*s.* 6*d.* = £35 per ton, and at 2*s.* = £30 per ton). The next important notice which we have respecting the culture of Hemp in the plains of India, is from Mr. Deneef, and of and from whom we have the following communication: Sample of Hemp grown and manufactured in Bengal, after the manner pursued in Belgium. Presented by Mr. H. Woollaston, on behalf of Mr. G. Deneef, Belgian farmer. Monsieur Spry, Secretaire de la Societe d'Agriculture et d'Horticulture du Bengale, Calcutta, Oc. 8, 7630, 1840. J'ai l'honneur de vous envoyer par l'entremise de Monsieur Woollaston, membre de votre Societe, un echantillon de chanvre, qui me semble meriter beaucoup d'attention, il me parait aussi avantageux qui le chanvre de Russie et de Manille qui se vendent a Londres £22 a £27 le tonneau. La manufacture en est tres simple et n'exige pas aucun instrument, elle est faite en Belgique par des vieillards et des enfants. Aucun ouvrage ne saurait etre plus convenable pour les bras inactifs des familles pauvres de cette contree, il n'est nullement fatigant et se fait par assis; de plus, chaque livre de chanvre, procure au teilleur 3 lb. de matiere a bruler. La preparation du sol ne demande pas de grands soins ni par consequent de grandes depenses; sa vegetation est superbe, la plante n'occupe le sol que pendant 80 jours (du commencement de Juin, a la fin d' Aout). J'en ai a peu pres 4 beegas, qui me donneront environ 1000 lb. de fibres, que je prepare en ce moment; et que je me propose d'envoyer le plutot possible, pour echantillon, a la Societe experimentale du Lin a Londres, et apres en avoir recu une reponse, concernant sa valeur reelle; je m'empresserai de vous envoyer un rapport exact sur la mode de sa culture. Il serait etonnant que l'Inde, qui a tant de moyens en terrain et en hommes, ne pourrait pas concourir avec la Russie, qui est obligee de payer £2 0 0 par tonneau frais d'exportation au gouvernement Russe meme, et 6*s.* per tonneau au passage qu Sond, et ne pourrait reclamer sa part, des millions d'especes, que la mere patrie est obligee de payer annuellement a la Russie sa puissante rivale. J'ai l'honneur de vous saluer avec la plus parfaite consideration, Votre tres devoue serviteur, G. Deneef, Belgian Farmer. The Hemp produced by so little labour and care, and which only occupied the ground for eighty days from the beginning of June to the end of August, according to Mr. Deneef, was pronounced good by the members of the Flax and Hemp Committee; by Mr. Fergusson, as "uncommonly strong, and if it can be produced cheaply and abundantly, it is likely to be a most important article." Mr. Hodgkinson, who doubted of its being the true Hemp—though without sufficient grounds,

pronounced "the article as superior, be it what it may, and deserving of the first attention." With respect to the interchange of seed, or to the kind which is most desirable, we have the following fact, though it is probable that some of the Himalayan seed would answer equally well. A few fresh stalks of Hemp raised from Russian seed were received from Dr. Royle, and corresponding specimens of the indigenous Hemp plant of Bengal. *Presented by Mr. Deneef.* The superiority of the former in texture was very apparent." In treating of both Flax and Sunn, mention was made of Mr. Sconce's experiments with both of these plants at Chittagong, in the year 1843. He at the same time grew some Hemp from country seed (*gonza*) sown in November. Of the fibre, the Hemp and Flax Committee reported: The Fibre is exceedingly strong and clean, but the admixture of Tow spoils the appearance and deteriorates the quality; while of the dressed Hemp it was said, that some of fibres were strong, others weak, and as only partially heckled. These defects, being those of management, might easily be remedied. From the far Southern we proceed to the North-Western provinces; here the late Mr. Bell, of Agra, on hearing of the above experiments in Bengal, writes, that there "can be no difficulty in the cultivation of the *bhang* or *ganja*, which is now sown only for the intoxicating drug the natives obtain from it; but the vigour the plant shows, and the height it reaches when thus sown, much scattered to admit of its throwing out its branches, satisfied me that, sown more densely, it would at least run the height of Sunn, and this I suppose sufficient for the desired length of fibre in the Hemp." There is no doubt that the Hemp plant will grow to a great height even in the plains of India. Dr. Royle received a letter from his friend, Capt., now Sir Proby Cautley, dated from Saharunpore (10th Aug., 1840), stating that the Hemp was in cultivation in the Botanic Garden, and looking as fine as any that he had ever seen, nearly twelve feet high, with a natural healthy look of dark green. Dr. Falconer, however, afterwards reported that the Hemp fibre did not retain the strength or flexibility which characterise it in the Himalayas. But Dr. Royle has been informed that they are able to use some of the Hemp growing spontaneously along the part of the Himalayan base, for the general purposes of cordage. The Hemp growing in the Goruckpore district at the foot of the Hills, is considered of good quality, and some was sent to Britain on purpose to have its properties tested. It is probable that Mr. Williams might succeed in the cultivation of Hemp in the soil and climate of Jubbulpore.

Quality and Cost of Himalayan Hemp.—From the account which has been given above, by local officers, of the cultivation, and the other testimony which we have respecting the plant, there is no doubt that the Ganja of the Himalayas is the true Hemp plant of Europe (the *Cannabis sativa* of botanists). As the plant has ceased to be as extensively cultivated as formerly chiefly from the want of any external demand, there would seem to be no difficulty in again increasing the culture, and to a still greater extent, if this requisite for all culture was again restored. The only questions which remain to be determined are the quality of the Hemp and the cost at which it could be conveyed to Indian ports, where, if not required for export to Europe, it could be beneficially employed for naval and other purposes. This would be preferable to their continuing, as in some places is still the case, to import Hemp and Tow from Europe, when India produces at least as good, if not a superior article, and at a cheaper rate. This is evident from the following abstract of the information on the subject. "In the Himalayas the Hemp grows wild, and is, moreover, carefully cultivated, both on account of its exhilarating secretions, and its strong and flexible fibre. With the properties of this the Hillmen are well acquainted, as they make with it both twine and rope, and a coarse cloth (*bhangela*) with which they clothe themselves, as well as make sacks and bags. Their hempen wrappers they wear much as a Highlander does his plaid, fixing it in front with a wooden skewer, instead of a brooch. A traveller in the Himalayas, some years since, described the natives as applying Hemp 'extensively to purposes of a domestic nature, such as hanging their supernumerary female children, administering rope's end to their wives, penning up cattle, and making a sort of netted, or knitted, or knotted shoes, to which a sole of untanned leather is sometimes, but by no means generally, affixed.' "The culture seems to be very well understood in most parts, though the best methods are not always practised either of planting, or of picking, or of preparing their Hemp. All along the Himalayas—that is in Nepaul, in Kumaon, in Gurhwal, and up to the newly acquired hills of the Punjaub, at elevations of from 3000 and 4000 to 7000 feet —Hemp is cultivated by the Hillmen, though chiefly for their own use, the plants growing to eight or ten, some say twelve or fourteen, feet in height. They sow about the month of May, carefully prepare, and usually manure the ground, weed and thin the plants to within three or four inches, and cut the male plants, '*phoolbhanga*, which flowers, but has no seed,' a month or six weeks before the female plant, '*goolanga*, or *goolbhanga*, which has seed,' the latter being harvested about the end of September. The stems, when cut down, are dried in the sun, and then steeped in water for three or more days. Beaten with wooden mallets, the fibre is then stripped off, and again beaten. In some places it is said to be boiled with wood ashes—that is,

potash,—and sometimes bleached before being spun into thread. The stalks are made into torches. The culture is described to be the most profitable of any, as the *churrus* and *ganja*, different forms of *bhang*, are said of themselves to pay the expenses of culture. The Hemp they sell among themselves for Rs. 2 a maund—that is, 4s. for about 82lb. The seed is even roasted and eaten, or expressed for its oil, and the oil-cake given to their cattle. The culture is not much extended, for it is more laborious than they like, and there is said to be a prejudice among the Brahmins and Rajpoots against the cultivation of this plant, which is therefore confined to the Doom class. But there is no doubt that the culture could be immensely extended if the inducements of price were greater." There being no doubt of this being the genuine Hemp plant, the next point to ascertain is the quality of the fibre which the natives produce with their own unaided efforts. On this point the information is most satisfactory. Mr. Hodgkinson, a Calcutta merchant, who was well acquainted with this staple, and had personal knowledge of the produce on the Continent, pronounced some Hemp sent from the Deyra Doon to be "equal in colour, cleanness, length, and strength to the best Russian. Mr. Deneef, a Belgian farmer, sent to India by the Flax Experiment Company, said: "Ces echantillons sont de vrai *Cannabis sativa*, pareil a celui du nord de l'Europe. J'ai ete enchante de voir une si charmante vegetation de cette plante produite dans l'Inde; mais cet article n'est pas preparé comme on le desire dans les marches Anglais; d'abord chanvre male et chanvre femelle ont ete coupes ensemble, et ensuite dresses dans l'etat humide d'apres la methode des Indiens. S'il etait dresse a la maniere des Europeens du nord, qui consiste a tirer le chanvre male, cinq semaines avant celui qui produit la semence, a ne rouir que bien peu chaque genre separement, la chanvre male ne pouvant pas sejourner dans l'eau aussi longtemps que l'autre; ensuite a ne le dresser que quand il est bien sec et lorsque les fibres se separent aisement; il formerat une belle matiere premiere pour les cordages solides. Au contraire, dresse et rince dans l'eau il perd'une certaine graisse qui lui est naturelle, et qui est cause que la poix s'imbibe plus facilement avec lui, ce qui le rend fort contre la pluie et la chaleur, et fait en meme temps benefice du manufacturier, qui sait si bien distinguer la difference de la preparation." [In preparing Hemp for the European market, care should be taken not to twist or tie the ends together, but having laid the fibres parallel to each other, simply to tie them together near the thicker end, so as to form *heads*, as seen in Peterburgh Hemp.] ('Journ. Agric. Soc. of India,' *i*, p. 46.) Some specimens of Hemp from the Himalayas recently tried in this country have been found to bear a greater weight and strain than the best Petersburgh Hemp. Some of it is also very fine and soft, more like Flax than Hemp. There is little doubt, therefore, of the good quality of this Hemp, even without any improvement from European instruction. It is a not less important point to ascertain the price at which it could be brought to this country. In the 'Journal of the Agri-Horticultural Society of India, (vol i, p. 45), may be observed a memorandum by the late Lord Auckland, when Governor-General of India, in which it is stated:

Prime cost of Hemp at Deyra, Rs. 54 per ton, ...	£5	8	0
Carriage to Calcutta (about 1000 miles) Rs. 25 per ton, ...	2	8	0
Total cost and charges of Hemp at Calcutta, ...	£7	16	0
Prime cost of Hemp seed at Deyra Rs. 36 per ton, ...	3	12	0
Carriage to Calcutta, Rs. 24 per ton,	2	8	0
	£6	0	0

Though the above are deduced from the rates at which the natives sell Hemp and Hemp seed among themselves, large quantities could not be obtained at the above prices, for the natives would not extend their crop, or take much trouble in preparing it for market, unless some greater inducements were held out to them. Others, therefore, have calculated that the price of the Hemp might be doubled to the natives, and that one rupee more should be given for their bringing it down to the foot of the hills, whence it could be readily conveyed to the Ganges, either from Kemaon or Gurhwal, or from Sirmore it the Jumna, and from the Kangra Hills to the Sutlej. Therefore Capt. Kirke calculated the cost of 500 maunds of Hemp from Deyra Doon, a valley within the Himalaya, to be about Rs. 2500; carriage on bullocks to the Ganges (but carts have been much introduced since then), Rs. 125; a 600 maund boat from Sookertal, Rs. 130; together Rs. 2755; this, with the addition of ten per cent for contingencies, making the total cost to Calcutta. Rs. 3080 for 500 maunds of Hemp, or for something more than seventeen tons, or about £17 14*s* a ton in Calcutta. Capt. Kirke's memorandum further states that 22½ feet of the fine sailcloth which he forwarded could be bought for 9½ annas; 88½ feet of the coarse sackcloth for six annas; 20 seeds of the rough Hemp for one rupee; and 20 seeds of the Hemp seed for one rupee. Major Corbett gives three calculations of the cost of Hemp from

the district of Kemaon to Calcutta, all expenses included:

From Kotedwarra, 37 tons, £661-	£17	17	per ton.
„ Chilkeea	13	15	„
„ Sunea	13	4	„

He also sent some Hemp cloth or canvas made in the Hills, which was 7¼ yards long, and 22½ inches wide, of which the price was one rupee. The above facts being sufficiently favorable, both respecting the quality and the cost of the Himalayan Hemp, and Dr. Royle having been informed by good practical judges that the best plan to make the peculiar qualities of any of these Indian fibres known to manufacturers here would be to have a few tons of each sent into the market for two or three years, he was induced to recommend that this should be done with the Himalayan Hemp. "As it is quite practicable to give an impulse to the growth of Hemp in the Himalayas, and as the price is so moderate and the quality so good, I believe it might be established as a regular article of export from India, or, at all events, of consumption in the dockyards of that country. I would therefore suggest that the local officers of the districts of Kemaon, Deyra Doon, Sirmore, and Kote Kangra (more properly Kooloo), should be authorised to purchase certain quantities of the Hemp (say from 5 to 10 tons), and send it down to Calcutta, for transmission to and sale in the markets of England, taking care that while they give sufficient encouragement to the cultivators, they do not so far increase the cost, either by raising the price or by enhancing the expense, as to interfere with its subsequent profitable sale by merchants. It is probable that the Himalayan Hemp would sell in England for £35 a ton." Dr. Royle has lately received a letter from Dr. Jameson, dated 6th Nov., 1854, referring to this fibre, and also to the order which had been sent by the Court of Directors to India for the purchase of some of this Himalayan Hemp, in order to make it known in the markets here. He states that the Civil Authorities had "issued orders to purchase ten tons of the Hemp grown in Gurhwal and Kemaon, which they were procuring at the rate of from Rs. 4 to Rs. 6 per maund, or £10 16*s.* to £16 4*s.* per ton. Carriage to Calcutta will cost about £5, and to England, with the other incidental charges, say £10 per ton [Mr. Henley (*v.* p. 86) estimates all such charges at £7 a ton] more, which will bring the article up to £25 16*s.* to £31 4*s.* Of course, when it is exported on a larger scale the price of carriage will be greatly decreased." "This country possesses immense advantage in abundance of land, &c., and the Calcutta and Bombay merchants could always have their Hemp to ship in December." With regard to the quality of the Hemp he observes: "Moreover, the Hemp grown in our mountains and in the Doons (valleys) is far superior in strength to the Russian samples of Russian Hemp which have been sent by the Court of Directors. On showing these to the Puharee (Hill) growers of Hemp, they declared that were they to produce such an inferior article it would scarcely find a sale." The specimens were obtained from one of the most respectable houses in London, and bought for their own use. They were sent for the purpose of showing how the Hemp of commerce comes into market, instead of being twisted, tied, or platted, as is much of the fibre from India. But if the Himalayan Hemp generally resembles that which has been referred to as from Kangra, no Russian Hemp will come near it in point of strength. The essentially good qualities of the Hemp grown in the Himalayas, consisting in the strength, divisibility, fineness, and softness of the fibres of much of what is grown there, will make it, when known, very desirable for many purposes. That grown at the lower elevations is also possessed of considerable strength, as proved from the experiments made on a 2-inch rope in the Master-Attendant's office at Calcutta. The results given in the accompanying table (p. 332) are a portion of an extensive series of experiments, undertaken in the year 1840, in compliance with the orders of the Marine Board, dated 7th October, 1839. The samples of Deyra and Arracan Hemp were forwarded for experiment from the Agri-Horticultural Society, and were laid up in a 2-inch rope, in November 1841, but the experiments were interrupted by the death of the Master-Attendant, and these samples were not submitted for trial till the 18th of December, 1844, so that the rope was three years old. At the same time, the small samples of *jetee* (*v.* p. 304) were tried. It will be seen from the abstract, that amongst the thirteen samples of the 2-inch rope, the Deyrah Hemp stands the fifth in strength and the twelfth in elasticity. ('Journ. Agri-Hortic. Soc.,' iii, p. 227.) Further details are given in other tables, at pp. 224-25 of the Journal. But Hemp of far greater strength is produced in these, which are probably the native hills of the plant. Mr. Williams, of Jubbulpore, gave to Dr. Royle, in the year 1858, a sample of Hemp, which he stated had been forwarded to him by D. F. Macleod, Esq., as the produce of Kote Kangra, in the Sikh Himalayas. This Dr. Royle has, in his Lecture and Experiments, as well as in communications with various individuals, called Kote Kangra Hemp. It is the fibre which is mentioned as not breaking with a weight of 400 lb., when China-grass from Assam broke with 320 lb. and Petersburgh Hemp with only 160 lb. It has, moreover, appeared to all the practical men who have since then examined it, as the strongest fibre with which they were acquainted.

Abstract of Report of Proof of Moorgahvi, Arracan, Deyra, and Jetee Rope, compared with Europe, Manilla, New Zealand, Sunn, and Coir Rope, in the order of Strength and Elasticity.

Number of Sample.	STRENGTH.				ELASTICITY.			
	2-inch Rope.		1½-inch Rope.		2-inch Rope.		1½-inch Rope.	
	Names.	Weight at which broken.	Names.	Weight at which broken.	Names.	Length stretched before breaking.	Names.	Length stretched before breaking.
		lb.		lb.		Inches.		Inches.
1	Manilla, (white,)	2731	New Zealand, ...	2231	Sunn, (white,).....	17½	Coir, (plain,)...	32
2	Sunn, (ditto,)	2679	Europe, (1839,)	1967	Ditto, (tarred,).....	13⅝	Jeetee,.....	15
3	Europe, (Pat,)	2655	Ditto, (Pat,)	1743	Manilla, (tarred,).....	13½	Sunn, (white,).....	13½
4	New Zealand, ...	2591	Sunn, (tarred,)	1703	Moorgahvi, (white,)...	13	Manilla, (white,).....	13
5	Deyrah, ...	25[illegible]	Ditto, (white,).....	1607	Manilla, (white,).....	11½	Sunn, (tarred,).....	11½
6	Europe, (1839,)	2463	Manilla, (tarred,)	1463	Europe, (1839,)	10⅝	Europe, (Pat,).....	10¼
7	Sunn, (tarred,)	2239	Ditto, (white,).....	1431	New Zealand, ...	10½	Moorgahvi, (tarred,)..	10
8	Arracan, ...	2231	Europe, (twice laid,) .	1214	Europe, (Pat,).....	10⅓	Ditto, (white,).....	9½
9	Manilla, (tarred) ...	1712	Jeetee,.....	903	Moorgahvi, (tarred,)..	9½	Europe, (1839,).....	9½
10	Europe, (twice laid,).	1351	Moorgahvi, (white,...	875	Arracan, ...	9	Manilla, (tarred,).....	9
11	Ditto, ditto,.....	1295	Europe, (twice laid,) .	871	Europe, (twice laid,)..	8⅔	New Zealand, ...	8
12	Moorgahvi, (white,)...	1175	Coir, (plain,)	823	Deyrah, ...	7½	Europe, (twice laid,)..	6½
13	Ditto, (tarred,)	1063	Moorgahvi, (tarred,)..	711	Europe, (twice laid,)..	7	Ditto, ditto,.....	6

Master-Attendant's Office,
30*th December*, 1844.

A. B. CLAPPERTON,
1*st Assist. to the Master-Attendant.*

Dr. Jameson, in the above letter, observes, with regard to the so-called Kote Kangra Hemp, that he himself had brought it to Mr. Macleod's notice, and that it was not produced in the Kangra district, but in Kooloo and Lahoul, which are a little farther in the interior. Before concluding, we have to detail the method of cultivating and preparing Hemp in Europe, in order to contrast them with the practice of the East, and for the information of those who may wish to cultivate it in this country. We are indebted for the directions to some of the most approved writers on the subject, and have contrasted them with those of Mr. Rowlandson in his paper in vol. x of the Journ. of the Royal Agricultural Society.'

Culture and preparation of Hemp in Europe.—Hemp being one of the few plants cultivated in Europe, which has the male and female flowers in different plants, affords some anomalies in its culture, especially that of having two harvests in the same crop. In some older works the male is frequently named the female plant, and *vice versa*.

Soil.—The soil, in which Hemp thrives, is a deep rich, moist soil, five or six inches deep; besides the alluvial, where sand and clay are intimately mixed, and having the above characteristics, also the friable loams, which contain much vegetable matter. All should contain a fair portion of sand, as this keeps the soil open and light for the roots to spread in. Hemp thrives well in Holland and Lincolnshire. Stiff, cold clays are unsuitable, for even if the plant should grow well, it is not easy to pull it "for when strong clay becomes saturated with rain, the soil runs together and on drying sets as hard as a pavement." If the soil be over-rich, the plant grows too luxuriantly, and produces a coarse but strong fibre. But Hemp is sometimes sown in such soils to meliorate them for the cereals, which would otherwise run too much to straw. But as many soils are too poor, they require to be raised to a suitable state by the addition of manure; and with this, it is said that Hemp may be grown in the same soil for many years. When a fine quality of fibre is required, of course, only the most suitable soil should be selected, or that in which the growth of the plant is neither excessive nor stunted. In Italy, Hemp is sown in their best lands, which are rich and strong loams, and made fine and friable. In Romagna, where the best Hemp is produced, they say it may be grown anywhere with manure. In the Himalayas, Dr. Royle has seen the Hemp growing most luxuriantly in the neighbourhood of bullock sheds, and producing fibre of great strength. In India, spots near the habitations of natives are the best adapted for the growth of Hemp; but in these they generally grow Tobacco. At Soonamooky it grew luxuriantly in sand, which was manured with stable-dung. Hence, Hemp grown in the plains will be dearer than the other fibres.

Culture and Manure.—But the richness of the soil, and the quantity of manure required must vary, not only according to the nature of the soil and its requirements, but also to the warmth of the soil and the nature of the climate. Warm, moist ones

require less than cold, whether dry or moist climates. In England, Mr. Rowlandson says, the generality of soil will require a dressing of ten tons of well-rotted farm-yard dung per acre, ploughed and harrowed in, early in April. He quotes an extensive grower, who says twenty-five tons of well-rotted, mixed stable and feedings-shed manure, should be applied per acre. The land should, of course, be in the first instance well ploughed and properly drained; also, well harrowed and rolled, to get the top-soil into good tilth; and weeds, as horse-mint, or twitch, destroyed. The manure must be carefully and evenly spread, and the plough follow close to the spreader.

Seed.—Of seed, that from Holland is the most esteemed, ripens soon, yields abundant crops, and of a fine quality; but well-grown English seed is also of good quality. Indian seed, from external appearance, appears fine; but may not be so well suited in the first crop for fibre; but the Himalayan seed, both from its appearance and the nature of its produce, is probably inferior to none, and perhaps only requires interchanging with different districts. The seed should be of a bright, grey colour, and plump: and must not have undergone heating in any way, and therefore the taste, when bitten, should be sweet, and not bitter or acrid. The quantity of seed may vary from two to two and a half, others say to three bushels an acre. The last, if a fine fibre is required for weaving into cloth. But the larger quantity cannot be sown on very rich soils. The thicker it is on suitable land, the finer it will grow. The fresh ploughed land should be sown very evenly, care being taken to scare away birds. The best time for sowing, in England, is from the 1st to the 15th of May; but it is sown even in June, as frosts are apt to injure the young plant; but late-sown plants are apt to grow thin and weak.

After-culture.—Hemp seed is sown both broadcast and in drills. When grown on account, chiefly, of the seed, it is sown thin. Sinclair says, by sowing Hemp in drills, a coarser and stronger bark or fibre, fit for cordage, will be produced, and a less quantity of seed is required than by sowing it broadcast. This latter mode is to be preferred, when Hemp is wanted for textile purposes. The stems rise slender and fine, according to their proximity; but they require to be weeded or hoed out to within a foot of each other, and may require a second hoeing, to destroy weeds; but in general the Hemp will, itself, smother all weeds, except in the spaces between drills. During its season of rapid growth, the plant necessarily requires moisture, and therefore, in some countries, irrigation is practised.

Pulling.—As already observed, Hemp has usually two harvests; but when grown on account of the fibre only, it may be pulled when in flower, and no distinction made between the male and female plants. But as it is usually desirable to get both the seed and the fibre of both plants, the male plants, or *white Hemp*, are pulled as soon as they have shed their pollen, usually about thirteen weeks after they have been sown. They may then be easily recognised by their leaves becoming yellow, and the stem of a whitish colour, and the flowers faded. Each plant is pulled up singly by the root, care being taken not to break or cramp the stem in the hand. The ripeness of the female plant is known not only by many of the same signs as those of the male, but also by the seeds beginning to turn of a grey colour, being firm inside, and some of the capsules to open. This is generally about Michaelmas in England. When the seed has become perfectly ripe, the bark is apt to become woody and coarse, and to separate with difficulty. But the seed which is required for sowing, ought to be taken from plants allowed enough of room to spread and then to fully ripen their seed.

Drying.—When the plants are pulled, it is recommended to hold the root end uppermost, and with a wooden sword dress off the flowers and leaves, as they assist in manuring the land. They are then bound in small bundles with bands at each end, of such a size that you can grasp with both hands, or sometimes into bundles of twelve handfuls each, and arranged along the borders of the field. If not done before, with a fork knock and shake off the soil from the roots, and scrape off the undergrowth of leaves. It is then set up like wheat in shocks, for a week or so. The stalks which form each handful should be as nearly as possible of an equal length, and the roots in particular should be placed as even as possible. If the crop is kept till spring, it is tied in larger bundles, and stacked and thatched.

Gathering Seed.—When the female Hemp is gathered, it is allowed to stand eight or ten days in the air, to allow the seed to dry and ripen; the tops being covered with undergrowth, to keep off the birds. After which, they cut off the heads, or gently beat out or thrash them to get out the seed, on a cloth. Care must be taken in conveying the bundles of seeded stems, as by passing a rope round the bundles and under the heads, and dragging the rope over the shoulder. The seed which remains after this operation, is got out by combing the heads on the teeth of a ripple; but the seed is inferior to that which first falls out, and is unfit for sowing. The female plant is generally stacked during the winter, and not steeped till the spring.

Drying.—When the Hemp has been pulled, it ought, according to some authorities, to be dried in the sun for one or two days, but Du Hamel observes, that it is a matter of doubt whether the plants should be dried before it is steeped; so Mills, in his 'Husbandry,' like the

natives of India with their Sunn (*v.* p. 274), thinks that this drying appears needless trouble. So Marcandier directs, that when the Hemp is perfectly ripe, it must be put into the water as soon as it is pulled out of the ground; and Sinclair says, that Hemp should be watered as soon as possible. In this state, it is said to require only four days, but, when it has been dried, eight days of steeping. The time must, moreover, depend a good deal on the temperature of the water.

Steeping.—The steeping of Hemp, called *Water-retting*, is a very important part of its preparation, and is to be distinguished from another method, which is called *Dew-retting*. The steeping places are often only ditches, three or four feet deep, varying in breadth and length, dug for the purpose on the margins of rivers. The bundles of Hemp are laid at the bottom of the water, and covered with straw, and sometimes with sods, and loaded with pieces of wood and large stones to keep them down. The object, as in the case of Flax, is by a slight degree of fermentation to enable the epidermis, or outer skin, to separate readily from the bark, and this from the boon or reed. This is readily ascertained, by taking out one of the steeped stems and holding it by the root end, and drawing the thumb-nail up the stem to the top. If the fibre slip up the stem, it is a proof that it has been sufficiently retted. Du Hamel, having steeped Hemp in different sorts of water, observes, that the fibres steeped in putrid standing water were softer than those which had been steeped in running water. But in water which does not run, the fibres contract a disagreeable colour: they are, however, notwithstanding this, easily bleached; it is desirable, however, to make a small stream of water pass through the steeping place. Du Hamel, referring to the common opinion, that Hemp intended for fine cloths should be retted more than that for coarse cloths, and that for making of ropes should be steeped least of all, observes, that though there may be some truth in this, it is in vain to hope greatly to improve, by this process, fibres which are naturally coarse. A fine fibre cannot be obtained without the concurrence of soil, of seasons, and of climate, the mode of sowing and of culture, and the degree of ripeness.

Drying after Watering.—When the Hemp is sufficiently retted, it is taken carefully out of the water, and then carried to a field of aftermath or any other grass (hence called *grassing*) that is clean and free from cattle. Here it is spread out very evenly, and will probably require to lie there for three weeks or more, in order to bleach and the fibre to become free; during which time it must be carefully turned over, with light long poles, every three or four days. Mr. Rowlandson says it is sufficiently bleached when pink spots appear on the stem. It is sometimes dried along a wall, or on rocky ground, and sometimes artificially, in ovens and kilns. When dry, the Hemp is tied up in bundles again, and carried to the barn or rick.

Peeling and Breaking.—When the Hemp is sufficiently dried, the next process is either to *peel* it, by taking one stalk after the other, breaking the reed, and slipping off the bark. The process is simple but tedious, and will give occupation to those who are without any. But it comes off in ribbons, which do not heckle so well as Hemp that has been broken, and they are apt to retain some of the thick parts next the roots, hence the saying, that this mode is better for the seller than the buyer. The term of breaking or braking Hemp, applies rather to the boon or reed than to the fibre, for this only bends under the hand of the dresser, and does not break. The operation is performed either by beating the Hemp, which is a laborious and tedious work, or by the break, which may be moved either by hand or by a spring or treddle attached to the upper jaw of the break, or by fluted rollers, worked by horse-, wind-, or water-, and now sometimes by steam-power. When Hemp has undergone the process of breaking, it is ready, like Flax, for the process of scutching, in which scutching mills are now used, as in the case of Flax. By rubbing, beetling, and striking the Hemp with reiterated blows, the longitudinal fibres are separated from one another, and in proportion to the greater or less degree of that separation the Hemp becomes more or less fine, elastic, and soft to the touch. (Du Hamel.) *Dew-retting* (p. 199), Mr. Rowlandson says (l. c., p. 186) will produce the most valuable white Hemp. The stems, after being pulled, are allowed to stand in the stooks for two or three days; they are then spread out on land where the grass is plentiful, and may require to be there for six weeks, and to be frequently turned. The process will be completed when the pink spots appear, as before noticed, which must be carefully looked for, when it will be ready to gather and tie up in bundles, to form stooks, in order to dry; the fibre will not sustain any damage before the pink spots appear. *Snow retting* is practised in Russia and Sweden. After the first fall, they spread the Hemp (which has been dried in the sun or otherwise) on the snow, and leave it there to be covered with other falls of snow, until spring, when it is usually found to be sufficiently retted. (Wisset, p. 194.) In Livonia they steep their Hemp in a manner which is a medium between still and running water, in a series of basins, one above the other, but as has already been observed, the French, for whom this information was originally obtained, do not avail themselves of it. (*v.* l. c., p. 204.) In addition to the ordinary methods of preparation of Hemp, we may briefly refer to others, most of which, however, have in improved forms been already noticed under the head of Flax. The Abbe Brulles re-

commended the use of soap in the proportion of one part to forty-eight of water, at a temperature of about 200° F., and the water to be about forty times the weight of the Hemp. Du Hamel tried boiling the Hemp stems in water, but he did not find that the peeling was facilitated. Marcandier recommended a second watering, and also the use of a warm alkaline ley (l. c., pp. 243 and 245). But as we have seen the use of hot water successfully applied to Flax in recent times, and soap has been used in several processes, and in a very ingenious manner in one which we omitted to notice,—that in which a little acid is afterwards added, so that decomposition takes place, in consequence of the acid uniting with the alkaline base, when the oil which is set free assists in softening the fibre. In the article on Sunn we have already referred (p. 276) to a peculiar method of drying, to which the Livonians are said to ascribe the good or bad quality of their Hemp. The stems are first set up to *drain*, and then spread out for a day to *dry*; after which they are made up in heaps, and covered over with straw, or other similar material of any kind, to make them *sweat*. When they have sweated *enough*, they are laid again in small heaps, so that the air may dry them in the shade by blowing through them; after which they are next effectually dried by fire, kiln, or oven, and immediately put under the breakers whilst yet hot. It is probable that this method, when skilfully practised, must produce some of the same effects in Hemp as in some other vegetable substances. Mr. Frushard observes, with regard to the natives of India: "The reason why their tobacco falls so much to dust, is owing to its not being *sweated* enough. When properly *sweated*, as they manage it in America, it becomes tough like a bladder; and toughness and suppleness are the qualities wanted in Hemp." (Wisset, p. 223.) Besides these, we have also the dry method of separating Hemp in some places, as related by Mr. Durno, who was the British Consul at Memel, and who states that in the southern parts of Poland, steeping is not practised at all, on the supposition that the harle is thereby weakened, and the colour darkened. Instead of steeping, they there *dry the stalks in the sun*. But the dressing is more laborious, and consequently more expensive. (Wisset, p. 177.) Mr. Dickson, as in the case of Flax, has succeeded admirably in separating Hemp fibre by passing dried stems from Italy under the rollers of his machine (v. p. 224), and Dr. Royle has no doubt that the method may be successfully practised with several fibres for many purposes.

Crop and Profit.—Mr. Rowlandson says the best land for obtaining fibre of the strongest description is a fat loam, not too heavy with clay, and a portion of sand intermixed. On such land, succeeding a crop of beans, Hemp will grow six or seven feet high, and bean-stalks in such make good manure for Hemp. He adds: "I have known 9 quarters of beans per acre after Hemp, weighing 21 stone per sack. Hemp after beans will produce 30 stone more per acre, of the strongest and heaviest fibre, than by any other mode of culture; the weight of fibre in ordinary culture and circumstances will produce 60 to 70 stone per acre." A good crop of Hemp after beans will produce 28 to 30 bushels of seed per acre; in the ordinary way, 20 to 22 bushels per acre. But only particular circumstances or prices render Hemp a desirable culture in England; for, in general, it cannot be considered a productive crop—though it may bring 5*s.* per stone, and good seed 5*s.* per bushel,—as it requires much manure, and "Hemp land will grow other crops of equal or superior value at a less cost." But other countries, such as parts of India and the Himalayas, which prefer any exportable produce like Flax or Hemp, will be glad to cultivate both, if they got any reasonable encouragement. The co-operation of a purely manufacturing establishment might facilitate and give advantages to the production of Hemp as well as to that of Flax.

Imports, etc., of Hemp from India.—It is not impossible therefore that as India now supplies England with the cheapest of fibrous materials, Jute, that the country will also be able to supply the strongest and best, that is, Himalayan Hemp. The greater distance which this has to travel, but chiefly by the Ganges River, may be easily paid for by its greater value. We also believe that as Mr. Deneef succeeded in growing some good Hemp even in the plains of Bengal in the rainy season, so others will be able to do so in other parts of India. The expenses of transit from distant parts will, no doubt, be diminished when larger quantities are operated upon and the arrangements are made by mercantile men. All such transactions in the Hills would be facilitated, if it were found possible to make the road from the Kemaon Hills into the plains practicable for light carts, as this has been done with the Sikh hills to some extent, but these are less precipitous. That there is nothing chimerical in the expectation of greatly increased quantities of fibre being imported, even from so distant a country as India, is evident from what has already taken place. If this has been possible with the cheaper it cannot be impracticable with the better. Though the information is not very certain, we find from the published reports that Hemp was exported from India to the following extent:

HEMP IMPORTED FROM INDIA, AND SOLD IN ENGLAND.

	cwt.		cwt.
1803	4820	1807	4738
1804	8335	1808	4023
1805	8399	1809	1543
1806	6421	1810	2555

In 1850-51 Imported into Bombay, of *Ganza*

(Hemp-herb), 514 cwt. from Concan; and Exported to the United Kingdom 15,895 lb.=Rs. 5,796. How greatly and rapidly the increase of fibrous materials has gone on within the last few years from India is evident from the following table of the imports from Russia and the British territories in India, from 1847 to 1851; while in the year 1831, 506,803 cwt. were imported from Russia, and only 9472 cwt. from the East Indies. Quantities of Hemp Imported into the United Kingdom from—

	1847	1848	1849	1850	1851
Russia,	544,844	540,207	641,548	614,535	672,342
Br. Ter in East Indies,	185,788	258,239	360,362	399,345	590,923

In successive editions of M'Culloch's 'Commercial Dictionary,' we find the following Imports into Great Britain; but, under the head of Hemp from India, are included the various Fibres described in this work, with probably no real Hemp, though this may be imported from thence.

Quantities of Hemp imported into the United Kingdom;

	1831	1847.	1851.
From Russia	506,803	541 341	672,993
„ British Territories in East Indies	9,472	185,788	590,523

In Russia as soon as Hemp is brought down in the spring, or in the course of the summer, it is selected and made up into bundles by sworn selectors (*brackers*), who are said to act with impartiality and exactness; and tickets are affixed to every bundle as selected, &c. Hemp at Petersburgh is assorted into clean Hemp, or firsts; outshot Hemp, or seconds; half-cleaned Hemp, or thirds; and Hemp Codilla. Riga Hemp is distinguished as resin (or clean), outshot, and pass Hemp. Particular care is taken to ship Hemp and Flax in fine, dry weather. If either get wet, they are apt to heat, and to be totally spoiled. For this reason every vessel taking in Hemp and Flax is furnished with mats to prevent their getting damp. A bundle of clean Hemp weighs from 56 to 65 poods; ditto outshot, 48 to 55 poods; ditto half-clean, 40 to 55 ditto. (1 pood=36 lb. avoirdupois) 63 poods are about equal to an English ton; the fixed charges on which in Petersburgh amount to 45 roub. 32 cop.; also commission and stamps, and on import into London, about £10 5*s.* 8*d.*, freight included; when the price is £40 a ton. (*v.* M'Culloch, from Mr. Borrison on the Commerce of Petersburgh.) With regard to prices, those of Hemp will of course vary at different times, like those of all other products. It is usually highest in the summer months, and lowest in September. In December, 1833, Petersburgh clean Hemp was 25*s.* to 26*s.*; Riga Rein at 29*s.* per cwt. In the year 1840, Italian Hemp was at 50*s* the cwt.; Polish Rein, 48*s.*; Petersburgh clean, 47*s.*; clean for cordage, 46*s.*; Polish Pass Hemp, 46*s.*; Petersburgh half-clean, 42*s.* In the year 1844, the price of Petersburgh Hemp was 38*s.* per cwt., or £38 per ton. At the end of 1854, Petersburgh clean, £60 10*s.* to £63; outshot, £59 to £61; half-clean, £57 10*s.*; Riga Rein, £61 to £64: do. outsthot, £58 to £63. But we cannot do better than conclude with an extract from the 'Commercial Circular' of the Messrs. Lindsay. "As regards Hemp, the rates for this article advanced in the early months of the year, and obtained their highest point in March, when £75 per ton was paid for clean. They then gradually fell to £58 to £60—about its present value—it having become apparent that supplies to a much larger extent than were anticipated would be received *via* Memel, &c. The future range of prices will, of course, necessarily depend on the action of our Government as respects Prussian neutrality. It, however, must not be lost sight of that the variety and extent of substitutes in the course of introduction will, under any circumstances, for some time to come diminish the consumption of Russian Hemp."—*Royle Fib. Pl. page* 340. At the Madras Exhibition of 1855, there were only four exhibitors of this fibre, the best and cleanest sample having been sent from Nellore: this plant does not thrive in Southern India so well as in the North West Provinces, and the colder parts of Bengal; it there produces a strong fibre suited for cordage and weaving, but in Southern India the Fibre deteriorates, and has little strength, it grows best at altitudes of 3 to 7000 feet. There are a number of Indian plants, which yield good substitutes for Hemp, some of which are extensively cultivated in the Madras Presidency. In China, *Hemp* is cultivated in the provinces north of the Meiling, but the plant also grows in Fuhkien; the grass cloth made from it is not so much used for common dresses as cotton and silk. There are three plants which produce a fibre made into cloth known under this name, viz. the *Cannabis sativa* or hemp at Canton, the *Urtica nivea*, a species of nettle grown about Suchan, and the *Sida tiliæfolia* near Tien-tsin-fu.—*Williams' Middle Kingdom, p.* 106.

(4292) HEMP SEED,

Sunn kee-beenge, Hind. | Chenevi, Fr.

The seed of the *Cannabis sativa*, *C. indica*, are albuminous and oily, and entirely devoid of all narcotic properties. They are used for crushing for oil.

(4293) HEMP SEED OIL. Cannabis sativa.

Ganja yenna, Tam.

This oil is obtained by expression from the seeds of the common hemp, which is cultivated in many parts of the country. In Russia, the oil is much used for burning in Lamps, but it is unknown to the natives of India. At the Madras Exhibition of 1855, three specimens were exhibited, one of a deep green colour from Tanjore, another of an olive green, sent by Lieut. Hawkes, and the third in the Madras Tariff.

(4294) HENBANE SEED.

Buzirulbung, Bung, Sikran, Urmanikou, ARAB.	Khorasanee ajwan, GUZ. HIND.
Khorasanie, CYNG.	Adas pedas, MAL.
Khorasanie-ajwan, DUK.	Adas, JAV.
Jusquiame, FR.	Hyoscyamus niger, LAT.
Bilsenkrout, GER.	Buzirulbung, PERS.
	Khorasanie omum, TAM.

The seeds are small, compressed, uniform, roundish, finely dotted, of a yellowish-gray colour, and have the odour of the plant and an oleaginous, bitter taste. The plant is a native of Europe and Asia Minor, and is extensively cultivated all over India. The chemical properties of the leaves and seeds have been carefully investigated, and an alkali has been obtained from it termed *Hyosciama*, but it differs little, if any at all, from *Atropia*.—*Faulkner*.

(4295) HENNA, LAWSONIA INERMIS. PRIVET EGYPTIAN.

Urkan, ARAB.	Henna, PERS.
Maritondi, CYNG.	Sakachera, SANS.
Mayndie, DUK.	Maroodanie, TAM.
Mendee, Henna, GUZ. HIND.	Gorunta Chettoo, Ivenie, TEL.
Daunlacca, MAL.	Mendi, BENG.

A reddish brown substantive dye, procured from the leaves of the Egyptian Privet (*Lawsonia inermis*). The Mahomedans in India, Persia, Arabia and other countries, use the shoots for dyeing the nails, tips of the fingers and toes, and palms of the hand, red. It is employed in the East for dyeing ordinary stuffs; and the extract of the flowers, leaves, and shoots, is used by the hakeems in lepra, and in obstinate cutaneous diseases.—*Faulkner*. The Henna tree, Lawsonia alba, Linermis, is the camphire of the English Bible, and the cypress shrub of the Greeks and Romans. "The cypress plant," says Rosenmuller, "is held in particularly high esteem by the Greeks, the Arabs, and the Turks; and they think that they make an agreeable present when they offer a person a posy of its flowers. In reality, this plant is, as Sonnini observes, one of those which are particularly agreeable to the eye and the olfactory organs. The flowers, of which the coloring is so soft, spread the most delightful fragrance to a great distance, and fill with balsamic odour the gardens and rooms which they adorn." It is extensively cultivated by the Burmese, and hedges formed of it are common in Bengal. The fresh leaves, beat up with catechu,

"Imbue
The fingers' ends with a bright roseate hue,
So bright that in the mirror's depth they seem
Like tips of coral branches in the stream."

This use of the leaves is as old as the Egyptian mummies, and is still practiced by Southern Asiatics.—*Mason*.

(4296) HEERA-KUSSEES, DRY PER-SULPHATE OF IRON. Is brought via Pali, used in dyeing and in making ink, blacking leather, &c. is only used in medicine made into, "missi" to apply to the teeth viz., to make

Black missi.—Heera-kussees, chaipal harra, choonigond, lila tootiga, iron filings, kuth, equal parts, pounded and mixed: rubbed on the gums.

White missi.—Sufaid soorum (crystallized carbonate of lime double refracting spar), and cinnamon pounded together: used as tooth powder.

Sada-kussees.—Impure sulphate of iron, the refuse from the manufactory of the sulphate of copper: four seers for one rupee.—*Gen. Med. Top. p.* 137.

(4297) HERITIERA ATTENUATA. One of the best and most plentiful of the jungle fruits is the heritiera. It grows in bunches resembling large grapes, is agreeably sub-acid, and when ripe, of a yellowish hue. The tree is small, and when arrayed with these long golden bunches it is very beautiful. It would be quite an acquisition to gardens both for ornament and utility. —*Mason*.

(4298) HERITIERA FOMES. See H. MINOR and LITORALIS.

(4299) HERITIERA MINOR AND H. LITORALIS.

KANAZOE, BURMESE.

These species are common in the Rangoon district, along the creeks and Sunderbunds. They afford the Soondree wood so well known in Bengal for its strength and durable qualities. It is a red-colored wood, strong and adapted for house-building.—*McClelland*.

(4300) HERITIERA MINOR. *Syn.* H. FOMES SOONDREE. The soondree is a gloomy looking tree that may be distinguished from all others for many miles distant. It is remarkably characteristic of a peculiar soil. Wherever the tides occasionally rise and inundate the land, this tree is sure to be found throughout the whole Tenasserim Coast, but it is never found at home, either on the high dry lands, on the one hand, nor in the wet mangrove swamps, on the other. It is the tree which was described by Dr. Buchanan Hamilton, who accompanied Symes' embassy, as *Heritiera Fomes*. It is the toughest wood that has been tested in India. When Rangoon teak broke with a weight of 870 pounds, Soondree sustained 1312 pounds. It is not a very durable wood, but stands without a rival in strength. Although so common on the other Coast, as to give name, as Captain Munro thinks, to the Soonderbunds, yet the tree grows much larger in these Provinces, and affords finer timber. —*Mason*.

(4301) HERMODACTYL SOORINJAN TULKH. Bull or cormus of an uncertain species of Colchicum.—*Irvine*. The Hermodactyl. In the medicine shops of India generally, there

are sold two varieties of a bulb called *soorinjan*, one the *S. tulk*, or bitter, the other *S. shereen*, or mild; both are identical with the Hermodactyls of the ancient Arabian and Greek writers. Their origin is unknown, but they are doubtless referable to some species of colchicum. The *tasteless* variety is about one inch long and the same in breadth, heart-shaped, rather flattened, grooved at one side, convex at the other. They are not wrinkled, and are easily broken and form a white powder. The *bitter* kind is smaller, and has a striped appearance. Pereira describes one of Mr. Royle's specimens as yellowish, somewhat transparent, horny, and striped lengthwise. No satisfactory experiments, whether chemical or clinical, have been yet made with this article. In some trials Dr. O'Shaughnessy made with an acetous tincture of the *soorinjan tulk*, he was led to believe it possessed of all the virtues of the dried colchicum of Europe. It certainly deserves careful and extensive examination.—*O'Shaughnessy, page* 661.

(4302) HERNANDIA SONORA.

Bongko, Jav.—*Ainslie.*

This is a native of various parts of the East and West Indies. It is a tall erect tree, fruit a dry drupe, calyx very large, inflated, with a small roundish mouth. The wind blowing over this aperture causes a whistling sound, whence the specific name is derived; the kernel is oily and purgative. The bark, seed, and young leaves are indeed all aperient; the fibrous roots are reputed to be an antidote to the Macassar poison. The juice of the leaves is described as a powerful depilatory, *(*Lindley.*) Rumphius says, that in Java the root is deemed a certain antidote to poison. This of course is but an imaginary property.— *O'Shaughnessy, page* 537.

(4303) HERMIT-CRAB. Pagurus. The common English name for the well-known crustaceans that occupy the empty turbinated shells of testaceous mollusks.

(4304) HERNANDIACEÆ, a natural order of incomplete Exogenous Plants. It has monœcious or hermaphrodite flowers, with an involucellum in the pistiliferous and hermaphrodite flowers; a petaloid calyx, tubular, 4-8-parted, deciduous; definite stamens inserted into the calyx in two rows, of which the outer is often sterile, with the anthers bursting longitudinally; the ovary superior, 6-celled, with a pendulous ovule and peltate stigma; a drupaceous fruit with one seed, which is pendulous; the embryo is inverted, without albumen; the cotyledons somewhat lobed, shrivelled, and oily. The species are trees with alternate entire leaves, and flowers arranged in axillary or terminal spikes or corymbs. This order has been constituted by Blume. It contains only two genera *Hernandia* and *Inocarpus*. These were sometimes referred to *Myristicaceæ*, from which they differ in the absence of albumen from their seeds. Their longitudinal anthers distinguish them from the *Lauraceæ*, in which order they have also been placed. Their affinity is undoubtedly with *Thymeleaceæ*, from which they differ only in their drupaceous fruit, lobed cotyledons, and the involucel to some of the flower. *Hernandia*, the typical genus of this order, was named after Hernandez, a naturalist sent out to Mexico by Philip II. of Spain; and it is said to have been given to these plants, which have large leaves and little flowers, in allusion to the great opportunities afforded to this naturalist and the little use he made of them. The characters of this genus are the same as the order. *H. sonora* is a tall erect tree, with cordate peltate leaves, yellowish, panicled flowers, a large inflated, succulent calyx, with a small, roundish entire mouth. It is a native of the various parts of the East and West Indies, and has obtained its name 'sonora' from the noise made by the wind in whistling through its persistent involucels. The bark, the seed, and the young leaves of this tree are slightly cathartic. Rumphius says that the fibrous roots chewed and applied to wounds infected with the Macassar poison, act as an effectual cure. The juice of the leaves is employed as a depilatory. It destroys the hair wherever it is applied, and this without producing pain. The wood of this species is very light, and Aublet says that the wood of *H. Guianensis* takes fire readily from a flint and steel, and may be used as tinder. Several species of *Hernandia* are mildly purgative. (Lindley, *Natural System;* Lindley, *Flora Medica*; Burnett, *Outlines of Botany.*)

(4305) HERPESTES (Illiger,) a genus of Digitigrade Carnivorous *Mammalia*, allied to the Civets. It is the *Ichneumon* of Lacepede, Geoffroy, and others; the *Mangusta* of Olivier and others; the Mangouste of the French and the mongoose of the English. It has the following characters:—Feet short, with 5 demipalmated toes, armed with claws which are slightly retractile; tongue furnished with horny papillæ; ears small; a voluminous simple pouch, which does not contain odoriferous matter, and at the bottom of which the vent is pierced. Body very much elongated; tail long, strong at its base. Hairs of the fur annulated. Dental formula:—

$$\text{Incisors},\frac{6}{6};\ \text{canines},\frac{1-1}{1-1};\ \text{molars},\frac{6-6}{6-6} = 40.$$

Mr. Bennett has noticed some peculiarities in the dentary system of these animals. In *H. fasciatus* and *H. Gambianus* he found the following arrangement:—

$$\text{Incisors},\frac{6}{6};\ \text{canines},\frac{1-1}{1-1};\ \text{molars},\frac{5-5}{5-5} = 36.$$

This is a system of dentition which as far as I am aware is altogether peculiar, and if confirmed by

the examination of other specimens will undoubtedly form the type of a new genus. Perhaps further and more rigid examination may even detect different species from the different localities, as specimens have arrived for the Society from Travancore and Bombay, and one from Madras, at the British Museum."

(4306) HERPESTES ICHNEUMON, the Ichneumon (*Ichneumon Pharaonis*: *Viverra Ichneumon*, α, of Linnæus). The fur a mixture of chestnut-brown and yellow, each hair being annulated with those two colours; the feet and muzzle black or deep chestnut; the tail terminated by a tuft of long hairs. This appears to have been one of the sacred animals of the ancient Egyptians; and we read in Herodotus (ii. 67) that the *Ichneutæ* (ἰχνευται), which the best critics consider to be synonymous with Ichneumons, were, as well as dogs, buried "in holy repositories." There is no good reason to doubt that it is the Ichneumon (Ἰχνεύμων) of Aristotle ('Hist. Anim.,' ix. 6; vi. 20, 35), Diodorus Siculus, Strabo, Ælian, and others; and as little that it is the *Ichneumon* of Pliny. Aristotle (ix. 6) relates, that when the Ichneumon sees the serpent called the Asp or Aspic (Ἀσπίς), he does not attack it till he has called to his assistance other ichneumons, and in order to defend themselves from the venomous bites of the snake, they cover themselves with mud by rolling on the earth after having dipped themselves in the water. Pliny ('Hist. Nat.,' viii. 24) gives a somewhat similar account. Diodorus and Strabo relate a much more marvellous feat; nor is Pliny slow to lend his aid in spreading the wonderful tale, how, when the crocodile is lulled asleep with open jaws, the Ichneumon darts like a weapon down his throat and gnaws his entrails ("erodit alum"). ('Hist. Nat.,' viii. 25.) It may be thought hardly worth while to refute such a fable; but it was long entertained as credible, and it may not be amiss to turn to Sonnini's observations on this point, more especially as they contain some interesting remarks on the habits of the animal. "Much," says Sonnini, who speaks of the Ichneumon as one of those animals which the Egyptians have domesticated,) "has been written concerning it, and much of this writing has been fabulous. It was one of the animals held sacred in ancient Egypt. Honours were rendered to it on its death: it was maintained with the greatest solicitude during life; funds were set apart for its support; they served up to it, as to cats, bread steeped in milk, or fish of the Nile cut down into morsels; and it was generally forbidden to kill any of the race. Object of the worship of a celebrated people, the pretended protector of the most singular country in the world against a scourge the most grievous to an agricultural nation, a stranger and unknown in our climates—what a field for the production of the marvellous? Accordingly it has not been spared. The greater part of travellers have seen the Mangouste without examining it; and with their minds prejudiced by the stories which the ancients and the moderns have spread respecting it, they have successively copied their relations." Sonnini then after a compliment to Buffon, and a statement that he had had it in his power to observe the Mangouste in its native country and in its state of liberty, proceeds as follows:—"With very great disposition to familiarity, the Mangoustes are not altogether domestic in Egypt. Not only do they now rear none in their habitations, but the inhabitants have not even the recollection that their ancestors reared any. Most probably then those which Belon and Prosper Alpin assert that they had seen domesticated were merely a few individuals preserved rather as objects of curiosity than for any useful purpose; for if they hunt away rats and mice, they likewise seize upon the poultry; and this appetite would more than overbalance the good which they could do in purging the houses of noxious animals, which cats would destroy more certainly and with less inconvenience. Having some resemblance in their habits to weasels and polecats, they feed upon rats, birds, and reptiles. They ramble about the habitations of men; they even steal into them, in order to surprise the poultry and devour their eggs. It is this natural fondness for eggs which prompts them frequently to scratch up the sand with the intention of discovering those which the crocodiles deposit there, and it is in this manner that they prevent, in reality, the excessive propagation of these detestable animals. But it is absolutely impossible to abstain from laughing, and not without reason, when we read of them leaping into the extended mouths of the crocodiles, of their sliding down into their belly, and not returning till they have eaten through their entrails. If some Mangoustes have been seen springing with fury on little crocodiles presented to them, it was the effect of their appetite for every species of reptiles, and not at all that of a particular hatred, or of a law of nature, in virtue of which they would have been specially commissioned to check the multiplication of those amphibious animals, as many people have imagined. It had been equally reasonable to say that nature places Mangoustes on earth merely to prevent the too great propagation of chickens, to which they are far more hostile in reality than to crocodiles. And what proves more clearly that men have been mistaken in ascribing such intentions to nature respecting Mangoustes is this—in more than half of the northern part of Egypt, that is it say, in that part comprised between the Mediterranean Sea and the city of Siout, they are very common, although there are no crocodiles there: whilst they are more rare in Upper Egypt, where the crocodiles are, in their turn, more numerous. The Mangoustes are nowhere more multiplied than in

Lower Egypt, which, better cultivated, more inhabited, more humid, and more shaded, presents also more abundantly the means of supplying them with prey and with food, and crocodiles never appear there."—*Eng. Cyc.*

(4307) HERRINGS.

Haringen, Dut.	Arenques, Port.
Harengs, Fr.	Seldi, Rus.
Haringe, Heringe, Ger.	Arenques, Sp.
Aringhe, It.	

A well-known fish, measuring from 8 to 12 inches in length, and weighing generally about 5½ ounces. It dies almost the instant it is taken out of the water. Herrings are met with in three different forms: *fresh herrings* are the condition in which they are taken from the sea; *white* or *pickled herrings* are merely salted, and put into barrels; and *red herrings* are gutted and salted, and afterwards hung up, and fired with the smoke of green wood.

(4308) HEUDELOTIA AFRICANA, or African Bdellium tree.—*O'Sh. p.* 287.

(4309) HEVEA GUIANENSIS. Caoutchouc plant. Siphonia elastica, *Syn.* Trunk 17 to 20 yards high, scaly like a pine apple, very straight, branched at the summit. Incisions in the bark cause the discharge of a juice which concretes into the well known and very valuable *caoutchouc* of commerce, a product however of many other trees in this and allied families, for example of Jatropha elastica, Ficus Indica, Artocarpus integrifolia, Urceola elastica, &c. The juice when first obtained is white and milky, spec. gr. 1.011 spread in thin layers it quickly dries into a colourless and often transparent solid substance. Pure caoutchouc is pale yellow, inodorous, tasteless. The ordinary black colour is attributed by some writers to its being smoke-dried, but specimens prepared by mere exposure to the air, have assumed the black colour. At 32° caoutchouc is hard, at 60° to 100° flexible like leather, and exceedingly elastic and adhesive. Sp. gr. 0.938.—*O'Shaughnessy, page* 560.

(4310) HIBISCUS, so named from one of the Greek names (*Ιβισκος*) of the Mallow, a genus of Plants belonging to the natural order *Malvaceæ*. The species, upwards of 100 in number, of this genus, are chiefly herbaceous, though of a large size, but a few are perennial and arboreous. They abound in the hot parts of Asia and America, and also in Africa and the tropical islands; a few extend into Europe, North America, and to the Cape of Good Hope. *H. Trionum*, which occurs in Europe, is also found in Cashmere. The genus is characterised by having an exterior many-leaved calyx; carpels united into a five-celled capsule; valves with the partitions in their middle; cells many-seeded, or very rarely containing only a single seed. The species are remarkable, like the family to which they belong, for abounding in mucilage, and for the tenacity of the fibre of their bark, whence several are employed for many economical purposes in the different countries where they are indigenous. The abundance of mucilage in some of the species renders them useful as articles of diet, as the unripe fruit of *H. esculentus*, the Okro or Gombo of the West Indies, which is employed both for thickening soup and as a vegetable; so in India *H. longifolius*, there called Ram Turai, is similarly employed, and much approved of by many Europeans, but objected to by others on account of its clamminess. The calyxes of *H. Sabdariffa* as they ripen become of a red colour and are pleasantly acid, whence in the West Indies the plant is called Red Sorrel. The calyxes are employed there, as well as in India, for making tarts; and a decoction of them, sweetened and fermented, is described in Browne's 'Jamaica' as a cool and refreshing drink, much used in many of the sugar islands. *H. Syriacus* and *H. Rosa Sinensis* are known as ornamental plants: the flowers of the latter are employed for blackening the eyebrows, as well as leather, both in India and China. The species of *Hibiscus* are chiefly useful for the tenacity of their fibre, and hence several are employed in rope-making. Thus *H. cannabinus* is cultivated everywhere in India in the rainy season for this purpose; and its fibre is often imported into Europe as a substitute for hemp. It is known by the name Sunn in Northern India, Ambaree in Western India, and Mesta Pat in Bengal. In the island of Otaheite rope and string are manufactured from the bark of *H. tiliaceus*, which is also made into matting of a white colour, and different degrees of fineness. Forster states that the bark is also sucked as an article of diet, when the bread-fruit fails there: it is also so employed in New Caledonia. Indeed the mucilage which all these plants contain will no doubt afford some nourishment. In the West Indies, the whips with which the slaves were lashed were made from the fibres of *H. arboreus* (Mohoe or Mohaul). The bark of so many species of this genus being used for its tenacity, it is impossible to enumerate all. Dr. Roxburgh particularly recommends the cultivation in India of *H. strictus*, in consequence of its long, fine, and strong fibres, of a beautiful glossy white appearance, and as likely to be an advantageous substitute for such as are already cultivated for this purpose.—*Eng. Cyc.* *Hibiscus clypeatus* and *elatus* are similarly employed in the West Indies; *H.* (now *Thespesia*) *populneus* & *H. tiliaceus*, already mentioned, in the Society and South Sea Islands; *H. Manihot* in Japan; *H. heterophyllus* in New Holland; and *H. verrucosus* in Senegambia.—*Royle.* Many of the Hisbiscus species are showy flowering plants, and thrive well in any garden soil; they are easily propagated by cuttings or layers.—*Riddell.* Dr. Wight in Icones, gives the following species of Hibiscus, viz. hir-

tus, 41 : lampas, 5 ; lunarifolius, 6 ; populneus, 8 ; pruriens, 6 ; Surattensis, 197.

(4311) HIBISCUS ABELMOSCHUS, so called from Hab-ul-Mooshk, the Arabic name of its musk-scented seeds, is now often named *Abelmoschus moschatus*, and formed into a new genus. Its seeds are said to be added to coffee in Arabia, and are in India employed as a cordial medicine. The plant abounds in mucilage, and is employed in the process of clarifying.—*Eng. Cyc. H. Abelmoschus*, in Hindee *mooshkdana*, or musk seed, is called *calee kustooree* in Bengal. The plants abound in mucilage, and are much employed in the North-West of India in clarifying sugar. The stems were cut when in flower by Dr. Roxburgh, and steeped immediately : for the result of his experiments. See FIBRES.—*Royle.*

(4312) HIBISCUS CANNABINUS. HEMP LEAVED HIBISCUS. Lin.

Poolchei keeray, also Casseric keray TAM.	Ghongoo koora, TEL.
Umbare ke baujee, DUK.	Garnikura, SANS.
Ambaree, in WESTERN INDIA.	Punday & pundrica, CAN.
Palungoo, MADRAS.	Maesta paut, of the BENGALESE.
Pooley Numajee, COIMBATORE.	Sunnee, at SAHARUNPORE.
Gongkura, of the TELINGAS.	Wilaitee, (or foreign) Sunn, at MUTTRA.
	Deckunee Hemp, of BOMBAY.

From the variety of synonyms which we have given of this plant, it is evident that it must be generally known all over India ; but from its having several distinct names of its own on the west, we should infer that it was a native of that side of India, or of the southern part of the Peninsula, as on the Bengal side its names are modifications of those of some of the other fibres. In Bombay, besides *ambaree*, its fibre is sometimes called Deckanee Hemp, to distinguish it from the *taag* or Conkunee Hemp (*Crotalaria juncea*). But it is very generally cultivated by the natives, though not in large quantities. This plant, found as yet only in a state of cultivation, is a herbaceous annual of about three months' duration. The stem is straight and simple, of from three to seven feet in height, with here and there a few inoffensive prickles, otherwise smooth. The leaves are spreading, alternate, with long, slightly prickly footstalks ; all are smooth, with their margins serrated ; but the lower leaves are heart-shaped ; those about the middle of the plant three-, four-, or five-lobed, with lanceolate acute lobes ; while the leaves at the top are simply linear-lanceolate. Stipules awl-shaped. The flowers are solitary, with short peduncles in the axils of the leaves ; very large : of a pale sulphur colour, with a deep purple centre. Of the double calyx, the outer is seven to eight-leaved, each subulate, spreading, and inserted near the base of the inner calyx. This is five-cleft, divisions sharp-pointed, bristly, and glandular near the margins, and with a large gland on the middle of each division. The stamens numerous, with their filaments united into a hollow column. Anthers one-celled, bursting by a transverse chink. Styles equal in number to the ovaries, and rising through the staminal columns. Carpels joined into a five-celled, five-valved capsule, with few seeds in each cell. Dr. Roxburgh says of this plant, in his 'Coromandel Plants,' vol. ii, p. 48, tab. 190, where a beautiful plate is given : "It is much cultivated by the natives. Its leaves are in general used as an esculent vegetable, and taste something like sorrel. The bark is replete with strong and tolerably soft fibres, and is employed as a substitute for Hemp, to which it is much inferior both in strength and durability. The usual time of cultivation is the cold season, though it will thrive pretty well at all times of the year, if it has sufficient moisture. A rich loose soil suits it best. The seeds are sown about as thick as Hemp, but generally mixed with some sort of small or dry grain, rendering it necessary to be sown very thin, that the other crop (which is one of those grains that does not grow nearly so high) may not be too much shaded. It requires about three months from the time it is sown, before it is fit to be pulled up for watering, which operation, with the subsequent dressing, is similar to that hereafter described for *Crotalaria juncea*." Dr. Roxburgh states, that he found the fibres to be stronger when obtained from full-grown plants that had ripened their seed, than when cut from plants in blossom. On the Coromandel Coast he found it cultivated, and a coarse sackcloth made of its fibres. In the Purneya district, Dr. Buchanan found it called *Ambya Patu*, on account of the acidity of its leaves, but in other parts *chandana*. In the southern parts the common cordage of the country was almost entirely made from its fibre. It was said to be sown in fields, which produce nothing else ; a practice which Dr. Buchanan had observed nowhere else in India. It appeared to him a coarse material in comparison with the fibre of the Corchorus, but he had no opportunity of trying its strength. In some places a few of the seeds are scattered about among other crops on account of its leaves. In Behar he found it called *Kudrum*, and cultivated only for being made into ropes, and not as an acid seasoning. About 200 begahs were occupied with it. In Bhagulpore he found it cultivated nearly as much as the Corchorus. The natives considered ropes made of it stronger and more durable than those of the Jute ; but its fibres are harsher, and, as he thought, could be reduced to fine thread. In Goruckpore it was cultivated to the greatest extent, but always intermixed with the *urhur* or *Cytisus cajan*, and ropes made of it were used for agricultural purposes. In the Dinajepore district, Dr. Buchanan found it called *Mesta*, but

its bark never used for making ropes; the leaves only being used as an acid green, the taste being pleasantly acid, and not unlike sorrel. We find it equally cultivated in Central and Western India. It is mentioned as one of the plants employed for cordage at Hyderabad. Colonel Sykes, in his 'Statistical Report of the Dukhun' (British Assoc., 1837, p. 241), enumerates it as one of the plants cultivated in the wet season; and among his drawings of cordage plants there is an excellent one of this plant, as well as of *Agave vivipara*, there called *gayal*. Among dry or spring season cultivation, Colonel Sykes enumerates the *Taag* or *Crotalaria juncea*, its fibres being employed for ropes and for coarse canvas. In the Madras Presidency, a number of fibre-yielding plants are mentioned by their native names, but as these differ in every district and are not accompanied by Botanical names, it is impossible to determine to what plants they refer. We know that Dr. Roxburgh found *Hibiscus cannabinus* in cultivation on the Coromandel coast, and that a coarse sackcloth was made of its fibres. In Vizagapatam it is called Gunny fibre, and a coarse sackcloth and rope made of it. So Dr. Ainslie says, "with the nar, or tough stringy fibre of the bark of the Hemp-leaved Hibiscus, a valuable kind of cordage is made, of various thickness." In a late Minute (19th Sept., 1854) by the Madras Government on the subject of fibres, we find it stated, that "the fibres of the roselle (*Hibiscus cannabinus*), which is known to grow readily and without much care all over the Madras territories, have been found to be an excellent substitute for tow, now imported from Europe." As the plant is so universally cultivated over a vast tract of country for home consumption, nothing would be easier than to obtain a very large supply of its fibres, if they were required for any of the ordinary purposes of cordage. The natives would have nothing to do but to increase a cultivation to which they are already well accustomed in all parts of the country. Dr. Buchanan states, as the result of his experience in the lower provinces, that it is cultivated everywhere in India, on account of its leaves, which are eaten as a vegetable, and for its bark, which is most useful for making cordage. Dr. Royle has seen it in the same way very generally cultivated in the North-Western provinces, chiefly for cordage for domestic and agricultural purposes. Though so generally cultivated, its fibre is hardly if at all known as a distinct article of commerce, —the exports of Indian fibres from the three Presidencies being entered as Hemp, those from Calcutta only being sometimes distinguished as Sunn. With regard to its strength, it may be said that, speaking generally, the fibres of the species of Hibiscus are not so remarkable for strength as for fineness. Dr. Roxburgh, in his experiments, found that a line made of this fibre, from plants in blossom, broke with 115 lb., but with 110 lb. when the seeds were ripe; Sunn fibre, under the same circumstances, breaking with 130 and 160 lb. So in Dr. Wight's experiments, the fibre of *Hibiscus cannabinus*, which is sometimes called the Jute of Madras, broke with 290 lb., when Sunn (*Crotolaria juncea*) broke with 404 lb. Both these, like Dr. Roxburgh's specimens, were probably grown in the same climate. But in Dr. Royle's experiments, Sunn broke with 150 lb., when Brown Hemp broke with 190 lb.; but the Sunn was from Bengal, and the Brown Hemp from Bombay. There is, however, some uncertainty about this, because though no fibres can well appear more distinct than these two, yet Dr. Royle has in his possession fibres of a Crotalaria which are hardly to be distinguished from Hibiscus Brown Hemp. The Sunn fibre of Bombay was, even in Dr. Roxburgh's time, remarkable for its dark colour. But some specimens of *Ambaree* fibre, sent by Dr. Gibson as those af *Hibiscus cannabinus*, and which closely resemble those of some kinds of ordinary Brown Hemp, were favourably reported upon as follows, by Messrs. Enderby, then of the rope-manufactory at Greenwich. Dr. Royle lately received an equally fine, if not finer, because softer specimen, from Messrs. Noble; but this is probably the produce of *Crotalaria juncea*. Unfortunately the best specimens of fibre came tied up in the same bundle with some ordinary Brown Hemp, and with some dirty, uncleaned fibre. September 26th, 1844. We have received your samples of India Hemp, and are pleased to observe that we are likely to obtain an article from thence, that will go far to make England independent of Russia for the supply of that important commodity. The samples supplied have much the character of Italian Hemp, but is inferior to it in colour and softness of fibre. It will not, therefore, in its present state be applicable for fine purposes. We send you a sample of some of the Indian Hemp we had dressed; it appears very good, but not equal in strength to the generality of Russia Hemp; we feel, however, assured that it is capable of being got up in better condition. The present price of Italian Hemp is £32 per ton; Russia Hemp, £28 per ton; Manilla, £23 per ton; New Zealand, £15 per ton; and Jute, about £13 per ton. The Indian Hemp, as per sample, £20 per ton; at which price we should at this period be prepared to purchase. Yours very truly, C. H. G. Enderby. To Dr. J. F. Royle. The Ambaree Hemp is stated by Dr. Gibson to be treated like the Tag or Crotalaria, being cut in November, and stored away until leisure time arrives for stripping the bark. It is in common use for plough and cart ropes, and is esteemed by the natives as very inferior to that of the *Crotalaria juncea*. Some of the fibre sent to Hull to be reported on in the year 1840, was

thus spoken of: "A greater part of that by the 'Wanderer,' which is of similar quality to your Umbarree, or *Hibiscus cannabinus*, cannot be sold for £16 a ton in the Hull market, when Baltic Hemp meets a ready sale at £40. You will perceive how much depends on colour and staple. Prejudice is not wanting,—but that is giving way." (Agric. and Hortic. Soc of Western India 1842.) The length of the fibres of carefully cultivated Ambaree Hemp is from five to six feet; they are of a paler brown than ordinary Brown Hemp, harsher in feel, and stick more together, as if all the gum had not been washed out; but they are divisible into fine fibrils, possessed of considerable strength, and well calculated for rope-making, as also for coarse fabrics. But, though esteemed by some of the natives of the West of India, it is not so good as the best Brown Hemp of Bombay—mentioned in connexion with Sunn. The fibres of this Hibiscus and of the *Sunn* are not distinguished from each other, or from others, in the account of the Exports from the Ports of India, and these have been given under the head of Sunn, and also in that article some observations on the preparation of these Exogenous fibres in India, as well as on their prices, and the quantities in which they may be obtained.—*Royle p.* 259.

(4313) HIBISCUS. In the West Indies H. clypeatus and elatus are cultivated for fibres: H. Manihot in Japan. H. heterophyllus in New Holland, and H: Verucosus in Senegambia.

(4314) HIBISCUS COLLINUS (ERIOCARPUS OF D. C.), a native of the mountainous parts of the Northern Circars, of Peninsular India, where it is called *kanda-gang*, and where the natives use the bark as a substitute for Hemp. Under the head of this plant, Dr. Roxburgh states that he has often observed that most of the Indian plants of this family might be employed for the same purposes as Hemp, as the bark is tough, and may almost always be stripped off in long slips. *H. ficifolius* is a species which Dr. Roxburgh so named, and of which he received the seeds from the Moluccas. It was an annual, growing very tall, often 12 to 14 feet high, growing straight, with few branches. The fibres he describes as uncommonly beautiful, and rather stronger than sunn.

(4315) HIBISCUS ESCULENTUS. BANDAKYA. Lin.

Vendokai, TAM.	Ghendamoola, SANS.
Baynda, DUK.	Ram Turai; Dhenroos, HIND.
Bendakaia, TEL.	

This plant is very common. It yields long silky fibres possessed of considerable strength and pliancy, well suited for the manufacture of rope, string, gunny bags, and paper. It bears a considerable resemblance to the true hemp of Europe. In the Madras Presidency, this fibre is in considerable request, and a small export trade is carried on, under the name of Hemp. In the year 1853-54, the exports amounted to 6,112 cwt. valued at 27,113 rupees. When cleaned without steeping, they are soft and pliant, whitish yellow in color and very silky. It is said to be the Okro or Gombo of the West Indies, but Dr. Riddell considers the latter to be a different species. The capsules when green are eaten, boiled, or put into soups and curries, the inside being of a slimy consistence. The seed is sometimes put upon toast with pepper, butter and salt. With *Hibiscus esculentus*, the *Okhro* of the West Indies, is now united the *H. longifolius* of the East Indies, the *Bandikai* of Madras, the *Ram turai* and *Dhenroos* of Bengal; and the *Bammia* of the west coast of Africa probably does not differ essentially from these two. Of all these, the long, young pyramidal pods are filled when green, with a large proportion of mucilage, on which account they are gathered in that state, and cooked as a vegetable, being much esteemed by many, though considered too viscid by others. The fruit is also used to thicken soups in the countries where it is indigenous and in the South of France and in the Levant. The seeds may also be added like barley to soups, and have been recommended to be roasted as a substitute for coffee. The bark of these plants also abounds in fibre, which is of fine quality, as in many others of the same genus. Dr. Roxburgh cut the stems when the seed was ripe, and committed them to the steep a few days after.—*Royle.*

(4316) HIBISCUS FURCATUS, a native of the interior of Bengal, growing to a height of from 6 to 8 feet. The bark yields abundance of strong white flaxen fibres, but the prickliness of the plant renders it very troublesome to handle. The stems were cut when in flower, and steeped immediately.

(4317) HIBISCUS LAMPAS. A plant yielding fibres.

(4318) HIBISCUS MACROPHYLLA is very plentiful in the forests of the Pegu and Tounghoo districts. It is a tall slender timber, of three or four feet girth, and would do for boards and house posts. Wood, white-coloured, adapted to every purpose of house-building.—*McClelland.*

(4313) HIBISCUS MUTABILIS. The changeable Rose. A large shrub bearing white flowers in the morning, and changing to red in the course of the day: easily propagated by cuttings. —*Riddell.* This native of China, is common in gardens in India, and remarkable for the change in the colour of its flowers during the day. The fibres of the bark were found to be of a hard nature, and of a bad colour.

(4320) HIBISCUS POPULNEOIDES.

Parispeepil, HIND.	Moonee gungaray. TEL.

This species is much like the next. Mr. Rohde

found it in a few of the gardens of the Natives near Samalcottah : it flowers during the wet and cold seasons. This species is immediately to be distinguished from populneus by the glands in the axills of the nerves of the leaves, their waved border and long points, and by the double integument of the capsule, the innermost of which requires force and a sharp knife to open it, whereas in populneus it is single ; and can be easily broken by the pressure of the thumb and finger. Thistree will answer better for avenues, parks, &c., than populneus, because it is much higher to the branches, consequently gives a free circulation to the air. When wounded there discharges the same yellow juice as in populneus. —*Rohde M.S.S.*

(4321) HIBISCUS POPULNEUS. POPLAR LEAVED. NOW THESPESIA POPULNEUS.

Gengarani kurra,	Poorsam marum, TAM.
Paris ka har,	Parspipal, DUK.

The poplar leaved hibiscus or tulip tree. This is a large handsome tree with dark green shining leaves, the flowers yellow, shaped like a tulip, capsules when ripe hard and downy, and on being cut through a yellow pigment exudes, having the appearance of gamboge : propagated easily by seed, and the tree is well adapted from its ornamental appearance for avenues, or the road side.—*Riddell.*

(4322) HIBISCUS ROSA CHINENSIS. SHOE-FLOWER PLANT. Lin.

Sapatoo poo, TAM.	Kambang sapatoo, MAL.
Jasoon ka pool, DUK.	Jasoon, DUK.
Dasanie poo, TEL.	Jaba, SANS.

This plant is common in India ; the leaves are used as emollients, anodyne and gentle aperients ; the flowers, for giving a red tinge to spirituous liquors. The flowers are deep scarlet, and yield a juice which turns rapidly to a dark purple, and is very mucilaginous. Applied to soft, unsized white paper, this colour is nearly as sensitive a test for acid as the celebrated litmus.—*O'Shaughnessy, page* 218. *Ainslie.* Shoe flowers are sometimes employed for dyeing lilac colour but it does not appear to be permanent, they are also occasionally rubbed on leather for the purpose of blackening and polishing it in the same manner as we find them used in Batavia.—*Ain's Mat. Med. page* 198. With this flower the natives make Achar.—*Ainslie's Mat. Med. page* 260. The petals of the Hibiscus rosa sinensis are used in some cases to furnish a black liquid to dye the eyebrows, and at Batavia they are employed to polish shoes.—*Williams' Middle Kingdom; page* 285. In Tenasserim, this [illegible]d, flaming flower is extensively cultivated, and [illegible]s a very good substitute for "Day and Martin's blacking."—*Mason.*

(4323) HIBISCUS SABDARIFFA, OR ROZELLE. WEST INDIA SORREL.

Yera googoo, TEL.	ra, also Sheemay kah-
Kaserika, Poolychay kee-	leg-keeray, TAM.

Hibiscus sabdariffa, is said to be so called from its Turkish name, while in the West Indies it is called Red Sorrel, and in the Madras territories *rozelle* and *rouselle.* It is cultivated in most gardens, because its calyxes as they ripen become fleshy, are of a pleasantly acid taste, and are much employed for making tarts, as well as an excellent jelly. Brown states that they are employed in the West Indies for making refreshing drinks. The stems having been cut when in flower, and the bark stripped off, and steeped immediately, display a mass of fibres, in Dr. Roxburgh's specimens, some of which are still in the India House, with the ultimate fibres of a fine silky nature. The name *rouselle* is said to be a corruption of *oseille.* The dietetical uses of these species have been mentioned, in order to show, that if cultivated on account of their fibre, they would also be useful for other purposes.—*Royle.* The fleshy acid calyx of this plant is well known to yield excellent jelly, and very palatable tarts. —*O'Shaughnessy.* The leaves are used as greens, alone, and mixed with others. The calyx and capsules when freed of seeds are made into jellies, and tarts ; generally cultivated ; the flowers of this plant are very pretty, often cultivated in flower beds.—*Juffrey.*

(4324) HIBISCUS STRICTUS, was a new species described by Dr. Roxburgh, and which seems to be a native of the Rajmahl Hills, with a straight stem of from 6 to 14 feet in height, and a very smooth bark. It thrives luxuriantly with little or no care ; seed-time the beginning of the rains ; it is in blossom about their termination, and the seed ripens in December and January, soon after which the plants perish. Like many other of the Malvaceous tribe, the bark of this species abounds in flaxen fibres ; but in none have I found so large a quantity, equally beautiful, long, glossy, white, fine, and strong, as in this. To these promising qualities may be added the luxuriant growth, and habit of the plant, rendering it an object deserving of every care and attention, at least until the real worth of the material is fairly ascertained. From several years' experience, I find the best season for sowing the seed in Bengal, is just when the first rains begin, which is generally in May, in beds ; and when the plants are about six inches high, transplant them out in rows, about nine inches asunder, and about as much from each other in the rows. In 1801, I had forty square yards planted in this manner, which yielded thirty-three pounds weight of the naturally very clean fibres. Dr. Roxburgh's original specimens, still in the India House, are 9 and 10 feet in length, a fibrous mass, apparently easily stript off, and composed of fine and easily divisible fibres.—*Royle.*

(4325) HIBISCUS SURATTENSIS.
Kashlee-keeray, TAM.

A herbaceous plant with speckled prickly stems and yellow flowers; the leaves are used as greens, indigenous.—*Jaffrey.*

(4326) HIBISCUS TILIACEUS is the *Bola* of the Bengalese, common also on the Malabar coast, and supposed not to differ from *H. arboreus*, the *Maho tree* and *Mohaut* of the West Indies. These grow abundantly both in the West and East Indies. Forster states, that the bark of this species is sucked in times of scarcity, when the bread-fruit fails. The mucilage with which all these plants abound, will no doubt afford some nourishment. The fibres of its inner bark are employed for cordage by the inhabitants of the South Sea Islands, and by the American Indians: it is said to gain in strength when tarred. The Otaheitans make fine matting from it, and likewise manufacture it into ropes and cords. Voyagers relate that these filaments are adapted to any kind of cordage, even for the rigging of vessels, but rope thus made is not nearly so strong as that prepared from Hemp. The whips with which the negroes in the West Indies used to be punished, are said to have been made with the bark of this species.—*Royle.*

(4327) HIBISCUS VIOLACEUS. A climbing plant found in Burmah during the rainy season, affording a coarse strong fibre.—*McClelland.*

(4328) HIBISCUS VESICARIUS. Good samples of the Hibiscus vesicarius fibre or wild Ambarre were exhibited at the Madras Exhibition of 1855, by Captain Meadows Taylor.

(4329) HIBISCUS VITIFOLIA. A plant yielding fibres.

(4330) HICK. A very hard, fine, close, very uniformly grained, heavy, Ceylon wood, in colour resembling pencil cedar.

(4331) HICKORY. A tree (*Carya*) common in Great Britain, and growing extensively in many parts of the United States. It is chiefly employed for carriage shafts and springs, large screws, chair-backs, hoops, whip-handles, &c.—*Faulkner.*

(4332) HIDES.

Huiden, DUT.	Cuoja, IT.
Peaux, FR.	Pelles, PORT.
Haute, GER.	Koshi, RUS.
Chamroo, GUZ.	Pellejos, Pieles, SP.
Chumra, HIND.	

Signify generally, the skins of beasts, but the term is more particularly applied to those of large cattle, such as buffaloes, cows, bullocks, deer, horses, &c. Various kinds are distinguished; *raw* or *green hides* are those in the state in which they are taken from the carcass. *Salted hides* are those dressed or smeared with salt, alum, or salt-petre, to prevent them from putrefying; and

tanned or cured hides. Buffaloe, Cow, and Sheep's hides, both salted and tanned, are largely exported from India to England.—*Faulkner.* At the Madras Exhibition of 1855, the Tanned hides and skins exhibited were nearly all of excellent quality and could bear comparison satisfactorily with the same kinds of leather prepared in Europe. They had been thoroughly saturated with the tanning materials, were free from animal odour, and their sections did not shew the white line between the outer and inner surface, indicative in bad leathers of a hasty and imperfect inhibition of the tan liquor. The collection comprise the tanned hides of the Bison, Sambre, Bullock, Horse, Cow, Sheep, Goat, Kid, Dog, and Iguana. The last is the only kind requiring any special mention here, as all the others are well known articles of trade and commerce. The Iguana skins which have been tanned and dyed black, or left of their natural color, are thin, even, soft, tough, elastic and granular, or shagreen-like in external appearance. From the absence of gloss, the appearance of this leather is not much in its favour, but it bids fair to be a durable article for light slippers, and a good covering for the commoner kinds of instrument boxes, such as are still done over with shagreen.

Tanned and Colored Skins—for book-binding purposes and boot-linings, were generally even, soft and pliant, and very suitable for their intended uses. Some of the colored leathers were very brilliant.

Sheep and kid skins tanned white—were exhibited in much perfection.—None of the specimens were fine enough for the better kinds of gloves, but they were all as well-suited as European skins of the kind for the purposes of the Apothecary.

Parchment skins.—The parchment skins take ink very well, but were not in every respect satisfactory. Their texture was uneven, and they had an odour quite distinct enough to lead the Jury to infer that they would be very liable to putrefactive changes on the accession of damp weather.

Wash Leather.—The skins prepared with oil, in imitation of chamois or wash leather, were all excellent specimens of the kind, so far as thickness, softness, pliancy and color, were concerned. In all these respects they will bear comparison with the European article. But as every one of the leathers was tainted with the odour of the Fish Oil employed in their preparation, they could not be recommended for household purposes, such as cleaning plate, though found very suitable for cleaning grasses and harness. As Potass, Soda, and dry hare deodorizing air are abundant in this country, a very little additional care would ensure the production of a perfectly inodorous chamois leather.

Buff leather.—The Buff leathers for accoutrements were nearly all extremely good in quality and have an evenness and equa-

lity in thickness which must render them very economical leathers for manufacturing purposes. The best tanned leather from Buffalo, Bullock, and Cow hides, were contributed by Colonel Sheriff and Lieut. and Qr. Mr. Grant from the Horse Artillery Tannery at Bangalore. They also exhibited specimens of leather prepared from the Hog, Calf, Goat, and Sheep skins, of unexceptionable quality. The Jury considered these gentlemen deserving of a 2d Class Medal for the best tanned leather of all kinds.

(4333) HIERACIUM GRANDIFLORUM. This is a very extensive genus of plants all over Europe, the dwarf kind are best adapted for rock-work, flowers of a yellow colour with the exception of the aurantiacum, native of Scotland: increased by cuttings, and the herbaceous kind by dividing the roots.—*Riddell.*

(4334) HIMALAYA. A thousand feet above Punkabaree in the outer Himalayas, the prevalent timber is gigantic, and scaled by climbing Leguminosæ, as Bauhinias and Robinias, which sometimes sheath the trunks or span the forest with huge cables joining tree to tree. Their trunks are also clothed with parasitical orchids. And still more beautifully there with Pothos (*Scindapsus*), Peppers, *Gnetum*, Vines, Convolvulus, and Bignoniæ. The beauty of thedrapery of the Pothos-leaves is pre-eminent, whether for the graceful folds the foliage assumes, or for the liveliness of its colour.—*Hooker, Him. Jour. Vol.* I. *p.* 108. From one steppe, the ascent to Punka baree is sudden and steep, and accompanied with a change in soil and vegetation. The mica slate and clay slate protrude everywhere, the former full of garnets. A giant forest replaces the stunted and bushy timber of the Terai Proper; of which the *Duabanga* and *Terminalias* form the prevailing trees, with *Cedrela* and the *Gordonia* Wallichii. Smaller timber and shrubs are innumerable; a succulent character pervades the bushes and herbs, occasioned by the prevalence of *Urticaceæ*. Large bamboos rather crest the hills than court the deeper shade, and of the latter there is abundance, for the torrents cut a straight, deep, and steep course down the hill flanks: the gulleys they traverse are choked with vegetation and bridged by fallen trees, whose trunks are richly clothed with *Dendrobium Pierardi* and other epiphytical Orchids, with pendulous *Lycopodia* and many ferns, *Hoya*, *Scitamineæ*, and similar types of the hottest and dampest climates.—*Ibid* 281. The forest was truly magnificent along the steep mountain sides. The apparently large proportion of deciduous trees was far more considerable than Dr. Hooker had expected; partly probably due to the abundance of the *Dillenia*, *Cassia*, and *Sterculia*, whose copious fruit was all the more conspicuous from the leafless condition of the plant. The white or lilac blossoms of the convolvulus like *Thunbergia*, and other *Acanthaceæ* were the predominant feature of the shrubby vegetation, and very handsome. All around, the hills rise steeply five or six thousand feet, clothed in a dense deep green dripping forest. Torrents rush down the slopes, their position indicated by the dipping of the forest into their beds, or the occasional cloud of spray rising above some more boisterous part of their course. —*Ibid, Vol.* I, *page* 103.

(4335) HING.

Thunghsheen pan, Burm.

A gum which is well known under that name in the bazars of Bengal, is procurable from two species of *Gardenia*, which yield it in Bengal, and which are very common throughout the Pegu, Rangoon and Tounghoo districts.—*McClelland.* See Decamullee.

(4336) HIPPOCRATEA ARBOREA. Tree like Hippocratea.

Katha-puhariya, Hind.

Found in Kotah hill jungles.—*Genl. Med. Top. page* 173.

(4337) HIPPOPOTAMUS (Ἵππος & ποτάμος), the Roman name for the River-Horse, and retained by modern zoologists as the generic appellation of the animas of that Pachydermatous form.

Dental Formula:—Incisors $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{7-7}{6-6}$ = 38.

"The Hippopotamus now only exists in Africa; it is found in the rivers of the south and west, as well as in the Nile; and there is also in some of the western rivers a pigmy species, of whose skull a cast was presented to the Society by the late Dr. Morton of the United States." The uses of the Hippopotamous to man are certainly not many but when we look at the enormous ripping chisel-like canines of the lower jaw, and the lower incisors formed for uprooting, we cannot but think that such an animal must be an active agent in clearing rivers from the greater water-plants which might in time, if left undisturbed, go far to convert the running stream into a sluggish swamp. With regard to minor details, the flesh of this Wasser Ochs is much esteemed as an article of food. In the first catalogue of the African Museum we read that it is much in request both among the natives and the colonists, and that the epicures of Cape Town do not disdain to use their influence with the country farmers to obtain a preference in the matter of Sea-Cow's Speck, as the fat which lies immediately under the skin is called when salted and dried. Nor are the whips which are made of the skin of the Hippopotami of the Nile thought lightly of in the neighbouring countries. They are said to be made by cutting the fresh skin into triangular strips some five or six feet in length; one extremity of the strip is pointed, and it gradually widens till the breadth at the opposite extremity is equal to the intended circumference

of the hulk of the whip. The strip is then rolled up so as to form a sort of conical pipe, is firmly tied to keep it in place, and dried in the sun. When all is finished a light and elastic whip is produced. But there is no part of the hippopotamus in more request than the great canine teeth, the ivory of which is so highly valued by dentists for making artificial teeth. No other ivory keeps its colour equally well; and these canine teeth are imported in great numbers to England (where more are sent in the first instance than anywhere else perhaps) for this purpose, and sell at a very high price. From the closeness of the ivory, the weight of the tooth, a portion only of which is available for the artificial purpose above mentioned, is heavy in proportion to its bulk; and the article fetches, or did fetch, upon an average, about thirty shillings more or less, per pound. One of the specific distinctions pointed out by M. Desmoulins is the comparative abrasion of the canines in the supposed two species; and we would call the attention of the curious who deal in these teeth to this circumstance and the papers above quoted. —*Eng. Cyc.*

(4338) HIPPURINÆ, the order Hippurinæ furnishes the water caltrops (Trapa) the seeds of which are vended in the Chinese streets as a fruit, after boiling, the Chinese name means buffalo head fruit, which the unopened nuts strikingly resemble.—*Williams' Middle Kingdom, p.* 282.

(4339) HIPTAGE MADABLOTA, Delight of the Woods. Malpighiaceæ.

Bokhee or Utimookta, Duk.

A large climbing shrub, with very beautiful white and yellow flowers in terminal racemes: petals fringed; four white, one yellow;—one of the stamens much longer than the rest; fruit unequally three winged. The bark is a good sub-aromatic bitter.—*Riddell.*

(4340) HIRUDO, L. the Leach. Diploneura v. articulata. Class annelida. Hirudo medicinalis, Linn. L. D. Sanguisuga, Savingy. Leeches and their effects must have been known from the earliest times. They were early employed therapeutically by the Hindoos, and the Arabs adopted their practice. (*Royle. Hindoo Med. p.* 38, and Wise *Hindu Medicine*, p. 177.) Themison mentions the employment of Leeches by the ancients. Herodotus alludes to one kind, (*Bdella nilotica.*) Dr. Pereira infers that *Sanguisuga ægyptiaca*, the species from which the French soldiers in Egypt suffered, is that referred to in the Bible (Prov. xxx. 15) by the name of *Olukch* or *Aluka*. The latter, or *Aluk* is also the Arabic name for Leech. Leeches are included by Cuvier in the genus *Hirudo*. This has since been subdivided into several genera. Savigny calls that which includes the leeches used in medicine Sanguisuga, the *Iatrabdella* of Blainville. Leeches are characterised by having an elongated, plano-convex body, tapering towards both extremities, wrinkled transversely, and composed of from 90 to 100 soft rings. The mouth furnished with a lip, and the posterior extremity provided with a flattened disk, both adapted to fix upon bodies by suction, and to serve the leech as the principal organs of locomotion. Underneath the body two series of pores are observed, which lead to as many interior pouches, which are regarded as organs of respiration. The intestinal canal is straight, inflated from space to space, as far as two-thirds of its length, where there are two cæca. The blood swallowed is preserved there red and unchanged for many weeks. The subgenus *Sanguisuga* has the upper lip divided into several segments, the aperture of its mouth is tri-radiate, and it contains three jaws, each armed on its edge with two ranges of very fine teeth. Ten blackish points are observed on the head, which are taken for eyes. The anus is small, and placed on the dorsal surface of the last ring. The two species most commonly used, and which by some are considered varieties of one another, are *Hirudo medicinalis* and *H. officinalis*. H. Officinalis is distinguished by its unspotted olive green belly and by the dark green back, along which and the flanks are observed six longitudinal, often interrupted, rusty-red stripes. Six of the eyes are said by Savigny to be very prominent. Teeth about 70 in number. A native of the south of Europe, as of France and Germany. It is usually called the Green Leech, sometimes the Hungary Leech, from being a native of that country. H. medicinalis (fig. 95, 1 to 3), the kind usually employed in England, and readily distinguished from the foregoing by its belly, which is of a yellowish green colour, but covered with black spots, which vary in number and size, forming almost the prevailing tint of the belly, the intervening spaces appearing like yellow spots. On the back are six longitudinal reddish or yellowish red bands, spotted with black and placed on an olive green or greenish brown ground. The number of rings varies from 93 to 108. Teeth 79 to 90 in number. A native of almost all parts of Europe, often called the English, the speckled, the true, the brown Leech, &c. Other species are figured by Brandt, as *Hirudo provincialis, H. Verbana, H obscura*, and *H interrupta*. In the United States they use *H. decora*. In Southern and Northern India Leeches are extremely abundant, procurable both in the tanks of Bengal and in the north-west provinces, as well as along the foot of the Himalayas. Six kinds of useful and six venomous Leeches are mentioned in Susruta and by Avicenna, *l. c.*—*Uses.* Leeches are effectual for the local abstraction of blood, affording indeed the best method in many cases, as in inflammation of the abdomen, scrotum, in hæmorrhoidal tum-

ours, and prolapsus of the rectum. They may often follow general depletion; but, according to the quantity or the nature of the case will themselves produce constitutional effects, especially in the cases of children, They act by a sawing motion, and draw about 1½oz. of blood, though 3oz. may be obtained by fomentation, &c. Excess of bleeding may be stopped by pressure, application of Matica; sometimes caustic is required, and even sewing up the wounds with a fine needle.

(4341) HODGSONIA HETEROCLITA, *Hooker*; TRICHOSANTHES, *Roxburgh*. Hodgsonia is the most magnificent plant of the jungles in the valley of the Teesta in Sikkim. It is a genus dedicated by Dr. Hooker to his friend, Mr. Hodgson. It is a gigantic climber allied to the gourd, bearing immense yellowish-white pendulous blossoms, whose petals have a fringe of buff-coloured curling threads several inches long. The fruit is of a rich brown, like a small melon in form, and contains six large nuts, whose kernels (called "katior-pot" by the Lepchas) are eaten. The stem, when cut, discharges water profusely from whichever end is held downwards.—*Hooker, Him. Jour. Vol.* II. *p.* 7. And at other places Dr. Hooker says it is a new cucurbitaceous genus, found in the Terai, clinging in profusion to the trees and also 5000 feet up the mountains.—*Hooker, Him. Jour. Vol.* 1, *p.* 395. And further on, he says, This magnificent cucurbitaceous climber grows in the forests; east of Chittagong: it is the same species as the Sikkim one. The long stem bleeds copiously when cut, and like almost all woody climbers, is full of large vessels; the juice does not, however, exude from these great tubes which hold air, but from the close woody fibres.—*Hooker, Vol.* II, *page* 350.

(4342) HOG.

Hog, ENG.	Khunzeer, ARAB.
Babi, MALAY.	Soôr, HIND.

All the wild hogs in the Archipelago are small animals, compared with the wild boar of Europe, or even with that of continental India. The Sus verrucosus, so called from the fleshy excrescence on the sides of the cheeks, has a grotesque and a formidable appearance, but is in reality a timid animal. The number of them in Java is immense, and in passing along the highway, in particular districts, scores of them are to be seen.—*Crawfurd, Dict. p.* 152.—See SUS.

(4343) HOG'S LARD.

Adeps suillus, LATIN.	Soor ke churbee, HIND.

This is the fat about the loins of the hog, *Sus scrofa*. It is purified by melting and straining. Its melting point is from 78° to 88°. Fahrt.; inodorous and tasteless while fresh, readily grows rancid. Lard contains carbon 79·098, hydrogen 11·146, oxygen 9·756—proximately it consists of ealine 62, stearine and margarine 38 per 100. In the rancid state it contains the margaric and stearic acids, and a peculiar volatile acid. In Europe, hog's lard is much employed in ointments, but in India the strong prejudice against the article renders it desirable to exclude it as much as possible from all pharmaceutical preparations, substituting for it the "simple liniment."—*O'Shaughnessy, p.* 690.

(4344) HOG PLUM. SPONDIAS MANGIFERA.

(4345) HOLARRHENA CODAGA. APOCYNACEÆ, Icon. 1292.

Kooda pallie marum, TAM.

A white small sized wood and very fine grained employed in cabinet-making. Dr. Wight gives Holarrhena Malaccensis, in *Icones*. 1298.

(4346) HOLARRHENA PUBESCEN S Roora. Wood light. This species and the *H. antidysenterica* yield the *Indurjuo tulk* of the bazar. (See *Wrightia.*)—*O'Shaughnessy page* 449.

(4347) HOLCUS, a genus of Grasses belonging to the tribe *Aveneæ*. It has 2-flowered glumes, the lower perfectly awnless, the upper usually stameniferous, with a dorsal awn; the paleæ hardening on the fruit. There are two British species of this genus. *H. lanatus* has the upper glume obtuse, apiculate; the awn smooth, except for a short distance from the tip. It grows in meadows and pastures. *H. mollis* has the upper glume acute, and the awn rough throughout its whole extent. It grows in thickets or open places on a light soil. The *H. cernuus* of Willdenow, and the *H. sorghum* of Linnæus are now referred to the genus *Sorghum*. Fraas refers the Μέλινη of Theophrastus ('Hist. Plant.,' viii. 1. 3, 7, 10) to these grasses, and not the *Setaria Italica*, as had been done by previous authors. (Babington, *Manual of British Botany*; Fraas, *Synopsis Plant. Florœ Classicœ*).—*Eng. Cyc.*

(4348) HOLCUS SACCHARATUS. *Syn.* ANDROPOGON SACCHARATUS, Roxb. A native of Caffraria. Stalks thick, and full of a sugary medulla. Professor Arduino, (*Journ. Botanique*, iii. 168,) gives an account of his experiments on the extraction of sugar from this species. They were extremely satisfactory.—*O'Shaughnessy, p.* 637. This has been lately recommended in the United States as a sugar producing plant and for the sake of its juice. Its stalks furnish three important products, sugar, which is identical with that of cane,—alcohol, and a fermented drink analagous to cider. This juice, when obtained with care and in small quantities, by depriving the stalk of its outer coating or woody fibre and bark, is nearly colourless and consists merely of sugar and water. Its density varies from 1,050 to 1,075 and the proportion of sugar contained in it from 10 to 16 per cent, a third part of which is sometimes uncrystallisable.—*Am. Rep. Com. of Patents, page* 220.

(4349) HOLCUS SORGHUM. *Syn.* SORGHUM VULGARE: H. SACCHARATUS: ANDROPOGON SORGHUM.

Joar, Beng. & Hind.

Grown in fields and sown during the rains; it is the common food of the poorer classes, made when ground into cakes. A native of India, and cultivated in Peru, and in Europe; seeds very hard, rounded, very variable, sometimes entirely smooth, insipid, parenchyme farinaceous; but little different from maize in chemical composition. The stalks afford sugar, but in less quantity than the last species,—*O'Shaughnessy, page* 936.

(4350) HOLCUS SPICATUS. *Syn.* PENICILLARIA SPICATA, Willd.

Douranelle, Egypt. | Cambon, Tam.
Couz-couz, Africa. |

East Indies, cultivated in Europe—*O'Shaughnessy, p.* 637.

(4351) HOLIGARNA, a genus of Plants belonging to the natural order *Anacardiaceæ*. The berries of *H. longifolia* are manufactured in India into a well-known black varnish.—*Eng. Cyc.*

(4352) HOLIGARNA. Buch.

Biba Biba, Can.

Biba is, strictly speaking the Canarese name of the Chittagong Varnish tree, but the Natives of Canara, Dr. Buchanan informs us, are not as yet aware of its peculiar quality.—*Ainslie, Mat. Med. p.* 143.

(4353) HOLIGARNA LONGIFOLIA. *Roxb. Fl. Ind.* ii. p. 80, one of the trees yielding the well known black lacquer varnish.—*O'Shaughnessy.* This black varnish tree grows in the forests, of Tenasserim and on the other Coast, where the tree grows, its exudation is used by the natives to varnish shields, and for other purposes.—*Mason.* A fine black varnish from the fruit of *Holigarna longifolia*, is imported from Munnipore, as is another made from *Semecarpus Anacardium* (marking nut), and a remarkable black pigment resembling that from *Melanorrhœa usitatissima*, which is white when fresh, and requires to be kept under water. This turns of a beautiful black colour when applied to a surface, owing, according to Sir D. Brewster, to the fresh varnish consisting of a congeries of minute organised particles, which disperse the rays of light in all directions; the organic structure is destroyed when the varnish dries, and the rays of light are consequently transmitted.—*Hooker, Him. Jour. Vol.* II. *p.* 331.

(4354) HOLOSTEMMA RHEEDIANUM. Specimens of the flowers, leaves, immature pods, and stem, of a fibre-yielding plant, were presented by Capt. Hannyington, Political Agent at Purulea in Chota Nagpore, to the Agri-Hortic. Society in 1841. Capt. H. mentions that this plant is very abundant in the Hills about Purulea, and is also found in the neighbouring plains. It is known to the Coles by the name of *Apoong*. The fibre is said to attain its best condition after the rains. The Secretary mentioned that this plant was introduced into the Botanic Garden from Western India, and is well known to Dr. Wallich, who immediately recognized it as *Holostemma Rheedianum* of Sprengel, the *Ado-Modien* of the Hortus Malabaricus.—*Royle Fib. Pl. p.* 306.

(4355) HOLOTHURIADÆ, a family of animals belonging to the order Echinodermata.—*Eng. Cyc. Vol.* III, *page* 110. M. De Blainville's Echinodermata form the first class of his Actinozoa and the first order of that class consists of the Holothuridea, which are followed (Atinolagie, 1834) by the Echinidea, his second order, M. De Blainville thus defines the Holothuridea. "Body more or less elongated, sometimes subvermiform, soft or flexible on all sides, provided with tentaculiform suckers, often numerous, very extensible, completely retractile, and pierced by a great orifice at each extremity. Mouth anterior, at the bottom of a sort of funnel or prebuccal cavity, sustained in its circumference by a circle of fibro-calcareous pieces, and provided with a circle of arbuscular appendages, more or less ramified. Vent terminating in a sort of cloaca opening externally by a large terminal orifice. Generative organs terminating externally by a single mesial orifice at a little distance from the anterior extremity, and nearly marginal." In his 'British Star-Fishes,' Professor E. Forbes makes the following general observations on this family:—"A *Holothuria* may be regarded in one light as a soft Sea-Urchin, in another as a radiated animal, approximating to the Annelides. The radiation of the surface is more or less complete in all the genera of *Holothuriadæ*; the internal organisation is mostly bilateral. The skin is usually soft and leathery; in a few genera strengthened by calcareous or horny spines. Five avenues of suckers separate the body into as many longitudinal segments, which in the majority are of equal, or nearly equal dimensions. In some the suckers are developed only on one side, so that the animal when creeping presents in a manner a back and a belly. The suckers are similar to those of the true star-fishes and sea-urchins. Besides progression by means of these suckers, the *Holothuriadæ* move as Annelides, by the extension and contraction of their bodies. They have a mouth and an anus, each terminal, and placed at opposite extremities of their bodies. The mouth is surrounded by plumose tentacula, the number of which, when they are complete, is always a multiple of five; but as these animals are singularly subject to the loss or absence of parts in individuals of the various species, much confusion has arisen from the establishment of

suppositious species from characters founded on abnormal numbers of the parts. When Mr. De Blainville says that he has never heard that any of these animals were of much utility to mankind, but that M. Delle Chiaje does indeed inform us that the poor inhabitants of the Neapolitan coasts eat them, he appears to have forgotten the great oriental traffic carried on with some of the species, as an article of food, under the name of Trepang or Trapang, Biche-de-Mer or Beche-de-Mer. Captain Flinders fell in with a fleet of Malay proas at the English Company's Islands, north coast of Australia, near the Gulf of Carpentaria (1803), and was informed that sixty proas belonging to the raja of Boni, and carrying one thousand men, had left Macassar with the north-west monsoon, two months before, on an expedition to that coast. "The object of their expedition," writes Captain Flinders ('Voyage to Terra Australis'), "was a certain marine animal called Trepang. Of this they gave me two dried specimens; and it proved to be the Beche-de-Mer, or Sea-Cucumber, which we had first seen on the reefs of the east coast, and had afterwards hauled on shore so plentifully with the seine, especially in Caledon Bay. They got the Trepang by diving, in from three to eight fathoms water; and where it is abundant, a man will bring up eight or ten at a time. The mode of preserving it is this:—the animal is split down one side, boiled, and pressed with a weight of stones, then stretched open with slips of bamboo, dried in the sun, and afterwards in smoke, when it is fit to be put away in bags, but requires frequent exposure to the sun. A thousand trepangs make a 'picol' (of about 125 Dutch pounds); and one hundred picols are a cargo for a prow. It is carried to Timor, and sold to the Chinese, who meet them there; and when all the prows are assembled, the fleet returns to Macassar. By Timor seemed to be meant Timor-laoet; for when I inquired concerning the English, Dutch, and Portuguese there, Pobassoo (Captain Flinder's informant) knew nothing of them: he had heard of Coepang, a Dutch settlement, but said it was on another island. There are two kinds of Trepang: the black, called Baatoo, is sold to the Chinese for forty dollars the picol; the white or gray, called Koro, is worth no more than twenty. The Baatoo seems to be what we found upon the coral reefs near the Northumberland Islands; and, were a colony established in Broad Sound or Shoal-Water Bay, it might perhaps derive considerable advantage from the Trepang. In the Gulf of Carpentaria we did not observe any other than the Koro, or Gray Slug." Captain Phillip Parker King, who quotes a part of the above passage ('Survey of the Intertropical Coasts of Australia') found a fleet of Malay proas in the bay at Coepang (1818): it had just returned from an unsuccessful voyage on the south coast of Timor in search of trepang. Dramah, the principal raja of the fleet, gave Captain King the following information respecting the coast of Australia, which the raja had frequently visited in the command of a fleet that annually frequents its shores. The coast is called by them 'Marega,' and has been known to them for many years. A fleet to the number of 200 proas (but Captain King thinks that this number is perhaps very much exaggerated) annually leaves Macassar for this fishery; it sails in January, during the western monsoon, and coasts from island to island, until it reaches the north-east end of Timor, when it steers south-east and south-south-east, which courses carry them to the coast of Australia; the body of the fleet then steers eastward, leaving here and there a division of 15 or 16 proas, under the command of an inferior raja, who leads the fleet, and is always implicitly obeyed. His proa is the only vessel which is provided with a compass; it also has one or two swivels or small guns, and is perhaps armed with muskets. Their provisions chiefly consist of rice and cocoa-nuts; and their water, which during the westerly monsoon is easily replenished on all parts of the coast, is carried in joints of bamboo. "After having fished along the coast to the eastward until the westerly monsoon breaks up, they return, and by the last day of May each detached fleet leaves the coast, without waiting to collect in one body. On their return they steer north-west, which brings them to some part of Timor, from whence they easily retrace their steps to Macassar, where the Chinese traders meet them, and purchase their cargoes. At this time (1818) the value of the trepang was from forty to fifty dollars a picol; so that if each vessel returns with 100 picols of trepang, her cargo will be worth 5000 dollars. Besides trepang, they trade in sharks' fins and birds' nests, the latter being worth about 3000 dollars the picol." To this Captain King appends a note, stating that in 1822 the value of the trepang was much less, the price having fallen to 25 dollars the picol. In Crawfurd's 'Indian Archipelago' it is stated that the Slug, or Trepang, is sometimes as much as two feet in length and from seven to eight inches in circumference; a span long and two or three inches in girth is however the ordinary size. But quality and value do not depend upon its size, but upon properties not discernible by those who have not had much experience in the trade. In shallow water the animal is taken out by the hand, but in deeper water it is sometimes speared. When taken, it is gutted, dried in the sun, and smoked over a woodfire. The fishery is carried on from the western shores of new Guinea and the southern shores of Australia, to Ceylon inclusive. Indeed within the last few years it has been successfully prosecuted on the shores of the Mauritius. The whole pro-

duce goes to China. In the market of Macassar, the great staple of this fishery, not less than thirty varieties are distinguished, varying in price from 5 Spanish dollars a picol (133⅓ lbs.) to fourteen times that price, each variety being distinguished by well known names. The quantity of trepang sent annually to China from Macassar is about 7000 picols, or 8333 cwt; the price usually varying from 8 dollars a picol to 110 and 115 dollars a picol, according to quality. There is also a considerable export of trepang from Manilla to Canton.—*Eng. Cyc.*

(4356) HOLYHOCKS: ALTHEA ROSEA. VARIETIES.—Well worth cultivating on the plains during the cold months. Seeds should be sown thinly in wooden boxes successively during the rains. When they have formed 3 or 4 leaves they should be planted out in the flower garden. Nothing can excel their gaudy appearance, if planted in well prepared soil, where they will grow from 6 to 12 feet high. Owing to their rapid development, it is a doubtful matter if double flowers will ever be had on the plains. They take about six weeks or two months from the time of sowing to flowering. Native of China. —*Jaffrey.*

(4357) HOMALONEMA AROMATICA. *Syn.* CALLA AROMATICA. Roxb. Fl. Ind. iii. p. 513.

Kuchoo gundubee, BENG.

A native of Chittagong, tubers covered with the dried sheaths of the leaves, with long white fibres proceeding from every part. When cut they exhale an aromatic scent like ginger. As a stimulant it is highly esteemed in India. (*Roxb.*) —*O'Shaughnessy, page* 625. Wight figures also Homalonema Calyptratum, 799; and rubescens, 807.

(4358) HONE. A fine kind of stone obtained from Germany and Turkey, used for sharpening or setting cutlery. It is of a green colour, inclining to yellow, often marked with thin dentrical lines, and is moderately hard, having a fine close texture, resembling indurated clay.—*Waterston.*

(4359) HONEY.

Ussul-ul-nehl, Injubeen, ARAB.	Miele, IT.
Pya-ya, BUR.	Mel, LAT.
Meepanny, CYNG.	Ayer-maddoo, MAL.
Honig, Honing, DUT.	Shahud, PERS.
Miel, FR.	Med, RUS.
Honig, GER.	Madhu, SANS.
Mudh, GUZ.	Miel, SP.
Mudh, Shahud, HIND.	Tayn, TAM.
	Teyni, TEL.

Honey consists essentially of sugar, with variable proportions of gum, wax, and aromatic and colouring principles. It is nutritive and slightly laxitive. The best description of honey procurable in the bazars, is that brought from the Arabian Gulf.—*Faulkner.* It is obtained from Apis mellifica, Linn., Order Hymenoptera, Linn. This is the Honey-Bee which is officinal only on account of the Honey and Wax which it secretes or stores up. Honey is secreted by the nectaries of flowers, sucked by the Bee into its crop, where it undergoes some slight changes, and is then stored up in the comb. The finest honey is that which is allowed to drain from thence; and, if obtained from hives which have never swarmed, it is called Virgin Honey. It partakes of the properties of the plants from which the bees have collected it. When of fine quality it is liquid and viscid, but translucent having a fine, though peculiar odour, and a very sweet taste, but the best appears to some people slightly acrid, from the uneasiness experienced in the fauces. After a time honey becomes thick, white, and granular in texture. Inferior qualities are of a reddish brown colour, granular, and intermixed with impurities, and are usually obtained by pressure of the comb. Honey is soluble in water, and a great part is taken up by boiling Alcohol. It is composed of crystallizable, with some uncrystallizable sugar, a small proportion of Mannite and a little aromatic principle. The inferior qualities contain wax, some acid matter, and impurities. Diluted with water, it undergoes the Vinous fermentation, and Hydromel, or Mead, is produced. "Honey should be clarified by despumation before being used. A watery solution is not rendered blue by Iodide of Potassium added along with an acid," proving that it is not adulterated with Starch. Mel despumatum, M. Clarified Honey, is prepared by melting Honey in the vapour-bath, and then removing, the scum.—*Royle.*

(4360) HONEYSUCKLE: CAPRIFOLIUM. This genus is seldom to be found on the plains of India, in a very satisfactory condition: with few exceptions, they are generally natives of cold countries, requiring rich vegetable soil, grow freely from cuttings under glass, if not kept too damp. —*Jaffrey.*

(4361) HONGE.

Honge, CAN.	Hip-pe, CAN.
Nella Kalavalu, TEL.	Moha, HIN. and MAH.
Karanj, HIND. and MAR.	

Are two different trees grown in the woods of Mysore. Oil is obtained from both of their seeds. The oil of the former is very smoky and bad though clear to look at; but the oil of the latter (Hippay) is just as white and good as the Cocoanut oil. The Hip-pe trees are extensively planted in topes in front of villages, for the purpose of obtaining oil.—*M. E. of* 1857.

(4362) HOOPS. Are circular bindings of casks or barrels, formed of iron, twigs, bamboos, &c.—*Faulkner.*

(4363) HOORMUL. Seed. Lahoorie Hoormul; Harmalæ Semina Seeds of Peganum Har-

mala, gray, small, pyramidal and triangular: small, and are used as rue.—*Ben. Pl.* 297.

(4364) HOPEA DECANDRA, Buch. Ooroopa wood.

Ooroopa, Mal.

Ooroopa is the Malayalum name of a tree which the natives of that country prefer to Teak for building ships, being more durable and close grained.—*Ain's Mat. Med. p.* 207.

(4365) HOPEA ODORATA.

Shingan, Burmese.

This hopea is considered the most valuable indigenous timber tree in the southern provinces of Tenasserim; and at Tavoy and Mergui it is sawn up for building purposes. The best canoes are made of hopea, and it is used extensively in native boat building.—*Mason.*

(4366) HOPEA ODORATA, plentiful in the Tenasserim Forests, is scarce in Pegu, and a few trees are to be found about the vicinity of Rangoon. Light-brown wood.—*McClelland.*

(4367) HOPS.

Hope. Dut.	Humulus, Lupulus, Lat.
Houblon, Fr.	Chanel, Rus.
Hopfen, Ger.	Oblon, Sp.
Luppoli Bruscandoli, It.	

Humulus is a genus of Plants belonging to the natural order *Urticaceæ*. It has the following characters:—Flowers dioecious, Males with the perianth parted; stamens 5; females with the perigone scale-like, open, hidden by the scales of an oval catkin; stigmas 2, elongated. The Hop twines round hedges in many parts of Europe. It is truly wild in England, and is also found apparently wild in the United States of America. It has rough opposite cordate lobed leaves, and numerous greenish-white flowers, of which the sexes are distinct. In the male the flowers form loose drooping panicles, and each consists of 5 sepals, 5 stamens, and a convex centre representing the ovary. In the female the flowers are arranged in little axillary stalked scaly tufts; each consists of a naked ovary, with two spreading downy stigmas, and is inclosed by a concave bract. These bracts increase in size after the flowering is past, are collected into a loose head of imbricated scales, within which are placed the small seed-[illegible], or seeds, as they are usually [illegible]. The [illegible] Koro- [illegible] ority of the Hop, as an ingredi- [illegible] seems [illegible] uors, depends upon the fact of [illegible] near th[illegible]in itself several distinct and in- [illegible] just as [illegible] Hip- [illegible] polony [illegible] ts of activity, which the bitter [illegible] different times been employed [illegible] as a [illegible] vanta[illegible]t possess. The bitter prin- [illegible] pentari[illegible] everage a tonic quality and [illegible] Koro, [illegible] while at the same time an [illegible] ing, wh[illegible]s a warmth and stimulating [illegible] Survey [illegible] modifies the bitterness: it likewise [illegible]ns an astringent principle (tannin), the effects of which are to precipitate the vegetable mucilage, and thus to remove from the beer the active principle of its fermentation: every attempt therefore to substitute an ordinary bitter for that of the Hop must necessarily fail, unless a compound can be so artfully constructed as to contain in due proportions the principles of bitterness, astringency, and aroma. The aromatic bitter gives to the Hop a very marked power over the digestive organs when debilitated. A narcotic property has also been ascribed to this article, which is denied to it by some writers, who attribute the intoxicating power of beer entirely to the alcohol and carbonic acid which it contains. Yet there can be no doubt that tincture of hops, and even extract of hops, possess sedative powers, and often procure quiet and sleep, where opium cannot be borne. Decoction does not seem to be a judicious mode of preparation, and should not be practised. Lupuline has been administered alone, but this does not possess any advantages over the common plan.—*English Cyclopædia.* Two varieties of the Hop plant are particularly distinguished; one cultivated near Canterbury and in East Kent, of which both the plants and catkins are smaller; the latter ovoid, about an inch and a half in length, of a pale but lively yellowish-green colour, and of a fine aromatic fragrance. The West Kent or Sussex Hop grows to a much larger size, is considered hardier, and its catkins are about two and a half, sometimes four inches in length, but do not bring so high a price in the market as the East Kent Hops. As root-sets from the female plants are alone planted by cultivators, the author was led to inquire how the seed was perfected? and if not, whether the Hop glands were produced in as great abundance and perfection as they might be if some *male* were set along with the *female* plants. He is informed by Mr. Alderman Masters of Canterbury that some *male* blossoms are always produced on the female plants, and suffice for the purpose of fertilizing them. Dr. Royle has been unable to learn whether the female ever changes into a male plant, or *vice versa*, as has been observed with the Nutmeg plant. He mentions, that, owing to the kindness of the above gentleman, as well as of Joseph Royle, Esq., of Stuppington, where the finest Hops are grown, he has been enabled to introduce the Hop plant into the Himalayas, where it is now flourishing alongside of the China Tea plant. The root-sets, with the ends dipped in wax, wrapped in cotton, and enveloped in caoutchouc cloth, were sent by the overland mail to the East India Company's Botanic Garden at Sharunpore. They arrived there in a living state, as reported by Dr. Jameson, and have produced fine plants, as well as the seeds sent with them. The successful cultivation of Hops would make malt liquors more within the reach of European soldiers, and assist in detaching them from the perni-

cious spirituous compounds of the bazars, which now destroy the health and shorten the lives of thousands. Well *hopped* ale, moreover, is well known to be one of the best stomachics and tonics for convalescents from many Indian diseases. —*Action. Uses.* Stomachic and Tonic, slightly Narcotic. The property of Hops of giving the bitter to Beer, and, by preventing acetous fermentation, of enabling it to be kept much longer, is well known. To it no doubt is owing a portion of the stomachic properties of malt liquor, as we see exemplified in the bitter, often called Indian, ales. Hops are Hypnotic, especially when stuffed into a pillow, but they should be first moistened with Spirits, to prevent the rustling noise. Fomentations also have been used. Hops are thought to be Diuretic (as is also the root), and to be useful in correcting Lithic acid deposits.—*Royle. Eng. Cyc.*

(4368) HORDEUM, the genus of Plants to which the corn called Barley belongs. It is distinguished from *Triticum*, or the Wheat genus, by its spikelets having only one perfect floret in each, and by its glumes being somewhat unilateral and bearded; Rye, or Secale, differs in having two perfect florets to each spikelet, and in the same additional circumstances as *Triticum*. As many as 15 species of *Hordeum* are distinguished by Professor Kunth, the latest writer upon the subject; in addition to which there are many varieties. The species are found wild in various places in both the Old and New World: as many as eight inhabit America. In the application of their botanical names to the cultivated barleys there is some confusion, one writer distinguishing four species, another six, and some a greater number. It does not appear possible to determine, upon existing evidence, which of these opinions is most correct; the probability however seems to be that there are not more than four, or at the utmost six species, which may be readily distinguished by attention to the following circumstances:—The 1-flowered spikelets of Barley grow in threes, on opposite sides of the ear. If all the spikelets are perfect, the grains of corn are therefore necessarily arranged in six lines or rows; these rows may be very distinctly arranged, as in *H. hexastichum*, or they may be disposed in an irregular manner, as in *H. Ægiceras*. But if the lateral spikelets of each parcel are imperfect all along the ear, the middle spikelet alone producing a grain of corn, the grains in that case will be in two rows only, as in *H. distichum* and *H. Zeocriton*. Of these two distinct forms there are some in which the grain adheres to the paleæ, or husk, as in common Barley, and others in which the grain is free from the husk, as in Naked Barley. It is generally supposed that barleys of the second kind are mere varieties of those of the first kind; but there is no proof of the correctness of the opinion, and probability against it. These characters and a few others being attended to, cultivated barleys may be arranged under the following heads:—Of most of the species there are many varieties, the most striking of which are those called 'Black Barleys,' on account of the dark colour of their husks. They are not of sufficient importance to require particular notice, except in works treating of agriculture in great detail. —*Engl. Cyc.*

(4369) HORDEUM ÆGICERAS (Royle's Manuscripts). Ears cylindrical; florets arranged in a confused manner, not in rows; awns soft, short, hooded, and bent downwards; grains loose in the husk. A most curious species, found in the northern parts of India, and probably in Tartary, as its grains have been sent to England under the name of 'Tartarian Wheat.' Its appearance is more that of wheat than of barley, and its naked grains assist the resemblance. It is however a genuine species of *Hordeum*. It appears to be a productive plant, but little is as yet known of its quality in the climate of England.

(4370) HORDEUM DISTICHUM (Linn., 'Sp. Pl.,' 125). Ear cylindrical; awns almost parallel with the ear; grains adhering to the husk. This is the common Summer-Barley of England, and that which cultivators seem to prefer; its ears are not so large as those of *H. hexastichum*, but the grains are heavier. It is commonly stated to be a native of Tartary. Colonel Chesney found it wild in Mesopotamia, upon the banks of the Euphrates.—*Eng. Cyc.*

(4371) HORDEUM GYMNODISTICHUM (Lowe's 'Elements of Agriculture,' p. 238.) Ear cylindrical; awns almost parallel with the ear; grains loose in the husk. Naked Barley, a species but little cultivated now, is of unknown origin. It is said to have been introduced into England in the year 1768; but it is reported to have preserved its characters unaltered from time immemorial in some parts of Europe.

(4372) HORDEUM HEXASTICHUM (Linn. 'Sp. Pl.' 125), Ears cylindrical; awns very long, rough, and rigid, rather spreading away from the ear; grains adhering to the husk. It does not appear in what way the *H. vulgare* of Linnæus differs from this. Professor Lowe has justly remarked that there is no such thing as a barley with the grains growing in four rows, the circumstance by which Linnæus defined his *H. vulgare*, and that all such appearances are merely imperfect states of *H. hexastichum*. The native country of this species is unknown: it is the Bere, Bigg, or Winter Barley of farmers, and is particularly valuable for ripening quicker than the common Two-Rowed Barley; its grains are however lighter, and it is considered an inferior species to the last. To northern nations with short summers it is however invaluable.—*Eng. Cyc.*

(4373) HORDEUM GYMNO-HEXASTICHUM (Lowe's 'Elements of Agriculture,' p. 238). Ear cylindrical; awns very long, rough, and rigid, rather spreading away from the ear; grains loose in the husk. The origin of this, the Naked Six-Rowed Barley, is unknown. It is extremely productive, and in some parts of Europe it is reckoned the most valuable of all. The French call it, on account of its good qualities, Orge Celeste.—*Eng. Cyc.*

(4374) HORDEUM ZEOCRITON (Linn., 'Sp. Pl.,' 125). Ears conical; awns spreading away from the ear, in a flabelliform manner; grains adhering to the husk. From the spreading direction of the awns, the ears of this barley acquire a much broader figure at the top than at the bottom, on which account it has been called Battledore Barley; it also bears the name of Sprat-Barley. It is little cultivated in England, because of the shortness of its straw; its native country is unknown.

(4375) HORDEUM VULGARE, H. HEXASTICHON.

Jow, Guz. Hind.

Oats, and rye are the staple crops of northern and mountainous Europe and Asia. In England barley is grown principally in the eastern and some of the midland countries, and chiefly for malting. It is most extensively cultivated in the Himalaya and Thibet, replacing in many districts the wheat, and producing an admirable flour. Since the establishment of the studs at Buxar, Ghazepore, &c., oats have been extensively cultivated. It is a winter crop. Although believed to have been indigenous to the countries bordering on the torrid zone, this grain possesses the remarkable flexibility of maturing in favorable seasons and situations on the eastern continent as far north as 70 deg., and flourishes well in lat. 42 deg. south. Along the Atlantic side of the continent of America, its growth is restricted to the tract lying between the 30th and 50th parallels of north latitude, and between 30 and 40 deg. south. Near the westerly coast, its range lies principally between latitude 20 and 62 deg. north. The barley chiefly cultivated in the United States is the two-rowed variety which is generally preferred from the fullness of its grain and its freedom from smut. Barley has never been much imported from that country, as the Americans have been rather consumers than producers. The consumption of barley there in 1850 in the manufacture of malt and spirituous liquors amounted to 3,780,000 bushels, and according to the census returns, the quantity of barley raised was 4,161,504 bushels in 1840, and 5,167,213 bushels in 1850. In England barley is extensively used for malting, distilling, and making beer; large quantities are consumed in Scotland, or carried into England. In Prussia, about 1 and a half million hectolitres of barley are ann ally raised. In the Canary Isles, about 354,0 bushels are annually exported. In Van Diemen Land in 1844, 175,405 bushels of barley we grown on 12,466 acres. The quantity of barl made into malt in the United Kingdom in t year ending 10th October, 1850, was 5,183,6 quarters, of which about four million quarte were used by 8,500 maltsters. The quantity malt charged with duty in the year ending 5 January, 1851, was 636,641 tons; the avera price per quarter, 26s. 2d. Barley is at prese extensively cultivated in the temperate distric and islands of Europe, Asia, Africa and Austr lia. In Spain, Sicily, the Canaries, Azores ar Madeira, two crops are produced in a year. I North America its growth is principally confine to Mexico, the middle, western, and northe States of the Union, and to the British Nort American provinces. The introduction of barle into the American colonies may be traced bac to the period of their settlement. By the ye 1648 it was raised in abundance in Virginia, bu soon after its culture was suffered to decline, i consequence of the more profitable and increase production of tobacco. It has also been sparing ly cultivated in the regions of the middle an northern States for malting and distillation, an has been employed, after being malted, as a sub stitute for rice. Barley, like wheat, has bee cultivated in Syria and Egypt for more tha 3,000 years, and it was not until after the Ro mans adopted the use of wheaten bread, that the fed their stock with this grain. It is evidentl a native of a warm climate, as it is known to b the most productive in a mild season, and wil grow within the tropics at an elevation of 3,00(to 4,000 feet above the level of the sea. It i one of the staple crops of northern and moun tainous Europe and Asia. It is the corn that next to rice, gives the greatest weight of flou per acre, and it may be eaten with no other pre paration than that of boiling. It requires littl or no dressing when it is sent to the mill, having no husk, and consequently produces no bran In this country barley is chiefly used for malting and distilling purposes. In the year 1850, 40,745,050 bushels of malt paid duty, the num ber of maltsters in the United Kingdom being from 8,000 to 9,000. About one and half million quarters of barley were imported in 1849, and a little over a million quarters in 1850, principally from Denmark and Prussia. The counties in England where this grain is chiefly cultivated are Norfolk, Suffolk, Cambridge, Bedford, Herts, Leicester, and Nottingham. The produce of barley on land well prepared, is from thirty to fifty bushels or more per statute acre, weighing from 45 to 55 lbs. per bushel, according to quality. It is said to contain 65 per cent. of nutritive matter, while wheat contains 78 per cent. The

estimated average produce of barley in this country may be stated as follows:—

	Acres.	Crop.
England,.....	1,500,000	 6,375,000
Ireland,.....	320,000	 1,120,000
Scotland,.....	450,000	 1,800,000
	2,270,000	9,295,000

The average produce per acre, in the United Kingdom, is 4¼ quarters in England, 3½ in Ireland, and 4 in Scotland. The prices of barley per quarter have ranged, in England, from 36s. 5d in 1840, to 27s. 6d. in 1842. In 1847 barley reached 44s. 2d., and gradually declined to 23s. 5d. in 1850.—*Simmonds' Comm. Prod. p.* 256.

(4376) HOREHOUND WHITE, PATCH LEAVES.

Pucha Pat, BENG. | Marrubium Indicum, LAT.
Patch Putta, GUZ. HIND.

These leaves are of a whitish-gray colour, having a woolly appearance, and possessing a faint agreeable odour, and a sharp bitter taste. That met with in Bombay, is imported from Singapore and is used in various ways by the natives, but chiefly as an ingredient in Gooracoo, and when combined with other herbs, for scenting the hair of women. The essential oil is in great request for imparting the peculiar fragrance of the leaf to clothes among the superior classes of the natives.—*Faulkner.*

(4377) HORN.

Hoorn, DUT. | Cornu, LAT.
Corne, FR. | Sing, GUZ. HIND.
Horn, GER.

Horn is distinguished from bone by being soft, tough, semi-transparent, and susceptible of being cut and pressed into a variety of forms. They are extensively used in the manufacture of handles for knives, walking sticks, and in that of spoons, combs, lanthorns, snuff-boxes, powder flasks, &c. Glue is sometimes made of the refuse of horns. Buffaloe and Deer horns are largely exported from Bombay to England; and Cow and Rhinoceros horns occasionally in small quantities.—*Faulkner.* Horns and Bones of various animals are brought to China in junks from the adjacent countries and islands, and form an important article of import with the native vessels. Buffaloes' horns are worked into lanterns, some of which are highly elegant; the manufacture of small boxes in which to put opium to carry it about the person, annually consumes many hundred pecals. Handles, buttons, and other useful articles, are also made; and the bones are burned into lime. In a single year, 502 peculs have been brought to Canton.—*Morrison.*

(4378) HORNS RHINOCEROS. The best sort comes from Cochin China, and sell at times for $300 a piece; an inferior sort comes from India, of which some probably are from southern Africa, which are sold for $30 and upwards a piece. The Chinese work the finest pieces into elegant cups and other articles, but the most of the importation is used as a medicine; it also forms an article of commerce in the Chinese junks trading to Japan. *Brass Leaf*, or *tinsel*, is manufactured by the Chinese to an enormous extent for making the *kin hwa* or 'golden flowers,' used in worship. It is exported to India; in boxes estimated to hold 50 catties. Also *tin-foil* to a small amount. —*Morrison, page* 143.

(4379) HORNS AND ANTLERS, are exported from Madras, No. 919839, cwt. 2189, Rs. 1,00,218. These are the dense Antlers of the "Samber" (Cervus hippelephas,) of the "barking deer" (Cervus muntjac,) of the "Axis" (Cervus axis,) the Neilghai (Damalis Rusa) and other species of Indian Deer—also horns of the Indian Buffalo, Ox, and Antelope. Horns are procurable all over India. Those for the Madras export market chiefly from Hydrabad in the Dekhan and are exported to the United Kingdom, France, Bengal, Bombay, and Ceylon. Ivory, buffalo and deer horn, porcupine quill, &c., such as chess boards, work and knitting boxes, tea-chests and tea-caddies, ink stands, baskets &c., which are lined with sandal-wood, and generally very neatly got up are made at Vizagapatam. But samples sent home to a well known establishment in London, were not considered suited to the English market. They are indeed far surpassed, both in cheapness and workmanship, by articles of a similar description, the produce of German industry, which are largly exported to England. The following are selling prices.

	Rs.	A.	P.
Ivory backgamon board, ...	85	0	0
Do. fluted envelope case, ...	25	0	0
Do. knitting box, ...	12	0	0
Sandalwood and ivory box, ...	8	0	0
Porcupine quill do., ...	8	0	0
White elk-horn inkstand, ...	12	0	0
Black do. do., ...	18	0	0
Porcupine quill, ivory and buffalo horn work box, ...	35	0	0
White elk-horn do., ...	30	0	0
Buffalo horn do., ...	18	0	0
Do. do. tea chest, ...	13	0	0
Sandalwood and ivory basket,... ...	18	0	0
Porcupine quill basket,...	5	0	0

(4380) HORNBEAM. An indigenous British tree (*Carpinus Betulus*) common in copses. In appearance it is graceful, resembling the beech. Its wood is tough, and well suited for toolhandles, cogs, and for other purposes in which strength is required, but it is coarse, and unfit for cabinet work.—*Waterston. Faulkner.*

(4381) HORNBILLS, a family of Birds named after the genus Buceros, Buceridae. They constitute a family of birds, the construction of whose

bills arrests the attention at first sight, and ornithologists have not been entirely agreed as to the situation which the form ought to occupy in the series.—*Eng. Cyc. Vol.* III, *p.* 123. *B. Rhinoceros*, Rhinoceros Hornbill. This species is to be found in most collections, and though there may be some variety from age and circumstance, the bill will be generally found to be about 10 inches long and of a yellowish-white, the upper mandible red at the base, the lower black. The horn, or casque, varied with black and white. The body black, of a dirty white below and posteriorly; tail about 12 inches, the feathers white at the base and tip, black in the middle; feet and claws obscure gray. It is a native of India and the Indian Islands (Sunda, for instance). *B. cavatus*: Throat, ear-coverts, circle round the eye, and a narrow-band at the occipital edge of the protuberance of the beak, black; neck dirty straw-colour, the feathers of the back of the neck elongated; body and wings black, greater coverts and quill-feathers tipped with white; thighs, upper and under tail-coverts, white; so is the tail also, with the exception of a broad black band about three inches from the tip; beak yellowish, inclining to scarlet at the tip, under mandible black at the base; tarsi black. (Gould.) The food of the *Buceros cavatus*, like that of other Hornbills, consists of fruits, berries, flesh, and even carrion; in short, it may be considered as strictly omnivorous. (*Gould.*) It is a native of India, the Himalaya Mountains. Java, and most of the Islands of the Archipelago.—*Eng. Cyc. Vol.* III, *page* 139.

(4382) HORRE. A hard, though coarse, open-grained, heavy Ceylon wood.

(4383) HORSE. The horse has been immemorially domesticated by most of the more advanced nations of the Malay Archipelago, wherever it could be made use of. The chief exceptions are the Malay peninsula, the eastern seaboard of Sumatra, and nearly the whole of Borneo; countries in which the people dwell on the marshy banks of rivers, in which there is not even a bridle-path, and fit, therefore, only for the boat and the buffalo. The native horse is always a mere pony, seldom reaching 13 hands high, and more generally of about 12 hands. There are many different breeds, every island having at least one peculiar to itself, and the large islands, several. Beginning with Sumatra, we have here at least two distinct races,—the Achin and Batubara, both small and spirited, but better adapted to draught than the saddle. Of all the countries of the Archipelago, Java is that in which the horse most abounds, and here we find several different breeds, as those of the hill countries, and those of the plains. Generally, the Java horse is larger than that of Sumatra, but in the language of the turf has less blood and bottom. The lowland horses, the great majority, are somewhat coarse and sluggish, but the upland spirited, smaller, and handsomer. The horse, although of a very inferior breed, is found in the islands of Bali and Lomboc, but the next island to these eastward, Sumbawa, produces the handsomest breeds of the whole Archipelago. They are the Arab of the Archipelago, yet the blood is not the same as the Arab, for the small horse of Sumbawa, although very handsome, wants the fine coat and the blood head of the Arabian. There are in this island, and adjacent islets, three different races, that of Tambora, of Bima, and of Gunung-api, the last being most esteemed. Next to Java, horses are most abundant in Celebes. These are inferior in beauty to those of Sumbawa, but excel all others of the Malayan portion of the Archipelago, in combining the qualities of size, strength, speed, and bottom. A very good breed is produced in Sumba, called in our maps Sandalwood Island. But perhaps the best breed of the whole Archipelago, although still but a pony, is that of the Philippines. It is superior in size to any of the breeds of the western islands, which it may owe to the superior pastures of the Philippines, and, possibly, to a small admixture of the Spanish horses of America, although this last is, by no means, an ascertained point. Generally, the horses of the Archipelago are hardy, surefooted, and docile. The horses are all entire, and the mares used only to breed and as beasts of burden. By the natives of the Archipelago the horse is only used for the saddle or to carry burdens, and never for draught, either for plough, or wheel-carriage. To see horses drawing a native carriage, except in imitation of Europeans, we must go to the sculptures on ancient temples in Java, where they are thus represented. In two islands only of the Archipelago is the horse found in the wild state, Celebes and Luzon, the only ones that are known to have extensive grassy plains fit for its pasture, and in these it is caught by the lasso and broke in as in the Llanos of America. In such situations it is certainly far more likely to have become wild from the domestic state than to be indigenous. In so far as Celebes is concerned this view is rendered probable by the name being a corruption to the Javanese in one language of that island, the Wugi, while in another, the Macassar, the horse is called "the buffalo of Java." In the Philippines it is not even alleged that the wild horses are anything else than domesticated ones become so. In Pigafetta's enumeration of the domestic animals of Cebu, he makes no mention of the horse. In the city of Manilla a pair of good riding horses costs from 100 to 120 dollars, and a pair of carriage horses from 20 to 30. Of course they are much cheaper in the provinces where they are reared. The horses of Sambawa, Celebes and Sumba, are largely exported to Java, to the British settlements in the Straits of Malacca, and

even as far as the Mauritius. In Batavia a good Bima or Batak horse is worth from 10*l.* to 15*l.* —*Crawfurd Dictionary, page* 155. The horse commonly seen in China is a mere pony, not much larger than the Shetland pony: it is bony and strong, but kept with little care and presents a worse appearance than it would if its hair were trimmed, its fetlocks shorn, and its tail untied. This custom of knotting the tail is an ancient practice, and the sculptures at Persepolis show that the same fashion prevailed among the Persians. The Chinese language possess a great variety of terms to designate the horse; the difference of age, sex, color and disposition are all denoted by particular characters.—*Williams' Middle Kingdom, page* 253. The Tanghan, of Thibet are wonderfully strong and enduring; they are never shod, and the hoof often cracks, and they become pigeon-toed: they are frequently blind of one eye, when they are called "Zemik" (blind ones), but this is thought no great defect. They average 5*l.* to 10*l.* for a good animal in Tibet; and the best fetch 40*l.* to 50*l.* in the plains of India, where they become acclimated and thrive well. Giantchi (Jhansi-jeung of Turner) is the best mart for them in this part of Tibet, where some breeds fetch very high prices. The Tibetans give the foals of value messes of pig's blood and raw liver, which they devour greedily, and it is said to strengthen them wonderfully; the custom is, I believe, general in central Asia. Humboldt (Pers. Nar. iv. p. 320) describes the horses of Caraccas as occasionally eating salt meat.—*Hooker, Him. Jour. Vol.* II. *p.* 131. The Thibetan pony, though born and bred 10,000 to 14,000 feet above the Sea, is one of the most active and useful animals in the plains of Bengal, powerful and hardy and when well trained early, docile, although by nature vicious and obstinate.—*Hooker, Vol.* 1. *p.* 118.

(4384) HORSE RADISH, Europe.

Cran de Bretange, Fr. | Raphanus-rusticanus, Lat.

The pungent root of the *Cochlearia armoracia*, a perennial plant common in moist places. It is used as a condiment, and is besides an article of the materia medica. *Waterston.—Faulkner.*

(4385) HORSE RADISH TREE. Moringa Pterygosperma. Hyperanthera Moringa.

(4386) HORSE RADISH, Indian.

Hubul-ban (seeds), Arab.	Moriaben, Pers.
Sujna, Beng.	Sigroomalla, Sobhanjum, Sans.
Sohunjana, Duk.	
Moonga-ka-jar kajar, Sujna, Hind.	Sagut-ka-jhar-kejur, Hind.
	Moorunghy Vayr, Tam.

The root of a tree (*Hyperanthera Moringa*, vern, *Sagul*), commonly cultivated all over India for its leaves, flowers, and pods, which are used in curries, and served up as vegetables. The roots have precisely the same flavour as the English horse radish, for which they are not unfrequently substituted, and seem identical in chemical composition. The long pods, when boiled and used as a vegetable, have much the flavour and taste of asparagus.—*Faulkner.*

(4387) HOYA VIRIDIFLORA, is one of a genus of plants belonging to the natural order *Asclepiadaceæ*, the species of which occurring in Southern Asia, are:—Hoya carnosa, fusca, lanceolata, linearis, ovalifolia, pallida, parasitica, pottsii, pauciflora, pendula, and viridiflora. This last species is a native of Coromandel, Sylhet and the Nilgherry hills. The root and tender stalks produce nausea and promote expectoration. The leaves peeled and dipped in oil are used by the natives of India as a discutient in the early stages of boils and in the more advanced stages to promote suppuration. Several of the species, under the name of Wax plants, are cultivated in England on account of their elegant flowers.—*Voight. Wight. Eng. Cyc.*

(4388) HUBB-OOL-MOOSHK,

Mushkdana, Hind. | Callee Dustooree, Beng.

or musk seeds, so named on account of their odour. Hubool mooshk, (formerly Hibiscus Abelmoschus,) now Abelmoschus moschatus. The plant abounds in mucilage, which is employed in the West Indies and in North Western India in the process of clarifying sugar. Its seeds are scented as if with musk hence their name, and are employed in India as a cordial Medicine and in Arabia are added to coffee.

(4389) HULDEE. Turmeric.

Curcuma Longa, Hind

There are four species of this plant, one a small and very fine sort; the other longer and coarse; the third, the Ambie, used chiefly as medicine, the fourth a wild species. That which is cultivated for domestic culinary purposes is sown in beds like ginger, and when ripe in twelve months taken up and dried. It is extensively cultivated in most parts of India, and sells, green, from eight to eighteen seers the rupee.

(4390) HULEEM. Arabis Chinensis; Cress.

(4391) HUMEA ELEGANS. Compositæ. This plant is a native of New South Wales, grows to the height of five or six feet, colour of the flower red, and well adapted for borders: it requires a good soil.—*Riddell.*

(4392) HURA, a genus of Plants belonging to the natural order *Euphorbiaceæ*. It has monœcious amentaceous flowers; the male flowers have a truncate calyx; numerous stamens united into a solid column; female flowers with 1 style; stigma with 12 or 18 rays; capsule with 12 or 18 cocci.—*Eng. Cyc.*

(4393) HURA CREPITANS. Euphorbiaceæ. The Sand-box tree; a small armed tree of rapid growth. The fruit resembles a small orange without the peel, and when ripe, its

numerous valves burst with an elastic jerk. The *H. crepitans*, or Sandbox-Tree, is a native of the West India Islands, Mexico, and Guyana. It is a tree abounding in milky juice. Leaves cordate, acuminate, entire, or very slightly toothed, stalked, smooth, coriaceous, with simple veins passing from the midrib to the margin in a curved direction, within a quarter of an inch or so of each other, and connected by numerous oblique veinlets; stipules large, ovate, leafy, deciduous; petioles as long or rather longer than the leaves, with 2 glands at the apex. Male flowers arranged in an erect long-stalked axilliary conical catkin, composed of imbricated 1-flowered scales; calyx short, urceolate, truncate; column of stamens surrounded in the middle by 2 or 3 rows of tubercles, each of which bears an anther on its under side. Female flower solitary at the base of the male peduncle, or near it; calyx urceolate, entire, or dividing eventually into 3 parts; stigma very large, discoidal, peltate. Fruit a depressed umbilicated woody capsule, about the size of a middling apple, with from 12 to 18 furrows, which separate into as many cocci, which fly asunder, each opening into two valves with great elasticity when dry and fully ripe. The milk is so venomous as to produce blindness in a few days after touching the eye. Seeds a violent drastic dangerous purgative. Aublet states that negro slaves to whom one or two seeds had been administered in the form of an emulsion, were nearly killed by them. —*Eng. Cyc.*

(4394) HURALA, Can. There are four sorts of the seed, grown in Mysore, viz. Maraharatta, Chitta Haralu, Dod-da Haralu, and Turaka Haralu. They are called in English, Lamp oil seeds. The second and third are largely exported to the adjacent countries.—*M. E. of* 1857.

(4395) HURRIA, Daudin's name for certain Indian Colubers, the scales or plates on the base of whose tails are constantly simple, and those of the point double.—*Eng. Cyc.*

(4396) HURRICANES. These hurricanes at the season of their occurrence (from December to April) form the great topic of interest and discussion in the Mauritius: in fact they talk of little else at that period. The immediate cause of these atmospherical phenomena has been supposed to be a disturbance of the equilibrium in the air that takes places at the change of the monsoons. This period of strife lasts about a month and then the hurricanes rage with terrific violence. Bedfield, Read and others have explained the laws by which they suppose them to be governed and their hypothesis is perfectly well known and understood by the Mauritians. The islands of Mauritius, Bourbon and Roderique lie directly in their ordinary track and if either of them happens to fall within the vortex of one of these hurricanes the consequences to life and property are terrible indeed. Of those residing at Mauritius who have earnestly studied and discussed the laws which govern these storms may be mentioned Dr. Thom, whose writings are well known, Lieutenant, Fryers of the royal engineers, and Mr. Sedgewick, who has published a little work, which he calls "The True Principle," and which has been reviewed by Dr. Thom, and, lastly, a gentleman attached to the observatory at Mauritius, Mr. Bosquett. This last named gentleman who has translated into French Piddington's Horn book with annotations of his own, claims to be able, by careful and constant meteorological observations, to foretell the existence of hurricanes in the Indian ocean and to describe the course they will take. The day before the Mississippi left Mauritius, he informed the Commodore that a cyclone was then blowing in a direction E. by N. from the island and that it would pass to the southward and eastward. By reference to the chart in Piddington's Horn book, it will be seen that these cyclones never extend to the northward of 10° or 12° south latitude in the meridian of Mauritius. Therefore vessels leaving the island in the hurricane season, for any part of India, should steer to the northward passing well to the westward of the Cargades, a most dangerous group, thus keeping a clear sea open to the westward, that there may be nothing in the way should it be desirable to run to the northward and westward, which would be the true course to take in case of encountering the southwestern or northwestern quadrants of a cyclone (which in the hurricane season a vessel from Mauritius is in danger of,) and this course she should keep until she is sufficiently far north to be beyond its influence. Steamers of course have superior means of avoiding these storms as they have the power of steering the most judicious course to escape from their greatest fury.—*American Expedition to Japan, p.* 137.

(4397) HURTAL, Persulphuret of Arsenic: Orpiment. There are two kinds, viz. Gobheri hurtal, in yellow flakes, used in oil painting, one seer costs one rupee four annas. Tabki hurtal, greenish crystallized: given by fakeers in fumigation: one ruttee of it is wrapped up in a leaf of "Muggarbel," and smoked in a hookah: it is evident that the smoker only escapes dangerous consequences, owing to the heat volatilizing most of the arsenic: as it is, the little inhaled often makes the person senseless, salt is then given to restore the senses: thus employed, tabki hurtal is considered a most powerful aphrodisiac, it is also used in ointments: costs three rupees for one seer.—*Genl. Med. Top.* p. 137.

(4398) HYACINTH, a Mineral, consisting of silica and zirconia, transparent, and of a red colour.

(4399) HYACINTHUS, a genus of Plants belonging to the natural order *Liliaceæ* and the

tribe *Scillceæ*. One of the most common of four garden plants is the *H. orientalis*. The genus formerly included two species of British plants, which are now referred to the genera *Endymion* and *Muscari*.—*Eng. Cyc.*

(4400) HYACINTHUS ORIENTALIS. These well known plants in Europe, are much esteemed for their beautiful and ornamental appearance, they are grown both in beds and glasses of water, the H. Orientalis is one of the most beautiful and fragrant : native name Sambul ; bulbs of different species are easily procurable from China. —*Riddell.*

(4401) HYÆNINA, the name of a family of Digitigrade Carnivorous *Mammalia*, distinguished by having their fore legs longer than their hind legs, by their rough tongue, great and conical molar, or rather cutting-and-crushing teeth, projecting eyes, large ears, and a deep and grandular pouch beneath the anus.

Dental Formula:—Incisors, $\frac{6}{6}$; canines, $\frac{1\text{-}1}{1\text{-}1}$; molars, $\frac{5\text{-}5}{4\text{-}4}$=34.

The false molars, three above and four below, are conical, blunt, and very large. The upper flesh-tooth (carnassiere) has a small tubercle within and in front, but the lower one has none, and presents only two trenchant points. The whole of the dental and molar organisation, and indeed the whole cranial structure, appears to have been formed with a view to the bringing into the most available action the formidable natural instruments which enable the Hyænas to break the hardest bones.

(4402) HYDNOCARPUS. The "Took" one of this genus grows in the Teesta valley in Sikkim. It is a beautiful evergreen tree, with tufts of yellow blossoms on the trunk : its fruit is as large as an orange, and is used to poison fish, while from the seeds an oil is expressed.—*Hooker Him. Journal Vol.* II. *page* 7.

(4403) HYDNOCARPUS INEBRIANS. *Flacourtianeæ*. Icon. 942.

Marravuttay marum, TAM.

A large tree, little is known of the wood, the berry is used for poisoning fish. Wight No. 51, Tinnevelly, Travancore 37. A common tree on the west coast, not so in the Coimbatore jungles. The quality of the wood is unknown.—*Wight.*

(4404) HYDNOCARPUS VENENATA, of Ceylon, allied to this order, has poisonous fruit, and induces intoxication.

(4405) HYDRANGEACEÆ, *Hydrangeads*, a natural order of Exogenous Plants consisting of shrubs, with perfectly opposite simple leaves, smooth or downy, with simple hairs, destitute of stipules, sometimes, creeping and rooting like ivy. Flowers usually in cymes ; those in the centre male, the marginal often sterile, and furnished with larger petals than the others. Calyx adhering more or less to the ovary, 4- or 6-toothed. Petals 4 or 6, inserted within the edge of the calyx, deciduous. Stamens 8 or 12, in two rows, inserted in the orifice of the calyx, distinct, deciduous. Anthers oblong or roundish, pollen with three longitudinal furrows. Ovary more or less adherent to the calyx, consisting of from 2 to 5 carpels, adhering by their sides, and forming an incompletely 2-or 5-celled cavity ; placentæ distinct from each other, but touching with many anatropal ascending or horizontal ovules ; styles as many as the carpels, perfectly distinct, diverging, with simple reniform stigmas. Fruit a capsule crowned by the permanent diverging styles, 2- or 5-celled, with a number of minute seeds, sometimes indefinite sometimes few, in consequence of the abortion of a part of the ovules. Testa thin, membranous, netted, occasionally expanded into a wing. Embryo orthotropal in the axis of a small quantity of fleshy albumen. The relationship between Hydrangeads and Saxifrages is admitted by all systematists, who have in general united them in the same order. Lindley places this order between *Saxifragaceæ* and *Cunoniaceæ*, and near *Philadelphaceæ* and *Caprifoliaceæ*. It differs from *Hensloviaceæ* mainly in its indefinite seeds, small quantity of albumen, and constant tendency to produce a superior ovary. Out of the species hitherto discovered, all of which inhabit the temperate parts of Asia and America, two only belong to the southern hemisphere, and twenty-three or about one-half to China and Japan. The species are found naturally in moist shady places. None of them appear to be of much use to man.

(4406) HYDRANGEA, is a well-known genus of hardy shrubs, of which one species is commonly cultivated for the sake of its beautiful flowers. This plant is a native of China and Japan : it was originally observed in the gardens of Canton by Loureiro, who took it for a primrose, and called it *Primula mutabilis*. It was next met with by Commerson, a French traveller, who named it *Hortensia*, in compliment to Madame Hortense Lepleaute.

(4307) HYDRASTIS CANADENSIS, or Canadian yellow root, a valuable bitter tonic, and useful yellow dye-stuff.

(4408) HYDRIDÆ. These are the true Sea-Snakes. They coil themselves up on the shore, and appear to live on sea-weed, and lay their eggs on the shore. They are often found asleep on the surface of the sea, where they are easily caught, for they cannot descend into the sea without throwing themselves on to their backs. This arises apparently from the necessity of expelling the air from their large lungs. They are often thrown ashore in the surf, and are occasionally carried up rivers by the tide, but they cannot live in fresh water. Their bite is venomous, and they are held in

great dread by fishermen wherever they occur, on this account. In spite of their venomous properties, one species at least, the *Hydrus Pelamis*) *bicolor* is said by Cuvier to be eaten at Taheite.

Pelamis. P. bicolor. Pacific Ocean. *P. ornata* Borneo.—Head moderate, rather compressed; gape moderate.

Lapemis.—Head moderate, short, rounded in front; dorsal scales square; ventral shield broad, 6-sided. *L. curtus.* Madras. *L. Hardwickii.* Borneo.

Aturia.—Head moderate, short, rounded in front; dorsal scales 6-sided; ventral shield 6-sided. *A. ornata.* Indian Seas. *A. Belcheri.* New Guinea.

Microcephalophis.—Head small; scales 6-sided; ventral scales keeled. *M. gracilis*, the Kadel Nagam. Madras. Scales ovate, 6-sided, imbricate, keeled, or with the keel reduced to a tubercle on the centre of the scales; head and gape moderate. Labial shields occupying the greater part of the lips; the eyes over the fourth, or rarely over the third or the fourth or fifth shield; ventral shield united.

Enhydrina.—Rostral plates narrow, erect; lower linear, sunken; nasal narrowed in front; ventral shield flat; head moderate, short; eyes moderate.

E. Bengalensis. Madras.

E. Valakadyen. Madras.

Hydrophis.—Rostral broad, transverse; lower triangular; nasal truncated or notched in front; ventral shield flat; head short; eyes small.

H. obscura, the Shooter Sun. Madras.

H. Lindsayii. China.

H. fasciata. Indian Ocean.

H. nigrocincta, the Kerril. Bengal.

H. doliata, the Black-Headed Kerril. Australia.

H. subcincta, Shaw's Chittul. Indian Ocean.

H. sublœvis, the Chittul. China and Indian Ocean.

H. mentalis, the Pale Chittul. Indian Ocean.

H. ocellata, the Eyed Chittul. Australian Seas.

H. spiralis, the Shiddil. Indian Ocean.

H. subannulata, the Ringed Sea-Snake. India.

H. aspera, the Rough Sea Snake. Singapore.

H. cærulescens, the Bluish Sea-Snake. Bengal.

Chitulia.—Rostral broad, transverse; lower triangular; nasal truncated or notched in front; ventral shields flat; head elongate, depressed; eyes large.

C. inornata. Indian Ocean.

C. fasciata. Indian Ocean.

Kerilia.—Rostral broad, transverse; lower triangular; nasal truncated in front; ventral shield broad, convex, forming a slight kneeled ridge; the hinder ones with a keel on each side; head short, shelving; scales very large, broad, 6-sided; eyes rather large, over third and fourth labial shields.

K. Jerdonii, the Karilia. Madras. Labial shield occupying the front half of the lip; eyes over the fifth or sixth shield; hinder part of the face covered with small scales; ventral scales generally 2-rowed, forming a keeled ridge, some united in pairs into 6-sided shield.

Hydrus.

H. major, the Sea-Snake. India; Australia.

H. annulatus, the Ringed Sea-Snake. Singapore.

Body covered with smooth polished imbricate scales; head as large as the body; ventral shields rather large, transverse, smooth, folded together and keeled.

Tomogaster.—Head with regular shields; superciliary shields simple; ventral shields entire.

T. Eydouxii. Indian Ocean.

Stephanohydra.—Head shields numerous; superciliary shields 3 or 4; ventral shields nicked behind.

S. fusca, Jukes's Hypotrophis. Darnley Islands. Head covered with scales, like the body; nostrils surrounded by a small, continuous ring; eyes surrounded by a series of small scales; labial shields small, with a larger series above them; pupil round; ventral shields very small scale-like, separated on each side of a keeled ridge. The species are all inhabitants of rivers.

Acrochordina.

Chersydrus.—Tail compressed, sword-shaped, prehensile; body fusiform, covered with small rhombic scales, with a central tubercular keel.

C. annulatus. Madras.

C. granulatus, the Chersydrus. Madras.

Acrochordus.—Tail conical, tapering, moderate; body fusiform, covered with tricuspid scales.

A. Javanicus. Java. Tail conical, tapering. Belly rounded beneath, with more or less broad band-like shields. Rivers or ponds. Head shielded; tail scaly beneath; abdominal shields flat, small, 6-sided, with a keel on each side, as if formed of two united scales; nostrils in a ring of small scales; scales keeled.

Erpetonina. Erpeton.

E. tentaculus, the Erpeton.

Cerberus.—Scales keeled, striated; hinder labial shield low. *C. cinereus*, the Karoo Bokadam. India. *C. acutus.* Borneo. *C. unicolor.* Philippines *C. australis.* Australia.

Homalopsis.—Scales keeled. *H. buccata.* Java. *H. Hardwickii.* India.

Phytolopsis.—Scales smooth.

P. punctata. India.

Tropidophis—Scales ovate, keeled, striated; eye over fourth and fifth shield.

T. histosus, the Chittee. Ceylon.

Myron.—Scales ovate, slightly keeled, smooth. *M. Richardsonii.* Australia. *M. trivittatus.* India.

Hypsirhina.—Seventh labial large; eye over the fourth and fifth labial; loreal distinct. *H. plumbea.* Borneo. *H. Hardwickii.* Penang. *H.*

Aer, the Ular Aer. Borneo. *H. bilineata*. China. *H. Chinensis*. China. *H. Bennettii*. China.

Fordonia.—Scales broad, rhombic; ventral shield rounded; loreal none; eye over third labial. *F. leucobalia*. Timor. *F. unicolor*. Borneo.

Raclitia.—Head small, conical; body subcylindrical; anterior frontal very small, triangular; loreal distinct; posterior ocular.

R. Indica India.

Miralia.—Head small, conical; body compressed; frontal plates 2 pairs; loreal none; posterior ocular 2.

M alternans. Java.

Xenodermus.

X. Javanicus, the Gonionote. Java. "The distribution of the colours on the body appears to be one of the most permanent characters of the species; but this becomes less distinct in the older specimens, and is often lost in the specimens that have been carelessly or long preserved in a museum.' The existence of this family of water-Snakes has undoubtedly given rise to the notion that a large Ophidian, which meets the popular view of a Great Sea-Serpent, exists. In all cases however, the reports of the existence of such a creature have been traced to the capture or sight of some other animal, or to the exaggerated representations of some other natural object. The *Hydridæ* amongst the *Ophidia* are of comparatively small size, seldom equalling the *Boidæ* in this respect, and falling far short of the enormous dimensions popularly attributed to the Great Sea-Serpent.—*Eng. Cyc.*

(4409) HYDROCHARIDACEÆ, *Hydrocharads*, a small natural order of Endogenous Plants inhabiting ditches, lakes, and rivers in various parts of the world. They have tripetaloideous flowers, often separate sexes, and an inferior ovary. The latter character cuts them off from *Alismaceæ* and *Butomaceæ*, to which they bear some resemblance in habit. *Vallisneria spiralis*, a plant of this order, is remarkable for its spiral flower-stalk, which enables it to accommodate itself to the depth of the stream in which it floats, so as always to keep its flowers above water when it is necessary. It is in the leaves of this plant that a peculiar movement in the interior of the cell called *Cyclosis* was originally observed. The same movement is also seen in the cells of *Hydrocharis Morsus Ranæ* and *Anacharis alsinastrum*, and is probably present in the whole of the order. The species are natives of fresh-water in Europe, North America, and the East Indies. One species is found in Egypt (*Damosonium Indicum*), and two Vallisnerias in Australia. Nothing is known of their uses unless that the fruit of *Enhalus* is eatable, and its fibres capable of being woven. According to Agardh, *Ottelia* and *Boottia* are eaten in India as pot-herbs. The Janji of Hindustan, the *Vallisneria alternifolia* of Roxburgh *Hydrilla* of Hamilton, is one of the plants used in India for supplying water mechanically to sugar in the process of refining it, "as clay is used in the West Indies to permit the slow percolation of water." Lindley places this order near *Naiadaceæ*, *Pistiaceæ*, and *Bromeliaceæ*. It has 12 genera and 20 species.

(4410) HYDROCOTYLE (from ὕδωρ, water, and κοτύλη, a cavity), a genus of Plants belonging to the natural order *Umbelliferæ* and to the suborder *Orthospermeæ*. The calyx obsolete; the petals ovate, entire, acute, with a straight apex; the fruit flatly compressed from the sides; the carpels without vittæ; the five ribs or nerves nearly filiform, the carinal and lateral ones usually obsolete, and the two intermediate ones joined. The species of this genus are generally bog-herbs; but few of them are under-shrubs. The umbel is single, surrounded by a few-leaved involucrum; the flowers sessile or pedicillate, white. Upwards of ninety species of plants have been referred to this genus. It is not however improbable that a more attentive study of them will lead to the distinction of other genera amongst them. Of the large number of species of this genus few if any are used in the arts or medicine, and none of them are sufficiently ornamental to lead to their cultivation. *H. Asiatica* is said to be used in India as a diuretic, and occasionally as a culinary vegetable. *H. umbellata* is recommended by Martius as a remedy in hypochondriasis, but on what grounds is not stated. The fresh juice acts as an emetic. It is said to possess an aromatic odour and an agreeable taste. The species of *Hydrocotyle* are easily cultivated; they must all be kept moist. The stove-greenhouse and frame kinds should be grown in pots placed in pans of water. (Don, *Dichlamydeous Plants*; Burnett, *Outlines*; Babington, *Manual of British Botany*.)

(4411) HYDROCOTYLE ASIATICA. UMBELLIFERÆ. Lin.

Vullarei keeray, TAM. | Mundooka purnie, SANS.
Mundooka brummie, TEL.

This is the greens of a plant of the class Pentandria and order Digynia.—*Ainslie's Mat. Med. p.* 258. An herbaceous plant, grows in moist shady places, flowers green, and of an uninteresting nature. An infusion of the toasted leaves of this low growing plant, in conjunction with Vendeum is given to children in Fever cases. This appears to be the Codagen of the Hort. Mal. Part 10, page 46.—*Ainslie's Mat. Med. p.* 126.

(4412) HYDROLEA ZEYLANICA. Vahl. Wight and Arnott in Hooker's Comp. 2. t. 26. Grows in water and marshy ground in East Indies, Herbaceous. The leaves beaten into a pulp and applied as a poultice are in India deemed useful in cleaning and healing ill conditioned ulcers in which maggots have formed. Lind. Fl. Med. p. 401.—*O'Shaughnessy, page* 507.

(4413) HYDROPHYLLACEÆ, *Hydrophyls*

a natural order of Exogenous Plants, consisting of small trees, bushes, or herbaceous plants, often hispid. The leaves are often lobed, alternate, or the lower ones opposite. The flowers arranged in gyrate racemes or unilateral spikes, or occasionally solitary and stalked in the axils of the leaves. Calyx inferior, persistent, deeply 5-cleft the recesses usually augmented with reflexed appendages. Corolla monopetalous, hypogynous, regular, shortly 5-cleft, between campanulate and rotate, rarely funnel-shaped. Stamens 5, epipetalous, alternate with the segments of the corolla, inflected in æstivation; anthers versatile, 2-celled, the cells parallel, dehiscing longitudinally. Ovary superior, simple, 1- or 2-celled, styles 2, long; stigmas 2, terminal; placentæ 2, free at their back, or united to the shell of the ovary, with two or many amphitropal ovules on their inner face. Fruit capsular, 2-valved, sometimes 1-celled, with a large placenta filling the capsule, sometimes somewhat 2-celled, with the dissepiments incomplete. Seeds reticulated; albumen abundant, cartilaginous; embryo conical, with its radicle next the hilum. For many years it has been considered that *Hydroleaceæ* was a distinct order from *Hydrophyllaceæ*, but recent botanists recognise so little distinction between them, that they are now both included in the above definition. Dr. Lindley places *Hydrophyllaceæ* near *Primulaceæ* *Plumbaginaceæ*, and *Boraginaceæ*. Some of the species are cultivated in gardens for the sake of their gay flowers, but none appear to possess useful qualities of any importance. They are mostly found either in the north or south provinces of America, and are not known much beyond that continent. *Nama* and *Hydrolea* are found in the East Indies. In the United States a decoction of *Hydrophyllum Canadense* is one of the many remedies for snake bites. *Hydrolea* is bitter, and the leaves are applied as a poultice in India. Many of the species, especially those of the genera *Nemophila* and *Eutoca*, are beautiful objects, and are extensively cultivated in our gardens. There are 16 genera and 75 species.

(4414) HYLOBATES, (from the Greek, signifying wood-walker, or one that goes through woods), Illiger's name for the Long-Armed Apes, or Gibbons. The general character of these Apes as to dentition and form agree with those of the Orangs; but there is some modification of the dental system in the Gibbons, which have also longer anterior extremities and have posterior callosities, though they have no tail. The vermiform appendix of the cæcum is also shorter. Dental formula:—Incisors $\frac{4}{4}$: canines, $\frac{2}{2}$: molars $\frac{12}{12} = 32$, F. Cuvier takes this type of dentition from the Siamang, and says that it is also found in the Wow-Wow and Onko. The height of the Gibbons rarely exceeds four feet, and when they are placed in an erect posture their upper extremities reach the ground. The species are found all over India and its islands. The forests are the haunts of these creatures, and they are rarely seen at a distance from them. Gregarious, but shy and timid, they keep up a howling concert, resembling in this respect in some degree the Howling Monkeys of America, and having some of them guttural sacs like that tribe. In the forest the activity of certain species is great, and they make way on the trees with their long arms and lengthened feet most rapidly; but when surprised on open plain ground, they are altogether as helpless. Other species (the Siamang, for instance) appear to be more sluggish; but these make good use of their acute eyes and ears, and are generally off before the enemy approaches near enough for a capture. In confinement they are gentle, and seem capable of great attachment to those who are attentive to them. Dr. Burrough gives a most interesting account of three individuals of the species called Hoolock (*Hylobates Hoolock*), which he had an opportunity of observing. One of them, a male, showed a most amiable and docile disposition; and a young female, which died early, was equally gentle and pacific. The Siamang kept by Sir Stamford Raffles was, according to Dr. Horsfield, very tame and tractable, and was never happy unless it was in the company of some person. Mr. George Bennet gives a lively description of the affectionate manners of another of these apes towards those who made its captivity light by their kindness.—*Eng. Cyc.*

(4415) HYLOBATES AGILIS, the Wow-Wow, or Active Gibbon, may be taken as an example of the genus. It has the forehead very low; orbitary arches very projecting; face blackish-blue in the male, and brown in the female; in the former a white band over the eyes, which unites with the whitish whiskers. Hair of the body fine, except about the neck, where it is longer and inclined to be woolly and curled; upper part chocolate-brown; back and fore part of the thighs yellowish-brown, but the colour varies a good deal according to the sex and age, the young being paler than the adults and aged, and the very young uniform yellowish-white. Height about 2 feet 7 or 8 inches. No guttural sac. It is very agile in its habits. As soon as they reach the forest they set pursuit at defiance, swinging, leaping, and throwing themselves from tree to tree with great rapidity. Notwithstanding the want of the guttural sac they howl in a manner very nearly resembling the Siamang, which has one. In captivity they are not very lively, as might be expected, from the impossibility of their exerting that freedom of motion on which their vivacity in a state of nature so much depends; but though timid they are soon re-assured, take pleasure in being caressed, and become familiar and even playful. This species is found in the forests of Sumatra, where the species is named Ungaputi. The Siamang of

the Malays, *Simia syndactyla* of Sir Stamford Raffles's 'Catalogue of a Zoological Collection made in Sumatra' ('Linn. Trans.,' xiii. 241), *Pithecus syndactylus* of Desmarest, *Hylobates syndactylus* of F. Cuvier, has a peculiar formation of the hands or feet of the lower extremities, the index and middle fingers being united as far as the middle of the second phalanx. This peculiarity would seem to indicate a generic distinction, notwithstanding the similarity of the teeth and skull to those of the rest of this tribe. These Sumatran Apes, sluggish and timid as they are, exhibit strong maternal affection; for though, if any of the troop are wounded, the rest abscond and leave them to their fate, the mother will remain with her little one if it is hurt, and suffer herself to be captured rather than abandon it. The females are also generally very attentive to their offspring, according to the accounts given by Messrs, Diard and Duvaucel. The following species are given in the 'British Museum Catalogue':—

(4416) HYLOBATES HOOLOCK, the Hoolock. It is the Simia Hoolock, Harlan; *H. Seyrites* and *H. Coromandus*, Ogilby; *H. Houlock*, Lesson. Asam (?).

(4417) HYLOBATES AGILIS, the Ungha; *Pithecus agilis* Desmarest; *H. variegatus*, Muller; *H. Raffiasii*, Geoffroy *H. Lar* F. Cuvier. Black specimens are marked from the Himalaya and brown from Malacca.

(4418) HYLOBATES LAR, the Gibbon; *Homo Lar*, Linnæus; *Simia longimana*, Schreber; *S. albimana* Vigors and Horsfield; Le Grand Gibbon of Buffon. It is a native of Malacca.

(4419) HYLOBATES LEUCISCUS, the Silvery Gibbon, or Wow-Wow *Simia leucisca*, Schreber, Moloch, Audeb. Malacca.

(4420) HYMENÆA (from 'Hymen,' in reference to its twin leaflets), a genus of Plants belonging to the natural order *Leguminosæ*. It has a calyx furnished with two bracts at the base; the tube turbinate, coriaceous; the limb 4-5 parted, deciduous, with two lobes sometimes united into one; 5 petals nearly equal, glandular; 10 stamens, distinct, inflated in the middle; the style filiform; the legume woody, oblong, many seeded, containing fecula; the embryo straight. The species are trees, with bifoliate leaves, and corymbs of white or yellow flowers.—*Eng. Cyc.*

(4421) HYMENÆA COURBARIL, Locust-Tree, or Gum-Anime Tree, has oblong ovate leaflets, unequal-sided, and unequal at the base ending in a long point with the legume oblong, compressed, yellowish, shining. It is a fine lofty spreading tree, and grows in the tropical parts of America, in Jamaica, and in Tenasserim. The seeds are enveloped in a cellular mealy substance, which is sweet like honey, and is eaten by the Indians with great avidity. When fresh it is slightly purgative, but by keeping it loses this property. A decoction of this substance, when allowed to ferment, forms an intoxicating drink resembling beer. From between the principal roots of this tree there exudes a fine transparent resin, of a red or yellowish-red colour, and which is collected in large lumps and sold under the name of Gum Anime, or Gum Animi. This resin resembles amber, is very hard, and sometimes contains leaves, insects, or other object imbedded in it, which remain in a perfect state of preservation. It burns readily, emitting a very fragrant smell. Dissolved in rectified spirits of wine it makes one of the finest kinds of varnish. According to Lindley this resin is called Jatahy, Jatchy, or Copel, and in Minas Geraes, Jatoba. Courbaril is the name of the tree in some parts of South America. In countries where this tree grows, the resin is used medicinally, and has also been employed in that way in Europe. It acts as a stimulant when taken internally, and as an irritant when applied externally. In fumigation it has been employed for persons labouring under asthma and dyspnœa. Dissolved in spirits of wine or oil it is used as an embrocation in rheumatism. Internally it has been recommended as a substitute for guaiacum, in venereal disease, and chronic rheumatism. The inner bark, either in the form of tincture or decoction, is administered as a vermifuge. The curadores have a method of mixing it with sugar and rum, so as to make a very agreeable emulsion or syrup. The wild bees are fond of building their nests in the trunk of this tree. The timber of the old trees is very hard and tough, and is in great request for wheel-work, particularly for cogs The wood is so heavy that a cubic foot is said to weigh a hundred pound: it takes a fine polish.—*Eng. Cyc.* The trunk acquires an immense height; the wood is used by cabinet makers, is very hard, and acquires a fine polish. When in a sickly state, it furnishes the resin called *Western Anime.—O'Shaughnessy, p.* 314. *Hymenæa Courbaril* was introduced into Tenasserim, by Major Macfarquhar, and is easily propagated.—Several other species of *Hymenæa* are described, but of these comparatively little is known. The Copal of Madagascar, and probably of the East Indies generally, is furnished by *H. verrucosa*. The Locust-Trees of the West have long been celebrated for their gigantic stature, and other species are the Colossi of South American forests. Some of them are, according to Martius, 84 feet in circumference at the bottom, and 60 feet where the boles become cylindrical. (Don, *Dichlamydeous Plants*; Lindley, *Flora Medica.*)—*Eng. Cyc.*

(4422) HYMENODICTYON EXCELSUM, Wallich, in Roxb Fl. Ind. ii. 148, (ed. 1828) *Syn.* Cinchona excelsa, Roxb. Fl. Ind. i. 529. Saggapoo Marum or Cedar Wood, Hymenodictyon excelsum.

Kundaroo, Bundaroo, Kala Buchnak, Hind. | Pundaroo, Tel.

This species of Hymenodictyon is a native of the mountainous parts of the Circars and chiefly of the vallies, where it grows to be a very large tree. Flowers during the rainy season. Seeds ripe in four or five months after. The wood is firm, close grained of a pale Mahogany colour, and very useful for many purposes. *Rox.—Rohde M.S.S.* The two inner leaves of the bark possess great bitterness and astringency ; the bark is used by the tanners, and also as a medicine among the Hindoos, in cases requiring astringents. Dr. O'Shaughnessy, analysed the bark from the Botanic Garden of Calcutta, but could detect no alkaline ingredient ; nevertheless the trees of hilly regions may furnish the valuable desideratum. The stamina being contained within the tube affords much ground for expecting the discovery of a febrifuge alkaline in this species.—*OSh. p.* 394. It is common all round the foot of the Neilgherries, wood much used and esteemed for inside work such as drawers &c.—*Mr. McIvor.* Pundaroo is the Telingoo name of this large tree, which grows in the mountainous parts of the Northern Circars, of Peninsular India : the bark of which, Dr. Roxburgh informs us, possesses both the bitterness and astringency of the Peruvian bark, and when fresh, even in a stronger degree.—*Ain's. Met. Mad. p.* 104.

(4423) HYMENODYCTION OBOVATUM. Icon. 1159.

Yella malakai marum, Tam.

A tree, but Dr. Wight was unacquainted with its dimensions or quality of the wood ; no specimens having been sent.—*Wight.*

(4424) HYMENODYCTION UTILE. Rubiaceæ, Icon. 1159.

Peroonjoly marum, Tam.

When Dr. Wight first gathered specimens of this tree, he was informed that it furnished the wood called bastard cedar. This information, if correct at all, can only be partially so, as he has since found two others similarly reported, the tree attains a large size and the heart wood is red, but its qualities are not known.—*Wight.*

(4425) HYOSCIAMUS HYOSCYAMIFOLIA, L. D. (Hyoscyamus, E.) Leaves. Hyoscyami Semina, L. and, Seeds of Hyoscyamus Niger, Linn. Henbane. Henbane has been employed in medicine from the earliest times ; is the *ὑοσκυαμος* of the Greeks, and the *bunj* of the Arabs. The seeds are known by the name of *Khorassani Ujwain* in India. Henbane (fig. 83) is annual or biennial, that is, plants grown from the seed of the biennial variety will, in favourable conditions of the soil and climate, come to full perfection in the first year. Roots spindle-shaped, those of biennial plants having considerable resemblance to small parsnip-roots in the winter and spring. (*Houlton.*) The plants in the first year throw up a tuft of radicle leaves which are petiolated, woolly, and possess little of that clamminess and odour which are peculiar to the mature plant. In the second spring, another set of leaves make their appearance with, and attached to the flowering stem. This is from a foot to 3 feet high, seldom branched, hairy, hairs glandular, viscid. Leaves sessile, subamplexical, occasionally decurrent, lower ones sometimes stalked, oblong-acute, coarsely and unequally cut or sinuate, appearing pinnatifid, clammy, and fœtid, of a pale dull green colour, slightly pubescent, with long glandular hairs, like those of the stem, upon the midrip. Flowers nearly sessile, axillary, subsolitary, unilateral, erect, much shorter than the leaves. Calyx funnel-shaped, 5-lobed, villous. Corol (2) funnel-shaped, limb spreading, 5-lobed, not quite equal, of a dull straw-colour, marked with dark purple veins. Stamens 5, declinate ; filaments pubescent. Ovary ovoid, shining, 2-celled, with numerous ovules attached to the placentæ. Style filiform Stigma (1) capitate. Capsule opening transversely by a convex lid, 2-celled, many seeded. Seeds small, roundish, finely dotted, of a light grey colour.—Indigenous in waste grounds throughout Europe, also in the Persian region of Botanists.—Nees von E. 192. St. and Ch. 9. Henbane plants come into flower about the beginning of June, but the annual plants a little later : the seeds ripen from August to October. Mr. Houlton is of opinion that the biennial plant should alone be employed medicinally, and that the leaves should be collected when the first flowers begin to appear. But it has not been proved that annual plants, when properly grown, are devoid of active properties. Dr. Royle was in the habit of largely cultivating Henbane in the Botanic garden at Saharunpore, where, from the nature of the climate, the whole process of cultivation, including the ripening of the seed, was completed between the months of October and March. The Extract made from these plants was highly approved of by several medical officers, and pronounced by Mr. Twining, after trial in the General Hospital at Calcutta, to be of " most excellent quality" (Himal. Bot. p. 281). But the secretions of plants growing in a colder and moister climate, or in seasons having these characteristics, may not come to so great perfection in the first year. Dr. Christison states, from experiments made in the Royal Infirmary at Edinburgh, " that inferiority of cultivated plants, if it exists at all, seems not appreciable in practice ;" and, with respect to the period at which the leaves acquire their activity, he says, " I have found them sufficiently active even in the spring, before the appearance of the flowering stem." When collected, they should as soon as possible be separated from the stem, spread out, and dried in a warm airy room. They ought to have a mucilaginous slightly bitter taste, and should retain some of the peculiar odour of the plant. Analysed by

Brandes, the seeds yielded Gum, Starch, Albumen, a large proportion of Fixed Oil, with a variety of salts, Ligneous fibre, and an oily-like alkali, resembling Conia, which was highly poisonous. Geiger and Hesse, however, obtained groups of radiated needle-like crystals, fusible and volatile, but readily decomposed when distilled, alkaline in nature, neutralizing acids and forming crystallizable salts, soluble in Alcohol and Ether, less so in water. These have been considered pure *Hyoscyamia*, which is very poisonous, dilates the pupils, and when moistened, smells strongly of Tobacco. The oily-like liquid of Brandes is thought to hold a little of this principle in solution. A highly poisonous empyreumatic oil is obtained by destructive distillation, as from the other solaneæ and from Foxglove.—*Action. Uses.* Narcotic, Anodyne, and Soporific. Available for a variety of cases where we wish to relieve pain, allay irritability, and procure sleep, having the advantage of not constipating the bowels like Opium. Hence it is frequently prescribed with Calomel, Purgatives, or with Antispasmodics. It may be given internally in powder in doses of gr. v.—gr. x. or in Extract or Tincture; or it may be applied externally in the form of fomentation, or in cataplasms of its leaves, or its Extract or Tincture used as those of Belladonna, p. 511.—*Royle p.* 515.

(4426) HYOSCYAMUS, EXTRACT OF. A large fresh specimen was forwarded from Hoonsoor, prepared by Asst. Surgeon Hilbers, the quality of the extract has been thoroughly tested in the different Civil Dispensaries, and it has been pronounced equally useful as the European article, considering that this valuable medicine has been prepared for the first time in the Presidency, the Jury award a 2d Class Medal.—*M. E. of* 1855. In 1841, the Bombay medical stores were supplied with this drug, from the Dapooree garden.—*Spry's Suggestions, p.* 36.

(4427) HYPERANTHERA MORINGA: Horse Radish tree.

Sujuna, Suhnjna, Hind.

Common in gardens in Southern Asia.—*Gen. Med. Top. p.* 192.

The root.

Moorungy vayr, Tam.	Moonaga vayroo, Tel.
Moongay ke jar ke jurr, Duk.	*Ainslie's Mat. Med. p.* 265.

See article Horse Raddish.

The greens.

Moorungy keeray, Tam.	Sheggooroo, Sans.
Moongay ke baujee, Duk,	*Ainslie, page* 254.
Moonaga koora, Tel.	

The flowers.

Moorungy poo, Tam.	Moonaga poo, Tel.
Moongay ka pool, Duk.	Sheggooroo, Sans.

This is used both as a pot herb and when pickled.—*Ainslie's Mat. Med. page* 260.

The fruit.

Moorungy kai, Tam.	Moonagakaia, Tel.
Moongay ke pullie, Duk.	Sheggooroo, Sans.

This very valuable and pleasant tasted pot vegetable grows to about half a yard long, is of the size of a finger in thickness, and is commonly eaten made into curry. The tree is the Kellor of the Malays; the root of it is used as horse radish.—*Ainslie, page* 241.

(4428) HYPERICUM, a species nearly resembling *H. perforatum.* is common in the Cashmerean mountains, but is not officinal. In Arabian medicine this plant is recommended to expel intestinal worms, to cure piles, prolapsus uteri et ani. In European practice St. John's wort was regarded as a mild stimulant tonic, diuretic, emenagogue, &c. The dried herb boiled in alum-water communicates a yellow, or yellowish red color, to wool, silk, &c.—*Honigberger, p.* 289.

(4429) HYPERICUM. Hypericaceæ.—St. John's Wort. These shrubs and herbaceous plants, all bear yellow flowers with one exception, the Cochin Chinese: they are inhabitants of all parts of the world, and grown by seed in any good garden soil.

(4430) HYSSOPUS OFFICINALIS.

Zufaiy-ycabus, Arab.	Isop. Ger.
Hyssope, Fr.	Zoofæ gabis, Arab.

The officinal hyssop of Europe is well known to be considered as tonic and stimulant; and was at one time, a medicine in repute in nervous cases. This plant, which is brought to India from Syria, was held in high esteem by the ancients.—*Faulkner.* Most are aware that this owes its celebrity to a passage in Josephus, who used the hyssop as a term of comparison with the cedar to give an idea of Solomon's botanical knowledge, (*Fee, p.* 455). In the Old Testament we meet its name in several of the sacred texts: "Purge me with hyssop, and I shall be clean;" and again—"The hyssop which groweth on the wall." The dried plant is brought to India from Syria. The Arabians place it among their anthelmintics and stimulants. Pliny thought it useful in diseases of the chest. It is cultivated in the Calcutta Garden. Celsus regarded it as diuretic.—*O'Shaughnessy, p.* 488.

(4431) HYSTRICIDÆ, a family of Animals belonging to the order *Rodentia*, Sub family *Hystricina*,—This sub-family embraces the animals familiarly known as Porcupines. The genus *Hystrix* of Linnæus embraces those Rodents whose covering consists, for the most part, of a kind of offensive and defensive armour, in the shape of spines or quills, instead of hairs. Colonel Sykes has described a species under the name of *Hystrix leucurus* (Sayal of the Mahrattas),

as *Hystrix cauda alba*. He states that the animal appears to be distinct from the European species, which it closely resembles in form and covering. It is nearly a third larger. All the spines and open tubes of the tail are entirely white, which is not the case in *Hystrix cristata*. The spines of the crest also are so long as to reach the insertion of the tail. The ears are much less rounded, and the nails are shorter, infinitely deeper, and more compressed, and with deep channels below. The white gular band is more marked; and, finally, the Asiatic speces is totally destitute of hair-spines, where wanting, being replaced by strong bristles even down to the nails. ('Zool. Proc.,' 1830, 1831.) Mr. Hodgson notes this species among the *Mammalia* of Nepaul, as inhabiting the central and lower regions. ('Zool. Proc.,' 1834.) Mr. Waterhouse gives the two following species of *Hystrix*:—

(4432) HYSTRIX HODGSONI, Crestless Nepaul Porcupine; *H. alophus*, Hodgson. General hue brown-black; head brown; in the visible portions of the quills the black prevails over the white, but numerous very long and slender quills are almost entirely white, the spiny bristles which form the chief covering of the animal are rather long and slender, and have long hair-like points. It inhabits Nepaul.

(4433) HYSTRIX JAVANICUM, Java Porcupine; *Acanthion Javanicum*, F. Cuvier and Vander Hoven; *H. fasciculata*, Muller; *H. brevispinosa*, Wagner; *Acanthion Javanicum*, Gray. It inhabits Java, Sumatra, and Borneo. *Atherura* Cuv. (*Acanthion*? F. Cuv.).—Neither the head nor the muzzle convex; tail long but not prehensile; feet like those of *Hystrix*. *A. cristata*, *Hystrix fasciculata*, Shaw; Le Porcépic á Queue en Pinceau, Buff. Mr. Bennett further observes that Linnæus founded his *Hystrix macroura* on Seba's figure; but Buffon having quoted neither Seba nor Linnæus, Dr. Shaw took it for granted that this was a different animal, and consequently gave it a new name—*H. fasciculata*. Mr. Bennett entertained however but little doubt, notwithstanding some trifling discrepancies in the figures, that Sir Stamford Raffles was right in his conjecture that they both represent one and the same species. It is found in the Celebes Islands (Seba): Asia (Linn.); Malay Peninsula (Buffon); Isles of the Indian Archipelago (Pennant); Sumatra (Sir Stamford Raffles); Fernando Po (Vial).—*Eng. Cyc.*

I.

(4434) ICE.

Yuch, *erroneously termed* Burf (snow.,) Guz. Hind. Pers.

Ice is extensively used for a variety of economical purposes, such as cooling liquors, beer, fruit, in the making of ice-creams, jellies, and as an ingredient in some confections. Of late years the practice of shipping it from Boston to Calcutta Madras and Bombay, and other warm climates, has been adopted with success, and it is justly esteemed in those countries a perfect luxury.—*Faulkner*. In many countries the command of a proper supply of ice or snow for cooling water or other liquids in summer has long been regarded as one of the necessaries of life. And so ancient is the practice, that we even find allusions to it in the Proverbs of Solomon:—"As the cold of snow in the time of harvest, so is a faithful messenger to them that send him; for he refresheth the soul of his masters." xxv. 13. The most simple and obvious method of securing a magazine of cold to meet the physical wants of summer, is to collect, during the winter, a store of ice or of snow, and to place it under such circumstances that it shall be shielded from rain, from warm air, and from the direct rays of the sun. Nothing is more desirable as an appendage to markets, &c., than an ice-house, for the purpose of preserving fish, meat, fruit, and vegetables fresh much longer than can be done by other means. The simplest method of keeping ice is by enveloping it in a large quantity of loose straw. For this purpose, the ground is formed into a flattened cone, for draining off the water from any portion of the melted ice; a layer of faggots is then put therein, with straw a foot or more in thickness, and on this the ice is piled in a large conical mass, and covered with straw to the thickness of one foot, then with faggot-wood to the thickness of two feet, for the purpose of preserving a stratum of air above and around the ice; and lastly, the whole is covered with two or three feet of straw arranged as a thatch. Of late years, ice has become an article of commerce between countries where it is found in abundance, and those where it is found scantily or not at all. The place where this remarkable traffic commenced, is Wenham Lake, about 18 miles from Boston, in the United States of America; and subsequently, some of the Norwegian lakes have furnished abundant supplies. The Wenham Lake Company was formed, and we learn from the *Illustrated London News* some particulars respecting their proceedings. In September, 1833, a cargo of ices shipped at Boston, was discharged at Calcutta, and sold at 3d. per lb. It was packed in large cubes, fitting

osely together so as to form one solid mass, ithin chambers of double planking with a layer well-dried refuse tan, or bark, between them. he quantity shipped, was 180 tons, of which out 60 wasted on the voyage, and 20 on the ssage up the river to Calcutta. Thousands of ns are now annually shipped from Boston to the ast Indies, to the West Indian Archipelago, and the continent of South America. The company have erected extensive ice-houses in London and at Liverpool, and have arranged for nporting into England thousands of tons of e every year. The masses are so large, that hey expose a very small surface to the action of he air, and hence they suffer but very little loss. t is also stated, that ice frozen upon deep water s more hard and solid than ice of the same thickness obtained from shallow water, and melts nore slowly. In Great Britain, the collection nd storing of ice is very precarious, on account of the uncertainty of the supply during our mild winters; but in America, where the cold of winter is intense, the cutting, storing, and transportation of the ice is regularly carried on throughout the winter. Wenham lake occupies an elevated position and lies embosomed in rugged hills. The lake has no outlet, but is fed by the springs which issue from the rocks at its bottom, at a depth of 200 feet. The ice-house, which is capable of storing 20,000 tons of ice, is built of wood, with double walls 2 feet apart all round, the intervening space being filled with sawdust. The machinery used for cutting the ice is worked by men and horses. From the time when the ice first forms, it is kept free from snow until it is thick enough to be cut; the cutting being commenced when the ice is a foot thick. A surface of some 2 acres is then selected, which, at that thickness, will furnish about 2,000 tons, and a straight line is then drawn through its centre from side to side each way. A small hand-plough is pushed along one of these lines, until the groove is about 3 inches deep and ¼ inch wide, when the marker, is introduced. This implement is drawn by 2 horses, and makes 2 new grooves parallel with the first, 21 inches apart, the gauge remaining in the original groove. The marker is then shifted to the outside groove, and makes 2 more. Having drawn these lines over the whole surface in one direction the same process is repeated in a transverse direction, marking all the ice out into squares of 21 inches. Meanwhile the plough drawn by a single horse follows in these grooves, and cuts the ice to a depth of 6 inches. One entire range of blocks is then sawn out, and the remainder are split off toward the opening thus made with an iron wedge, called an *ice spade*, when it is dropped into the groove the block splits off with a very slight blow, especially in very cold weather; the labour of *splitting* being slight or otherwise according to the temperature of the air. Low platforms are placed near the opening made in the ice with iron slides extending into the water, and a man stands on each side of a slide armed with an ice hook, with which he catches the ice, and by a sudden jerk throws it up the slide upon the platform. In a cold day everyt hing is quickly covered with ice by the freezing of the water on the platforms, slides, &c. and the huge blocks of ice, some of which weigh more than 2 cwt. each, are hurled along these slippery surfaces with great ease. By the side of the platform is a sled of the same height, capable of containing about 3 tons, which when filled, is drawn over the ice to the front of the sto re-house, where a large stationary platform of the same height is ready to receive its load, which, as soon as discharged, is hoisted a block a time into the house. Forty men, assisted by 12 horses, will cut and stow away 400 tons a day. Sometimes in favourable weather 100 men are employed at once. When a thaw or fall of rain occurs, the ice is made porous and opaque and unfitted for the market: when snow is followed by rain, and that by frost, the snow-ice thus formed is removed by the *plane*. The operation of planing is somewhat similar to that of cutting. A plane gauge to run in the grooves made by the marker, and which shaves the ice to the depth of 3 inches, is drawn by a horse, until the whole surface of the ice is planed. The chips thus produced are then scraped off, and if the clear ice is not reached the process is repeated. If this makes the ice too thin for cutting, it is left until a few nights of hard frost shall have added below as much as was removed from above. In addition to filling their ice-houses at the lake and in the large towns, the Company fill a large number of private ice-houses during the winter; all the ice for these purposes being transported by railway. We come now to the second part of our subject —the production of ice artificially; the most ancient example of which was probably that carried on in the upper country, near the town of Hoogly, about 40 miles from Calcutta. By a skilful application of the process of evaporation the natives are able to procure a supply of ice during their short winter, viz. from the end of November to the middle of February. The ground where the ice is made is a large open plane: 3 or 4 troughs are formed, each about 120 feet in length by 20 feet in width and 2 feet in depth: the bottom is made smooth and allowed to dry by exposure to the sun. It is covered with bundles of rice straw to the depth of about a foot, and then loose straw is strewed in, to within 6 inches of the adjoining land. The water to be frozen is contained in pans of unglazed porous earthenware, very much like those put under our garden flower-pots, and these are arranged in regular order close to each other upon the loose straw in rows to the number of 5 or 6,000. The natives fill the pans with soft

water by means of small earthen pots, attached to the end of bamboo-rods, long enough to reach half way across the trough. The water is taken from large water-jars sunk deep in the ground near the pits where the ice is stored, and filled from the neighbouring pools or with drainings from the ice. The quantity of water poured into each pan varies from ½ to ⅓ of a pint, depending upon the clearness of the sky and the steadiness of the wind. The most favourable wind is from the NN. W: but any point between N. and W. will do, although less ice is produced. If the wind is between E. and S. no ice will be formed. The ice which begins to appear a little before midnight, is carefully watched by persons stationed near each trough. As soon as a slight film of ice appears, the contents of several pans are mixed together, and the freezing liquid sprinkled over the others. The freezing continues till sunrise, when perhaps as much as half an inch of ice will be found in each pan. In very favourable nights the water is entirely frozen. The ice is generally removed by women, 7 or 8 of whom are appointed to each ice-bed: they use a blunt semi-circular knife to scoop out the ice, which they throw together with any unfrozen water into earthen vessels placed near them. When these are full their contents are poured into conical baskets, placed over the large water-jars from which the pans are filled; by which means a supply of cool water is collected for the next night's operations. When the ice has been sufficiently drained, it is deposited in wells near the ice-beds; and at night removed to large circular pits lined with mats, and covered over with a straw shed. The heat of the day, even in the ice-making season, is frequently greater than that of the hottest summer days of England, so that after all precautions, a partial thawing goes on in the pits. The water thus produced was carried off through holes in the bottom of the pits to a deep well, which also serves to supply the pans in the ice-bed; thus throughout the process the cold is economised as much as possible. The ice was conveyed in boats to Calcutta by night. When the weather was coldest it was simply packed in bags; at other times in baskets lined with straw mats, and conveyed to the city before sunrise. During the hot season, when ice was most needed, it was scarcely possible to preserve it in any quantity, and the first heavy fall of rain usually melts all that is left of the last ice-making season. Some of the most useful freezing mixtures are given in the following table:—

MIXTURES.	PARTS.	THERMOM. SINKS.
Sal Ammoniac, ...	5	
Nitre, ...	5	from 50° to 10°
Water, ...	16	
Nitrate of Ammonia,	1	
Water, ...	1	„ 50° „ 4°
Sulphate of Soda, ...	5	
Dilute Sulphuric Acid, ..	4	„ 50° „ 3°

Snow,...	1	from 32° to 0°
Common Salt, ...	1	
Muriate of Lime, ...	3	„ 32° „ —50°
Snow, ...	2	
Snow, ...	2	
Dilute Sulphuric Acid,	1	„ —10° „ —56°
Dilute Nitric Acid,...	1	
Snow, or Pounded Ice.	12	
Common Salt, ...	5	„ 18° „ —25°
Nitrate of Ammonia,	5	
Snow, ...	1	
Muriate of Lime, ...	3	„ —40° „ —73°
Dilute Sulphuric Acid,	10	
Snow, ...	8	„ —68° „ —91°

Ice and salt furnish the cheapest and most convenient freezing mixture; but where ice cannot be procured the salts mentioned in the first two recipes given above may be used, and the salts recovered by evaporation when they have served their purpose, so that they can be used over again.—*Tomlinson.* Mr. Fortune tells us that on the right bank of the Ning-po river, above the town and fort of Chinhæ, and in various other parts of the north of China he met with ice-houses. When he inspected them for the first time in 1843, their construction and situation differed so much from what he had been accustomed to see in England, differing, too, in things which he used to consider as indispensable to an ice-house, that he had great doubts regarding their efficiency; but at the end of August 1854, he found many of these houses were yet full of ice, and then seemed to answer the end most admirably. The town of Ning-po stands in the midst of a level plain from twenty to thirty miles across. These ice-houses are built on the sides of the river in the centre of the plain, completely exposed to the sun—a sun, too, very different in its effects from what is experienced in England,—clear, fierce and burning; which would try the efficiency of the best English ice-houses as well as it does the constitution of an Englishman in China. "The bottom of these ice-houses is nearly on a level with the surrounding fields, and is generally about twenty yards long, by fourteen broad. The walls which are built of mud and stone, are very thick, twelve feet in height, and are, in fact, a kind of embankment rather than walls, having a door on one side level with the floor, for the removal of ice and a kind of sloping terrace on the other, by which the ice can be thrown into the house: on the top of the walls or embankment a tall span roof is raised, constructed of bamboo, thickly thatched with straw, and in appearance exactly like an English haystack. And this is the simple structure which keeps ice so well during the summer months, and under the burning sun of China." "The Chinaman, with characterestic ingenuity, manages also to fill his ice-houses in a most simple way and at a trifling expense. Around the house he has a small flat level field connected with the river. This field he takes care to flood in winter before the cold

weather comes on. The water then freezes and furnishes the necessary supply of ice at the very door. Again in spring, these same fields are ploughed up and planted with rice, and the water which drains from the bottom of the ice-house helps to nourish the young crop. Of course here, as in England, when the house is filled the ice is carefully covered up with a thick coating of straw. Thus the Chinaman, with little expense in building his ice-house, and an economical mode of filling it, manages to secure an abundant supply for preserving his fish during the hot summer months. "It now, I think, becomes a question whether we could not build ice-houses at less expense and more efficient, upon the Chinese plan, than upon the old under ground system common in England. An accompanying sketch enables one to form an idea of the appearance which these ice-houses present to the traveller in going up the Ning-po river. Ning-po, August, 1844." Since this letter was published I have had frequent opportunities of testing the qualities of the Chinese ice-house, both at Ning-po and also at Chusan and Shanghae, and I have found that it answers the purpose admirably. The winter of 1844-1845 was unusually mild in this part of China; little or no ice was formed on the ponds and canals, and of course the ice-houses could not be filled; but many of them contained large quantities which had been laid up the year before, and by this means the market was supplied with ice which had been in store at least a year and a half, and would probably have kept some time longer. The ice is of great importance to the Chinese, who depend so much for their food upon the fish which is caught in their waters. They are enabled by this means to keep their fish during the hottest weather for a considerable time and transmit them in this way to different parts of the country.—*Fortune Residence.*

(4435) ICELAND MOSS.

Cetraria, Lat.

A lichen (*Cetraria Islandica*), common in the North of Europe and North America, which yields a nutritive starchy substance, sometimes employed to make bread and gruel. It may be formed into a paste; and from its possessing demulcent qualities, as well as a bitter principle, it is extensively employed in consumptive diseases, being regarded as a dietetic, as well as a therapeutic agent. *Waterston.—Faulkner.*

(4436) ICHNEUMON, a genus of Insects belonging to the order *Hymenoptera*, section *Terebrantia*, and family *Pupivora*, in the arrangement of Latreille. The genus, as defined by Linnæus, included such pupivorous *Hymenoptera* as are furnished with veined wings (the anterior pair presenting in their disc several complete or closed cells), filiform or setaceous vibratile antennæ composed of a great number of articulations, and an ovipositor of various length and complicated structure. The Linnæan genus now constitutes a group including a great many well-marked genera and an immense assemblage of species. All these are remarkable for the habits of their larvæ, which are parasitic in the bodies of other insects. These bodies the perfect Ichneumons perforate by means of their ovipositors, and there lay their eggs. This destructive habit gave rise to the name by which they are known; a comparison being drawn between them and the Egyptian Ichneumon (*Herpestes Ichneumon*) the quadruped celebrated as the destroyer of serpents and crocodiles.—*Eng. Cyc.*

(4437) ICHNOCARPUS (from ἴχνος, a footstep vestige, and καρπος, a fruit, in reference to the slender follicles), a genus of Plants belonging to the natural order *Apocynaceæ*. It has a salver-shaped corolla, 5-cleft calyx, and inclosed stamens; sagittate anthers, free from the stigma. The species are climbing shrubs with opposite leaves; the flowers in branched terminal panicles, white and inodorous.—*Eng. Cyc.*

(4438) ICHNOCARPUS FRAGRANS has oblong lanceolate leaves tapering to both ends, and axillary trichotomous spreading peduncles. It is a native of Nepaul, and has large handsome flowers.—*Eng. Cyc.*

(4439) ICHNOCARPUS FRUTESCENS, has a twining stem, oblong-lanceolate leaves tapering to both ends, axillary peduncles very long and racemose. It is a native of Ceylon and Nepaul. The flowers are small and purple; the leaves deep green above and pale beneath. According to Dr. Royle, it is sometimes used in India as a substitute for Sarsaparilla, and it is also mentioned by Afzelius in his 'Remedia Guinensia,' as a medicinal plant.—*Eng. Cyc.*

(4440) ICHNOCARPUS LOUREIRII, has a frutescent stem, ovate oblong leaves, lateral 3-flowered peduncles. It is a native of Zanzibar. All the species of *Ichnocarpus* grow well in a mixture of loam, peat and sand, and cuttings strike readily in sand under a hand-glass (Don, *Dichlamydeous Plants*; Lindley, *Flora Medica.*)

(4441) ICHTHYOLOGY. The branch of science which comprehends a knowledge of the structure, nature, and forms of Fishes is thus called.—See Fishes of Southern Asia.

(4442) ICHTHYOPHIS GLUTINOSUS, an immense earth worm, common in Sikkim. It is a native of the Khasia Mountains, Singapore, Ceylon and Java.—*Hooker Him. Jour. Vol.* II. *p.* 25.

(4443) ICICA, a genus of Plants belonging to the natural order *Burceraceæ*. It has a small obtusely 5-toothed calyx; 5 petals inserted under the disc, recurved, sessile, valvate; 10 stamens shorter than the petals inserted with them; a cup-shaped disc with 10 crenatures at the margin; a sessile 5-celled ovary with two collateral pendules ovules in each cell; a very short style; a 5-angled stigma; a globose obtuse 1-3-celled

drupe with thick and fleshy dissepiments; resinous seeds without albumen. The species are shrubs or trees with unequally pinnate leaves, and white flowers seated on panicled racemes which are terminal or axillary.—*Eng. Cyc.* There are several species of *Icica*, all of which yield the same transparent fluid, resembling turpentine in many of its properties. *I. Icecariba*, a native of Brazil, yields a resin, which is brought into the market under the name of Gum Elemi, but is not the true gum of that name. *I. decandra* is found in the woods of Guyana, where it is called Chipa. The fluid which exudes from it yields on evaporation a resin. *I. altissima* grows in Guyana. There are two varieties of this tree, known by the name of White Cedar and Red Cedar. The latter is a very durable wood, and is used for making household furniture, boats, canoes, &c. (Don, *Dichlamydeous Plants*; *Outlines of Botany*; Lindley, *Flora Medica.*)—*Eng. Cyc.*

(4444) ICICA HEPTAPHYLLA, has 5-7-stalked oblong acuminated leaflets, with the racemes few-flowered, somewhat corymbose, and six times shorter than the petiole. It is a small tree, a native of the woods of Guyana, where it is called Arbre d'Encens. The whole plant is sweet-scented, and like the last species yields a clear balsamic fluid when it is wounded. It is burned as a perfume, and used as a remedy in dysentery. The seeds are contained in a viscid pulp which hardens into a gray resin, and is used by the natives for burning as a perfume. The carib name of this tree is Arouaoo.—*Eng. Cyc.*

(4445) ICICA HETEROPHYLLA, has ternate or pinnate leaves, with stalked, ovate, acuminated, entire, simply-veined leaflets; the racemes simple, rather shorter than the leaves. This plant is the *I. Aracouchini* of Aublet. It is a tree 50 feet in height, growing in Guyana, on the banks of the river Couron, where it is called by the natives Aracouchini. When an incision is made in the bark of this tree a yellow balsamic aromatic fluid exudes, which retains its fluidity a long time after exposure to the air. This fluid is used by the Guyanese as an application to wounds. A resin is found also in the seeds, and the natives of Guyana carry the nuts about with them on account of the scent they give out. These nuts they often send as presents to their friends. The Caribs also use the exudation for mixing with oil, with which they anoint their bodies.—*Eng. Cyc.*

(4446) ICTHYOCOLLA, a name derived from ἰχθυς a fish, and κολλα glue, is translated Isinglass, a word derived from the German *Hausenblase*, from *hausen*, the great sturgeon, and *blase*, a bladder, being one of the coats of the swimming-bladder of Fishes, chiefly of the genus Acipenser, or Sturgeon, and of which the best qualities are imported from the rivers of Russia, flowing into the Black and Caspian Seas, but also from the Sea of Aral, and the Lake Baikal. Isinglass is also imported from Brazil, and likewise from India. Of late the quality of this has been much improved. Isinglass is the purest known form of Animal Jelly; and it is therefore as Gelatine that it is valuable. Gelatine, when pure, is transparent, and nearly colourless, devoid of both taste and smell, easily preserved when in a dry state, but soon putrefying when moist. It is soluble in the different dilute acids, as well as in the fixed alkalis. Its solution forms a copious precipitate on the addition of Tannin, and which smells like tanned leather. As Corrosive Sublimate does not precipitate Gelatine, it serves to distinguish it when in solution from Albumen. Gelatine unites with a large proportion of water, and on cooling becomes a soiled tremulous mass. By boiling with Sulphuric Acid it may be converted into a kind of Sugar. Isinglass in its purest form is white, semitransparent, devoid of smell or taste, softening in old water, and dissolving in boiling water, with the exception of a minute proportion of earthy impurities. Bengal Isinglass, analysed by Mr. E. Solly, yielded, in three specimens, respectively 86·5, 90·9, and 92·8 per cent. of Gelatine.—*Royle.*

(4447) ICTIDES, a name given by M. Valenciennes to the Benturongs, a genus of Plantigrade *Mammalia*, which E. Cuvier had previously referred to the genus *Paradoxurus*. It is the *Arctictis* of Temminck.

(4448) ICTIDES ALBIFRONS. Fur gray; hairs long, silky, black at the base, and white in their extreme third, short on the head and limbs; sides of the snout, forehead, pencils of the ears (which are edged with white), black; upper part of the snout and forehead white; iris yellow; belly, gray, with shorter hairs than those on the upper parts of the body. Size, that of a very large domestic cat. In another specimen the sides of the snout and the tail, its extremity excepted, were gray. It inhabits Bootan, Nepaul (Káchar: though they occasionally occur in the central region of Nepaul. Hodgson). Sir Thomas Stamford Raffles describes the gait of this Benturong as low and crouching, the body being long and heavy, and the legs short. The tail, thick at its insertion, gradually tapers to the extremity, where it curls upwards. In climbing trees the animal is assisted by this tail, which is strong. One that was kept alive many years by Major Farquhar partook both of animal and vegetable food. Slow in motion, and timid in disposition, the animal sleeps much during the day: the night is the season of its comparative activity. Two other species have been described.—*Eng. Cyc.*

(4449) IGUANIDÆ, an extensive family of Saurians, of which the genus *Iguana* may be considered the type. Messrs. Dumeril and Bibron, in their 'Erpetologie' (1837), treat of these reptiles under the name of Lezards Iguaniens,

on Sauriens Eunotes. In 'the Catalogue of the Specimens of Lizards in the British Museum' the *Iguanidæ* with the *Agamidæ* constitute the tribe *Strobilosaura.—Eng. Cyc.*

(4450) ILLECEBRUM, a genus of Plants the type of the natural order *Illecebraceæ*. It has 5 sepals slightly cohering at the base and horned at the back. Petals absent or 5, subulate, inserted with the 5 stamens on a perigynous ring; a 1-celled 1-seeded furrowed capsule bursting along the furrows. One species is a small trailing shrub with opposite leaves having scarious stipules at the base.—*Eng. Cyc.* Wight gives Illecebrum brachiatum, 1776.

(4451) ILLECEBRUM LANATUM. Root of the woolly Illecebrum. Lin.

Sirroopoolay vayr, Tam.	Astmabayda, Sans.
Kut kejar, Duk.	

This root is considered as demulcent, and is prescribed in cases of strangury in the form of decoction. The Teloogoo name of the plant is Pindic Conda.—*Ains. Mat. Med. p.* 115.

(4452) ILLECEBRUM SESSILE. Lin.

Poonarkany, keeray, Tam.	Poonaghenti koora, Tel.
Poonaghuttie ke bawjee, Duk.	Priasattic, Sans. —*Ain's. Mt. Md. p.* 256.

(4453) ILEX, is a name given to two very different plants. As that of a species, it indicates the Evergreen Oak of the South of Europe, or *Quercus Ilex*: as that of a genus, it belongs to the Common Holly, *Ilex Aquifolium*, the type of the natural order *Aquifoliaceæ*. This latter plant, which constitutes so beautiful a feature in the winter scenery of many parts of England, and whose scarlet yellow berries render it so universal a decoration of churches (hence the name Holly-Tree, or Holy-Tree) and dwelling-houses at Christmas time, is in Great Britain upon the most northern limits within which it ranges in a wild state. It is however at those limits that it attains its greatest size and beauty; but it occasionally suffers from severe winters. It is common in the middle of Europe, and the southern side of the range of the Caucasus, where it is only a bush, and it probably extends far to the eastward. It is chiefly valued as a shelter in winter, and an ornamental tree, but its fine-grained heavy compact timber is used for a great number of useful purposes, especially by the turner and mathematical instrument maker; the black handles of metal teapots are carved out of its wood. It is also employed medicinally; the leaves and bark possess febrifugal powers of a strongly-marked character: the root and the bark are said to be diuretic and expectorant, but the berries have the discredit of being poisonous, producing purgative and violent emetic effects. Besides the Common Holly and its numerous varieties, the genus *Ilex* comprehends a large number of species, the most remarkable of which are the *I. Balearica*, or broad-leaved species of Minorca, a very handsome kind which is hardy in the middle and south of England: the *I. vomitoria*, or Cassena-Tree of the North Americans, whose leaves possess strongly-marked emetic qualities: and the *I. Paraguayensis*, or Mate Plant, of whose leaves a very large consumption takes place in South America, under the name of Tea of Paraguay. The leaves are dried, and afterwards used like the tea of the Chinese. (Loudon, *Arboretum Britannicum.*)—*Eng. Cyc.* Dr. Wight gives Ilex Gardneriana, 1217; and Wightiana, 1216.

(4454) ILEX DIPYRÆNA, is common at Mussoorce and every where in the Himalayas. It bears a very close resemblance to the holly, especially in November and December, when it is covered with clusters of scarlet berries.

(4455) ILEX SERRATA, another lofty species is also found in Mussooree, and *I. excelsa* in Nipal, (Royle, Illust. p. 167.)—*O'Shaughnessy, page* 272. In China says Mr. Williams, the order Ilicinæ, or holly, furnishes several genera of Rhamnea, whose fruit are often seen on tables. The Zizyphus produces the Chinese dates, and the fleshy peduncles of the Hovenia are eaten, the latter is quite common in Hongkong. The leaves of the Rhamnus theezans are among the many plants collected by the poorer Chinese, as a substitute for the true tea. The Chinese olive is obtained from the Pimela, but it is a poor substitute for the rich olive of Syria.—*Williams' Middle Kingdom, p.* 283.

(4456) ILLICIUM, (illicio, I allure), a genus of Plants, so named in consequence of their very agreeable aromatic fragrance; they belong to the Winter's Bark tribe. These are now generally described as a separate family under the name of *Winteraceæ*, and are distinguished by their dotted leaves and aromatic properties from *Magnoliaceæ*, of which they are sometimes made a section. The genus *Illicium* is characterised by having from 3 to 6 petaloid sepales; 27 petals arranged in several rows below the numerous stamens and pistils. The capsules are disposed in a circular manner, and open upwards; each contains a single shining seed. The species are few in number, but widely distributed. Two are indigenous in Florida; and the others in China and the neighbouring islands. *I. Floridanum* is a red-flowered species, of which the leaves are very fragrant, and the capsules smell of anise, though more faintly than the Chinese species. The bark has been proposed as a substitute for cinnamon and sassafras barks. *I. parviflorum* also, a native of North America, has similar properties, especially in its leaves. The most important species however is *I. anisatum*, or the Aniseed-Tree of China, of which the fruit is exported from Canton, and well known in commerce by the name of Star Anise. In India they are called Badian Khatai, or Chinese Anise. Hence the name Badiane, by which they are chiefly known on the continent of Europe, where they

are more employed than in England; being esteemed, as in the East, for their aromatic and carminative properties. The smell and taste of both the capsule and seed being like that of aniseed, a volatile oil is distilled from them, which may be employed for all the purposes of the oil of aniseed: it is said to give the flavour to Anisette de Bordeaux and to Anisette de Hollande. The Chinese use it in substance both as a condiment and a stimulant medicine, and burn it as incense in their temples. The tree flourishes in China and some of the Philippine Islands, and is found also in Japan, whence Siebold has described a new species. M. Perrotet also mentions that there is an undescribed species at Manilla, which is there called San-ki; that its leaves are mixed with their tea and coffee in the Philippines, and that a liqueur is likewise prepared from its fruit.—*Eng. Cyc.*

(4457) ILLICIUM ANISATUM.

Badian khutaie, ARAB. | Skimmi, JAPAN.
Pa-co-hu-huei-hiam, CHIN. | Badian-i-khotai, PERS.
Anas phool, DUK. | Anaseepoo, TAM.
Badian, HIND.

Star anise, Badian Khutai, or Chinese anise is a native of the countries extending from 23½° to 35 of N. latitude, or from Canton to Japan. The name of *Star* is applied to the fruit from the manner in which they grow, the pods being in small clusters joined together at one end, and diverging in five rays. They are prized for the volatile oil obtained from them, and for their aromatic taste. The barks have a more aromatic flavor than the seeds, but they are not so sweet. In China, their most common use is to season sweet dishes: In Japan they are placed on the tombs of friends and presented as offerings in the temples. They are chiefly exported direct to India, England, and the north of Europe, at the average value of 8½ dollars per picul. in 1850, 695 piculs were exported from Canton valued at 8,200 Spanish dollars. In India they are much used in seasoning curries and flavouring native dishes, and large quantities are used in Europe in the preparation of liqueurs 3,000 piculs of Anise are exported annually from Cambodia, and in 1841, 81 piculs of oil of Aniseed, valued at 11,900 dollars, were exported from Canton.—*Morrison. Simmonds, Faulkner. O'Shaughnessy.* In preparing a spirit of Anise, the Star Anise, may be used instead of common Anise—*Beng. Phar, p.* 412. The capsules constitute in India a rather important article of commerce, and are sold in all the bazars. Large quantities are also used in Europe in the preparation of liqueurs. Both capsules and seeds evolve a powerful odour of anise; the taste is similar, very mild, sweet, and somewhat acidulous. The kernel of the seed is oily. The capsules and seeds abound in an essential oil easily procured by distillation with water; this oil is rather brown, lighter than water, more difficultly congealed than the true aniseed oil, but in other respects exactly of the same properties. Large quantities of the capsules are used in Europe in the preparation of liqueurs. The powdered capsules are used by the Mahomedan practitioners as stimulant carminatives. For the colics of children the essential oil is given with advantage.—*O'Shaughnessy, page* 191.

(4458) IMPATIENS, a genus of plants so called from the sudden and elastic force with which they burst their capsules: hence 'Noli me tangere' is the name of one of the species, another is well known as a highly ornamental annual by the name of Balsam, whence the natural family to which it belongs has been called *Balsaminaceæ*. The genus is especially an East Indian one, though single species extend into Europe, Siberia, and North America, Linnæus was only acquainted with 7 or 8 species; but Dr. Wight, in the "Madras Journal," Vol. ii., states that not less than 100 species are now known, and almost entirely from the mountains of the Peninsula of India and the Himalayas; in those from *Silhet* as far north as the *Sutlej*, and in 30° N. lat., at as great elevations as 7000 feet. They are absent from the plains of India; some are found on the Malabar Coast, little elevated above the sea, but only during the monsoon. Dr. Royle has stated that they are only found in the Himalayas during the rains, and hence inferred that the moisture and moderate temperature, as well as the equability of both during the rainy season, is as favourable to their growth as the heat and moisture of the Peninsula; but Dr. Wight has since ascertained that the species are chiefly found at elevations of 4000 and 4500 feet, in a region where there is moisture combined with a moderate but equal temperature. These facts are important as showing the influence of climate on vegetation; and useful as affording hints and principles for the cultivation of these plants at a lower temperature than is necessary for the plants of the plains from the same latitudes, though great success has been attained in the cultivation of Balsams in Britain.—*Eng. Cyc. Vol* III. *page* 225.

(4459) IMPATIENS BALSAMINA. BALSAM. The common balsam, or touch-me-not, *Noli me tangere* is very common, both wild and cultivated, in Tenasserim.—*Mason.*

(4460) IMPATIENS GLANDULIFERA. Treating them as Indian flowering plants Dr. Riddell says of *Noli me tangere*, that it is so named because the ripe capsules, on being touched, fly open and scatter their seeds. A native of India. The double flowered are most prized. The colours are rose. pink, white, blue, and variegated. When the true colour of the plant from seed can be depended upon, if sown in large beds, or patches, they have a pretty effect in full blossom, and may of course be arranged according to the taste of the cultivator. Is propagated by seed at the commencement of the rains, in

small beds, and then transplanted. After the first blossoms are off they may be cut down, and will throw out fresh shoots, but will not blossom so fine as the first. A rich light loamy soil, with old decayed stable manure. No plant should ever be closer than one foot, especially if the soil is rich, and all lower superfluous leaves and stalks removed from the stems. They thrive well in pots, and during the time they are in blossom look very ornamental placed amongst evergreens.—*Riddell.* Dr. Wight in Icones gives species of Impatiens, albida, 743; campanulata, 744; cuspidata, 741; dasysperma, 742; fasciculata, 748; fruticosa, 966; Gardneriana, 1050; Goughii, 1603; inconspicua, 970 Jerdoniæ, 1602; Kleinii, 884; latifolia, 741, 970 Leschenaultii, 741, 970; modesta, 968; Munronii, 1049; oppositifolia, 883, rivalis, 751; rosmarinifolia, 750; rufescens, 969; scabrida, 323; scapiflora. 967; tomentosa, 745; triphylla, 323, umbelleta, 745; uncinata, 747; viscida, 746.

(4461) IMPERATA CYLINDRICA. THATCH GRASS. Saccharum cylindricum, and Saccharum spontaneum. The Karens in Amherst Province cover their houses with the tall grasses which are so abundant on the Coast, and a few Europeans prefer this thatch to that made from the Nipa. Two different species of grass are used for this purpose both of which were formerly referred to the genus which produces sugar cane. The sugar grass seen in Maulmain, which flowers two or three feet high has been removed since Roxburgh wrote, into the genus Imperata. This is one of the grasses used for thatch, and is often mistaken for *Saccharum spontaneum.*—*Mason.*

(4462) INDIA.

Area and Population of the British Presidencies and the Native States of India.

BRITISH PRESIDENCIES.	DIVISION.	Area in square miles.	Population.
Bengal, Agra or N. W. Provinces & Punjab,	Lower Provinces,	119,633	37,262,163
	Saugur and Nerbudda Territories,	15,388	1,929,587
	Jaloun,	1,873	176,297
	British Mhairwarrah,	282	37,715
	Umballah, Loodianah, and Territory lately belonging to Seikh chiefs,	4,559	2,311,969
	North-eastern frontier including Assam, &c.	29,900	1,180,935
	Arracan,	15,164	321,522
	South-west frontier including Sumbulpore, Chota Nagpore, &c.	30,589	2,627,456
	Nagpore or Berar,	76,432	4,650,000
	The Punjab and Kooloo Territory,	78,447	9,153,209
	Tenasserim Provinces,	29,168	115,431
	Jhansi,	2,532	200,000
	The Sunderbunds, &c.	6,500	Unknown.
	North-western Provinces, including Delhi, Agra, Benares, &c.	72,052	30,271,885
	Butty Territory, Deyrah Dhoon, Kumaon, Gurhwal, &c.	13,599	600,881
	Total,	496,118	90,839,050
Madras,	Regulation Provinces,	116,248	19,847,305
	Non-Regulation Districts,	19,444	2,454,392
	Total,	135,692	22,301,697
Bombay,	Regulation Provinces,	57,723	9,015,534
	Non-Regulation Districts,	62,342	2,093,533
	Total,	120,065	11,109,067
The Eastern Settlements of Singapore, Prince of Wales Island and Malacca,		1,575	202,540
Native States within the Presidency of Bengal,	Hyderabad, Bhopal, Burtpore, Scindias and Holkar's Dominions, &c.	503,554	38,259,862
Do. within the Presidency of Madras,	Cochin, Mysore, Travancore, &c.	51,802	4,752,975
Do. do. do. of Bombay,	Guzerat, Cutch, Colapore, &c.	60,575	4,460,370
Foreign European Possessions,	French (Pondicherry, &c.)	188	171,217
	Portuguese (Goa),	1,066	313,262

IMPORTS INTO INDIA.

Years.	Merchandise.						Treasure.				Merchandise and Treasure.			
	Into Bengal.	Into Madras.	Into Bombay.	Total.		Total Merchandise.	Into Bengal.	Into Madras.	Into Bombay.	Total.	Into Bengal.	Into Madras.	Into Bombay.	Grand Total.
				From United Kingdom.	From other Countries.									
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
1834-35	1,999,130	503,290	1,758,685	2,682,221	1,578,884	4,261,106	646,224	153,115	1,093,683	1,893,023	2,645,355	656,405	2,852,369	6,154,129
1839-40	3,341,591	683,307	1,806,337	4,289,489	1,541,747	5,831,236	1,226,786	112,406	606,071	1,945,264	4,568,378	795,714	2,412,408	7,776,501
1844-45	5,933,990	1,046,894	3,773,181	7,952,179	2,801,886	10,754,065	1,581,365	188,561	1,982,545	3,752,471	7,515,355	1,235,455	5,755,727	14,506,537
1849-50	5,283,170	906,004	4,110,713	7,578,980	2,720,907	10,299,888	1,214,865	121,437	2,060,505	3,396,807	6,498,035	1,027,441	6,171,218	13,696,696
1850-51	6,115,201	897,823	4,545,764	8,327,992	3,230,795	11,558,788	1,189,484	260,110	2,362,214	3,811,808	7,304,685	1,157,933	6,907,978	15,370,597
1851-52	7,087,406	906,435	4,246,647	9,226,729	3,013,760	12,240,490	2,306,470	297,398	2,448,190	5,052,059	9,393,877	1,203,834	6,694,837	17,292,549
1852-53	4,993,674	840,531	4,236,655	7,235,078	2,835,783	10,070,861	3,393,987	576,854	2,860,536	6,831,377	8,387,661	1,417,385	7,097,191	16,902,239

Years.	Merchandise.						Treasure.				Merchandise and Treasure.			
	From Bengal.	From Madras.	From Bombay	Total.		Total Merchandise.	From Bengal.	From Madras.	From Bombay.	Total.	From Bengal.	From Madras.	From Bombay.	Grand Total.
				To United Kingdom.	To other Countries.									
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
1834-35	4,092,043	886,107	3,015,268	3,056,973	4,936,447	7,993,420	66,554	106,377	21,808	194,740	4,158,598	992,485	3,037,077	8,188,161
1839-40	6,800,925	1,228,467	2,833,352	5,969,951	4,892,793	10,862,745	200,017	127,446	143,059	470,522	7,000,943	1,355,914	2,976,411	11,333,268
1844-45	9,822,197	1,641,462	5,126,552	7,240,619	9,349,592	16,590,212	396,543	65,053	645,243	1,106,840	10,218,740	1,706,516	5,771,796	17,697,052
1849-50	10,143,038	1,272,884	5,891,376	7,026,470	10,285,828	17,312,299	354,205	72,637	544,400	971,244	10,502,244	1,345,522	6,435,776	18,283,543
1850-51	9,997,527	1,556,970	6,599,645	8,104,016	10,060,133	18,164,149	276,329	104,140	160,818	541,288	10,273,857	1,671,117	6,760,464	18,705,438
1851-52	10,423,970	1,658,808	7,796,474	7,138,888	12,740,517	19,879,253	250,588	215,768	452,732	919,088	10,674,559	1,874,576	8,249,207	20,798,342
1852-53	10,738,554	2,121,613	7,604,464	8,428,295	12,036,338	20,464,633	476,375	36,382	542,472	1,055,229	11,214,929	2,157,996	8,146,937	21,519,862

Account of the Quantities and Declared Value of the principal Articles Exported from Great Britain to India in Three years, from 1850-51 *to* 1852-53.

ARTICLES.	Quantities.			Value in Sterling.		
	1850-51	1851-52	1852-53	1850-51	1851-52	1852-53
				£	£	£
Apparel,	.....	.....	.....	261,209	250,931	256,213
Books, Stationary &c.,	.....	.....	.....	148,563	118,712	113,601
Cotton twist and yarn,	.....	.....	.....	1,01',262	1,373,949	1,102,500
Do. Piece goods,	.....	.....	.....	3,581,996	4,662,036	3,578,349
Fruits,	.....	.....	.....	975	943	121
Jewellery,	.....	.....	.....	52,164	56,934	28,564
Malt liquor,	.....	.....	.....	123,342	146,947	151,870
Machinery,	.....	.....	.....	19,052	11,541	23,126
Metals, Manufactured,	.....	.....	.....	201,082	230,105	182,944
Do. Copper, Cwt.,	118,982	44,004	24,796	611,719	216,342	114,631
Do. Iron, do.	984,433	688,722	338,795	457,503	267,462	140,005
Do. Lead, do.	.....	.....	.....	58,446	27,329	17,992
Do. Speltar, do.	63,303	58,758	9,070	62,758	55,738	8,748
Do. Tin, do.	.....	.....	.....	8,301	6,955	1,608
Salt, do.	790,953	1,158,983	837,946	376,965	552,366	399,362
Silken goods, pieces,	.....	.....	.....	18,892	31,495	38,804
Spices,	.....	.....	.....	.....	.....	.....
Spirits, gallons,	89,251	96,863	68,526	42,927	49,648	33,482
Tea,	.....	.....	.....	.....	.....	.....
Tobacco, Cigars,	.....	.....	.....	516	913	534
Timber,	.....	.....	.....	1,014	1,086	1,252
Woollen goods,	.....	.....	.....	206,966	200,435	114,794
Wines, gallons,	334,127	255,125	175,101	232,455	200,658	144,761
Miscellaneous,	.....	.....	.....	849,886	764,204	781,817
Total Merchandise,	.....	.....	.....	8,327,993	9,226,729	7,235,078
Do. Treasure,	.....	.....	.....	503,029	1,041,015	2,340,947
Total Merchandise and Treasure,	.....	.....	.....	8,831,022	10,267,744	9.576,025

Account of the principal Imports into Great Britain from India in three years from 1850-51 *to* 1852-53.

ARTICLES.	Quantities.			Value in Sterling.		
	1850-51	1851-52	1852-53	1850 51	1851-52	1852-53
				£	£	£
Coffee, lbs.	4,209,717	6,324,435	4,244,845	61,484	58,429	61,029
Cotton, raw, lbs.	141,446,798	81,104,223	181,360,994	2,059,718	1,171,280	2,525,186
Grain, Cwt.	779,809	624,167	1,157,985	131,634	105,335	177,459
Indigo, lbs.	8,723,343	8,193,236	6,773,160	1,525,962	1,444,705	1,136,887
Ivory, Cwt.	2,753	5,149	3,375	40,953	85,949	51,078
Lac, Cwt.	42,040	30,448	52,543	78,446	58,041	104,043
Pepper, lb.	1,332,128	1,918,973	1,208,945	11,412	16,335	10,479
Piece goods, Cotton, pieces, ...	142,380	208,723	428,550	48,801	7 ,071	136,622
„ Silk do.	560,484	408,304	502,947	311,210	224,836	267,855
„ Shawls do.	9,975	7,496	11,211	134,738	113,848	179,410
Rum, gallons,...	391,151	224,463	171,984	19,462	10,814	8,447
Silk, raw, lbs.	1,271,249	1,437,658	1,381,203	609,450	680,537	664,454
Saltpetre, Cwt.	282,538	254,670	339,444	216,062	196,848	258,787
Sugar, do.	1,488,879	1,506,051	1,356,630	1,709,743	1,689,153	1,605,321
Wool, lbs.	4,492,794	7,056,713	12,0.0,999	65,525	100,606	171,169
Miscellaneous, ...	.....	.....	.....	1,079,411	1,111,108	1,070,069
Total Merchandise, ...	.....	.....	.....	8,104,011	7,138,889	8,428,295
Do. Treasure.	.....	.....	.....	10,164	7,051	128,919
Total Merchandise and Treasure....	.....	.....	.....	8,114,175	7,145,940	8,557,214

Abstract of the Area and Population of the British Presidencies and the Native States of India.

British Presidencies.	Division.	Area in Square miles.	Population.
British Possessions, ...	Bengal, Agra and Punjab, ...	496,118	90,839,050
	Madras, ...	135,692	22,301,697
	Bombay, ...	120,065	11,109,067
	Eastern Settlements, ...	1,575	202,540
Native States, ...	Bengal,...	503,554	38,259,862
	Madras, ...	51,802	4,752,975
	Bombay, ...	60,575	4,460,370
Foreign European States. ...	French, ...	188	171,217
	Portuguese, ...	1,066	313,262
	Total of India,.....	1,370,635	172,410,040

Encyc. Brit.

(4463) INDIA RUBBER, This has already been noticed under the head caoutchouc, and its scientific relations will now be noticed. India-rubber is the common name of a vegetable compound which is found in all plants with a milky juice. It is also known by the name of Caoutchouc. The existence of a milky juice in many plants, which flows from them when their tissues are wounded, is a fact that has been familiarly known from time immemorial. It is however only a matter of recent discovery that this milky juice characterises certain families of plants. Although the great majority of plants which yield this juice in abundance are tropical, yet they are not without their European representatives. The Spurges, Dandelion, and Celandine of our roadsides are instances. The families of plants which furnish this milky juice in the greatest abundance are—*Moraceæ*, *Euphorbiaceæ*, *Artocarpaceæ*, *Apocynaceæ*, *Cichoraceæ*, *Papaveraceæ*, *Campanulaceæ*, and *Lobeliaceæ*. This juice, which is called by botanists 'the milky juice,' because it has an appearance similar to milk, has also the physical constitution of that fluid. It is an aqueous liquid charged with soluble matter, in which float globules of a substance insoluble in water, and which are by their tenuity held in suspension in the liquid, but for which they have no affinity, in the same manner as butter is held in suspension by milk. From the difference of the refractive powers of these two substances, each of which taken separately would be colourless or transparent, arise the opacity and white colour of the two: hence the compound is properly called a 'milky' juice.' The analogies which this juice exhibits with the milk of animals and vegetable emulsions are seen in the manner in which it acts when left to itself. Run out into the air, received and preserved in close vessels, it separates itself into two layers, as milk itself would do. The watery part very soon has an insoluble part floating upon it, which collects together and swims at the top as cream swims upon milk, and which forms nearly the half of the entire mass. But with these physical resemblances the analogies cease. That which in milk and in emulsions produced from seeds collects on the surface of the aqueous liquor is, properly speaking, a fatty body, containing oxygen in its composition; while the kind of cream which swims upon the milky juice is a compound of carbon and hydrogen. This substance has long been known to the natives of both the Old and New World, in Hindustan and South America. It was not however till the expedition of the French academicians to South America in 1735 that its properties and nature were made known in Europe by a memoir upon it by M. de la Condamine. This notice excited little attention; and subsequently notices of this substance were sent to the French Academy in 1751 by M. Fresnau, and in 1768 by M. Macquer. At the latter end of the last century and the beginning of the present it was brought into England in small quantities, where, on account of its being used for rubbing out black-lead pencil marks, it acquired the name of India-Rubber. Although after its application to the water-proofing of garments its consumption gradually increased, the importation into the United Kingdom in 1830 appears not to have been more than 50,000 lbs. In 1842 the import of this article had increased to between 700,000 and 800,000 lbs. Up to the present time the consumption of India-Rubber has prodigiously increased; and one port alone in South America is said now to send to Great Britain nearly 4000 cwts. annually. To the large consumption in the United King-

dom must be added that of America, where the application of Caoutchouc has been much more general and successful than even in Great Britain. The particular species of plants which are employed for procuring India-Rubber are very numerous, and it is probable that many yield it which are not yet known to botanists. The tree which supplies most in Continental India is the *Ficus elastica*, a tree belonging to the order *Moraceæ*; it is exceedingly abundant in Assam. All the species of *Ficus* yield Caoutchouc to a greater or less extent in their juices, and even the Common Fig (*Ficus Carica*) of Europe contains it. Species of *Ficus* produce the Caoutchouc brought from Java; and *F. radula*, *F. elliptica*, and *F. prinoides* are amongst those mentioned as affording a portion of that brought from America. Next to the *Moraceæ* the order *Euphorbiaceæ* yields the largest quantity of Caoutchouc. The *Siphonia elastica*, a plant found in Gayalla, Brazil, and extending over a large district of Central America, yields the best kinds of India-Rubber that are brought into the markets of Europe and America. To another order, *Apocynaceæ*, we are indebted for the Caoutchouc which is brought from the islands of the Indian Archipelago. The plant which is the source of this substance in those districts is the *Urceola elastica*, a climbing plant of very rapid growth and gigantic dimensions. A single tree is said to yield, by tapping, from 50 to 60 lbs. annually. Many other plants of this order yield Caoutchouc, and of those given on good authority we may mention—*Callophora utilis* and *Camerania latifolia*, plants of South America; *Vahea gummifera*, in Madagascar; and *Willughbeia edulis*, in the East Indies. To this order belongs the Cow-Tree, or Hya-Hya (*Tabernæmontana utilis*), of Tropical America, which yields a milky juice that is drunk by the natives of the district in which it grows. The Caoutchouc, whilst it is in the tissues of the plant, is evidently in a fluid condition; but, after its separation from the other fluid parts, its consistence becomes changed, and it forms a solid mass similar in its external characters to vegetable albumen. In this state it is dense and hard, but may be separated and rolled out so as to form a sheet resembling leather. It has many interesting and peculiar properties. Insoluble in water and in alcohol, it dissolves in ether, in the sulphuret of carbon, the fat oils, and the liquid carburets of hydrogen. It is soft and elastic at the ordinary temperature, but at the temperature, of 2° above the freezing point it acquires the hardness of wood. A temperature of 100° softens it without altering its form. It then unites with itself with the greatest facility, and two pieces recently cut apart re-unite so as to render it impossible to discover where the junction has taken place. But a higher temperature, approaching 150°, changes it into an adhesive substance, which on cooling does not recover the primitive properties of Caoutchouc. In the state of recent coagulation, and while still in a pulpy condition Caoutchouc possesses a degree of elasticity which admits of its receiving, by means of moulds, the most varied form. The greater part of the Caoutchouc of commerce is obtained by the natives of the countries in which it is produced in the form of shapeless masses, collected at the foot of the tree which has been incised or cut for the purpose of extracting the juice from it, or solidified in a trench made in the earth, and coagulated in this rude mould in voluminous masses, which often resemble the trunk of a large tree. A part of it however possesses other forms which the rude art of the natives attempts to communicate to it. They model with plastic clay figures of animals, imitations of the human foot, and pear-shaped bodies; and then dipping these moulds in the thickened Caoutchouc, and renewing the connection when the first coat is solidified by exposure to the air, they obtain, by breaking the mould and getting it out in fragments through an opening properly arranged, hollow flasks, figures of animals, rough slippers, &c. They thus make Caoutchouc serve for the manufacture of objects for which we ourselves employ animal membranes and leather. India-Rubber is obtained from both the Old and New World. The East Indies supplied the original specimens seen in Europe, and have ever since been a source of supply to the British markets. It comes principally from Java, and is often glutinous, and is less esteemed in commerce than that furnished by the equatorial regions of America. Great quantities of Caoutchouc are imported to Europe from Mexico, from South America, and especially from the province of Para in Brazil. That which comes in the shape of bottles is generally preferred; and when it is pure, and the different coats which comprise it are well united, it may be employed immediately for many purposes. Bnt it often happens that the coats which form the pear-shaped masses are badly united. It then becomes necessary, in order to make use of them, to work it up by a process of kneading, so as to obtain it in a coherent or homogeneous mass. This operation becomes especially indispensable when, as most commonly happens, the Caoutchouc is in large impure masses, and mixed with sand and the debris of vegetable matter. These impurities do not entirely proceed from the moulds made in the earth into which the juice has been allowed to exude, and in which it has been left to thicken and solidify; but their quantity and their presence between the coats of the pyriform masses show that the impurity is mainly to be attributed to fraud. The Caoutchouc thus obtained is not applicable to any use until it has undergone a previous purification. The purification of the Caoutchouc is accomplished by submitting the impure Caoutchouc to the action of cylinders furnished with

teeth turning in opposite directions and with unequal velocities, which cause it to undergo a kind of mastication. By this treatment the Caoutchouc becomes softened without being liquified, and a homogeneous mass is formed which is cut in the form of rectangular blocks, which being again cut, constitute those small parallelopipedons used by draughtsmen to rub out the marks of black lead pencils. This use was in England for a long time the only one to which this substance was applied, but this limited use was far from indicating the extent to which Caoutchouc has been employed in the last thirty years, or the multiplicity of services it has been called upon to perform for sanitary and industrial purposes. To rub out pencilmarks, to form the rude slippers which seemed well adapted to the Indian toilet, but to which a form acceptable in Europe had not been imparted, were in fact the only uses to which Caoutchouc was applied up to 1820. The relations of Caoutchouc to the functions of the plants in which it is found are not understood. Many fallacious views have been offered on this subject. Schulze of Berlin, who has written most extensively on this subject, regarded it as a principle in the juices of plants analogous to the fibrine of the blood, but his views with regard to the milky juice of plants and the laticiferous tissue are now generally allowed to be erroneous. It is not improbable that Caoutchouc is formed as the result of the deoxidation of cellulose, or some other ternary constituent. The chemical composition of Caoutchouc is Hydrogen and Carbon. In what proportion they exist is not known. When distilled, Caoutchouc yields oils which have a composition similar to oil of turpentine—C_5, H_4, or C_{10}, H_8. (*Reports of the Great Exhibition of* 1851, Class XXVIII., by Dr. Lankester: Schleiden, *Principles of Scientific Botany*; Gregory, *Handbook of Organic Chemistry*.) An India Rubbe tree, probably the Ficus elastica, grows to some seventy to ninety feet high. Immense forests of it are found on the west side of the Burampooter, extending along the Meeree and Abor mountains. It is a stately tree—it is said some are 100 feet high. The rubber from this tree has not answered for exporting from India. The expense of making is a mere trifle; but, whether it is owing to the tree having been accustomed to a colder climate, or from some chemical property in the rubber, it cannot bear the heat of a passage to Europe. It becomes a fluid during the voyage. Otherwise, in cold climate, it is equal to other rubbers.—*Bonynge America, page* 258.

(4464) INDIAN CORN. [ZEA,]

(4465) INDIANCRESSES [TROPÆOLACEÆ.]

(4466) INDIAN OX. [BOVIDÆ.]

(4467) INDIAN SHOT. [MARANTACEÆ.]

(4468) INDIANITE. This Mineral occurs in granular masses. It has a hardness 5·5 to 5·5. It scratches glass. The colour is white or grayish; lustre shining; translucent; specific gravity 2.64. It is infusible by the blow-pipe, and gelatinises in acids. It occurs associated with *Garnet, Felspar, Fibrolite, and Hornblende.*

(4469) INDICOLITE. [TOURMALINE.]

(4470) INDIGO.

Neel, ARAB.	Tarcom, MAL.
Main-ay, BURM.	Neel, PERS.
Chamnho-la, COCHIN.	Anil, PORT.
Nili, CYN.	Krutick, RUS.
Indigo, DUT. FR. GER.	Nili, SANS.
Goolee, Neel, GUZ. HIND.	Anil, SP.
Indaco, IT.	Neelum, TAM.
	Nilmi, TEL.

Indigo.—The plants which afford Indigo dye are grown chiefly in the East and West Indies, in the middle regions of America, in Africa and Europe, and are mostly species of the genera *Indigofera, Isatis* and *Nerium*. *Indigofera tinctoria* furnishes the chief indigo of commerce, and affords in Bengal, Malabar, Madagascar, the Isle of France, and St. Domingo, an article of middling quality, but not in large quantity. The *Indigofera disperma*, a plant cultivated in the East Indies and America, grows higher than the preceding, is woody, and furnishes a superior dye-stuff. The Guatamala indigo comes from this species. *Indigofera Anil* grows in the same countries, and also in the West Indies. The *Indigofera argentea*, which flourishes in Africa yields little indigo, but it is of an excellent quality. According to Mr. Simmonds *I. pseudotinctoria*, cultivated in the East Indies, furnishes the best of all. *I. glauca* is the Egyptian and Arabian species. There are also the *cinerea, erecta* (a native of Guinea), *hirsuta, glabra*, with red flowers, species common to the East, and several others. The *Wrightia tinctoria*, of the East Indies, an evergreen, with white blossoms, affords some indigo, as does the *Isatis tinctoria*, or Woad, in Europe, and the *Polygonum tinctorium*, with red flowers, a native of China. *Baptisia tinctoria* furnishes a blue dye, and is the wild indigo of the United States.—*Simmonds, p.* 453. Plants of other genera are also employed for obtaining Indigo—as *Wrightia*, (*Nerium*, Roxb.) *tinctoria, Marsdenia tinctoria, Galega tinctoria*, but especially the first two. Dr. Bancroft [vol. i. p. 190] also adduces *Spilanthes tinctoria, Scabiosa suecisa, Cheiranthus fenestralis*; also a species of *Bignonia* and a *Tabernomontana*, on the African coast, with *Amorpha fruticosa* and *Saphora tinctoria*, as all yielding a blue dye, or coarse sorts of indigo.—*Eng. Cyc. Vol.* 3, *page* 228. Indigo of an excellent quality has been obtained in the East from a twining plant, *Gymnema tingens* or *Asclepias tingens*. The *Ruellia* species furnish the well known Room dye of Assam, and the Chinese obtain a blue dye from the Ruellia indigotica, another

species of this genus, as also from the *Isatis indigotica* of Mr. Fortune.

Sources of supply.—Indigo is at present grown for commercial purposes chiefly in Bengal, and the other provinces of that Presidency, from the 20th to the 30th deg. of north latitude; in the Province of Tinnevelly, Cuddapah and the two Arcots in the Madras Presidency; in Java, in the largest of the Philippine islands, in Gautemala, Caraccas, Central America and Brazil. Bengal is, however, the chief mart for indigo, and the quantity produced in other places is comparatively inconsiderable. It is also still cultivated in some of the West India islands, especially St. Domingo, but not in large quantities. Indigo grows wild in several parts of Palestine, but attention seems not to have been given to its cultivation or collection. On most parts of the eastern and western coasts of Africa, it is indigenous; at Sierra Leone, Natal, and other places it is found abundant.—*Simmonds.*

History.—Indigo was known to, and in constant use amongst the Greeks and Romans; and is mentioned especially by Arrian in his *Periplus* as imported by way of Egypt from the country in the vicinity of the Indus. The Venetians, the Portuguese, the Dutch, and subsequently the English imported indigo amongst other articles of the dye and dry-saltery trade. Early in the seventeenth century we find this article becoming one of increasing consumption among the dyers; so much so indeed as to interfere seriously with the trade in woad. So jealous were the authorities of that age of any commercial innovation, of any encroachment upon vested rights, that, in the year 1654, the use of this article, which was called "the Devil's dye," was strictly forbidden within the Austrian dominions, by imperial proclamation. Not content with this extremely conservative measure, the good people of Nuremberg compelled the dyers of their city to take oath each year, that they would employ no indigo in their work. Despite imperial edicts and Nurembergers' oaths, this dye continued to find favour generally throughout Europe; and indifferent as was the article produced in those days, the trade became one of considerable value until the close of the seventeenth century, when they were driven from the European markets by the active competition of the West Indian planters and the colonists of America. Subsequently, however, when the States declared their independence, and the culture of the West Indian plant was neglected for other articles, the E. I. Company resumed their dealings in it, and by giving all the encouragement in their power, not only to native but to European planters, they succeeded, after a number of years, in establishing the manufacture of indigo on such a firm footing, that the Bengal article now ranks the highest in public estimation, having fairly driven all competition from the field. It is highly problematical, however, if the manufacture of indigo in British India would have arrived at its present state of prosperity but for the spirit evinced by the Directors of the East India Company, who, in the teeth of losing markets, continued to make extensive purchases of the article from the European planters, shipping their investment to a certain loss, until, after a series of years, the agriculture of the plant, and the chemistry of the manufacture, became so thoroughly investigated, and received so many improvements, as to place the trade beyond the necessity for any further fostering. The first, or London East India Company, carried on a very profitable trade in this dye for upwards of a century; purchasing it from the native makers at about a shilling the pound, and selling it at five times that price. Between the years 1664 and 1694 their imports of the article into Great Britain did not exceed 60,000 lbs. annually. In those days the seat of the native manufacture of indigo of the finest quality was at Agra. Lahore contributed a good article, as did the Golconda country. The inferior sorts came from Surat, Berampoor, Indore, Oude, and Bengal. At the present time the finest indigo is manufactured in the Bengal presidency, where it has been found that both soil and season are highly favourable to the culture and development of the plant. A considerable quantity, about 4,000 chests, is produced in and about the vicinity of Madras, some of which is of superior quality. Towards the close of the last century, say in 1786, the shipments of indigo to Great Britain amounted to 245,000 lbs. Shortly after that period the attention and capital of English cultivators were turned towards the article, as already related; and we find the results of this enterprise in the statement of exports to all parts of the world, but mainly to England: this gives the quantity for 1795 as 2,644,710 lbs.; for 1799, at 4,571,420 lbs.; for 1810, at 5,520,874 lbs.; and for 1848-9, at 9,920,000 lbs., of which three-fourths were to Great Britain.—*Capper's Three Presidencies, p.2.* The quality of indigo depends upon the species of the plant, its ripeness, the soil and climate of its growth, and the mode of manufacture. The East India, and Brazilian indigo arrives in England packed in chests, the Guatemala in ox-hides, called serons. The indigo imported from the western hemisphere was for some time considered superior in quality to that of the East. Its cultivation, however, has been neglected, and the Bengal indigo is preferred at present to any imported from South America, where it is now only cultivated by the Brazilians and Colombians. If proper attention were paid to the cultivation of the plant, and to the preparation of the dye, it is very likely part of that important trade would be brought back. It thrives best in a moist climate, and the interior of Guiana, chiefly newly-cleared

land, would be well adapted for it. The late Mr. Dunlop ("Travels in Central America") gives an interesting description, which, at the risk of repetition in some points, I shall give entire. "Several vessels generally arrive at the Union from South America at the time of the periodical fairs, where nearly all the indigo (the only produce of any importance), is disposed of; formerly it reached 10,000 bales, but at present it does not at most exceed 3,000 bales of 150 lbs. each. The indigo well known in Europe by the name of Guatemala indigo, was never cultivated in that province (in the same manner as not a grain of the Honduras cochineal is grown there), being entirely grown in the state of San Salvador, in the vicinity of San Miguel, San Vicenti, and the city of Salvador, with the exception of a small quantity of very superior quality grown in the state of Nicaragua, and a few bales in Costa Rica, which is all consumed in the State. Under the government of Spain, the produce of the state of San Salvador alone had reached 10,000 bales, and that of Nicaragua 2,000; the produce of San Salvador in 1820 two years before its independence, being 8,323 bales. But since 1822 the annual produce had gradually declined, and in 1846 it did not exceed 1,000 to 1,200 bales, nearly all the indigo estates being abandoned, partly, no doubt, from the great fall in the price of the article, but more on account of the impossibility of getting laborers to work steadily. The plant cultivated in Central America for the manufacture of indigo, is the triennial plant, supposed to be a native of America; but there is also an indigenous perennial plant, abounding in many parts of Central America, which produces indigo of a very superior quality, but gives less than half the weight which is produced by the cultivated species. The ground for sowing the indigo seed is prepared in April, — a piece of good forest land near one of the towns being selected, a part is cut to make a rude fence, and the remainder burnt, which is easily accomplished, as everything is very dry at that season; and the ground is afterwards scratched with two sticks, fastened crosswise, to resemble somewhat the shape of a plough, and the seed scattered over it by hand. The rainy season always commences early in May, and the indigo is ready for cutting about the middle of July, taking about two and a half months to come to perfection. The growing crop somewhat resembles lucerne, and is in the best state for making indigo, when it becomes covered with a sort of greenish farina. The crop of the first year is small, and sometimes not worth manufacturing; that of the second year is the best, and the third is also very good, if it has been carefully weeded; but many indigo fields have lasted more than ten years without being re-sown, as the seed which falls naturally springs up again, and where the land is good yields nearly as large a crop as a new-sown field. When the plant is ready for manufacturing, a number of men are collected, each of whom is either provided with, or brings his own mule or horse, if he has one. Two men always go together, cut the plant, then about the height of full-grown red clover, and take it to the vats, which are large tanks made of brick and lime, holding at least 1,000 gallons, and some as much as 10,000. Into these the plant is thrown till they are nearly full, when weights are put above it to prevent its floating, and the vats filled with water till it covers the mass of the indigo plant. After remaining from twelve to twenty-four hours according to the state of the plant, weather, and other circumtances (the time required being determined by the color which the water assumes), the herb is taken out, and the water beaten with paddles in the very small vats, and by a wheel suspended above and turned by men or horses in the larger ones, till it changes from a green color, which it has acquired ere the removal of the herb, to a fine blue, when it is allowed to stand for some hours, till the coloring matter has settled to the bottom of the tank, a process which is generally hastened by throwing in an infusion of certain herbs to facilitate its settlement, or as the natives term it curdle (*cuajar*) the colored water. As soon as all the color has settled, the water is drawn off, and the blue, which is of the consistency of thick mud, is taken out of the vat and spread upon cotton, or coarse woollen cloth, and dried in the sun. The color in a great measure depends upon removing the herb exactly at the proper time, and upon properly beating the water, neither too long nor too short. Unless these processes are properly performed, the indigo will not be of first-rate quality; but some estates will never produce the best indigo, whatever care may be bestowed on the manufacture. A *mansana*, of 100 yards square, which is nearly two British statute acres, produces generally about 100 to 120 lbs. of indigo, the carriage and cutting of the herb costing about twenty dollars, and the cleaning of the field and all other expenses connected with it, including the manufacture of the indigo, about as much more. The indigo of Central America is not put into moulds when drying, as that of Bengal, but is allowed to remain in the rough shape in which it dries, and without further preparation is ready for baling and exportation. The bales are generally made up in 150 lbs. each, and the quality is classed by numbers, from 1 to 9; Nos. 1 to 3 being of the quality called *cobres* in Europe; Nos. 4 to 6 of that called *cortes*, and Nos. 7 to 9 of that called *flores*; Nos. 1 to 6 do not at present pay the expenses of manufacture, and are never intentionally made. No doubt, with a little more skill in the manufacture, the whole might, as in Bengal, be made of the quality called *flores*; but such improvements cannot be expected till a new

race of people inhabit Central America. At present about one half of the indigo produced is under No. 7, and as the cultivation is said not to pay at the present prices—and, indeed, hardly can be supposed to compete with Bengal, a country where labor is so much cheaper, and capital abundant—it is probable, that the cultivation will shortly be entirely abandoned, unless the price should again rise in Europe." In 1846, 31,933 lbs. of indigo were exported from Angostura. The following particulars were contributed to Simmonds' "Colonial Magazine," by the late Dr. Edward Binns, of Jamaica :— The species generally cultivated is the *I. tinctoria*, which requires a rich moist soil and warm weather. The seed, which is at first sight not unlike coarse gunpowder, is sown three or four inches deep, in straight lines, twelve or fifteen inches apart. The shoots appear above ground in about a week; at the end of two months the plant flowers, when it is fit for cutting, which is done with a pruning knife. It must be mentioned that great care is requisite in weeding the indigo field when plants first shoot through the earth. In the State of St. Salvador, large vats made of mahogany, or other hard wood, are constructed for the reception of the plant, where it is allowed to undergo maceration and fermentation. In a short time the water becomes greenish, and emits a strong pungent smell, while carbonic acid gas is freely evolved. In about twenty-four hours it is run off into large flat vessels, and stirred about until a blue scum appears, when additional water is added, and the blue flakes sink to the bottom. The supernatant water has now acquired a yellowish tinge, when it is run off carefully, and the blue deposit or sediment put into bags to drain. It is subsequently dried in the shade, or sometimes in the sun, then placed in cotton bags and carried to the indigo fair, or forwarded to the city of Guatemala. The East Indian mode of manufacturing the indigo differs materially, and many suppose it preferable to the Salvador. It consists in *steaming* the fermented mass in large pipes enclosed in huge boilers. I am inclined to believe this to be the most economical, if not the best way of manufacturing indigo. From Guatemala alone, it is computed that from 6,000 to 8,000 serons of indigo are exported annually; while San Miguel, Chalatenaugo, Tejulta, Secatecolnea, St. Vincent, Sensuntepepe, not only, it is said, produce a larger quantity, but the four-last mentioned places have the advantage as to quality. The *Belize Advertiser* stated some time since, that the value of this dye from one State in 1830 produced 2,000,000 dollars, the minimum of an immense sum which has been most unjustly and unwisely wrested from the people of Jamaica, and the West India islands. Bridges ("Annals of Jamaica," p. 584, Append.), speaking of the vast returns of an indigo plantation, says, "The labour of a single negro would often bring to his owner £30 sterling per annum clear profit,—a sum which was at the time the laborer's highest price. It continued the *staple* of Jamaica till an intolerable tax oppressed it, while its price was lowered by the competition of other colonies. Its cultivation immediately declined throughout them all, but nowhere so rapidly as here. The financial error was quickly discovered,—a remedy was attempted by a bounty; but it came too late, the plantations were thrown up, and the planters, attracted by the temporary gain, abused the tardy boon, by introducing, as of their own growth, large quantities of foreign indigo." As Bridges may be said in this passage to be merely a commentator on Edwards, who has entered more largely upon the subject, I shall condense from the latter, statements connected with the manufacture and decay of this branch of industry, once the staple of Jamaica. Edwards ("West Indies," vol. ii., p. 275, 2nd edition) reckons three kinds of indigo—the wild, Guatemala, and French. The first is the hardest, and the dye extracted from it of the best quality as regards colour and grain; but one or other of the two species is commonly preferred by the planter, as yielding a greater return. Of these the French surpasses the Guatemala in quantity, but yields to it in fineness of grain and beauty of color. The indigo thrives almost on any land, though the richest soils produce the most luxuriant plants, and the longest dry weather will not kill it. The cultivation and manufacture our author thus describes :—"The land being prepared, trenches, two or three inches in depth, are made by the hoe. These are ten or twelve inches asunder. The seeds are then strewed in the trenches by the hand, and slightly covered with mould. When the plants shoot, they are carefully weeded, and kept constantly clean, until they rise high enough to cover the ground. A bushel of seed is sufficient for four or five acres. The best season for planting is March; but if the land be good, it may be sown at any time, and in three months the plants attain maturity. In seasonable situations, they have four cuttings in the year. The subsequent growths from the plants ripen in six or eight weeks; but the produce diminishes after the second cutting, so that the seeds should be sown every second year. A species of grub, or worm, which infests the plant on the second year is avoided by changing the soil; or, in other words, by a rotation of crops. The produce per acre of the first cutting is about 60 lbs. It is nearly as much in North America; but when the thermometer falls to sixty, the returns are very uncertain, that degree of heat being too low for the necessary vegetation, maceration, and fermentation. The yieldings for the subsequent cuttings somewhat diminish; but in Jamaica and St. Domingo, if the land is new, about 300 lbs. per acre of the second quality may be expected annually from all the cuttings

together; and four negroes are sufficient to carry on the cultivation of five acres, besides doing other occasional work, sufficient to reimburse the expenses of their maintenance and clothing." The process for obtaining the dye, according to the same author, was conducted through the means of two cisterns, the one elevated above the other, in the manner of steps. The higher, which was also the longer, was named the *sleeper*—its dimensions sixteen feet square and two and a half in depth. The second, into which the fluid was discharged, was called the *battery;* it was about twelve feet square, and four and a half in depth, These cisterns were of stone: but strong timber answered remarkably well. There was also a lime-vat, six feet square and four-feet deep, the plug of which was at least eight inches from the bottom. This was for the purpose of permitting the lime to subside, before the lime-water was withdrawn. The plants then being ripe, or fit for cutting, were cut with reaping-hooks, or sickles, a few inches from the ground—six was the minimum—and placed by strata in the *sleeper*, until it was about three parts full. They were then pressed with boards, either loaded with weights or wedged down, so as to prevent the plants from floating loosely: and as much water was admitted as they would imbibe, until it covered the mass four or five inches deep. In this state it was allowed to ferment until the water had extracted the pulp. To know when this had been thoroughly effected, required extreme attention and great practical knowledge; for if the fluid were drawn off too soon, much of the pulp was left behind; and if the fermentation continued too long, the tender tops of the plants were decomposed, and the whole crop lost. When the tincture or extract was received in the battery, it was agitated or churned until the dye began to granulate, or float in little flakes upon the surface. This was accomplished at one period in Jamaica by paddles, worked by manual labor, and, in the French islands, by buckets or cylinders, worked by long poles; but subsequently—that is, at the time Edwards wrote—convenient apparatus was constructed, the levers of which were worked by a cog-wheel, kept in motion by a horse or mule. When the fluid had been churned for fifteen or twenty minutes, a small quantity was examined in a cup or plate, and if it appeared curdled, or coagulated, strongly impregnated lime-water was gradually added, not only with a view to promote separation, but to prevent decomposition. Browne remarks ("Civil and Nat. Hist. of Jamaica," art. "Indigo"), the planters "must carefully distinguish the different stages of this part of the operation also, and attentively examine the appearance and colour as the work advances,—for the grain passes gradually from a greenish to a fine purple, which is the proper color when the liquor is sufficiently worked,—too small a degree of agitation leaving the indigo green and coarse, while too vigorous an action brings it to be almost black." The liquor being then, as we shall suppose, properly worked, and granulation established, it was left undisturbed until the flakes settled at the bottom, when the liquor was drawn off, and the sediment (which is the indigo) placed in little bags, to drain, after which it was carefully packed in small square boxes, and suffered to dry gradually in the shade. Such is the account, nearly word for word, which Edwards gives of the mode of manufacturing indigo. I shall now quote his remarks upon the outlay and gain upon the article *verbatim*.—"To what has been said above of the nature of the plant suiting itself to every soil, and producing four cuttings in the year, if we add the cheapness of the buildings, apparatus, and labor, and the great value of the commodity, there will seem but little cause for wonder at the splendid accounts which are transmitted down to us concerning the great opulence of the first indigo-planters. Allowing the produce of an acre to be 300 lbs., and the produce no more than 4s. per pound, the gross profit of only twenty acres will be £1,200, produced by the labor of only sixteen negroes, and on capital in land and buldings scarce deserving consideration." Yet, notwithstanding this statement, the author informs us afterwards that he knew, in the course of eighteen years' residence in the West Indies, upwards of twenty persons who tried to re-establish indigo manufactories, but failed. This appears strange, since it is plain that what has once been done can be done again, but especially in the manufacture of an article requiring a capital so very small in proportion to the profits as almost to tempt the most cautious and the most timid man to embark in it. I quote the following passage from the same author, for the purpose of showing the very loose manner in which statements are made on the authority of others, who are as incompetent to decide the merits of a question as the party himself chronicling their opinion. Speaking of the twenty unfortunate indigo-planters, our author thus writes —"Many of them were men of foresight, knowledge and property. That they failed is certain; but of *the causes of their* FAILURE *I confess I can give no satisfactory account.* I was told that disappointment trod close upon their heels at every step. At one time the fermentation was too long continued, at another the liquor was drawn off too soon: now the pulp was not duly granulated, and now it was worked too much. To these inconveniences, for which practice would doubtless have found a remedy, were added others of a much greater magnitude—the mortality of the negroes, from the vapour of fermented liquor (an alarming circumstance, that, I am informed, both by the French and English planters, constantly attends the process), the

failure of the seasons, and the ravages of the worm. These, or some of these evils, drove them at length to other pursuits, where industry might find a surer recompense."—(p. 283.) The fallacy of much of this requires no comment, as it must strike even the most careless reader,—for if the so-called indigo-growers did not know the process of manufacturing the commodity, then it could not be surprising that they failed. Thus the cause of their failure required no comment, and no explanation. Were a ploughman taken from the field and placed at the helm of a ship, and the vessel in consequence wrecked, would any one be astonished but at the folly of those who placed him there? This was the case with the indigo-growers,—they attempted what they did not understand, and, consequently, lost their labor and their money. The mortality of the negroes employed, stated as another reason for abandoning the attempt, requires a somewhat more lengthy notice. I can briefly say, that I have learned that in the Central States of America, deaths among indigo-laborers are not more frequent than in other branches of tropical industry; and I never heard or have read that the *original* growers complained of the mortality attending the progress. The truth is, that this statement is not founded on fact. There is nothing whatever in the manufacture of indigo, either in the cultivation or the granulation, or even the maceration and fermentation of the plant, which is directly or indirectly, *per se*, injurious to human life. I have certainly never seen the indigo plant macerated on a large scale; but I have myself steeped much of it in water, and allowed it even to rot, and found nothing in the mass differing in any marked degree from decomposed vegetable matter. It seems to me that this idea of the manufacture of indigo being especially inimical to human life, is as unfounded as the belief, even by Humboldt, up to a very recent period, that none of the Cerealia would grow in tropical climates. In conversing with an old gentleman in Jamaica, some twelve years since, who had tried the manufacture of indigo, and with every prospect of success, but abandoned it, as he confessed, for the cultivation of the sugar cane, since it was then more profitable, he suggested the solution, that as the manufacture was light work, probably aged and debilitated, in place of youthful and vigorous slaves, were too frequently employed in the process—hence the mortality. This may be correct to a certain extent; but I am also inclined to think that another cause of mortality might be found in the mode and manner in which the negro was fed and clothed, and not because aged persons were exclusively engaged in the manufacture. I believe I may state, without fear of contradiction, that the real cause of the decline and consequent abandonment of the indigo plant was the monstrous duty levied upon it by the

English government. Indeed, this has been already stated in the extract from Bridges; while the cause of the failure of the attempt to renew it, over and above the reasons we have given, is the greater temptation to embark capital in sugar plantations,—the West Indies enjoying a monopoly in this article, while they had competitors in the Southern States of America in the other. We have, therefore, no hesitation in saying, that with a trifling capital, under prudent management, indigo might be cultivated to a very great extent, and with considerable profit, even now in Jamaica. But the adventurer is not to expect to count his gains, as the original growers did by thousands; he must be content with hundreds, if not fifties; for at the present day every branch of industry is laden with difficulties, encumbered by taxation, and obstructed by competition. There are two objections, however, which I have not removed,—I allude to "the failure of the seasons and the ravages of the worm." Very little need be said to combat these. Seasons are mutable, and the same Heaven that frowns this year on the labors of the husbandman, may smile the next; while a remedy for the "ravages of the worm" may be found in the mutation of the soil, the destruction of the grub, or the rotation of crops,—accessories to success which seem not to have entered into the vocabularies of the twenty pseudo indigo-growers, "many of them men of knowledge, foresight and property." The following passage from Bryan Edwards will corroborate much that I have endeavoured to enforce. It furnishes not only a solution which has been hinted at before, of the enigma why indigo ceased to be cultivated in Jamaica, but also *an incentive* to re-introduce the culture. He says (p. 444), "It is a remarkable and well known circumstance, after the cultivation of indigo was suppressed by an exorbitant duty of near £20 the hundred-weight, Great Britain was compelled to pay her rivals and enemies £200,000 annually for this commodity, so essential to a great variety of her most important manufactures. At length, the duty being repealed, and a bounty some time after substituted in its place, the States of Georgia and South Carolina entered upon, and succeeding in the culture of this valuable plant, supplied at a far cheaper rate than the French and Spaniards (receiving too our manufactures in payment) not only the British consumption, but also enabled Great Britain to export a surplus at an advanced price to foreign markets."—It is therefore plain that the manufacture of indigo was lost to Jamaica, not from any difficulty in growing the plant, or from any loss of life attending the process of manufacturing it, but from the ruinously heavy duty of £20 the hundred-weight—and that now, when no duty exists, it might be again cultivated with great advantage. The cultivation of indigo has been repeatedly attempted

in Cuba, but never with much success; although the shrub called the Xiquilite, from which it is extracted, grows wild in several districts of the island, but more especially towards the eastern extremity. The first *anileria*, or manufactory of indigo, was established in 1795, under the patronage of the *Ayentamento* of the Havana, who made an advance of 3,500 dollars, without interest, to the party engaging in the speculation, in order to encourage the enterprise; but the undertaking proved unsuccessful, and the same fate has befallen every subsequent attempt to introduce this branch of industry. In 1827, the whole produce amounted only to 56 arobas. In 1837 the imports of indigo greatly exceeded the exports; the former having amounted to 121,350 lbs., and the latter to 82,890 lbs. In 1833, 5,184 lbs. reached the United Kingdom from the Havana, and in 1843, 62,675 lbs. In 1826, British Honduras exported 358,552 lbs.; in 1830, 2,650 serons; in 1844, 1,247 serons; and in 1845, 1,052 serons. The indigo shrub is one of the most common bushes in Trinidad, where it grows wild on almost all the indifferent soils. In 1783, there were several plantations and manufactories of indigo established in Trinidad: these were subsequently abandoned, on account of a supposition that they were unhealthy. Prior to 1783, the colonists had a kind of simple process by which they extracted sufficient coloring matter to serve domestic consumption. This process is at present unknown, hence all the indigo used there is imported from Europe, although the plant from which it can be made vegetates in every direction. In 1791 Hayti imported 930,016 lbs. of indigo, while in 1804 the exports had dwindled to 35,400 lbs. Indigo, as I have already stated, was once a most important crop in South Carolina, some attention has recently again been given to it by an individual or two in Louisiana, and the enterprise is said to promise success: enough might undoubtedly be raised in the United States to supply the home market. Some indigo produced at Baton Rouge was pronounced to have been equal to the best Caraccas, which sells at two dollars per pound; and the gentleman who cultivated it remarks, that one acre of ground there, well cultivated, will yield from 40 to 60 lbs.; that it requires only from July to October for cultivating it; that there is not connected with it one-third of the expense or time that is generally required for the cultivation of cotton. I take the following from Smyth's "Tour in the United States." "This plant is somewhat like the fern when grown, and when young is hardly distinguishable from lucern grass, its leaves in general are pinnated, and terminated by a single lobe; the flowers consist of five leaves, and are of the papilionaceous kind, the uppermost petal being longer and rounder than the rest, and lightly furrowed on the side, the lower ones are short and end in a point; in the middle of the flower is formed the style, which afterwards becomes a pod containing the seeds. "They cultivate three sorts of Indigo in Carolina, which demand the same variety of soils. First, the French or Hispaniola indigo, which striking a long tap root will only flourish in a deep rich soil, and therefore, though excellent in sort, is not so much cultivated in the maritime parts of the State, which are generally sandy, but it is produced in great perfection one hundred miles backwards; it is neglected too on another account, for it hardly bears a winter so sharp as that of Carolina. The second sort, which is the false Guatemala, or true Bahamas, bears the winter better, is a more tall and vigorous plant, is raised in greater quantities from the same compass of ground, is content with the worst soil in the country, and is therefore more cultivated than the first sort, though inferior in the quality of its dye. "The third sort is the wild indigo which is indigenous here; this, as it is a native of the country, answers the purposes of the planter best of all, with regard to the hardiness of the plant, the easiness of the culture, and the quantity of the produce. Of the quality there is some dispute not yet settled amongst the planters themselves; nor can they distinctly tell when they are to attribute the faults of their indigo to the nature of the plant, to the seasons, which have much influence upon it, or to some defect in the manufacture. "The time of planting the indigo is generally after the first rains succeeding the vernal equinox; the seed is sown in small straight trenches, about eighteen or twenty inches asunder: when it is at its height, it is generally eighteen inches tall. It is fit for cutting, if all things answer well, in the beginning of July. "Towards the end of August a second cutting is obtained, and if they have a mild autumn, there is a third cutting at Michaelmas. The indigo land must be weeded every day, the plants cleansed from worms, and the plantation attended with the greatest care and diligence. About twenty-five hands may manage a plantation of fifty acres, and complete the manufacture of the drug, besides providing their own necessary subsistence and that of the planter's family. "Each acre yields, if the land be very good 60 or 70 lbs. weight of indigo: at a medium the produce is 50 lbs. This however, is reckoned by many skilful planters but a very indifferent crop. "When the plant is beginning to blossom it is fit for cutting, and when cut, great care ought to be taken to bring it to the steeper without pressing or shaking it, as great part of the beauty of the indigo depends upon the fine farina, which adheres to the leaves of this plant. The apparatus for making indigo is inconsiderable and not expensive, for besides a pump, the whole consists only of vats and tubs of cypress wood, common and cheap in this

country. "The indigo, when cut, is first laid in a vat, about twelve or fourteen feet long and four feet deep, to the height of about fourteen inches, to macerate and digest; then this vessel, which is called the *steeper*, is filled with water; the whole having lain from about twelve to sixteen hours, according to the weather, begins to ferment, swell, rise, and grow sensibly warm. At this time spars of wood are run across, to mark the highest point of its ascent; when it falls below this mark, they judge that the fermentation has attained its due pitch, and begins to abate; this directs the manager to open a cock, and let off the water into another vat, which is called the *beater*; the gross matter that remains in the first vat is carried off to manure the ground, for which purpose it is excellent, and now cuttings are put in, as long as the harvest of the weed continues. When the water, strongly impregnated with the particles of indigo, has run into the second vat or beater, they attend with a sort of bottomless buckets, with long handles, to work and agitate it, when it froths, ferments, and rises above the rim of the vessel that contains it. To allay this violent fermentation, oil is thrown in as the froth rises, which instantly sinks it. When this beating has continued for twenty, thirty, or thirty-five minutes, according to the state of the weather (for in cool weather it requires the longest continued beating), a small muddy grain begins to be formed; the salts and other particles of the plant united, dissolved and before mixed with the water, are now reunited together, and begin to granulate. To discover these particles the better, and to find when the liquor is sufficiently beaten, they take up some of it from time to time on a plate, or in a glass; when it appears in a hopeful condition, they let loose some lime water from an adjacent vessel, gently stirring the whole, which wonderfully facilitates the operation; the indigo granulates more fully, the liquor assumes a purplish color, and the whole is troubled and muddy; it is now suffered to settle: then the clearer part is permitted to run off into another succession of vessels, from whence the water is conveyed away as fast as it clears on the top, nntil nothing remains but a thick mud, which is put into bags of coarse linen. These are hung up and left for some time until the moisture is entirely drained off. "To finish the drying, this mud is turned out of the bags, and worked upon boards of some porous timber, with a wooden spatula: it is frequently exposed to the morning and evening sun, but for a short time only; and then it is put into boxes or frames, which is called the curing, exposed again to the sun in the same cautious manner, until, with great labor and attention the operation is finished, and the valuable drug fitted for the market. The greatest skill and care is required in every part of the process, or there may be great danger of ruining the whole; the water must not be suffered to remain too sho or too long a time, either in the steeper or bea er; the beating itself must be nicely manage so as not to exceed or fall short; and in the cu ing the exact medium between too much or to little drying is not easily attained. Nothing bu experience can make the overseers skilful i these matters. There are two methods of try ing the goodness of indigo; by fire and b water. If it swims it is good, if it sinks i is inferior, the heavier the worse; so if i wholly dissolves in water it is good. Anothe way of proving it, is by the fire ordeal; if i entirely burns away, it is good, the adulteration remain untouched." Indigo to the extent c 220,000 lbs. per annum is grown in Egypt. Th leaves are there thrown into earthen vessels which are buried in pits and filled with water heat is applied, and the liquid is boiled away un til the indigo becomes of a fit consistence, whe it is pressed into shape and dried. Many Ar menians have been invited from the East Indie to teach the fellahs the best mode of preparation and, in consequence, nine indigo works hav been established belonging to the government The indigo plant is found scattered like a wee abundantly over the face of the country in th district of Natal, Eastern Africa. It is said tha there are no less than ten varieties of the plan commonly to be met with there. Mr. Blain submitted, in 1848, to the Manchester Chambe of commerce, a small specimen of this dye-stuff which had been extracted by a rude process fron a native plant, which was pronounced by gooc authority to be of superior quality, and worth 3s. 4d. per pound. Mr. W. Wilson, a settler a Natal, in a letter to the editor of the *Nata Witness*, thus speaks of the culture:—"My at tention was first forcibly drawn to the cultivation of indigo by some seed imported by Mr. Kinlock from India. This seed, on trial, I found to grow luxuriantly; and after a few experiments I suc ceeded in manufacturing the dye. The success which thus attended my first attempts has en couraged me to try indigo planting on a more extensive scale. For this purpose I am allow ing all the plants of this season to run to seed and intend to plant equal quantities of Benga and native indigo. While my attention was engaged in these preliminary experiments, I ob served that the country abounded in a variety o species of indigo, and by a series of experiments found it rich and abundant, and have since learnt that it is known and in use among the na tives, and called by them Umpekumbeto. This of course induced further inquiry, and on con sulting different works I find that the Cape of Good Hope possesses more species of indigo than the whole world besides. Now I take it for granted that if Providence has placed these materials within our reach, it was evidently in tended that we should, by the application of in-

dustry, appropriate them to our use. It becomes, then, a matter of necessity that indigo must thrive, this being its native soil and climate; and the experiments I have successfully made, go to support me in the opinion that the cultivation of indigo will bring an ample reward. Indeed it seems contrary to the laws of nature that it should be otherwise. I have obtained from the 140th part of an acre the proportion of 300 lbs. of indigo per acre. That the plant will cross successfully, I have also ascertained."

Cultivation in India.—During the nine years which preceded the opening of the trade with India in 1814, the annual average produce of indigo in Bengal, for exportation, was nearly 5,600,000 lbs. But since the ports were opened, the indigo produced for exportation has increased fully a third, the exports during the sixteen years ending with 1829-30, being above 7,400,000 lbs. a year. The consumption in the United Kingdom has averaged, during the last ten years, about 2,500,000 lbs. a year. In 1839 40 the export of indigo from Madras amounted to 1,383,808 lbs. A small quantity is also exported from the French settlement of Pondicherry. In 1837 the export from Manilla amounted to about 250,000 lbs. The export from Batavia in 1841 amounted to 913,693 lbs. and the production in 1843 was double that amount. The annual exports of indigo, from all parts of Asia and the Indian Archipelago, were taken by M'Culloch, in 1840, to be 12,440,000 lbs. The imports are about 20,000 chests of Bengal, and 8,000 from Madras annually, of which 9,000 or 10,000 are used for home consumption, and the rest re-exported. The total crop of indigo in the Bengal Presidency has ranged, for the last twenty years, at from 100,000 to 172,000 factory maunds; the highest crop was in 1845. The factory maund of indigo in India is about 78 lbs. In the delta of the Ganges, where the best and largest quantity of indigo is produced, the plant lasts only for a single season, being destroyed by the periodical inundation, but in the dry central and western provinces, one or two *ratoon* crops are obtained. The culture of indigo is very precarious, not only in so far as respects the growth of the plant from year to year, but also as regards the quantity and quality of the drug which the same amount of plant will afford in the same season. The fixed capital required, as I have already shown, in the manufacture of indigo, consists simply of a few vats of common masonry for steeping the plant, and precipitating the coloring matter; a boiling and drying house, and a dwelling for the planter. Thus a factory of ten pairs of vats, capable of producing, at an average, 12,500 lbs. of indigo, worth on the spot £2,500, will not cost above £1,500 sterling. The buildings and machinery necessary to produce an equal value in sugar and rum, would probably cost about £4,000. The indigo of Bengal is divided into two classes, called, in commercial language, Bengal and Oude; the first being the produce of the southern provinces of Bengal and Bahar, and the last that of the northern provinces, and of Benares. The first class is in point of quality much superior to the other. The inferiority of the Oude indigo is thought to be more the result of soil and climate, than of any difference in the skill with which the manufacture is conducted. The indigo of Madras, which is superior to that of Manila, is about equal to ordinary Bengal indigo. The produce of Java is superior to these. Large quantities of indigo, of a very fine quality, are grown in Scinde. I have to acknowledge the receipt, from the Indian Government, of an interesting collection of documents on the culture and manufacture of indigo in Upper Scinde. The papers are chiefly from the pen of Mr. Wood, Deputy Collector of Sukkur, though there are several others, perhaps of much value, from various other of the revenue officers of Scinde. Mr. Wood is of opinion that Scinde is much better suited than Bengal for the production of this dye-stuff—the alluvial soil on the banks of the Indus is equal in richness to that on those of the Ganges, and the climate seems equally well suited for the growth of the plant. But in two years out of three, the crops of the Bengal planter are injured by excessive inundations, while the work of gathering and manipulation is necessarily performed during the rainy season, under the greatest imaginable disadvantages. In Scinde, on the other hand, the inundation of the river is produced almost solely from the melting of the snows in the Himalayas, and it is not liable to those excessive fluctuations in amount, or that suddenness in appearance peculiar to inundations chiefly arising from falls of rain. The Ganges sometimes rises ten feet in four-and-twenty hours, and at some part of its course its depth is at times forty feet greater during a flood than in fair weather, while the Indus rarely rises above a foot a day, its extreme flood never exceeding fifteen feet, the limits and amount of the inundation being singularly uniform over a succession of years. Moreover, as rain hardly ever falls in Scinde, and when it does so, only continues over a few days, and extends to the amount of three or four inches, no danger or inconvenience from this need be apprehended. Mr. Wood mentions that hemp may be grown in profusion on the indigo grounds, and that were the production of the dye once introduced, it would bring hundreds of thousands of acres now barren into cultivation, and secure the growth or manufacture of a vast variety of other commodities for which the country is eminently fitted. An experimental factory might, it is believed, be set up for from two to three thousand pounds, but this appears to be an amount of adventure from

which the Government shrinks. The districts of Kishnagar, Jessore and Moorshedabad, in Bengal ranging from 88 to 90 degs. E. latitude, and 25½ to 24 degs. N. longitude, produce the finest indigo. That from the districts about Burdwan and Benares is of a coarser or harsher grain. Tirhoot, in latitude 26 degs., yields a tolerably good article. The portion of Bengal most propitious to the cultivation of indigo, lies between the river Hooghly and the main stream of the Ganges. In the East Indies after having ploughed the ground in October, November, and the beginning of December, they sow the seed in the last half of March and the beginning of April, while the soil being neither too hot nor too dry, is most propitious to its germination. A light mould answers best; and sunshine, with occasional light showers, are most favorable to its growth. Twelve pounds of seed are sufficient for sowing an acre of land. The plants grow rapidly, and will bear to be cut for the first time at the beginning of July; nay, in some districts so early as the middle of June. The indications of maturity are the bursting forth of the flower buds, and the expansion of the blossoms; at which period the plant abounds most in the dyeing principle. Another indication is taken from the leaves, which, if they break across when doubled flat, denote a state of maturity. But this character is somewhat fallacious, and depends upon the poverty or richness of the soil. When much rain falls, the plants grow too rapidly, and do not sufficiently elaborate the blue pigment. Bright sunshine is most advantageous to its production. The first cropping of the plants is the best; after two months a second is made; after another interval a third, and even a fourth; but each of those is of diminished value.

Culture in India.—For the following excellent account of the modes of culture, and practice, &c., in Bengal, and other parts of India, I am, says Mr. Simmonds, indebted to Mr. G. W. Johnson, one of the correspondents of my "Colonial Magazine." Mr. Johnson, besides his own Indian experience, has consulted all the best authorities, and the opinions of contributors to the leading periodicals of Calcutta on this imortant subject:—When America became known to Europeans, its indigo became to them a principal object of cultivation, and against their skill the native Hindostanee had nothing to oppose, but the cheapness of his simple process of manufacture. The profit and extent of the trade soon induced Europeans to brave the perils of distance and climate to cultivate the plant in Hindostan; but those obstacles, added to the superior article manufactured by the French and Spaniards in the West Indies, would long have held its produce in India in subordination, if the anarchy and wars incident to the French Revolution, especially when they reached St. Domingo, had not almost annihilated the trade from the West, and consequently proportionally fostered that in the East. The indigo produce of St. Domingo was nearly as large as that of all the other West India islands together. From the time that the negroes revolted in that islands, the cultivation of indigo has increased in Hindostan, until it has become one of its principal exports and the quality of the article manufactured is not inferior to that of any other part of the world. The most general mode of obtaining the necessary supply of *weed*, as it is called by the planter, is as follows:—The land attached to the factory is parcelled out among the ryots or farmers, who contract to devote a certain portion of their farm to the cultivation of indigo, and to deliver it, for a fixed price per bundle, at the factory; a sum of money, usually equal to half the probable produce, has to be advanced to the ryot by the planter, to enable him to accomplished the cultivation and to subsist upon until the crop is ready for cutting. If, as is generally the case, sufficient land is not attached to the factory to supply it with plant, the owner obtains what he requires by inducing the ryots in his vicinity to cultivate it upon a part of their land. Yet it is with them far from a favorite object of cultivation; and, indeed, if it were not for the money advanced to each ryot by the planter, to provide seed, &c., and which gives him a little ready money, bearing no interest, it is doubtful whether he would engage in the cultivation at all. Even this advance of money does not induce him to appropriate it to any but the worst part of his farm, nor to bestow upon it more than the smallest possible amount of labor. The reasons for this neglect are valid, for the grain crops are more profitable to the ryot, and indigo is one of the most precarious of India's vegetable products. In Bengal the usual terms of contract between the manufacturer and the ryot are, that the latter receiving at the time a certain advance of money, perhaps one rupee (2s.) per biggah, with promise of a similar sum at a more advanced period of the season, undertakes to have a certain quantity of land suitably and seasonably prepared for sowing, to attend and receive seed whenever occasion requires, and to deliver the crop, when called upon, at the factory, at a specified price per bundle or 100 bundles. The particular conditions of these contracts vary generally in Bengal; they amount to advancing the ryot two rupees for every biggah of land, furnishing him with seed at about one-third its cost, on an engagement from him to return whatever his lands may produce (which, as has been said, is generally none at all), at the price charged, and receiving the plant from him at six, seven, eight, or sometimes nine bundles for a rupee—much oftener the former than the latter rates. A ryot cultivating alluvial lands, and having no seed, can hardly ever repay his advances; but it does not follow that he has been a loser, for he, perhaps, could not value

his time, labor, and rent altogether at half the amount; and as long as this system is kept within moderate bounds, it answers much better than private cultivation to the manufacturer, and has many contingent advantages to the cultivator. In Tirhoot similar engagements are entered into with the ryots, who are then called *Assamees*. These engagements with Assamees are generally made in the month of September, on a written instrument called a *novishaun*, by which they agree for a certain quantity of land, for five years, to be cultivated with indigo plant, and for which they are to be paid at the rate of six rupees per biggah, for every full field of plant measured by a luggie or measuring-rod. The luggie, it must be observed, varies in size throughout the district. In the southern and eastern divisions of Tirhoot and Sarun it is eight-and a-half to ten feet long; and in the northern and western from twelve to fourteen feet. The Assamee receives, on the day of making his *bundobust*, or settlement, three rupees advance on each biggah he contracts for, another rupee per biggah when the crop is fit to weed, and the remaining two rupees at the ensuing settlement of accounts. Exclusive of the price of his mal or plant, the Assamee is entitled to receive two or three rupees per biggah (as may be agreed on) for gurkee, or lands that have failed, as a remuneration for his trouble, and to enable him to pay his rent. The foregoing are the principal stipulations of the novishaun, but the Assamee further engages to give you such land as you may select, prepare it according to instructions from the factory, sow and weed as often as he is required, cut the plant and load the bakeries at his own cost, and in every other respect conform to the orders of the planter or his aumlah (managing man). The Assamee is not charged for seed, the cartage of his plants, or for the cost of drilling. I should mention that a penalty is attached to the non-fulfilment of the Assamee's engagements, commonly called *hurjah*, viz., twelve rupees for every biggah short of his agreement, and this for every year that the novishaun has to run. This is, however, seldom recoverable, for if you sue the Assamee in court and obtain a decree (a most expensive and dilatory process), he can in most instances easily evade it by a fictitious transfer of his property to other hands. The planter generally finds it his interest to get the Zemindar of the village in which he proposes cultivating, to join in the novishaun, as a further security; or he engages with a jytedar, or head ryot, having several others subordinate to him, and for whose conduct he is responsible. But a still better system is lately gaining ground in this district, I mean that of taking villages in ticka, or farm, by far the best and cheapest plan that has ever been resorted to for the cultivation of indigo. When the planter cultivates the ground himself, it is called in Tirhoot *Zeraut* cultivation. In this mode, lands are taken on a puttah or lease for five years, at the average rent of three rupees per biggah. The heavy cost attending this cultivation has occasioned its decrease in most factories in Tirhoot and particularly since the fall in prices. About a third, I believe, was the proportion it formerly bore to the whole cultivation of the district, but of late such factories only have retained it as cannot procure sufficient good land under the Assamewar system; but now that the plan of taking villages in farm is becoming more and more prevalent here, it is very likely that Zeraats will be entirely abandoned. From all the information I have been able to collect, the cost of a biggah of Zeraut (ten feet luggie) may be estimated at sixteen rupees; that of Assamewar is generally twenty-five per cent. less, both exclusive of interest, agents' charges, and private expenses. It can only be the reluctance of the ryot to cultivate indigo that induces a manufacturer to grow it himself, for it has been found an expensive plan, profitable only when the dye is at its highest rate, and even then scarcely furnishing an adequate return. They not only could not cultivate so cheaply as the native laboring husbandman, but ordinarily had to engage extensive tracts of land much of which was not suitable for their purpose, or, perhaps, for any other, and consequently, although the average rate of rent was even low on the whole, it constituted a very heavy charge on the portion from which they obtained their return. In Oude there are three systems of obtaining a supply of the plant, viz., *Kush Kurreed*, *Bighowty*, and *Nij*; but the latter is a mere trifle in proportion to the others, and is, therefore, not worth mentioning. On the *Bighowty* system, which prevails chiefly in the Meerut and Mooradabad districts, the planter advances for a biggah of *Jumowah* (irrigated sowings) nine rupees, and for a biggah of *Assaroo* (rain sowings) five rupees four annas. The next year's plant, or *khoonti*, becomes his on an additional payment of eight annas per biggah. He also supplies the seed at the rate of six seers per biggah, being almost double the quantity made use of in Bengal, but which is necessary to make up for the destruction of the plant the year following by the frost, white ants, hot winds, grass cutters, and, I may add, the village cattle, which are let loose to graze on the khoonte during the latter period, when not a blade of grass or vegetation is to be seen anywhere left. The Bighowty system is a sadly ruinous one, as, independently of the attempts to assimilate Assaroo, at five rupees four annas, with *Jumowah*, at nine rupees per biggah, which is very easily effected if the planter is not very vigilant, he is obliged to maintain an extensive and imposing establishment of servants, not only to enforce the sowings, weeding, and cutting, but also to look after his khoonte, and protect it from being destroyed by bullocks and

grass cutters, or from being ploughed up clandestinely by the Zemindars themselves. The Kush Kurreed system again has its evils, as the planter never gets plant for the full amount of his advances, and hence often leads to his ruin.

Soils.—Indigo delights in a fresh soil; new lands, of similar staple to others before cultivated, always surpass them in the amount and quality of their produce. Hence arises the superior productiveness of the lands annually overflowed by the Ganges, the earthy and saline deposits from which in effect renovate the soil. The further we recede from the influence of the inundation, the less adapted is the soil for the cultivation of indigo. The staple of the soil ought to be silicious, fertile, and deep. Mr. Ballard, writing on the indigo soils of Tirhoot, says that high "soomba," or light soils, are generally preferred, being from their nature and level less exposed to the risk of rain or river inundation; but they are difficult to procure, and, moreover, require particular care in the preparation. Next in estimation is "doruss," a nearly equal mixture of light earth and clay; a soil more retentive of moisture in a dry season than any other. "Muttyaur," or heavy clay soils, are generally avoided, although in certain seasons, with mild showers of rain, they have been known to answer. The safest selection I should conceive to be an equal portion of soomba and doruss. In a country, however, interspersed with jheels and nullahs, it is difficult to form a cultivation without a considerable mixture of low lands, more or less, according to the situation of the Assamee's fields. Great care should be taken, at all events, to guard against oosur lands, or such as abound with saltpetre; these can be most easily detected in the dry months. *Puchkatak*, that is, lands slightly touched with *oosur*, have been known to answer, as partaking more of the nature of *doruss* soil; but the crop is generally thin, although strong and branchy. There is another description of land that should be cautiously avoided. It goes by the name of *jaung*, and is a light soil, with a substratum of sand from six to twelve inches below the surface. The plant generally looks very fine in such fields till it gets a foot high, when the root touching the sand, and having no moisture to sustain it, either dies away altogether, or becomes so stunted and impoverished as to yield little or nothing in the cutting. Of the *daub* or *dearab* (alluvial) land, says Mr. Ballard, there is scarcely any in the district except what falls to the lot of my own factories, being situated on the banks of the Ganges and Great Gunduck. Of *bungur*, a stiff reddish clay soil, there is little in Tirhoot; it pervades the Western provinces, and is best adopted, for Assaroo sowings, which do not succeed in Tirhoot.

Preparation of the soil.—The root of the indigo plant being fusiform, and extending to about a foot

in length, requires the soil to be loosened thoroughly to that depth at least. Experience teaches that the fineness of the tilth to which the soil is reduced previously to the seed being committed to it, is one very influential operation for the obtaining a productive crop. Yet in some districts of Bengal, particularly about Furudpore, the sowing is performed without any previous ploughing. This is where the river, when receded, has left the soil and deposit so deep, that about October, or a little later, the seed being forcibly discharged from the sower's hand, buries itself, and requires no after covering by means of the rake or harrow. In Tirhoot they are indefatigable in this first step of the cultivation. Mr Ballard says, that the preparation of indigo lands should commence in September, as soon as the cessation of the rains will permit; and as we do not rely on rain for our sowings (as is the custom in Bengal and elsewhere, and irrigation is never resorted to, from the heavy expense attending it), our principal aim is to preserve as much moisture in the fields as possible. They should receive, for this purpose, not less than eight ploughings, besides a thorough turning up with the spade, after the fourth ploughing, to clear the field from stubble, grass and weeds. It is absolutely indispensable to get all this done on our light soils, especially before the end of October, and have the land carefully harrowed down, so as to prevent the moisture escaping. Should there be heavy rains between the interval of preparing and sowing, it will be necessary to turn the fields up with either one or two ploughings, and harrow them down as before. If only a slight shower, running the harrow over them will be sufficient to break the crust formed on the surface, and which, if allowed to remain, would quickly exhaust the moisture. This, with the occasional use of the weeding-hook, is all that the lands will require till the time of sowing.—("Transactions of the Agri.-Hort. Society of Calcutta," vol. ii.. p. 22).

Sowing.—The time when the seed is committed to the soil varies in different parts of India, and, even in the same place, admits of being performed at two different seasons. The periods of sowing in Bengal are first immediately after the rains, from about the latter end of October. The rivers are then rapidly retiring within their beds, and as soon as the soft deposit of the year has drained itself into a consistency, though not solid enough to keep a man from sinking up to his knees in it, they begin to scatter the seed broadcast. This is continued until the ground has become too hard for the seed to bury itself; the plough is then used to loosen the crust, and the sowing continued to about the middle, or even the end of November, from which period the weather is considered too cold, until February. These autumnal sowings are called October sowings, from the month in which they generally commence. Much of the plant perishes

during the months of December and January, and more again in the spring, unless there are early and moderate showers. The crop that remains is not so productive ordinarily in the vat, as that obtained from spring sowings, and some think the quality of the produce inferior. But there is no expense of cultivation, and the liabilities of the crop to failure are such a discouragement to cost and labor in rearing it, that the October sowing is followed by most planters who can obtain suitable land. The second period of sowing is the spring, with the first rains of March, or even the end of February. The land having been measured and placed under its slight course of tillage during the two or three preceding months, is sown broadcast as soon as the ground has been well moistened, or even in prospect of approaching rain. The quantity of seed used for this autumn sowing is generally more than what is considered requisite for spring sowing; six seers at the former and four at the latter season per biggah, in Bengal, is the quantity usually allowed. Some cultivators commence the autumn sowing as early as at the close of September, or as soon as the low lands are in a state to permit the operation after the inundation has subsided. This seed time may be said to continue until the end of December, and the crops from these sowings often yield an average produce, if the lands are not very low and wet. If they are, the sowing had better be delayed until January, or even February, for the crops from these latter sowings are usually the most productive, and the dye obtained from them the finest. The object for thus delaying the sowing is, that the young plants may have a more genial season for vegetation. Those who prefer sowing earlier, and yet are aware of the importance of saving the young plants as much as possible from the comparative low temperature of the season, sow some other crop with their indigo. Til, the country linseed, is good for this purpose in high lying soils. But I never knew an intermixture of crops that was not attended by inconveniences and injuries more than was compensated by the advantages gained. The success of sowings during March and April is very doubtful. It depends entirely upon the occurrence of rain, which in those months is proverbially uncertain. If the season should be sufficiently wet, the sowing may be performed in May; but a June sowing is very rarely remunerating. The rains setting in during the latter part of this month so promote the growth of weeds, that the young plants are choked and generally destroyed. The exceptions only occur in high lands, in unusually propitious seasons, and ought never to be relied upon, except when the earlier sowings have failed. To protract the manufacturing season, some planters begin sowing upon low lying lands in the hot season, for the chance of a crop at the commencement of the rains; and they sow at the close of the rains with the hope of, as it were, stealing another in the next year. In the western provinces sowing necessarily occurs in the dry weather, usually in March and April, though occasionally either a little earlier or later. In Tirhoot the sowings commence about the latter end of February or the beginning of March, if by that time there is sufficient warmth in the atmosphere to ensure a healthy vegetation. Light soils are sown on one close ploughing; heavy soils on two, with from four to eight seers of seed, in proportion to the size of the biggah. After strewing the seed, the field should be harrowed down by two turns of the harrow, and then again by two turns more after the third day. In case of rain before the plant appears (which it ought to do on the sixth or seventh day), if a slight shower, the harrow should be used again; if very heavy, it were best to turn up the ground and re-sow. If rain fall after the appearance of the plant, and before it has got past four leaves, and attained sufficient strength to resist the hard crust before alluded to, immediate recourse must be had to drilling. In fact, the closest attention is required to watch the state of the young crop for a month at least after the sowings; if it yield the least, or assume a sickly appearance, drills are the only resource. These, if applied in time, in all March, for instance, or before the middle of April at latest, are generally successful, not only in restoring plants, but recovering such as may have become sickly from want, or excess, of moisture, or any other cause. In dry seasons they have been known to give a crop when broadcast sowings have failed. Each drill, with a good pair of bullocks, should do five biggahs a day. They are regulated to throw from three to four seers per biggah, but the qnantity can be increased or diminished at pleasure. The natives do not employ them in their grain sowings, but commonly adopt a contrivance with their own plough for sowing in furrows, whenever their fields are deficient in moisture. The drill employed in Tirhoot resembles considerably the implement known by that name in England. It is found not only to effect a great saving of seed, ten seers being there sown broadcast on a biggah of 57,600 feet square, and only seven seers by this drill; but also materially to improve the quality and regularity of the growth of the plant. Experience has demonstrated, that the more lateral room the plants have, the more abundant is their produce of leaves, in which the coloring matter chiefly resides. The seed employed should always be as new as possible, for though, if carefully preserved, it vegetates when one year old, and even when nearly two years old has produced a moderate crop, yet this has been under circumstances of an unusually favorable season and soil. The plants from old seed rare-

ly attain a height of more than a foot before they wither and dye. As frauds are very likely to be practised by giving old seed the glossiness and general appearance of new, great circumspection should be shown by the planter, who does not grow his own, in obtaining seed from known parties. Planters in the lower provinces are induced to use up-country seed, because, coming from a colder climate, it vegetates, and the plants ripen rapidly, so as to be harvested more certainly before the annual inundation, but they employ one-fourth more. Three seers per Bengal biggah are sufficient, if it is "Dessee" seed; but four is not too much if it is up-country seed. A Bengal biggah is only a third of the size of that of Tirhoot. If the weather is dry, the seed very often does not germinate until the occurrence of rain, and it has been known in a dry, light soil, to remain in the ground without injury for six weeks. If seasonable showers occur, the plants make their appearance in four days, or even less; and they must be watched, in order that they may be weeded on the earliest day that they are sufficiently established to allow the operation to be safely performed. In dry weather, it must not be done while they are very young, otherwise many of the seedlings will have their roots disturbed, and perish from the drought. However, not more than a fortnight should be allowed to pass, after the seedlings have appeared, before the weeds are carefully removed, and this clearing should be frequently repeated until the plants so overshadow the ground that they of themselves keep back the advance of the weeds. The first weeding is best performed immediately after a shower of rain. Irrigation is rarely adopted for the indigo crops in the lower provinces of Bengal, unless they happen to be grown in some situation very favorable to the operation, such as the bank of a river. It is much more attended to in the western province, and in Oude, the water being obtained from wells, which are dug in nearly every cultivated plot. In Oude, Mr. Ballard says that a biggah of land employs three persons to irrigate it, and occupies never less than six days. The ryot, or cultivator, requires for the work a pair of bullocks, which cost him at least 32s., a bucket made of a white bullock hide, at 2s., and a rope for 2s. more, both of which do not last him above a year. He never pays less than 8s. for the rent of a biggah of land near a well. In Bengal the plant requires three months to attain its highest state of perfection for manufacturing, but is often cut, from necessity, within half that time; for the approach of the river compels the premature removal of the crop, unless, indeed, its growth has been so retarded that it would not pay the expense of working. Most indigo factories have consequently to begin in June, or early in July, whenever they may have effected their spring sowings, and the labours of the season are commonly terminated by the middle or end of August. When the plants begin to flower is considered the best time for cutting them, and this is just what the botanist would have suggested, because then the proper sap of all plants is most abundant, and most rich in their several peculiar secretions. A vividly green, abundant and healthy foliage, downy at the back, is the surest intimation of the plants being rich in indigo. Plants that are ready for cutting in July and August, are usually the most productive. In the western provinces from sixteen to twenty maunds of plant is considered a good produce per biggah. In the upper provinces the produce of the best crop, which is sown directly the rains commence, is not more then ten maunds per biggah. The factory maund is equal to about seventy-eight pounds. One thousand maunds of plant are considered as producing quite an average quantity of indigo, if this amounts to four maunds. Adopting another mode of estimate, Mr. Ballard says, that in Bengal an average crop may be considered to be from ten to twelve bundles, over an extensive cultivation, in a good season, from each Bengal biggah; the sheaf or bundle being measured by a six-feet cord or chain. Speaking of the produce in Tirhoot, the same gentleman says the "luggie," or measuring rod, varies throughout the district. The common Tirhoot biggah, is, I believe, equal to two-and-a-half or three Bengal biggahs (about an English acre). Its produce varies according to the size of the luggie, the fertility of the soil, and accidents of season; eight to ten hackery loads, however, is generally considered a good average return. South and east of Tirhoot, one hundred maunds from six hundred biggahs, including "khoonti," or a second cutting, is reckoned a successful result. In another part of the district, including Sarum, where the "luggie" is larger, the average produce is about one-third better. As we measure our plant on the ground (he adds), the bundle system is unknown here; but, I believe, forty-five or fifty Tirhoot hackery loads of plants (estimated to yield a maund of dry indigo), will be found equal to two hundred Bengal bundles.—("Trans. Agri. Hort. Soc., vol. ii. page 23.") In Oude the *jamowah*, or crop sown in May, yields on an average twenty maunds, or say thirteen bundles, per biggah (160 feet square). The "assaroo," or rain sowings, producing a very inferior plant, the average return is not more than three maunds, or two bundles. The "khoonti," or crop of the next year from the same plants, averages fifteen maunds, or ten bundles per biggah. In Central and Western India, the plants are allowed to produce the second and even the third year, according to some statements; but in Bengal the same stocks are rarely suffered to yield a second crop; being nearly all on lands that are under water in

the height of the inundation, the stock is rotted in the ground. Mr. Ballard, speaking of the duration of the plant, says that, as for three years' plant and "khoonti," it is a mere chimera, like the many others with which the planters have hitherto deluded themselves, and which it only requires a little reflection to overthrow. A biggah may be cut here and there, on an extensive cultivation, but it can never be relied upon as forming a part of the cultivation. The uncertainty of the indigo crop has been already noticed, and is, indeed, as proverbial as that from the hop plant in England. In Bengal the crop is particularly subject to be destroyed by the annual inundation of the river, if it occurs earlier than usual. A storm of wind, accompanied by rain and hail, as completely ruins the crop as if devoured by the locust; neither from this latter scourge is the crop exempt. This proneness to injury extends throughout its growth. The seedlings are liable to be destroyed by an insect closely resembling the turnip-fly, as well as by the frog. Caterpillars feed upon the leaves of older plants, and the white ant destroys them by consuming their roots. To these destructive visitations are to be added the more than ordinary liability of the plant to injury, not merely from atmospheric commotions, but even from apparently less inimical visitations. Thus not only do storms of wind, heavy rains, and hail, destroy the indigo planter's prospects, but even sunshine, if it pours out fervently after showers of rain, is apt, as it is properly termed, to *scorch* the plants; and if it occurs during the first month of their growth, is most injurious to their future advance. The reason of this effect appears to be the violent change from a state of imbibing to a rapid transpiration of moisture. No human invention or foresight can preserve the crop from the atmospheric visitations. To destroy and drive away the little coleopterous insects which attack the seedlings, it would be a successful method to spread dry grass, &c., over the surface intended to be cultivated, and to burn the litter immediately before the sowing. The heat and smoke produced has been found perfectly efficacious against the turnip-fly in England. To destroy the caterpillar, slacked lime dusted over the leaves, while the dew is upon them, is an effectual application. The white ants may be driven away or destroyed by frequent hoeings, which is the best preventive of the scorching, for hoeing preserves the soil in an equable and fitting state of moisture. The great supply of seed for Bengal cultivation is obtained from the western provinces, and forms an article of trade of no inconsiderable magnitude. The stubble in the low lands of Bengal is generally submerged before it has time to throw out fresh shoots, on which the blossom and subsequent seed-pod are formed. There are, however, some high tracts reserved for that purpose, and on these the plant is found well in flower in September, and the seed fit to gather in November or early in December. Two methods are pursued to extract the indigo from plant; the first effects it by fermentation of the fresh leaves and stems; the second, by maceration of the dried leaves; the latter process being most advantageous. They are thus described by Dr. Ure, in his "Dictionary of Arts and Manufactures:"—

From the recent leaves.—In the indigo factories of Bengal, there are two large stone-built cisterns, the bottom of the first being nearly upon a level with the top of the second, in order to allow the liquid contents to be run out of the one into the other. The uppermost is called the fermenting vat, or the steeper; its area is twenty feet square, and its depth three feet; the lowermost, called the beater or beating vat, is as broad as the other, but one-third longer. The cuttings of the plant, as they come from the field, are stratified in the steeper, till this be filled within five or six inches of its brim. In order that the plant, during its fermentation, may not swell and rise out of the vat, beams of wood and twigs of bamboo are braced tight over the surface of the plants, after which water is pumped upon them till it stands within three or four inches of the edge of the vessel. An active fermentation speedily commences, which is completed within fourteen or fifteen hours; a little longer or shorter, according to the temparature of the air, the prevailing winds, the quality of the water, and the ripeness of the plants. Nine or ten hours after the immersion of the plant, the condition of the vat must be examined; frothy bubbles appear, which rise like little pyramids, are at first of a white colour, but soon become grey, blue, and then deep purple red. The fermentation is at this time violent, the fluid is in constant commotion, apparently boiling, innumerable bubbles mount to the surface, and a copper coloured dense scum covers the whole. As long as the liquor is agitated, the fermentation must not be disturbed, but when it becomes more tranquil the liquor is to be drawn off into the lower cistern. It is of the utmost consequence not to push the fermentation too far, because the quality of the whole indigo is deteriorated; but rather to cut it short, in which case there is, indeed, a loss of weight, but the article is better. The liquor possesses now a glistening yellow color, which, when the indigo precipitates, changes to green. The average temperature of the liquor is commonly 85 deg. Fahr.; its specific gravity at the surface is 1·0015; and at the bottom 1·003. As soon as the liquor has been run into the lower cistern, ten men are set to work to beat it with oars, or shovels four feet long, called *busquets*. Paddle wheels have also been employed for the same purpose. Menwhile two other laborers clear away the compressing beams and bamboos from

the surface of the upper vat, remove the exhausted plant, set it to dry for fuel, clean out the vessel, and stratify fresh plants in it. The fermented plant appears still green, but it has lost three-fourths of its bulk in the process, or from twelve to fourteen per cent. of its weight, chiefly water and extractive matter. The liquor in the lower vat must be strongly beaten for an hour and a half, when the indigo begins, to agglomerate in flocks, and to precipitate. This is the moment for judging whether there has been any error committed in the fermentation, which must be corrected by the operation of beating. If the fermentation has been defective, much froth rises in the beating, which must be allayed with a little oil, and then a reddish tinge appears. If large round granulations are formed, the beating is continued, in order to see if they will grow smaller. If they become as small as fine sand, and if the water clears up, the indigo is allowed quietly to subside. Should the vat have been over-fermented, a thick fat-looking crust covers the liquor, which does not disappear by the introduction of a flask of oil. In such a case the beating must be moderated. Whenever the granulations become round, and begin to subside, and the liquor clears up, the beating must be discontinued. The froth or scum diffuses itself spontaneously into separate minute particles, that move above the surface of the liquor, which are marks of an excessive fermentation. On the other hand, a rightly fermented vat is easy to work; the froth, though abundant, vanishes whenever the granulations make their appearance. The color of the liquor, when drawn out of the steeper into the beater, is bright green; but as soon as the agglomerations of the indigo commence, it assumes the color of Madeira wine; and speedily afterwards, in the course of beating, a small round grain is formed, which, on separating, makes the water transparent, and falls down, when all the turbidity and froth vanish. The object of the beating is threefold; first, it tends to disengage a great quantity of carbonic acid present in the liquor; secondly, to give the newly-developed indigo its requisite dose of oxygen by the most extensive exposure of its particles to the atmosphere; thirdly, to agglomerate the indigo in distinct flocks or granulations. In order to hasten the precipitation, lime water is occasionally added to the fermented liquor in the progress of beating, but it is not indispensable, and has been supposed capable of deteriorating the indigo. In the front of the beater a beam is fixed upright, in which three or more holes are pierced, a few inches in diameter. These are closed with plugs during the beating, but two or three hours after it, as the indigo subsides, the upper plugs is withdrawn to run off the supernatant liquor, and then the lower plugs in succession. The state of this liquor being examined, affords an indication of the success of both the processes. When the whole liquor is run off, a laborer enters the vat, sweeps all the precipitate into one corner, and enters the thinner part into a spout which leads into a cistern, alongside of a boiler, twenty feet long, three feet wide, and three feet deep. When all this liquor is once collected, it is pumped through a bag, for retaining the impurities, into the boiler, and heated to ebullition. The froth soon subsides, and shows an oily looking film on the liquor. The indigo is by this process not only freed from the yellow extractive matter, but is enriched in the intensity of its color, and increased in weight. From the boiler the mixture is run, after two or three hours, into a general receiver called the *dripping vat*, or table, which, for a factory of twelve pairs of preparation vats, is twenty feet long, ten feet wide, and three feet deep, having a false bottom two feet under the top edge. This cistern stands in a basin of masonry (made water-tight with Chunam, hydralic cement), the bottom of which slopes to one end, in order to facilitate the drainage. A thick wooden web is stretched along the bottom of the inner vessel, to act as a filter. As long as the liquor passes through turbid, it is pumped back into the receiver; whenever it runs clear, the receiver is covered with another piece of cloth to exclude the dust, and allowed to drain at its leisure. Next morning the drained magma is put into a strong bag, and squeezed in a press. The indigo is then carefully taken out of the bag, and cut with a brass wire into bits, about three inches cube, which are dried in an airy house, upon shelves of wicker work. During the drying a whitish efflorescence comes upon the pieces, which must be carefully removed with a brush. In some places, particularly on the coast of Coromandel, the dried indigo lumps are allowed to effloresce in a cask for some time, and when they become hard they are wiped and packed for exportation.

Indigo from dried leaves.—The ripe plant being cropped, is to be dried in sunshine from nine o'clock in the morning till four in the afternoon, during two days, and threshed to separate the stems from the leaves, which are then stored up in magazines till a sufficient quantity be collected for manufacturing operations. The newly dried leaves must be free from spots, and friable between the fingers. When kept dry, the leaves undergo, in the course of four weeks, a material change, their beautiful green tint turning into a pale blue-grey, previous to which the leaves afford no indigo by maceration in water, but subsequently a large quantity. Afterwards the product becomes less considerable. The following process is pursued to extract indigo from the dried leaves:—They are infused in the steeping vat with six times their bulk of water, and allowed to macerate for two hours, with continual stirring, till all the floating leaves sink.

The fine green liquor is then drawn off into the beater vat, for if it stood longer in the steeper, some of the indigo would settle among the leaves and be lost. Hot water, as employed by some manufacturers, is not necessary. The process with dry leaves possesses this advantage, that a provision of the plant may be made at the most suitable times, independently of the vicissitudes of the weather, and the indigo may be uniformly made; and, moreover, that the fermentation of the fresh leaves, often capricious in its course, is superseded by a much shorter period of simple maceration.

PRODUCTION OF INDIGO IN INDIA.

	maunds.		maunds.
1840	120,000	1845	127,862
1841	162,318	1846	101,328
1842	79,000	1847	110,000
1843	143,207	1848	126,565
1844	127,862	1849	126,000

Average of the ten years 126,744 maunds.

The yield from the different districts in 1849, was nearly as follows:—

	maunds.
Bengal,.....	84,500
Trihoot,.....	24,500
Benares,.....	9,500
Oude,.....	6,500
	125,000

In the Madras Presidency, Indigo is chiefly manufactured in the districts of Cuddapah, Nellore, Chittoor, Cuddalore, and Chingleput, but the produce of Cuddapah, in England known as Curpah or Kurpah, is always reckoned of superior quality and brings a higher price than that of other Madras districts. It sells in Madras at from 30 to 45 Rupees a maund of 25 lb. and is chiefly exported to the United Kingdom and France. In former years the usual mode of extracting Indigo, in Southern India, was from the dry leaf, by a process minutely described in the pages of Heyne and Roxburgh. But this is now almost entirely superseded, by the better system of the *green leaf* manufacture, which is followed in all the Indigo growing districts of this Presidency, save the Province of South Arcot. In the latter, the *dry leaf* process is still persevered in, but it is likely that it is only so, from the distance to which the leaf has generally to be carried before it reaches the factory, and the consequent partial drying that takes place on the journey. The Indigo trade of Madras has of late years sustained a great development, though, owing to the drought of 1854, the export fell off above 50 per cent, it having in that year only reached 2,162 Candies (about 4,300 chests) while in 1853, it amounted to 5,445 Candies (about 10,900 chests). The subjoined table of the quantity landed each year in the port of London will show the progress of the trade since 1840.

Landed in 1840	3600	chests.
1841	3312	,,
1842	6436	,,
1843	5318	,,
1844	7731	,,
1845	11348	,,
1846	8261	,,
1847	8948	,,
1848	3848	,,
1849	5383	,,
1850	6094	,,
1851	8582	,,
1852	9311	,,
1853	9761	,,
1854	9229	,,

The average import from Bengal during the same period was about 22,000 chests, so that Madras now contributes 30 per cent. of the whole supply of this dye from India to the London market. But notwithstanding this importance of the traffic, the general manufacture is conducted, in so imperfect a system, that the value of the article produced is seriously diminished, and its currency injured as an article of trade. It is not that the quality of Madras Indigo is inferior to the ordinary run of that of Bengal, for where the manufacture has been conducted on a large scale, and with elaborate care and skill, as in the factories of Messrs. Arbuthnot and Co., at Cuddapah and Bimlipatam and Messrs. Hart and Simpson in the Cuddapah and Nellore districts, an article is produced which is held in high estimation in the home market, and commands as current a sale as the produce of any Bengal factory. But Indigo is commonly manufactured over the Madras Presidency in driblets; one vat-owner often not producing enough to fill even a chest, and the consequence is, that no one can make a purchase of a quantity of Indigo in the Madras market upon a sample, as is commonly done in Bengal,—that every parcel, and often the same chest is of mixed qualities, and that the value of the dye becomes thereby disproportionately depreciated at home. At the Madras Exhibition of 1855, nine samples of *Green leaf* Indigo and four of *Dry leaf* were sent to the Exhibition. The First Prize for the former was awarded to the produce of Messrs. Hart and Simpson's Factory, a beautiful specimen of the dye. Ranking closely with it, was the produce of Messrs. Arbuthnot and Co.'s Factory, which, though not quite coming up to the former specimen in colour, was so well manufactured, so even, square and uniform in quality, as to deserve the highest commendation.

Pala Indigo.—Of the Indigo manufactured from the Pala tree, Wrightia tinctoria, three samples were sent from Madura, Salem, and Canara, but only one deserved mention, that from Messrs.

Fischer and Co. of Salem, which is well manufactured. Fair specimen of the variety, broken square, light, even ordinary copper, sandy. The other samples were heavy, sooty, coarse and grey, as were all the specimens of Indigo sent from the Western Coast.—*M. E. J. R.*

In 1790 the general object of cultivation in Mauritius was indigo, of which from four to five crops a year were procured. One person sent to Europe 30,000 lbs., in 1789, of very superior quality.

Ceylon.—Indigo, though indigenous in Ceylon, is still imported from the adjoining continent, but its growth in this island would be subject to none of the vicissitudes of climate, that in the course of a single night have devastated the most extensive plantations in Bengal, and annihilated the hopes and calculations of the planter at a time when they had attained all the luxuriance of approaching maturity. The district of Tangalle, in the southern province, is the best adapted to the culture and manufacture of indigo for various reasons, such as the abundance of the indigenous varieties of the plant, the similarity of the climate to that of the coast of Coromandel, where the best indigo is produced; facility of transport by water to either of the ports of export, Galle or Colombo, during the south-east, or to Trincomalee by the south-west monsoon; every necessary material is at hand for building a first rate indigo factory, including drying yards, leaf godowns (stores), steeping vats and presses, except roof and floor tiles—which may be obtained in any quantity from Colombo, during the south-west monsoon, at a moderate rate compared with their cost at home. In 1817 an offer was made to the Government to introduce the cultivation of indigo, on condition of a free grant of the land required for the purpose and freedom from taxation for thirty years, after which the usual tax was to be levied; and in case the cultivation were abandoned, the land was to revert to the Crown. But whether from the disturbed state of the colony at the time or from incredulity on the part of the Government, as to the capability of the colony in this respect the application was unheeded. A subsequent proposal, emanating from a Swedish gentleman of great ability, skill and enterprise, was defeated by his death, although a company was on the point of formation to carry out the scheme. It would not be difficult, says Mr. Barrett, to select 500,000 acres, the property of the Crown, which at a comparatively small expenditure might be brought into a proper state of cultivation for the reception of indigo seed; for very little would be required to be done beyond clearing the land of weeds, burning the grass, and then lightly ploughing and levelling the ground; and whenever manure might be requisite, the fecula of the leaf affords one of the richest that could be employed. Ceylon produces two other plants from which a very valuable blue dye may be obtained by a similar process to that of making indigo. The Singhalese head men of the Tangalle district have long been anxious for the establishment of an indigo plantation there, and would readily have taken shares in a company established for that purpose. Indigo would seem to have been exported by the Dutch from Ceylon so late as 1794. The wild varieties of indigo which grow on the sea-shore are used by the dobies (*Washermen*). Indigo grows in a wild state in Siam, and all the dye used in the country is manufactured from these plants. The extensive low grounds are admirably suited for the cultivation of this plant. A large quantity is raised in Manila, but I have no full details of the cultivation in the Philippines. However, in the first six months of 1843, 1,039 piculs of indigo were shipped to Europe, and about 650 to other quarters—equal in all to about 226,000 lbs. in the half year. In the year 1847 the exports of indigo were 30,631 arrobas, equal to about 7,658 cwt.; in 1850 the total exports from Manila were 4,225 quintals.

Java.—The cultivation of indigo was introduced into Java in the time of the company. It was so much neglected during the adminstration of Governor Daendels that the exportation ceased. It however revived subsequently, and in 1823 the exports were close upon 17,000 lbs. In 1826 it had risen to 46,000 lbs. In the single province of Westbaglen, about 60 square miles in extent, 86 indigo factories were established in the course of seven or eight years. In 1839, the exports of this dye-stuff from Java were 588,764 kilogrammes, valued at 7½ million francs. It has been found by experience that a good soil is essentially necessary for the plant, and the indigo transplanted from elevated grounds to the rice fields succeeds better and yields more coloring matter than when raised direct on the spot from the seed. The residencies of Cheribon, Baglen and Madion, are those in which the crop succeeds best. From being so exhausting a crop, and finding it prejudicial to their rice grounds, they are gradually abandoning indigo culture in Java, and about two-thirds of the indigo plantations have within the last year or two been replaced with sugar. The value of the Java indigo is set down at 250 rupees (£25) per maund. If this be the average price, and it cannot be manufactured lower, Bengal has little to fear from Javanese competition. The product of indigo rose from 276 maunds in 1825 to 28,000 in 1842, and the quantity sold by the Dutch Trading Company in the last-named year was 10,500 chests, of about the same dimensions as those usually exported from Calcutta. Some further statistics of the culture in Java are shown in the following returns of the quantity exported:—

	lbs.
1830	22,063
1835	535 753
1839	595,818
1841	913,693
1843	1,890,429
1851	769,580
1852	838,288

The produce in 1848 was 1,151,368 lbs.

	1840.	1841.
Residence in which this culture is introduced	9	10
Number of factories	728	728
Families occupied with this culture	197,085	192,159
Extent of fields where the cutting has been made in *bahus* of 71 decamatres	40.844	38,829
Quantity of *bahus* planted before the gathering	317	538
Quantity of indigo crop in pounds	2,032,097	1,663,427
„ average pounds per *bahu*	49¼	43

The extent of fields destined for the crop of 1842 was 37,970 bahus, and the amount of the crop was calculated by approximation at 1,862,000. The gradual increase of the export in the eighteen years ending 1842, is shown as follows :—

	Maunds.		Maunds.
1825	76	1834	3.310
1826	126	1835	7 023
1827	109	1836	5.365
1828	310	1837	10,822
1829	600	1838	9,778
1830	480	1839	15,680
1831	563	1840	27,246
1832	2,213	1841	24,044
1833	2,861	1842	28,000

Total imports of indigo into the United Kingdom, and quantity retained for home consumption :—

	Imports. cwts.	Home consumption. cwts.
1848	59,127	9,032
1849	81 449	12,270
1850	70,482	16,374
1851	89,994	27,947
1852	83,565	16,381

IMPORTS OF INDIGO.

	East Indies. lbs.	Mexico and the ports of South America. lbs.
1831	6,996,062	—
1832	6,196,080	66,363
1833	6,315,529	125,264
1834	3,595,697	64,638
1835	3.861.853	88 306
1836	7 218,991	198,003
1837	5,706,896	365,091
1838	6,578,352	142,739
1839	4,651,542	363.481
1840	6,940.192	124,766
1841	7,451,653	247,031
1842	8,931,112	155,003
1843	6,319,294	130,836

Entered for home consumption about two millions and a half pounds annually. (" Par. Returns No. 656, September 1843, and 426, September 1844.")

The consumption of indigo in Europe and North America in round numbers, estimated from authentic sources, is thus set down by Mr. Macculloch in 1849 :—

	chests.
In Great Britain for home consumption	9,820
„ France total for ditto	10,400
„ American ports from London and Liverpool	2,500
„ „ Calcutta	700
„ „ Holland, &c	400
Other European countries export from London and Liverpool	21,530
„ „ Holland	4,270
„ „ Calcutta	120
„ „ France	300
—*Simmonds, page* 478.	50,040

(4471) INDIGOFERA, a genus of Plants belonging to the natural family *Leguminosæ*, indigenous in the equinoctial parts of Asia, Africa, and America, and celebrated for some of the species yielding Indigo. The species are about 150 in number ; all are small herbaceous or shrubby Plants. The leaves are usually pinnate ; the flowers small and papilionaceous, in axillary clusters of a purple, blue, or white colour. The calyx is 5-cleft ; segments acute ; vexillum roundish, emarginate ; keel furnished with a subulate spur on both sides, stamens diadelphous [9 and 1]. Legume continuous, one or more seeded. Seeds usually truncated, separated by cellular spurious partitions. There is some difficulty in ascertaining all the cultivated species, as the subject is usually neglected both by naturalists and cultivators.—*Eng. Cyc. Vol.* III. *p.* 227. Dr. Wight, in Icones, gives, Indigofera arborea, 368 ; argentea, 331 ; aspalathoides, 332 ; atropurpurea, 369 ; cœrulea, 366 ; *cinerea*, 386 ; echinata, 316 ; enneaphylla, 403 ; flaccida, 387 ; *fragrans*, 385 : glandulosa, 330 ; linifolia, 313 ; paucifolia, 331 ; pedicellata, 983 ; pentaphylla, 385 ; *prostrata*, 314 ; pulchella, 367 ; tinctoria, 365 ; trifoliata, 314 ; trita, 315, 386 ; uniflora, 333 ; viscosa, 404.

(4472) INDIGOFERA. Wild indigo. An indigenous shrub, a species of indigo, is sometimes, in Tenasserim, used in forming a blue dye. —*Mason.*

(4473) INDIGOFERÆ, Sp.

Doun-daloun, Burm.

This tree is four or five feet in girth, found both in the Rangoon and Tounghoo districts, though it is scarce. Wood, white colored, adapted to every purpose of house-building.—*McClelland.*

(4474) INDIGOFERA ANIL. From the name it might be inferred that this was an Asiatic plant ; but it is said by De Candolle to grow wild in America, and to be cultivated in both Indies, as also along the Gambia in Africa. The name Anil, which has passed into the Spanish, has evidently the same origin as the Arabic Neel, or Nil. The Spaniards and Portuguese,

who had found the way to India by two opposite courses, must there have become acquainted with Indigo, and adopted its Indian name: they were the first to manufacture it in America—the Portuguese in Brazil, and the Spaniards in Mexico. This species is characterised by an erect suffruticose stem; leaves pinnate in 3 to 8 pairs; leaflets oval-oblong, scarcely pubescent on the under surface; racemes axillary, shorter than the leaves; legumes compressed, not torulose, deflexed, curved, with both sutures thickened and prominent, 10- to 12-seeded. Messrs. Wight and Arnott state, "We have not sufficient materials to enable us to determine if *I. Anil* be a distinct species. We know of no distinguishing character, unless it is to be found in the fruit, and the descriptions given of that part in the two species differ in different authors." But the authors of the 'Flore de Senegambie' consider them distinct, as do most botanists. According to Dr. Honigberger, p. 289, Indigofera Anil, is cultivated in some provinces of the Punjab, but more for dye, than for medicine. The leaf of the *Indigofera Anil* (Vishaso Danie, *Sans.*) is used by the natives in hepatitis. Powdered indigo has been employed in Germany in the treatment of epilepsy, but with very uncertain results.—*O'Shaughnessy, p.* 292.

(4475) INDIGOFERA ARGENTEA, is a species usually stated to be a native of India, and the authority of Dr. Roxburgh might be cited for the fact; but Messrs. Wight and Arnott state that *I. aryentea* of Linnæus is not found in India. It is the species cultivated in Egypt and Barbary for the sake of its Indigo, and, according to Humboldt, also in America. The Indian species which has been confounded with it is *I. paucifolia* of Delille, which has alternate leaflets, and linear, slightly compressed, torulose legumes. *I. argentea* is shrubby, with round branches, which appear of a silky whiteness from appressed pubescence; leaves pinnate, 1- to 2-paired; leaflets opposite, obovate, silky-pubescent; racemes shorter than the leaf; legumes pendulous, much compressed, torulose, canescent; 2- to 4-seeded.

(4476) INDIGOFERA CÆRULEA (Roxb.). This is a new species described by Dr. Roxburgh, and called Karneeli in Telinga by the natives of the peninsula of India. He states that from the leaves of this plant he had often extracted a most beautiful light Indigo, more so than he ever could from the common Indigo Plant, or even from *Nerium tinctorium*, and in a large proportion. He says it is an erect shrubby species, growing in dry barren uncultivated ground to the height of 3 feet, and higher in good garden soil. It flowers during the wet and cold seasons. The leaves are pinnate; leaflets 4-paired, obovate, emarginate; racemes rather shorter than the leaves; legumes reflexed, curved, contracted between the seeds, hairy; from 3- to 4-seeded. De Candolle inquires whether this be sufficiently distinct from *I. tinctoria*. Dr. Roxburgh states that it comes near to *I. argentea*, Linn. The process he adopted for extracting Indigo from this plant was similar to that practised with the leaves of *Nerium tinctorium*, or the scalding process.—*Eng. Cyc.*

(4477) INDIGOFERA DISPERMA. This, according to Humboldt, is also one of the species cultivated in America, and seen among the most ancient hieroglyphical paintings of the Mexicans. Dr. Bancroft considers it as the species called Guatemala Indigo, which yields fine pulp, but is less productive than other species. The stem is herbaceous, weak; the branches round; leaves pinnate, 4- to 6-paired; leaflets elliptico oblong, smooth; racemes slender, larger than the leaf; legumes round, subtorulose, mucronate; 2-seeded.—*Eng. Cyc.*

(4478) INDIGOFERA ENNEAPHYLLA. The expressed juice of the "trailing indigo," *Indigofera enneaphylla*, is given as an alterative by the native physicians in old syphilitic diseases.—*O'Shaughnessy, page* 292.

(4479) INDIGOFERA LINIFOLIA, vegetates in the lower mountains of the Punjab. There the root of this plant is said to be officinal and to be used in febrile eruptions. It is Dealsings root for Torkee.—*Honig.*

(4480) INDIGOFERA TINCTORIA.

Tarum, MALAY.	Tayum, TAGALA.
Talum, LAMPUNG.	Tayung, BISAYA.
Tom, JAVANESE.	

Indigofera tinctoria.—Is the species generally cultivated in India, whence it has been introduced both into Africa and America. It is suffruticose, erect, branched; leaves pinnate; leaflets 5 or 6 pairs; long obovate, scarcely pubescent, racemes of flowers axillary, shorter than the leaves. Legumes approximated towards the base of the rachis, nearly cylindrical, slightly torulose, deflexed, and more or less curved upwards; sutures thickened; seeds about 10, cylindrical, truncated at both ends. This species is sometimes called Indigo Franc, and French Indigo in the West Indies. It is said to be found wild along the sands of Senegal. ('Flore de Senegambie,' vol. i. p. 178.)—*Eng. Cyc.* The true indigo plant, Indigofera tinctoria, is grown occasionally by both Karens and Burmese, but not extensively.—*Mason.* Some of these Indigo plants are very beautiful, natives of India, and worthy of a place in any garden; the colours being purple, red or pink.—*Riddell.*

(4481) INDURJUO, BITTER.

Indurjuo-i-tulkh, PERS.

Seeds of Holarrhena pubescens, "*Roora*," and H. Antidysenterica, the same size and colour, furrowed deeply at one side: very bitter—*Pen. Ph.* 208.

(4482) INDURJUO, MILD.
Indurjuo-i-shereen, PERS.

Seeds of Wrightia anti-dysenterica, about ¾ inch long, brown, nearly tasteless.—*Ben. Ph.* 208.

(4483) INGA, a genus of Plants belonging to the natural order *Leguminosæ*, which, though it has been separated from *Mimosa*, yet contains upwards of 100 species. These are found in the tropical parts of Asia, Africa, and America. They are distinguished by their legumes being broadly linear, compressed, and 1-celled. The seeds are usually covered with pulp, more rarely with farinaceous matter or a pellicle. The species form shrubs or trees, and are commonly unarmed. The flowers are in spikes, or are capitate, and of red or white colour. From the number of species in this genus, as well as in *Acacia* and *Mimosa*, and from their having been removed from one to the other, there is some confusion in the synonyms. A few of the useful species have been further separated into the genus *Parkia*; but many still remain which are important in the countries where they are indigenous, either for astringent properties, like many Mimosas and Acacias, or for the edible nature of the fecula or pulp which surrounds their seeds. Thus *I. cochliocarpus* has bitter and astringent bark, which is used in tanning and also in medicine. It is taken to Portugal, where it is called the Brazilian Bark, and used even as a substitute for that of the *Cinchona*. Martius distinguishes from this species, which he calls *I. Jurema*, another which he has named *I. astringens*, and of which the bark has similar properties. The bark of these trees is considered by some authors to be the Cortex Astringens Brasiliensis of old pharmacopœias. *I. salutaris* is another astringent species, a native of New Granada, of which the bark is much used in the form of decoction for various complaints in which astringents are indicated, and for the same purposes as Ratany Root. Some of the species, as before mentioned, are esteemed for the sweetish edible pulp with which their seeds are surrounded, as *I. dulcis* in India and *I. insignis* in the province of Quito, where it is called Guabo, or Guabas, but Pacaes in Peru. So *I. Camatchili*, according to Perrotet, is similarly esteemed in Manilla, and *I. Furoba* in Western Africa, in the neighbourhood of the Senegal. *I. vera* contains tannic acid, and is one of the numerous leguminous plants used for obtaining Catechu. The pulp of the fruit of this species also is purgative. *I. fæculifera* yields in its pods a laxative pulp called Pois-Doux in St. Domingo. It has a sweet taste. The pulp also of the pods of *I. tetraphylla* is sweet and mucilaginous. (Lindley, *Vegetable Kingdom.*)

(4484) INGA BIGEMINA.
Tau-yew, BURM.

Native gardens, in Tenasserim, are often ornamented with a species of inga which affords a thick beautiful shade, and when in flower its tufted boughs seem to bend under their burdens of sweet, scented blossoms. It is a leguminous plant, whose seeds are poisonous and when taken into the stomach sometimes produce disastrous consequences, yet the Burmese and Karens are extravagantly fond of them, as a condiment to their preserved fish, and they bring a high price in the bazars.

(4485) INGA DULCIS. Sweet Inga or Manilla Tamarind.
Seema chinta, TEL. | Coorkapooli marum, TAM.

A most valuable hedge plant, is now used along the line of railway, the wood is hard Isolated trees of 12 to 18 inches diameter are occasionally found, these resemble the hawthorn in general appearance. It is the *Pithecolobium dulce*, Benih. The pulp of the fruit is eatable, the seed was brought from Manilla to Samulcottah, hence the name "Manilla tamarind." The Spaniards introduced the tree to the E. Indies from Mexico. —*M. E.* Inga dulcis, says Mr. Jaffrey, is a large and handsome tree, with drooping branches armed with short straight thorns. Pods curiously twisted, filled with a sweet pulp, which forms a nourishing food. This is the best hedge plant in South India.

(4486) INGA XYLOCARPA, MIMOSEÆ, Roxb. c. 100.
Eroovaloo marum, TAM. | Tangedu mara, TEL.
Pyenkadoe, BURM. | Jamboo, HIND.

This tree grows to a large size, and is much valued for house building, on account of its strength and toughness. It is remarkable for its thick woody legume, and is the *Xylia dolabriformis* of Benih.—*M. E. of* 1855. Mr. Mason says that this is a species of the old genus acacia, and its timber is usually denominated iron wood in Arracan, and is sometimes so called in the Tenasserim Provinces. The hard wood is as impervious to white ants as teak, and is even more durable in the ground. Natives have assured him that they have seen house posts of this wood taken up after having stood forty years, and that the part which had been buried was as sound as new timber. The trees abound in the province of Tavoy, especially near the forks of the Tenasserim.—*Mason.* Dr. McClelland however states that both *Inga xylocarpa* Pyin Kadoe. and 2 *T. bijemina*, Tauyeu, afford iron-wood. This first is called Pin-ka-doe by the Burmese. It is found in all the Teak Forests. In the Prome Forests it is usually about six feet in girth, but in all the other Forests it attains a larger size, frequently eight or nine feet. It is most plentiful throughout the province. The second species is of smaller girth, but grows to a great height. Wood black.—*McClelland.* Dr. Wight describes it as a dark coloured, hard and very strong wood, excellent for naves of wheels and in-

deed for all purposes demanding great strength. He believes it is abundant in the Walliar forests. An inch bar sustained 250 lbs.—*Wight.* Mr. Rohde says it is the Conda Tangeda of the Circars. Roxburgh states it to be used for knees and bends of ships in Pegu. In the Circars he has not met with it exceeding a foot or 14 inches diameter and always faulty in the centre, the quantity brought down is comparatively small, he thinks it a good wood for screws, framing of furniture, linings of drawers, tool handles and generally for all purposes for which a moderately hard, strong wood not liable to split or cast about is required; polished it has something the appearance of a close grained palur, and has been sold by hard wood dealers in London as "patridge wood."—*Rohde.*

(4487) INK.

Sira, Tel.	Inchiostro, It.
Mye, Tam.	Atramentum, Lat.
Ink, Dut.	Shai, Pers.
Encre, Fr.	Tschernilo, Rus.
Dinte, Ger.	Tinta, Sp.
Seahi, Guz. Hind. Pers.	Blak, Sw.

Is composed of different ingredients, the chief of which are gall-nuts, copperas, gum, and logwood, according to the purposes to which it is to be applied. There are several varieties of ink, such as printing ink, writing ink, marking ink, India ink. &c. The Ink of China is brought over in small oblong cakes, readily diffusible in water. It is made of very fine lamp black, prepared with a peculiar glue, or jelly. Comp-Desc. The Tamools occasionally make ink with nearly the same materials that we do, but that which is used by the Hindoo Native Writers in the Cutcherries and Public Offices is prepared by the following very different process. *First*, a burnt rice water is to be made in this way; half a seer of rice burnt black is to be well boiled in a seer and a half of water, till but one seer remains then strain off the dregs. To this seer of burnt rice water is to be added two pollams of Komburruck (Lac), boil them well together and strain off the dregs. Half a seer of Carpoo vernum (Lamp black) and half a pollam of Vullam pisin (Gum Arabic) are then to be well rubbed into a fine powder, and gradually added to the decoction of Komburruk and burnt rice water, when the whole are to be rubbed together and well shaken, at different intervals for the space of three days. The Mahometans prepare their ink, which they call Seeahee, in the following manner. Take of Lamp black and Gum Arabic equal quantities and pound them together into a very fine powder. This powder is then to be moistened with the juice of the pulp of the Kuttalay (Small Aloe,) and well rubbed at intervals for two days together after which it is to be formed into little cakes that are to be put on plantain leaves, and dried in the sun for use.—*Ain's. Mat. Med. p.* 175.

(4488) INK, RED.

Segapoo Mye, Tam.

The Tamools prepare this by adding a little water to Shem pungie (red cotton) luttooka doodi, Tel.—*Ain's. Mat. Med. p.* 175. Red ink is formed by steeping and afterwards boiling chips of red dye woods in Vinegar that formed by lake is not permanent.—*Rohde, M.S.S.*

(4489) INSECTA, one of the classes of Invertebrate Animals. The Latin term Insecta, like Greek Entoma, which has been applied to these animals, has reference to the insected or divided appearance of the body; hence the English name Insect, the French Insecte, and the German Insect. Invertebrate Animals are divided by Lamarck into two groups, which he calls Animaux Apathiques, and Animaux Sensibles. The latter, or the Sensitive Animals, contain six classes, of which Insects are the first. According to Latreille's arrangement in the 'Regne Animal,' the class *Insecta* forms the third great division of articulated animals—articulated referring to the innumerable joints of which this class of animals is composed. True Insects may be thus defined:—Articulated animals possessing six legs, two antennæ, two compound eyes; a small brain at the anterior extremity of a double medullary chord. Circulation effected by a Pulsating dorsal vessel provided with numerous valves. Respiration by tracheæ, which form two lateral trunks, and ramify through the body; generation oviparous; two distinct sexes; adult state attained through a series of metamorphoses, Insects generally possess two pairs of wings; the trunk in the adult animal is usually composed of three chief parts, the head (Caput), Thorax, and Abdomen; or the trunk of an insect may be described as consisting of thirteen segments, of which one constitutes the head, three form the Thorax, and the remaining nine compose the Abdomen. The head includes the organs of sensation and manducation, and its principal parts have received the following names:—the Clypeus, Vertex, Occiput, Lenæ, Canthus, Gula, Oculi, Stemmata, Antennæ, and the Trophi.—*Eng. Cyc.*

(4490) INULA, a genus of Plants belonging to the natural order *Compositæ* and the sub-order *Asteraceæ*. It has a many-flowered heterogamous head. Florets of the ray female in one row, sometimes by abortion sterile, usually ligulate sometimes somewhat tubular and trifid; those of the disc hermaphrodite, tubular, 5-toothed; involucre imbricated in several rows; receptacle flat or somewhat convex, naked; anthers with 2 setæ at the base; achenium without a beak, tapering, or in *I. Helenium* 4-cornered; pappus uniform in one row, composed of capillary roughish setæ.—*Eng. Cyc.*

(4491) INULA ROYLEANA, grows in the Cashmerean hills, but as the plant is considered

poisonous it is not used. Dr. Honigberger is of opinion, that important, virtues lie hidden in it, and that it is well worthy of being experimented with.— *Honigberger, p* 290.

(4492) INULA VISCOSA AND GRAVEOLENS, have been lately recommended as diuretics, and as useful in calculous diseases.— *Honigberger, p* 290.

(4493) IODINE.

Iode, Fr. | Iod, Ger.

Iodine (I=126), from *ἰώδης, violet*, the colour of its vapour, was obtained by M. Courtois in 1812 in the residual liquor of the process for obtaining Soda from Kelp. Though but lately discovered, its effects have long been obtained in medicine, as it is found in Sea and several Mineral waters, and in Sea-weeds, Sponge, Corals, and some Molluscous animals. In the present day, the leaf of a Sea-weed (a species of Laminaria, *Dr. Falconer*) is employed in the Himalayas, and called the *goitre-leaf*, and in S. America the stems of a Sea-weed are sold by the name of *goitre-sticks*, because they are chewed by the inhabitants wherever goitre is prevalent.—*Royle.* Iodine is procurable by burning large quantities of sea weed or of the conferva of the salt water lake near Calcutta: but to prepare it from these, the process is only economical where the weeds yield enough of impure Carbonate of soda, to cover the general expense of this operation. This is not the case with the Calcutta conferva.— *Beng. Phar. p.* 870.

(4494) IONIDIUM, a genus of Plants belonging to the natural order *Violaceæ*. It has 5 sepals not prolonged at the base; corolla unequal, 2-lipped, consisting of 5 petals, the lowest of which is very large and unguiculate; stamens 5, hypogynous, unequal, the two anterior having anthers that are often appendiculate; capsule protected by the permanent sepals; petals and stamens few, or many-seeded. The species are herbaceous plants or shrubs.—*Eng. Cyc.*

(4495) IONIDIUM IPECACUANHA, is a native of the forests of Brazil. It has alternate lanceolate ovate leaves, serrated, acute at each end; stipules ovate-lanceolate, acute, membranous, ribbed in the middle; sepals semi-pinnatifid; lower petal very large, transversely elliptical. The roots are emetic, and are often collected as a substitute for the true Ipecacuanha.—*Eng. Cyc.*

(4496) IONIDIUM SUFFRUTICOSUM. *Syn.* Viola suffruticosa, (L.)

Ruttun puruss, Duk. | Charati, Sans.

A rugged and somewhat prickly reclining herb, having a small crimson flower. It is common over the peninsula of India, and is used as a demulcent. Dr. O'Shaughnessy examined carefully specimens obtained from the Calcutta Garden, but did not detect the least trace of the active principles emetine or violine.—*O'Shaughnessy, page* 209.

(4497) IORA, or JORA, a genus of Birds established by Dr. Horsfield, and placed by Mr. Swainson among his *Brachypodinæ*, or Short-Legged Thrushes.

(4498) IPOMÆA, a genus of Plants of the natural family of *Convolvulaceæ*. which is very closely allied to *Convolvulus*, or Bindweed, whence has been derived its name. From the more minute investigations of modern botanists considerable changes have taken place in the nomenclature of the species sometimes referred to this genus and sometimes to other nearly allied genera. M. Choisy, who has most recently examined the Oriental *Convolvulaceæ*, excludes many species usually referred here, and forms the genus of the species of *Ipomæa* and *Convolvulus* of authors. *Ipomæa* has a 5-sepaled calyx, a campanulate corolla, with five stamens included within it; style single; stigma bilobed; lobes capitate; ovary 2-celled; cells 2-seeded; capsule 2-celled. The species are very numerous, and found in the tropical parts of Asia, Africa, and America. A few ascend the mountains in such latitudes. Most of the species are ornamental; others have been removed to *Quamoclit, Argyreia, Pharbitis, &c.*, and one of the most useful as an article of diet in tropical countries, to *Batatasas*. *B. edulis* produces the tubers so well known by the name of Sweet Potatoes. —*Eng. Cyc.* Roxburgh in his Flora Indica page 497 to 504 describes eleven species of Ipomæa. Dr. Wight in Icon. gives Ipomæa, 1356; bracteata, 1374; campanulata, 1374; chrysoides, 157; pes tigridis, 836; pileata, 1363; pulchella, 156; Ipomæa rugosa, 887; sessiliflora, 169; Wightii. 1364; The species and varieties of *Ipomæa* are pretty creepers flowering in the morning. They greatly enhance the beauty of Indian gardens, when the various colors are well arranged, raised from seeds sown at the commencement of the rains, they may be sown where intended to flower. Any garden soil will suit, if not too heavy. —*Riddell.* Mr. Williams says that in China, the large family of Convolvulaceæ contains many beautiful species of Ipomæa, cultivated for their flowers, especially the Ipomæa quamoclit, found about the houses even of the poorest people.— *Williams' Middle Kingdom, page* 287.

(4499) IPOMÆA. Arrow-headed Ipomæa. There is an elegant little twining species of Ipomæa with arrow-headed shaped leaves. The corolla is cream-coloured with a purple eye. It is in bloom in the hedges of Maulmain at the close of the rains.—*Mason.*

(4500) IPOMÆA BONA-NOX. Muricata. (Hairy.) Rubro-Cœrulea (blue and pink.) Tyrianthina. (Bright violet.) Violacea. (Violet Blue.) Splendens, (pale red.) Tuberosa (yellow species.)

(4501) IPOMÆA COCCINEA. A beautiful species herbaceous and shrubby, well adapted for

covering trellis work, walls, or pillars, growing easily from seed, at the commencement of the rains in any good soil, when they produce flowers in profuse abundance.—*Riddell.*

(4502) IPOMÆA CŒRULEA. SKY-BLUE IPOMÆA.

Neel-kulmi, HIND.

Seeds Inflaton and Kala-dana. This grows wild in the hedges about Ajmeer. The seeds called kala-dana are kept by the punsaries and are much employed as a purge; but reckoned very irregular in operation. One tola is taken by an adult as a dose.—*Gen. Med. Top. p.p.* 144 and 181. The seeds of this plant are officinal all over Hindostan and the Punjab, the natives administer them chiefly as purgatives.—*Honigberger, p.* 291.

(4503) IPOMÆA CUSPIDATA, is a creeping weed, and Dr. Honigberger, p. 291, states its leaves are used medicinally.

(4504) IPOMÆA DASYSPERMA, the seeds of this plant Dr. Honigberger received from Hindostan, as an antidote to hydrophobia. It is called Koota ke beenj. i. e. the seeds for dogs, he had not an opportunity of trying them in Hydrophobia.—*Honigberger, p.* 291.

(4505) IPOMÆA JALAPA. JALAP PLANT. *Syn.* Convolvulus Jalapa, *Linn.* Ipomæa Purga. *Wenderoth.* A native of South America, Xalappa, and on the Eastern declivity of the Mexican Andes. The roots are fleshy, large oval oblong, rugose, and blackish externally, while recent; in dry state, and as sold in the shops, they are cut in flakes of variable diameter, sometimes cleft lengthwise and pyriform. If entire they are usually small, wrinkled, heavy, unequal, hard, brittle, deep brown grey externally, of a dirty grey within, fracture smooth and wavy, shewing a great number of resinous points, visible to the lens, and often to the naked eye. The odour is peculiarly nauseous, thoug[illegible] week. The taste acrid and disgusting. A br[illegible] cathartic. The powder is of brown grey colour, and must be prepared with caution, as it is exceedingly irritating. The worm-eaten roots are much more active than the sound, as the worms only attack the amylaceous and sweet parts. The resin of jalap is dry, brittle, readily reduced to powder, in rolls of elongated or spiral form, the size at most of the little finger, greyish yellow, dull, unequal, and chinked externally, of brilliant fracture and yellowish brown while recent. Totally soluble in alcohol, insoluble in ether, inodorous until rubbed, when the peculiar smell of jalap is evolved; its taste is nauseous and very acrid. This resin is exposed to numerous adulterations, especially with other resins, of which that of the Guaiac is most used; the perfect insolubility of the jalap resin in ether will lead to the detection of numerous frauds of this description. According to Humboldt 400,000 lbs. weight of jalap roots are annually exported from Vera Cruz. The plant thrives best on cool shady hills, about 2000 feet above the level of the sea.—*O'Shaughnessy, pages* 502, 503.

(4506) IPOMÆA MACRORHIZA is supposed to be the *Convolvulus Jalapa* of Linnæus. It is a plant inhabiting the sandy soil of Georgia and the Carolinas, with white insipid farinaceous roots, weighing from 40 to 50 lbs. It is said to possess no purgative properties, but, like *Batatas*, consists chiefly of saccharine and farinaceous matter.—*Eng. Cyc.* In 1834, Lord Auckland introduced into the Calcutta Garden, the *Ipomæa macrorrhiza*, a native of Georgia and Carolina. It perfectly succeeded, and the roots attained such an enormous size that a cluster belonging to one plant weighed 70 lbs.; while recent it was fleshy, white, juicy, of mild flavour, and altogether devoid of the acrid resin. It had a sweetish taste, and has been eaten by several persons without any ill effect being experienced. To test the applicability of the root as fodder, seven sheep were fed on it, but six of them died suffering from diarrhœa within a month.—*O'Shaughnessy.*

(4507) IPOMÆA MARITIMA is a plant of extensive range, trailing over the sandy beaches along the coast from Hainan to the Chusan archipelago.—*Williams' Middle Kingdom, p* 287.

(4508) IPOMÆA PESCAPRÆ. GOAT-FOOTED IPOMÆA. On the sands of the sea shore, this large red-purple flowered species of ipomœa is abundant and helps to bind the shifting sands. —*Mason.*

(4509) IPOMÆA PESTIGRIDIS. TIGER'S FOOT IPOMÆA.

Kunra Pora-batul, HIND.

Very common in the rains every where in Rajpootanah. Another and most beautiful extensive perennial Ipomœa is to be seen at Rajgurh and in the resident's garden at Ajmeer generally called the Malabar creeper, it has bright yellow flowers and glabrous palmate leaves. This species seems to agree with the *Ipomœa Tuberosa* of the West Indies, only this has no scent. This plant extends an immense length and affords a very close shade.—*Genl. Med. Top. p.* 182. In Tenasserim the tiger-footed ipomœa, with large palmated leaves is not uncommon.—*Mason.*

(4510) IPOMÆA PHÆNICEA, Scarlet Ipomœa common in hedges and gardens during the rains.—*Genl. Med. Top. p.* 181.

(4511) IPOMÆA PILEATA. BONNET IPOMÆA. In October, as soon as the rains close, a pretty little twining species of Ipomœa is seen blushing through every hedge and bush in Tenasserim. It is peculiar for its concave bonnet shaped involucre, in the midst of which

half a dozen tiny blossoms hide their rosy lips. —*Mason.*

(4512) IPOMÆA QUAMOCLIT: WING LEAVED IPOMÆA, White and crimson. Lal-kamluta. Hind. (The crimson) sweta kamluta (the white). Pers Ishk pecha (love's ringlets)—*Genl. Med. Top. p.* 181. The Cyprus Vine or Crimson Quamoclit. Flowers in the cold weather, of a most beautiful bright crimson colour; tube long, slender; in gardens pretty common.—*Riddell.*

(4513) IPOMÆA RENIFORMIS.

Perretay-keeray, TAM.

A perennial creeper with yellow flowers; the leaves used as greens mixed with tamarind; very common during the cold months.—*Jaffrey.*

(4514) IPOMÆA REPTANS.

Vellay-keeray, TAM.

A creeping annual of the convolvulus family with rose colored flowers, found about the borders of tanks and moist places. The leaves are used as greens.—*Jaffrey.*

(4515) IPOMÆA SEPIARIA.

Thalee-keeray. TAM.

A climbing perennial plant of the convolvulus family with rose colored flowers, found in hedges; the leaves are eaten mixed with others as greens.—*Jaffrey.*

(4516) IPOMÆA TUBEROSA. Malabar Creeper. An immense climbing plant, with woody stem; common in gardens; a native of Tropical America; leaves palmated, seven parted. Flowers yellow and showy appear in October and November. It is in general use for covering old walls, trellises, &c., and for which purpose, from its exceeding rapid growth, it is well adapted.—*Riddell.*

(4517) IPOMÆA TURPETHUM, Syn, CONVOLVULUS TURP.

Teoree, Doodh-kulmee, &c. HIND. and BENG.

A native of Bengal, Ceylon, and India generally.—*Roxb. Fl. Ind.* i. p. 476. *I. Turpethum* is found in the East Indies, Malayan Archipelago, Australia, Timor, Otaheite, Friendly Islands, Marianne Islands, Tinian, &c. Its root is perennial. The stems twining, several fathoms long, from 3- to 4- sided, a little downy, with winged angles; leaves stalked, varying in form from cordate to linear, all pointed and lobed, or angular and downy; peduncles axillary, downy, many-flowered; flowers large and white; bracts oval, concave, velvety, decidous; ovary seated on a large glandular disc; stigma 2-lobed; capsules involved in the dry calyx, absolutely 4-sided, 2-celled, opening at the apex by a kind of operculum; seeds round, black, one in each cell. The root has been long employed in India as a common purgative. The bark of the roots is the part employed by the natives, as it contains all the active properties; they use it fresh, rubbed up with milk. About 6 inches in length of a root as thick as the little finger they reckon a common dose. (Roxb). It is reckoned an excellent substitute for jalap, and is free from the nauseous taste and smell of that drug. The plant is a native of all parts of continental and probably of insular India also, as it is said to be found in the Society and Friendly Isles and the New Hebrides.—*Eng. Cyc.* The recent roots are very long, cylindrical, bent, brached, gorged with acrid milky juice, the dried roots are in broken pieces the thickness of the finger, and 4 or 5 inches long. They are separated from the ligneous part, and consist of a grey or slightly reddish cortical system, composed of parallel longitudinal fibres, and of proper vessels in which particles of resin are observed; inodorous, tasteless at first, subsequently nauseous and acrid. The natives of Bengal use this root as a purgative, rubbing up a slip of the bark with water on a stone and swallowing the emulsion thus formed. A strip six inches in length from a root as thick as the little finger is deemed a sufficient dose. Mr. Gordon, Dr. Glass, and Dr. Wallich, have published several notices of its effects in Carey's edition of Dr. Roxburgh's Fl, Ind. ii. p. 57. Dr. O'Shaughnessy, also subjected its properties to careful clinical experiment, and asserts that the action of the medicine is so extremely uncertain that it does not deserve a place in our Pharmacopæia. —*O'Shaughnessy, page* 504.

(4518) IRIARTEA. A genus of palms peculiar to the forests of South America. I. exorrhiza, Mart. is the *Pashiuba* or *Pasciuba* of Brazil, produces a fruit used as fruit. The Iriartea setigera, Mart is fabricated into blow pipes. The *I. Anticola*, Sp. is the Wax-palm of the Andes. This genus might be introduced into India with advantage.—*Seeman.*

(4519) IRIDACEÆ. This order is remarkable for containing the saffron (*Crocus sativus*) and the *iris*, more than one species of which affords the Orris root of commerce. Their properties are of trivial importance in a medicinal point of view.—*O'Shaughnessy, page* 654.

(4520) IRIS FLORENTINA. FLORENTINE IRIS. A native of Italy and Asia Minor. The roots are the *orris root* of European shops. This article contains volatile acrid resin, astringent matter, gum, extractive, starch, and woody fibre; in full doses it is emetic and purgative. Peas turned from the wood are used in issues to support suppuration. Reduced to powder it is a favorite ingredient in hair and tooth powder. Excellent orris root is procurable in the Calcutta bazars under the name of *Begbanopsha*. Mr. Royle under this head very confidently refers the *putchuk* of commerce to this article. A species of Iris is cultivated in India. Its roots are used in the same manner as those of the Florentine kind.—*O'Shaughnessy, page* 654.

(4521) IRIS XIPHIOIDES. There are the fibrous rooted and tuberous rooted kinds of iris:

species numerous, hybrids, the tuberous rooted are said to be the most difficult to cultivate. though most of the species thrive well in India, they require merely a good rich soil.—*Riddell.*

(4522) IRON.

Heeded, ARAB.	Ferrum. LAT.
Jern, DAN.	Mars, PERS.
Yzer, DUT.	Ahan, POL.
Fer, FR.	Zelazo, PORT.
Eisen, GER.	Ferro RUS.
Loha, GUZ. HIND.	Scheleso, SANS.
Ferro, IT.	*Faulkner.*

Iron is found native, when it is supposed to be generally of meteoric origin ; extensively in combination with Oxygen or Sulphur, as a Salt of various acids, as Carbonate, Sulphate, &c. ; and all these in a more or less pure state, that is, mixed with earths or other metals. It also exists in vegetables, and in the blood of animals. It is extracted from Iron ores. Some of the Oxides, as Magnetic and Specular Iron ore, are heated only with Charcoal, as in Sweden, Elba, and India, when the Carbon combining with the Oxygen, the Iron is set free, and melted. The Carbonate, Iron Pyrites, Clay Iron ore, Red and Brown Hæmatites, and Spathose Iron, are first roasted, and then exposed to a fierce heat in contact with Charcoal, Coke, or small Coal, and a flux, either Lime or Clay, according as the ore is argillaceous or calcareous. These earthy matters become vitrified, and form a slag at the surface, while the heavy particles of Iron, falling down, run out by a hole at the bottom into moulds, and form *Pig* or *Cast Iron*. This is still impure, from the presence of Charcoal, Sulphur, and portions of Silicon and Aluminum. It is again twice fused in the refining and puddling furnaces, and exposed to the influence of a current of air, at a high temperature, when the whole of the Charcoal and Sulphur are burnt out, and the other impurities form a slag at the surface. The metal is taken out, beaten or pressed, and then drawn into bars which form the *Malleable* or *Wrought Iron* of commerce.—*Royle.* Iron Ores, abound in almost every district of India, and the prevailiug ore is the Oxydulous iron, often magnetic, and with polarity ; but specular iron ore, hæmatite, clay iron stone and, sulphuret of Iron, also occur abundantly. In the Malayan Peninsula also, the ores of iron occur in great varieties. The Editor has written largely on these ores, and further information is given in the reports from the geological survey.

(4523) IRON, SULPHATE OF. Sulphate of the Protoxide of Iron.

SYN. Ferrum Vitriolatum.
Sal Martis.
Sulphate de Fer, FR.
Schwefelsaures Eisentxydul, GER.
Eisenvitriol, GER.
Heera kasis, HIND.

Ferri Sulphas.—Green crystals, soluble in water ; does not deposit copper on a piece of polished iron. *Sulphas Ferri.* The Green vitriol. or Heera kasis. The salt is found abundantly by the natural oxidation of the sulphuret of iron, a mineral common especially in coal districts. It occurs in the Indian bazars in large masses of green crystals, and in a state of considerable purity. For Medical use select the greenest and most transparent crystals.—*Beng. Phar. page* 325. Vitriolated Iron, or Green Vitriol, was known to the ancients. It is mentioned in the *Amera Cosha* of the Hindoos (*Hind. Med.* p. 44), and it is used by them, as by the Romans in the time of Pliny, in making Ink. It is found in nature : the Sulphuret, absorbing Oxygen from the atmosphere, is converted into the Sulphate of the Protoxide of Iron ; this is apt to be changed into the red-coloured Sulphate of the Sesquioxide. The Sulphate, being soluble, is found in some mineral waters. It is also made artificially on a large scale for use in the arts by exposing moistened Pyrites to the air, and is called Copperas or Green Vitriol.

(4524) IRON WOOD.

Yserhout, DUT.	Legno di ferro. IT.
Bois de fer, FR.	Lignum ferreum, LAT.
Eisenholz, GER.	Plohierro. SP.

Iron wood is a term applied to a great variety of woods, in consequence of their hardness, and almost every country has an iron-wood of its own.—*Holtz :* The product of an evergreen tree (*Sideroxylon*), remarkable for the hardness and weight of its timber, which sinks in water, receives this name : it is of a reddish cast, and corrodes like iron. The tree grows chiefly in the West India islands, and is likewise very common in South America, and in some parts of Asia.—*Faulkner. Mesua ferrea*, which has received its specific name from the hardness of its wood, is a native of the peninsulas of India and Malacca and of the islands, and perhas M. pedunculata, furnishes part of the timber known under this name. *Metrosideros vera* is called true iron-wood : the Chinese are said to make their rudders and anchors of it, and among the Japanese it is so scarce and valuable, that it is only allowed to be manufactured for the service of their king. The iron-wood of southern China is *Baryxylum rufum ;* of the island of Bourbon, *Stadmannia Sideroxylon*, and of the Cape of Good Hope, *Sideroxylon, milanophleum*, which latter is very hard, close grained, and sinks in water. The Ceylonese also have an Iron-wood tree—and in Tenasserim the term is also applied to the wood of Inga Xylocarpa ; and of a species of Diospyros. The iron-wood of Guiana is *Robinia Panacoco* (of Aublet), that of Jamaica is *Tagara Pterota*, and also *Erythroxylon areolatum*, which is also called red-wood. *Agiphila martinicensis* and *Cocaloba latifolia*, are other West Indian

trees, to the woods of which the name of iron-wood has been applied, *Ostrya virginica*, called American hop horn beam, has wood exceedingly hard and heavy, whence it is generally called iron-wood in America, and in some places lever-wood.—*Holtzappfell. Tredg.*

(4525) ISARMEL, Aristolochia Indica.—*Ben. Ph.* 209.

(4526) ISATIS, a genus of Plants belonging to the natural order *Cruciferæ* and the tribe *Isatideæ*. It has a laterally compressed pouch, 1-celled, 1-seeded, valves keeled, eventually separating.—*Eng. Cyc.*

(4527) ISATIS INDIGOTICA. In China, coloring matter for dyeing blue, is derived from two species of plants, the *Polygonum tinctorium* at the South, and the *tien tsing* or *Isatis indigotica*, cultivated at Shanghai and Chusan. *Williams' Middle Kingdom, vol.* 2, *p.*105. The Shanghae indigo (Isatis indigotica) is largely cultivated in the Ke-wang-meow district, a few miles to the south.

(4528) ISATIS TINCTORIA, Dyers-Woad.

(4529) ISCARASEE WOOD.

Iscarasee kurra, Tel.

(4530) ISINGLASS. Fish Sounds; Fish Maws; Air Bladder. Swim. Brief scientific notices were given of this article of commerce, under the head Air Bladder, Fish-maws, Gelatine, and Ichthyocolla, and allusion was made to this being the source of isinglass: but with the commercial article it is desirable that more extended observations should be furnished. It was long unknown to the European capitalists of the East what substance was meant by that so largely imported into China as Fish-maws, but after much correspondence, to Dr. Royle is due the credit of ascertaining that Fish-maws are Fish Sounds and Isinglass. The late Dr. Malcolmson of Bombay furnished him with some specimens of different sizes of the Bombay Fish-maws. On examination, these proved to be composed of a sac-like membrane, which had been slit open; some were small, thin, and transparent, others three and four inches across in both diameters, something of the shape of short purses with spring clasps, of a light colour, and semi-transparent;—resembling the ordinary qualities of Isinglass, especially some of the Brazilian kinds, in appearance. On submitting these to Mr. Yarrell, he pronounced both kinds to be the sound of a Fish which he thought might perhaps be the same species, but at different ages, and that it was apparently allied to the Gurnards, and it is interesting here to observe, Cuvier mentions that, in India there are species allied to Trigla hirundo (or the sapphirine Gurnard). Fish-maws are therefore Fish sounds, and have long been carried away by the Chinese from the vicinity of Calcutta, at the rate of about a shilling a pound, without any one being apparently aware of that fact. In Bombay also a commerce has long been established in Fish-maws, at about double the price of the former, without its being generally known that it was Isinglass which was thus exported, and Madras shares in the Trade. The Chinese, therefore, obtain from India, what Europe imports from Russia and Brazil, and in this respect exhibit no greater strangeness of taste than Europeans do. For they give only about the same price (£14) which is obtained in the London Market for Isinglass of the same quality, while we give as much as between £60 and £70 for the best kind and between £90 and £100 when we require this for consumption. Dr. Royle's consultation of the official accounts of the export and imports from the three Indian presidencies showed that not less than to the value of nearly forty thousand pounds of shark fins and Fish-maws was exported in one year from Bombay to China, being first imported from a great variety of places and sold at

From	90	to	105	Rs.per maund	in	1836-37
„	92·8	to	95	Ditto.	in	1837-38
„	18	to	25	Ditto.	in	1836-37
„	25	to	35	Ditto.	in	1837-38

and the following quantities and value of shark-fins and fish-maws were imported into and exported from Bombay in the years,

Shark-fins and Fish-maws	1836—37.		1837—38.		
	Cwt.	lbs.	Value Rs.	Cwt.	lbs.	Value Rs.
From the Coasts of Africa, ...	38	—	1,3[illegible]	87	— 66	2,709
Ceylon, ...	5	— 52	[illegible]			
Arabian Gulf, ...	915	— 72	32,775	461	— 84	14,815
Persian Gulf, ...	1,849	— 0	69,086	2,456	— 70	80,721
Malabar and Canara, ...	417	—101	10,874	647	— 96	14,359
Cutch & Scinde, [nate Ports	742	— 91	34,916	0	—133¼	512
Goa, Demaun & Diu Subordi-	203	— 70	15,748	68	— 63	4,981
Panwell and Concan, ...	101	— 93	6,33[illegible]	183	— 6	3,7[illegible]6
Guzerat, ...	15	— 9[illegible]	580	103	— 49	4,437
Imports into Bombay, ...	4,172	— 50	1,64,931	4,356	—103	1,49,529
Exports to China, ...	9,426	— 28	3,92,676	5,088	— 39	2,55,145

Besides these there were Imported into and Exported from Madras.

Shark-fins and Fish-maws.	1837—38.	
	cwt. lbs.	Value. Rs
Imports.—Fort St. George. From Ceylon and Tranquebar, ...	64—0	252
From Ganjam, Vizagapatam, Rajahmundry and along the Coast,.....	105—0	3,814
Exports.—To China and Straits of Malacca.....	1043—0	22,88
From Tanjore to Straits of Malacca,.....	39—0	11,527

In the four years ending 1855—56 the trade of Madras, in these two articles was to the following extent :

EXPORTS.

Fish maws.		Shark fins.	
Quantity.	Value.	Quantity.	Value.
cwt.	Rs.	cwt.	Rs.
1344	19,636	4056	83,158

The Exports being to Bombay, United Kingdom and Malacca Straits. But the greater portion doubtless finds its way to China. The fondness of the Chinese for all gelatinous substances is well known, and has been described by all those who have visited their country and partaken of their banquets. In addition to employing animals and parts of animals which are rejected in other countries as articles of diet, they import various substances which can be valuable only as yielding Gelatine of different degrees of purity. Of these we have examples in Agar-Agar, Tripang, Birds-nests, Sharks-fins, and Fish-maws, among these we may explain that the Agar-Agar, is a species of Fucus or sea weed exported from the islands of the Indian Archipelago as a portion of the cargo of every junk. It forms a gelatinous mass with water to which the Chinese add Sugar and use it as a sweetmeat. *Gracillaria tenax*, —another sea-weed is imported in large quantities into Canton from the Coasts of Fo-Hein and Tchekiang and is supposd to be an ingredient of the Chin-chow glue or Jelly. *Gracillaria lichenoides*, a species of sea-weed, a native of Ceylon, as also of a gelatinous nature, and after being washed in fresh water and pressed to remove the salt and some mucilage is employed as a preserve. This is thought to be the substance which by some is incorrectly considered to be a species of Gelidium and by others the spawn of fish floating on the surface of the sea, made use of by the Salangana or Esculent swallows in constructing their nests which are so highly esteemed by the Chinese : that appears however to be a viscous secretion of the salivary glands of the mouth and stomach of the bird, like what is observed hanging from the bill of the common swallow. The nests, Mr. Crawfurd remarks, both in external appearance and consistence, resemble a fibrous ill-concocted Isinglass. At all events, the best kinds are sold for about £5 18s 1½d per pound, and even as high as 4,200 Spanish Dollars per picul, the last, therefore, are more valuable than their weight in silver. Mr. Crawfurd calculates that not less than 242,400 lbs. of different qualities (white, middling, and black) are yearly imported from the Indian Islands into China. Brandt and Ratzeburg describe the swimming bladder as consisting of three membranes, the outer or peritoneal coat, the middle membranous and muscular one, and the inner, glossy, highly vascular coat, which has a pulpy appearance and is the membrane which forms the best Isinglass. The species of fish which yield the European supplies are the Great Sturgeon, Osseter, Sevruga and Sterlet, also the Silurus Glanis, Barbil, Cyprinus Brama and Carpio and Perca lucioperca, which do not belong to the tribe of sturgeons. In the fisheries of the Caspian and Volga, where the system is most complete and the division of labour the greatest, the Sounds and Roes are extracted immediately the fish are caught and delivered over to the Isinglass and to the Caviare makers. The fresh sounds are first split open and well washed to separate the blood and any adhering extraneous matter (on the Lake Baikal, warm water is used according to Georgi); they are then spread out, and exposed to the air to dry, with the inner silvery white membrane turned upwards. This which is nearly pure Gelatine, is carefully stript off, laid in damp cloths and left in the outer covering, and forcibly kneaded with the hands. It is then taken out of the cloths, dried in the form of Leaf Isinglass, or rolled up and drawn in a Serpentine manner into the form of a heart, horse-shoe, or lyre (long and short staple), between three pegs on a board covered with them ; here they are fixed in their places by wooden skewers. When they are somewhat dried thus, they are hung on lines in the shade till their moisture is entirely dissipated. The oblong pieces sometimes are folden in the form of Book Isinglass. In order to obtain good Isinglass, it is necessary to have well-arranged rooms to dry it in, as at Astrakhan. But it is not alone isinglass which is obtained from Fish-Sounds. There is no doubt, according to Pallas even, that at the lower parts of the Volga, a fine Gelatine is boiled out of the fresh swimming-

bladder, and then poured into all kinds of forms. In Gurief, a fine boiled Fish-glue is prepared, perfectly transparent, having the colour of amber, which is cast into slabs and plates. The Ostiaks also boil their Fish-glue in a kettle. The common Cake Isinglass is formed of the fragments of the other sorts, these are put into a flat metallic pan, with a very little water, and heated just enough to make the parts cohere like a pancake, when it is dried. Parts of the sounds of Silurus Glanis and Barbel are also boiled, but as the glue does not entirely dissolve, the liquid is strained to separate filaments from the Gelatine. Besides these the cartilaginous and tendinous part of several fishes are boiled down to form Fish-glue. Isinglass being prepared from the Swimming-bladder of certain fishes and this being an organ generally though not universally possessed by that class of the animal kingdom, it seems remarkable that it should not be more generally employed for the purpose of yielding so valuable a commercial article. For though Isinglass of the finest quality, and in the largest quantities, is yielded by, it is not confined to, the sturgeon tribe; for even in Russia, the Silurus Glanis, species of Cyprinus, and Barbel yield it and we meet in commerce with Brazilian, New York, and Hudson's Bay Isinglass. The fishes which produce it on the coast of Brazil, have not been ascertained. Camera supposed them to be species of Gadus. Mr. Yarrell informed Dr. Royle that no species of Gadus is caught on the coast of Brazil. The common cod prefers water of a low temperature; though found all the year about Boston, it migrates northward from New York when warm weather begins. The fishes producing Isinglass in Brazil, he further writes, are probably species of the genera Pimelodus and Silurus, or of closely allied genera. The Brazilian Isinglass is imported from Para and Maranham. It is very inferior in quality for domestic purposes to the best imported from Russia, which sells for 12s. per lb. and the other from about 3s. to 3s. 6d. and even as low as 9d. per lb. It is in the form of Pipe, Block, Honeycomb, Cake, and Tongue Isinglass, the last formed of a double swimming-bladder. The specimens shewn to Mr. Yarrell appeared to him to belong to seven different species of Fish. The Isinglass obtained from North America in the form of long ribbons, is produced, according to Dr. Mitchill, by Labrus squeateague, at New York, called weak fish, which is about fifteen inches in length, and above six pounds in weight, forming one of their most abundant fish and furnishing the principal supply for their tables. One author states that its thick silvery swimming bladders are pressed, and another that the sounds of the Hake (Merlucius vulgaris) are also pressed between iron or wooden rollers to form thin Isinglass.—*Royle on Isinglass, pages* 21, 22. The Labrus Squeateague is Otolithus regalis of Cuvier (the Johnius regalis of *Block*), of the tribe Sciænoides. These are allied to the Perches, but have more variety and a more complicated structure in their natatory bladders; almost all are good for eating, and many of superior flavour. To the genus Otolithus also belong some indian fishes, as O. versicolor, Cuv. and O. ruber, Cuv., the peche pierre of Pondicherry, called there "panan," which is fifteen inches long and caught in abundance all the year, being esteemed as food. This genus is closely allied to Sciæna, of which, species, as S. Aquila (maigre of the French, and umbrina of the Romans), &c, are found in the Mediterranean. S. Pama or Bola Pama of Buchanan resembles the "maigres," but has a singular natatory bladder. When twelve or fifteen inches long, it is erroneously called whiting at Calcutta, and furnishes a light and salubrious diet. It is caught in great abundance at the mouths of the Ganges, but never ascends higher than the tide. In New England, the intestine of the common Cod (Morrhua vulgaris) are cut into ribbon Isinglass; in Iceland also the Cod is said to yield Isinglass, so also the Ling (Lota Molva), but Mr. Yarrell informed Dr. Royle that he had no reason to believe that Isinglass is so prepared. At least in the southern parts of England fish being brought alive in well-boats as far as possible, cod and also ling sounds are mostly preserved soft, by salting, and are dressed for table as substitute for fish. Hence we see that Isinglass is not confined to the tribe of Sturgeons, nor to the rivers of Russia, but that it is found in fishes on the warm coast of Brazil and the cold one of Iceland. It is also yielded by some of the great variety and shoals of fishes, on the long extended coasts of Eastern and Southern Asia, and some quantities are imported into Britain. A trade in Isinglass, and in some of its substitutes, has long been established on the coast of India and it has long been imported by the Chinese from Bengal. Indeed on investigating the subject, the discovery was made that Isinglass is exported in much larger quantities and from a much greater variety of places than is generally supposed. So large a quantity as 800 or 900 maunds of the sounds of Fish, that is of Isinglass being annually exported to China from the neighbourhood of Calcutta. The first who appears to have drawn attention to this subject was an anonymous correspondent in 1839, who stated, that the Chinese had long been engaged in a trade with Calcutta in Isinglass. Also that this was afforded by a fish called "sulleah" in Bengal, and that from a half a pound to three-quarters of a pound was obtained from each fish. This information was energetically followed up by Mr. McClelland of the Bengal Medical Service. The curing of fish had been previously suggested by Dr. Cantor of the same service. Mr. McClelland's first paper

was published at Calcutta in June 1839, in the Journal of the Asiatic Society, vol. VIII. p. 203. In this he informs us, that having procured a specimen, from the bazar, of the fish yielding the Isinglass, he was surprised to find it to be a species of Polynemus, or paradise fish, of which several species are known for their excellence as articles of food. Of these he adduces the Mango Fish or tupsee mutchee of the Bengalees (Polynemus Risua, Buch.) as a familiar instance, though this is remarkable as being without a swimming-bladder; while the other species have it large and stout. These occur in the seas of warm climates; five are described by Dr. Buchanan in his Gangetic fishes, but only two are of considerable size, occurring in the estuary of the Hoogly, and probably in those of the Ganges. One of these, with another large species, is also described by Dr. Russell in his work on the fishes of the Madras Coast. That figured in tab. 184 and called maga-booshy is Polynemus uronemus of Cuvier, while the maga-jellee, tab. 183, named P. tetradactylus by Shaw is probably P. Teria of Buchanan. Both, but especially the first, Russell says, are esteemed for the table and called Roeball by the English. Mr. McClelland ascertained that the species affording the Isinglass, is the Polynemus Sele of Buchanan, Sele or Sulea of the Bengalese, described but not figured in his work on the Gangetic fishes (p. 226). Mr. M. has however published in the Journal of the Asiatic Society of Bengal, a figure from Dr. Buchanan's unpublished collection of drawings, which are kept at the East India Company's Botanic Garden at Calcutta. This figure, he states, conveys a good representation of the Sele, about half the size of a specimen, from which he obtained sixty-six grains of Isinglass. Dr. Buchanan describes the Sele as affording a light nourishing food, like most of the fishes which he has called Bola, but as inferior to many of them in flavour. It is common in the estuaries of the Ganges, and is often found weighing from twenty to twenty-four pounds; and may perhaps be the Emoi of Otaheiti, the Polynemus lineatus of Lacepede, the P. plebeius of Broussonet. This, according to Block, is by the English called king-fish, and is the Kala mine, *Tam.* of John, from Tranquebar, and abundant in the Kistnah and Godavery. Buchanan further states, that the Sele has a stroug resemblance to the above named "maga,booshee" of Dr. Russell. As the anonymous author above referred to, stated that from half a pound to three quarters of a pound may be obtained from each fish. Mr. McClelland supposed either that P. Sele attains a much larger size than twenty-four pounds, the limit given to it by Buchanan, or that Isinglass is also afforded by a far larger species, namely, P. tetradactylus, Telia, or teriya bhangan. This, as we have seen, is identical with the "maga-jellee" of the Coromandel Coast, and which Buchanan often saw six feet long in the Calcutta bazar, and was informed, it sometimes equalled 320 pounds avoirdupois in weight. It is considered by the natives as a wholesome diet although seldom used by Europeans. Mr. McClelland says he has frequently seen them of a uniform size, that must have weighed from fifty to a hundred pounds at least, loading whole cavalcades of carts on their way to the Calcutta bazar during the cold season. Both the Sele and the "teria bhangan" must consequently be very common there from November to March. *P. Sele* is supposed to be a variety of *P. lineatus*, which is said to be common on all the shores to the eastward; but if so, Mr. M. says, it seems strange that the Chinese should send for it to the Hoogly. The same might, however, be said of the Cod, which, though caught in abundance on the coasts of Great Britain, is also diligently sought for on the banks of Newfoundland. He also inquires whether Polynemus Emoi and P. plebeius, supposed by Buchanan to correspond with his Sele, contain the same valuable substance, and whether either of Russell's species, the above named maga-booshee and maga-jellee (*Indian fishes*, 183-184), yield it.—*Royle on Isinglass, passim.* It will have been seen that Isinglass is the air-bag, or swimming-bladder, sometimes called the sound, of various fish, chiefly of the sturgeon tribe, and belonging to the genus Acipenser. This bag is a membrane filled with air, situated near the spine, above the centre of gravity. In most fish it communicates with the æsophagus, or stomach by a duct, which is known as the ductus pneumaticus, in others the duct is imperforate; occasionally there are two sacs, one anterior to the other, and communicating by a short tube. The air-bag is made up of an external or peritoneal covering a middle fibrous, and in some cases muscular coat, and an internal, highly vascular membrane. This is called also the Air Bag, Swim, or Sound. It is a peculiar organ with which the great majority of fishes are provided, and by which they are enabled to adapt the specific gravity of their bodies to the various pressures of the superincumbent water at different depths, It is composed of a lengthened sac, sometimes simple, as in the common perch, sometimes divided into two or more compartments, by a lateral or transverse ligature, as in the trout and salmon, and, at other times furnished with appendices, more or less numerous according to the particular species. In all cases, it is composed of a thick internal coat of a fibrous texture, and of a very thin external coat; the whole being enveloped in the general covering of the intestines. Although it does not appear that the air-bladder is connected with the function of respiration in fishes, it occupies the position, and has the same relations, as the lungs in reptiles. It is in fact, the homologue of these organs. Fishermen are well acquainted with the nature

and functions of the air-bladder. They are accustomed to perforate this vessel with a fine needle in cod and other species which require to be brought fresh to market, sometimes from a very great distance. By this operation, the confined air is allowed to escape, and the fish constrained to remain quiet at the bottom of their well-boats, where they live for a very considerable period. The Cod sounds, brought into Britain in great quantities from Newfoundland, are the salted air-bladders of these fishes. They are also largely imported into England from the East Coast of Scotland. The Iceland fishermen, as well as those of America, prepare isiaglass of a very excellent quality from cod-sounds, though they are not acquainted with the method of clarifying it, which the Russians practise in preparing isinglass from the sound of the sturgeon — *Eng. Cyc. p.* 103. Russian Isinglass is prepared from the sounds of the Sturgeon *Accipenser sturio*, found in the Caspian and Black Seas and their tributary rivers. In America, from the *Labrus squeteague*, the intestines of the cod, *Morrhua vulgaris:* and in Calcutta, from the sounds of the Polynemus Sela, the *Sulea* of Bengal.—*O'Shaughnessy, page* 685. The sounds of two Madras fish are so employed. The following are the principal species of fish from which Russian isinglass is derived—Acipenser Huso or the Beluga, A. Gouldenstadtii or the Osseter, A. Ruthenus or the sterlet, A. stellatus or the Sewruga Silurus Glanis and Ciprinus carpio. In addition to the above isinglass is obtained in different parts of the world from several other kinds of fish. In New York from the Labrus squeteague of Mitchel. In New England it is procured from the intestines of Morhua vulgaris or the common cod. In the Brazils it is obtained from a large fish, probably a species of Silurus, and in Iceland from the cod and Lota Moloa or Ling. *Isinglass, Fish Maws, Fish-sonds, or Air-Bladders.* (*Palogpong ikan* or *ari ari ikan* of the Malays, *loo-pa* of the Chinese) appear to have formed an article of exportation from the islands of the Indian Archipelago as early as they became visited by the Chinese. When these people commenced to settle in the Straits, they not only there collected fishmaws but also from distant localities. Bombay, Ceylon, Madras, Bengal, Tenasserim and most of the Malayan Islands contribute to the annual supply, which is bought up by Chinese dealers at Penang, Malacca, and Singapore. By them the Maws are exported to China. The fact was noted by Mr. Crawfurd, but that the Fish maws are isinglass, appears to have been the discovery of an anonymous correspondent in Parbury's *Oriental Herald* for January 1839. The personal exertions of Mr. McClelland have been mainly instrumental in adding isinglass to the articles of exportation from India to the European Markets. Since 1842, Mr. W. T. Lewis, Assistant Resident Counsellor of Pinang, has made some very successful attempts to improve the production of isinglass in Prince of Wales Island. But European Merchants there appear unwilling to engage in this novel branch of commerce, as the supply from want of proper care is uncertain, and procurable but in comparatively small quantities. These, however, are no objections to the Chinese dealers, as they are sure of a profitable and quick return of their outlay. The fishes from which isinglass is obtained at Pinang are,

Lates keptadactylus, (*Ikan siyakup.*)
Polynemus indicus, (*Ikan kurow.*)
Otolithus biauritus, (*Ikan salampae.*)
Otolithus ruber, (*Jarang gigi.*)
Otolithus argenteus, (*Jarang gigi.*)
Otolithus maculatus, (*Jarang gigi.*)
Johnius diacanthus, (*Ikan tambareh.*)
Lobotes erate, (*Ikan batu.*)
Arius truncatus, (*Ikun saludu.*)
Arius arius, (*Ikun saludu.*)
Arius militaris, (*Ikan saludu.*)

The total Quantities and value of Fish-maws imported into and exported from Prince of Wales Island, from 1832 to 1842.

IMPORT.			EXPORT.		
1832—33 to 1841—42	Quantity in Pikuls.	Value in Dollars.	1832—33 to 1841—42	Quantity in Pikuls.	Value in Dollars.
Total,...	1,323	50,172	Total,...	1,939	73,842

The fishes of Eastern and Southern Asia, from which Isinglass is prepared have been described at length under the head of Fish-Sounds; and it is here necessary merely to mention that on the Malabar Coast, excellent Isinglass is obtained from two species of Otolithus. One, perhaps the *O. biauritus*, Cantor, is named in Malayalim "*Sille korra*," it grows to a large size and is highly prized for the Isinglass it yields; the *O. ruber*, also yields good Isinglass. Mr. Mason also describes the Corvinus coitor, or Indian Whiting, and the Polynemus sele as yielding this substance in Tenasserim. He says, of Indian Whiting, there are two or three species of fish common in Calcutta that are called whiting, from their resemblance, both in form and flavour, to the European fish of that name. One species is frequently seen in the Maulmain bazars, and besides being a good fish for the table, its air-bladder makes excellent isinglass. He thinks he has observed more species than one sold under the same native name, but the specimen he sent Mr. Blyth he said was *Corvinus coitor.—Mason.*

King-fish.—Polynemus sele, Buch; *plebeius*, Brouss; *lineatus*, Lacep; *gelatinosus*, McClell; *ka-tha* (*the young,*) O'Riley; *lukwah* (*Arracan,*)

Bogle. *Emoy*, Otaheite A few years ago the attention of the Commissioners of the Tenasserim Provinces and Arracan was drawn to the fish that produce isinglass; and the result was, the discovery on their shores of the species of Indian whiting noticed above, and *Polynemus sele*, a fish that is found from Calcutta to Otaheite. The polynemus produces isinglass of the best quality, and Mr. O'Riley estimated that two thousand pounds might be obtained annually off Amherst alone. None of their merchants have yet entered into the isinglass speculation, but the sounds are a constant article of traffic among the Chinese. Mr. Blundell said the largest sounds were exported from Rangoon, and that they sell here at about half a rupee a pound; and Major Bogle wrote, that about ten thousand of the fish, large and small, were taken annually in Arracan, and that the sounds sold there for about a third of a rupee per pound to the Chinese, who exported them to Penang, where they are said to bring more than a rupee a pound. The specimens that have been prepared in India for the European market, are "complained of," says Dr. M'Clelland, "as being too thick, if intended to come into competition with the superior varieties of Russian isinglass. The first quantities sent from India brought only 1*s.* 7*d.*, others have been sold for 3*s.*, and a few samples have been valued at 4*s.* per pound."—*Mason.* Isinglass has long been exported from India to various countries. According to Mr. Jerdon and Dr. Cantor, the following are the more important of the fishes, which produce Isinglass on the coasts of Eastern and Southern Asia.

(4531) *Arius arius.* (Buchanan Humilton,)
SYN. Pimelodus arius (Buch. Ham.)
Ikan Saladu or Surdudu, Malay,

Total length 1 foot; 10 inch. This fish Inhabits Sea and estuaries of Penang: Malayan Peninsula, Singapore, Pondicherry and Gangetic estuaries. At Penang small individuals of this species are very numerous, at all seasons. They form an article of food, and contribute more than any other, of the Siluroidœ, to the exportation of Isinglass.—*Cantor* 1241.

(4532) *Arius militaris.* (Linne).
SYN. Silurus militaris, Linne.
Osteo-geneiosus, Bleeker.

Length 1 foot, 6 inch. Inhabits the Sea and estuaries of the Malayan peninsula, and of its islands, of Malabar, the Ganges and Irawaddy: also Coromandel. Their air vessels are preserved.

(4533) *Arius truncatus*, Cuv. and Val, Length, 11⅛ inch inhabits sea and estuaries of Penang, Malayan Peninsula. Its air vessel is small but very thick; transversely divided into two compartments. The fish is held in esteem by the natives, but at Penang it occurs so rarely that its air-vessel does not contribute much to the general stock of Isinglass.—*Cantor, p.* 1240.

(4534) *Capoeta macrolepidata*, Kuhl. Length 11 Inches. Inhabits Penang, Java and Tenasserim, (fresh water). The air-vessel is very large, thin, white, consisting of two elongated oval portions, of which the anterior is truncated in front.—*Cantor, p.* 1250.

(4535) *Corvinus coitor*, Blyth. Inhabits the estuaries of the Ganges and Irawaddy. Its air-bladder makes excellent Isinglass.—*Mason, page* 303.

(4536) *Corvinus chaptis*, Balo chaptis. The Bola. Inhabits the Malay coast: furnishes isinglass.—*Mason, p.* 303.

(4537) *Johnius maculatus*, Bloch, Schneider, var?

SYN. Sari Kulla, TAM., Russell.
Corvina maculata, Cuv. and Val.

Total inches? Inhabits Sea of Penang. The form of its air vessel resembles that of Johnius belengeri.—*Cantor, p.* 1051.

(4238) *Johnius Dussumieri*, Cuv. and Val.

SYN. Corvina dussumieri, Cuv. and Val.

The total length of this fish is 6⅘ inches. It inhabits the Sea of Penang, the Malayan Peninsula, Singapore and Malabar. The length of the air vessel is about ¼ the total length. The isinglass is reputed good, but owing to the small size of the fish little is procurable.—*Cantor, p.* 1047.

(4539) *Johnius diacanthus*, (Lacepede).

SYN. Lutjanus diacant'us, Lacep.
Johnius catalens, Cuv.
Sciæna maculata, Cuv. and Val.
Corvina catulea, Belanger and Bleeker.
Nalla Katchelee, Russell. Katchelee, Russell.
Corvina nalla Katchelee, Richardson.
Ikan Tambareh, Malay.

This fish grows to 2 feet 9 inches. It inhabits the sea of Penang, Malayan Peninsula, Singapore, Malabar, Coromandel, Bay of Bengal, Gangetic estuaries, Tenasserim, Canton, China seas, Madura and Java. The *air*-vessel, ⅓d of the length of the fish, is of a broad lanceolate shape tapering behind into a very elongated point. This fish is not only valuable as an article of food, but also on account of the quantity and quality of its isinglass, which sells in the China market at from 40 to 45 Spanish dollars per pecul.—*Cantor, page* 1050.

(4540) *Lates heptadactylus*, (Lacepede.)

SYN. Perca maxima, Sonnerat.
Holocentre heptadactyle. Lacepede.
Pandoo menoo, Russell.
Coius vacti. Ham.
Lates nobilis, Cuv. and Val: Richardson and Bleckeer.
Ikyan Siyakup, Malay.

The total length is? This fish inhabits the sea and estuaries of Penang, Malayan Peninsula

and Singapore. Jerdon also describes the L. nobilis at Madras. It yields isinglass, of which however in the straits of Malacca, but little is collected, partly on account of the comparative scarcity of the fish and partly owing to the thinness of the air-vessel. That of a fish when dried, weighs upwards of one ounce. At Penang this kind sells at the rate of 25 to 30 dollars per pecul.—*Cantor.*

(4541) *Lobotes erate*, Cuv. and Val.

Syn. L. Farkarii, Cuv. and Val.
Ikan batu, or Ikan pichat priek, Malay.

Total length 2 feet 5 inches. It inhabits Sea of Penang, Malayan Peninsula, Singapore, Java, Madura, Malabar, Ceylon, Bay of Bengal, and estuaries of the Ganges. The air-vessel is very large, about ⅓ of the total length, silvery white and of a lanceolate shape. It is excessively thin and so firmly adhering to the back, that but a small part can be removed. The isinglass is by the Chinese dealers considered to be of good quality, but the small quantity procurable renders the fish less valuable in this respect,--*Cantor*, *p.* 1061.

(4542) *Mugil Cephalotus*, Cuv. and Val.

Syn. Mugil our, Forskal.
Jumpul, Malay.
M. Cephalus, Russell.
Boutali, Tam, Russell.
Sole bhauggan. Ham.

Total length, 2 feet. It inhabits, Penang, Malayan peninsula, Singapore, Macao, Lancavy, Chusan, Madura, Coromandel, Bay of Bengal; Gangetic Estuaries, Malabar. The air-vessel is large, elongated, its parietes very thin, pearl-coloured.—*Cantor*, p. 1076.

(4543) *Otolithus*, Sp., perhaps *O. biauritus of Cantor.*

Syn. Sille-kora, Malayalum.

This fish grows to a large size. It is found on the Malabar coast, and highly prized for the isinglass it yields.—*Jerdon.*

(4544) *Otolithus biauritus*, Cantor. Total length: 3 feet. Inhabits Sea of Penang, Malayan Peninsula, Singapore, Lancavy, Tenasserim Provinces, and according to Jerdon, the Malabar coast, where it is called Sille-kora, in Malayalim. The air-vessel is nearly one half of the total length, and in shape might be compared with an elongated antique urn with two handles. From the anterior part of each of the latter proceed five branches, four of which give off smaller ones to each side, and the fifth is tortuous and smaller than the rest. It yields a large quantity of isinglass, which in the Chinese market is considered to be of the best quality, and fetches 40 to 50 Spanish dollars per pecul.—*Cantor*, *p.* 1041.

(4545) *Otolithus ruber*, Bloch and Schneider.

Syn. Jaran-gigi, Malay.

The total length of this fish is 2 feet, 6 inches. It inhabits the Sea and Estuaries of Penang, the Malayan Peninsula, Singapore, Coromandel and Malabar. The air-vessel is large, flattened, broad lanceolate, terminating behind in a single point. The isinglass is considered very good and sells in the Chinese market from 40 to 45 Spanish dollars per pecul.—*Cantor*, *p.* 1043.

(4546) *Otolithus maculatus*, Kuhl. and Van Hasselt.

Syn. Jaran gigi, Malay.

The total length of this fish is 2 feet 9 inches. It inhabits the Sea and Estuaries of Penang, the Malayan Peninsula, Singapore and Batavia. It is highly valued for the sake of its air-vessel, which yields a considerable quantity of the best kind of isinglass.—*Cantor*, *p* 1045.

(4547) *Otolithus versicolor*, Cuv. and Val. The total length of this fish is only 6½ inch. It inhabits the Sea of Penang. Its air-vessel is ¼ of the total length.—*Cantor*, *p* 1046. *Otolithus versicolor.* Cuv. and Valen: Russell, 109. Panna *Tam.* This fish is one foot long and very common at Madras.—*Jerdon.*

(4548) *Pempheris molucca*, Cuv. Length 3⅜ inch. Inhabits sea of Penang, Moluccas, Batavia and Japan. Its air-vessel is large and thick. —*Cantor*, 1158.

(4549) *Pempheris molucca*, Cuv. This fish grows to 3⅜ inches. It inhabits the Sea of Penang, the Moluccas, Batavia and Japan. Its air-vessel is large and thick.—*Cantor*, *p.* 1158.

(4550) *Platax arthriticus.* Cuv. and Val.

Syn. Ecan bonna, Bell.
Chœtodon arthriticus, Cuv. and Val.

The total length of this fish is 1 foot, 7 inches. It inhabits the Sea of Penang, Sumatra, Java and Singapore. The flavour is excellent, but the large air-vessel is too thin, and yields too little isinglass to become of value.—*Cantor.* *page* 1152.

(4551) *Polynemus.* The species of this genus, furnish a considerable portion of the isinglass of Southern and Eastern Asia.

(4552) *Polynemus hepiadactylus.* Total length 4⅜ inches. Inhabits Penang, Batavia, Cheribon and Samarang.—*Cantor.*

(4523) *Polynemus indicus*, Shaw.

Roe-ball, Eng. | Ikan kurow, Mala.
Walan kala, Tam. | King Fish, Eng.

Syn. P. Sele, Buchanan.
P. uronemus, Cuv. and Val.
P. ploteus, McClelland.
P. lineatus, McClelland.
P. gelatinosus, McClelland.
Ka-tha, the young, Burmese; Lukwah, Arracan.

The total length of this fish is 3 feet. It inhabits the Sea of Penang, Singapore, Malayan peninsula, Surabaya; Estuaries of the Ganges;

Vizagapatam; Madras and Pondicherry. The structure of the air-vessel of this species is the most striking character by which it may at once be distinguished from P. plebius. Its membrane is silvery thick; the general form oval. It occupies the whole length of the stomach terminating behind in a very sharp point, which penetrates the thick of the tail over the first interspinal of the anal. At Penang single individuals occur at all seasons: but numbers are taken from June to August. The weight is commonly from 4 to 6 lb. seldom exceeding 20. The air-vessel of a good sized fish, when dried and ready for the market in China, weighs upwards of 2 oz., is considered very good isinglass, and fetches 25 to 30 dollars per pecul. The fish itself is valued as an article of food, though less so than P. tetradactylus.—*Cantor*, Mr. O'Riley estimated that 2000 lbs. of isinglass from this fish, might be obtained annually off Amherst alone.—*Mason*, *p.* 304. Mr. Blundell said that the largest sounds were exported from Rangoon, and that they sell there at about half a rupee a pound. Major Bogle wrote that about 10,000 of the fish, large and small, were taken annually in Arracan and that the sounds sold there for about a third of a rupee per pound to the Chinese, who exported them to Penang where they are said to bring more than a rupee a pound.

(4554) *Polynemus plebius*, Broussonet: Linne Bloch; Shaw; Cuv. and Val.

Roe-ball, Eng. | Pole kala, Tam.
Syn. P. lineatus, Lacepede.
P. niloticus, Shaw.
P. commersonii, Shaw.
Bynni, Bruce.

This fish attains to 4 feet as its full size. It inhabits, Coromandel coast, Otaheite, Isle of France and Isle of Tanna. Its value as a fish yielding isinglass requires to be ascertained.—*Cantor.*

(4555) *Polynemus sextarius*, Bloch-Schneider. This fish is only four inches long. It inhabits Penang, Batavia, Tranquebar and Coromandel. Its air-vessel is minute, being of the shape and size of a grain of oats.—*Cantor.*

(4556) *Polynemus hexanemus* Cuv. and Val. 4 inches long. Inhabits Penang, Batavia, Samarang and Pasuruan.—*Cantor.*

(4557) *Polynemus tetradactylus*, Shaw.

Roe-ball, Eng. | Yerra kala, Tam.
Syn. Polynemus teria. Gray.
Triglia asiatica, Linne.
P. salliah Cantor.
P. quadrifilis, Cantor.
Maga jelle, Russell.

Inhabits Penang, Singapore, Malayan Peninsula, Lancavy, Bay of Bengal, Gangetic estuaries; Australia; China: Bantam; Batavia; Tjilatjap; Samarang; Surabaya: Bangkallang. This species has no air-vessel.

(4558) *Pristipoma Guoraca*, Cuv. and Val.

Syn. Perca grunniens, Forster.
Anthias grunniens, Bloch-Schneider.
Guoraka, Russell.

This fish is one foot long. It inhabits the Isle of Tanna, Batavia, Coromandel and Mahe (fresh water). Its air-vessel is very thin, from which its isinglass is of little value.—*Cantor*, *p.* 1056.

(4559) *Umbrina Russelli*, Cuv. and Val. Richardson.

Syn. Qualar Katchelee, Tam: Russell.
Ikan gulama, Malay.

Total length 6 inches to one foot? Inhabits Sea of Penang, Malayan Peninsula, Singapore, Vizagapatam; Indian and China Seas. Its isinglass is considered of good quality.—*Cantor.* Good Isinglass is generally described as being one of the purest forms of Gelatine we are acquainted with, it consists, in fact, of little else besides, and accordingly presents very nearly the characters of that substance. The properties of pure Isinglass or Gelatine are briefly the following. It is transparent and colourless or nearly so, inodorous, tasteless, and of a hard or horny consistence. It is but little hygrometric, remaining tolerably dry in ordinary conditions of the atmosphere. In cold water, it gradually softens and swells up; in hot water, it easily dissolves, and forms a clear solution, which if it contain as much as a $\frac{1}{100}$th part of its weight of Gelatine, has the property of gelatinizing or assuming the form of a soft tremulous solid as it cools. Dry Gelatine is a permanent and unchangeable substance, but in solution it is very liable to undergo decomposition becoming mouldy and rapidly putrifying when exposed to the air it has been observed that the ordinary and more impure forms of Gelatine are more liable to undergo this change than the pure substance: the presence of minute quantites af acids, alkalies and other impurities greatly accelerating its decomposition. All Isinglass contains small quantities of Albumen, saline and earthy matter, and a peculiar substance called Ozmazome, the better sorts containing less, and the inferior more of those impurities. The Bengal Isinglass, however, has been found to consist of Gelatine, Albumen, a small portion of saline and earthy substance Ozmazome, and a minute trace of an odorous oil. In the Indian Isinglass, it is probable that its defects are in a great measure to be attributed to a want of sufficient care in its preparation, and it is evident that good Isinglass cannot be made without considerable attention is paid during the processes of washing, beating, scraping, and drying; all of which have a very important influence on the goodness of the finished Isinglass. The imperfect solubility of some, and more especially the thick pieces, is occasioned by the presence of a considerable quantity of Albumen or insoluble

membranous matter having most of the properties of albumen which is not only itself insoluble, but in addition renders much of the Gelatine, with which it is associated, likewise insoluble. It is more than probable that the greater part of this albuminous substance might be readily removed by sufficiently scraping the Isinglass during its preparation. Attention should also be directed to the process of drying, as, if not properly dried, it might possibly undergo a slight change or decomposition, and become partially converted into a more insoluble form of Gelatine. A more important objection is the smell which however may likewise to some extent be traced to the preparation. It is probable that by increased care in cleaning and drying by exposure to air, some of those defects may be removed especially as we shall observe in comparing the two processes, that much greater care is bestowed on the preparation in Russia than in India. Boiling with fresh made charcoal would probably have the effect of depriving inferior Isinglass of some of the smell and colouring matter when required for the purposes of a jelly. The Isinglass cut into threads is unsuitable for the English market, notwithstanding that Isinglass for retail is cut into fine threads, as more convenient for general use, and for making jellies and soups, in consequence of the extensive surface which is exposed rendering it more easily and quickly soluble. But there is a great prejudice in the wholesale market to buying things in a cut or powdered state in consequence of the innumerable methods adopted for falsifying and adulterating almost every drug. Machinery is used in London for cutting the Isinglass into threads of any degree of fineness, and as it is inpracticable at present to rival this in India, besides having to contend against prejudice, if sent in this state, it is preferable, and will be cheaper to prepare the article and send it as sheet Isinglass, that is, the form of the slit sounds themselves, or their purest membrane washed, cleaned, and dried in the best manner. The Indian Isinglass, as at present prepared, is complained of as too thick if intended to come into competition with the superior varieties of Russian Isinglass. Some of it may, without difficulty, be rendered thinner, for even in the dried state, layers of membrane which display a fibrous structure may be stripped off, and which no doubt contain the greater portion of the insoluble Albumen. It might also be made thinner by beating, or pressing between iron rollers or marble slabs, as is done with American and some kinds of Brazilian Isinglass. The extra labor which this would require might be profitably saved, by not tearing it into fibres, in which state it is disapproved of in the market; but it might still be cut or rasped into a state fit for domestic use. The refuse should be turned to account; the soluble parts of the sounds, separated from the insoluble and poured out into thin plates and dried on nets, as is done with some of the Gelatine of commerce. In order to ascertain the value of the article (merely stripped of all impurities calculated to injure its quantity without any regard to appearance) a considerable quantity was sent to England by Dr. McClelland. From the account received of the sale, it appears that this Isinglass realized only 1*s.* 7*d.* per lb., which was considerably under its prime cost. Forty-four maunds and ten seers of Fish Sounds having been bought for forty rupees a maund, required an expense of 100 rupees for cleaning, after purchase from the fishermen, thus costing altogether about 1*s.* 7*d.* per lb. This quantity, or 2,285 lbs., at 1*s.* 7*d.* per lb., realized £176. 18*s.* 8*d*; but the charges in India and in England, consisting of packing, demurrage, freight, insurance, shipping charges export and import duties, warehouse, brokerage, commission, interest &c., were so heavy that the whole did not realize quite one-third of the outlay. One of the cut samples had been bleached, but was of no more value than the one unbleached. Though the first quantities from India brought only 1*s.* 7*d.* others have been sold for 3*s.*, and a few samples have been valued at 4*s.* per lb. Besides this opening for an extensive sale in the European market, even in the present state, we know there is always a constant demand in China for the Isinglass of Bengal. This will no doubt afford sufficient encouragement to persevere in the extension and improvement of this newly established and highly promising article of the export trade of India to Europe. The East Indian will be only available for brewers' use, and then it must be sweeter and of better flavour than the present samples. The Brazil is the description taken by brewers, and is worth 2s. 6d. to 3s. 6d. per lb., but is quite free from the objectionable smell, as is also the Samovy, which is of nearly the same value, and applied to similar purposes. A parcel of East Indian in sheet was sold at public sale in November 1850 at 2s. 6d. per lb., in bond, but it was subsequently supposed it would now bring a higher price. R.W. Barchard, Esq., stated that when the Bengal Isinglass was compared with an equal quantity of Brazilian Isinglass in a brewing establishment where the latter was used, it was found that the Bengal was nearly all dissolved in the usual menstrum (sour beer) some time before the Brazilian. The Bengal Isinglass appeared also to make a much finer and stronger jelly than the other with the advantage of dissolving in about half the time and without unpleasant smell. The inner membrane also of the sturgeon yields the best Isinglass, while in the sele it seems to be rejected. This would account for the more fibrous nature of the Bengal Isinglass, though it does not follow, that in the Sele, the innermost is the best. A decided improvement would be effected if the Isinglass were prepared

as soon as possible after the fish is caught. The Sound should be extracted, split, and more carefully washed (perhaps with lime-water) than the native fishermen are likely to practise, if left to themselves, besides being freely exposed to the air. Some of the Isinglass of commerce has the defect of a fishy smell, as well as of being in part insoluble, while other kinds are made more saleable by the assistance of pressure, and more soluble by the aid of acetic acid. The only legitimate method, however, is to prepare it from the thinner and more gelatinous, and if possible from the inner membrane, as in the Sturgeon. The Isinglass of commerce consists of the sounds simply dried and of a well prepared inner membrane. The Brazilian is composed of the former, and with it the Indian Isinglass is at present able to contend. As both are now only applicable to the purposes of fining the object should be to prepare the Indian of such quality, that it might be applied to all the purposes of the best Isinglass, and thus be able to command the higher, if not the highest prices. Isinglass is brought to market in different forms, sometimes in that of simple plates, at other times rolled up in different shapes or cut into fine threads. When of good quality Isinglass is of a whitish colour, thin and semi-transparent but tough and flexible, destitute of taste as well as smell. Isinglass being mild and unirritating in nature and at the same time nutritious is much employed as an article of diet for the sick and convalescent, and the fine shreds into which it is cut and kept in shops give great facilities for making a jelly in the shortest possible time. This can be made as palatable and nourishing as any by the addition of sugar and milk acids or spice; about one-third or half an ounce is sufficient for a pint of water. It may also be taken in the form of a soup with the addition of salt, spices and sweet herbs, or it may be employed medicinally as an emollient and demulcent either externally or internally. The best kinds of Isinglass are alone employed in articles of diet and for the best confectionary, being added in small quantities to other, especially vegetable jellies, to give them a tremulous appearance. But gelatine is now frequently substituted.—*Royle on Isinglass, p.* 11. Isinglass is also employed in making court-plaster, which in France is called Sparadrap d'Angleterre; it is a thin coating of Isinglass with a little tincture of benzoin spread on black sarcenet. It is also employed for giving a lustre to some kinds of woven fabric; but it is more extensively used for clarifying different liquors such as wine, beer, and coffee than for any other purpose. The inferior kind called cake Isinglass being brownish coloured and having an unpleasant odour is only employed in the arts and for the purposes of glue. The great consumption of Isinglass, necessarily however of the inferior kinds, is chiefly by the brewer in the process of fining. This he effects by the use of Isinglass which he dissolves in sour beer to the consistence of thick mucilage. A little of the solution being added to the liquor to be clarified causes the subsidence of all the suspended matter in the course of a few hours when the liquor remains perfectly transparent. The sounds of cod fish are said to be employed for the same purpose, though the principal import into England is in a salted state for food.—*Royle, p.* 12. Isinglass is the purest form of commercial gelatine. The best is prepared from the air bladders and sounds of three or four species of sturgeon, inhabiting the Black and Caspian seas and their tributary streams. These tissues are cleansed, dried and scraped, forming *leaf isinglass*; or they are twisted into various forms, and called *long* and *short-staple*: or folded into packages called book isinglass. In Russia, from whence the best isinglass is obtained, the swimming bladders of the fish are first placed in hot water, carefully deprived of adhering blood, cut open longitudinally and exposed to the air, with the inner, delicate, silvery membrane upwards. When dried, this fine membrane, is removed by beating and rubbing and the swimming bladder is then made into different forms, and as cut by machinery into the delicate filaments in which it is usually sold. It is a colourless inodorous substance perfectly soluble in hot water and largely consumed as an article of food. It forms a very transparent jelly, and indispensable in the preparation of blanc mange, ices, creams, and other delicacies for dessert. Inferior isinglass answers for fining beer. But for domestic use, the purest and whitest is required, entirely free from unpleasant odour and dissolving readily and completely in warm water. Isinglass has long been made in India, and exported to China, but much of it has an unpleasant, fishy odour, which renders it unfit for culinary purposes. The Caspian and Aral seas yield the various kinds of the genus Acipenser in great abundance: they are also to be found in the waters several hundred miles beyond Astrakhan in the Volga, Yik, Don and even in the rivers as far as Siberia. The fisheries to the extent of three bazens or twenty one feet depth of water belong to the proprietors of the coast. The Hon. Captain Keppel in his "Travels" describes one merchant as holding thirty fisheries, for one only of which at Karmaziack he paid an annual rental of 450,000 roubles.

Method of Preparation. The fish, are taken from the boats with instruments somewhat resembling boat hooks and laid in a row. The head of each fish is then split in two and the caviare and air bladder immediately separated. The latter is at once slit open and placed in cold water. After a short time they are cleaned, divested of a certain outside skin or membrane which envelopes the sounds, nailed to

a board and exposed to the sun to dry. This preparation however has reference only to leaf isinglass. That known as short staple, long staple and book isinglass, has each its distinctive method of preparation. Short staple is formed of a thin Astrakhan isinglass, which is rolled to something under the thickness of a finger or cord and the length varying according to the intended size of the staple. A thin membrane is generally selected for the centre of the roll round which the rest is folded, about half an inch of each extremity being mostly turned inwards ; the two ends of the roll are then drawn together and pinned with a small peg. The middle of the roll being pressed downwards the staple assumes a heart shape and without further preparation it is left to dry. Samovey short staple prepared from an inferior isinglass is likewise imported : indeed this description is received in the three forms of staple leaf and book. The manufacture of long staple varies a little from that just described, the operator lengthens the staple at will by interfolding the ends of the pieces with the portion ready for twisting. The required dimensions being thus attained, the ends are fastened together in the same manner, but it is afterwards subjected to a heavier pressure from the middle ; then in order to preserve the shape of the three obtuse angles consequently formed, a cane or stick about a quarter of an inch in diameter is fastened in each angle with small wooden pegs at each extremity to keep them in position. When sufficiently dried to retain their form, the pegs &c., are removed and on the drying being completed the pieces are colligated in rows by the passing of a string through the peg-holes : this is done for the convenience of package and exportation. The isinglass known as book is of an inferior quality and requires far less preparation. The larger bladders when cut open, cleaned and partly dried, are merely folded up square in the same manner in which book-folding is conducted, a resemblance that points out the origin of its name. It may be asked why all this evidently useless system of preparation is resorted to when much expensive trouble might be dispensed with and the article exported of equal value in its natural and unprepared state. It may be inferred that the system of twisting isinglass into staple or folding it into books was originally practised to disguise the article and keep other nations in the dark as to the source of isinglass. There is however a kind of isinglass exported from St. Petersburg which receives little or no preparation. This description is taken from the silurus glanis and the Ciprinus carpis. These produce the kind of isinglass called purse. It consists of the sounds or swimming bladders dried just as taken from the fish, being neither cut open nor folded but merely dried and collected together by a string passed through the upper part of each bladder. It is gathered together by certain collectors and by them brought to the Irbites fair held in January and February in each year. It is there bought up by the various dealers, cleaned and carried to St. Petersburgh where it arrives during the months of May and July. The entire quantity of Isinglass shipped during the seasons of the past seven years was as follow, viz.

In 1844	the total	amount	shipped	was 5300 poods.
1845	„	„	„	4200 „
1846	„	„	„	5100 „
1847	„	„	„	3600 „
1848	„	„	„	3200 „
1849	„	„	„	4900 „
1850	„	„	„	5100 „

By the above figures it will be seen that the average annual exportation of isinglass from the Russian capital, during the period mentioned, was 4500 poods. The Russian pood being equal to thirty-six English pounds, it follows that 152,000 pounds of isinglass, on the average, are shipped every season (a period seldom lasting more than six months), and that in the course of seven annual seasons, 31,400 poods were exported, a weight equal to one million, one hundred and thirty thousand, four hundred pounds. In addition to the isinglass imported from Russia a vast quantity is annually received from the Brazils, and the East and West Indies. It is, however, greatly inferior to the descriptions we have noticed. Indeed, Brazilian isinglass is only fit for fining purposes, and for such it is almost wholly bought up by the proprietors of large brewing establishments, who consume nearly the entire quantity imported. Some of the better kinds of Brazilian isinglass are manufactured in the same way as Russian, and sold at a cheaper rate. No doubt in some instances, this is mixed with, or sold as, the best, and it has been ascertained that acids and other chemicals have been used to improve the colour of Brazilian isinglass, but the test of good isinglass is in the jelly made therefrom. The jelly made from Russian isinglass dissolves readily, furnishes scarcely any sediment and is remarkably firm, pure, and translucent. On the other hand, Brazilian isinglass makes a far inferior jelly, with these remarkable differences : that whilst Russian isinglass is firm, and free from deposit, Brazilian isinglass leaves a deposit of insoluble matter amounting to twenty or thirty per cent., is less readily dissolved, and the jelly is opalescent, and assumes the appearance of milk. On making blanc-mange with the purest Russian isinglass milk is needed to impart the snow-white colour of that Jelly, but in the case of Brazilian isinglass hot water alone will render it nearly of that colour. It is almost needless to add that the blanc-mange is much inferior in quality, and the large per centage of insoluble matter renders the jelly proportionately weak.

The quality of any isinglass may easily be tested by dissolving a small portion in a glass vessel with about a table spoonful of boiling water. The best Russian isinglass will instantly dissolve and scarcely a particle of sediment remain, the soluble matter in this article being, according to the best authorities, ninety eight grains in every hundred. The same test applied to Brazilian isinglass will extract the gelatine, but the shreds from their fibrous character, do not entirely dissolve; they turn white and retain their form unless disturbed, in which case they break up and form a deposit at the bottom of the vessel. If Russian isinglass be adulterated with Brazilian the admixture may easily be detected by the insoluble shreds or white deposit, which is sure to appear in proportion to the amount of Brazilian isinglass that may be introduced. The smell of the latter also is strong, far from pleasant, and forms a great contrast with the faint, inoffensive, sea-weed like odour of Russian isinglass.

Manufacture of Isinglass.— On the arrival of the isinglass into England, the best kinds are submitted to a course of preparation before they are ready for consumption. The Beluga leaf is closely examined and all discoloured parts cut away, the cuttings and other pieces not deemed good enough for the best, are placed aside as seconds or thirds. These in some cases are used for fining the better description of ales, but more generally for wines, liquors, &c. It is also rolled and cut into shreds for domestic purposes, where colour is not an immediate object. Purse isinglass is mostly sold to the brewers, who consume a vast quantity in the fining of their several beverages. Long and short staple isinglass is extensively demanded by cider makers, confectioners and others, to whom it is sold in the same state as imported into this country. Leaf isinglass taken from the Beluga, after having been picked from all impure or discoloured pieces, constitutes the very best article, either for dietetical use, or for the higher class of clarifying purposes. This description of isinglass has to undergo a process of manufactnre before it is ready for use. What are termed perfect specimen leaves are nearly round, the bladder having been opened longitudinally about two feet in circumference and weigh from eight to sixteen ounces, according to the thickness of the sound. It is not uncommon however to meet with heavier samples, some having been known to reach four pounds. A steam engine of some eight or ten-horse power is generally used under the present method of preparing isinglass, the adjunct machinery consisting of a series of powerful rollers, arranged in pairs in a manner resembling those used for expressing the juice from the sugar cane. The rollers when in motion are fed with leaf isinglass as fast as possible, which, in passing between the two rollers, becomes amalgamated and spread out, and is expelled from the opposite side

of the rollers in one continuous sheet. The isinglass thus rolled is called "ribbon," but it is not yet ready for the process of cutting. The sheet or "ribbon" is probably a sixth, eighth, or tenth part of an inch in thickness, and as it is necessary to reduce it until it is as thin as writing-paper it is passed through rollers more closely set, until, as the thickness diminishes, the desired result is obtained; the width of the "ribbon" of course increasing. It is to be remarked that in rolling the ribbon being confined to the width of the rollers generally about two feet, increases only lengthways and when completed, can be folded or rolled up in the same manner as a length of common linen. After a brief delay for the purpose of drying, the next and last process of cutting is effected. By the introduction of modern machinery, this part of the preparation of isinglass is performed with surprising celerity and the material is cut into very fine shreds. The cutting machine is a cylinder with some five or six keen-edged blades fixed in a tangential direction to the cylinder. The same engine which serves to roll out the isinglass, as already described, suffices to turn this little machine at the rate of some 800 or 1000 revolutions per minute; taking a low estimate we will suppose it turns 800 times. On examining the cylinder we find five or six blades set in it, and as each of these knives severs a shred from the width of the "ribbon" while the cutting process is going on, it follows that four or five thousand shreds are cut in the short space of one minute. Such is the plain and simple method of preparing cut isinglass. There are, however, many consumers who still prefer the old-fashioned style of hand-cut isinglass. In this case the thin leaf is pulled to pieces with the fingers or divided into strips with scissors, a work mostly performed by women. The isinglass is of course in much thicker pieces, but nevertheless it is still preferred by some, not on account of its cheapness as the cost of preparation is much about the same as machine-cut isinglass. We have now given a general discription of isinglass, enumerated the fish from which it is obtained, described the fisheries, the preparation of isinglass, and its manufacture. From a paper by Dr. Pereira, in the fifth volume of the Pharmaceutical Journal, page 66, we learn that theSamovy isinglass referred to is obtained from the silurus glanis, the Russian name for which fish is Som, whence the word Samovy or Somovy is no doubt derived. A difference of opinion has been entertained as to which coat of the air-bladder yields the isinglass. The several layers which enter into the composition of the swimming bladder, commencing from without, are 1st, a peritoneal coat; 2nd, a middle coat composed principally of a modification of what is known as white fibrous tissue; and 3rd, an internal epithelial lining. Blood-vessels rami-

fy through both the external and middle coats, but are most abundant on the inner surface of the latter. These vessels are sometimes described as forming a distinct vascular layer. Some also make mention of a muscular coat entering into the formation of the air-bladders of certain of the fish from which isinglass is obtained and it is probable that more or less muscular fibre of the unstriped kind is present in nearly all cases. Of these coats, the external, or peritoneal covering, is; we believe, usually stripped off; while the internal, which is very thin and forms but little of the substance of the air bladder, is also generally removed in the washing and cleansing to which the isinglass is subject. In the case of purse isinglass it is not removed however. There remains then only the middle coat and it is this we believe which furnishes the isinglass a view entertained by Dr. Pereira, as appears from the second edition of his Materia Medica. The accuracy of this opinion has been however called in question by Dr. Edward Marting, who describes the air-bladder as consisting of only two membranes, an outer strong shining and fibrous membrane and an inner, soft, mucous coat. The inner membrane, namely, the mucous membrane, writes Dr. Marting, is the isinglass. To this description Dr. Marting appends the following note.—"Pereira (Elements of Materia Medica vol. ii. second edition, p. 1861.) erroneously regards the middle coat as yielding gelatine. It appears from the description of Dr. Marting as well as from the above remark that he has overlooked the epithelial lining altogether and has not therefore enumerated this as one of the coats of the air-bladder. The isinglass membrane of Dr. Pereira and the mucous membrane of Dr. Marting, there is therefore reason to believe, are one and the same. The epithelial layer is insoluble in boiling water and in some instances it is so thick, as in purse isinglass, as materially to deteriorate the value of the article. When dry, isinglass is transparent, but when immersed in cold water for a few minutes it becomes white and opaque. Under the microscope it presents a fibrous structure which immediately disappears on the addition of dilute acetic acid, the isinglass swelling up and again becoming very transparent. Examined with the microscope after the action of acetic acid, the walls of the blood-vessels, sometimes the white corpuscles of the blood, and scattered nucleated fibres of fibre-elastic tissue, may be seen. Now in all these particulars isinglass resembles very closely white fibrous tissue a modification of which it is evidently to be considered. The jelly made even from the best Russian isinglass is when cold slightly opalescent. This is due to the presence of a small quantity of albumen. The whiteness of the jelly of Brazilian isinglass, which is so remarkable, results from the presence of a much greater amount of albuminous matter.

Gelatine.—Now as gelatine is obtained from these substances and is extensively employed as a substitute for isinglass, we will, in the next place, proceed to give a description of its preparation. From Pereira's Materia Medica we learn that gelatine is extracted from the bones of the ox and the sheep. It is obtained by boiling bones in water under pressure. It is more readily procured by employing bones which have been previously digested in hydrochloric acid to extract the phosphate of lime. In this way, a nutritious soup is prepared in Paris for the hospitals and other pauper habitations. The patent gelatine of the shops is obtained, I presume, from bones. It is sold either plain or coloured, and is used as a substitute for isinglass. Gelatine has been extracted from antediluvian bones. A soup was prepared from the bones of the great mastodon by a prefect of one of the departments of France. The patentee commences his specification by stating that heretofore, in manufacturing gelatine, it has been usual (with one exception) to act on large pieces of hides or skins, and to employ acids and alkalies, together with mechanical and other processes which occupy considerable time and are likewise costly, and in the excepted case above referred to, it has been the practice to reduce the pieces of hide into the state of pulp in a paper machine, and then to employ blood to purify the product obtained. This invention consists in the following more simple mode of manufacturing gelatine. The patentee takes hides or skins, or parts thereof, as fresh and sweet as possible, and free from hair, and he reduces the whole into shavings or thin slices or films, by any suitable instrument, he soaks the shavings or films for about five or six hours in cold water, and then changes the same; he repeats such changing of the water two or three times each day, until no smell or taste is to be detected, either in the water or in the shavings, and then he removes the shavings from the water. If this product is intended for soup, it is dried on nets, and is then ready for use. If gelatine is to be extracted, the shavings, after the above soaking, are put into a suitable vessel, with a quantity of water, sufficient to cover them when pressed down, and they are subjected to a heat not exceeding boiling water. When dissolved, the gelatine is to be strained through linen or other fabric, subjected to slight pressure with the hands or otherwise, or the solution may be permitted to run off from the vessel without straining, by which means much of the gelatine will be separated from the fibrous matters. The product of gelatine thus obtained is run in thin films on to a smooth surface of slate, or other suitable material, to set; it is then removed on to nets to dry, and when dry it is cut up with an isinglass cutter or other suitable apparatus. The residue, dried or not, may be used for thickening soup, and other culinary purposes." "Another ma-

nufacture of gelatinous substances is produced by the following process, from cod sounds, or other fishy matters capable of yielding gelatine: These matters are reduced to shavings or thin films, soaked in water, subjected to the action of heat, and the gelatine strained or run off as above described. The patentee obtains a first, second, and third product of gelatine, which he forms into sheets, and when dry cuts up the same with an isinglass cutter. This manufacture of gelatine will be found highly useful as a cheap substitute for isinglass for clarifying liquids." Isinglass and gelatine differ very considerably from each other in many of their characters, and especially in the following. The shreds of isinglass, when immersed in cold water, becomes white, opaque, soft, and swollen. The swelling of the shreds is equal in all directions, so that, when viewed with a low power of the microscope, they appear more or less quadrangular. In boiling water, they dissolve nearly without residue. The smell of the dissolved isinglass, when hot, is somewhat fishy, but not unpleasant. The shreds of gelatine, on the contrary, when placed in cold water, swell up, acquire increased transparency, and become transluent and glass-like. The form which the threads take in swelling is peculiar: they do not, like those of isinglass, swell equally, and remain quadrilateral, but become expanded, flat, and ribbon like, the broad surfaces corresponding to the incised margin. The dry threads on the uncut surfaces frequently present a peculiar, shining lustre, not unlike that of tinsel. In boiling water, the shreds do not entirely dissolve, but in most cases a copious deposit falls to the bottom of the glass. The smell of the hot infusion is like that of glue, and therefore disagreeable. It thus appears that between isinglass and gelatine there are several well-marked distinctions some of these sufficiently simple to enable the ordinary observer to distinguish for himself the one from the other. The action of a little cold water on a few of the filaments spread out on glass is all that is necessary for the discrimination. From the above Table, it appears that out of the twenty-eight samples of isinglass submitted to examination, ten, or more than one third, of the samples consisted entirely of gelatine. That the price of the genuine isinglass varied from 8d. to 1s. 4d. per ounce; while that of the gelatine ranged between 10d. and 1s. 4d. per ounce. Now, as isinglass is very different from gelatine in many of its properties, and as it is undoubtedly much the superior of the two, it is evident, from these inquiries, that the public are seriously imposed upon and injured by the substitution for isinglass of such an article as gelatine.—*Food and its Adulteration, p.* 359.

(4560) ISOETES COROMANDELIANA. Lin.

Nechetty kalung, Tam. | Ghee ka gudda, Duk.

This grows in low, moist grounds, and is eaten by the common people.—*Ainslie, p.* 249.

(4561) ISONANDRA, a genus of Plants belonging to the natural order *Sapotaceæ*. It is distinguished by the stamens being all fertile, and twice as numerous as the lobes of the corolla. —*Eng. Cyc.* The *Isonandra Gutta* flourished for centuries in its native jungles, exuding its juice only to be received by the soil, before the discovery was made, only a few years back, that Gutta Percha was suited for such an infinite number of applications; now, there is scarcely any vegetable product more extensively useful, or one more generally sought after for mercantile purposes, a regular supply being of much consequence to some manufactures. To urge the necessity of exercising careful vigilance in protecting the trees whence so valuable a product is derived, will perhaps appear unnecessary, but we know that even their admitted financial value has not been sufficient to protect them from thoughtless and unnecessary waste (but the contrary), as has been illustrated by various writers in the Journal of the Indian Archipelago. The geographical limits of the taban or Gutta Percha tree, have yet to be ascertained, and the properties of the other species of Isonandra, indigenous in our forests, remain to be investigated. Considering the chemical nature of such secretions, we are full of hope that some trees among its numerous congeners, furnishing a similar gum elastic will be brought to light, and the various appearances of the article imported lead to the impression that it is derived from different trees. Dr. Montgomerie, Bengal Establishment, first transmitted specimens of this substance to England, (1st March, 1843), and received the gold medal of the Society of Arts for its introduction, "as a new and hitherto unknown substance, likely to be useful for various purposes in the Arts," and if he had been an exhibitor in the Crystal Palace, we understand that a further award for the discovery would have been made to him.—*Dr. Cleghorn.* Dr. Wight, in Icones,—gives Isonandra Candolleana, 1220; lanceolata, 359; *Percha*, 1589; Perrottetiana, 1219; polyandra, 1589; villosa, 360.

(4562) ISONANDRA GUTTA, (Hooker), the Gutta-Percha Tree, has its leaves on long stalks, obovate-oblong, with a short point golden beneath; flowers axillary, fascicled; stamens 12. This tree is a native of the Malayan Archipelago. The substances yielded by this tree, and designated by the name of Gutta-Percha (pronounced 'Pertsha'), is, like Caoutchouc, a carburet of hydrogen, and isomeric with that substance, and possesses a great number of the properties which characterise India-Rubber but exhibits certain special properties which admit of its being applied to particular uses to which caoutchouc is not adapted. Gutta-Percha possesses as great an indestructibility by means of

chemical agents as caoutchouc. It has an intermediate consistence between that of leather and wood; it is capable of being softened by heat, and of regaining its primitive consistence on cooling. It is therefore at the same time capable of taking and of retaining the most delicate impressions. The important uses to which it has been latterly applied are only the forerunners of those to which it will be adapted hereafter, provided, the lack of this precious material (which unfortunately is produced in much less quantities than India-Rubber, and in localities much more circumscribed) does not present an obstacle to it. But as the plants which furnish caoutchouc abound in the whole of the territorial zone which extends between the tropics, so the *Isonandra gutta* is not the only tree which yields Gutta-Percha. It grows scarcely anywhere except in certain parts of the Malayan Archipelago, and up to the present time has been almost exclusively obtained from Singapore. It was brought for the first time into England in the days of Tradescant, as a curious product, under the name of Mazer-Wood; and subsequently it was frequently brought from China and other parts of the East, under the name of India-Rubber, in the form of elastic whips, sticks, &c. In 1843 Doctors D'Almeida and W. Montgomery drew particular attention to it, together with its various singular properties, its easy manipulation, and the uses for which the Malays employed it. The most common employment of it was for whips; and it was by the introduction of a horse-whip made of this substance that its existence was for the first time known in Europe. The specimens of the products of the East Indies, shown in the Great Exhibition of 1851, proved that the natives of the country in which the *I. Gutta* grows know also how to appropriate it to the manufacture of different kinds of vases, and that European industry has little more to do than to imitate their processes. The importation of Gutta-Percha into England, where the employment of this substance first drew attention, was in 1845 only 20,600 lbs.; but in 1848 it had increased to above 3,000,000 lbs.; and during the last five years the importation has amounted to a much larger quantity, and one which begins to cause some apprehension as to the possibility of the supply sufficing for the requirements of the novel uses in store for it in the future. It is true that during its use Gutta-Percha is but little consumed, and the waste from the articles in this material, submitted to a proper softening, can be made to serve new uses; nevertheless its constantly increasing consumption, added to the barbarous manner in which the product has hitherto been extracted, may well justify some apprehension. During the first few years of the employment of Gutta-Percha it was the custom to cut down the tree for the purpose of obtaining the juice, which, left to itself, very soon allowed the Gutta-Percha to separate and coagulate of its own accord. There is reason to hope that European industry will soon be embarked in the cultivation of this product, and that the Niato (which is the name that the Malays give to the tree which produces Gutta-Percha), multiplied by means of a regular culture, naturalised in other countries than those to which it is indigenous, and worked by regular incision, which will only take from the tree a portion of its juice without hindering its development, will be the means of furnishing at a low price a substance which is destined to render notable services to industrial and domestic economy. The Gutta-Percha which arrives in Europe in the form of lumps of some pounds weight is far from being pure. The natives of the Malayan Archipelago make no scruple of introducing into it stones, earth, &c.; the presence of which in the interior of these blocks renders a purification indispensable, which purification however is capable of being attained without much manipulation. Indestructible by water, and at the same time a bad conductor of electricity, Gutta-Percha has been found available for inclosing the metallic wires employed in the electric telegraph; and the use of this substance may certainly claim its share in the success of the submarine telegraph, by means of which London and Paris and the other great cities of Europe are now brought within a few minutes of each other. It may be conceived to what a variety of forms a substance can be turned which, becoming soft, without adhering, at the temperature of boiling water, regains at the ordinary temperature the slight elasticity and the consistence of leather.—*Eng. Cyc.*

(4563) ISORA CORYLIFOLIA. Some good white fibres from the bark of the *Isora Corylifolia* were exhibited by the Madura Local Committee, by Mr. Saldanah and Mr. Jaffrey. The same fibre is called Googull and is made into excellent Ropes at the Training Depot.—*M. E.*

(4564) ISOTOMA AXILLARIS. This is a beautiful elegant plant, the flowers of which, look like a large lilac jassamine, and are cultivated like the Lobelia.—*Riddell.*

(4565) ISPAGULA. ISPAGOOL. Seeds of Plantago Ispagula.

(4566) ISREE. At the Madras Exhibition of 1855, Conjetty Arjapah Chetty exhibited excellent unbleached Isree to which a prize of 50 Rupees was awarded. Vizagapatam Isree: Nellore white Percalah, and Jyempettah Soocey, were all specimens of accurate workmanship, evincing much pains and skill. It is a cotton cloth.—*M. E. of* 1855.

(4567) IURINEA. COMPOSITÆ. All the species succeed well in any common soil, the colour of the flowers are purple, red and yellow, and may be cultivated from seed, or by dividing the roots.—*Riddell.*

(4568) IVORY. A beautiful and compact substance, obtained from the tusks of the elephant, the narwhal, the walrus, and the hippopotamus, and also from the teeth of the same animals. The best and largest supply is however from the elephant. The male elephant when full grown has two tusks, varying considerably in size on different animals, but most valued when they are large, straight, and light in colour. These tusks are hollow at their insertion into the jaw, and for a considerable space therefrom, but become solid as they taper towards the extremity. The principal sources whence they are obtained are the western coast of Africa and Hindostan; but the African tusks are most esteemed, as being denser in texture, and less liable to turn yellow. By an analysis, the African show a proportion of animal to earthy matter, of 101 parts to 100; while in the Indian it is 76 to 100. The applications of ivory are so numerous that a large demand for elephants' tusks has existed for a lengthened period. During twelve years at the close of the last century, the imports into Great Britain amounted on an average to 1,576 cwts. annually; in 1831 and 1832 they had increased to 4,130 cwts., of which 3,950 cwts. were retained for home consumption. Now, reckoning the medium weight of a tusk at about sixty pounds, it is evident that the imports of the years last named would require 7,709 tusks, or the destruction of 3,854 male elephants. But since that period the imports have so greatly risen, that in Sheffield alone 180 tons of ivory are worked up annually into knife-handles, &c. It is also affirmed that of the quantity of tusks imported, although some weigh from 60 to 100 pounds, yet the number of small tusks is so enormous, that an average weight of nine pounds can only now be reckoned on; in which case 45,000 tusks, from 22,000 elephants are required to supply the demand of this great cutlery mart of England. Occasionally, it is allowed, broken or shed tusks are collected, or those of animals which die a natural death are obtained; but the supply from these sources is never very large, so that the slaughter of elephants, after all deductions made, is going on at a rate which leaves it a constant wonder that the breed of this noble animal has not been sensibly diminished. The value of the ivory consumed in Sheffield is very great; but there are also other seats of manufacture, and ivory is wrought into the forms of chess-men, billiard-balls, the keys of musical instruments, thin plates for miniatures, mathematical and other instruments, and an immense variety of small objects of use, amusement, or ornament. None of our manufactures have yet reached the consummate skill of the Chinese in the workmanship of ivory, chiefly remarkable in their concentric balls, their chess pieces and models. Yet the adaptation to useful purposes of this valuable substance is fully understood by those who cannot rival the exquisite minuteness of Chinese art. A manufacturer of surgical instruments in Paris is in the habit of rendering ivory flexible for use as tubes, probes, &c., by acting on the well-known fact, that when bone are subjected to the action of hydrochloric acid the phosphate of lime, which forms one of the component parts, is extracted, and thus bone retain their original form, and acquire great flexibility. M. Charriere, after giving the pieces of ivory their required form and polish, steeps them in acid, either pure or diluted, until they become supple and elastic, and of a slightly yellow colour. In the course of drying the ivory returns to its original hardness, but its flexibility can be easily restored by surrounding it with wet linen, or by placing wet sponges in the cavities of the pieces. In some cases, the articles have been kept in the acidulated water, in a flexible state, for a week, without change or injury, and without acquiring any taste or disagreeable smell. It has lately been ascertained that the decay of articles in ivory can be effectually checked, even when its progress has advanced so far as to cause the specimens to crumble away under the hands. Some of the works in ivory forwarded by Mr Layard from Nineveh, were found on their arrival in England to be in a state of rapid decomposition. Professor Owen was consulted on the subject, and he suggested a remedy which has proved entirely successful, thereby preserving to this country these curious relics of ancient art. Concluding that the decay was owing to the loss of gelatine in the ivory, he recommended that the articles should be boiled in a solution of gelatine. Under this process they became apparently as firm and solid as when they were originally entombed. The tusks of the hippopotamus afford a very hard and white ivory. These are usually short and much curved, hollow at the place of insertion, and covered with a glossy enamel. They vary in weight from three or four pounds to thirty. These are highly prized by the dentists, and are better adapted than any other ivory for making artificial teeth. The thick coat of enamel which covers them has first to be removed, for this entirely resists steel tools, and under it is found a pure white ivory with a slight bluish cast. The parts rejected by the dentists are used for small carved and turned works. The horn or tooth of the narwhal is also hard and susceptible of a fine polish. The largest size is ten feet long; at the lower extremity it forms a slender cone of a twisted or spiral figure. Another and a very remarkable source of ivory is that which supplies almost the whole of the ivory-turner's work made in Russia. Along the banks of the larger rivers of the Russian Empire, and more particularly those of further Siberia, thousands of tusks are annually dug up, which once constituted the weapons of defence of a species of elephant or mammoth now ex-

tinct. These form what is called *fossil ivory*, but they have not undergone the changes usually understood in connexion with the term fossil, for their substance is as well adapted for use as the ivory procured from living species. So numerous are these tusks, that they are occasionally exported from Russia, being cheaper than recent ivory. They are rarely to be met with in England, except in museums. Mention is made, however, of one which measured 10 feet in length, and was solid to within 6 inches of the root, weighing no less than 186 lbs.: this was cut up into keys for piano-fortes. There is a substitute for ivory now in general use, which it is necessary to notice here. It is the fruit of a species of palm, imported from Peru for some time past into the European market, and named by two Spanish botanists, who met with it in the groves of Peru, *Phytelephas macrocarpa*. These writers also supply the following description :—"The Indians employ the leaves of this most beautiful palm as a covering to their cottages. The fruit at first contains a clear insipid fluid, with which travellers quench their thirst; this fluid afterwards becomes gradually sweet and milky, and at length acquires solidity, so as to be as hard as ivory. If the fruit be gathered while the juice is fluid, the latter soon becomes acid; but when allowed to attain perfection, the kernels are of sufficient hardness to be employed by the Indians as knobs for walking-sticks, reels of spindles, and little toys, which are white, and perfectly hard while dry; if they are put under water they soften, but on drying, their hardness is restored. Bears eagerly devour the young fruit." Two species of this palm are recognized, the *P. macrocarpa*, or large-fruited, and *P. microcarpa*, or small-fruited. The vegetable ivory is in fact the albumen or nutritious substance surrounding the embryo, and which in some other palms, as the cocoa-nut palm, constitutes a beautiful and firm substance lining the shell. The vegetable ivory is enclosed in a hard rind, some of which generally adheres to it as imported. The Doum Palm has a similar albumen, which is turned into beads for rosaries. The African ivory, as already stated, is superior to any other: its appearance, when first cut, is mellow, warm, and transparent, almost as if soaked in oil, and with very little appearance of grain or fibre; the oil dries considerably by exposure, and a permanent tint then remains, a few shades darker than writing paper. The Asiatic ivory is more dead-white at first, but is more disposed of the two to turn yellow afterwards. It is also less dense, and does not take so high a polish. The choice of ivory is accompanied with much uncertainty, even to experienced buyers. The tusks are received in all varieties of size and figure. They may be 8 or 10 feet long, or only as many inches. They may weigh (as we learn from the magnificent specimens in the Great Exhibition) 325 lbs. the pair, or they may not reach as many ounces. Mr. Holtzapffel mentions a small and hollow tusk in his possession, which only weighs 2½ ounces. Their curvature may describe a simple half circle, or they may be curved in two directions, the tusk inclining to the shape of the letter S. The outside may be dark-coloured almost to blackness, or it may be run through all the varieties of light and deep orange, hazel, and brown; their ends may taper off to a fine point, or they may be very much worn away, or they may end abruptly as if broken off. The buyer, therefore, has to make the best selection he can by choosing a tusk as nearly straight, solid, and round as possible, with a smooth rind free from cracks, and a point that gives evidence in the worn part, that the tusk is of the desired fineness of grain. Yet after all precautions, it is only after the first cut of the saw that the quality can be really determined. Sometimes the interior exhibits a succession of layers or rings, of different shades and degrees of transparency; sometimes the solid parts of the most beautiful and transparent tusks have long oval patches of opaque white ivory, in some cases a regular grain is observable, almost like the engine-turning of a watchcase; in others no grain is perceptible; occasionally there is a deficiency of animal oil, and the ivory crumbles under the workman's tool; or there may be the serious defects of darkness of colour, and coarseness of grain. In rare instances a considerable portion of the tusk is found to have been injured by a musket ball, the iron or leaden bullet being enclosed in it. Two instances, if not more, have occurred in which these bullets were of gold, showing that the shot was fired by royal hands, for it is the reputed custom among Eastern potentates to use gold or silver bullets in their sports. One of these golden bullets is stated to have been cut through by a comb-maker in dividing a tusk. The portion of the tusk thus injured, is generally useless for any ornamental purpose for many inches each way around the ball; but cases have occurred in which a ball, and even a spear-head, has entered at the thin part near the skull of the animal, and become embedded without injury to the external surface. Great economy is used in cutting up the tusks, so that the only waste may be that which arises from the passage of a thin saw between the several pieces into which it is divided; and even here it can hardly be termed waste, for the clean saw-dust of the ivory is sometimes used in making jelly. Every portion is, in fact, turned to some account, the outside rind being used for handles of pen-knives, &c., and the scraps burned in retorts for the manufacture of ivory black, used in copper-plate printers' ink, and for other purposes. The saw used in cutting up the ivory is about the fortieth of an inch thick, with rather coarse teeth, about five

or six to the inch: it is stretched in a steel frame to keep it very tense. The sawing is commenced at the root end, and two or three pieces are cut to the length of such articles as can be made in that thinner portion of the tusk. The blocks are rarely cut more than five or six inches long. As the solid part of the tusk is reached, the blocks have to be greatly subdivided; perhaps longitudinal slices have to be cut for miniatures, or the taper handles of knives and razors have to be economically severed by cutting the slabs wedge form, the thick end of one against the thin end of the next, and then subdividing by parallel or inclined cuts, made either with the saw just described, or with the circular saw. The entire division of each block or length of tusk is settled and accurately marked in pencil upon the end of the piece, before the saw is used. When the tusk is to be used for turnery work only, the first cut is usually made where the hollow ends, which is ascertained by thrusting a wire up the tusk. Unless the latter is extremely curved, the principal pair is formed into cylinders or rings, but the greater the curve the shorter the pieces that can be prepared from it without waste.

(4569) IVORY BLACK. A kind of animal charcoal, procured by the incineration or close distillation of ivory, and of the horns or bones of animals. It is extensively used in the arts.—*Waterton.*

(4570) IVORY (ELEPHANT,) of Elephants Teeth.

Ivorie. Fr.	Huthee Danth, Guz. Hind.
Elfenbein, Ger.	Duudhan-i-feil, Pers.

The teeth or tusks of the Elephant. They are largely imported into Bombay from the African Coast, Zanzibar, &c. and are chiefly re-exported to England.

(4571) IVORY (FOSSIL), Are the tusks or teeth of the Mammoth, which are found plentifully, and in a high state of presservation in the Laichovian isles, and on the shores of the Frozen Sea. They are chiefly used by the Russian turners.

(4572) IVORY-NUTS, OR COROSOS, are produced by Phytelephas macrocarpa, growing in central America and Columbia, (Humboldt.) They are described as seeds with osseous albumen; the tree is a genus allied to the Pandaneæ, or screw Pines, and also to the Palms. The nuts are of irregular shapes, from one to two inches diameter, and when enclosed in their thin husks, they resemble small potatoes covered with light brown earth: the coat of the nut itself is of a darker brown, with a few loose filaments folded upon it. The internal substance of the ivory-nut resembles white wax rather than ivory; it has, when dried, a faint and somewhat transparent tint between yellow and blue, but when opened it is often almost grey from the quantity of moisture it contains, and in losing which it contracts considerably. Each nut has a hole, which leads into a small, central, angular cavity; this, joined to the irregularity of the external form, limits the purposes to which they are applied, principally the knobs of walking sticks, and a few other small works.—*Holtzapfel.*

(4573) IVORY, (WALRUS OR SEA HORSE), Moye-Danth, Guz. Hind.

The tusks or teeth of the Sea-horse or Walrus, and Hippopotamus, are also used as ivory. They have a curved form and grooved surface, are much harder and whiter than those of the Elephant, and do not turn yellow so soon. They are now chiefly used in dentistry. They are imported into Bombay from the African coast, Zanzibar, &c., and are almost entirely re-exported to England.—*Faulkner.*

(4574) IVORY-WARE. The elegant carving of the Chinese in ivory, and the cheapness of the articles, causes a large sale of the most useful to all parts of the world. Fans, seals, paper-knives, chessmen, &c. &c., are exported principally to the United States and India, but also to South America, Europe, &c. Under the old system, 100 ivory fans were estimated to weigh 6 catties, 4 taels, and paid 6¼ mace duty. The Chinese manufactures in ivory, greatly surpass in delicacy and elegance the works of European artists. The most elegant are, *Camp Baskets*, consisting of several pieces placed upon each other, surmounted with a handle, richly carved: —*Work Baskets* of various shapes:—*Fans*, some in open work: others with figures and ornaments raised, or in relief:—*Hand Screens* wrought in a similar manner:—*Card Racks*, &c. But the most singular article is the *Wrought Ball*, which contains from nine to fifteen internal globes, one within another, wrought from a solid piece of Ivory, through apertures not more than half an inch in diameter.—*Comp. Desc.* Fine ivory carved work can be executed in Shorapore, in the Dekhan, of a peculiar and very delicate description. This consists of figures of deer and birds, flowers, as also combs large and small, cups, &c. &c. Any orders for which would be executed with peculiar care. It would be impossible to define the prices of these articles, as they would depend upon the size and work required.—*M. C. C.* At the Madras Exhibition of 1855, a very interesting and complete series of carvings in Ivory was exhibited by His Highness the Rajah of Travancore. It comprises many of the common animals, reptiles, fruits and flowers of the country, which are carved with taste and carefully finished. There was a good deal of grace and spirit in the action of the animals, some of which were in natural attitudes particularly a bull and cow, two deers, a cheeta and a rabbit. Of the reptiles, a frog and lizard were well represented, and a pair of paper cutters with ornamental handles were particularly deserving of notice, one for the judicious adaptation of a com-

mon garden flower to the design, and the other of a lizard in a spirited attitude. The fruits and flowers were well represented and the whole series evinced a perception of the natural beauties of the objects represented. The Jury recommend a 2nd Class Medal for the series. Ivory of Madras Exported is lbs. 4,810, Rs.71507. Several specimens of fine Ivory were exhibited; the largest pair of Elephant tusks sent to the Exhibition, weighed 180 pounds, obtained from a wild Elephant killed in the Travancore forests. One tusk weighed 71 pounds, the other 67 pounds, and showed a fine white compact kind of ivory; of these two, one measured 6 feet 8 inches in length, and the other 6 feet 6 inches, the circumference at the base being 17 inches in each case. The domestication of the Elephant is usually attended by deterioration of the length and quantity of the Ivory.—*M. E. J. R.*

(4575) IXIA CHINENSIS AND CAPENSIS. *Iridaceæ.*—These beautiful flowers vary in colour, and form, they are mostly from the Cape of Good Hope, and require the same cultivation as plants of the Lily tribe, and are propagated by dividing the bulbs.—*Riddell.*

(4576) IXORA, a genus of Plants belonging to the tribe *Cinchonaceæ* and the genus *Rubiaceæ* so named, it is supposed, from the Indian god Iswara. The genus is characterised by having a small 4-toothed calyx; corolla 1-petaled, funnel-shaped; tube long, with the four stamens in its mouth: ovary 2-celled, 1-seeded; style single; berry drupaceous, inferior, 2-seeded. The species are numerous, and chiefly confined to India and the Oriental Archipelago. They form shrubs or small trees, with opposite leaves, and stipules arising from a broad base, but acute at the apex. The flowers are in terminal corymbs, and are usually red, but sometimes white, and are generally highly ornamental, whence several are cultivated in our hot-houses, where they require to be kept in a moist heat to thrive well. Some of the species are used medicinally, but not to any extent. Dr. Horsfield mentions *I. coccinea* as employed in Java as a stimulant, and Rheede two or three other species; but none appear to be possessed of any very active properties.—*Eng. Cyc.* Dr. Wight in Icones gives Ixora acuminata, 706; alba, 707; bndhuca, 149; barbata, 185; brachiata, 710; coccinea, 153,707; cuneifolia, 709; fulgens, 151; lanceolaria, 827; nigricans, 318; Favetta, 1-8; parviflora, 707, 711; polyantha, 1066; stricta, 184, 707; tomentosa, 186; undulata, 708; villosa, 150.

(4577) IXORA ALBA. WHITE IXORA. A white-flowered ixora is a Tenasserim wild flower that ought to be brought into cultivation.—*Mason.*

(4578) IXORA BANDHUCA. JUNGLE GERANIUM.

Bandhooka, Ruktuka, Buckolee, HIND.

A spreading shrub, smaller than I. Coccinea, but equally common: in flower almost during the whole year—of a pale crimson colour; there is also a white variety:—blossoms during the rains.—*Riddell. Irvine.* In the Kotah gardens and jungles, it is a beautiful bush, covered with numerous scarlet flowers all the year and would be very ornamental in gardens.—*Gen. Med. Top. p.* 179.

(4579) IXORA COCCINEA. Crimson Ixora. This species of ixora is very common in front plots, and is sometimes called by the European residents of Tenasserim "the country geranium." Ixora coccinea and other species of that genus, are among the most common shrubs in Chinese gardens.—*Fortune.*

(4580) IXORA PALLENS? Wild Ixora. An indigenous species of ixora is frequently met with in Tenasserim in mountains and plains whose flowers are of a much paler hue than the preceding species.—*Mason.*

(4581) IXORA PARVIFLORA, TORCH WOOD. Small flowered Ixora (at Kotah).

Soowndee cuttay also Karang cuttay, TAM. Henna Gorivi, CAN. | Gandhul, Runghun, Jilpai, HIND.

This is a small tree, employed by the poor for beams and posts. It burns very readily and clearly, and, on that account, the branches of it are often made into torches by people travelling in the night. The Tennam eerk is used in preparing torches in Ceylon; the spathe and receptacle of certain plants are also employed for similar purposes.—*Ains. Mat. Med. page* 203. On the banks and near talaos at Kotah, the flowers of this Ixora are very sweetly scented and the tree blossoms in the hot weather; it would form a very fit ornament for gardens and pleasure grounds.—*Genl. Med. Top. p.* 179.

J.

(4582) JACANA. The singular jacana is a native of China and is distinguished not less by the grace of its form than its adaptation to the localities for which nature has allotted it. Formed for traversing the morass and lotus covered surface of the water it supports itself upon the floating weeds and leaves by the extraordinary span of the toes aided by the unusual lightness of its body. Like the moor-hen, of whose habits and manners it largely partakes, it is doubtless capable of

swimming, the long and pendent tail feathers being elevated so as not to dip in the water.—*Williams' Middle Kingdom, p. 268.*

(4583) JACK TREE. Artocarpus integrifolia.

(4584) JACKWOOD.

Phunsee also Funsee, Guz. Hind.

Jackwood is imported into Bombay from the Malabar Coast, and was at one time in great request for making furniture. Of late years, however, it has been entirely superseded by blackwood for this purpose.—*Faulkner.* Jack is the wood of *Artocarpus integrifolia*, or the entire leaf bread-fruit tree, a native of India, is imported into Britain in logs from 3 to 5 feet diameter, and also in planks; the grain is coarse and crooked, and often contains sand. The wood is yellow when first cut, but changes to a dull red or mahogany colour. It is very much used in India for almost every purpose of house carpentry and furniture, and in England for cabinet work, marquetry, and turning, and also for brushbacks. The Jack-wood is very abundant, and its fruit is commonly eaten by the natives, and rarely by Europeans at desert, with salt and water like olives. The Jackwood is sometimes misnamed orange-wood from its colour and also Jack-wood, Jaack-wood and Kuthul. See *Baker's Papers.* —*Holtzapffell.*

(4585) JADE.

Yu, Chin.

This mineral, referred by Jameson to *Prehnite*, is greatly valued in China. Its colour is greenish-white, passing into grayish-green, and dark grass-green; it is semi-transparent, and cloudy; fracture splintery, and splinters white. It is peculiarly difficult to cut; yet the Chinese take pride in fashioning it into various shapes, such as cups, saucers, bracelets, clasps, and even animals. Some of these articles require the labour of eight or ten years. *Waterston.—Faulkner.* The term Jade, has been given to several Minerals which resemble each other but little, except in colour, and therefore it is one which it would be well should fall into disuse. *Serpentine, Nephrite*, and *Saussurite* have all been described under the name of *Jade.—Eng. Cyc.* The Chinese estimate their celebrated Jade stone very highly, and there are numerous shops, both for cutting it and exposing it for sale, carved into all those curious and fantastic forms, for executing which this people are so well known.—*Fortune's Wandering, p.* 88. Its value in the eyes of the Chinese depends chiefly upon its sonorousness and color. The most valued specimens are brought from Yannan and Khoten; a greenish white colour is the most highly prized, but a plain color of any shade is not much esteemed. A cargo of this mineral was imported into Canton from New Holland not long ago, but the Chinese would not purchase it, owing to a fancy taken against its origin and color. The patient toil of the workers in this hard and lustreless mineral is only equalled by the prodigious admiration it is held in and both fairly exhibit the singular taste and skill of the Chinese. Its colour is usually a greenish white, passing into a greyish-green and dark grass-green internally it is scarcely glimmering. Its fracture is splintery, splinters white, mass simi-transparent and cloudy; it scratches glass strongly but rock-crystal does not scratch it.—*Williams' Mid. King. page* 243.

(4586) JAGREE, Coarse Sugar.

Kund, Arab.	Nulla Vellum, Tam.
Jagree, Goor, Guz. Hind.	Bellum, Tel.
Guda, Gura, Sans.	

A coarse kind of sugar formed by evaporating the juice of sugar canes, &c, in India. Jagree is largely manufactured in various parts of Southern Asia, and is in great request among the lower orders of the natives. A large quantity of Jagree has lately been exported from Bombay to England under the designation of "Coompta" sugar, the place of its produce. It is also exported to the Arabian and Persian Gulfs.—*Faulkner.*

(4587) JAIPHUL, Nutmegs.

(4588) JAIPHUL KA TEIL, Nutmeg Oil.

(4589) JAIWANTRY, Mace.

(4590) JAIWANTRY KA TEIL, Mace Oil.

(4591) JALAP.

Jalap, Fr.	Sciarappa, It.
Jalapp, Ger.	Jalappa, Sp.

The root of a Convolvulus indigenous to South America and Mexico. The root is met with in thin transverse slices, solid, hard, weighty, of a blackish colour on the outside, and internally of a dark grey, with black circular striæ. The odour of jalap, especially in powder, is very characteristic. See *Lewis's Materia Medica.*—*Faulkner.*

(4592) JAMA MUSJID OF DELHI. The Jama Musjid is the principal mosque of Delhi and according to Hamilton's Gazetteer cost ten lakhs of rupees and took six years in its construction. It was begun and completed in the reign of Shah Jehan, and is an edifice worthy of his name. Three of the highest, the broadest and finest flights of steps in Delhi, made of stone, lead to the front and side entrances, whence the spectator comes to a square platform. In the centre of this is a large cistern which is intended for the performance of the "woozoo," or ablutions before prayer. While the three sides open inwardly with a corridor and cloisters, the west of the square platform is the cathedral itself, rising in three large domes and two of the most stately minarets within the town of Delhi. Its space admits of a vast congregation, and on the anniversary of a saint of any celebrity or on any

other particular occasion, it was crowded with the Mahomedans of the place, who always seemed very strict in their devotions.—*Tour in India by French, p.* 10.

(4593) JAMBEE, a cane with stiff stems and large knots, imported from China.

(4594) JAMBOSA ALBA, aquea, *vulgaris*.

(4595) JAMOON, Eugenia Jambolana.

(4596) JANIPHA, a genus of Plants belonging to the natural order *Euphorbiaceæ*. It has monœcious flowere; calyx campanulate, 5-parted petals wanting; stamens 10 in the male flowers, filaments unequal, distinct, arranged round a disc. In the female flowers the style is one; stigmas 3, consolidated into a rugose mass: capsule 3-coccous.

(4597) JANIPHA MANIHOT. Lin. The Tapioca, or Cassava or Cassada root.

Mara Vullie kalung, TAM.	Aal vullie kalung, TAM.
Shuftuloo, DUK.	—*Faulkner*.
Maracheenee, CAN.	

Janipha Manihot (*Jatropha Manihot* of Linnœus) is a native of Brazil but largely grown in India. It has an oblong tuberous root, as big as a child's head, full of a wheyish venomous juice. The stems are white, brittle, having a very large pith, and several knobs sticking out on every side like warts, being the remains of the foot-stalks of the leaves, which have dropped off, usually 6 to 7 feet high, with a smooth white bark; branches crooked, and have on every side near their tops leaves irregularly placed on long terete petioles, broadly-cordate in their outline, divided nearly to their base into 5 spreading lanceolate entire segments, alternate at both extremities, dark-green above, pale-glaucous beneath; the midrib strong, prominent below, and there yellowish-red: from it there branch off several oblique veins, connected by lesser transverse ones; stipules small, lanceolate, acuminate, caducous; panicles, or compound racemes, axillary and terminal, 4 to 5 inches long, bearing sometimes all male or female flowers, at other times these are mixed on the same peduncle; pedicels with small subulate bracts at their base. Male flowers smaller than the female. Calyx purplish on the outside, fulvous-brown within, cut about half-way down into five spreading segments: disc orange-coloured, fleshy, annular, 10-rayed; stamens 10, alternate with the lobes of the disc; filaments shorter than the calyx, white, filiform, free; anthers linear, oblong, yellow. Female flowers of the same colour as the male, deeply 5-parted; the segments lanceolate, ovate, spreading; disc an annular orange-coloured ring, in which the purple ovate furrowed ovary is imbedded; style short; stigmas 3, reflexed, furrowed and plaited, white; capsule ovate, 3-cornered, 3-coccous; seeds elliptical, black, shining, with a thick fleshy funiculus. The expressed juice is dangerously poisonous. Fecula of the root harmless when separated from the juice and exposed to heat. It is called Cassava—a principal article of diet in South America. The nutritious substance known as Tapioca is the Cassava differently prepared and granulated. These preparations are obtained by crushing the roots after the bark has been removed, and straining off the water, when the mass is gradually dried in pans over the fire. (Lindley, *Flora Medica.*)—*Eng. Cyc.* The root is in great estimation amongst the Natives in the Southern parts of the Indian Peninsula, who make it into curry, &c. Previous to its being roasted or otherwise dressed it ought to be well boiled.—*Ainslie, p.* 249. In Travancore Tapioca is extensively cultivated in gardens. Great care is requisite in the preparation of these roots, as they contain a poisonous principle, which is only got rid off by the application of strong heat. The poorer classes use the tapioca flour, but none is exported.—*M. E. J. R.* Tapioca and Moussache or cassava, are the fecula of the root of the Janipha manihot. The juice of the root deposits a white fecula, which, after being well washed and dried, constitutes what is called "*moussache.*" This is formed of rounded grains having a central dark point, and of remarkably equal size, the density of moussache to arrow root is as 14 to 16. When the moussache is dried on hot plates the grains partly burst, and the fecula agglomerates in irregular semi-opaque gumlike masses, and is then called Tapioca. Both these substances constitute excellent articles of diet, especially for convalescents. The Messrs. Speed cultivate the Janipha in the vicinity of Calcusta, and produce a *tapioca* of admirable quality. To prepare *Tapioca* take one ounce of the grains, steep in soft water for an hour. Pour off the superfluous water, and boil with a pound of water for an hour. A transparent uniform syrup-like fluid is obtained, which jellies on cooling, and has a peculiarly rich and agreeable flavour. The juice of the Janipha root from which the fecula has separated is a very formidable poison. *Cassava bread* is made of the tapicoa root, from which the acrid juice and fecula have been removed by washing.—*O'Shaugh., p.* 559. Mr. Mason is not aware that either tapioca, or cassava is manufactured on the Tenasserim Coast, but manihot, the plant which produces both, is frequently seen in culture. The natives boil the root, and eat it like a yam, though severe sickness is often induced by the use of it. The Karen name signifies "tree yam," and in Burmese it is called the "Penang yam," which shows whence it was imported. Malays have told him that much of the sago, and arrow root which comes from Penang and Singapore, is made from this plant, though the former is usually supposed to be prepared from the sago

palm; and Mr. Ranney informs him that arrow root is made from it at the Mauritius. It is said that an acre of ground, planted with the cassava tree, yields nourishment to more persons than six acres cultivated with wheat. It is of easy culture. Though Cassava, or Manioc, is obtained from the roots, these abound in a highly poisonous juice, which contains Hydrocyanic or Prussic Acid, so that very small doses produce the most dangerous consequences. The acid however is easily driven off by heat, and consequently there is no practical difficulty in procuring the nutritious substance in a pure state. In order to effect this the roots are peeled, well washed, and then ground between millstones till they are reduced to the state of paste. This is subjected to pressure for the purpose of depriving it as far as possible of the juice: the residue is placed in vessels over a brisk and regular fire, and continually stirred until it becomes dry; it then acquires a granular appearance, is gradually cooled, and afterwards packed in barrels, when it may be preserved for a great length of time. Half a pound of this substance daily is said to be sufficient to support a vigorous man. Tapioca is a preparation of Cassava, but contains less nutritive matter. Topioca consists almost entirely of starch.—*Eng. Cyc. p.* 793.

(4598) JANAPUM. Thin rope made of the fibre of Crotolarea juncea.

(4599) JAPANNED WARE. LACKERED WARE.

Marchandises de Japan. FR. | Japansch lakwerk DUT. Japanischie ware, GER.

Articles of every description, such as tea-trays, clock-dials, candlesticks, snuff-boxes, &c. that are covered with coats of Japan, whether plain or embellished, with painting or gilding. Birmingham is the grand mart of this manufacture, which is there carried on to a great extent.—*McCulloch. Faulkner.*

(4600) JASMINACEÆ, *Jasminworts*, a natural order of Monopetalous Exogens, deriving its name from the *Jasminum*, which forms one of its genera. It is one of the very few orders of that class with regular diandrous flowers, and is only to be mistaken for *Oleaceæ*, which have a valvate corolla, and which otherwise are scarcely different. Only five genera of this order have yet been discovered, the principal being *Jasminum* itself, which consists of a large number of species, sometimes fragrant, sometimes scentless, erect or twining, inhabiting the hot or temperate regions of Europe, Africa, and Asia, including Australia, but hardly known in America. The order is characterised by having opposite or alternate simple or compound exstipulate leaves. Monopetalous flowers, the segments of whose corolla are imbricated, and seldom correspond with those of the calyx; two stamens, and a superior 2-celled few seeded ovary. The species, about 100 in number, are chiefly valued for their fragrance; a few species have been regarded as bitter and astringent.—*Eng. Cyc. Vol.* III. *p.* 302.

(4601) JASMINUM. A genus of plants belonging to the natural order *Jasminaceæ*. It has a tubular 5 or 8 cleft calyx; a 5 or 8 parted corolla; stigma 2-lobed or bifid; berry didymous, having one of the lobes usually abortive; seeds without albumen. The species are usually twining shrubs, leaves simple or compound; petioles articulated; flower white or yellow.—*Eng. Cyc. Vol.* III, *page* 301. Many of the Jasmines are very pretty shrubs with white and yellow flowers, in most cases scented. The yellow varieties should be grown in pods, but being natives of the higher latitudes of the tropics, they often perish during the hot season, they require a loamy soil well manured, and perfect drainage. The white varieties grow well in the flower borders, requiring to be pruned occasionally, to keep them in proper form, this should be done after flowering.—*Riddell.* The species given in Icones, by Dr. Wight, are affine, 1255; angustifolium, 698, 700; arborescens, 699, 703; *aureum*, 1258; auriculatum, 700, 1254-55; *bignoniaceum*, 1858; bracteatum, 1248; brevilobum, 1254-55; chrysanthemum, 1258; Courtallense, 1252; elongatum, 702-701; erectiflorum, 1251; flexile, 1252-53; grandiflorum, 1257; hirsutum, 702; latifolium, 699, 703; *laurifolium*, 1247; Malabaricum, 1250; *myrtifolium*, 1247; ovalifolium, 1256; *pubescens*, 702; revolutum, 1258; rigidum. 1247; Rottlerianum, 1249; Sambac, 704; simplicifolium, 705; *tetraphis*, 1247.

(4602) JASMINUM ARBORESCENS. TREE LIKE JASMINE.

Munem-manus, HIND.

A beautiful large fragrant flowered species, cultivated at Ajmeer.—*Genl. Med. Top. p.* 172.

(4603) JASMINUM ANGUSTIFOLIUM. ROOT OF THE NARROW LEAVED JASMINE, Lin.

Caat mallika vayr. TAM. Adivie mallevayroo, TEL. | Kanana mullika, SANS.

J. angustifolium, Narrow-Leaved Jasmine, is a native of the Coromandel coast. It is a twining bright plant, with ovate or oblong leaves, smooth, of a shining deep-green colour. The flowers are large, white, with a faint tinge of red, star-shaped, having a peculiar but very pleasing fragrance. The bitter root of this species, ground small and mixed with powder of *Acorus calamus* root, is considered in India as a valuable external application in cases of ringworm. The plant being constantly covered with leaves of a bright deep-green, sometimes as small as those of Box, render it always beautiful and well adapted for screening windows and covering arbours in warm climates.—*Eng. Cyc.* Another Sanscrit name of the plant is Asphota.—*Ains. Mat. Med. p.* 74.

(4604) JASMINUM AURICULATUM: AURICULATED JASMINE.

Juhi, HIND.

A small sweet flowered species much cultivated at Ajmeer.—*Genl. Med. Top. p.* 172.

(4605) JASMINUM CHRYSANTHEMUM OR REVOLUTUM: CURLED FLOWERED YELLOW JASMINE.

Pela Chambeli, HIND.

Cultivated and is a very free flowerer and highly ornamental.—*Genl. Med. Top. p.* 172.

(4606) JASMINUM GRANDIFLORUM, CATALONIAN JASMINE.

Chambeli, Jaty, HIND.

Much cultivated at Ajmeer for the flowers.—*Genl. Med. Top. p.* 172. *J. grandiflorum* has opposite pinnate leaves, leaflets bluntish, the outer ones 3- to 5-confluent, buds horizontal. It is a native of the East Indies, and greatly resembles *J. officinale*, except in the size of the leaflets and in the exterior ones being confluent and the flowers larger and reddish underneath. Both this and the former species yield the true essential oil of jasmine of the shops. This species is very much prized by the natives of India; the large white flowers having a most powerful scent, and being in blossom throughout the year, are used as garlands on all festive occasions.—*Riddell.* This Catalonian, or Spanish Jasmine, is the most exquisitely fragrant species of the genus, and is very generally cultivated by both Burmans and Europeans.—*Mason.*

(4607) JASMINUM NUDIFLORUM Mr. Fortune tells us that, in the north of China there are a number of plants which have their flower-buds very prominently developed in autumn, so much so that they are ready to burst into bloom before the winter has quite passed by, or, at all events, in the first dawn of spring. Amongst these, Jasminum nudiflorum occupies a prominent position. Its yellow blossoms, which it produces in great abundance, may be seen not unfrequently peeping out from amongst the snow, and reminds the European stranger in these remote regions of the beautiful primroses and cowslips which grow on the shaded banks of his own land. Nearly as early as this the pretty daisy-like Spiræa prunifolia: the yellow Forsythia viridissima, the lilac Daphne Fortunei and the pink Judas-tree, become covered with blossoms, and make the northern Chinese gardens extremely gay.—*A Res. among the Chi. p.* 241.

(4608) JASMINUM ODORATISSIMUM. The yellow Jasmine; and elegant shrub with small shining leaves, flowers bearing a sweet scent, a native of Madeira, introduced into India.—*Riddell.*

(4609) JASMINUM OFFICINALE, Common Jasmine, is a Native of the South of Europe. It has opposite leaves, pinnate; leaflets ovate-accuminate; buds erectish. The plant is glabrous, the branches angular. Calycine segments 5, subulate; corolla white, 4 or 5-cleft, sweet-scented; the terminal leaflet is the longest. The common Jasmine has been a favourite wall-shrub from time immemorial. Its native country, as well as the date of its introduction, are unknown. Gerarde in 1597 says it was in common use for covering arbours. There are golden and silver-edged leaved varieties of the common Jasmine, as well as a double flowered variety.—*Eng. Cyc.* It is used generally for covering trellis work by Europeans. The natives grow it in bushes, and use the flowers at most of their festivals. It is propagated by layers; the plant does not require any particular care, further than watering.—*Riddell.* A perfumed oil, is prepared from this with the fixed oil of the *moringa*. Dr. Jackson has given an interesting account of this in a paper drawn up for the Indian Materia Medica and published by the Editor in the Journal of the Asiatic Society for 1839.—*O'Shaughnessy, p.* 436.

(4610) JASMINUM PUBESCENS. DOWNY LEAVED JASMINE.

Koond, HIND.

Is cultivated as a flower, and is very ornamental, but, it is curious that the flowers of Ajmeer, with a light soil have no scent, while at Hooshungabad in a stiff black soil the flowers in the mornings are highly odoriferous.—*Gen. Med. Top. p.* 172.

(4611) JASMINUM REVOLUTUM, AND OFFICINALE, the Common White Jasmine.

(4612) JASMINUM SAMBAC. Lin. Double Jasmine.

Mootya, HIND.	Kudda mulla, HORT. MAL.
Koday Mullie poo, TAM.	Bela, HINDOOIE.
But moogra DUK.	Navamallica, SANS.
Zam bak, PERS.	
Boondoo Mallie, TEL.	

This beautiful and very fragrant flower is commonly called by the English the double Moogrie.—*Ains. Mat. Med. page* 159. This Jasminum sambac, single flowered Arabian sambac, is a twining plant. Leaves almost jasmine, membranous, from cordate to oblong, acute or obtuse, glabrous; berries globular; branches, petioles, and peduncles downy. It is a native of the East Indies. The flowers generally form small trichotomous umbellets, white and fragrant The berries are black. A perfume, known as Oil of Jasmine, is obtained from this species.—*Eng. Cyc.* There are two varieties and one is *Jasminum Sambac, plenum*, the great double Arabian Jasmine. The rich lobed branches of this variety are studded all over like the snow-drop tree with lovely white flowers, the size of small roses, and delightfully fragrant.—*Mason.* The Arabian Jasmine is probably more universally cultivated than any other flower. The

common double variety is more generally seen, but the single flowered, with a twining habit is not unfrequent.—*Mason.* At Ajmeer the largest double variety is called, "hazarea mogra" and was brought to Ajmeer from Cawnpore. The single is called "motiga." The beautiful varieties are cultivated there called "Satha" with single and double flowers, which have the odour of fine green tea. These are probably the Jasminum scandens of Willdenow, —*Irvine's Med. Top.* In the fields in the vicinity of Foo-Chow-foo large quantities of Jasminum Sambac are cultivated. It is used to decorate the hair of the Chinese ladies and to garnish the tables of the wealthy. Mr. Fortune believes that all Chinese gardens, both in the north and south are supplied with this favourite flower from the province of Tokein. Various other shrubs such as Murraya exotica, Aglaia odorata, and Chloranthus inconspicuus, are grown for their blossoms, which are used for mixing with the tea.—*Fortune's Wanderings, page* 382.

(4613) JASMINUM SYRINGAFOLIUM. WILD JASMINE. There is wild climbing jasmine seen throughout the Tenasserim Provinces festooning the forests, and arching the pathways with its delicate flowers, like a wreath of snow flakes flung over the arms of a Canada spruce.—*Mason.*

(4614) JASMINUM UNDULATUM. The leaves of these are slightly bitter. The root of *J. pubescens* is thought to be elexiteric.—*Eng. Cyc.*

(4615) JASPER.

Jaspis, DUT.	Diaspro, IT.
Jaspe, FR.	Jaschma, RUS.
Jaspiss, GER.	Jaspe, SP.

This stone occurs usually in large amorphous masses, sometimes in round or angular pieces; its fracture is conchoidal, and its colours are various. It is usually divided into four species, denominated *Egyptian* jasper, *striped* jasper, *porcelain* jasper, and *common* jasper. It is sometimes employed by jewellers in the formation of seals. *McCulloch—Faulkner.* Jasper is a handsome stone for inlaid work, and admits of a high polish, but is not used as a gem. It is a siliceous rock, containing, according to Beudant, silica 93.57 per cent., peroxide of iron 3.98, alumina 0.31, lime 1·05. water 1.09. It is coloured red by the peroxide, and yellow or brown by the hydrate of iron. It also occurs of green and other shades. When striped with green, yellow, red, or brown, it is called *riband jasper.* When these colours are in irregular concentric zones, it is called *Egyptian jasper.* Another variety is called *ruin jasper,* when a variety of brown markings appear on a dark ground. Jasper is nearly equal to agate in point of hardness, and is subject to the same treatment as cornelian in the lapidary's art.—*Tomlinson.*

(4616) JATROPHA, a genus of plants belonging to the natural order *Euphorbiaceæ.* It has monœcious flowers: a 5-parted or lobed calyx; corolla 5-parted or absent; stamens 8 or 10, with unequal monadelphous filaments; styles 2, bifid or dichotomous: capsule 3-coccous.—*Eng. Cyc.* Nearly all the Jatrophæ are powerful cathartics. Fee cites *J. gossypifolia,* America, *J. glandulosa,* Arabia, and the *J. multifida,* or coral plant, (Avellana purgatrix, *grand ben purgatif*) a native of America and India, a shrub 8 or 10 feet high, replete with acrid bitter juice, with large pinnatifid glabrous leaves, the fruits slightly pyriform, about the size of a nutmeg; a single seed is said to be purgative Lindley says it is "one of the best of the emetics and purgatives, acting briskly without inconvenience, and the effects readily allayed by a glass of white wine." Dr. O'Shaughnessy, still considers it a very dangerous article.—*O'Shaughnessy, page* 558. Dr. Wight gives Jatropha *peltata,* 1196.; villosa, 1169

(4617) JATROPHA CURCAS. PHYSIC NUT. Vern.

Caat-amu-nak, TAM.	Napatain, TEL.
Bag Barendee, BENG.	

Grows in New Andalusia, Havanna, India. Fruit oval, size of a small nut, yellow or blackish, containing three whitish bivalve, monospermous seeds.—*O'Shaughnessy.* Physic-Nut is a very common small tree, or bush, on the coast of Coromandel. The bark is smooth and light ash-coloured: leaves scattered stalked, broad, cordate, 5-angled, smooth, about 6 inches each way; petioles round, smooth, 4 to 6 inches long; stipules absent; panicles terminal or from the exterior axils cymose, bearing many small yellow flowers. The male flowers at the extremities of the ramification on short articulated pedicels, and the female ones in their divisions with their pedicels not articulated. Bracts, a small one below each subdivision of the panicle, and generally one pressing on the calyx: calyx 5-leaved; corolla 5-petaled, campanulate, somewhat hairy; disc of 5 glandular bodies round the base of the filaments; filaments 6, the central one very thick, columnar, the 5 exterior ones filiform towards the base, adhering to the central one, all erect, and a little longer than the calyx; anthers 10, sagittate, equal: 5 supported by the large general filament, and 1 by each of the others. The leaves are rubefacient and discutient; warmed and rubbed with castor-oil, they are applied by the natives of India as poultices. The seeds are violently emetic and drastic; their expressed oil is reckoned a good application in itch and herpes, and also a little diluted, in rheumatism. The milky juice is considered detergent and healing; it dyes linen black. The oil boiled with oxide of iron forms a varnish used by the Chinese for covering

boxes. In large doses the seeds are energetic poisons.—*Eng. Cyc.* The physic-nut tree is often seen in cultivation in Tenasserim and its juice dyes linen black.—*Mason.* The leaves warmed and rubbed with castor oil are used as a poultice to hasten suppuration: seed excessively drastic. The milky juice boiled with oxide of iron makes fine black varnish. The same idea exists as to the acridity of the castor oil, namely, that the embryo is the source of this quality, and that by removing the embryo the nut becomes bland and alimentary; MM. Fee and Humboldt support this opinion. The physic nut is a powerful cathartic, one seed, or three or four drops of the expressed oil, being a sufficient dose.—*O'Shaughnessy, p.* 558. A beautiful pale yellow oil is procured from the seeds of the angular-leaved physic-nut. It is used by the natives in medicine and as a lamp oil. About 700 tons of this oil was imported into Liverpool in 1850 from Lisbon, for the purpose of dressing cloth, burning &c.—*Simmonds.* In the Dekhan, this plant is used as a hedge from its easy growth: it flowers in the rains.—*Riddell.*

(4618) JATROPHA GLANDULIFERA, is a native of the East Indies. The leaves about the extremities of the branchlets are alternate, petioled, and generally palmate; the lobes from 3 to 5, oblong, serrate, with each serrature ending in a short green glandular-headed bristle; stipules bristly, many-cleft, each division ending in a glandular head; panicles terminal, about as long as the leaves. Male flowers most numerous and terminal, small, of a pale yellowish-green colour. The female flowers few, and subsessile in the divisions of the panicle. The pale or whey colored thin juice, which exudes from a fresh wound, is employed by the Hindoos as an escharotic to remove flaws from the eyes. Common in gardens above Calcutta; *Roxb.*—*O'Sh. p.* 559.

(4619) JATROPHA GLAUCA. GLAUCOUS LEAVED PHYSIC NUT.

Addale or Authaulay yennai, TAM.

J. glauca is found in Arabia Felix. It has leaves from 3-5-lobed, mucronate, serrate, toothed; petioles naked; stipules palmate, with setaceous branched divisions, glandular at the apex. The seeds yield a stimulating oil recommended by the Hindoos as an external application in cases of rheumatic and paralytic affections.—*Eng. Cyc.* Seeds yield a stimulating oil, used as an external counter-irritant.—*O'Shaughnessy.* This, which in appearance approaches castor oil, seems to be but little known. It is fluid and light straw colored, and is procurable in South Arcot, where the plant grows in waste land. It is now chiefly used medicinally as a counter irritant, but if procurable in sufficient quantity seems likely to prove an useful oil.—*M. E. of* 1855.

(4620) JATROPHA MULTIFIDA. CORAL PLANT, is a native of tropical America. It has palmate 11 lobed smooth leaves, the segments wedge-shaped and pinnatifid; stipules setaceous, multifid; flowers corymbose, scarlet, with coloured pedicels. The seeds are one of the best of all emetics and purgatives, acting briskly, but without inconvenience; their effects are readily stayed by the administration of a glass of good white wine.—*Eng. Cyc. Vol.* III *page* 303. Though a native of America, the coral plant, with its brilliant carmine corymbs is considerably diffused in Maulmain grounds.—*Mason.* This shrub is common in almost all the gardens; and is known by its resemblance to the substance from which it is named. The seed is sometimes eaten by children, but is of a deleterious nature, and an emetic should be immediately administered. The inspissated juice forms a substance like caoutchouc. —*Riddell.*

(4621) JATAMANSI VALERIAN. JATAMANSI, BALCHUR: VALERIANA JATAMANSI. Roots of Nardostachys Jatamansi.

(4622) JAVA. In 1851, the aggregate value of Imports and Exports of the Island was £8,761,980. It has a population of 10,000,000, with 461 inhabitants to the square mile.—*Crawfurd.*

(4623) JET, BLACK AMBER, PITCH COAL.

Git, Zwarte-barnsteen, DUT.	Gagat, GER.
Jais, Jayet. FR.	Gagata, Lustrino, IT.
	Gagus, LAT.

Jet is found in detached fragments in the amber mines in Prussia, Germany, France, and Spain: it is also found at Whitby, Scarborough, and Yarmouth, and is also imported from Turkey. The finer and harder pieces are worked into brooches, armlets, studs, rosaries, necklaces, &c. It is also sometimes used as an ingredient in varnishes and cements.—*Faulkner.* Jet is a variety of bituminous mineral coal, harder than cannel coal, of a deeper black colour, and possessing a higher lustre. It receives a brilliant polish, and is worked in the same manner as alabaster. In jewellery, the use of jet in mourning ornaments is very considerable It can be turned with most of the ordinary tools, and worked with files and saws. Before the polishing, it appears of a brown colour, but after that process, it attains a beautiful and brilliant black.—*Tomlinson.* Jet occurs sometimes in elongated reniform masses, and sometimes in the form of branches, with a woody structure; fracture conchoidal; soft and brittle; specific gravity but little greater than that of water; lustre brilliant and resinous: colour velvet black, opaque. It is found in Saxony and also in the Prussian amber-mines, in detached fragments. The coarser kinds are used as fuel; it burns with a greenish flame and a strong bituminous smell, and leaves a yellowish ash.—*Engl. Cyc. Vol.* III. *page* 303.

(4624) JERUSALEM ARTICHOKE. This is a species of sun-flower, a native of South

America. It goes to seed generally in October and November, and may be raised from it, or by dividing the root, planting them the same as potatoes. They should be put down in January or February, and will require occasional watering until the rains, when they make their appearance. As the plants grow they must be well earthed up, and if very tall, may probably require to be supported with sticks. This vegetable is ripe as soon as the stalk withers, and the best method of preserving them is to let the roots remain in the ground,—that is, if the white ants and other insects do not attack them. If you are obliged to take them up, keep them in a safe place, in earth, watering them occasionally. To sow them, put either a half or a whole one, at a foot distance, in rows, the same as potatoes, and attend to them in like manner.—*Riddell.*

(4625) JERUSALEM SAGE. Phlomis.

(4626) JETEE OR CHITTEE FIBRE, "Rajmahal Bowstring creeper," grows there in dry barren places. Its dried milky juice serves as a caoutchouc. Its fibres are made into thread, twine, bow-string, and rope. It belongs to the family Asclepedeæ.—*Royle Fib. Pl.*

(4627) JETTAMANSI, SPIKENARD.

(4628) JETTIMAD, LIQUORICE ROOT.

(4629) JETTIMAD KA RUS, LIQUORICE JUICE

(4630) JHALL, NETS.

(4631) JHEELS. Near Churra, the common water plants of these Jheels are Vallisneria serrata, Damasonium, 2 Myriophylla, 2 Villarsiæ, Trapa, blue, white, purple and scarlet water-lilies; Hydrilla, Utricularia, Limnophila, Azolla, Salvinia, Ceratopteris, and floating grasses.—*Hooker, Him. Jour. Vol.* II. *p.* 309.

(4632) JEWELLERY. Workers in iron and steel could never have found difficulty in managing gold and silver, for which indeed the East has always been famous. Working in gold was familiar to the Egyptians before the exodus of Israelites. That the Hindoos have long been familiar with its applications we find in the hymns of Rig Veda, where golden armour and golden chariots, and decorations of gold and jewels, are frequently mentioned. The variety of ornaments and of arms which have been displayed show their skill in working it up. Mr. Hamilton sent from India a series of specimens of gold and silver in different stages, to show the process of making gold wire. The rose chain from Trichinopoly, and the snake chains sent by the Rajah of Vizianagrum, all displayed great skill in the workmen, as also the silver filagree work from Hyderabad, for which Cuttack and Dacca are most famous, and display greater delicacy and beauty than either Genoa or Malta. Much of the Indian jewellery being peculiar in form, and in the ways in which it is worn, is not much admired in Britain as the skill of the workmen otherwise deserved. The articles usually made in filagree work are bracelets, earrings, brooches, and chains, groups of flowers, uttardans, and small boxes for native uses. Mr. Taylor says, "the design best adapted for displaying the delicate work of filagree is that of a leaf; it should be drawn on stout paper, and of the exact size of the article intended to be made. The apparatus used in the art is exceedingly simple, consisting merely of a few small crucibles, a piece of bamboo for a blow-pipe, small hammers for flattening the wire, and sets of forceps for intertwisting it." The art of making gold wire, that is, silver covered with gold, is practised in various parts of India, as Dacca and Hyderabad, as well as Delhi and Benares. "Several varieties of gold and silver thread (*badla*) are made at Dacca, as *goolabatoon* for the embroidery of muslins and silks; *goshoo* for caps and covering the handles of chouries; *sulmah* for turbans, slippers, and hookah-snakes; and booiun for gold lace and brocades." Much fringe of various patterns is made, and thin tinsel stamped into various forms of flowers, or impressed with excellent imitations of jewels, such as flat diamonds, emeralds, and rubies. Many of the ornaments are made only for the poorer classes, for instance, imitations of precious stones, ornaments in pewter, in shell, and lac, and still simpler, a bracelet with straw to represent the gold, and the red seeds of *Abrus precatorius* in the place of garnets.—*Royle Arts. &c. of India. pages* 509 *and* 510.—The following are the names and uses of a few of the Jewels of Southern India:

Vunkee, or Armlet.
Jumpaloo, or Ear Jewel.
Kutree Paval, Ear ornament.
Vallels, or Bangles.
Nuthoo, Nose Jewel.
Moothoo Coopoo, or Ear ornament.
Patteel, or Bangles.
Coopy, or Head ornament.
Mayer Mootha, Ear jewel.
Jadabillay, or Head ornament.
Adega, Neck ornament.
Curdapoo, or Head ornament.
Thallysaman, or Head ornament.
Gaya or Geddy Gooloosoo, or Leg ornament,
Jaga Undoo, or Head ornament.
Cummul and Jemeeka.

(4633) JONESIA, a genus of Plants of the tribe *Cassieæ* and of the natural family of *Leguminosæ*, which was named by Dr. Roxburgh in honour of Sir William Jones, who, in the midst of his numerous other avocations, found time to pay attention to Indian plants. The species are few in number, and indigenous in the islands of the Malayan Archipelago, as well as the eastern frontier of Bengal, that is, in Silhet and lower Assam. They form trees which are highly ornamental from their handsome shining abruptly-

pinnate leaves, and from the showy nature of their crowded racemes of flowers.—*Eng. Cyc. Vol.* III. *page* 303.

(4634) JONESIA ASOCA, the best known species, is often referred to by Hindoo poets by the name which has been adopted by botanists to distinguish it as a species. Dr. Roxburgh says, and we can in a great measure coincide with him in opinion, "When this tree is in full blossom, I do not think the whole vegetable kingdom affords a more beautful object." Flora Indica II. p. 220.—*Eng. Cyc. Vol.* III. *page* 303. When Dr. Wallich found the Amherstia, it was growing beside a Jonesia, and though it be but little diffused over our garden plots, yet its symmetry, and numerous bunches of red and orange flowers certainly entitled it to companionship with that celebrated tree. Gaudama, it is said, was born under this tree; and within the fall of its shadow, he delivered his first harangue. "At the instant of his birth," say the Burman sacred books, "he walked seven steps, and with a voice like the roaring of the king of lions he exclaimed. 'I am the most excellent of men. I am the most famous of men. I am the most victorious of men."—*Mason.*

(4635) JUBBULPORE HEMP. Crotolaria tenuifolia, is a perennial plant a native of Coromandel, which grows to 6 or 9 feet high and yields the fibre known in England and Calcutta as Jubbulpore hemp. It is considered equal to Russian and bears a heavier weight.

Kind and quality of rope.	Size.	Government Proof.			Breaking weight.		
	Inches.	Cwt.	qr.	lb.	Cwt.	qr.	lb.
Oiled Jubbulpore Hemp, Artillery Traces, ...	3	36	0	0	43	2	0
Untarred do, superior four Strand, plain laid, ...	3½	42	0	0	83	0	0
Untarred Dhunchee (Aeschynomene Cannabina Rox), Sesbania aculeata, ...	3½	49	0	0	75	0	0
Pine apple fibre, ...	3¼	42	0	0	57	0	0

A good deal of the value of this plant is supposed to be the result of the climate and soil in which it is grown. See CROTOLARIA TENUIFOLIA.

(4636) JUGLANDACEÆ, *Juglands*, are a natural order of Apetalous Exogenous plants, consisting of trees or shrubs having eatable nuts and somewhat resinous leaves. The former are the walnuts and hickory nuts of the markets; the first produced by the genus *Juglans*, the latter by that called *Carya*. The leaves are alternate and pinnated; the flowers usually monœcious, those which are male collected in catkins. The calyx of the latter consists of a few scales attached obliquely to a single bract, and surrounding a variable number of stamens; that of the females is superior. The ovary is one-celled, and has one solitary erect ovule, which changes into a 4-lobed seed, with crumpled cotyledons, inclosed in a 2-valved nut, clothed with a fleshy epicarp. The Common Walnut (*Juglans regia*), a native of Persia, is well known for its excellent timber, from which musket-stocks (and formerly cabinet-work) are manufactured, for its agreeable wholesome nuts, and the sweet drying oil which they furnish when pressed. *Carya alba*, the White Hickory, bears nuts like those of the walnut, only smaller, smoother, and with a thicker shell, and furnishes a valuable tough elastic white timber much employed in the construction of carriages and other vehicles. Other species of Hickory are also eaten, especially the Pecan Nut, the produce of *Carya olivaformis*, a small and delicate sort. Although the fruit of these plants is eaten, it contains a purgative principle, which renders some of the species cathartic, as is the case with *J. cathartica* and *J. nigra*, two North American species; and even the common walnut participates so much in this quality, when the fruit is young, that a laxative conserve well known in domestic medicine is prepared from it. *J. nigra*, the Black American Walnut, is a tree of remarkable size and beauty. The species are chiefly found in North America, a few are East Indian, one species a native of Persia and Cashmere, another of Caucasus, and a third of the West India Islands. There are 4 genera and 27 species. —*Eng. Cyc.*

(4637) JUGLANS, a genus of Plants belonging to the natural order *Juglandaceæ*. All the species are large trees. The flowers are unisexual, and those containing the stamens and pistils are found on the same tree. The stameniferous flowers are arranged in cylindrical drooping solitary catkins, which are developed from buds borne by shoots produced the year previous to that in which the catkin appears. The calyx is composed of 5 or 6 scales, which are attached to a bractea at a distance from its base and tip. The stamens are from 18 to 36 in number. The pistiliferous flowers are solitary, or only a few in a

group, and are terminal on a shoot developed in the same year. The calyx is ovate, including the ovary, and adhering to it, except at the four-toothed tip. The petals are 4, small, and inserted into the free part of the calyx. The ovary has one cell, and one erect ovule. The stigmas are two or three, and fleshy, scaly, with glands. The fruit a drupe. The covering of the nut is a fleshy husk of one piece that bursts irregularly. The nut is woody, consisting of two valves. The seed single, erect, lobed, wrinkled. There are four species of *Juglans*, three of which are natives of North America and one of Asia. The genus *Carya*, to which the hickory-trees belong, was formerly included under *Juglans*, but was separated by Nuttall. The species of *Juglans* are much more rapid in their growth than those of *Carya*, and are furnished with only simple aments.—*Eng. Cyc.*

(4638) JUGLANS REGIA, the Royal or Common Walnut-Tree, Akrot; Char-mughz; is the oldest and the best known of the species Its leaves are furnished with from 5 to 9 oval glabrous obscurely-serrated leaflets. The fruit is oval, and seated on a short inflexible peduncle. The nut is rather oval, and uneven. It is a native of Persia, in the province of Ghilan on the Caspian Sea. It was also seen by Loureiro in the north of China; and Palsal, who saw it in Taurida and south of the Caucasus, supposed it indigenous there. The Walnut-Tree was known to the Greeks under the name of Persicon, Basilicon, and Caryon. It is uncertain at what time it was first cultivated in Europe, but it was cultivated by the Romans before the death of the emperor Tiberius. Its wood was much valued by the Romans, and the nuts were also eaten. There is no history of the intrduction of this tree into Great Britain, but it is now very commonly cultivated there, although it fails to propagate itself by its seeds. It is only however in the southern and middle parts of England that the walnut brings its fruit to perfection. The walnut, when full-grown, is a large handsome tree with strong spreading branches. Its trunk is thick and massive, and covered with a deeply furrowed bark; the branches are of a gray colour, and smooth. The leaves, when bruised, give out a very peculiar aromatic odour and in the heat of summer this scent is sometimes so powerful as to produce unpleasant effects on persons who approach these trees. The foliage is graceful and light, and of a bright yellowish-green colour, which contrasts well with trees having foliage of a darker shade. Its leaves are almost the latest to appear, and the first to fall. It grows very rapidly and vigorously in the climate of London, and trees will attain a height of 20 feet in ten years. It sends down into the earth a large tap-root, with numerous branches, and, on account of the size and strength of the root, there is no tree more able to resist the effects of wind, or better adapted for exposed situations. It is said that plants will not grow under its shade; this probably arises from the bitter properties of its leaves: when they are not allowed to accumulate, the shade of the walnut does not appear more injurious than that of other trees. The uses of the walnut are very various. Before the introduction of mahogany and other woods, the wood of the walnut was held in higher estimation than that of any other European tree. It is on this account that it was so extensively cultivated in England and on the continent three or four centuries since. The timber of the walnut is light, a cubic foot weighing when green 58½ lbs., and when dried scarcely 47 lbs. When the tree is young, the wood is white, and in this state very much subject to be worm-eaten; but as the tree grows older, the wood becomes more compact, and is of a brown colour, veined and shaded with brown and black. In France and Germany it is still much used by turners, cabinet-makers, joiners, coachmakers, and musical-instrument markers, who prefer the wood which has grown on poor hilly soils. The wood of the roots is the most beautifully veined. One of the most important uses of walnut-timber is the making of gun-stocks. For this purpose it is well adopted on account of its strong lateral adhesion, its lightness, and its not being liable to splitting or warping in the working. The demand for walnut-wood for this purpose was immense during the last war on the continent, and it was stated in 1806 that France required 12,000 trees annually for the making of guns. The government of France still maintains large plantations of walnut-trees for supplying her army with gun-stocks. In England the walnut has seldom been used except for the higher-priced fire-arms, but such was the demand for it for that purpose at the beginning of the present century, that single walnut-trees were sold for as much as 600*l*. This led to the importation of walnut-timber from the Black Sea, and also of the timber of the black walnut from America, so that the cultivation of the tree as timber is almost at an end in England. The walnut is of more value at the present day on account of its fruit than of its timber. In almost every stage of its growth the fruit of the walnut is used for the table. When young, green, and tender, it is pickled and preserved with the husks on. About the end of June they may be preserved with or without their husks. "The green and tender nuts," says Gerarde, "boyled in sugar and eaten as suckade, are a most pleasant and delectable meat, comfort the stomach, and expell poyson." When they are about half ripe, a liqueur is distilled from them, which is considered to possess medicinal properties. In August, before they are quite ripe, the French eat them in what they call 'cerneaux,' scooping out the kernel with a knife, and eating it with vine-

gar, salt, pepper, and shallots. When the nuts are fully ripe, which is generally at the end of September or the beginning of October, the kernel, deprived of its investing skin, is eaten in great quantities. As long as the skin can be easily removed they are a nutritious and healthy article of diet; but when they get dry, so that their skins stick to them, they become indigestible. In no part of England do they constitute an important article of diet, but in many parts of France, Spain, Germany, and Italy, people live during the season of their ripening almost entirely on walnuts. A great number of the walnuts consumed in England are of foreign growth. In 1831 there were imported from France and Spain 23,578 bushels, which then paid a duty of 2s. per bushel. As they are now free of duty, the importation is not registered. On account of the large consumption of the fruit, both as an article of diet at home and for exportation, the walnut-tree is still largely cultivated in many parts of the continent. The district of the Bergstrasse on the Rhine, between Heidelberg and Darmstadt, is almost entirely planted with walnut-trees. Evelyn states that such is the importance attached to the growth of this tree, that "in several places between Hanau and Frankfort in Germany, no young farmer is permitted to marry a wife till he brings proof that he is a father of a stated number of walnut-trees; and the law is inviolably observed to this day for the extraordinary benefit which this tree affords the inhabitants." The fruit of the walnut is commonly gathered by thrashing the tree with a long pole. By many this process is thought to be beneficial to the tree, and barren walnut-trees are often thrashed to make them bear. But although barren trees may be made to bear by reducing the excessive growth of their shoots by breaking them off, it is no proof that the same process is good for healthy-bearing trees. The natural process of separating the fruit from the tree is undoubtedly the best, and gently shaking the branches till the fruit falls has been recommended by many walnut-growers as much preferable to thrashing. The nuts should be gathered at the time they easily fall out from the husk, and then exposed to dry for a day or two in the sun. The best mode of keeping the nuts fresh for eating is to bury them in dry soil or sand, so deep as not to be reached by frost or the heat of the sun, or by rain: or they may be placed in dry cellars, and covered with straw. "When the nut is to be preserved through the winter for the purpose of planting in the following spring, it should be laid in a rot-heap as soon as gathered, with the husk on; and the heap should be turned over frequently in the course of the winter." (Loudon.) The albumen which constitutes the bulk of the seed of the walnut contains an oil, which is used in large quantities, especially

on the Continent. It is obtained by reducing the seeds to a pulp by means of a stone wheel and basin, and then expressing the oil, first without heat and then by the application of heat. The oil requires great care in keeping, as it becomes tainted by slight changes in the state of the atmosphere. That which is cold-drawn keeps best, and is alone used for the purposes of diet. It has however always the taste of the walnut, which is to some persons disagreeable. The oil obtained by heat is used by artists, and also for lamps. Artists use this oil in mixing white, or any delicate colour: and they prefer it on account of the rapidity with which it dries. In copper-plate printing also, in Paris, walnut-oil is considered indispensably necessary in order to obtain a fine impression, whether in black or in colours. For this purpose the oil is prepared in various ways, according to the several colours with which it is to be mixed. In all cases it is reduced in bulk by boiling or by setting fire to it, so as to reduce it to the required consistency. One bushel of nuts, it is said, will yield about 7 lbs. of this oil. The mass which is left after the oil is expressed is made into cakes, and used as food for sheep, and poultry, and in some places it is made into candles, which give a tolerably good flame. The husks and root of the walnut both yield a dye, which is much used by gipsies and theatrical performers for staining the skin brown. It is also used by cabinet-makers and joiners to stain white and yellow woods of a dark-brown or black colour, like that of the walnut. In the preparation of the dye from the husks they should be allowed to rot, and then boiled in water, adding to the decoction fresh water, according to the colour required to be produced by the solution. The sap of the walnut-tree contains a large quantity of saccharine matter; and in some countries the trees are tapped for the purpose of obtaining the sap, which by evaporation is converted into sugar. It is also in many parts of Europe and Asia fermented and made into wine, and a spirit is also distilled from it. The leaves of the walnut, as well as other parts of the tree, contain a large proportion of alkali in them and in some parts of France they are collected and burned for the sake of the potash contained in the ashes. The bark of the leaves, the husks, and the oil of the walnut have all been used in medicine, and had at one time a great reputation, All parts of the plant, excepting the albumen of the seed, posses a bitter principle, which acts as a tonic and an anthelmintic, and has been its great recommendation as a medicine. Cowley, in his 'Plants,' sums up the virtues of the walnut in the following lines:—

"On barren scalps she makes fresh honours grow.
Her timber is for various uses good:
The carver she supplies with useful wood.
She makes the painter's fading colours last.
A table she affords us, and repast.
E'en while we feast, her oil our lamp supplies.

The rankest poison by her virtues dies;
The mad dog's foam and taint of raging skies.
The Pontic king, who lived where poisons grew,
Skilful in antidotes, her virtues knew."

Anglers employ an infusion of the leaves or husks for pouring upon the earth, in order to procure worms, which it speedily brings to the surface.—*Eng. Cyc.*

(4639) JUGLANS TRICOCA.

Ta-soung-let-wah, Burm.

Scarce, but found on the banks of the streams in the Pegu district. It is a hard strong timber. Wood, white colored, adapted to every purpose of house-bulding.—*McClelland.*

(4640) JUJUBES. A fruit of the plum kind, produced in the South of Europe, Persia, and other countries. The Asiatic is much darker than the European kind, which is of a reddish yellow colour. The best are fresh, plump, and well dried. The term is also applied to a composition sold by confectioners, consisting of gum-arabic, sugar, &c., and used to allay coughs, colds &c.—*Faulkner.*

(4641) JUMALGOTA. Croton Tiglium. A small tree, leaves alternate ovate cordate, from three to five inches long and two or three broad; yields the croton oil.—*Jaffrey.*

(4642) JUNCACEÆ. Rushes. "The *Juncaceæ*, or true rushes, are insipid and inodorous; several are employed for mechanical purposes only, as the common rush, for making mats, baskets, and the bottoms of chairs, while the pith is employed for the wicks of rushlights. *Juncus effusus*, which is the common European species, is, according to Thunberg, cultivated in in Japan for making floor-mats. *J. glaucus* a European species found in the Himalayas, and closely allied to *J. effusus*, might be employed for all the purposes of the common rush." ('Illust. Himal. Bot.,' p, 401.) Rushes are found in moist places on the mountains of India. —*Royle, Fib. Pl. p.* 60.

(4643) JUNCUS, a genus of Plants belonging to the natural order *Juncaceæ*. This genus is distinguished by its inferior perianth, composed of 6 glumaceous leaves; its 3-celled, 3 valved capsules, the seed bearing dissepiments of the valves being in their middle. The species are numerous, and are found mostly in moist, boggy situations in the colder parts of the world; are however inhabitants of tropical regions.—*Eng. Cyc. Vol.* III *p.* 309. Wight gives J. Lamprocarpus.

(4644) JUNIPER BERRIES.

Hub-ul Hoober, Arab.	Baies de Genievre, Fr.
Geneverbessen, Dut.	Cocole-di-Ginepro, It.
Wacholder-beeren, Ger.	Embro, Sp.

The well-known fruit of the *Juniperus communis*. These berries have stimulating and diuretic properties, and are an article of the *Materia Medica*, but are chiefly used in the distilleries in England and Holland for flavouring Gin or Geneva.—*Waterston.* The berries which are procurable in the Indian bazars, are supposed to be brought from the Himalayas and Cabool.—*Faulkner.*

(4645) JUNIPERUS, a genus of hardy evergreen woody Plants, belonging to the natural order *Coniferæ*. Its distinctive character consists in its female fructification being succulent, consolidated, and reduced in the number of its parts below what is usual in the order to which the genus belongs. Like other *Coniferæ*, its fruit is composed of scales representing carpels spread open, and collected in a spiral manner round a common axis. But they are not more than six in number, generally three, and when ripe are fleshy, and consolidated into a body resembling a drupe. In the language of the Pharmacopœia they are berries, in that of botanists they are termed *Galbuli*. About 20 species are known, *J. excelsa* and *J. Chinensis* are handsome hardy trees; *J. Lusitanica*, the Goa Cedar, is also of great beauty, because of its drooping habit and light gray branches, but it will not live long in England, except in the warmest of the southern counties; and *J. Phœnicea* is a handsome bush; the others are of little moment.—*Eng. Cyc.*

(4646) JURIPERUS CHINENSIS. This low spreading shrub has been brought from China and cultivated in gardens.—*Eng. Cyc.*

(4647) JUNIPERUS COMMUNIS, the Common Juniper, is a common bush, with long, narrow, sharp-pointed leaves, which are concave and glaucous on the upper side, but convex and green on their under, and with blackish fruit. It grows wild in all the northern parts of Europe, and, as is said, in North America also and the north of India, but it is doubtful whether the plants called Juniper by travellers in the Himalaya Mountains are not some other species. Occasionally the Juniper becomes a small tree. The fruit is used in considerable quantities in the preparation of gin, and in medicine as a powerful diuretic; a kind of beer called genevrette is also obtained in some parts of France by fermenting it with barley. The words 'gin' and 'Geneva' are derived from the French name of this species Genevre. Oil of Juniper, obtained from the *Galbuli*, is said to be a useful diuretic.—*Eng. Cyc.* According to Dr. O'Shaughnessy, the Common juniper, was found by Captain Webb on Netee Pass, called *bilhara, pudma, pumaroa;* and by Mr. Inglis in Kunawur—3 to 6 feet high, forming a dense, diffuse, irregular bush, occasionally tree-like, and attaining an elevation of 20 feet. Odour of the leaves agreeable and balsamic, of the berries also agreeable, taste of the leaves resinous, rather bitter; of the berries sweet, aromatic, slightly saccharine, hot, and rather bitter. The berries

(*Abhul* and *Hoober*,) in bazars are considered diuretic and emmenagogue; brought from the Himalayas and Cabul. *Arkonus* and *baratee* are assigned as Greek names.—*Royle*, *p* 352. The berries alone are now employed in medicine; these contain sugar, mucilage, and a little essential oil. The oil is white or yellowish, light, very liquid, of hot and acrid juniper taste, and very strong smell; the extract of the berries is called a "Rob." The oil is prepared on the large scale in Holland, and is often adulterated with turpentine. The chief consumption of juniper berries is, however, for the flavouring of the spirit called *gin*. Besides its stimulating and narcotic properties, *gin* is also acknowledged to be a powerful diuretic.—*O'Shaughnessy*, *p*. 620.

(4648) JUNIPERUS EXCELSA, is according to Royle, the Himalayan cedar.—*O'Shaughnessy*, *page* 620. Juniperus Excelsa, forms a fine tree; and is used in Britain as an ever-green.—*Eng. Cyc.*

(4649) JUNIPERUS RECURVA. The weeping blue juniper (*Juniperus recurva*, Deschoo"), and the arboreous black one (called "Tchokpo") yield beautiful wood, like that of the pencil cedar, but are comparatively scarce in Sikkim.—*Hooker Vol.* II. *p*. 45.

(4650) JUNIPERUS SPHÆRICA. On one of Mr. Fortune's excursions amongst the hills he met with a curiously formed tree, which at first sight seemed to confirm the old Virgilian tale of apples growing upon plane trees. It was one of those junipers which grow to a considerable size in the north of China, and which the Chinese are fond of planting round graves.—*A Res. among the Chi. p.* 68.

(4651) JUNK. A Malay and Javanese word applied to the larger craft of the Archipelago, used both in war and for commercial purposes. The word is properly Ajong or Jong corrupted by the Portuguese into Junco which the English have improved into Junk, and apply to the larger Chinese vessels. The Chinese word for the vessels we call Junks, is Wang-kang.—*Crawfurd.*

(4652) JUREMA BARK. An astringent substance, the product of the *Acacia jurema*, a native of Brazil.—*Faulkner.*

(4653) JURKUNDALOO, Kundaloo; and Kubra, a large nettle, growing in the northern and middle parts of the Himalayas. It grows about eight or nine feet high; and the natives make ropes of the fibre, for tying up their cattle and snow sandals.—*Royle Fib. Pl.*

(4654) JUSSI FIBRE, and striped Jussi dresses from Manilla, were exhibited in the Exhibition of 1851; the plant yielding the fibre is not known.—*Royle Fib. Pl.*

(4655) JUSTICIA, a genus of Exogenous Plants belonging to the natural order *Acanthaceæ*. The species of this genus inhabit all the tropical parts of the world, preferring however damp woods to dry and open plains. It is especially in the forests of Brazil and India that they occur. Many of them are never woody, some are bushes or small trees, and a small number are valued by gardeners as objects of ornament. As limited by Linnæus the genus comprehended a very discordant collection of species; modern writers have accordingly broken it up into many new genera. As now limited, *Justicia* itself scarcely contains a plant of any importance. As among the species now removed from *Justicia* to other genera there are some which are useful as medicinal agents, especially in India, it may be as well to mention them here, instead of referring to genera which are not yet generally known. Thus *J. Adhatoda*, celebrated in Sanscrit works by various names, as Vidiumatri, Vasika, &c., has been called *Adhatoda Vasika*, and is chiefly esteemed as a demulcent in coughs. *J. nasuta* is now *Rhinacanthus communis*, and is much employed in Indian medicine, especially for the cure of ringworm and other cutaneous affections, mixed, according to Dr. Roxburgh, with lime-juice and pepper. It is also one of their remedies for snake-bites, but is no doubt inefficacious for such purposes. *Andrographis* (formerly *Justicia*) *paniculata* is the best known and probably the most valuable of all, as one of its names, Muha-tita, implies Chief, or King of Bitters: it is also very commonly called Kalup-nath, and well known to Europeans in the peninsula of India by the name of Creyat, or Kreat, and has been prescribed with benefit as a bitter in this country. It forms one of the ingredients of the Drogue Amere, which is well known in India, and at one time obtained considerable repute as a cure for cholera; but it can be useful only as a stimulant and tonic—*Eng. Cyc.* Lindley also quotes *J. pectoralis*, as stomachic. *J. biflora*, and *Acanthus mollis*, having emollient leaves are used for poultices, (*O'Shaughnessy*, *p* 482.) and Wight gives J. linida.—*Gen. Med. Top. p.* 124.

(4656) JUSTICIA ADHATODA. Malabar Nut Justicia. Now Adhatoda Vasika.

Arus, Alusa Bakus, Vasooka, Hind.

This plant, now become Adhatoda vasika, grows abundantly wild: and common all over India. Leaves are used at Ajmeer, and are considered diaphoretic and sedative, and used in cough prescriptions. The root is used in Ceylon as an emmenagogue and to cause abortion. The charcoal of the plant is used to make gunpowder.—*Irvine's Top. of Ajmere pp.* 124, and 173.

(4657) JUSTICIA COCCINEA.—This is a species bearing a small pink flower. The leaves are of a reddish colour underneath. It is said by the natives that the root is an antidote to the bite of a snake, and that it is the root sought after by them when bitten by the cobra.—*Riddell.*

(4658) JUSTICIA ECBOLIUM. *Roxb. Fl. Ind. i.* 114.

Jati, Oodoo-Jathe. HIND.

A native of the Indian forests, said to be diuretic. Flowers pale blue, tube very long and slender. A shrubby plant.—*O'Shaughnessy.*

(4659) JUSTICIA GANDURUSSA, WILLOW LEAVED JUSTICIA. Lin.

Jugut-mu Kali-Shumbali, HIND	Caur Noochie, TAM. Neela Nirghoondie, SANS.

A handsome shrubby plant with bark of a dark purple hue very smooth, and in some varieties green, flowers during the rains, it grows readily by cuttings or slips: the leaves when rubbed have a strong and not unpleasant smell; they are roasted and given by the natives in chronic rheumatism.—*Riddell.* It is cultivated in the Kotah gardens; also found in Fakeer's plots. —*Genl. Med. Top p.* 172. Ainslie tells us it is used by the Vitians in decoction, in chronic Rheumatism attended with swellings.—*Ains. Mat. Med. p.* 73.

(4660) JUSTICA NASUTA. WHITE-FLOWERING JUSTICIA. It is now called Rhinacanthus communis.

Kabuter ke jhar ka jurr, HIND.

A shrubby plant with white flowers in axillary and terminal panicles; grows spreading along the ground. The leaves are bruised and used by the natives for curing ringworm.—*Riddell. Genl. Med. Top. page* 173. Found in the native gardens as a flower. The flowers are sold along with those of Jasmine, and the root used in medicine as an excitant.

(4661) JUSTICIA PICTA. PAINTED JUSTICIA.

Soorkh-Vasooka, HIND.

This is a very ornamental and handsome variegated shrub, bearing red flowers, having green, leaves with large white spots fringed with green, and some varieties with red and dark red spots. The leaves are used for the decoration of the dessert after dinner, and other ornamental purposes: few leaves can be found on which some grotesque resemblance to the human countenance may not be fancied or traced.—*Riddell. Genl. Med. Top. p.* 173.

(4662) JUSTICIA PANICULATA. NAT. CREYAT. This plant grows wild in the southern parts of India. It is highly prized as an excellent stomachic. Seeits present name ANDROGRAPHIS PANICULATA.

(4663) JUSTICIA VERTICILLATA. ERECT JUSTICIA.

Kustoola, HIND.

Found in the Kotah jugles.—*Genl. Med. Top. p.* 173.

(4664) JUTE. JEW'S MALLOW. (Corchorus Olitoreus and C. Capsularis.)

C. Olitoreus.

Sans. Putta, BENG. Pat: fibre, JUTE.	Cloth, TAT. Chotee, megila, VERN.

C. Capsularis.

Isbund, HIND.	Ghi-nalita pat fibre Naltapat, BENG.

There is a variety called by the natives Teetah Pat. This fibre has long been known in India, in the manufacture both of cordage and cloths, but it was only during the past fifteen years that it has come to be used in England. It is the product of the two distinct plants above named: both of them common all over India, and Ceylon and China, are cultivated for their leaves, and under shoots, as pot herbs, and for their fibres. The C. Olitoreus, is the Jew's mallow, and is supposed to be the plant alluded to in Job, XXX, 4. There is a variety which the natives call Bem Pat. Some of the Jute lately imported into England, has been twelve feet in length, in bales of about 4 cwt. bound round with ghunny cloth. Jute is easily spun: It is now much used to mix with codilla. It is made into "Ghunny"; cloth (*Megili*), cordage, and paper and well bleached samples of damask have been seen manufactured from its fibres. Cloth made of Jute is said to be more durable than that fabricated from cotton. It brings, according to quality from £13 to £22 per ton, in the English market. The fibres are subdivisible into very fine fibrils, which are easily spun: they are long, soft and silky, and under the microscope, cannot be distinguished from those of flax, to all the purposes of which the jute fibre is applicable. When prepared by steeping, the plant requires long maceration, a fortnight or three weeks being scarcely sufficient for it. The chief sites of its cultivation in the Bengal Presidency, are Malda, Purnea, Natore, Rungpore and Dacca, and four varieties are distinguished, *Pat, Tasa, Mesta and Coshta.* Merely local names as at Jungpore the names given to Jute are, Ghore Sun (probably Hibiscus) 2 *Paut* 3 Cooch Murda Paut and 4 Amleeah Pat, (probably Crotolaria). In the culture the land is prepared as for rice, the plants are weeded when a foot and a half high, and it is cut close to the roots when it has flowered, and before the seeds are ripe, a few plants being left to allow the seeds to come to maturity. After the plants are cut down, their tops are clipped off, and fifty to a hundred tied together. These bundles are laid in a shallow tank and weighed and allowed to remain for eight or ten days, being daily examined to ascertain that they are not unduly rotted. When the bark is found to separate and the stalk and fibres become soft, the bundles are opened; and five or six stalks taken in the hand at a time, by the person standing in the water, who breaks off about two feet of them from the bottom; the bark, which has become soft like thread is held in both lands, and the

stalks are taken off. The fibres are separated by mere washing, are dressed and exposed to the sun to dry, by hanging them over bamboos. They are afterwards partially cleaned, and finally made up into bundles of from one to two maunds, for the market. The culture of Jute has of late years greatly improved in many places; the produce is stated to be from 400 lbs. to 700 lbs. per acre. Jute has been noticed, which, see at length under the article CORCHORUS.

K.

(4665) KACOOTA KALUNG.

Kacoota kalung, TAM.

This root Dr. Ainslie had never seen, nor could he learn that the Botanical name of the plant has been ascertained.—*Ainslie, p.* 249.

(4666) KADOLL. A rather hard, fine, close grained, heavy Ceylon wood. Specimen, much worm-eaten.

(4667) KADOMBAIRIA. A rather hard, fine, close-grained, somewhat, light Ceylon wood; its surface curiously veined.

(4668) KADOOMBA. A soft, though fine, close-grained, and rather light Ceylon wood.

(4669) KÆMPFERIA, a small genus of India *Scitamineæ*, or *Zingiberaceæ* of some authors, of which the species are indigenous to the islands of the Archipelago and the southern parts of the continent of India, as Bengal and the districts on its eastern frontier. All are furnished with tuberous roots like the turmeric and ginger plants. The spikes of the flowers are short and rising from the root, in some species before, in others with, and nestled among the leaves; all are highly ornamental, and *K. rotunda*, called by the natives Bhooi Chumpa, or Ground Chumpa, is much cultivated in gardens on account of the beauty and fragrance of its flowers. It was supposed to yield the round Zedoray of the shops, but incorrectly, as Dr. Roxhurgh thinks, since he considers his *Curcuma Zedooria* to be the plant. So *K. Galanga* was, equally incrrectly, long supposed to yield the Galanga of the shops. It is a native of the mountainous districts beyond Chittagong, and there called Kumula, and is cultivated by the Mugs; by them it is sold to the people of Bengal, who use it as an ingredient in their betel. The roots possess an agreeable fragrant smell, and a somewhat warm, bitterish, aromatic taste. The Hindoos use them, according to Dr. Roxburgh, not only as a perfume, but also medicinally. The roots of *K. angustifolia* are, according to the same authority, used as a medicine for cattle by the people of Bengal. Dr. Wight gives Kæmpferia (Vol. VI, page 15) Galanga 899; rotunda 8029; in Icones.

(4670) KÆMPFERIA CANDIDA. WHITE KÆMPFERIA. During the dry season, a white-flowered species of kæmpfera with a yellowish limb, is often seen lifting its crocus-like flowers without a single leaf, on the most arid spots in the jungles of Tenasserim.—*Mason.*

(4671) KÆMPFERIA GALANGA. GALANGA KÆMPERIA. Roxb. i. p. 15.

Chundra moola, BENG,

Common all over India. Rhizoma fleshy, tuberous, with fleshy fibres; the roots are agreeably fragrant, and of warm bitterish aromatic taste. Notwithstanding its specific name, it is not the source of the true *galanga* root of the druggists, a drug now known to be the produce of the *Alpinia galanga.—O'Shaughnessy, p.* 650. The roots of this plant may be often seen attached to the necklaces of Karen females, for the sake of their perfume. They also put them with their clothes, and use them to a small extent medicinally.—*Mason.*

(4672) KÆMPFERIA ROTUNDA, FRAGRANT KÆMPFERIA, Roxb. i. p. 16.

Booi Champa, BENG.

This species is cultivated all over India, and was long considered to produce the *Zedoaries.* Fee still refers them to it. But Lindley, with most other writers of authority, states that this article is the root of the *Curcuma zedoaria.—O'Shaughnessy, page* 650. This is the finest species of the genus, and is cultivated by amateurs for its beautiful sweet-scented blossoms. A nearly related species is indigenous in the Karen jungles.—*Mason.*

(4673) KAI MOOLINGHIE, TAM. This pot vegetable Dr. Ainslie had never seen but he understood that the upper and edible part of the plant has somewhat the taste of a radish; the root is not eatable.—*Agriculturists' Nomenclature, Vol.* II. *page* 240.

(4674) KAKRASINGHEA, is officinal with both Hakims and Hindoo doctors at Lahore. In the Materia Medica of the latter, its use has been handed down from olden times. These are vegetable excrescences and probably produced by the deposit of eggs of a certain insect on that kind of Rhus which is found in abundance in the north-west of Hindostan.—*Thirty five years in the East, Dr. Honig. p.* 335.

(4675) KALADANA, OR MIRCHAI. Seeds of Pharbitis cærulea, Indian substitute for jalap.

(4676) KALA KUSTOORIE. Abelmoschus Moschatus. Musk Okro.

(4677) KALA NIMUK. Black salt is made by pounding together five seers of suji khar, two seers of dried anola fruit, and one maund of common salt, adding water, and boiling for some time: is considered to promote digestion: is much eaten: used in many mesalihs.—*Gen. Med. Top. p.* 144.

(4678) KALAN. MUSHROOM. Agaricus campestris. Lin.

Kalan, TAM.	Poota ghonkooloo, TEL
Kootay ke chitrie, DUK.	Surpachitra, SANS,

(4679) KALI, the name of the maritime plant from the ashes of which soda is obtained by lixiviation; and from the name of this plant, with the Arabic article *al*, is derived that of a class of substances possessing peculiar properties, which are called alkalies. Kali was also formerly employed to designate the alkali Potash. —*Eng. Cyc.*

(4680) KAM ALOO, HIND. Dioscorea Alata. —Winged Yam. Tubers oblong, brown on the surface, internally white of a great size. Besides the tubers, the proper roots of all those plants are fibrous, springing chiefly from and about the union of the stems with the tubers, and spreading in every direction.—*Riddell.*

(4681) KAMARUNGA, fruit of Averrhoa carambola.

(4682) KANARI OIL. Mr. Crawfurd in his History of the Indian Archipelago speaks most favorably of an oil obtained from the Kanari, a tree which, he says, is a native of the same country as the sago palm, and is not found to the westward though it has been introduced to Celebes and Java. He has not been able to distinguish its botanical name; but Mr. Crawfurd describes it as a large handsome tree and one of the most useful productions of the Archipelago. It bears a nut of an oblong shape nearly the size of a walnut, the kernel of which is as delicate as that of a filbert, and abounds with oil. The nuts are either smoked and dried for use or the oil is expressed from them in their recent state. It is used for all culinary purposes and is purer and more palatable than that of the coco-nut. The kernels mixed up with a little sago-meal are made into cakes and eaten as bread. —*Simmond's Comml. Product, page* 546.

(4683) KANDLE, the Tamil name of a Ceylon tree which grows to about fourteen inches in diameter, and twenty-four feet high. It is used at times in house-work.—*Edye. Ceylon.*

(4684) KANJUREA, the Tamil name of a Ceylon tree which grows to about sixteen inches in diameter, and ten or fifteen feet high. The natives use it at times in house-work. It produces a fruit which is used as a medicine.—*Edye. Ceylon.*

(4685) KANOJ. Seed of a small tree brought from Pali and Delhie: considered heating and constipating taken as a condiment, and also given as a medicine in diarrhœa: one seer for two rupees.—*Gen. Med. Top. p.* 141.

(4686) KANOOR. Sheathing bases of the leaves of Crinum asiaticum, v. toxicarium.—*Ben. Phar.*

(4687) KAOLINS are porcelain earths, procurable in great abundance in Southern India, at Ahtoor in Salem: near Chingleput: also near Little Mount, and at Trivatoor and Nuttum in Chingleput, at Triputty in North Arcot: at Bangalore, Cuddapah, Chittoor, Dindigul: Bellary, Neilgherries, Bimlipatam; Travancore; between Vellore and Arnee. Madras: Coringa; Madura, Chicacole;

Dirty yellowish white kaolin, ...	Procurable near Chingleput.
Fawn coloured kaolin,...	Procurable near Salem.
Felspathic kaolin,.....	Procurable in Trivatoor and Chingleput.
Felspathic kaolin,.....	Procurable in Triputty Hill.
Fine white kaolin, ...	Procurable in Travancore.
Greenish yellow kaolin,	Procurable in Bangalore.
Kaolin or porcelain earth,	do.
Kaolin or porcelain earth,	Procurable in Cuddapah.
Kaolin or porcelain earth,	Procurable near Chittoor.
Kaolin or porcelain earth,	Procurable at Dindigul Hills.
Kaolin, ...	Procurable in Salem.
Magnesian kaolin, ...	Procurable near Vellore.
Magnesian kaolin, ...	Procurable in Chingleput.
Magnesian kaolin, ...	Procurable from the cotton soil—Bellary.
Pink kaolin, ...	Procurable in Neilgherries.
Puce coloured kaolin, ...	Procurable in Bangalore.
Red kaolin, ...	Procurable near Salem.
Silicious kaolin...	Procurable near Nuttum Chingleput.
Silicious kaolin, ...	Procurable near the little Mount—Madras.
Talkose kaolin,.....	Procurable near Bimlipatam.
White kaolin, ...	Procurable at Ahtoor near Salem.
White kaolin, ...	Procurable between Vellore and Arnee.
White kaolin, ...	Procurable at Madras.
White kaolin, ...	Procurable in Chittoor.
Kaolin	Procurable in Coringa.
White kaolin, ...	Procurable in Madura.
White kaolin, ...	Procurable in Chicacole.
White kaolin (composed of decayed ice spar and soap stone, ...	Procurable near Salem.
Cream coloured kaolin,...	Procurable in Ahtoor and Salem.
Cream coloured kaolin,...	Procurable in Neilgherries.

Kaolin or Porcelain earth has been observed in parts of Malabar.—*M. C. J.*

(4688) KARANGALLE, the Tamil name of a Ceylon tree which is more generally known to the English by that of "Ebony." It may be procured at Trincomalee in great quantities, but that which is near the water-side is very small. The largest may be about nine inches in diameter, and from ten to twelve feet high: it is used for chairs and house furniture. On the Malabar coast this tree is named Charu Maram. It grows to about ten inches in diameter, and from fifteen to twenty feet high, but the black heart of it does not exceed seven inches in diameter. In the north part of Malabar, in Canara, it is named Acha Maram, by some of the Kanatakas Nugagha. The natives use the young buds, leaves, and flowers of this tree in cases of flux and in inflammation of the liver, for the cure of which it is said to be most useful. At Point de Galle, a great deal of the Ebony and Kalamandel wood is exported to England.—*Edye, Ceylon.*

(4689) KARKAKARTAM VYER. CLITORIA TERNATEA.

(4690) KARTUMA, the Tamil name of a Ceylon tree which is considered to be the Wild Mango. This tree grows to about two and a half or three feet in diameter, and twenty-four feet high. It is used for canoes, native boats, &c. The fruit is very acid, and is sometimes made use of by the lower class of natives in cookery.—*Edye. Ceylon.*

(4691) KARTU NEDENARI, the Tamil name of a Ceylon tree which grows to about fourteen inches in diameter, and fifteen feet high. It is used by the natives for their huts. It is not very durable, and is of little value.—*Edye, Ceylon.*

(4692) KARTU TANGIE, the Tamil name in Ceylon of the jungle cocoa-nut. It grows to about twenty inches in diameter, and twenty five feet in height. The fruit of this tree is of no use, and the trunk is of little value.—*Edye, Ceylon.*

(4693) KARTU TODA, the Tamil name in Ceylon of the wild or jungle orange tree; it grows to from ten to sixteen inches in diameter, and ten feet in height. It is a very handsome yellow wood, its fruit is of no use.—*Edye, Ceylon.*

(4694) KARUCUE WAEH, the Tamil name of a Ceylon tree which is very close grained and heavy. It is used for the frames of native vessels, and is considered a good strong wood. It grows to eighteen inches in diameter, and twelve to fourteen feet in height.—*Edye, Ceylon.*

(4695) KARUDU, the Tamil name of a Ceylon tree which the natives use in boat-work. It is not durable, and is of little value.—*Edye, Ceylon.*

(4696) KATAMANAK.

Katamanak, TAMIL. | Miniley, PORT.

This tree grows to about thirty feet in height, and two feet and a half in diameter. It can be obtained in great quantities. It is used by the natives for planks in vessels, and is considered valuable; but from what I have seen of the stock in a store at Trincomalee-yard, I am of opinion that it is only applicable to inferior purposes in the dockyard and ships.—*Edye, Ceylon.*

(4697) KATHALAY is the Tamil term applied to the Agave vivipera, the manufacture of fibres from which has been successfully accomplished in the Bangalore jail. The name of "silk grass" also is applied to these fibres as well as to those of the A. yuccæfolia. The fibres of the A. vivipera are said to equal in strength the best hemp. The A. cantala of Roxburgh is supposed to differ little from the A. Americana and its fibres could be equally turned to use. (*Syn.* Pita. Pita Kalabuntha. Cantala. Bans-keora.) As the economic uses to which all the parts of a plant can be put, are of much importance to the success of all agricultural operations, we may mention that, *Fourcroya gigantea* (Ventenat), known as the Sheemay Kathalay, is not an Aloe, although its fibre is usually so denominated. The fibrous plants here described are not natives of India, but have mostly been introduced from America. They are capable of enduring a great variety of climates, and are all rapidly extending over India, but they are not yet sufficiently abundant, the Fourcroya gigantea, especially, to yield the fibre in large quantities. F. gigantea produces a fibre five or six feet long, somewhat finer than that of the Agave fibres, but possessing similar properties The F. gigantea is less abundant than the Agave, but is as easily propagated, and its leaves attain a length of ten feet.

(4698) KATHBEL. Wood-apple.—Feronia Leaves and fruit of Feronia elephantum.

(4699) KATTUKENDE. A hard, fine, rather close-grained, heavy wood.—*Gen. Med. Top. page* 142.

(4700) KASNI KA JUR, Cichorium endivia, Succory Root, considered warm, stimulating, and febrifuge given in "manjus," the diluent taken preparatory to purging, the seed is used in sherbets, is plentiful about Ajmeer.—*Gen. Med. Top. p.* 142, *Cichorium intybus.* Chicory. Wild succory, Κιχωριον, Diosc. Europe. Leaves radical, oblong, deep green, deeply lobed, lobes toothed, cauline leaves small, sessile, and very entire; inodorous, taste very bitter. The Indian species called *Kasni,* scarcely differs from the *C. Intybus.* The roots contain nitrate and sulphate of potash, mucilage, and some bitter extractive principle. An infusion of succory mixed with syrup causes a thickening of the liquid, and a substance is formed termed by the discoverer, M. Lacarteria—SACCHO-CICHORING GUM.—*O'Shaughnessy, page* 408. Wild Chicory vegetates luxuriantly during the summer in Cashmere, and in the Punjab during the

cold season. The Hakims use the Succory-seeds, which are consequently kept in the bazars.—*Honigberger, page* 256. See CHICORY.

(4701) KAUDESEQUE CHECKE, a Drug.

(4702) KAULFUSSIA AMELLOIDES. This is a small annual plant with bright blue flowers, the florets of which curl back after they have been expanded a short time, it requires a light soil and the seed may be sown at the end of the rains.—*Riddell.*

(4703) KAUNA, the Tamil name of a Ceylon tree which is used for boat crooks, knees, &c. This tree grows to about fourteen inches in diameter, and six to ten feet in height. It is strong and durable, and produces a fruit which is similar to the cocoanut, and is used by the poorer natives as food.—*Edye, Ceylon.*

(4704) KAWUL-GUTTI, NYMPHÆA LOTUS. The seeds of the lotus: they are tasteless; but much used in medicine: mucilaginous: said to check vomiting, six massee are a dose: also roasted as food.—*Gen. Med. Top. p.* 143.

(4705) KAYANN, the Tamil name of a Ceylon tree which is about ten inches in diameter, and fourteen in height: it produces a fruit which is of no value.—*Edye, Ceylon.*

(4706) KEEKUR GUM, produced by *Vachellia farnesiana*—also a variety of Gum Arabic.

(4707) KELINGOO, a name given in Ceylon to the young plant of the Palmyra Tree, Tamul kurung. It is an article of food chiefly in that island and is cultivated for that purpose; the seeds being sown in six to eight layers, under loose sandy soil. When fresh they are roasted, boiled, or sliced and fired like the Bread fruit. When it is to be kept, the parchment like covering is removed, and they are dried in the sun, and kept under the name of "*Odial*" and this when boiled is called "*Poolooc Odial.*" When the odial is reduced to flour or meal, it is used to form the preparation of "*Cool,*" of the Singalese. The Singalese also prepare from kelingoo meal, a dish called "Putoo," which is occasionally eaten with rice, and also with jaggery. It is made of prawns, or fish, scrapings of cocoa-nut kernels and unripe jack fruit. The people of Southern India and Ceylon have for many hundred years been in the habit of eating the pulp or root, which is the first shoot from the Palmyra nut, which forms the germ of the future tree, and is known locally as *Pannam kilingoes.* It is about the size of a common carrot, though nearly white. It forms an article of food among the natives for several months in the year; but Europeans dislike it from its being very bitter. Recent experiments have proved that a farina superior to arrowroot can be obtained from it, prepared in the same way: and 100 roots, costing 2½d., yield one and a-half to two pounds of the flour.—*Simmonds. Seeman.*

(4708) KELON TURPENTINE. Oily product of Pinus or Cedrus Deodara.

(4709) KERMES.

Grein Scharlakenbessen, DUT.	Kermes, Kirmiz, GUZ. HIND.
Scharlachbeeren, GER.	Grana Chermes, IT.
	Grana Kermes, SP.

An insect (*Coccus ilicis*), found in large quantities on a small species of oak in many parts of Asia, and the South of Europe, particularly in Spain. It contains a red colouring principle, and, until the discovery of the cochineal insect, was the only substance used in dyeing scarlet from a very remote period. In Europe it is almost superseded by cochineal.—*Waterston.*

(4710) KENNEDYA. LEGUMINOSÆ. A genus of beautiful plants, with lilac, and crimson coloured flowers, with short keels whilst the K. Coccinea have long ones, they are propagated by seed, in any good soil.—*Riddell.*

(4711) KESRU, HURSINGAR, NYCTANTHES ARBOR TRISTIS. The tubes of the corolla of the weeping nyctanthes, are brought from Mewar, considered heating given in medicine, one tola a dose, used chiefly to dye yellow: two seers for one rupee.—*Gen. Med. Top. p.* 143.

(4712) KHABAJI. Althæa alhugas (chhota gul khairu): Common Mallow. The seed is used as the mallow.——*Gen. Med. Top. p.* 143.

(4713) KHARWA.

Kharwa, GUZ. HIND.

A coarse kind of red cloth, chiefly manufactured in Guzerat.—*Faulkner.*

(4714) KHASSIA. The climate of Khasia is remarkable for the excessive rain-fall. Attention was first drawn to this by Mr. Yule, who stated, that in the month of August, 1841, 264 inches fell, or twenty-two feet, and that during five successive days, thirty inches fell in every twenty-four hours! Dr. Thomson and Dr. Hooker also recorded thirty inches in one day and night, and during the seven months of his stay, upwards of 500 inches fell, so that the total annual fall perhaps greatly exceeded 600 inches, or fifty feet, which has been registered in succeeding years! From April, 1849, to April, 1850, 502 inches (forty-two feet) fell. This unparalleled amount is attributable to the abruptness of the mountains which face the Bay of Bengal, from which they are separated by 200 miles of Jheels and Sunderbunds.—*Hooker, Him. Jour. Vol.* II. *page.* 282.

(4715) KHATMI ALTHÆA ROSEA, (bura gul khaira): Hollyhock. The seed is considered cooling: in medicine one tola is given: the corollæ and pericarps when fresh are exceedingly

mucilaginous and used in sherbets.——*Gen. Med. Top. p.* 143.

(4716) KHEKERA. CUCUMIS SATIVA. Cucumber, common. See CUCUMBER.

(4717) KHUB-KALI, KHUB-KALA. The seed of the yellow fruit of a small tree about Ajmeer ; very mucilaginous : considered refrigerant.—*Gen. Med. Top. p.* 143.

(4718) KHUSKHUS-GRASS. ANDROPOGON ANATHERUM MURICATUS. Both Karens and Burmese cultivate little bunches of this large grass for its fragrant roots.—*Mason.*

(4719) KHUSH KHUSH. PAPAVER SOMNIFERUM. Poppy Seed. This is simply the seed of the poppy and used in confectionary, as well as to make oil.—*Riddell.*

(4720) KILGUTCH, KATKARANJA, KUTKALEJA, GUILANDINA BONDUCELLA : Bezoari nut. The seed is very bitter : used very generally as tonic, febrifuge and deobstruent ; common at Ajmeer : natives foolishly suppose the seed will cure a scorpion sting.—*Gen. Med. Top. page* 143.

(4721) KILIOORUM BARK.

Kilioorum puttay, TAM.	Darshishan, ARAB
Patannie lode, DUK.	Soogundie, SANS.
Kaiyphul, HIND.	

This is a white, slightly aromatic pleasant tasted bark found in many Indian bazars. It is held in high estimation by the Native Practitioners for its stomachic qualities and bears a strong resemblance in its external appearance, to the Canella Alba, but is not nearly so warm or pungent. In Ainslie's time the botanical name of the tree from which it is obtained, had not been, ascertained. Capt. Hardwicke saw the Kaiyphul growing amongst the mountains betwixt Hurdwar and Sirinagar and places it amongst plants of the class Cryptogamia and order Filices : the red fruit of it he says is much esteemed by the Natives.—*Ains. Mat. Med. page* 83.

(4722) KINCHINJUNGA, (forty-five miles distant) from Durjeeling is the prominent object, rising 21,000 feet above the level of the observer out of a sea of intervening wooded hills ; whilst, on a line with its snows, the eye descends below the horizon, to a narrow gulf 7000 feet deep in the mountains, where the Great Rungeet, white with foam, threads a tropical forest with a silver line.—*Hooker, Him. Jour. Vol.* 1 *p.* 122.

(4723) KIN-LE-SUNG. But the finest tree of all, and quite new to Mr Fortune was a beautiful species of cedar or larch, which Dr. Lindley, to whom he sent specimens, called Abies Kæmpferi.—*A Res. among the Chi. page* 266. I have already noticed a new cedar or larch-tree named Abies Kæmpferi discovered among these mountains.—*A Res. among the Chi. p.* 274. It is called by the Chinese, the Kin-le-sung, or Golden Pine, probably from the rich yellow appearance which the ripened leaves and cones assume in the autumn. Although he had often made enquiries after it, and endeavoured to get the natives to bring him some cones, or to take him to a place where such cones could be procured, he met with no success until the previous autumn, when he had passed by the temple from another part of the country. Their stems, which he measured, were fully five feet in circumference, two feet from the ground, and carried this size, with a slight diminution, to a height of 50 feet, that being the height of the lower branches. The told height I estimated about 120 or 130 feet. The stems were perfectly straight throughout, the branches symmetrical, slightly inclined to the horizontal form, and having the appearance of something between the cedar and larch. The long branchless stems were, no doubt, the result of their growing close together and thickly surrounded with other trees, for he had since seen a single specimen growing itself on a mountain side at a much higher elevation, whose lower branches almost touched the ground. He thus concludes the notice of his first sight of this plant. I need scarcely say how pleased I was with the discovery I had made, or with what delight, with the permission and assistance of the good priests, I procured a large supply of those curious cones which were sent to England in the winter of 1853.—*A Res. among the Chi. p.* 275.

(4724) KING WOOD. A fancy wood, the product of a small tree growing in Brazil. It is extremely hard, of a dark chocolate colour, with black veins. It is chiefly employed for small cabinet work.—*Waterston. Faulkner.*

(4725) KINO.

Palass-goond, BENG.	Kino-harz, GER.
Gomme de Kino, FR.	CHINO, IT.

Much uncertainty long existed regarding the origin of this astringent gum, of which there are several kinds. The East Indian, African, Australian, and American varieties, are ascribed to different trees. Kino generally occurs in shining grains, of a rich ruby red colour, nearly all soluble in alcohol, and readily pulverisable between the fingers. In India it is used for communicating a nankeen colour to cotton. It is also an article of the materia medica.—*Waterston. Faulkner.* Kino, is well known as an astringent substance, and occurs in small and shining, brittle, angular fragments of a deep-brown colour, which appears to be a natural exudation of some one plant, from the uniformity of its appearance. Several kinds of Kino are, however, met with in commerce, as well as described in books, as that of *Butea frondosa* from India, at one time acknowledged by the Dublin College and which has no doubt been sometimes imported as Kino. Botany Bay Kino, proceeded by *Eucalyptus re-*

sinifera, or Brown Gum Tree, at one time acknowledged by the Edinburgh College; a Jamaica, and a Columbian Kino, are mentioned; and an extract of Bhatany is sometimes enumerated with them. But a genuine Kino has been supposed to come from the west coast of Africa. There is no doubt however, and the fact may be easily ascertained by any one making inquiries in the proper channels, that the best is now imported into Great Britain from Bombay. Kino seems to have been first introduced into European practice by Dr. Fothergill, in 1757, who states, in a paper in Med. Obs. and Enq. i. 358, that he was indebted for information respecting it to Dr. Oldfield, and that the substance was obtained from the river Gambia, whence he called it *Gummi rubrum astringens Gambiense*. Previous to this, Moon, in his travels into Africa, mentions a red gum as issuing from incisions in trees, and which he mistook for Dragon's blood. Mungo Park discovered that the tree which yielded this substance was called Pao de Sangue (Blood-tree) by the Portuguese. His specimens were determined by Mr. R. Brown to belong to *Pterocarpus erinaceus*,—a tree which has since been well figured and fully described in the Flore de Senegambie. The origin of the name Kino has not yet been satisfactorily ascertained. It was introduced into the E. P. 1774 as *Gummi Kino*, and into the L. P. 1787 as *Resina Kino*. Dr. Royle has long been of opinion that the name was derived from the Indian *kuenee*, or *kini*, applied to a similar exudation from the bark of *Butea frondosa*, of which the Sanscrit name is *Kin-suka* (*Himal. Bot.* p, 195, and *Proc. Royal Asiatic Soc.* p. 50, May, 1838), because this *Butea gum* had been sent as Kino to the above Society from Bombay. An old specimen in the India House is marked *Gum Cheena*. Dr. Pereira, several years since, found this "in the warehouse of an old drug firm in London a substance marked *Gummi rubrum astringens*," which he was told had formerly fetched a very high price. It is, however, very distinct from the Kino of commerce, which, for many reasons, Dr. Royle was inclined to think was the produce of *Pterocarpus marsupium*. Dr. Pereira states that what he calls *East Indian Kino* is always regarded in commerce as *genuine Gum Kino*, and that an experienced East Indian broker assured him it was the produce of the Malabar coast. He also traced it to Bombay, and to Tellicherry, on that coast. In the official reports of the commerce of Bombay, the Kino exported to this country appears to have been previously imported from the Malabar coast. Dr. Royle's attention was again especially turned to this subject on finding in the India House specimens of Kino marked from Anjarakandy, which he recognized as being identical with the present Kino of commerce; but was unable for some time to ascertain the locality of Anjarakandy, until informed by Mr. Dyer (*v.* p. 304) that it was the name of a farm within a few miles of Tellicherry,—that is, near the very place to which Dr. Pereira had traced the East Indian Kino. Since then he discovered that this was formerly one of the East India Company's plantations, under the superintendence of Mr. Brown, and was visited by Dr. Buchanan, in January 1801 (*Mysore* II. p. 544), when he states, numerous valuable experiments were carrying on in the plantation. Having thus determined the place, the next point was to ascertain the plant which yielded this kind of Kino, as well as its mode of preparation. This was effected by writing to Dr. Wight, stationed at Coimbatore; and though he did not at first succeed, Dr. Kennedy afterwards sent him specimens of the flower, leaves, and fruit, also a small portion of the wood and of the gum. On inspecting these, Dr. Wight states, "the specimens received along with the letter leaves no doubt that the Malabar Kino is the production of *Pterocarpus marsupium*." Dr. Kennedy writes that he is informed by his friend Mr. J. Brown of Anjarakandy, that "the juice is extracted when the tree is in blossom, by making longitudinal incisions in the bark round the trunk of the tree, so as to let the gum ooze down into a receiver formed of a broad leaf so placed and fixed in the bark as to prevent the gum from falling on the ground. From the leaf it is made to run into a receptacle placed under the leaf to receive the gum. When this receptacle is filled, it is removed, the gum is dried in the sun until it crumbles, and then filled into wooden boxes for exportation." Dr. Gibson had already stated (see the above *Proc.* p. 59) that "Kino was the produce of *Pterocarpus marsupium* (*beula* or *bia*), a tree very common below the Ghats;" also that the Kino is exported in considerable quantities from the Malabar coast. Dr. Roxburgh, however, was the first to direct attention to this tree, which, he states, exudes a red juice, which hardens into a strong, simply astringent, brittle gum-resin, of a dark red colour, strongly resembling that of the *Butea frondosa*; so that the same analysis might serve for both. He further observes, that the specimen of the gum Kino tree (*P. erinaceus*) in the Banksian herbarium is exceedingly like this plant. The specimens of the Indian and of the African Kino were, as we have seen, the produce of two distinct species of *Pterocarpus*, or perhaps even of four species as it would appear from Mr. Mason's remarks below. *P. Marsupium*, *Roxb.* (Fig, 62.) is a lofty tree, with the outer coat of the bark brown, inner red, fibrous and astringent; leaves subbifarious, alternate, leaflets 5—7 alternate, elliptic, emarginate, above shining and of a deep green colour, from 3 to 5 inches long: panicles terminal; petals white with a tinge of yellow, long clawed, all waved or crested on the margins; stamens ten,

united into one body near the base, but soon splitting into two bodies of five each; ovary generally two-celled, legume long-stalked, the under three-fourths orbicular, the upper side straight; the whole surrounded with a waved veined membranous wing, rugose and woody in the centre, generally one, sometimes, two-celled; seed solitary kidney-shaped. Roxb. Corom. Pl. ii. *t.* 116; Fl. Ind. iii. p. 234. It is a native of the Circar mountains and forests of the Malabar coast, apparently also in those of the foot of the Himalayas, according to Buchanan Hamilton. Kino is in small, irregular, somewhat angular, glistening fragments, of a dark-brown or reddish-brown colour, brittle, and affording a powder which is lighter-coloured than the masses. It is without odour, and has a bitterish, highly astringent, and ultimately sweetish taste. It is not softened by heat; cold water dissolves it partially, boiling water more largely, and the saturated decoction becomes turbid on cooling, and deposits a reddish sediment. Alcohol dissolves the greater portion. It consists chiefly of a peculiar modification of Tannin, with Extractive matter, and in some of the varieties of a minute proportion of Resin. According to Vauquelin, it contains no Gallic acid, but Tannin and peculiar extractive 75, red Gum 24, insoluble matter 124. Its aqueous solution, is precipitated by Gelatine (with which it produces a green colour, in consequence of the presence of a little *Caluchine*), by soluble salts of Iron, Silver, Lead, and Antimony, by the Purmuriate of Mercury, and by the Sulphuric, Nitric, and Muriatic acids. The alkalis favour its solubility in water, but essentially change its nature, and destroy its astringent property.—*Royle, page* 370. It has already been mentioned that in 1839, Dr. A. Gibson of the Bombay Medical Establishment, stated that this astringent is produced by the *Pterocarpus marsupium* of Roxburgh, and was at that time an article of export from the Malabar Coast. Long ago Dr. Roxburgh had said that "the specimen of the gum kino tree, in the Banksian Herbarium, is perfectly like P. marsupium.") Dr. Pereira was about the same time assured by an experienced East India broker, that kino was produced in the Malabar forests; while Dr. Royle ascertained by inspecting the official reports of the commerce of Bombay that kino had been imported in 1835-36 to the extent of 36 cwt. Subsequent inquiries of Professor Royle, Dr. Pereira and Dr. Wight have entirely confirmed the statement of Dr. Gibson, and established the fact that all the kino of British commerce is really the produce of Malabar, and is prepared near Tellicherry, chiefly by those enterprising merchants the Messrs. Brown of Anjarakandy. The mode practised in Malabar according to Royle, is as follows:—"The juice is extracted when the tree is in blossom, by making longitudinal incisions in the bark round the trunk of the tree, so as to let the gum ooze down into a receiver, formed of a broad leaf so placed and fixed in the bark as to prevent the gum *from falling* on the ground. From the leaf it is made to run into a receptacle placed under the leaf to receive the gum. When this receptacle is filled, it is removed, the gum is dried in the sun, until it crumbles, and then filled into wooden boxes for exportation."—*Pharmaceutical Journal*, May 1846, p. 500. The *Pterocarpus marsupium* is one of the most lofty and striking trees in the Indian forests—it is well described by Roxburgh, in the *Flora Indica*, Vol. iii. p. 234—and figured in his *Coromandel Plants*, ii. *t.* 116. It yields from incisions a large quantity of blood-red juice, which on being simply exposed to the sun, hardens and then quickly cracks into little angular masses, and crumbling fragments which constitute, without further preparation, the kino of the shops. Specimens of the exudation sent by Dr. Cleghorn to Professor Christison in 1846, from Mysore, were considered by him "quite identical with the kino of commerce." The tree abounds not only near Tellicherry, but along the whole Malabar Coast. Dr. Cleghorn has seen it both in the ascent of the Eastern and Western Ghauts. Dr. Wight sent to him specimens from Coimbatore, and Roxburgh found it in the N. Circars. Buch. Hamilton mentions it under the name of *Vijaya* as occurring in Nepal and also to the eastward of Bengal. The vernacular names are as follows: Beuba, Bia, Beebla, *Duk*; Whoay, *Can.*; Yegy, Vayga, *Beng.* It has been observed in the Concans, (Graham.) Rajpeepla jungles, (Dr. Lush:) Assam, (Voigt). The tree being thus widely diffused, and the exudation procurable in *large quantity*, it may possibly come into extensive use in *dyeing* and *calico-printing*. The product can be obtained with facility by simply incising the bark, and requires no outlay, save that of collecting. "There is no good recent analysis of E. I. Kino showing the propertion of its astringent principl, but it is obviously great." (Christison.) Kino agrees closely with catechu in its action, and like it is a pure and energetic astringent. It is undoubtedly serviceable in dysentery and sore-throat, and is a valuable adjunct to the list of country medicines.—*Cleghorn*. According to Dr. McClelland, the Gum kino from India is supposed to be obtained from *Pterocarpus marsupium*. But as the articles sold as *kino* are produced from trees of four different families of plants, and come from many opposite parts of the world, it is probable that the properties on which their value depends are of a general nature, and therefore that *P. dalbergioides*, equally with *P. marsupium*, affords the *Gum kino* of India, and this opinion is also entertained by others. *P. dalbergioides* is found in the northern parts of the Pegu province in the Prome district chiefly in the vicinity of towns and inhabited

places, rarely in the Forests.—*McClelland.* According to Mr. Mason another Kino gum tree, Pterocarpus Indicus in Tenasserim, is a majestic evergreen, whose yellow papilionaceous flowers clustering amid the bright drooping foliage, scent the air, like the large magnolias, for several hundred yards around. It is propagated by simply planting large branches in the ground at the commencement of the rains. There are, however, two species, the red, and the white, as distinguished by Burmese—the red producing the finest timber, but the white padouk is by far the finest ornamental tree.—*Mason.* In the Journal of the Asiatic Society for August 1848, Dr. Royle, in a valuable article on gum kino, ostensibly enumerates all the various regions from which it has been imported into England; but does not mention it as being a product of the Tenasserim Coast. Yet long before Dr. Royle compiled that communication, more than one consignment had been made by parties in Maulmain, to houses in London, of gum kino to the amount of a thousand pounds. It was brought to Maulmain by an English merchant from the Shan States, and stated by him, to be the production of the pa-douk, the same tree as the one in Maulmain thus denominated by the Burmans. Several years before, Mr. Mason had directed attention to this tree as producing an astringent gum resembling gum kino, but the medical officer, to whom he submitted specimens, said it was "a kind of dragon's blood." However, after Dr. Morton came to the Provinces, he tried it in his practice, and found it, in its medicinal virtues, identical with the gum kino of the druggists. The next inquiry that arises is for the genus and species of the pa-douk. When Mr. Mason first came to the Coast, all the English residents of his acquaintance called it "Burman senna," and the surgeon of the station told him that he believed it was a species of senna. Dr. Malcom, in his Travels, writes; "Pa-douk: or Mahogany, (*Swietenia Mahogani*) is plenty in the upper provinces, especially round Ava, found occasionally in Pegu." In a native Pali dictionary, found in the Burmese monasteries, pa-douk stands as the definition of *pe-ta-tha-la* and the corresponding Sanscrit word in Wilson's dictionary, is defined *Pentaptera*; but the pa-douk does not belong to that genus. In Piddington's Index, however, *peetshala* stands as the Hindee name, and in Voigt's Catalogue, *pee-sal* is the Bengalee name of *Pterocarpus marsupium*; and this brings us nearer the truth. for pa-douk is a name common to two different species of pterocarpus, but which look so much alike that they are usually regarded as one species. One has "long, waving branches, with their extremities generally much drooping, racemes axillary, flowers numerous, deep orange yellow, and very fragrant, filaments ten [often] united into two equal distinct bodies of five each; stile rather shorter than the stamina; and stigma acute;" which is the description of *P. indicus*; but on full examination I think it is the species described by Dr. Wight as *P. Wallichii* that was marked in Wallich's Catalogue as *P. dalbergioides*. There are, however, several points of difference, but not more than there are between Wight's description, and the coloured drawing that he gives of this same species. In the drawing, the leaflets are pointed wholly unlike our plant, but in the letter-press description there is an exact correspondence—in the drawing, the stamens are represented as divided one way, in the description another, and both modes of division, with some others, are seen here on the same tree. This loose way of describing and figuring plants makes it exceedingly difficult for an out-door botanist to identify nearly allied species with book discriptions, made perhaps originally from isolated dried specimens. The other species has leaflets which correspond both to Roxburgh's description, and to Wight's figure of *P. dalbergioides;* and though it differs in some other respects, yet I think it is the same tree. Both these species produce an astringent gum, but which has been exported for gum kino or whether a mixture of both, which is most probable, he is not able to say; possibly neither. It may be that *P. marsupium* is found in the Shan states, for it grows in Assam, where it would doubtlessly be called pa-douk by a Burman. Be that as it may, it is certain that these Provinces can furnish the commercial world with a large quantity of gum kino. The exudation of our pa-douk, one of the most abundant forest trees, has been proved by experiment, to possess all the properties of gum kino. While the product of the neighbouring provinces, whose only avenue to market is through our territories, has been bought by the London druggists for the gum kino of the Pharmacopœia. See *Pterocarpus Wallichii, and Pterocarpus dalbergioides.—Mason.* Dr. Forbes Royle says of the *Butea frondosa*, that it yields by incisions made in its bark an astringent gum, which was at one time supposed to be the genuine Kino of commerce. It is no doubt possessed of similar properties, is frequently used as such in India, and useful like it in Diarrhœas and advanced stages of Dysentery. It is also used in the art of tanning. It has been occasionally sent to Britain as Kino, and Dr. Pereira found it in an old drug firm, marked *Gummi-rubrum astringens.* Its Sanskrit name is *Kin-suka.* It is commonly known in India as *Kini ke gond*, and also by the name *Kumrkus.* Its chemical characteristics are very like those of the Kino of Pterocarpus. It is very carelessly collected, and therefore often contains impurities. It is remarkable for containing a beautiful red colouring matter, difficult of separation. Analysed by Mr. E. Solly, a portion in the crude state yielded about 50 per cent. of Tannin; but

when purified by simple solution in water, so as to separate the impurities, 100 parts contained 78-26 parts of Tannin, 5-05 of difficultly-soluble Extractive, and 21-67 of Gum, with Gallic acid and other soluble substances. The colour and properties of Tannin vary with the exposure and season of collection.—(*v. Roxburgh, Fl. Ind* iii. *p.* 245, and *Pro. R. Asiatic Soc. May* 1838.)

(4726) KIRE PALLE. A very soft, coarse, open-grained, light Ceylon wood.

(4727) KISMISS. The name given to a small, pale coloured, stoneless grape, when dried, and from which Shiraz wine is obtained. It is produced in Persia, whence considerable quantities are brought to Bombay. It is chiefly used in puddings, as a substitute for currants ; and is also served up with stoned almonds, as an article of dessert.—*Faulkner.*

(4728) KITCHELLY CAPOOR, of CHINA, is a scented root, chiefly used by probound and in the perfumery powders called sicsa, rautha and other purposes, and is also used for the medicines. This is called Kitchelly Kelangoo in Tamil sold at from 40 to 60 Rupees a Candy. That from Malabar, from 28 to 40 Rupees a Candy.

(4729) KITTESOLS, OR KITTYSOLS. the distinctive name by which China paper summer-heads are known. They are an extensive article of Export from China to Bombay, Calcutta, &c.—*Faulkner.* These are a cheap sort of umbrella, made of bamboo frames covered with oiled paper or cheap silk. They are sent to the Archipelago and India in boxes containing 100 umbrellas each, which is estimated to be a pecul. Considering the material they are made of, this sort of umbrella or parasol (for their use is for the most part as a protection against the sun) wear a long time.—*Morrison.* This kind of umbrella, or parasol, made of oiled paper, or cheap oiled silk, is largely exported by the Chinese to India; the article is durable, considering its material, and its cheapness induces a large consumption.—*Williams' Middle Kingdom. Vol.* II. *page* 401.

(4730) KNEVEA, the Tamil name of a Ceylon tree which grows to about eighteen inches in diameter, and fourteen feet long. It is used by the natives in boats and house work.—*Edye. Ceylon.*

(4731) KNITTING, appears to be unknown to the natives of India, though it is well worthy of being taught to them ; as, indeed, it has been in the few girl's schools which the natives have allowed to be established.—*Royle, Arts. &c. of India, page* 504.

(4732) KNIVES.

Messen, DUT.	Churi, HIND. GUZ.
Couteaux, FR.	Facas, PORT.
Messer, GER.	Noshi, RUS.
Coltelli, IT.	Cuchillos, SP.

Well-known articles made of iron and steel. They are used for a variety of purposes as their different names imply, such as table knives, pen-knives, oyster-knives, pruning knives, &c. &c. England is reputed to excel every part of the world in the manufacture of knives, as in most branches of cutlery. London and Sheffield knives are esteemed the most.—*Faulkner.*

(4733) KNOWLTONIA VESICATORIA, used commonly as a blister at the Cape of Good Hope.—*O'Shaughnessy.*

(4734) KOAN, A very hard, fine, close-grained, heavy Ceylon wood.

(4735) KOES OR JACK. A moderately hard, but rather coarse and open-grained, though heavy Ceylon wood of a beautiful saffron yellow colour, emits a peculiar, but by no means unpleasnt odour.

(4736) KOMBHUGRAS. Root of a small plant from Delhi: tasteless; but is heating: one tola is given as a tonic or aphrodisiac.—*Gen. Med. Top. p.* 143.

(4737) KOOCHNAL. HIND. BAUHINA VARIEGATA. Lin. Koochnal is the Hindoostani name of a tree, the beautiful flowers of which are eaten in some parts of Bengal as a delicate vegetable. Grows in the Jungle at Molamputty near Coimbatore.—*Ainslie's Mat. Med. p.* 260.

(4738) KOOLEE BAYNEGUN, SOLANUM LONGUM. Egg Plant, cylindrical. See BRINJAL. —*Riddell.*

(4739) KOOMBHEE (CAREYA ARBOREA) A fibre employed in the Himalayas as slow match for their matchlocks.—*Royle.*

(4740) KOORINJA, the Tylophora asthmatica, a plant of the order Asclepidaceæ, yields a strong, white, silky fibre, resembling flax.

(4741) KOOSSOOM, SAFFLOWER, CARTHAMUS TINCTORIUS, the beautiful red dye called *Koossumba rung*, largely used by the dyers.

(4742) KOTHEELA : TRAGACANTH.

Tshaw, BURM.

Six species of *Sterculia*, four of which, *viz. Sterculid ramosa, S. fœtida, S. campanulata, S. piperifolia*, are very plentiful throughout the Province, and yield a gum which is known in the bazars of Bengal under the name of Kotheela. The other two species, *Sterculia balangas* and *S. calorata*, are not so plentiful. This gum is probably analogous to *Tragacanth*, which Dr. Lindley states is obtained from a species of *Sterculia* at Sierra Leone.—*McClelland.*

(4743) KOOTUB MINAR. This column, stately in its structure and gigantic in its dimensions, is a great feature of attraction at Delhi, and arrests the eye of the traveller from afar. While it towers majestically over every thing around, from a distance its conical point seems to pierce the sky. It is from 225 to about 250

feet high has 378 steps and the diameter at the base is about 50 or 55 feet. It is reputed to be 700 years old, and is in excellent order. About 25 years ago it suffered a little from an earthquake but under the directions of the British government a part of the resources of the state were devoted to the restoration of this emblem of antiquity and it now stands in just as great perfection as ever. It throws out three ranges of circular balconies at different heights and is surmounted by a cupola palisaded by a brass railing, an evidently modern improvement made when the edifice was repaired under European superintendence. This colossal piece of architecture is a polygon, fluted cylindrically as well as angularly in alternate order, and wreaths of Arabic inscriptions entwine its massy circumference, the letters being displayed in high relief of about a foot or more in length. The material of the building is a kind of red sandstone but a portion of the upper part is composed of white marble. It is yet a point at issue whether this singular and stately column owes its origin to Hindoo or Mahomedan. It wears a perfect semblance to the Mahomedan style of architecture, but the old dilapitated and crumbling Hindoo ruins in its immediate vicinity raise strong doubts on the subject; added to which, there is a peculiar column of bell metal which stands close by it, with an inscription, of some Buddhist or Hindoo character, bearing the impression of a cannon ball fired at it, some say by Aurunzebe, and others by the Jauts in one of their early expeditions into Delhi.—*Tour of India by French, p.* 20.

(4744) KRAMERIA TRIANDRA. This plant is a native of Peru, and yields the Rhatany root of the Pharmacopœia; a powerful astringent, but destitute of any other virtues. Under the head of *Diospyros* will be found a most efficient indigenous substitute for this article.—*O'Shaughnessy, page* 211.

(4745) KRIS, the abbreviation of Karis, a dagger or pouiard, the universal weapon of all the civilised inhabitants of the Archipelago, and of a hundred different forms, short or long, with a straight or serpentine blade, and with every variety in the shape and ornament of the hilt and scabbard. Men of all ranks, from the peasant to the prince, wear this weapon, and those of rank when full dressed, two or even four. In Java, even women of rank sometimes wear a small one. The wood is probably Malay, but is now of general adoption through the Archipelago. The Javanese have three native names for it besides the Malay one, and it is found represented on several of the ancient temples of Java. The Kris has even reached the Philippine Islands, for there is no doubt but that it is the same word of the Tagala and Bisaya languages which the Spaniards write cális, and translate "sword."—*Crawfurd Dict. p.* 302.

(4746) KRIS, KREES OR KRITZ? is a root of an unknown origin used in Cashmere, in the process of dyeing nafurmance (jacia?), also medicinally. It is indeed one of the most useful substances. The root, Honigberger had as a sample, from Cashmere, was four inches in length, thick as a finger, knotty, fibrous, with some excrescences, having two barks, the outer very thin, like an epidermis, light brown, the other subjacent, not very thick, of a dark brown color, the root was white and very hard, odor slight but agreeable, flavor bitter, aromatic afterwards pungent on the tongue. The flower is said to be blue.—*Honigberger, p.* 265. The root of some parasitical plant, under the name of kritz, is used in Cashmere to wash the celebrated shawls; soap is used only for white shawls.—*Simmonds' Comml. Product, p.* 574.

(4747) KUCHILA KE MULUNG. A Parasite (Viscum monoicum) found on the Nux Vomica trees of Cuttack; a substitute for preparations of Strychnine—(*O'Shaughnessy,*) and is an extremely powerful narcotic. Its powder is a powerful convulsive tonic, producing the same effects as the strychnic and brucinic preparations.—*Beng. Phar. p.* 406, *and Dis. p.* 376.

(4748) KUDDOO. Cucurbita lagenaria.—Bottle Gourd. This is grown at the commencement of the rains; a good soil is all that is necessary, requiring no further care.—*Riddell.*

(4749) KUEPHUL. Bark of Myrica sapida.

(4750) KULA, the Portuguese name of a Ceylon tree, called in Tamil Kanugha. It is very heavy and close-grained, grows to about twenty-four inches in diameter, and eight feet high. The natives use it for general purposes, and for houses and vessels. It produces a fruit which they eat, and from which they extract an oil which is used as a medicine.—*Edye. Ceylon.*

(4751) KULAEE. PHASEOLUS TRILOBUS. Three-lobed Bean. Sown like other native beans. —*Riddell.*

(4752) KULKUL. Seed of Cassia tora.

(4753) KULLYHAIN, a plant from the fibres of which, the Lepchas near Darjeling, make rope.

(4754) KULMEE SAG. CONVOLVULUS REPENS. Creeping Bind Weed. This grows wild; the leaves are eaten by the natives.—*Riddell.*

(4755) KUL TEAK. TECTONA GRANDIS, VAR. Wynaad about Sultan's Battery, scarce, is considered superior to the common Teak.—*McIvor M. E.*

(4756) KULTHEE. DOLICHOS BIFLORUS. Two-flowered Bean Horse Gram. This is grown in fields after the rains, and chiefly used for cattle; when given to horses it must first be boiled; they soon become very fond of it, and keep in as good condition as upon any other grain.

(4757) KUMRUCK. AVERRHOA CARAMBOLA.

(4758) KUMUT or BARK CLOTH, from the River Baram, supposed to be from a species of Artocarpus, is worn by the Kayans when mourning their dead.—*Royle Fib. Pl. p.* 341.

(4759) KUNKER. A limestone deposited from water: very common in India.

(4760) KUPASSEE. Belonging to the family of Compositæ, we may mention a plant which is remarkable for the under surface of its leaves being covered with a cotton-like tomentum; hence it is called *kupassee*, from *kupas* (a name of cotton). The people in the Himalayas use it as tinder. It is also spun into thread and woven into cloth, of which bags are made. The string, until examined, looks as if formed of fibre. A coarse kind of blanket, called *kurkee*, is said to be made of this substance by the Hill people north of Deyrah. Though curious, this substance is not of much importance.—*Royle Fib. Pl. p.* 301.

(4761) KUPILA, ROTTLERA TINCTORIA. The dust from the capsule of the fruit is used; to dye silk yellow: alum is used as the mordant, considered in medicine as of a warm nature, also anthelmintic; given to children in "dai." Three or four massee are a dose, used in ointments for herpetic eruptions: two and a half seers for one rupee.—*Gen. Med. Top. p.* 142.

(4762) KURBOOZAH. Cucumis melo.—Melon. See MELON.

(4763) KURETIA. A hard, fine, close-grained, heavy Ceylon wood.

(4764) KURROO. Roots of Pneumonanthe Kurroo: an Indian substitute for Gentian.

(4765) KURSUMBUL KE PULLIE. Dolichos lunatus.—Duffin Bean. This is a very fine sort of large bean, and when dressed resembles the Windsor; it is grown like all other beans that require sticks for support.—*Riddell.*

(4766) KURUNDU. Vide Carissa.

(4767) KUSAILOO, KUSAILI. The bark of a small tree, wild about Ajmeer: is tasteless; given to lying-in women to clear the blood and create milk from one to four pices' size from the dose in six or seven days.—*Gen. Med. Top. p.* 142.

(4768) KUTIRA. The native name of a gum having a great resemblance to gum Tragacanth, yielded by the trunk of the *Cochlospermum gossypium*, a tree common in the Arracan mountains, in Bundlecund, and other places. This gum is considered useless in the arts, and in medicine it is used by native practitioners as a demulcent and emollient.—*Faulkner.* The true,

(4769) KUTIRA GUM, is the produce of Cochlospermum gossypium or yellow-flowered Cotton tree; but under the same name and of very similar properties, is often sold the gum of several species of sterculia, (Bulea) of Bombax pentandrum, Huttian ka goond &c. &c. See KOTHEELA.

(4770) KUVEAMA, the Tamil name of a Ceylon tree which is remarkably heavy and strong. It grows to about two and a half or three feet in diameter, and is curved in its growth. It is used in the frames of native vessels: it produces a fruit which is of no use.—*Edye. Ceylon.*

(4771) KYABOCA-WOOD OR AMBOYNA-WOOD, is imported from Singapore, appears to be the excrescence or burr of some large tree, it is sawn off in slabs from 2 to 4 feet long, 4 to 24 inches wide, and 2 to 8 inches thick; it resembles the burr of the yew-tree, is tolerably hard, and full of small curls and knots, the colour is from orange to chesnut-brown, or sometimes red brown. It is a very ornamental wood, and is much esteemed in China and India, where it is made into small boxes and writing desks, and other ornamental works, the same as by ourselves. The Kiabooka is said by Prof. Reinwardt, of Leyden, to be the burr of the *Pterospermum indicum*; by others that of *Pterocarpus draco*, from the Moluccas, the island of Borneo, Amboyna &c. The native name appears, from the specimen of Mr. Witson Saunders to be "*Serioulcut*," the wood itself is of the same colour as the burr, or rather lighter, and in grain resembles plain Mahogany. "The root of the cocoa-nut tree says Colonel Lloyd is so similar, when dry and seasoned, to the 'bird's-eye' part of the wood here termed kyabooca, that I can perceive no difference, the cocoa has a tortuous and silky fracture, almost like indurated asbestos."—*Col. G. A. Lloyd.* The comparison of the palm wood with the kiabooca, renders the question uncertain, as amongst the multitudes of ordinary curly woody fibres, that one cannot account for in a palm there are a few places with soft friable matter much resembling it.—*Holtiz.* At the Madras Exhibition of 1855, a slab of Kyabooca wood, imported from Singapore was exhibited by J. Sanderson, Esq. A small portion was polished, and showed well the highly ornamental appearance of the timber in its marking. The specimen exhibited the very knotty character and curly fibres of the wood, from which pieces of even a foot square free from flaws, can rarely be obtained. The Botanical name of the tree has not yet been determined with certainty, although it is generally believed to be "*Pterospermum indicum*."—*M. E. J. R.*

(4772) KYANAN. On the low lands near the sea-coast of Tenasserim, there is a large tree of which canoes are occasionally made, that is much used for sandals. The wood is red; but turns black on being anointed with petroleum. I have never seen the tree either in flower, or fruit; but it has pinnate leaves, with two pairs of oval leathery leaflets, and is, I imagine, a leguminous tree.—*Mason.*

(4773) KYDIA, a genus of plants occurring

in Southern Asia. Several of the family it belongs to, abound in mucilage, and as a Guazuma is employed in South America in clarifying sugar, so a Kydia is in India. Dr. Wight in Icones, gives Kydia calycina, 879-880; *fraterna*, 879-880; Kydia *pulverulenta*, 881; Roxburghiana, 881.

(4774) KYDIA CALYCINA.

Bokemaiza, Burm.

A middle sized tree, pretty common along the Western Ghauts. Hort. Gard. 69. *Kydia calycina* is plentiful throughout the Forests, more especially in the Pegu and Tounghoo districts. The small saplings are used, from their great strength and elasticity, by the natives, for making banghy sticks, but it is large enough to afford timber of three or four feet girth. Wood, white-colored, adapted to every purpose of house-building.—*McClelland.*

(4775) KYLLINGIA MONOCEPHALA. One headed Killingia, common at Ajmere in low grounds. The root is sweet-scented, used and named as Zedoary: "nirbishee."—*Genl. Med. Top. p.* 174.

L.

(4776) LABIATÆ, Dr. Royle very appropriately sums up his account of this family, by stating that many which are indigenous in the Himalayas, continue to be imported from the Red Sea, to be prescribed at the foot of the mountains where the fresh and genuine articles may be had in any quantity. Dr. Royle especially recommends the introduction of the peppermint, with the essential oil of which the natives are well acquainted, from its common use in Cholera. He informs us that species of Anisomeles, Dyospita, Elschotzia and Pogostemon are used as substitutes, for their European allies. The only plant of this family much cultivated in India is the Dracocephalum Royleanum, or Balungoo, the seeds of which, *Tukm balungoo*, are very generally used in India for the preparation of mucilaginous drinks.—*Royle, p.* 303;—*O'Sh. p.* 492.

(4777) LABLAB, a name, it is said, of Egyptian origin, which has been adopted by botanists to designate a genus of Papilionaceous *Leguminosæ* of the tribe *Phaseoleæ*. This genus, like *Dolichos*, from which it has been separated, is a twisting climber, with leaves composed of three large leaflets. The flowers are in racemes, and either white or purple-coloured. The legumes are large, scimitar-shaped, flat, and compressed, tubercularly muricated along the sutures, and having the seeds separated from one another by transverse partitions. It is on account of these seeds and legumes that the species are valued and cultivated in hot countries such as India, Egypt, and the West India Islands, as well as in China. In India *L. vulgaris* and *L. cultratus* are chiefly cultivated in the rainy season in gardens, and may be considered the analogues of the French and kidney beans of European gardens. —*Eng. Cyc.*

(4778) LABLAB VULGARIS. Sayme ke Pullie Lat. Dolichos Lablab Native Bean, red.

Averay kaya, also Tatta pyre, Tam.

(4779) LABLAB VULGARIS, *var* FLORE RUBRO. Dolihos.

Segapoo Averay kai, Tam. | Yerra Chickoodi kaia, Tel.
Laul saym ke pullie, Duk.

Lablab has a compressed scimitar-shaped pod, rough, with tubercles at the sutures, and furnished with transverse imperfect cellular partitions, and ovate seeds with a fungous, callous, linear scar. *Lablab vulgaris*, the old *Dolichos Lablab*, is a common plant in the hedges in many parts of India, whence it has travelled into the tropical parts of America. It is a smooth perennial with showy white or purple flowers, and large horizontal pods, containing from three to four seeds. It has a heavy disagreeable bug-like smell, prefers a rich black soil that cannot be flooded by rains, and produces a coarse but wholesome pulse, much eaten by the lower classes in India.—*Eng. Cyc.* This bean is sown in the fields like all others in rows, and are eaten both boiled or put into curries.—*Riddell.* This valuable legume when young is eaten pod and all, when full grown the seeds only are used. It is about five inches long and has got its names from the reddish colour of its edges.—*Ainslie, p.* 244. Burmese and Karens grow several varieties of one or two species of lablab, which occupy the place of kidney beans in Europe.—*Mason.* The pods of this plant are used as a substitute for French beans, the beans in curries; commonly cultivated in gardens, of easy growth, a pandal is required for its support.—*Jaffrey.*

(4780) LABRAX. (Cuvier), a genus of Fishes of the section *Acanthopterygii* and family *Percidæ*. The fishes of this genus are closely allied to the true Perches, but may be distinguished by the opercular bones being covered with scales, the absence of denticulations on the suborbital and interopercular bones, the operculum being terminated by two spines, and likewise by the tongue being almost entirely covered with minute and closely-set teeth. There are two dorsal fins. —*Eng. Cyc.*

(4781) LAC.

Laak. Arab.	Ambaloo, Mal.
Gomlac, Dut.	Lacca em paos, Port.
Lakada, Cyng.	Laka, Rus.
Lacque, Fr.	Laksha, Sans.
Lack, Ger.	Goma-laca, Sp.
Lakh, Guz. Hind.	Komburruki, Tam.
Lacca, It.	Commoleka, Tel.
Balo, Jav.	Khjeijk, Burm.

It is a substance obtained from incrustations made by an insect (coccus lacca), similar to the cochineal, (coccus cacti) on the branches and twigs of many trees in India, as *Vatica laccifera*, *Croton laccifera*, *Butea frondosa*, *Inga dulcis*, *Feronia elephantum*, *Erythrina indica*, *Schleichera trijuga*, (coosumb tree,) &c. The lac is formed by the insect into cells, somewhat resembling a honey-comb, in which the insect is generally found entire, and owing to whose presence, stick-lac yields by proper treatment a red dye, nearly if not quite as bright, as that obtained from Cochineal, and more permanent. Lac is found encircling the branches of these trees in the form of a tube ($\frac{1}{2}$ inch to one inch in diameter) the broken branches with encrustations at various distances is called in commerce *stick-lac* which ought to be semitransparent. The coloring matter exhibited by grinding stick-lac, and then treating it with water, constitutes *seed-lac*. At the Madras Exhibition of 1855, the crude stick-lac attached to branches of various trees as abovementioned was exhibited from 16 localities extending from Kamptee to Trivandrum. The resin is abundant in the jungles of S. India, but is not much collected for commercial purposes, although always procurable in the bazars; the best lac is produced upon the *Schleichera triguga*, which abounds in the central provinces, and yields the colouring matter twice a year.—*M. E. J. R.* *Coccus Lacca.* "When the females of this Coccus have fixed themselves to a part of the branch of the trees on which they feed (*Ficus religiosa* and *F. Indica*, *Butea frondosa*, and *Zizyphus jujuab*), a pellucid and glutinous substance begins to exude from the margins of the body, and in the end covers the whole insect with a cell of this substance, which, when hardened by exposure to the air becomes lac. So numerous are these insects, and so closely crowded together, that they often entirely cover a branch; and the groups take different shapes, as squares, hexagons, &c. according to the space left round the insect when first it began to form its cell. Under these cells the females deposit their eggs, which after a certain period are hatched, and the young ones eat their way out." (Kirby and Spence, Vol. IV, p. 124).—*Eng. Cyc. Vol.* II, *p.* 44. In Bengal, Lac is chiefly produced in the forests of Sylhet and Burdwan; it is also procurable in the Deccan; but Siam and Pegu afford the largest supplies.—*Faulkner.* At the Madras Exhibition of 1857, Lac was exhibited from the Ficus elastica, Butea Frondosa and Zizyphus jejuba.—*Madras Exhibition of* 1857. This substance, which is improperly called a gum, is found in great abundance on the Croton laccifera (growing near Columbo), on the island of Ceylon, it is also an article of commerce from Siam and Pegu. The Abbe Rochon informs us that Gum Lac is brought from Quan-an-ton in the province of Quei-chu in China, but of a quality greatly inferior to that of Bengal. The Vyteans prescribe Komburruk in old and obstinate bowel complaints, when the habit has been much reduced; they also (when mixed with Gingelie oil) use it has an external application for the head,in cases in which the patient is debilitated from long continued fever. The stick-lac from Pegu is, perhaps, the finest in the world, preferable even to that of Bengal. See *Oriental Repertory.* —*Vol. 2d*, *page* 580. Mr. W. Francklin in his Tracts, Political,Geographical, Commercial on the dominions of Ava (page 71), tells us, that Charong is the name given in the Burmah country,to a kind of black lac which is extracted from a large tree; one or two plants of which were brought to Calcutta by Captain Cox. He adds that the lac was in general use amongst the Natives for their lacquered ware.—*Ains. Mat. Med. p.* 23. The jungle at Taldungah consists chiefly of thorny bushes, Jujube of two species, an *Acacia* and *Butea frondosa*, the twigs of the latter often covered with lurid red tears of Lac, which is there collected in abundance. As it occurs on the plants and is collected by the natives it is called Stick-lac, but after preparation Shell-lac. In Mirzapore, a species of *Celtis* yields it, and the Peepul very commonly in various parts of India. The elaboration of this dye, whether by the same species of insect, or by many from plants so widely different in habit and characters is a very curious fact; since none have red juice, but some have milky and others limpid.—*Hooker Him. Jour. Vol.* I. *p.* 9. According to Tomlinson, Lac is a resinous substance found on several different kinds of trees in the East Indies, and produced by the punctures of an insect (*coccus lacca*), and by its formation of the exuding juice into cells for its eggs. These adhere to the branches in grains, completely encrusting them, and are either imported in that form, and called *stick-lac*, or the grains are gathered from the branches, their colouring matter extracted, and formed into flat cakes, still preserving the granular appearance, and called *seed-lac*, or the seed-lac is melted up into masses, and called *lump-lac*. Finally there is *shell-lac*, which is seed-lac further purified by being put in bags of fine linen, and melted over a charcoal fire until it passes through them. The bags are squeezed, and passed over a smooth surface of wood, on which the lac is deposited in thin layers. If pure, this kind of lac will take fire on a hot iron, and burn with a powerful smell. The heat of a ship's hold will sometimes run it into a solid mass, and

thus diminish its value. The chief consumption of lac in Europe is for the manufacture of sealing-wax and varnishes. In India the inferior kind is made into bangles or armlets for women of the lower classes, the superior is fashioned into rings, beads, and other trinkets; and to fit it for such purposes, the natives purify it by melting in the manner above described. When the lac begins to exude, it is scraped off, and the bags are twisted or wrung by means of cross-sticks at their ends, to force out the melted contents. The natives of India make a good varnish of lac, coloured with cinnabar or some other pigment, with which they varnish boxes, cabinets, and other articles. Coloured varnishes of this description are much used in the adornment of their religious houses. They also employ lac as a dye. By pouring warm water on stick-lac a crimson colouring matter is obtained, which is made into square cakes for sale, and called *lac dye*, *lac lake*, or *cake lake*. These cakes when broken are dark-coloured, shining, and compact, but when scraped they yield a bright red powder approaching carmine. A mixture of lac, alum, and tamarind-water is the native dye for silk or cotton cloth of a crimson colour. The Indian lapidaries make use of lac as a vehicle for retaining the hard powders used in cutting and polishing gems. The Indian corundum wheels are described under EMERY. The dye above referred to, and which constitutes much of the value of lac, is due to the insect which makes the cells, and which is of the same family as the cochineal insect. The parent lac insect, after laying her eggs, becomes a mere lifeless bag, of an oval shape, containing a small quantity of a beautiful red liquid. The young insects feed on this liquid, and their bodies assume the same hue, so that the branch which bears them appears to be covered with red powder. The cells of gum-lac which shelter them are more or less deeply tinged with the same colour. The best time for gathering stick-lac, so as to secure the colouring matter, is before the insects have made their escape. Previous to the discovery of the true cochineal, the colouring matter of the lac insect was universally employed for dyeing red. The crimsons of Greece and Rome, and the imperishable reds of the Brussels and Flemish schools, were obtained from this source. The best quality of stick-lac is obtained from Siam; the twigs being frequently encrusted all round to the depth of a quarter of an inch, while sometimes a great accumulation takes place on one spot, that of Assam ranks next: the stick-lac of Bengal is inferior to these, being scanty and irregular in its coating of resinous matter. So abundant is the supply of lac among the uncultivated mountains of India, that it is asserted a consumption ten times greater than at present might be readily supplied. The accumulation of insects is so great, that the trees, often a species of *ficus*, on which they live, are exhausted and injured by this vermin. After the dye is extracted, the gum-lac still requires much purification before it can be used for the more delicate varnishes. It was long a desideratum to render lac colourless, its dark brown hue being a drawback to its use as a spirit varnish. A premium of thirty guineas and a gold medal were offered by the Society of Arts for "a varnish made from shell or seed lac, equally hard, and as fit for use in the arts," as that prepared from any other substance. These were claimed by two persons, Mr. Field and Mr. Luning; and as both their processes were found to answer the desired end, a premium of twenty guineas was awarded to each. See VARNISHES.—*Tomlinson.*

(4782) LACE.

Kanten, DUT.	Merletti, Pizzi, IT.
Dentelle, FR.	Krushewo, RUS.
Spitzen, GER.	Encajes, SP.

A plain or ornamental net work, tastefully composed of many fine threads of gold, silver, flax, and cotton, interwoven. There are many varieties of lace, each bearing a distinct name, and having peculiar qualities.—*Faulkner.* At the Madras Exhibition of 1855, some very fine thread lace was contributed by the Edeyengoody Mission School Tinnevelly, and by the Nagercoil Mission School, Travancore, so nearly equal in merit that a second class medal was awarded for each. The patterns of both were varied and tasteful, but the prices above those of European lace. The Cochin Local Committee exhibited some very creditable specimens of lace insertion and edging. Some excellent specimens of *Gold Lace, Cord Sashes and Sword Knots* were exhibited by the Madras Local Committee, deserving of honorable mention.—*M. E. J. R.* Lace is a term unlikely applied to two very distinct arts, one consisting of gold and silver wire, or even silk thread, woven into ribands for embroidering hats and uniforms. The other is the well-known transparent network, in which the threads of the weft are twisted round those of the warp; it may be made of silk, flax or cotton, or even of gold and silver thread, and has usually a pattern worked upon it, either during the process of making the lace, or with a needle, after this has been completed. Though much lace is now made by machinery, the highly esteemed genuine articles is made by hand; and, therefore, may fitly commence the series of arts which depend chiefly on manual dexterity. Lace knitting is considered to be a German invention; but lace worked by the needle is of far older date, and was probably an Eastern invention, though it does not appear to have been known or practised in India. Lace however is enumerated by General Cullen as being made in the territories of the Rajah of Travancore; and the

Madras Central Committee, in their final report, state, that "the lace of Nagercoil, which, though knit by natives of the country, was declared equal to the best French lace." A few of the European residents are already aware of the superior quality of "the lace, and use it, but its beauty is well deserving of being more generally made known than it at present is." The lace, when seen at the Great Exhibition, was much admired, and some said that it must have been made in France. But the doubt may easily be resolved, and advantage would result to all parties, by giving orders for some of this lace to the native workers in Travancore. Samples of six different kinds were sent. Gold and silver blond lace are both excellent of their kinds, but as the demand is limited, and fashion changeable, they might not always command a sale. But the broad black lace on wire-ground, and the broad white and fine lace on Brussels ground, and of the nature of Bedfordshire lace, are highly approved of by the best authorities. The broad being thought worth four shillings, and the narrow worth two shillings a-yard.—*Royle, Arts &c. of India, p.* 503.

(4783) LACERTA SCINCUS. Linn. Is still used by the Eastern doctors. It has been recommended in leprosy.—*Thirty five years in the East, by Dr. Honig. p.* 342.

(4784) LACERTIADÆ OR LACERTIANS. Under the family name Lacertians, Cuvier arranged—1st. The Monitors and their subdivisions, namely, the Monitors properly so called, including the Ouarans of the Arabs (*Varanus*), &c.; the Dragons (*Crocodilurus* of Spix, *Ada* of Gray), and the Sauvegardes (*Monitor* of Fitzinger and Ameiva). 2nd. The Lizards properly so called. The second group comprises, according to Cuvier, the genera *Lacerta*, *Algyra*, and *Tachydromus*.—*Eng. Cyc.*

(4785) LAC DYE. LAC LAKE. Consists of the colouring matter extracted from the stick lac. It is met with in small square cakes, similar to indigo. They are used as red dyes for some purposes, instead of Cochineal. Lac dye is largely manufactured in Bengal, whence it is exported to England. A sample of this dye was exhibited at the Madras Exhibition of 1855 by Mr. Flynn, who supplies the following information. "Lac Lake was prepared by boiling coarsely powdered Rangoon stick lac in several portions of water, until it ceased to yield any colouring matter; a small quantity of Alum was then added to the filtered solution, after a few minutes, a small quantity of Liqr. Potassæ was used to throw down the *Alumina* with the colouring matter, the fluid at the same time being constantly agitated. The precipitate was allowed to settle for a day, the fluid then drawn off and the sediment pressed into cakes and dried in the shade." The Jury awarded Mr. Flynn honorable mention.—*M. E. J. R.*

(4786) LACKER. A varnish either for wood or for brass, made with shell-lac and spirits of wine. That for wood called *hardwood* lacker, may be in the proportion of 2 lbs. of lac to the gallon. Another recipe is 1 lb. of seed-lac and 1 lb. of white rosin to a gallon of spirits of wine. For brass the proportions are ½ lb. of pale shell-lac to 1 gallon of spirit. It should be made without heat, but simply by agitation for five or six hours. It should then be left until the thicker portions have subsided, when the clear lacker must be poured off, or if not sufficiently clear, it must be filtered through paper. It darkens by exposure to light, so that paper should be pasted round the bottle to exclude it. A pale yellow lacker may be prepared from 1 oz. of gamboge and 2 oz. of Cape aloes, powdered and mixed with 1 lb. of shell lac. For a full yellow, ½ lb. of turmeric and 2 oz. of gamboge: for a red lacker, ½ lb. of dragon's blood and 1 lb. of annotto. The colour, however, is modified by that of the lac employed. Lackers may also be coloured by dissolving the colouring matters in spirits of wine, and adding the proper proportions of these to the pale lacker, according to the tint required. Mr. A. Ross prepares lacker with 4 oz. of shell-lac and ¼ oz. of gamboge, dissolved by agitation in 24 ounces of pyro-acetic ether. The clear liquor is decanted, and when required for use is mixed with eight times its volume of spirits of wine. Hardwood lacker is applied nearly in the same manner as FRENCH POLISH. In lackering brass, the work must be cleansed from grease and oil, and if convenient, heated to the temperature of boiling water, when the spirit evaporates, and the varnish attaches itself more firmly to the metal, producing a brilliant effect. If heat cannot be applied, the air should be dry and warm. The lackering should follow immediately after the work is polished, otherwise it will become tarnished, and prevent the lacker from adhering. To prevent this tarnish, the work may be smeared over with oil, or kept under the surface of pure water, or wrapped closely up in cloths. Before lackering, the oil must be carefully cleaned of with *moslings*, and afterwards with whitening applied with a rag or a brush. In brasswork factories, a *lackering-stove*, with a broad, flat top, is used for holding the articles which are to be heated preparatory to lackering; or a metal plate, supported by four legs like a table, and heated by a ring of gas-jets below, may be used. Brass tubes may be heated for lackering by being filled with boiling water, the ends being stopped with corks. In lackering the heads of a large number of small screws, they may be inserted in a piece of card, and heated over a charcoal fire or a gas flame, and the whole be lackered at one process. In thin circular works, the friction of polishing gives the heat required for the process. The lacker must be laid on quickly and uniformly by means of a camel's-hair brush; and as soon as one

coat is applied, another must be put on, heat being used between the two coats if necessary. Circular works may be lackered on a lathe.—*Tomlinson.* The word *lacquer* is evidently derived from the Indian name *lac* or *look*. The name occurs in Avicenna, who mentions it, as described by some, as the gum of a tree like the myrtle, and by others that it is a substance like to, and having some of the properties of amber. It is mentioned in many Indian works, and is apparently alluded to by Ctesias. This substance is used for a variety of purposes in India, and it is the common material for uniting things together, as gum and glue are in Europe. viz. Toys of various kinds, lac chains gilt, and lac grindstones, were shown. The term lacquer is applied to laying on or covering with a preparation of lac; but two different processes are usually confounded under this term. The one prevailing in Burma and the southern parts of the Indian Peninsula was well known to Dampier, in 1638, as he says, "The lac of Tonquin is a sort of gummy juice which drains out of the bodies or limbs of trees," and that "the articles lackered are cabinets, desks, &c." Some chemical change, no doubt, takes place on exposure of these juices to the air. This kind of lacquered ware was much appreciated in the last century, and was imported chiefly from China; much, however, was always prepared in Burmah, though that of Japan was always considered superior to any other, and of which many fine specimens may still be seen in large folding screens, &c. Both these and the lacquer of Burma are prepared only from the juice of a family of plants (the *Terebinthaceæ*), the same as that to which the marking nut and sumach belong. The chief expense of the manufacture arises from the care with which successive layers of varnish must be laid on. Various specimens of boxes have been sent from Moulmein and from Singapore, some showing different stages of the process. Another kind of lacquer-work is rather of the nature of papier-mache, covered with one or more layers of lac varnish. This is the case with the lacquered boxes from Cashmere and Lahore, so remarkable for the beauty and elegance of their patterns.—*Royle Arts &c. of India, page* 486. At the Madras Exhibition of 1855, a series of lacware from Hyderabad consisting of bracelets, chains, neck ornaments, pincushions, purses, and other ornaments were exhibited through Dr. Smith, excellent of their kind, and well finished. Some large and interesting specimens of this manufacture contributed from Kurnool, consisted of Charpoys, Trays, an Almirah and several boxes, and exhibited considerable proficiency in the execution and arrangement of the patterns, but too great a sameness of color with a preponderance of yellow. The joinery also admits of much improvement. *M.E.J.R.* In China, lackered ware was formerly exported in considerable quantities, but partly owing to the liability to injury on the homeward passage, and being superseded abroad by other things more substantial, the exportation has dwindled to a mere trifle. Such articles as are exported consist of those which have always been in request, as fans, waiters, boxes, teaboards, tea-caddies, teapoys &c. The patterns worked on them affect their sale, and the least mark spoils the varnish. The best kind of lackered ware comes from Japan, but it is difficult to be obtained in China. *Com. Des.* The beauty of the lacquered-ware of China owes its lustrous coloring to a composition of lampblack and the clarified juice obtained from a species of sumach, called *Rhus vernix* or *Vernicia.* Wood oils are obtained from other plants of the same family, and the different qualities of lacquered-ware are owing to the use of these inferior ingredients. The real varnish tree is described by De Guignes as resembling the ash in its foliage and bark, it is about fifteen feet in height, and furnishes the sap when seven years old, which is carefully collected from incisions in the trunk opened in the summer nights. The body of the ware is wood partially smoothed, or pasteboard, upon which two or three coats of a composition of lime, paper, and gum are first laid and thoroughly dried and rubbed. The surface of the wood is also hardened by rubbing coarse clay upon it, and afterwards scraping it off when dry. Two coatings of lampblack and wood oil, or in the finer articles, of lampblack and varnish, are laid upon the prepared wood, and after drying, the clear varnish is brushed on, one coating after another, with the utmost care, in close and darkended rooms, allowing it to dry well between the several coats. The articles are then laid by to be painted and gilded according to the fancy of customers, after which a last coating is given them. The varnish is brought to market in brownish cakes, and reduced to its proper fluidity by boiling; it is applied to many purposes of both a varnish and paint, when it is commonly mixed with a red or brown color. A beautiful fabric of lacquered ware is made by inlaying the nacre of fresh and saltwater shells in a rough mosaic of flowers, animals &c. into the composition, and then varnishing it. Another kind, highly prized by the Chinese, is made by covering the wood with a coating of red varnish three or four lines in thickness, and then carving figures upon it in relief. The great labor necessary to produce this ware renders it expensive. A common substitute for the true varnish is the oils of the Dryandra, Jatropha, Croton, and other members of the Euphorbiaceous family, expressed from their seeds by a variety of simple machines, consisting for the most part of different applications of power to cylinders and pestles by which the seeds are pressed or pounded. The oil, after pressing, according to De Guignes, is boiled with Spanish white

in the proportion of one ounce to half a pound of oil; as it begins to thicken, it is taken off and poured into close vessels. It dissolves in turpentine, and is used as a varnish, either clear or mixed with different colors; it defends woodwork from injury for a long time, and forms a good painter's oil. Boiled with iron rust, it forms a reddish brown varnish. In order to prevent its penetrating into the wood when used clear, and to increase the lustre, a priming of lime and hog's blood simmered together into a paste is previously laid on.—*Williams' Middle Kingdom, Vol.* II, *p.* 121.

(4787) LACTUCA, a genus of Plants belonging to the natural order *Compositæ*, the suborder *Ligulifloræ*, the tribe *Cichoraceæ*, and the sub-tribe *Lactuceæ* of De Candolle. It has a cylindrical imbricated involucre, with the scales membranous at the margin, and few-flowered; the receptacle naked; the achenium compressed, wingless, with a long filiform beak; the pappus hair-like in several rows. *L. virosa*, Acrid Lettuce, has leaves with a prickly keel, horizontal, oblong, auricled, and clasping mucronate, dentate or sinuated, the beak white, equalling the fruit, which is black. This plant is found on hedges, old walls, and the skirts of fields throughout Europe. It yields a milky juice, which, when procured and dried, has the name Lactucaricum. This substance is also procured from the Garden Lettuce (*L. sativa*), and in the 'London Pharmacopœia' the *L. sativa* is the only plant recognized for supplying this substance.—*Eng. Cyc.*

(4788) LACTUCA SATIVA. Garden or Roman lettuce.

Kahoo. Hind.

A well known garden vegetable, inodorous, of scarcely sensible taste, or slightly bitter: at the flowering time it contains a milky juice, which has acquired some celebrity under the name of Lactucarium, or Thridace.—*O'Shaughnessy. page* 406.

(4789) LADUNUM or LABDANUM. Cistus creticus. Lin.

Laden, Arab. | Ladanum, Lat.
Ciste, Ladenifere, Fr. |

This resinous substance which was considered by some of our old writers cephalic, pectoral and nervine, is now only used by us in the preparation of certain plasters. It is not unknown to the Mahomedan medical Practitioners of lower India, and has a place in the Materia Medica of the Arabians amongst their Munzigat (Supparantia).—*Ains., Mat. Med. p.* 23. Ladanum, is sometimes written *Labdanum*, but incorrectly as it is the Λήδανον of the Greeks, and the Ladun of the Arabs. It is first mentioned by Herodotus (iii. 112) as procured in Arabia, and used by the Arabs for fumigation. The word is not Greek, but an Arabic word with a Greek termination; the Greeks also used the word Λήδος to indicate the shrub which produced the Ladanum. This gum-resin is produced by several species of *Cistus*, the Κισσος, of Dioscorides, though the name and description are often confounded with those of the Κίσσος, or *Hedera*. *C. ladaniferus*, *C Creticus*, and *C. Ledon*, Lam., are usually mentioned as the species which are indigenous in the Grecian Islands, in Spain, Italy, and the south of France. That obtained from the Levant is the most celebrated. The juice exudes upon the leaves and branches of these shrubs and is collected, according to Tournefort, by means of an instrument resembling a rake, with leather thongs instead of teeth, which is drawn over the plant; and as the juice adheres to the thongs, it is afterwards separated. Ladanum is also described by Dioscorides as being collected from the beards of goats which had been feeding on the leaves of *Cistus*. (Compare Herodot. iii. 1112.) It is now seldom employed for any purpose, as it is with difficulty obtained of a sufficient degree of purity from the adulterations to which it is subjected; one analysis yielding 72 parts of ferruginous sand, and another 86 of resin, out of 100 parts. The purest kind, seen only in the places where it is produced, is described as blackish, homogeneous, and tenaceous; easily softening under the fingers, and even sticking to them; having a grayish fracture, which however becomes black by exposure to the air; rather a bitter taste, and a very agreeable smell from the presence of a volatile oil. It was formerly employed as a stimulant, more recently as an expectorant, and is esteemed even in the present day by the Turks as a perfume, and used for fumigation.—*Eng. Cyc.*

(4790) LAGENARIA (from 'lagena,' a bottle), a genus of Plants belonging to the natural order *Cucurbitaceæ*. The flowers are monœcious, the calyx campanulate, with subulate segments shorter than the tube. The corolla is white, with obovate petals spreading below the edge of the calyx. It has five triadelphous stamens, the fifth one distinct; three subsessile granulated stigmas, obovate compressed seeds, tumid at the margin, 2-lobed at the apex.—*Eng. Cyc.*

(4791) LAGENARIA IDOLATRICA, is held in great veneration by the Hindoos in their religious ceremonies. (Don, *Dichlamydeous Plants*; Lindley, *Flora Medica.*)—*Eng. Cyc.*

(4792) LAGENARIA PIPO.

Pooshnee-kai, Tam.

The Pumpkin, similar to the above, much used by the natives.—*Jaffrey.*

(4793) LAGENARIA VULGARIS. *Syn.* Cucurbita lagenaria. Bottle gourd. East Indies.

Soriaic-kai, Tam.

Belaschora (Rheede,) *Toombee*, (Royle,)—the Gourd of this variety is used for making the stringed musical instrument called the *Sitar*.—*O'Shaughnessy. L. vulgaris*, the common Bottle-Gourd, is a musky-scented plant, and clothed with a soft down. It has a climbing stem, with tendrils from 3 to 4-cleft. The flowers are stellated, spreading, and in clusters; the fruit in shape like a bottle, when ripe of a pale-yellow colour, sometimes six feet in length. When dried it becomes hard, and is used to contain water; it is then of a pale bay colour. In its wild state this plant produces a poisonous fruit, and Dr. Royle states that a very intelligent native doctor informed him that cases of poisoning have occurred from eating the bitter pulp in the district where it grows. Some sailors also are said to have died from drinking beer that had been standing in a flask made from one of those gourds. These injurious effects seem however to be removed by cooking, for Don says that the poor people among the Arabians eat it boiled with vinegar, or fill the shells with rice and meat, and so make a kind of pudding of it. The pulp of the fruit is often employed in poultices; it is bitter and purgative, and may be used instead of colocynth. This species grows abundantly in Egypt and Arabia; the Arabians call it Charrah; it thrives wherever the mountains are covered with a fit soil. There are three other species enumerated by Don growing in Guinea and the East Indies.—*Eng. Cyc.* The Lagenaria Vulgaris. or the Bottle gourd is commonly cultivated by the natives, to whom it is of some importance as food; of easy culture, seldom eaten by Europeans, it being very coarse.—*Jaffrey.* In Tenasserim, the bottle gourd grows luxuriantly, and several varieties may be seen about the Indian cabins.—*Mason.*

(4794) LAGERSTRŒMIA, a genus of Plants of the natural family of *Lythraceæ*, which extends from the Malayan Archipelago into China and Japan, as well as along the foot of the Himalayan Mountains to the northern parts of India. The genus was named by Linnæus in honour of Lagerstrœm, who was director of the Swedish East India Company and imported many interesting plants from India and Chiua. The species are few in number, but most of them highly ornamental in nature. *L. Reginæ* especially forms a small tree and is conspicuous from its large rose-coloured flowers, of which the petals, standing out on rather long claws, more fully display the varied outline of its undulated limp. The bark and leaves are accounted purgative and hydragogue, the seeds narcotic. *L. Indica and L. parviflora* are small and shrub-like and suited to our hot-houses, but all require moisture in the season of flowering.—*Eng. Cyc.* Speaking of this genus, as they occur iu China, Mr. Williams remarks that few trees in any country present a more elegant appearance, when in full flower.—*Williams' Middle Kingdom, p.* 285. Mr. Fortune speaking of Hongkong says, the Botany of the island possesses a considerable degree of interest, at least would have done so some years ago, when the plants indigenous to it were less known than they now are. By far the most beautiful plants met with on the low ground, are the different species of Lagerstrœmia. There are two or three varieties, having red, white, and purple flowers, and in the summer months when they are in bloom, they are quite hawthorns of China; surpassing in their gorgeous flowers even that beautiful family. I have generally met with them in a wild state, very near the sea shore. A little higher up we find the beautiful Ixora coccinea flowering in profusion in the clefts of the rocks, and its scarlet heads of bloom under the Hong-kong sun are of the most dazzling brightness. The ravines are crowded with ferns and creeping shrubs of different kinds, not however of much interest to the lover of ornamental flowering plants. Here, however, under the ever-dripping rocks, we find the beautiful Chirita sinensis, a plant with elegant foxglove lilac flowers, which I sent to the Horticultural Society soon after I arrived in China, and which is now to be found in many of the gardens of England. —*Fortune's Wandering, page* 20.

(4795) LAGERSTRŒMIA. SMALL LAGERSTŒMIA. The Tavoy forests are adorned with a smaller species of largerstrœmia than the L. Indica but the flowers are equally elegant and quite as large.—*Mason.*

(4796) LAGERSTRŒMIA ALBA. LAGERSTRŒMIA INDICA.

Henna or Telinga, CHINA.

This is the white flowering species of the China mendie. A common shrub in gardens, and used for border hedges, it bears a small reddish flower and grows easily from cuttings at the commencement and during the rains.—*Riddell.*

(4797) LAGERSRŒMIA GRANDIFLORA. In the Terai, east of Siligoree, *Bombax, Erythrina*, and the *Duabanga* (*Lagerstrœmia grandiflora*), were found by Dr. Hooker in full flower, and with the profusion of *Bauhinia*, rendered the tree-jungle gay; the two former are leafless when flowering. The Duabanga is the pride of these forests. Its trunk, from eight to fifteen feet in girth, is generally forked from the base, and the long pendulous branches which clothe the trunk for 100 feet, are thickly leafy, and terminated by racemes of immense white flowers, which, especially when in bud, smell most disagreeably of assafœtida.—*Hooker Him. Jour. Vol.* I. *p.* 401..

(4798) LAGERSTRŒMIA INDICA. Indian Lagerstrœmia Tsjinkin (Rumph.) This is a small pretty shrub, common in gardens in Maulmain, and of easy cultivation.—*Mason.* Tsjinking is the name given, in Rumphius, to one of the most

beautiful flowers in our Indian gardens, which however, does not appear to be a native of India, having no proper Tamool appellation, but is sometimes called Cheena poo by the gardeners. This shrub grows to the height of seven or eight feet; the flowers hang in bunches at the extremity of the branches, and are of a beautiful lilac colour.—*Ains. Mat. Med. p.* 164.

(4799) LAGERSTRŒMIA LANCEOLATA.

Bodah or Bondaga, Hind.

An erect tree with oblong lanceolate leaves, flowers small, white, appearing in April and May, the whole of the species may be propagated by seed or cuttings in any garden soil.—*Riddell.*

(4800) LAGERSTRÆMIA MICROCARPA. Ben Teak. Icon. 109.

Venteak, yen bugum, Eng.	Cutchay cuttay marum or
Benteak, Ventakoo, Can.	Ven takoo marum, Tam.

A tree of large size with a long straight stem, the timber is of ordinary character, easily worked and suited for purposes where strength and beauty are not required.—*M. E.* This tree attains a large size and, for common purposes, where timber of inferior quality is sufficient, is very useful, being easily worked. Tested by the scale it only bore 290 lbs. on a second trial however it sustained 374 lbs. Were it stronger and more durable, the length and straightness of the stem would adapt it for spars. —*Wight.* Common in Wynaad and on the Western Ghauts: wood prized for making coffee cases.—*McIvor.*

(4801) LAGERSTRŒMIA PYMMAH.

Pymmah, Burm.

A common and valuable timber, found generally all over the Pegu country. It ceases however a little below Tounghoo and Prome, so that at those places it cannot be made available for building purposes; but at all the lower stations from Prome and Tounghoo downwards, it ought to supersede the use of Teak. Red-colored wood, strong and adapted for house-building.—*McClelland.*

(4802) LAGERSTRŒMIA REGINÆ. Queen Lagerstrœmia. Icon. 413. Roxb. 65.

Cadali pua, Tam.	Stotulari. Sans.
Hort, Mal.	*Ains. Met. Med. p,* 163
Arjano, Beng.	Jarool Adamboe, Rheed

When cultivated in England the queen Lagerstrœmia is a small shrub, but in its native soil it is a large timber tree, and when in flower is one of the most conspicuous trees in the Tenasserim Provinces. A tree in full blossom looks in the morning as if mantled with roses, but the flowers change through the day to a beautiful purple, making it appear at evening, if seen from a short distance, like a bower of English lilacs.—*Mason.* The queen Lagerstrœmia, or jarool, is an abundant timber tree in the Tenasserim Provinces, though very scarce on the Coromandel Coast. The posts of an old wharf at Tavoy which were of this wood, stood erect for twenty or thirty years; but house posts often decay in the ground in a much shorter period. It is considered a valuable timber in ship building. There is a smaller species of lagerstrœmia in the Tenasserim jungles whose wood is inferior, but it is sometimes confounded with the other.—*Mason.* This tree is more celebrated for its large handsome flowers than for its timber, which last however is used for common purposes.—*Riddell.* About 70 miles up the river Soornah, the mountains on the North, which are east of Jynteа rise 4000 feet high in forested ranges like those of Sikkim. Swamps extend from the river to their base, and penetrate their valleys, which are extremely malarious: these forests are frequented by timber-cutters, who fell jarool (*Lagerstræmia* reginæ), a magnificent tree with red wood, which, though soft, is durable under water, and therefore in universal use for boat-building. The toon is also cut, with red sandal wood (*Adenanthera pavonina*); also Nageesa, *Mesua ferrea*, which is highly valued for its weight, strength, and durability: *Aquilaria agallocha*, the eagle-wood, a tree yielding uggur oil, is also much sought for its fragrant wood, which is carried to Silhet and Azmerigunj, where it is broken up and distilled. Neither teak, sissoo, sal, nor other *Dipterocarpi*, are found in these forests.—*Hooker, Him. Jour. Vol.* II. *p.* 327.

(4803) LAGOMYS BADIUS. On entering Tibet, Dr. Hooker found the ground burrowed by innumerable marmots, foxes, and the "Goomchen," or tail-less rat, (*Lagomys badius*), sounding hollow to the tread, and at last becoming so dangerous that he was obliged to dismount and walk.—*Hooker, Him. Jour. Vol.* II. *p.* 156.

(4804) LAGOMYS RUFESCENS, of Gray, is a little quadruped found on the mountains of Afghanistan, and perhaps onward to the Hindu Kosh, but which is very unlikely to inhabit the Indian side of the passes.—*Cal. Rev.*

(4805) LAMB SKINS.

Peaux d ageneaux, Fr.	Pilli agnelline, It.
Lammsfelle, Ger.	Pielles de Corderos, Sp.

Are chiefly used in the glove manufacture. The value of lamb-skins varies according to the fineness, brilliancy, and colour of the wool, the black being most esteemed.—*Faulkner.*

(4806) LAMPS.

Lampe, Ger	Lampadu, Rus.
Lampe, Fr.	Lampara, Sp.
Lucerna, It.	

Are appliances formed of various material and shapes, in which liquid inflammable bodies are burned, for the purpose of producing artificial light. Those in most common use in India are Argand lamps.—*Faulkner.* Lamps are arranged for burning materials which are fluid at or-

dinary temperatures, in order to produce light. Such are the oils. Fats which are solid at common temperatures are usually made into candles. The kind of oil used in different parts of the world for burning in lamps varies with the sources of supply, and these are numerous. In Great Britain, whale oil, boiled from the subcuticular fat of the whale, was long used, and still is to a certain extent, although the general introduction of coal gas has lessened the demand for it. Oils obtained from seeds by pressure are used for artificial illumination in different parts of the world. In Paris, oil of rape-seed and oil of poppy-seed are clarified for lamps by filtration through cotton, wool, and other processes. In the south of France and in Italy an inferior kind of olive-oil is used, as also the oil of *arachis hypogæa*, or earth-nut. In Italy, lamp-oil is expressed from the stones of the grape. In Piedmont, walnut-oil is used; In India, Coconut, castor, gingelly and ground nut oils are in use; on the eastern and southern coasts of the Mediterranean and in China, oil of sesamum seed; and in tropical countries coco-nut oil (which at the temperature of Britain is a white solid like tallow): it is burnt in lamps made of the shell of the coco-nut and of bamboo. Much of the oil used in China is expressed from the seeds of a tree called *Camellia oleifera*, cultivated for the purpose, as is also a shrub, *Croton sebiferum*, from the fruit of which a solid oil is obtained by expression. Seal oil is used by the Esquimaux. The essential oils are too volatile for lamps. Petroleum and naphtha from fossil vegetable matter are used in localities which produce them. Naphtha, the most liquid of the oils, is also prepared by distilling fossil vegetable matter, and is well adapted for burning. In Genoa, the streets are lighted with naphtha from the adjacent territory of Amiano; and some years ago it was obtained by the distillation of pit coal, for the purpose of burning in the street-lamps of London. Alcohol, or spirits of wine, is chiefly used as a source of heat, on account of its clean flame, no soot being deposited.—*Tomlinson.*

(4807) LAMP BLACK.

Noir de fumee, Fr. | Kienruss, Ger.
Nerodi fumo, It.

For the demands of trade, lamp-black is obtained by burning the impurities left in the precipitation of tar and pitch, and collecting the particles carried off, and deposited in the form of soot. The finest kind is procured by collecting the smoke from a lamp, which supplies more oil than can be perfectly consumed. It is used in the arts, particularly in the manufacture of painter's ink.—*Faulkner.*

(4808) LAL CHITRA. Blistering Plumbago. Root of Plumbago rosea.

(7809) LAMINARIA SACCHARINA (spec) is officinal at Lahore and in Cashmere. The fronds are procured from Thibet, where they are reported to grow in a salt lake, but some English physicians maintain, that they are brought from the Caspian Sea.—*Honigberger, p.* 297.

(4810) LAMTENG IN SIKKIM Here birds were scarce, with the exception of alpine pigeons (*Columba leuconata*), red-legged crows (*Corvus graculus, L.* and the horned pheasant (*Meleagris satyra*, L.)—*Hooker Him. Jour. Vol.* II *p.* 37.

(4811) LANCE-WOOD. The timber of a tree (*Guatteria virgata*), indigenous to Jamaica, and which is much valued on account of its exceeding even ash in lightness, strength and elasticity. It is chiefly used for shafts for carriages.—*Faulkner.*

(4812) LANCE-WOOD OF MAULMAIN. There is a tree found all over the Provinces which yields a wood that the residents at Maulmain sometimes call lance-wood. The Karens make bows of it, but prefer *Cassia fistula*. Mr. Mason never met with the tree in flower, but thinks it a species of dalbergia, though it may possibly be a cassia.—*Mason.*

(4813) LANCE-WOOD, OF TENASSERIM. Apocynaceæ. A tree which produces a timber possessing the properties of lance-wood is not uncommon in the Provinces, but it belongs to the dog-bane tribe, and is not at all related to *Guatteria virgata*, the lance-wood of commerce.

(4814) LANIADÆ, a family of Birds including the Shrikes, or Butcher-birds (*Lanius*, Linn). Linnæus places his genus *Lanius* at the end of his first order, *Accipitres*, immediately following the Owls (*Strix*). The *Picæ* form the succeeding order. Cuvier makes the Pies-Grieches (*Lanius*, Linn,) the first great genus of his *Dentirostres*, his second order; the Oiseaux de Proie (*Accipitres*, Linn.) being his first.—*Eng. Cyc.*

(4815) LANSIUM, a genus of Plants belonging to the natural order *Meliaceæ*, established by the late Dr. Jack, and formed of the *Lansium* of Rumph., 2, p. 151, t. 54, which is the *Lansai* of Marsden's 'Sumatra,' pl. v. p. 101, and the Langsah or Langseh of the natives of the Malay Islands. This forms one of the highly-esteemed fruits peculiar to the Malayan Archipelago, or what was termed India Aquosa by old writers, though unnoticed in many works where we might expect to find it fully described. The genus is characterised by—Calyx deeply 5-parted; corolla 5-petalled, petals roundish. The tube formed by the union of the stamens is subglobose, with its mouth nearly entire, having the 10 anthers included within it. Ovary 5-celled, cells with 1-2 ovules; style short, columnar; stigma flat, 5-rayed; berry cortical, 5-celled, 5-seeded, with one or two cells only perfecting their seed;

seeds enveloped in a semitransparent pulpy tunic or aril, exalbuminous; cotyledons unequal, peltate, the short radicle being inserted into their centre. The Lanseh forms a moderate-sized tree with tomentose branches. Leaves alternate, pinnate; leaflets 7 to 9, alternate, short-pedicelled, elliptic-oblong, very smooth; the young leaves are pubescent on the under surface; stipules none; recemes springing from the trunk and naked branches, at first suberect, afterwards drooping by the weight of the fruit. The fruit is of an agreeable taste, according to Marsden, though the skin contains a colouring juice, extremely bitter, and which is apt to taint the fruit if not opened with care. The Ayer-Ayer is another fruit so nearly resembling the Lanseh in most particulars that D. Jack, hesitating to rank it as a species, mentions it as a permanent and well-marked variety under the name var. *B. L. aqueum*. The fruit of the Ayer-Ayer is rounder, and the pulp more watery, and dissolves more completely in the mouth than the Lanseh. Both are highly esteemed by the Malays, and are equally agreeable to the European palate. The juicy envelope of the seeds is the part eaten, and the taste is cooling and pleasant. ('Linnæan Transactions.' xiv. D. 114.)—*Eng. Cyc.*

(4816) LANSIUM, Sp. NAT. ORD. MELIACEÆ.

Var, *a*. Langsat, Malay & Javanese, shape globular.
Var, *b*. Duku „ „ „ oblong.

A genus of plants, consisting of moderately sized fruit bearing trees, and peculiar to the Malay archipelago Europeans regard its fruit as next to the mangostei. It is about the size of a pigeon's egg, having a tough white skin with a bitter taste, and the edible part is the pulpy semitransparent envelope of the seed. —*Crawfurd, p.* 214. At another place he says, Duku, is the Malay and Javanese name of a tree and fruit of the genus Lansium, and natural order Meliaceæ of botanists. To the same genus belong the belangseh, langsat or langsab, for in all this forms the word is written, the rambeh and the ayar-ayar, probably all four but varieties of the same species. The duku is the most esteemed of them, and to the European palate is the best of the native fruits of the Archipelago, after the mangostin. The natives class it after the durian and mangostin. It is of the size of a pigeon's egg, of globular form, and covered with a coriaceous skin of the colour of parchment. The species seems to be indigenous in the western portion of the Archipelago, but to have been introduced into the Philippines where one variety of it, the langseh, is cultivated.—*Crawfurd Dict. page* 125.

(4817) LANTANA, a genus of Plants belonging to the natural order *Verbenaceæ*, named from one of the old names of *Viburnum*, which some of the species somewhat resemble in habit. They are often stated to be confined to America, but a species is found in Arabia, and two in India. They form small or moderate-sized shrubs, often with rugose aromatic leaves, and a somewhat peculiar odour in the clustered flowers, which are either pink, yellows white, or changeable. Piso states that three species, which are confounded together in Brazil under the name *Camari*, are there used for making medicated baths for diseases of the skin. Martius states that the flowers of some species are employed for making demulcent drinks in catarrhal affections. *L. Macrophylla* is employed in infusions as a stimulant, and *L. Pseudo-Thea* as a substitute for tea.—*Eng. Cyc.*

(4818) LANTANA NIVEA :: MUTABILIS. Changable lantana. This straggling shrub appears to be quite naturalized in the neighborhood of Maulmain; though rarely seen in other parts of the Provinces. The flowers are yellow when they first open out, but afterwards change to a rose colour.—*Mason.*

(4819) LANTANA SELLOVIANA. These are large shrubs, producing pink, yellow, orange colored heads of flowers, they blossom at all seasons, and are found in most gardens, the leaves have the scent of black currants, the berries are eaten, may easily be propagated by seed, or suckers.—*Riddell.*

(4820) LAPIS LAZULI, AZURE STONE. A mineral substance of an azure blue colour, with numerous golden spots. When found massive, it is opaque, and its blue colour is not uniform. The finer kind is much prized by the lapidary and the common is used for toys, ornaments, &c. Its chief use, however, is for affording *Ultra marine*, a beautiful pigment, highly valued by painters. Chief localities, China, Persia, Bokhara, Siberia, &c.—*Faulkner.* It is found in Hainan in China, and other parts of Asia. Great quantities of it are procured from the Island of Hainan, in the Chinese Seas. The colour of this stone is a fine azure blue; having little lustre, but susceptible of a fine polish. The Chinese are supposed to use it in painting upon copper and on their porcelain. The beautiful and permanent colour called *Ultramarine*, is prepared from Lapis Lazuli.—*Comp. Desc.*

(4821) LAQUIS. The name given to a variety of the Manilla Hemp Plant, by the Bisayas, by whom the fibres of the original abaca are termed *Lamot*. Rumphius states that the Malay name is *Pissang utan*; that it is called in Amboyna, *Kula abbaal*, in Ternate, *Fana*; and in Mindanao *Coffo*, as also the cloth made from it. He distinguishes the mindanao kind from that of Amboyna.—*Royle Fib. Pl.*

(4822) LARD.
Dukkur-kee-Churbee, HIND.

The fat of the omentum and mesentery of the pig. When properly freed from membranes and

blood by being picked, kneaded in water, melted and strained through linen, it should be white, pultaceous, in thin layers, somewhat tough, without smell, and of a sweetish taste. Lard is employed in the formation of ointments, plasters, liniments, for other medicinal purposes, and also in cookery. *Waterston.—Faulkner.*

(4823) LATHE. Native carpenters make use of a kind of lathe consisting of two rough upright supports mortared into two bars, one of which is fixed while the other may be adjusted by sliding along two slips of wood or bamboo to which it is then fixed by moveable wedges, a boy having in his two hands the ends of a cord passed round the work to be turned causes it to revolve as in the pole lathe: when the work cannot be so fitted the lathe used by brass-smiths is had recourse to: in this a kind of rough wooden mandrel, with a broad face smeared with lac for fixing objects to be wrought, works between a back centre as in the carpenters lathe and a collar shaped, the collar being formed of a plank sawn down the middle and embracing the mandrel which is turned to fit.—*Roxde M.S.S.*

(4824) LATHYRUS APHACA. (Europe), Chuna. Burachuna, *Beng.* ripe seed narcotic *L. Cicera*, (Spain), seeds poisonous. *L. sativus*, Khesaree, Teora, *Beng.* The expressed oil of the seeds is a powerful and dangerous cathartic.—*O'Shaughnessy, page* 317.

(4825) LATHYRUS ODORATUS, Sweet Pea. This genus is formed for the most part of very handsome plants when in flower, but require sticks or trellis work to support them. The seed should be sown after the rains, at the commencement of the cold season, in pots. It is very seldom that they blossom,—*Riddell.*

(4826) LATHYRUS SATIVUS.

Kussoor, Hind.

Kussoor is the Hindoostanee name of a pulse, common in the higher provinces of India, but cultivated in the southern parts of the Peninsula.—*Ainslie p.* 240.

(4827) LAURELS: LAURACEÆ, a natural order of Apetalous Exogens, consisting of trees and shrubs inhabiting the warmer parts of the world, and in most cases aromatic, on which account several are mentioned in works on officinal plants. The best known species in Europe is *Laurus nobilis*, the sweet Bay, a beautiful ever green, whose fragrant leaves are commonly employed to flavour confectionary. Other products of the order are cinnamon and cassia, L. sassafras, whose bark has great reputation in North America as a powerful sudorific; Pichurim beans an indifferent substitute for nutmegs; and finally, not to mention other useful substances, camphor, obtained by the Chinese from the *Camphora Officinarum* by means of dry distillation. In general it may be suspected that the trees of this order are valuable as aromatics and stimulants, although but a comparatively small number has yet been brought into use. They are known by the peculiar structure of their flowers, which has no corolla, stamens in one or several rows, often in part gland-like and sterile, a single-celled superior 1-seeded ovary, and especially by the anthers bursting with recurved valves. [Cinnamomum; Laurus; Nectandra; Benzoin; Sassafras.] There are 46 genera and 450 species of this natural order. Its position is near *Thymelaceæ* and *Cassythaceæ.—Eng. Cyc.*

(4828) LAURUS, a genus of Plants belonging to the natural order *Lauraceæ*, to which indeed it has given its name. It includes as a species one of the most celebrated trees of antiquity, and until recent times some of the most elegant and useful of the vegetable kingdom, as among them were the trees yielding the camphor of Japan, Cinnamon, both of China and of Ceylon, Cassia bark and buds, the Malabathrum leaf of the ancients, with the less known Culilawan and Sintoc barks, as well as the American Persea, Pichurim, and Sassafras. Most of these are however now placed in distinct genera by the latest authors who have paid attention to the subject, as Nees von Esenbeck and Blume.—*Eng. Cyc.* Laurus Camphorifera of Kæmpfer, now the *Camphora officinarum* of Nees, is a native of Japan and of the province of Fokien in China, and also of the island of Formosa, whence, according to Mr. Reeves, the chief portion of the camphor of commerce is brought to Canton. As the wood is said to be valuable, the root, refuse wood, and smaller branches are cut into chips, covered with a little water, and the camphor separated by sublimation. [Camphora.] It is necessary to distinguish this camphor from that produced in Borneo and Sumatra by *Dipterocarpus*, or *Dryobalanops Camphora*. [Dryobalanops.] The kinds of cinnamon are not so clearly settled, as there is both a Ceylon and a Chinese cinnamon. The former however is no doubt produced by *Cinnamomum Zeylanicum*, and the latter by the *C. aromaticum* of Nees. This cinnamon is of superior quality, at least some of it, and is preferred by the Chinese to that of Ceylon, and said to be produced in Cochin China chiefly in the dry sandy districts lying north-west of the town of Faifoe, between 15° and 16° N. lat. Mr. Crawfurd ('Embassy to Siam,' p. 478) informs us that there are 10 varieties of it, and that it is not cured, like that of Ceylon, by freeing it from the epidermis. Dr A. T. Thomson gives this as one of the characters by which cassia may be distinguished from cinnamon. It is possible therefore that some of it may be imported into Europe and sold as cassia, though Mr. Marshall states that the cassia-bark of shops is only a coarse cinnamon obtained from the thick roots or large branches

of the cinnamon tree. Cassia-Buds, or *Flores Lauri Cassiæ*, are the dried receptacles of some species of this family, by some supposed to be the above *C. aromaticum*; but it has been pointed out by Loureiro, and is named *C. Loureirii* by Nees. It is a native of Cochin-China towards Laos, and Japan. [CASSIA-BUDS.] It is sometimes been doubted whether the substances we now call Cinnamon and Cassia are exactly the same things as those to which the ancients applied these names. It is very certain that the substances which formed such highly-esteemed articles of commerce must have possessed some remarkable physical and sensible properties not common in products beyond the tropics. The aromatic principle is that which is most conspicuous in the products of the tropical zone, and is found probably in most of the substances which the ancients obtained from the east—at least Dioscorides has described them all together. It would be difficult even with our present knowledge to find any other substances which would equally well answer the ancient descriptions, without going still farther east. The Greek name of cinnamon is Κιννάμωμον, which Herodotus says his countrymen learnt from the Phœnicians; and the Hebrew name, we know, is Kinnemon. It is remarkable that the Malay name is Kayu-Manis, which Mr. Marshall says is sometimes pronounced as if written Kaina-Manis. By the Hindoos cinnamon is called Dar-Cheence, indicating, that they obtained it from the Chinese; and Professor Wilson has lately proved that there was commerce by sea with China at a very early period, and, what is still more remarkable, that the navigators were Hindoos. The Culilawan Bark, often written Culibaban, or Culitlawan, said to be derived from 'kulit,' bark, and 'lawan,' clove, in some measure resembles Cassia. It is one of those which has been known in Europe since the 17th century, but it has been little used in modern times, though Blume describes it as possessed of remarkable properties in curing diseases. Analyzed by M. Schloss, it was found to yield a resin, a volatile oil, and a bitter extractive substance. A volatile oil obtained from it in Amboyna is used as a stimulant, according to Labillardiere. It was formerly employed in Europe as an aromatic stimulant, and must be useful in cases where such remedies are indicated. The tree yielding it is a native of Amboyna, and is called Cinnamomum Culilawan by Blume.—*Eng. Cyc.* Dr. Wight in Icones gives Laurus, 1833; bilocularis, 1828; cassia, 128-132-140; cinnamomum, 129-136; Culilaban, 137; dulcis, 138; lanceolaria, 1821; multiflora, 131; nitida, 124; obtusifolia, 139; porrecta, 1832; recurvata, 133; and villosa, 1822.

(4829) LAURUS. A solitary post of a species of laurus is often found in Tavoy houses. There was one in Mr. Mason's which the white ants selected in preference to all others; and as long as left undisturbed, they never wandered from home. It may be an advantage to have one post in a house of this timber, but one is quite sufficient.—*Mason.*

(4830) LAURUS CAMPHORA. Lin. CAMPHORA OFFICINARUM. Nees. The Camphor tree is an evergreen, grows to a considerable size, is straight below and branched. All parts emit a camphoraceous odour when bruised. Wood white, fragrant, much used in China for making trunks, boxes, &c. Branches somewhat lax, smooth, with a greenish bark. Leaves alternate, with long petioles, ovate-lanceolate, rather coriaceous, smooth, shining, and bright-green above, paler beneath, triple-nerved, with a sunken gland opening by a pore beneath, at the axils of the principal lateral veins. Leaf-buds scaly. Flowers small, hermaphrodite, smooth externally, in naked, axillary, and terminal corymbose panicles. Perianth 6-cleft, with a deciduous limb. Fertile stamens 9 in 3 rows, the 3 inner supported at the base with 2 stipitate compressed glands. Anthers 4-celled, opening by as many ascending valves, the 3 interior looking outwards, the others opening inwards. Three sterile stamens subalternate with those of the second row, three other stipitate, each with an ovate head. Drupe situated in the truncate cup like base of the perianth.—Native of China, principally near Chinchew in the province of Fokein; also of Formosa and Japan.—Nees von Esenb. 130. St. and Ch. 129.—*Royle.* Mr. Fortune saw near a bridge, a noble specimen of the camphor-tree (Laurus camphora) laid prostrate on the ground having been blown down by a typhoon many years ago. And he tells us that the curious gnarled and angular branches for which this tree is remarkable when it is alive and standing, seemed more striking in its prostrate and withered condition.—*Fortune Residence among the Chin. p.* 39. Dr. Riddell tells us that the Camphor tree of China introduced into Bombay, is a large tree with ascending branches, bark of the stem somewhat rough, but on the inner surface is smooth and mucous. The tree does not blossom until it has attained a considerable size, the fruit is a purple berry the size of a pea, composed of a soft pulpy substance having the flavour of cloves and camphor.—*Riddell.* To this tree it is that the camphor of European commerce is chiefly due.—*O'Shaughnessy, page* 545.—See CAMPHOR. To obtain the camphor, the wood is cut into billets and boiled in water, in iron pots covered with earthenware heads filled with straw; the camphor volatilizes and concretes on the straw. This process is followed in Japan, Sumatra, Borneo, and Malacca. Camphor is a principle found in many plants, but only in two in any great abundance. Camphor, like several substances the produce of countries to the southward or eastward of India, was unknown to the ancients. (Hindoo Med. p. 93.) It

was known to the Arabs, and called by them *Kaphoor*. Camphor is diffused through all parts of the plant, and is separated from the root, trunk, and branches, which when cut into chips, are boiled in water and then sublimed into inverted straw cones contained within earthen capitals. It is thus obtained in the form of *Crude Camphor*, chiefly from the province of Fokien and the opposite island of Formosa, but some of good quality is also procured from Japan. The Dutch exported from thence into Europe 310,520 lbs. in seven years. It is sometimes imported into Britain from Batavia. The ordinary Crude Camphor is in small greyish-coloured, slightly sparkling grains, which by aggregation form greyish crumbling cakes, with all the properties of purified Camphor. In England this is separated from impurities by being mixed with lime and sublimed in thin glass vessels, which being afterwards cracked, the Camphor is obtained in a concavo-convex cake about three inches thick with a hole in its middle. Camphor is solid, colourless, and translucent, with a crystalline texture, has a strong, penetrating, aromatic odour, and a bitter, rather pungent taste, followed by a sensation of coolness; though brittle, it is not, from its toughness, easily pulverized. Sp. Gr. ·98 to ·99; so that it floats on water, and, evaporating, produces a circulatory movement. From its volatility, it volatilizes at ordinary temperatures, and crystalizes on the inside of bottles. —*Royle.*

(4831) LAURUS CASSIA. *Syn.* CINNAMOMUM ALBIFLORUM. Nees. Cassia lignea. Κινναμωμον and Κασσια, Hip. Κασσια, Dioscorid. This is found in Malabar, Sumatra, and Java. The cassia tree (*Laurus cassia*) grows chiefly in Kwangsi and Kweichau, and its dried bark affords the principal part of that spice used in the west. The bark is stripped from the twigs by running a knife along the branch and gradually loosening it; after it is taken off, it lies awhile until decay commences, when the epidermis is easily scraped off, and it is dried into the quilled shape in which it comes to market. The fleshy receptacles of the seeds of this tree, or the pulpy substance which is found in the pods, are also collected, and brought to market under the name of *cassia buds*, being applied to the same purposes as the bark; they require little or no other preparation than simple drying. The leaves and bark of the tree are also distilled and furnish cassia oil, a powerful and pleasant oil employed by perfumers and cooks. The manufacture of it has of late years been interfered with by the officers from an apprehension, as has been alleged, that a want of fuel would ensue if the distillation was not restricted.—*Williams' Middle King. Vol.* II. *p.* 137. Bark, red brown, in fragments of a foot and longer, sometimes in plane pieces a line in thickness, and of variable width or in rolled smooth pieces with a greyish epidermis covered with lichens, chiefly *graphides* and *lecanora*. Hard, inflexible, and with plane fracture. Odour aromatic, agreeable, but weaker than the true cinnamon. Taste sweetish, mucilaginous, rather acrid, bitterish, and tenacious; powder of chamois leather colour. The valuable properties of this bark, depend on its essential oil. Cassia bark is much used for adulterating true cinnamon; it may be distinguished at once, by its very mucilaginous character when chewed. M. Fee places the name of a separate species to this article, but Mr. Marshall is of opinion that cassia bark is merely an inferior kind of cinnamon, obtained from the larger branches and trunk of the true tree. Mr. Marshall's long residence in Ceylon, and his close habits of observation, entitle us to regard his opinion with full confidence.—*O'Shaughnessy, page* 543.

(4832) LAURUS CINNAMOMUM. CINNAMON. Lin.

Karuwa puttay, TAM. Kulmie Darchinie. DUK.	Sanala winga-putta, TEL. *Ainslie's Mat. Med. page* 264.

This tree is rare in the Deccan, and is only to be found in private gardens; where it is most probably introduced from Ceylon, where it blossoms in January and February, the seeds ripen in about four months, the berry is oval about the size of a pea, and when first gathered the taste resembles that of the Juniper berry, and when dry, if boiled, yield a substance which when cold becomes solid like wax, and may be made into candles; propagated by seeds, shoots, or layers; soil a sandy loam mixed with decayed vegetable matter.—*Riddell.*

(4833) LAURUS CULILAWAN. *Syn.* Cinnamomum Culilawan. *Blume.* Telakal, or Sindoc, bark Suleekhe, *Arab.* Selecka, *Mathiolus*, Selechacha, *Avicenna.* Islioos assigned as Greek name.—*Royle, p.* 325. This grows in Amboyna and the Moluccas. The bark of this tree is an aromatic stimulant like Cassia, with some astringency and a flavour of cloves: It contains resin, volatile oil and bitter extractive. Dose 10 grains to ½ a drachm. The oil is used in Amboyna as a stimulating liniment.—*O'Sh. p.* 539.

(4834) LAURUS MALABATHRUM, (Fee.) SYN. Cinnamomum Malabathrum, (Nees and Ebermaier.) Folia malabathri of the ancients.

Leaves, Tej pata, BENG. | Bark Sadrus, Putruj, HIND.

The odour resembles that of cloves; the flavour is aromatic and hot. A native of the Malabar and Coromandel hills, and of the mountain ranges from Sylhet to Missouri.—*O'Shaughnessy, p.* 539.

(4835) LAURUS NITIDA,

Panna-tha, BURM.,

and a second species, are both small trees, about twenty feet high. Their bark is aromatic and affords an inferior kind of cinnamon. They are found in the Pegu and Tounghoo districts.—*McClelland.*

(4836) LAURUS NOBILIS, Sweet bay. *Hub-oolghar* is the Arabic name of the berries, which are still used in medicine in India, with the Greek name Daphne corrupted into *Zakuee* and *Zafuee*.—*Royle*, p. 326.—*OShaughnessy page* 538.

(4837) LAURUS PERSEA. This tree grows to a large size and requires much water. The wood is very brittle. It bears fruit during the rains, the size of a baking pear, but to describe it more accurately would be to say that it is from six to eight inches long, and in the thickest part about three inches in diameter. It is called Subaltern's butter. The outside has a dark green skin, rather thin; and inside a soft whitish pulp, which may easily be divided with a spoon. The seed is about the size of a pigeon's egg, and will grow if planted immediately. The flavor of the pulp is sweeet and creamy, and perhaps the name of Subaltern's butter is derived from this particular taste and appearance. The Natives do not seem fond of it.—*Riddell*

(4838) LAVAJAH TIMBER, short round logs of Timber in the Madras market from 12 to 16 feet in length. 2 to 3½ feet square.

(4839) LAVANDER, the name of hoary, narrow-leaved, fragrant bushes, with generally blue flowers, arranged in close terminal simple or branched spikes. Twelve species have been described, only two of which are of much interest, viz. the common lavender (*Lavandula vera*), and French lavender (L. *spica*). The former yields the fragrant *oil of lavender* used in perfumery, (its solution in spirits of wine forming what is called *lavender-water*,) and the latter *oil of spike*, used by painters on porcelain, and in the preparation of varnishes for artists. [See Essential Oils.] English oil of lavender is most esteemed: it is prepared chiefly at Mitcham in Surrey, where the plant is extensively cultivated for the purpose. It is in highest perfection when about a year old. At first it is nearly colourless, but gradually acquires a pale amber tint. Oil of spike is chiefly imported from the South of Europe —*Tomlinson.*

(4840) LAVANDULA STÆCHAS, (æstakhoodus,) is different in some botanical characters, in other respects nearly the same as the next. It is much prized as an expectorant and antispasmodic by the Arabs.—*OShaughnessy, page* 489 A species of Lavender flower is imported into Bombay from the Persian Gulf, and used medicinally by the natives of India. The Persains term it *Ossa-kuddas.—Faulkner.*

(4841) LAVANDULA VERA AND SPICA, of Decandolle. *Syn.* L. Spica of Linn., and its variety. Europe. Flowers small, bluish, calyx, tubular, cylindrical, streaked, tomentose, corolla infundibuliform, pubescent, tube rather longer that the calyx, limb with five unequal divisions, upper lip large, obcordate, bifid, lower lip trifid. Odour agreeable and penetrating, taste aromatic acrid, rather hot. The volatile oil is limpid, very transparent, yellowish white; four parts contain nearly two of camphor. Often adulterated with the oil of turpentine, and of a species of lavender of superior aromatic power, though more acrid. Lavandula (spica) yields an oil much used by porcelain painters, and called "oil of spike"—*O'Shaughnessy, page* 488. Wight gives Lavandula (Ch.) Burmanni; 1438 (Ch.) Lawii; 1439.

(4842) LAVANDULA VERA.

Sitakepungerie, Duk.

This plant never blossoms in the Deccan, but grows to great perfection on the Neilgherry Hills. The bush there has a strong aromatic scent, but seldom survives more than two years. Is propagated by cuttings and layers, in a good rich soil.—*Riddell.* Lavender, requires pot culture and careful renewing of the stock every season by cuttings, old plants being very uncertain; should be planted in rather poor soil. Seeds sown at the commencement of the rains. —*Jaffrey.*

(4843) LAWANG or KULIT LAWANG. Malay, the clove bark of commerce. According to Crawfurd, this is the bark of the cinnamomum sinto, and takes its name from having a clove flavour. It is a produce of Borneo and an object of export to China.—*Crawfurd, page* 215. See Cinnamomum Culilawan and Laurus Culilawan.

(4844) LAWSONIA, a genus of plants belonging to the natural order *Lythraceæ*, which, consisting of only one or two species, may be found in most oriental regions in gardens or in field cultivation. The genus is characterised by having a 4-partite calyx, 4 unguiculate petals, 8 stamens, a sessile ovary, the capsule scarcely dehiscent, or rather forming a globular membranaceous 4-celled berry, with several angular seeds in each cell. It is disputed among botanists whether this genus consists of one or of two species; in the latter case, one species being armed with thorns, was called *L. spinosa*, and the other being without any, was named *L. inermis*, by Linnæus. De Candolle has followed Lamarck in uniting them together under the name *L. alba*, stating that when young the plant is unarmed, but when older becomes thorny from the hardening of the smaller branches. The natives of North of India distinguish the unarmed species by the name Phoolke, or flowering Mhendee. It is a much smaller plant, but flowers most abundantly. The thorny species is called Mhendee; this, besides being a larger plant, contains a greater proportion of colouring matter, and is extensively cultivated in the vicinity of Sidoura, near the north-west bank of the Jumna. The flowers of both are corymbose, white, and powerfully fragrant; the leaves smooth,

opposite, oval, lanceolate. To the latter species or variety the Arabic name Hinna or Henna is more especially applied, which, in many of their medical works, as in that of Serapion, is described under that of Al Kanna, where it is interesting to observe he quotes the description by Dioscorides of Κύπρος, as applicable to this plant. This Kupros, or Cyprus, is moreover supposed to be the Copher of Scripture. ('Canticl.,' i. 12). Besides the similarity of name, no plant is more likely to have been alluded to in the above passage, as no other is more highly esteemed or more frequently employed than the Hinna, and it would appear to have been applied to the same purposes from very remote antiquity. All oriental travellers describe the use of this plant by Asiatic women in dyeing their nails and the tips of their fingers, as well as the soles of their feet, of an orange hue with the leaves of the Hinna. It is also used by the men for dyeing their beards, the orange colour being afterwards converted to a deep black by the application of indigo. That this plant was similarly used from very early times is highly probable from the allusions to it by poets, as well as from some of the Egyptian mummies appearing as if the nails had been similarly dyed.—*Eng. Cyc.*

(4845) LAWSONIA ALBA. Lawsonia Inermis. The Henna tree is the camphire of the English Bible, and the cypress shrub of the Greeks and Romans. "The cypress plant," says Rosenmuller, "is held in particularly high esteem by the Greeks, the Arabs, and the Turks; and they think that they make an agreeable present when they offer a person a posy of its flowers. In reality, this plant is, as Sonnini observes, one of those which are particularly agreeable to the eye and the olfactory organs. The flowers, of which the coloring is so soft, spread the most delightful fragrance to a great distance, and fill with balsamic odour the gardens and rooms which they adorn." It is extensively cultivated by the Burmese, and hedges formed of it are common in Bengal. The fresh leaves beat up with catechu,

> ——————"Imbue
> The fingers ends with a bright roseate hue,
> So bright that in the mirror's depth they seem
> Like tips of coral branches in the stream."

This use of the leaves is as old as the Egyptian mummies, and is still practiced by Southern Asiatics.—*Mason.*

(4846). LAWSONIA INERMIS. Henna. Egyptian Privet.

Urkan, Arab.	Henna, Pers.
Maritondi, Cyng.	Sakachera, Sans.
Mayndie, Duk.	Maroodanie, Tam.
Mendee, Henna, Guz.Hd.	Gorunta Chettoo, Ivenie, Tel.
Daunlacca, Mal.	

Lawsonia inermis, furnishes an important dye stuff, and the distilled water of the flowers is used as a perfume. The extract of the flowers, leaves, and shoots is used by the Hakims in lepra, and in obstinate cutaneous diseases, half a tea-spoonful being given twice in 24 hours. The Mahomedan women in India use the shoots for dyeing the nails red, and the same practice prevails in Arabia and Barbary. In all these countries the manes and tails of the horses are stained red in the same manner.—*O'Shaughnessy.* *Lawsonia inermis*, Eastern privet: forms a fine hedge and perfumes the air, with a delicious fragrance. The leaf, triturated with rice gruel, or water is used in staining the nails, palms of the hands and soles of the feet, of a red colour. Mr. Faulkner says, a reddish brown substantive dye, is procured from the leaves of the Egyptian Privet (*Lawsonia inermis*). The Mohomedans in India, Persia, Arabia and other countries, use the shoots for dyeing the nails, tips of the fingers and toes, and palms of the hand, red. It is employed in the East for dyeing ordinary stuff; and the extract of the flowers, leaves, and shoots, is used by the hakeems in lepra, and in obstinate cutaneous diseases.—*Faulkner.* Ispund the seeds of the Mayndee are burnt as a charm with benjamin or with mustard seed and Patchouli (Pogostemon Patchouli). It is a hedge plant, resembling the English privet, the wood strong and suited for tool handles, tent pegs, &c., the leaves yield the dye used by the natives.—*Hort. Gard.* 33. Henna (*Lawsonia inermis*), is an important dye-stuff, and the distilled water of the flowers is used as a perfume. The Mahomedan women in India use the shoots for dyeing their nails red, and the same practice prevails in Arabia. In these countries the manes and tails of the horses are stained red in the same manner.—*Simmonds.*

(4847) LEAD. Plumbum. Saturn of the Alchemists.

Sheesh, Duk.	Surb, Pers.
Anuk, Arab.	Olow, Pol.
Hih yen, Chin.	Chumbo, Port.
Lood, Loot, Dut.	Swinetz, Rus.
Plomb. Fr.	Sisaka, Sans.
Bley, Blei. Ger.	Plomo, Sp.
Seesa, Guz. Sheesh.	Eeyum, Tam.
Piombo, It.	Sheshum, Tel.
Plumbum, Lat.	Temettam, Mal.

A soft and flexible metal, of a pale livid gray colour, easily malleable, but slightly tenaceous, and not sonorous. It is of common and extensive use in the arts. Alloyed with tin in different proportions, it forms *solder* and *pewter*; and with antimony it constitutes *type metal*. Combined with oxygen, it forms *massicot*, a protoxide of a pale yellow colour; *Litharge*, also a semi-crystalline protoxide, obtained in separating silver from lead ores, enters largely into the composition of flint glass; *minium* or *red lead*, a duetoxide, extensively used as a paint, and also in the manufacture of flint glass; the *Carbonate of lead* or *white lead*, is a dense white powder, commonly employed as a pigment: the *chromate*

of lead, of a beautiful yellow colour, is also much used as a pigment; and the *acetate or sugar of lead*, is employed for various purposes.—*Waterston.—Faulkner.* Lead (Pb=104) is one of the most anciently known of the metals. It is found chiefly as Sulphuret or Galena, but a little in a metallic state also, as an oxide, and combined with several acids.—*Royle.* At Dessouly in higher Hindoostan about fifty-five coss east of Sirinagur, there is a lead mine of considerable value, worked by the Rajah, and Captain Turner informs us, that at a place situated nearly two days journey from Tessoolumboo, in Thibet, there is one which much resembles some of those in Derbyshire in which the lead is mineralized by Sulphur. In lower India, this metal has been found at Jungumrauzpillay, in the Cumbum District, in combination as far with varying proportions, of Iron, Antimony, Silver, Sulphur, Argil, and Silex. The greater part of the lead however that is met with in the Peninsula comes from Siam, from Araccan and occasionally from the Burmah dominions. It is also a product of Omen in Arabia, but Dr. Ainslie was not aware that it is exported from that country.—*Ains. Met. Med. p.* 56. *Galena or sulphuret of lead.* A rich ore of lead from Martaban containing silver has already been noticed. Another locality from which Galena is exhibited is the Dhone Talook Kurnool, from which Galena in very large blocks has been obtained; one piece measured about 18 inches in diameter and weighed upwards of 3 Cwt. This ore was carefully tested by Dr. Scott some years ago, and was then found to contain from 53 to 70 per cent. of lead but no silver; some of the last consignments are found to be rich in silver: It was also tried at the Mint and yields a large per centage of Lead. It has been used for some years at the Madras School of Arts for glazing Pottery, and answers well for that purpose, though it is found to succeed better when reduced to the form of minium, and then ground with Felspar and an Alkali. The raw galena only answers for the softest and commonest glazes, and the per centage of impurities mixed with this description, varies so considerably, that it has been found safer to reduce it from the state of Sulphuret to that of an oxide before applying it to the wares. Much of the Pottery from the School of Arts has been glazed with this Galena in different states. Galena is also known to occur at the Neilgherries and in two parts of the Cuddapah District. A good sample is exhibited amongst the Chemical substances, from Hyderabad, as Soorma; but this appears to have been purchased in the Bazaar. *Lead containing silver.*—The limestone of the Burmese Provinces probably contains large quantities of lead. In the valley of the Salwen, there is a rich vein of argentiferous galena, which is reported to appear on the surface. A specimen that Dr. Morton sent to England for analysis, was said to be a very valuable Mineral, and destined to make a fortune for some one. Professor Mitchell in the certificate that he furnished Dr. Morton of the analysis, says: "It contains

Lead,	Lime,	} Carbonic Acid.
Sulphur,	Magnesia,	
Silver,	Iron,	
Gold, (traces)	Silica.	

It is a sulphuret of lead or galena. The quantity of lead and silver appears to be considerable, but there was not sufficient of the mineral to estimate either." The ore is seen in the limestone precisely as galena is found in the limestone of the Mississipi, one of the richest known deposits of lead in the world. Mr. O'Reiley states that the carbonate of lead exists near the head waters of the Houngdarau.—*Mason.* The Galena of Jungumrazpilly near Cuddapah, of which a fine specimen was shown at the Madras Exhibition of 1855, has only been procured in small quantities through Capt. Hemery; it has been examined by Dr. Scott.—*M. E. J. R.*

(4848) LEAD BLACK: PLOMBAGO. Is said to be occasionally sold for antimony in the bazars, it is found in Ceylon and Travancore also in the Northern Circar mountains in the Vizagapatam district, though I am not aware of any having found its way into the market, but I understand it has been procured thence by the proprietors of the Bimlipatam sugar works for use in machinery. I have had some from Bangalore of good quality for common purposes, it is found in the hill on which Capt. Orr's house stands.—*Rohde, M.S.S.*

(4849) LEAD, SEMIVITRIFIED OXIDE. LITHARGE. Plumbi Oxydum (Semivitreum) L. D.

Moordarasingy, TEL.	Litharge, FR.
Lithargyrum, ENG.	Protoxide de Plomb.
Oxide of Lead, fused.	Blei-oxyd, GER.

This Oxide of Lead (PbO=112) was known to the ancients, being easily produced when melted. Lead continues to be exposed to a current of heated air. The surface of the metal becomes rapidly covered with a scaly powder of a Sulphur-yellow colour, which is the Protoxide of Lead, and which, being skimmed off, is known in commerce by the name of *Massicot.* When the heat is continued to a bright red, some metallic Lead is separated, the Oxide is fused, though imperfectly, and on cooling becomes an aggregated mass, which readily separates into crystalline scales, of a greyish-red colour These form the *Litharge* of commerce, which varies, in colour, and is called *Gold Litharge* when of a red colour, owing to the presence of a little *Red Lead*, but *Silver Litharge* when lighter coloured. These are frequently obtained in the process of refining Gold and Silver by means of Lead, and in separating the Silver from

Argentiferous Lead. The Litharge of commerce is liable to contain a little Iron, also Copper, Carb. Lead, Silica, and other earths. Litharge, like the other preparations of Lead will affect those exposed to its influence; but it is only employed Pharmaceutically, as for making Diacetate of Lead, and by combining with oil to form the Lead Plaster, which is the basis of several others. —*Royle.* It is used as a drier in painting but seldom the Red lead being preferred by moochies, it is however suitable for rendering oil drying for varnishes.—*Rohde M.S.S.*

(4850) LEAD, RED: MINIUM.

Yerra Sindoorum, TEL. | Gunga Sindooram

Is used both as a pigment and drier by Moochies: it is not manufactured in India.—*Rohde M.S.S.*

(4851) LEAD, WHITE.

Safeda, TEL.

Imported as a paint, when exposed as such it rapidly decomposes the oil with which it is mixed, Oxides of lead should be avoided in all outside work in India.—*Rohde M.S.S.*

(4852) LEAD WORT PLUMBAGINCEÆ, Plumbago. Red colored, Blue, White. The white flowered grows wild.—*Riddell.*

(4853) LEATHER.

Læder, DAN.	Cuojo, IT.
Leder, DT.	Corium, LAT.
Cuir, FR.	Chuam, PERS.
Leder, GER.	Kosha, RUS.
Charmo, Chumra, GUZ. HIND.	Cuero, SP.
	Lader, SW.

The skins of various quadrupeds dressed in a particular manner for the use of manufacturers. For converting skins into leather, different processes are followed, according to the nature and kind of article required, as tanned leather, salted leather, &c.-*Faulkner. Leather* is a chemical art with which the Hindoos have long been acquainted, though it is doubtful whether they ever made leather of very superior quality; but the arts is practised in native states where it is not likely to have been introduced by European influence, as for instance, in Cashmere and in Cutch, whence we have had skins dyed of different colours. But leather of very excellent quality has been sent from the Government farm at Hoonsoor in Mysore, likewise from Calcutta by the Messrs. Teil. The native shields are, however, not to be surpassed.—*Royle Arts &c. of India, page* 484. The manufacture of leather in the Madras Presidency, is by no means so thriving as it might be, considering the great abundance of Tanning materials at command. This is probably owing to the very low rank of the Artisans, (*Chuchlers* or *Chumarwallas,*) for the art of leather production is well understood and successfully practised by the European tanners at Pondicherry, Hoonsoor, Guntoor, Bangalore and Madras, the leather being scarcely inferior to that made in Europe. Goat skins, Sheep skins, Buffalo and Bullock hides are much used and are generally procurable, but are very badly dressed, as many be readily imagined from the excellent description of the usual process given by Mr. Rohde, which accompanied the consignment of leather from Guntoor: indeed, currying the leather being the province of the shoemaker's wife, while manufacturing it for the market belongs to the husband, inferiority of Indian leather may be ascribed to want of skill on the part of the currier, and from the use of quicklime. It is generally acknowledged that there is no better tanning materal than Oak bark—but it has been shown in the class of Leather (including saddlery and harness) that similar substances, if treated with care and skill, may be employed with great success, as for instance, Divi Divi Catechu, Tanghedú Bark, &c., these produce their effects more rapidly, and the leather so manufactured is said to be nearly as durable.—*M. E. J. R.* Leather is a chemical combination of skin with the astringent vegetable principle called *tannin* or *tannic acid.* The manufacture in Great Britain ranks next in importance to that of cotton and of wool, and is probably equal to that of iron. There is a large and constant demand for leather as an article of clothing: it enters into the construction of various engines and machines; supplies harness to our horses, linings to our carriages, and covers to our books. For all the varied purposes to which leather is applied, it is well adapted, and it was probably at the earliest period of man's history that an art so necessary to his comfort and welfare became known. The skins of animals taken in the chase are in their fresh state tough, flexible, and elastic, and seem, at first view, to be well adapted for clothing; but in drying they shrink, become horny, pervious to water, and, on exposure to moisture, putrid and offensive. But if the skin be separated from fleshy and fatty matters, and then be put into a solution of certain vegetables containing tannin, which abound in almost every country, the skin separates the whole of the tannin from the liquid, and becomes hard, insoluble in water, almost impenetrable by it, and incapable of putrefaction. The subsequent operation of currying renders it pliable and more waterproof. Similar but less decided changes are produced upon the skin by impregnating it with alum, and also with oil or grease. The object of these processes being to render soft and flexible that which would otherwise be hard and unyielding, the skin thus transformed was called by our Saxon ancestors *lith. lithe,* or *lither,* —that is, soft, or yielding; whence our term, *leather.* The word *tan,* and the French *tanner,* are from the Low Latin, *tanare.* All tanned leather is classed under the denominations of HIDES, KIPS, and SKINS. From these there are various kinds of leather tanned in Eng-

land: 1st. *Butts* and *backs*: these are selected from the stoutest and heaviest oxhides. The butt is formed by cutting off the skin of the head for glue; also the cheeks, the shoulder, and a strip of the belly on each side. In the *back*, the cheeks and belly are cut off, but the shoulder is retained. 2nd. *Hides* consist of cow-hides, or the lighter ox hides; they are the same as *butts* with the bellies on. Hides are sometimes tanned whole, and are struck for sole leather, in which case they are called *crop hides*. 3d. *Skins*: these are used for all the lighter kinds of leather. The hides of South America are in high repute; they are the produce of the half-wild cattle which pasture on the wide plains between Buenos Ayres and the Andes: Hides are also imported from various parts of Europe, as also from Morocco, the Cape of Good Hope, and other places. They are imported *dry* or *salted*. The following were the imports into the United Kingdom for the years 1850 and 1851:—

	River Plate & Rio Grande.		*East India*	*Horse*
	Dry.	Salted.	Kips.	Hides.
1850,.....	29,820	630,400	1,606,380	231 510
1851,.....	62,640	719,510	2,262,700	140,640

The *butt* or *back* of the ox-hide forms the stoutest and heaviest leather, such as is used for the soles of boots and shoes, for most parts of harness and saddlery, for leather trunks and buckets, hose for fire-engines, pump-valves, soldiers' belts and gloves for cavalry.

Bull-hide is thicker, stronger, and coarser in its grain than cow-hide. The hide of the *bullock* is intermediate between the two. *Calves'-skin* is thinner than cow's, but thicker than most other *skins*. It is tanned for the bookbinder; but the greater part of the supply is tanned and curried for the upper part of shoes and boots.

Sheep-skins are supplied chiefly by the home markets, but many thousands are imported from the Cape of Good Hope, and are considered to be superior to those of English growth: they are distinguished by the greater width of the skin that covers the tail. They are simply tanned, and employed for various purposes for which a thin, cheap leather is required; such as for common book-binding, leathering for common bellows, whip-lashes, bags, aprons, &c. Sheep-skins also form the cheaper kinds of washleather for breeches, gloves, and under-waistcoats; as also coloured and dyed leathers, and mock-morocco, used for women's shoes, for covering writing-tables, stools, chairs and sofas, lining carriages, &c.

Lamb skins are chiefly of home produce; they are also imported from the north of Italy, Sicily, and Spain. They are dressed white or coloured for gloves. The skins of *goats* and *kids* form the best kinds of light leather. The chief supply of the best kid-skins is from Switzerland and Tuscany, whence they are shipped, chiefly at Leghorn.

Goat-skins are principally obtained from the coast of Barbary and the Cape of Good Hope. They form the best dyed morocco of all colours. Kid-skins supply the finest white and coloured leather for gloves and ladies' shoes.

Deer-skins,—are, to some extent, supplied by our parks; but the chief supply is from New York and New Orleans; a few are sent form Canada, and some from India. *Antelope-skins* from the Cape of Good Hope are of good quality. Deer-skins are all *shamoyed*, or dressed in oil, chiefly for riding-breeches. Shamoyed leather, of sheep, goat, and deer-skins, was formerly a lucrative branch of the leather trade of Great Britain. This kind of leather was employed chiefly for breeches, white or dyed, worn by persons who rode much on horseback. The English shamoyed leather was so much esteemed, that it was not only worn by their own cavalry, but by that of Prussia, Austria, and most of the German states. During the Peninsular war, however, it was noticed by the British commander that in wet weather the leathern garments fitted close to the skin, and were long in drying, so that the men were liable to colds, rheumatism, and other complaints arising from this cause. Woollen cloth was therefore substituted, and the example being speedily followed by Austria and Prussia, this branch of the leather trade speedily declined.

Horse-hide,—is tanned and curried for harness work, for collars, &c. It has of late years been substituted for *seal-skin*, but does not produce so good a leather. Enamelled horse-hide, split or shaved thin, is used for ladies' shoes, in imitation of seal.

Dog-skin,—is thin, but tough, and makes good leather. The supply is limited to this country, but has fallen off of late years; horse-leather taking its place for thin dress-shoes. But most of the *dog-skin gloves*, as they are called, are really made of lamb-skin. *Seal-skin* makes a valuable leather, but a large proportion of the supply of seal-skins is used as fur for covering caps.

Hog-skin,—affords a thin, porous leather, which is used for covering the seats of saddles. The common custom of cooking pork with the skin on greatly limits the supply, which is chiefly from Scotland and Yorkshire. The following selection from the "Prices Current," contained in the circular of Messrs. W. T. Goad and Rigg, of Mark Lane, forms a good illustration of the extent and variety of the trade in hides and skins:—

OX AND COW-HIDES.

Buenos Ayres and Monte Video:—	Weight.	Prices Duty free.
Dry—		
Best Heavy,	29—32 lbs. at per lb.	6½—
Common do.	30—34 „	4½—5½
Best light,...	21—24 „	5½—6
Bulls,..... ..	38—42 „	4 —4½
Salted—Heavy ox,..		3½—4

Rio Grande and Rio Janeiro :—			
Dry—	Weight.		Duty free.
Best heavy.	32—34 lbs.	at per lb	5 —5½
2d sort.....	20—30	,,	4½—5
Salted—Cow.....			3 —3½
Valparaiso, Lima, Punta, Arenas, &c. :—			
Dry—1st sort	24—30	,,	5¼—5½
Brazil :—			
Dry Salted.....			3¾—4
Wet Salted.....			2¾—3¼
Cape :—			
Dry.....			4 —5
Salted heavy.....			3 —4⅝
Kips and Skins.....			4 —5½
New South Wales :—			
Salted.....			2½—2¾
North American :—			
Salted.....			2½—4¾
West India :—			
Dry.....			2½—4½
East India :—			
Dry Salted.....			3 —8¼
Brined.....			3½—7½
Buffaloes.....			2½—4¼

HORSE-HIDES.

Buenos Ayres :—		
Salted.....	per hide	4*s.*—6*s.*
Rio Grande.....	,,	4*s.*—5*s.*
German—dry.....	,,	4*s.*—5*s.*
Russian.....	,,	4*s.*—5*s.*

KIPS-DRY.

Buenos Ayres.....	per lb.	7 —7½
African.....	,,	3 —6
Petersburg, 8— 9 lbs.	,,	8¾—9
,, 10—12 ,, ...	,,	8½—8¾
Cape.....	,,	4½—6
Mogadore.....	,,	3½—5½

SKINS.

		s.	*d.*	*s.*	*d.*
Nutria.....	per doz.	10	0	15	0
Chinchilla.....	,,	7	0	52	0
Deer, Buenos Ayres large red.	per skin	1	0	2	0
small thin...	,,	0	6	0	9
Vicuna, Buenos Ayres and West Coast.....	,,	2	6	3	0
Sheep—Mogadore.....	per doz.	15	0	22	0
Buenos Ayres.....	,,	10	0	18	0
Trieste.....	,,	10	0	15	0
Tuscan.....	,,	16	0	18	0
Cape.....	,,	12	0	28	0

Italian Kid.....	per 120	6	0	0	8	10	0
Lamb.....	,,	4	10	0	6	5	0
Ankona Kid.....	,,	7	0	0	8	10	0
Lamb.....	,,	5	0	0	6	15	0
Tuscan Kid.....	,,	8	0	0	10	10	0
Lamb.....	,,	5	10	0	9	10	0
Naples Kid.....	,,	4	10	0	6	10	0
Lamb.....	,,	4	10	0	5	10	0
Sicily Kid.....	,,	5	0	0	7	0	0
Lamb.....	,,	3	0	0	4	10	3
Trieste Kid.....	,,	5	0	0	6	5	0
Lamb.....	,,	4	10	0	6	10	0
Bilboa Kid.....	,,	7	0	0	8	10	0

Bilboa Lamb.....	per 120	4	10	0	7	0	0
Spanish Lamb.....	,,	5	15	0	8	0	0
East India Kid....	per doz.	0	5	0	1	7	0
Buenos Ayres Lamb	,,	0	6	0	0	12	0
Goat Lisbon.....	,,	0	6	6	0	18	0
Cape.....	,,	0	15	6	2	9	9
Mogadore.....	,,	0	12	0	0	18	0
Seal-Fur-Largewigs	per skin	0	5	0	0	7	6
Middings & small	,,	0	12	0	1	15	0
Large pups.....	,,	0	11	0	1	8	0
Newfoundland. .	,,	0	2	6	0	6	0
Greenland.....	,,	0	1	1	0	5	6

HORSEHAIR.

		s.	*d.*	*s.*	*d.*
Long Combed, Buenos Ayres clean.....	per lb.	1	9	2	3
Tails rough, Buenos Ayres	,,	0	10	2	0
Good mixed.....	,,	0	9½	0	10½
Fair mixed	,,	0	7½	0	8½
Common and short ...	,,	0	6	0	7¼
Ox & Cow, on the skin	,,	0	7	0	7½
Ditto clean and free of	,,	0	8	0	8¾
Russian long combed.	,,	2	0	2	2
2d quality.....	,,	0	9	0	10
Short	,,	0	6	0	7

HORNS.

Cape	per 123	48	0	—86	0	
B Ayres, M. Video, & Rio J. Ox.....	,,	26	0	—45	0	
Small Ox and Cow....	,,	12	0	—24	0	
Buffalo	per cwt.	16	0	—38	0	
Deer.....	,,	24	0	—35	0	
Tips—Buenos Ayres..	,,	18	0	—22	0	
North American.	,,	18	0	—20	0	
Buffalo.....	,,	17	0	—22	0	

BONES.		£	*s.*	*d.*	£	*s.*	*d.*
River Plate.....	per ton	4	10	0	6	10	0

Vegetable Substances used in Tanning.—The tannin or tannic acid of different vegetables does not appear to be the same astringent substance. The differences between tannins from different sources are small, and are chiefly interesting to the chemist. There are, however, certain broad features which are alike in all. Tannin is characterised by an astringent taste, and by its bluish-black or dark-green precipitates from aqueous solutions, by the solution of salts of the peroxide of iron: it also affords a dirty-white or brown precipitate with a solution of gelatine. A solution of protosulphate of iron does not precipitate a solution of tannin, until, by exposure to the air, oxygen is absorbed, and a peroxide of iron is formed. This change, however, is very rapid. If cold aqueous solutions of tannin and animal gelatine (such as glue, size, or isinglass) be mixed in certain proportions, both are thrown down as a precipitate, which is called *tanno-gelatin*: it contains about half its weight of tannin. If heat be applied, or the acid be in excess, the precipitate forms, on stirring, a viscid, elastic mass, resembling caoutchouc. Tannin is most easily procured in its pure state from gall

nuts. These must be coarsely powdered, and placed in a glass percolator, the bottom of which is plugged with cotton. Gallic acid exists ready formed in gall-nuts, sumach, mango-seeds, divi, valonia, tea, &c. and is probably formed in all cases from the decomposition of tannin. It is not so soluble in cold water as tannin, but is very soluble in hot. It does not combine with gelatine or gelatinous tissues as tannin does, and hence is little or no use to the tanner. The tannin of gall-nut and sumach is more liable to pass into Gallic acid than any other description of tannin. This change in the case of gall-nuts, and probably, also, in other cases, is expedited by the contact of the insoluble vegetable matters which remain after the tannin is extracted. Pyroligneous acid retards the decomposition of tannin, while tartaric, malic, and vegetable acids in general, accelerate it. Sumach is peculiarly liable to fermentation, probably in consequence of the malic acid present in the leaves. Hence it is of great importance to the tanner to become acquainted with the circumstances which favour the conversion of tannin into Gallic acid; and to avoid them if possible, for this is a positive source of loss. In the spent or waste tan liquors there is a considerable proportion of Gallic acid. There is an opinion among tanners, that the presence of gallic acid is useful; and when hides have been cleansed with lime-water, they are left for a time in the waste liquor, the gallic acid of which is said to expand the hides, and facilitate the penetration of the solution of tan, when the hide is transferred to a stronger liquor. Now, as almost any other acid would answer this purpose (indeed water soured with sulphuric acid is so used), it certainly does appear to be a circuitous as well as costly method of getting an acid by the decomposition of tannin. *Oak-bark* is the most important tanning material in common use. [See BARK.] It must be stripped in spring, for it then contains more tannin than bark cut in autumn, and this again more than that which is taken in winter. The trees are felled about May: but in some cases, a small quantity is cut down about two months later: this is called *midsummer bark*, but it is now seldom seen in the market. The quantity of tannin is considered by tanners to be in proportion to the freedom with which the sap flows at the time of stripping, and to the facility with which the bark is removed. Bark which has the appearance of having been removed with difficulty, fetches a lower price than that which appears to have come off with ease. The richest bark is obtained in the warmest spring, for then the sap is most abundant. A few days of cold previous to the felling and stripping reduce the proportion of tannin and sap. The bark of coppice trees about 12 years old contains more tan than younger trees, and these more than old ones. According to Stenhouse, the tannin of oak-bark when subject to destructive distillation does not afford pyrogallic acid, as the tannin of gall nuts does: hence the tannin of bark is probably not identical with that of galls. Oak bark contains from 5·6 to 6·0 per cent. of tannin, and in this as in other astringent barks the tannin is contained solely in the inner white layers next the alburnum, the middle coloured portion containing most of the extractive matters, and the epidermis or exterior but little extractive and no tannin. From 4 to 6 lbs. of oak-bark are required for the production of 1 lb. of leather. Leather tanned with oak-bark is considered superior to that made with any other tanning material, but the process is slower. The price of good English oak-bark per load of 45 cwt. delivered in London in June 1852, varied from 12*l.* to 13*l* 10*s*. When the bark has been stripped, the long pieces are set up on end (*stacked*) to dry. In the present year, 1852, after the stacking, a succession of three weeks' rain greatly deteriorated the bark, by washing out a portion of the tannin. *Sumach* is used in the manufacture of the lighter and finer kinds of leather. It consists of the powder of the leaves and young branches of shrubs growing in the south of Europe and known to botanists as *Rhus cotinus*, *Venus sumach*, or the wild olive; *Rhus coriaria*, hide or elm-leaved sumach. The former is used most extensively by the dyer and calico printer; the latter by the tanner. Of late years sumach leaves have been imported entire in consequence of the adulteration which formerly prevailed. Its per-centage of tannin had been found to vary from 16·4 and 16·2 in Malaga and Sicilian specimens, to 10, and 5 in Virginia and Carolina sumach. The tannin appears to be identical with that of galls, and a good deal of gallic acid exists ready formed in sumach. When mixed with water it is more apt to ferment than any other tanning material. The price of Sicilian sumach in June 1852 was from 14*s*. 6*d*. to 16*s*. per cwt. *Divi or divi divi* is the pod of a leguminous shrub, *Cæsalpinia coriaria*, a native of South America, and growing to the height of 20 or 30 feet. It is imported into Great Britain from the West Indias and from various parts of the north coast of South America. The pods are of a dark brown colour, about 3 inches long, but curled up as if by heat in drying. The whole of the tannin exists in the rind below the epidermis; the taste is highly astringent and bitter, but the inner skin which encloses a few flat seeds, is nearly tasteless. Divi contains a considerable quantity of tannin, and also a mucilaginous substance which prevents its being used in dyeing and calico printing. It soon ferments when mixed with water. The leather made by means of divi is very porous, and is of a brown or deep brownish red colour. The colouring matter is produced somewhat suddenly, and appears to be the result of fermentation. If air be excluded the colour is not produced and

the leather is equally good. The price is from 8*l.* to 9*l.* per ton.

Valonia consists of the acorn-cups of *Quercus Ægilops*, or prickly cupped oak, growing in the Morea. As soon as the acorns are gathered they are partially dried, and conveyed by mules to Symrna for shipment. There are here stored in warehouses for some months, in layers of from 3 to 5 feet in thickness. The cups undergo a slight fermentation, and in drying, the long spreading scales which confined the acorn contract, and allow the acorn to fall from the cup. The acorns which contain no tannin are separated from the cups, and those of the latter which are damaged are also picked out. The diameter of the cups including the scales is a little under 2 inches. A small kind of valonia, *camata*, bears a higher price than the common: it is somewhat richer in tannin, and is chiefly used by the silk dyers. Good valonia is thick, full grown, and bright in colour. If exposed to rain after being gathered the cups lose a portion of their tannin and become of a deeper colour. About 2 lbs. of valonia are required for the production of 1 lb. of leather, which is said to be less permeable to water than that made with oak-bark, and so heavy as to make valonia the cheapest of all tanning materials, except catechu or terra. A mixture of valonia and oak-bark may be used with good effect.

Catechu, *cutch*, *terra-japonica* and *terra*, are inspissated aqueous extracts from the bark, wood, and probably the leaves of the *Acacia catechu* and *Uncaria gambir*. In commerce, the two sorts are known as *Catechu*, or *Gambier*, and *Cutch*. Most of the catechu from Bombay is said to be from the former tree, and that from Bengal from the latter. Bombay catechu or cutch is the richer in tannin; it is of a dark brownish red colour, internally as well as externally, and of specific gravity 1·38. Bengal catechu or terra is of a light brown colour internally: its specific gravity is 1·28. Both are astringent and bitter, leaving a sweetish taste on the palate. Catechu is said to be prepared by felling the tree, cutting it up into small pieces, and boiling with water in a narrow mouthed vessel until only one-half of the original bulk of liquid remains. The solution is then transferred to a wide earthen vessel, in which the evaporation is continued; the inspissation is completed by exposure to the sun with occasional stirring. Before the extract is quite dry it is placed in cloths, strewed over with the ashes of cow-dung, cut into small lumps and again exposed to the sun. Mr. Parnell remarks that the appearance of the dark-coloured variety, or cutch, answers better to the description of this mode of preparation than that of the light-coloured variety. This, which is more pulverulent than the former, is said to be prepared by mixing the concentrated decoction of the tree with a pulverulent substance resembling starch. The powder is disposed in a thin layer on a floor or shelf, and the concentrated infusion or decoction allowed to run over the floor, and be imbibed by the powder. When the mass is become stiff by drying, it is cut up into small lumps and dried in the sun. Both kinds of catechu contain about half their weight of tannin, which differs from that of galls in affording olive green precipitates with salts of iron, and yielding no pyrogallic acid on destructive distillation. The tannin of catechu is soluble in cold water. Catechu also affords a peculiar principle, which has been named *catechin* and *catechuic acid*, which is not soluble in cold water, but slightly so in the solution of the tannin of catechu. Catechu is extensively used in India tanning, and of late years has also been much used in this country. It tans the skins with great rapidity, but the leather is light, spongy, permeable to water, and of a dark reddish fawn colour. The light-coloured variety of catechu produces a softer leather than that tanned with cutch. Catechu produces but little of the deposit of *bloom* which is yielded by oak-bark, valonia, and divi. A pound of catechu is said to be sufficient for the production of about a pound of leather. Catechu is used by calico printers, to produce a fast bronze on cotton fabrics.

Myrobalans.—The substance known by this name is the fruit of several East Indian trees, and is used in India as a substitute for galls. When ripe, the fruit is pear shaped, deeply wrinkled, and of a brownish yellow colour: it weighs from 70 to 100 grains. The husk contains the whole of the astringent matter, some mucilage, and a brownish yellow colouring substance, which is used in India for dyeing yellow. The husk is usually separated by bruising the nut, which it encloses. The tannin of myrobalans differs slightly from that of galls. Gallic acid is also present in rather large proportion. The price of myrobalans in June 1852 was quoted at from 5*l.* to 10*l.* per ton.

Mimosa or *Wattle-bark*, is procured from different species of mimosa, which grow in Australia and New Zealand. It is sometimes imported in the form of fluid extract, as well as bark. The leather produced by its means is of good quality, but of bad colour. The bark must be finely ground, or it does not give up the whole of its tannin to warm water.

Cork-tree bark.—The outer dead bark of the cork oak, known as *cork* may be removed without injury to the tree. [see CORK,] but the inner bark which is used in tanning cannot be removed without destroying the tree. In Corsica, Spain, and a few other countries, where the tree is abundant, the bark is removed for tanning. This bark contains twice as much tannin as oak-bark of average quality. The tannin appears to resemble that of catechu: it affords scarcely any bloom and gives a dark colour to the leather.

Larch bark is sometimes used as a substitute for oak bark, for tanning the inferior sheep skins, known as *basils*. It contains a good deal of tannin, mucilage, and some resin.

Willow bark.—The bark of the common willow contains, according to Davy, 2·3 per cent. tannin, and that of the Leicester willow 6·8 per cent. Danish leather, which has a peculiar and agreeable odour, and is used for making gloves, is prepared from kid and lamb skin, by means of willow bark. The same bark is also used in the preparation of Russia leather, but the odour of that leather is produced by the oil of birch tree bark. The following extract from Messrs. Goad and Rigg's Prices Current for 1851, will show the sources and prices of the imported barks. They are all free of duty.

	£	s.		£	s.
Oak Bark—					
Flemish,.....per ton.	5	0	—	7	0
Dutch, ... ,, ,,	4	5	—	5	10
German,..... ,, ,,	4	10	—	5	10
Cork Tree Bark—					
Spanish,..... ,, ,,	7	0	—	8	0
Leghorn, ... ,, ,,	6	0	—	7	0
Mimosa Bark, ... ,, ,,	8	10	—	9	10
Gambier [Terra Japonica, ...} ,, ,,	16	10			
Divi, Divi—					
Savanilla, ... ,, ,,	8	0	—	9	0
Maracaibo,..... ,, ,,	none.				
Valoni—					
Smyrna,..... ,, ,,	14	0	—	15	0
Morea, ... ,, ,,	10	0	—	12	0
Camata, ... ,, ,,	14	0	—	16	0

The following table is from a more elaborate one, constructed by Sir H. Davy, to show the value to the tanner of the different substances named. The numbers express the relative quantities of dry hides capable of being tanned by equal weights of the materials:—

Bombay Catechu, ...	261
Bengal ditto.	231
Nut galls, ...	127
White inner bark of Leicester willow, ...	79
Sicilian sumach, ...	78
White inner bark of young oak, ...	77
——————— old oak, ...	72
——————— Spanish chestnut,...	63
Souchong Tea, ...	48
Green Tea, ...	41
Entire bark of Leicester willow, ...	33
——————— oak, ...	29
——————— Spanish chestnut, ...	21
Middle bark of oak, ...	19
——————— Leicester willow, ...	16
——————— Spanish chestnut, ...	14
Entire bark of elm,...	13
——————— Common willow, ...	11

(4854) LEDEBAURIA HYACINTHINA. *Syn.* Erythronium indicum. A native of Bundlecund and Hyderabad. Martius and Ainslie describe the bulbs as a substitute for squill, and the latter writer informs us they are used in cases of strangury and fever in horses. Bulbs sent by Dr. Key, of Bolarum, were slightly acrid and bitter, but although given in double and treble the usual quantity in which squill is employed, they did not in any case produce the marked effects which squill occasions. The bulbs Dr. O'Shaughnessy used had not flowered that season. From trials it would appear that this article holds out but little prospect of its ever being usefully employed in medicine—*O'Shaughnessy, page* 663.

(4855) LEDUM CISTUS. *Ericaceæ.*—Cultivated the same as Lavender.

(4856) LEEA MACROPHYLLA. A curious looking herbaceous plant, with a leaf larger than a cabbage leaf, is sometimes cultivated for the astringent properties of its roots. It is the large-leaved Leea. The Burmans use it to stop the effusion of blood in wounds; but in Hindustan it is said to be a remedy for the Guinea-worm.—*Mason.* Dr. Wight gives also L. staphylea.

(4857) LEECHEE TREE. This is a shady and large tree, some 40 feet high, ornamental, and bears the fruit of that name. It is a delicious fruit, as large as a good sized plum. It produces a very large quantity of fruit, and there is not the least injury to be feared from a free use of it. In that respect, it is like the mango. The fruit is dried in India. Foo-chew Fo, in Fo-kein, in China, is noted for this fruit, and the trade in them in a dried state is extensive.—*Bonynge America, page* 152. See LEECHEE.

(4858) LEECHES. SANGUISUGA, OR HIRUDO MEDICINALIS: nat. cl. ANNULOSA of Macleay.

Aluk, Kheeraheen, ARAB.	Patchet, MAL.
Koodalla, CYNG.	Zeloo, PERS.
Sangsue, FR.	Jaluka, SANS.
Blutigel, GER.	Attei, TAM.
Jouk, GUZ. HIND.	Jalagah, TEL.
βδελλα, GREEK.	Jerika, TEL.

Leeches are common throughout Europe, America and India, inhabiting lakes, pools, &c. There are a great variety of leeches, some of which are considered poisonous,—*Faulkner.* Leeches, the genus Sanguisugo or Hirudo (H. medicinalis) belongs to the family of Hirudinidæ of the class Annelidæ from annulus a ring, and containing the true medicinal leeches, which are procurable in all the stagnant waters of India. In the dry climate of the Dekhan, a caste of Hindoos rear them for hospital use. The full grown leech of Madras and Bengal will draw six drams, but those employed in Bombay scarcely a dram. The numbers of these annelids in most warm parts of the world are immense. When travelling in Sikkim, Dr. Hooker mentions that, between Singtam and Chakoong, he was either wading through deep mud or climbing over rocks.

Leeches swarmed in incredible numbers, in the streams and damp grass and in the bushes: they got into his hair, hung on his eyelids and crawled up his legs and down his back. He repeatedly took upwards of 100 from his legs, when the small ones used to collect on clusters on the instep and the sores they produced were not healed for five months. He thinks snuff or tobacco applied to the feet the best means of preventing their attacks.—*Hook. Him. Jour. p.* 17. He thinks that the extraordinary abundance of these *Anelides* in Sikkim may cause the death of many animals. Some marked murrains have followed very wet seasons, when the leeches appear in incredible numbers; and the disease in the cattle, described to him by the Lepchas as in the stomach, in no way differs from what leeches would produce. It is a well-known fact, that these creatures have lived for days in the fauces, nares, and stomachs of the human subject, causing dreadful sufferings, and death. He has seen the cattle feeding in places where the leeches so abounded that fifty or sixty were frequently together on his ankles; and ponies are almost maddened by their biting the fetlocks.—*Hooker.* The leeches used in the Calcutta Hospitals are caught in tanks and jeels in the direction of Baraset by persons who allow them to fasten on the naked skin. They are to be procured at all seasons; but are occasionally scarce during the months of April and May, when the tanks dry up. The bazar price is two rupees per hundred. In the Upper Provinces a superior kind of leech is used, called the *Shakooabadee jonk*, caught in the tanks about *Shakoabad* in the Agra district. The Punjaubee leeches are the next best, and are procured in abundance about Pateealah in the Sirhind district. The Shakooabadee leech will generally bear three applications, and is the only description of leech that will do so. The animal is of a light olive green colour, and marked with two bright yellow stripes on the sides. The common wild leech of the Upper Provinces is called "Daubree;" but for Hospital purposes it is very inferior to those mentioned. The average price of Shakooabadee leeches varies from three to four rupees per hundred. The Daubrees from eight annas to one rupee per hundred. (*Mr. Daily's notes.*) In Europe leeches are kept in pans with a little soft water, the vessels being covered with canvass to admit the air. In Bengal they are placed in common earthen vessels with moist clay. The common leech used in the Bengal Hospitals averages 50 grains in weight, and draws from two to three fluid drachms of blood.—*O'Shaughnessy, page* 680. In Southern India they are found in almost all pools which are not dry in summer and in which the water is good that is not impregnated with salts.* It is said that cattle are frequently affected by their adhering to their throats when drinking. Mr. Rohde recommended salt to the ryots as a remedy and thinks an addition of salt to the bran mash usually given, an effectual remedy.—*Rohde M. S. S.*

(4859) LEEKS. ALLIUM PORRUM. The native inhabitants of Tenasserim are as much attached to leeks, as the Israelites were to the leeks and onions of Egypt, and they abound in their gardens.—*Mason.* The seed may be sown at the commencement of the rains, or after, in beds, broad-cast. When abut six inches high they require transplanting into large beds, or rows, at leat one foot apart: they go to seed in the course of six months, and grow very well in all parts of the Deccan.—*Riddell.*

(4860) LEGUMINOSÆ, OR FABACEÆ, a very extensive natural order of Plants, consisting of herbaceous plants, shrubs, or vast trees, extremely variable in appearance. The leaves are alternate, most commonly compound, occasionally marked with transparent dots; petiole tumid at the base: stipules 2 at the base of the petiole, and 2 at the base of each leaflet; pedicles usually articulated, with 2 bractlets under the flower; calyx 5-parted, toothed or cleft, inferior, with the odd segment anterior, the segments often unequal and variously combined; petals; 6, or by abortion 4, 3, 2, 1, or none, inserted into the base of the calyx, either papilionaceous or regularly spreading; the odd petal, if any, posterior; stamens definite or indefinite, perigynous, rarely hypogynous, either distinct, or monadelphous, or diadelphous, very rarely triadelphous; anthers versatile; pistil simple, superior, 1-celled, 1- or many-seeded, commonly consisting of a single carpel, but occasionally of 2 or even of 5 carpels; style simple, proceeding from the upper margin; stigma simple; fruit either a legume or a drupe; seeds attached to the upper suture, solitary or several, occasionally with an aril; embryo with or without albumen, either straight, or with the radicle bent upon the cotyledons; cotyledons either remaining under ground in germination or elevated above the ground and becoming green like leaves, always very large in proportion to the radicle, and very often amygdaloid. The most common feature of Leguminous Plants is to have what are called papilionaceous flowers, and when these exist no difficulty is experienced in recognising them, for papilionaceous flowers are found nowhere else. Another character is to have a leguminous fruit: and by one of these two characters all the plants of the order are known. It is remarkable however that one or other of these distinctions disappears in a great many cases. *Cæsalpiniea* have an irregular flower with spreading petals and stamens adhering to the calyx; others have no petals at all, or some number less than five, while *Mimoseæ* have perfectly regular flowers and indefinite hypogynous stamens. *Detarium, Dipteryx*, and others, instead of a legume have a fruit not distinguishable from a drupe. This last circumstance is easily to be understood if we bear

in mind that a legume and a drupe differ more in name than reality, the latter being formed on precisely the same plan as the former, but with this modification, that its pericarp is thickened, more or less fleshy on the outside and stony on the inside, 1-seeded, and indehiscent. Hence some of the regular flowered genera with distinct stamens may be said to be rosaceous in flower and leguminous in fruit. Simple therefore as the diagnosis of this order usually is, Brown is perfectly correct in asserting that, until he indicated the difference of the position of the odd lobe of the calyx in Leguminous Plants and Roseworts, no positive character had been discovered to distinguish the one order from the other. Very few double flowers are known in this order; those of *Spartium junceum* and *Ulex Europæa* are the most remarkable. Two ovaries are common in *Wistaria Sinensis*, and the same phenomenon is to be seen, according to De Candolle, in *Gleditschia*. On account of these and other circumstances, De Candolle assumes the carpel of Leguminous Plants to be solitary by abortion, and that a whorl of 5 is that which is necessary to complete the symmetry of the flowers. In consequence of the highly irritable nature of the leaves of many of the plants of this order, and of the tendency to irritability discoverable in them all, some botanists have placed them at the extremity of their system, in contact with the limits of the animal kingdom. For observations upon the nature of this irritability see Dutrochet, 'Sur la Mortilite,' Paris 1824, in which the author endeavours to show that the motion is the effect of galvanic agency; and the same writer's 'Nouvelles Recherches sur l'Exosmose,' in which he alters the explanation of the manner in which galvanism produces the motion, adhering however to his opinion of that subtle principle being the real agent. It is more probable however that these movements are connected with the inherent irritability of the protein common to all plants. In many respects this order is one of the most important which the botanist can study; more especially as it serves to show how little real importance ought to be attached to dehiscence of fruit in determining the limits of natural orders. What may be called the normal fruit of Leguminous Plants is a legume, that is to say, a dry simple carpel, with a suture running along both its margins, so that at maturity it separates through the line of each suture into two valves; but every conceivable degree of deviation from this type occurs. *Arcahis* and many more are indehiscent; in *Carmichælia* the valves separate from the suture, which remains entire, like the replum of *Cruciferæ*; in all Lomentaceous genera such as *Ornithopus*, the valves are indehiscent in the line of the suture, but separate transversely; in *Entada* a combination of the peculiarities of

Carmichælia and *Lomentaceæ* occurs; in *Hæmatoxylon* the valves adhere by the suture and split along the axis; and finally, *Detarium*, *Dipteryx*, and others, are true drupes, in no respect different from those of *Amygdaleæ*. The geographical distribution of this order has been considered with great care by De Candolle, from whom the substance of what follows is borrowed. One of the first things that strikes the observer is, that if a number of genera of Leguminous Plants have as extensive a range as those of other orders there is a considerable number of which the geographical limits are clearly defined. Thus the genera of Australia are in most cases unknown beyond that vast island; the same may be said of north and south America, and the Cape of Good Hope, and there are 14 or 15 genera unknown beyond the limits of Europe and the neighbouring borders of Asia and Africa. About 62 genera out of 280 are what are called sporadic, or dispersed over different and widely-separated regions, such as *Tephrosia*, *Acacia*, *Glycine*, and *Sophora*. The species are found more or less in every part of the known world, with the exception of the islands of Tristan d'Acuhna and St. Helena, neither of which do they inhabit; but they are distributed in extremely unequal proportions. In general they diminish sensibly in approaching the pole. This will be apparent from the following table;—

Europe, with the exception of the Mediterranean.	184
Siberia.	129
United States.	183
China, Japan, and Cochin China.	77
Levant.	250
Basin of the Mediterranean.	468
Canaries.	21
Arabia and Egypt.	87
Mexico.	152
West Indies.	221
East Indies.	452
Equinoctial America.	605
Equinoctial Africa.	130
Australia.	229
Isles of Southern Africa.	42
South America beyond the tropics,	29
Cape of Good Hope.	353
South Sea Islands.	13

This distribution, if condensed, will give the following results:—

Equinoctial Zone.	1602
Beyond the Tropics to the North.	1312
Beyond the Tropics to the South.	524

Since the time this calculation was made the order has been prodigiously enlarged and a very considerable number of species has been added to those from the tropical parts of America, Australia, and the Cape of Good Hope. Nevertheless the calculation, with these exceptions, is instructive as a general sketch of the statistics of this branch of Geographical Botany. [illegible] Legu-

minous order is not only among the most extensive that are known, but also one of the most important to man, whether we consider the beauty of the numerous species, which are among the gayest coloured and most graceful plants of every region, or their applicability to a thousand useful purposes. The properties of the order are very various; some are nutritious, others tonic and astringent, others purgative, and some poisonous. The plants supply timber, fibres, gum, dyes, and various other economical articles. There is however to be borne in mind, in regarding the qualities of this order in a general point of view, that upon the whole it must be considered poisonous, and that those species which are used for food by man and animals are exceptions to the general rule. The species amount to some thousands, and are conveniently divided into three sub-orders, *Papilionaceæ*, *Cæsalpiniceæ*, and *Mimoseæ*. *Papilionaceæ*, Pulse section, have what or called papilonaceous flowers, that is of the five petals one is large, broad, spread open, and called the standard; two others are parallel, convex, or slightly spreading, and called wings; and the two remaining ones are also parallel, but united by their anterior edge so as to form a body not unlike the keel of a boat, after which it is named. In all these plants the stamens are definite in number, and inserted with tolerable distinctness into the calayx; but while many are diadelphous, others are monadelphous or decandrous; the fruit is either a legume, a lomentum, or a drupe, or some form intermediate between the first and last. It is here that the great mass of the order occurs, especially in the colder parts of the world. Peas, beans, clover, saintfoin, lucern, liquorice, indigo, medicks, and trefoils, lupines, and numerous other common European genera, belong to *Papilionaceæ*. Many species are tonics and astringents, and others yield a kind of gum, and among those that yield dyes is the *Baptisea tinctoria*, the Wild Indigo of America. In a very large number of species narcotic properties have been discovered. The descriptions of the useful genera will be found under their respective heads, such as Astragalus, Butea, Colutea, Cytisus, Indigofera, Ervum, Glycyrrhiza, Geoffroya, Mavia, Crotalaria, Melilotus, Triptolomea, &c., &c. The sub-order *Cæsalpiniceæ* have the petals spread out, and nearly equal-sized, with distinct unequal stamens; they may be considered the regular form of the order, while *Papilionaceæ* are the irregular form. Their fruit is usually a legume, but not always. The *Cassia*, which furnishes the senna-leaves of the shops, is the most interesting among them; to this sub-order also belong the Tamariud and Algaroba fruits, the trees yielding Logwood, Brazil-wood, Sappan-wood, &c., and *Hymenæa*, from which gum anime is procured. Purgative properties are the great characteristic of this sub-order. Senna is their most remarkable product. Some of them yield dyes. The Locust-Trees of North America belong to this order, and are celebrated for their gigantic stature. The principal species are described under Cassia, Ceratonia, Copaifera, Hæmatoxylon, Hymenæa, Robinia, Tamarindus, &c.

The sub-order *Mimoseæ* have small regular flowers collected into heads, numerous often indefinite stamens, usually hypogynous, and a legume. They are unknown in cold countries in a wild state, but in the hotter parts of the world they form a strikingly beautiful portion of the vegetation. From the much greater length of their stamens, their petals, and the clustered compact arrangement of their flowers, the latter often resemble tassels of silk, of the most vivid colours, intermingled among the leaves. Their bark is usually astringent, with a frequent intermixture of gum. The gums Arabic, Senegal, Sassa, and others, are produced by different species; catechu is the extract of the astringent bark of *Acacia Catechu*, and the timber known in England as rose-wood is said to be the timber of some *Mimosa* inhabiting the interior of Brazil. One of the most striking phenomena among the plants of this order is the excessive irritability observable in the leaves of certain species of *Mimosæ*, such as *M. pudica*, *M. sensitiva*, which are hence called Sensitive Plants. It is however a special peculiarity, and not one of general occurrence; unless the folding up at night of the leaves of the whole sub-order be regarded as an instance of the same irritable quality in a low degree. The species of this order are described under Acacia, Entada, Mimosa, &c.

(4861) LEIOSAURUS. [Iguanidæ]

(4862) LEIOTRICHANÆ (Swainson), a subfamily of the *Ampelidæ*, a family of Birds. It is thus defined by Mr. Swainson:—Legs large robust, syndactyle: hind toe longer than the outer; wings short and rounded; bill strong; the gonys ascending. The only other genus besides *Leiothrix* placed in this sub-family by Mr. Swainson as *Pteruthius* (Sw.) to which that author gives the following generic characters;—Bill short compressed, thick; the tip shrike-like-hooked; culmen arched; gonys ascending; nostrils basal; the aperture round; gape wide; rictus slightly bristled; wings very short, rounded; tail short, broad, rounded; the tips obtuse; tarsi smooth, pale. *P. erythropterus*, Gould's 'Century of Himalaya Birds,' pl. 11. *Lanius erythropterus*, India, is an example.

(4863) LEIOTH[illegible], a genus of Birds established by Mr. Swainson, with the following generic characters:—Bill much compressed; culmen gradually curved; nostrils large, membranaceous; tail moderate, deeply forked.

(4864) LEIOTHRIX, a genus of Birds established by Mr. Swainson, with the following generic characters :—Bill much compressed ; nostrils large, membranaceous ; tail moderate, deeply forked.—*Eng. Cyc. Vol.* III. *p.* 380.

(4865) LEIOTRICHANÆ [Swainson] a subfamily of the *Ampelidæ*, a family of Birds. It is thus defined by Mr. Swainson, Legs large, robust, syndactyle ; hind toe longer than the outer : wings short and rounded ; bill strong ; the gonys ascending.—*Eng. Cyc. Vol.* III. *p.* 380. The only other genus besides *Leiothrix* placed in this subfamily by Mr. Swainson is Pteruthius [Sw], to which that author gives the following generic characters :—Bill short, compressed, thick ; the tip shrike like, hooked ; culmen arched ; gonys ascending ; nostrils basal, the aperture round ; gape wide ; rictus slightly bristled ; wings very short, rounded ; tail short, broad, rounded ; the tips obtuse, tarse, smooth, pale. *L. erythropterus*, Gould's "Century of Himalaya Birds," pl. II. [*Lanius* erythropterus], India, is an example.—*Eng. Cyc. Vol.* III. *p.* 380.

(4866) LEMMUS, [Muridæ].

(4867) LEMNA MINOR, the common Duckweed grows in the Sikkim Himalaya.—*Hooker Vol.* I. *page* 306.

(4868) LEMON.

Lemoon, Arab.	Limoni, It.
Limoenen, Dut.	Leembo, Pers.
Limons, Fr.	Limoes, Port.
Limonen, Ger.	Limonu, Rus.
Limboo, Neemboo, Guz. Hind.	Limones, Sp.

The fruit of a tree of the citron or orange family, a native of Eastern Asia, Assyria, Persia, and now cultivated in different parts of Europe.

(4869) LEMON. [Citrus.]

(4870) LEMON GRASS, Andropogon schænanthus. Camel's Hay, Sweet Rush.

Askhur, Arab.	Malatrinakam, Sans.
Gundha-bena, Beng.	Camachie-Pilloo, Wassina-Pilloo, Cavatum-Pilloo, Tam.
Gund-beyl, Olacha, Guz. & Hind.	Kamachie kussoo, Tel.
Seeree, Jav.	
Gowr-geea, Pers.	

A sweet-smelling, bitterish, aromatic grass, having long, striated, scabrous leaves, which are frequently used as a substitute for tea, and the white succulent centre of the leaf bearing culms, is often put into curries to give them an agreeable flavour. An infusion of the leaves is also used medicinally by the native Hakeems, who consider them to be tonic and stimulant. Sweet rush is much cultivated in gardens in Bombay, on the Coromandel Coast, and extensively in the north of Bengal.—*Faulkner*. This flourishes in any good soil. It is propagated by slips from the root, and only requires watering. It is used as an infusion.—*Riddell*. Lemon-grass is cultivated by natives all over the Tenasserim Provinces, and a decoction made from the leaves is deemed by them of much efficacy in cholic, and similar complaints.—*Mason*. In Madura, are the three sorts of grass named "Poathapil," "Seegompil" and "Comatchipil." To make oil, each sort of the grass should be cut in pieces of one span long (the little roots excepted) and the same put into earthern pans separately. Their subsequent exposure to the warmth of fire will extract the oil. Madura, 14th September 1850. (Signed) R. D. Parker, Collector. (True copy) E. Maltby, Collector. The following is a Memorandum by Ross and Co. Of the efficacy of Lemon Grass Essential Oil. "Of its use and properties, particularly in Rheumatic cases, there can exist no doubt, as those (and there are many) who, happened to languish under its acute pains and who had felt an instantaneous relief by the application of it outwardly—would, we feel assured, join us in recommending it to the community in general. Its properties and intrinsic worth even as a perfume of other oils are well known in England and therefore need hardly he recapitulated in this place.—*M. C. C.*

(4871) LEMON JUICE, Lime Juice.

Jus de limon, Fr.	Limboo-ka-rus, Hind.
Zitronen saft, Ger.	Jugo de limon, Sp.
Agro o sugo de limone ; It.	

The expressed juice of limes or lemons. It is an approved specific in the prevention and cure of scurvy ; a powerful and agreeable antiseptic ; as well as an ingredient in many pleasant refrigerant drinks. Lime juice is imported in large quantities into Bombay from Cambay.—*Faulkner*.

(4872) LEMON GRASS OIL, Andropogon. (Schænanthus.)

Camachie Pillo Tylum, Tam.

This well known Oil, Camachie Pilloo Tylum, *Tam.* is obtained by distillation from the above grass, which grows plentifully in many parts of the country. It is much used as a rubefacient for Rheumatic affections, as well as in Perfumery, for which purposes it is said to be largely exported from Travancore. When newly made, this Oil is of a light straw color, but age changes it to a deep red.—*M. E. of* 1855. Another Oil of Lemon grass or Citronelle, the produce of "*Andropogan Citratum*," was exhibited from Travancore, and also from Ceylon, by Mrs. Goodsir.

(4873) LEMON PEEL.

Lames de ecorce de citron, Fr.	Limboo-ka-chall, or chilta, Hind.
Zitronenshalen, Ger.	Scorze de limone, It.
	Cortezas de citra, Sp.

The rind of the lemon is a bitter aromatic, and is frequently employed in stomachic tinctures, and for making preserves and liqueurs ; it also yields an essential oil, which is much used in perfumery.—*Faulkner*.

(4874) LEMUR. [Lemuridæ.]

(4875) LEMURIDÆ, a family of Animals belonging to the *Quadrumana*. Linnæus, in his 'Characteres Mammalium,' defines *Lemur*, the

third genus of his *Primates*, thus—"Dentes primores inferiores 6." In the body of the work ('Syst. Nat.') he characterises the genus as follows:—Upper incisors (primores) 4; the intermediate ones remote; lower incisors 6, longer, prominent (porrecti), compressed, parallel, and approximate. Canines (laniarii) solitary, approximate. Molars numerous (plures), sublobate, the anterior ones longer and more acute. The genus consists of *Lemur tardigradus*, *L. Mongoz*, *L. Macaco*, *L. Catta*, and *L. volans*. To these species Gmelin added *L. Indri*, *L. Potto*, *L. murinus*, *L. bicolor*, and *L. laniger*. *Stenops* is Illiger's name for a genus of *Prosimii*, his third family of his second order, *Policata* of *Mammalia* including the genera *Loris* and *Nycticebus* of Geoffroy. Mr. Bennett, in his 'Garden and Menagerie of the Zoological Society,' observes that in an early memoir on the family to which the Slow-Paced Lemur belongs, M. Geoffroy St. Hilaire divided it for the first time into those minor groups of which it was most obviously composed. But Mr. Bennett remarks that M. Geoffroy has since carried the principle of subdivision to a still greater extent by separating the Slow-Paced Lemur from the slender *Loris*, with which he had previously associated it, in order to form from it and some other doubtful species the genus *Nycticebus*. Mr. Bennett cannot perceive any sufficient grounds for thus disuniting two animals so intimately allied to each other, and differing in no more essential characters than the somewhat greater length of the nose and of the limbs in the one than in the other. For this reason Mr. Bennett prefers M. Geoffroy's older arrangement, and proceeds, in accordance therewith, to describe the Slow-Paced Lemur as a species of *Loris*, which he considers to be a well-marked and circumscribed natural genus, differing from the Lemurs of the same author in many highly important characters. The following are the generic characters of *Loris* and *Nycticebus*, Geoffroy:—

Loris.—Four upper incisors; six lower incisors inclining forwards; head round, eyes very large, limbs very slender, no tail; four mammæ coming from two mammary glands only. The tibia longer than the femur; ears short and hairy.

$$\text{Incisors, } \frac{4}{6}; \text{ canines, } \frac{1-1}{1-1}, \text{ molars, } \frac{6-6}{5-5} = 36.$$

Species.—1. Loris Grele, *Loris gracilis*, Geoff.; Le Loris, Buffon; Le Tardigradus, Seba. 2. Loris de Ceylon; *Loris Ceylonicus*, Fisch. The locality assigned to both these species is Ceylon; but, according to M. Lesson, neither Geoffroy, Desmarest, nor F. Cuvier admit the second species, regarding it as a simple variety differing hardly at all from *Loris gracilis*.

Nycticebus.—Head round; muzzle short; eyes very large; ears short and hairy; a tail more or less long; extremities strong and robust.

$$\text{Incisors, } \frac{4}{2}; \text{ canines, } \frac{1-1}{1-1}, \text{ molars, } \frac{6-6}{5-5} = 34 \text{ or } 36.$$

The species are—*N. Bengalensis*; *N. Javanicus*; and *N. Ceylonicus*. All from the East Indies. We here adopt Mr. Bennett's view of the subject, and take the Slender Loris and the Slow-Paced Loris, or Slow-Paced Lemur, both of which are confounded by Linnæus under the name of *Lemur tardigradus*, as examples of the genus *Loris*.

Loris gracilis,—the Slender Loris, has the visage produced and dog-like; forehead high above the nose; ears large, thin, and rounded; body slender and weak; limbs very long and slender; thumb on each foot more distinct, and separate from the toes; on that and the three outmost toes are flat nails; on the interior toe of every foot a crooked claw; no tail; the hair on the body universally short and delicately soft; the colour on the upper part tawny, beneath whitish, space round the eyes dusky; on the head is a dark-shaped spot with the end pointing to the interval between the eyes. Length from the tip of the nose to the anus only eight inches.

Loris tardigradus, the Slow-Paced Lemur.—The most accurate description known to us is that given by Mr. Bennett:—"The Slow-Paced Lemur," he says, "is an animal of small size, scarcely equal to that of a cat. The largest individual yet noticed appears to be that seen by Pennant, who states its length at no less than 16 inches from the nose to the extremity of its back. Its proportions are short and thick-set; and the apparent clumsiness of its form is much increased by the manner in which it usually contracts itself into a kind of ball. Its head is broad, flat, and rounded, with a slightly projecting and pointed muzzle, in which the nostrils are perforated laterally. Its eyes are large and perfectly orbicular, and furnished with transverse pupils capable of being entirely closed during the day, and of being very largely dilated at night; their inner canthus is situated so low towards the nose that the motion of the eyelids appears to take place in a diagonal instead of a horizontal direction. The ears are short, round, widely open, but buried in the fur; and the tail is merely a rudiment of a few lines in length. The hinder limbs are considerably longer than the fore. The whole of the body, with the exception of the muzzle and hands, is thickly invested with long close woolly hair of a deep ashy gray with something of a brownish tinge. A deep brown or chestnut band passes along the middle line of the back, and is accompanied on either side by a faint grayish stripe, expanding on the back of the head into a still lighter patch. The dark middle stripe divides on the head into

two branches, each of which is again subdivided, the posterior division passing transversely across the forehead and inclosing the ear, the anterior crossing the eye obliquely and extending to the angle of the mouth. Between the two, above the outer angle of the eye, is a large white spot. Each of the eyes is surrounded by a ring of dusky black, between which a narrow white line passes from the back part of the head to the tip of the nose, which, with the exception of the naked muzzle, is also white. The latter, together with naked parts of the hands, is of a livid flesh-colour with a tinge of black. On the under surface the fur is of a lighter gray than above."—*Eng. Cyc.*

(4876) LEONOTIS LEONURUS. *Labiatæ.* SCARLET DANDELION. A beautiful small scarlet flower, native of the Cape, and now common in all Indian gardens; blossoms throughout the year, and is very difficult to get rid of when once sown: any soil seems to suit it.—*Riddell.*

(4877) LEONURUS TATARICUS. *Stachydeæ.* Tartarian Motherwort. This is a shruby plant grown from seed and cultivated in some gardens.—*Riddell.*

(4878) LEPIDUM SATIVUM. GARDEN CRESS.

Haleem DUK. BENGAL.

Aliverie of the bazars. The aliverie seeds of the bazar, which were referred by Rottler and Ainslie to the Arabis Chinensis, have been ascertained by Dr. Wight to belong to the garden cress, which Roxburgh informs us is cultivated universally in Asia during the cool season. The seed is of reddish colour, agreeable warm taste, and is used by the native physicians as a gentle stimulant. Bruised and mixed with lime juice, it is deemed useful for checking local inflammation.—*Ainslie*, vol. ii. p. 12. Taken whole in half drachm doses, we find also that it answers as a gentle and warm aperient—*O'Shaughnessy, page* 188.

(4879) LEPIDOPTERA. In the winged insect-world, there are numerous species common to the two regions: among the most prominent of which, appertaining to the *Lepidoptera*, are the cosmopolite *Cynthia cardui* (or 'Painted Lady' butterfly) at all elevations, the *Papilio machaon* (or English 'Swallow-tail' butterfly) in the Himalaya, the *Colias edusa* (or 'Clouded-yellow' butterfly) and the *Argynnis lathonia* (or 'Queen of Spain') also common in the Himalaya, *Sphinx convolvulus* at all elevations, &c.; but others are represented by nearly similar species, which are considered different upon comparison, as the 'Purple Emperor' (*Apatura*), and 'Common Sulphur' (*Gonepteryx*) butterflies, and others which are more obviously different, as *Vanessa vulcania* of the Himalaya compared with *V. atalanta* of Europe. Two species of 'Death's-head' Moths (*Acherontia*) are common to all habitable elevations; and one of these is exceedingly similar to that of England (*Ach: atropos*); but is nevertheless considered by the eminent entomologist Westwood to be distinct.

(4880) LEPORIDÆ, a family of *Rodentia*, the type of which may be considered as existing in the Common Hare. Mr. Swainson defines the genus *Lepus* thus:—Cutting teeth $\frac{4}{2}$, the upper in pairs two in front, large and grooved, and two smaller behind; lower teeth square; grinders $\frac{6-6}{5-6}$, composed of two soldered vertical plates; a sixth, very small, in the upper jaw; soles of the feet hairy; anterior feet with five toes; posterior with four; tail very short, turned upwards.—*Eng. Cyc.*

(4881) LEPTADENIA SPARTEA, The fibre of another species of the genus, *L. Jacquemontiana*, was described to Dr. Royle by Dr. Stocks, as employed in Sindh with *Periploca aphyllum* for making into ropes and bands used for wells, as water does not rot them.—*Royle Fib. Pl. page* 306.

(4882) LEPTOPHIS (BELL). Some of this genus inhabit Mexico, and Brazil; and three are Asiatic, two from the East Indies and one from the island of Java. Rostrum obtuse; upper jaw projecting, but very slightly beyond the lower. Mr. Bell records three species, two from the East Indies, and one from America (Carolina). To these Dr. Gray subsequently added two species, *L. punctulatus* and *L. spilotus* (*Coluber spilotus*, Lacepede) collected by the expedition under Captain Phillip Parker King, R. N. ('Survey of Australia.')

(4883) LEPTOPHIS PURPURASCENS, (COLUBER PURPURASCENS, Shaw). Violet, changing to green, gilded; a lateral and dorsal line of a paler hue; head obtuse. It is found in the East Indies. ('Zool. Journal,' vol. ii.)—*Eng. Cyc.*

(4884) LEPTOSIPHON. POLEMONIACEÆ. These are pretty annuals allied to the Gilia, and propagated in the same manner, the colours are white, blue and purple.—*Riddell.*

(4885) LEPURANDA SACCADORA: ANTIARIS SACCADORA. Netavil Marum or Chundul. A stately forest tree, called Chandul, *Lepurandra saccadora*, is indigenous on the West side of India, as in the ravines at Kandalla and in the jungles near Coorg, where people manufacture sacks from the bark by a very simple process. A branch is cut, corresponding to the length and diameter of the sack wanted. It is soaked a little, and then beaten with clubs until the inner bark separates from the wood. This done, the sack formed of the bark is turned inside out and, pulled down, until the wood is sawed off, with the exception of a small piece left to form the bottom of the sack, and which is carefully left untouched. These sacks are in general use

among the villagers for carrying rice, and are sold for about six annas each.—*Royle. Fib. Pl. page* 348. This is very common and the most gigantic of all the trees in the Wynaad Jungles: Coorumboor bags or sacks are made from the bark: wood not much used.—*Melvor.*

(4886) LEPUS ÆGYPTICUS, Egyptian Hare. Egypt.

(4887) LEPUS CUNICULUS Linn, the Rabbet, Rabbit, or Coney; Coniglio of the Italians; Conejo of the Spanish; Coelho of the Portuguese; Kaninchen of the Germans; Konyn or Konin of the Dutch and Belgians; Kanin of the Swedes; Kanine of the Danes; and Cwningen of the Welsh, is known to every one. The fertility of the animal may be imagnied when it is remembered that it will begin to breed at the age of six months, and produce several broods in a year, generally from five to seven or eight at a time. Pennant says :—"Rabbits will breed seven times a year, and bring eight young ones each time. On a supposition that this happens regularly during four years, their numbers will amount to 1,274,840." The young are blind at their birth, and nearly naked. The fur of the Rabbit is in considerable demand, particularly for the hat trade; and at one time the silver-haired varieties, or silver-sprigs, fetched three shillings a piece, for ornamental linings to cloaks, &c.; in Pennant's time however the price had fallen to sixpence. The following additional species of Asiatic *Lepus* are found in the 'British Museum Catalogue.'

(4888) LEPUS DIOSTOLUS, the Woolly Hare of Thibet. Nepaul. LEPUS DIOSTOLUS. At another place, this author names another Lepus. There was, he says, much short grass about the lake on which large antelopes, "Chiru" (Antilope Hodgsoni), and deer, "Goa" (*Procapra picticaudata*, Hodgson), were feeding. There were also many slate coloured hares with white rumps (*Lepus diostolus*), with marmots and tail-less rats.—*Hooker Him. Jour. Vol.* II. *page* 157. He found the horns of the Chiru on the south side of the Donkia pass, but he never saw a live one except in Tibet. The *Procapra* is as described by Mr. Hodgson.—"*Bengal As. Soc. Jour.* 1846, *page* 338," *Hooker Him. Jour. Vol.* II. *page* 157.

(4889) LEPUS HISPIDUS, the hispid hare occurs at Siligoree in the Terai. It is the best game of this part of the country.—*Hooker Him. Jour. Vol.* I. *p.* 399.

(4890) LEPUS KURGOSA, the Lada, or Khargosh.

(4891) LEPUS MACROTUS, the Indian Hare. Nepaul.

(4892) LEPUS TIMIDUS, the Common Hare.

(4893) LETROMIA SETOSA. HAIRY LETSOMIA. A large red flowered creeper of the convolvulus tribe, and genus letsomia is seen in Tenasserim during the rainy season on almost every hedge.—*Mason.*

(4894) LETTSOMIA, Dr. Wight gives of this genus aggregata, 1359; cymosa, 889; setosa, 1360.

(4895) LETTUCE.

Kahoo, GUZ. HIND.

A well-known succulent vegetable (*Lactuca Sativa*), cultivated in Europe, in most of the European colonies, India, and other places. After its flower stem shoots, it abounds with a milky juice possessing soporific powers, which, in the strong scented wild lettuce (*Lactuca virosa*), is so abundant, that it has been used as a substitute for laudanum and opium; it is termed lactucarium.—*Faulkner.* There are various sorts of Lettuce: the most esteemed are the cabbage, red and brown cos-lettuce. For early salading the seed may be sown at the commencement of the rains, although neither are in perfection until the cold season. They are mostly raised in small beds, and then transplanted into others at about one foot apart, or on ridges around other vegetables; they do not require any particular care. The ground should be light and rich, and when the plants are of a sufficient size they should be tied up; and this may be done with shreds of plantain-leaf or twine.—*Riddell.*

(4896) LEUCADENDRON. PROTEACEÆ. These are a handsome genus of shrubs, growing to a large size, with heads of yellow flowers, and silky leaves, and may be cultivated in any good garden soil.—*Riddell.*

(4897) LEUCAS, Dr. Wight gives of this genus, in Icones, Leucas biflora, 866; cephalotes, 337; *helianthemifolia*, 1435; *Indica*, 1451; (A.) lanceæfolia, 1452; nepetifolia, 867; (A.) rosmarinifolia, 1455; (A.) suffruticosa, 1454; (A.) ternifolia, 1453; (H.) urticæfolia, 1451; vestita, 338.

(4898) LEUCAS ASPERA, *Syn*: PHLOMIS ESCULENTUM.

Thoombaykeera, TAM.

A small annual weed with white flowers; appears during the rains; the leaves are used as greens mixed with others.—*Jaffrey.*

(4899) LEUCOSPERMUM. PROTEACEÆ. An interesting genus of plants, with entire downy, or hairy leaves, and terminal heads of yellow flowers. They require the same culture as the Protea.

(4900) LEYCESTERIA, a genus of Plants belonging to the natural order Rubiaceæ, named after the late Mr. Leycester, Capt. of the Bengal Civil Service, who paid much attention to horticulture in India. The genus consists of only a single species.—*Roy. Oye.*

(4901) LEYCESTERIA FORMOSA, is a native of the Himalaya Mountains, at elevations of from 6000 to 7000 and 8000 feet, in Nepaul and Sirmore, where it grows among oaks and pines, and is therefore well suited to the climate of England, where indeed it may be seen growing in great luxuriance in some gardens, and showing that many others from the same situations are equally suitable to this climate, which is not the case with many shrubby Rubiaceous plants. It forms a large and very showy shrub, with numerous luxuriant smooth and cylindric fistulous shoots issuing from the root, which are of a purplish colour. The leaves are opposite, ovate-lanceolate, and glaucous; the flowers white, with a tinge of purple, arranged in drooping racemes, which are furnished with coloured foliaceous bracts.—*Eng. Cyc.*

(4902) LIBER, the inner bark of the plant, is a layer consisting of woody tissue, cellular substance, and vessels of the latex, forming a compact zone immediately applied to the wood. The woody tissue of which it is composed quickly becomes thick-sided, by the addition of internal ligneous strata, the consequence of which is that such tissue in this part is more tough than elsewhere. Hence it is usually from the liber that are extracted the fibres employed in making cordage or linen-thread: this at least is its source in hemp, flax, the lime-tree, the lace-bark, and the many other Exogens which furnish thread; but in Endogens, which have no liber as the Cocoa-Nut, it is the ordinary woody bundles of the leaves, stem, and husks of the fruit from which the fibre used for ropes is procured. It is said that certain Exogens, such as *Menispermaceæ*, have no liber. ('Comptes Rendus,' v. 393.) In many plants a new layer of liber is formed annually, contemporaneously with a new layer of wood, but this is by no means universal; on the contrary, the oak and the elm increases their liber slowly and irregularly.—*Eng. Cyc.*

(4903) LICHENS. Various species of *Lecanora*, particularly *L. tartarea*, known as cudbear, are used in dyeing woollen yarn. The *Rocella tinctoria* and *fusiformis* furnish the orchil or orchilla weed of commerce, which is sometimes sold as a moist pulp, but usually in the form of dry cakes, known under the name of *litmus*; it produces a fine purple colour. English imports, which have amounted to 6,000 or 7,000 cwts. annually, are derived chiefly from the Canary, Azores, and Cape Verd Islands. Rock orchilla was shown at the Exhibition of 1851; from the Berlingen Isles, from Angola, Madeira and the Cape de Verds. Orchilla weed is very plentiful about the shores of the islands of New Zealand, some being sent from thence to that Exhibition; but from a want of knowledge as to the time at which it should be gathered, and the mode of preparing it for the market, it has not yet become a saleable commodity. The rich varieties of lichens on the rocks and plains of Australia have not been tested, as they ought to be, with Heist's lichen test. Various lichens, and *Rocella tinctoria*, from Tenasserim and other parts of India, have been introduced by the East India Company, and there are many on the mountains of India, to which attention might be directed. In the Admiralty instructions given to Capt. Sir James C. Ross, on his Antarctic voyage, a few years ago, his attention was specially called to the search and enquiry for substitutes for the *Rocella*, which is now becoming scarce. A prize medal was awarded, in 1851, to an exhibitor from the Elbe for specimens of the weed, and an extract of red and violet orchil. Specimens of varieties of the lichens used in the manufacture of cudbear, orchil and litmus, and of the substance obtained, were also shown in the British department, which were awarded prize medals.—Lichen: Several lichens grow on the top of the Dounkia pass as *Cladonia vermicularis*, the yellow *Lecidea geographica*, and the orange *L. miniata*, also some barren mosses. At 18,300 feet, Dr. Hooker found on one stone only a fine Scotch lichen, a species of *Gyrophora*, the "*tripe de roche*" of Arctic voyagers, and the food of the Canadian hunters; it is also abundant on the Scotch alps.—*Hooker, Him. Jour. Vol.* II. *page* 130. Of the lichens several are nutritious, some bitter, some yield to ammoniacal solutions a variety of brilliant colours, and are much used as dye stuffs. They are perennials, spreading in the form of a crust over rocks, trees, or the surface of the earth.—*O'Shaughnessy, p.* 671. The chief lichens employed in the manufacture of orchil and cudbear are the Angola weed (*Ramalina furfuracea*) and Mauritius weed (*Rocella fusiformis*), which comes also from Madagascar, Lima, and Valparaiso, and then bears the distinctive commercial name of the port of shipment.

(4904) LICHEN ODORIFERUS. Borrera asneh, Royle. Is a product of the Himalayas. It is officinal at Lahore. The Hakims administer it in disorders of the stomach, dyspepsia, vomiting, pain in the liver or womb, induration in the uterus, amenorrhœa, calculi, and nocturnal spermatic discharges.—*Dr. Honigberger, page* 299.

(4905) LICHEN ROTUNDATUS, Rottl.

Kull pashie, Tam.	Hinnaey koreish, Arab.
Puthur ka pool, Duk.	Ratipanchie, Tel.

This is a dried Rock Moss which the Tamool practitioners suppose to possess a cooling quality and prepare a liniment with it accordingly.—*Ains. Mat. Med. p.* 86.

(4906) LICUALA, a genus of Palms of the tribe *Coryphinæ* of Martius, so named by Rumphius, from the Macassar name of the species L. *spinosa*, figured by him in 'Herb Amboin.,' i. t. 9, and which is found in the islands of Macassar and of Celebes. Another species, *L. pel-*

tola, is described by Dr. Roxburgh as a native of the mountainous and woody parts near Chittagong, which separates that province from the Birmah territories. Both species are small, with palmate, somewhat fan-shaped leaves, but of little use. Rumphius describes the narrow leaves of this tree as being formed into pipes for smoking tobacco, while the broader are employed for wrapping up fruit, and for other domestic uses. —*Eng. Cyc.* This genus of palms is confined to the tropical parts of Asia, and composed of about a dozen species.—*Seeman.* The different Canes which are imported, are most of them produced by species of Calamus. The walking sticks called "Penang Lawyers," however, are the stems of the small palm, *Licuala acutifida*. The Ground Rattan is distinguished by its straight head and straight and stiff character altogether, as well as by its pale colour; though some are at least an inch in diameter, and others not half that thickness. Some are distinguished by a hard, and others by a soft bark. It is not known whether the slender are of the same species as the thicker kinds, growing in different situations, or from roots of different ages, but *Rhapis flabelliformis* is said to yield the Ground Rattan. The Malacca Cane is supposed to be produced by *Calamus Scipionum*, but said to be imported from Siak, on the coast of Sumatra. Some of these are simply mottled or clouded, others of a brown colour, in consequence, it is said, of their having been smoked. The more slender specimens of these, with the longest internodes, are those most highly valued. —*Seeman.*

(4907) LICUALA. WALKING-CANE PALM. The islands of the Mergui Archipelago yield a small palm, the stems of which are used for walking-sticks, like "Penang Lawyers"; and is probably a species of the same genus that produces those famous canes.—*Mason.*

(4908) LICUALA LONGIPES. STEMLESS LICUALA. This is a nearly stemless palm described by Griffith as remarkable for its dark green foliage. He met with it in the forests south of Mergui.—*Mason.*

(4909) LICUALA PELTATA, Roxb. one of the finest of the species, the "Chatta-pat," of the Assamese inhabits all the woody mountains to the eastward of Bengal, as well as the base of the Himalaya, below Darjeling, Rungpore and Assam, and its large peltate orbicular leaves, though coarser than "Toko pat" of Assam, are used for the same purpose, though only by the lower orders. Nevertheless the demand for them is very great, scarcely a single ploughman, cowkeeper or coolie being without his "*jhapee*" or *chatlah*, (umbrella-hat, made of *chattah*-pat.—*Seeman.* This is also a Sikkim palm.—*Hooker.*

(4910) LIGNITE. Fossil wood carbonised to a certain degree, but retaining distinctly its woody texture, is thus disignated. A greater degree of change constitutes Cannel and Common Coal, in which the original structure of the constituent plants can only with difficulty be traced; a less change belongs to peat. Dr. M'Culloch observes:—"In its chemical properties Lignite holds a station intermediate between peat and coal; while among the varieties a gradation in this respect may be traced; the brown and more organised kinds approaching very near to peat, while the more compact kinds, such as jet, approximate to coal." ('On Rocks,' p. 636.) His synopsis of Lignite runs thus:—

A Jet. Hard, compact, with pitchy lustre.

B. Surturbrand. Less compact and more brittle than jet.

C. Moor Coal of some authors, Friable.

D. Bovey Coal. Fibrous, the vegetable texture very apparent, colour brown or brownish-black.

E. Cologne earth, earthy and pulverulent mass. The thickness said to be 50 feet.

F. Basaltic Coal. Of variable structure; some parts like wood, others like coal.

Lignite often occurs in beds of considerable thickness and extent, and supplies to particular districts a bad substitute for coal. It is often accompanied by iron pyrites (Alum Bay), lies in alternating series with arenaceous and argillaceous beds, and is sometimes covered by fresh-water limestone (Rapinach), and presents many analogies with coal, among the older rocks of the secondary series.—*Eng. Cyc. Vol.* III. *page.* 430. Lignite, or brown coal, has been found in several localities. On the banks of a small tributary of the Tenasserim, in about ten miles of latitude north of Tavoy, trunks of trees changed to lignite may be seen in the stiff clay, and near them the trunks of other trees completely silicified, and turned to stone. There is a great variety in this wood coal, both in its appearance and chemical analysis. Dr. Goodall, to whom Mr. Mason subjected specimens for analysis, wrote: "100 parts contain, 52 carbon, 29 bitumen, 19 ashes. The specimen was not good. It is good coal?" When Mr. Blundell saw several baskets of the coal that he had had brought in, he said it looked exactly like the first that was brought him from the Mergui coal field. This must be the coal referred to by the Coal Committee in their report for 1841, in which they say: "More recently, excellent specimens of coal have been presented to the Committee by Mr. Blundell, the Commissioner of these Provinces, as found somewhere on Tavoy river." No coal has been found on Tavoy river, and as this was the time when Mr. Blundell obtained the specimens of this lignite from the Tenasserim, there is doubtless an error in the reference to the locality. The Committee call it "Cannel coal," which only proves that lignite is sometimes "a perfect mineral coal;" that this coal is lignite, no one will question who has visited the

locality. The committee also reported on a specimen of coal from Maulmain as "Cannel coal," but Mr. O'Riley who visited the locality whence it was said to have been brought, says that if found in that neighbourhood, it must be lignite. Dr. Morton recently furnished specimens of lignite collected by the commander of the surveying vessel on the coast, below Amherst. As the shore there for many miles is covered with laterite, it is probably found in that rock. Lignite occurs in laterite on the other coast. Mr. O'Riley found lignite near the head waters of the Ataran. He says: "Approaching the head waters of the Ataran River, where the strata are considerably elevated, with the dipat an angle of 38° two separate lines of lignite occur in a coarse sandstone conglomerate with shale and a semi-indurated blue clay containing limestone pebbles. This lignite is highly pyritous, its decomposition affording a copious deposit of sulphate of iron which covers the exposed surface with a dirty-colored efflorescence. Some of the species taken from the deposit retain their original characteristics, do not fracture, and may be sawn through in sections across the grain, the same as wood imperfectly carbonized. Other deposits of wood less charged than the foregoing are found in the banks of the rivers Dahgyaine and Gyaine, some 20 to 30 miles to the north east of Maulmain, covered with the same blue clay as that already noticed, but none possess any useful quality as a combustible material."—*Masson.* Lignite occurs in great abundance around the coasts of the Indian Peninsula, in the recent strata.

(4911) LIGNUM ALOES, the eagle wood and Calambak of commerce, yielding an aromatic perfume, is furnished by the *Aquilaria malaccensis*, and *agallocha*, in Silhet, an ornamental evergreen shrub. A very high artificial value is placed on the better qualities of this product by the natives of the East: the best quality being worth about £14 the picul of 133 lbs. This fragrant wood is probably the lign aloes of the Bible. Incense to the value of nearly one million and a quarter francs was exported from Alexandria in 1837. Calambak or eagle wood, the true lignum aloes so highly esteemed in the East as a perfume or incense, is said to be produced by the *Aloexylum agallochum*, Lour. This remarkable wood contains a large quantity of an odoriferous oleo-resin; when heated it undergoes a sort of imperfect fusion, and exhales a fragrant and very agreeable odor. Its price in Sumatra is about £80 per cwt. Inferior specimens are obtained at Malacca. Eagle wood is also obtained from several other trees. The true eagle wood is however very scarce—*Simmonds, p.* 459. See AGAR, AGAL AQUILARIA, EAGLE WOOD.

(4912) LIGNUM-VITÆ or GUAIACUM, is a very hard and heavy wood. It is shipped from Cuba, Jamaica, St Domingo, and New Providence, in logs from 2½ to 36 in diameter, and is one of the heaviest of the woods. Col. Lloyd says, that it grows in the Isthmus of Darien to the size of 5 or 6 feet and is there called Guallacan, and that it is one of the most abundant woods of the country. When first cut, it is soft and easily worked, but it becomes much harder on exposure to the air. The wood is cross-grained, covered with a smooth yellow sap like box, almost as hard as the wood, which is of a dull brownish green and contains a large quantity of the gum guaiacum, which is extracted for the purposes of medicine. Lignum-vitæ is much used in machinery &c. for rollers, presses, mills, pestles and mortars, sheaves for ship blocks, skittleballs, and a great variety of other works requiring hardness and strength. It was employed by the Spaniards for making gun-carriages and wheels. The fibrous structure of this wood is very remarkable: the fibres cross each other sometimes as obliquely as at an angle of 30 degrees with the axis, as if one group of the annual layers wound to the right, the next to the left, and so on, but without much apparent exactitude. The wood can hardly be split, it is therefore divided with the saw; and when thin pieces, such as old sheaves, are broken asunder, they exhibit a fracture more like that of a mineral than an ordinary wood. The chips, and even the corners of solid blocks, may be lighted in the candle and will burn freely from the quantity of gum they contain, which is most abundant in the heart-wood. The Bahama lignum-vitæ has a very large proportion of sap-wood, pieces of 8 or 10 inches diameter have heart wood that scarcely exceeds 1 or 2 inches diameter. One variety of cocoa-wood and also the almond-wood are somewhat similar to lignum-vitæ.—*Tredgold.*

(4913) LIGUSTICUM AJOWAN. AJWAYAN. Is a species of lovage, cultivated about Ajmeer (and all over India), the seeds are highly carminative; promote the secretions; good in dyspepsia: much used in all mesalihs; eight seers for one rupee.—*Genl. Med. Top. p.* 124. Dr. Wight gives Ligusticum Ajowan, 566; and Ligusticum diffusum, 569.

(4914) LIGUSTRUM, a genus of Plants belonging to the natural order *Jasminaceæ*. It has a fleshy fruit, the berry containing two membranous 1-seeded nuts. The calyx is short, tubular, and 4-toothed; the limb of the corolla ½-parted and spreading; stamens two, with short filaments. The species are shrubs or low trees, natives of Europe and Asia.—*Eng. Cyc.* This genus has bitter and astringent leaves, and coloured berries, used in dyeing wines. The bluish colour they yield is very much admired.—*O'Shaughnessy, page* 435. Dr. Wight gives Ligustrum intermedia, 1245; macrophylla, 1245; ramiflora, 1245.

(4915) LIGUSTRUM JAPONICUM, is a native of Japan, with oblong ovate grooved

leaves, and white flowers growing to the height of 6 or 8 feet.—*Eng. Cyc.*

(4916) LIGUSTRUM LUCIDUM, is the Wax-Tree, a Japanese plant.

(4917) LIGUSTRUM SINENSE, has lanceolate tomentose leaves, white flowers, and very small brown berries. It is a native of China, near Canton.—*Eng. Cyc.*

(4918) LIGUSTRUM SPICATUM, has elliptic acute leaves, hairy beneath, as well as the branchlets. Flowers crowded, almost sessile, spicate, disposed in a thyrse, having the axis very hairy, and minute bracteas. It is an evergreen shrub, native of Nepaul, on mountains, growing from 6 to 8 feet in height. All the species of Privet are of easy culture, and will grow in any kind of soil. Cuttings root without difficulty. *L. lucidum* requires some protection in the winter. (Don, *Dichlamydeous Plants;* Babington, *Manual of British Botany;* Fraas, *Synopsis Floræ Classicæ*; Loudon, *Encyc. of Trees and Shrubs.*)—*Eng. Cyc.*

(4919) LILIACEÆ, *Lilyworts*, an important natural order of Endogenous Plants, containing many of the most beautiful of that class of the vegetable kingdom. A large proportion, especially of those of cold countries, consists of bulbous plants, producing annually a stem which perishes after having produced its leaves and flowers; others have an annual duration with perennial fleshy roots; and a few acquire, in warm countries, a stem of very considerable size, as the Dragon-Tree (*Dracæna Draco,*) of which there is an ancient specimen in Teneriffe with a stem many feet in diameter. The flowers of Liliaceous Plants are generally large and showy, especially in those with annual stems, as the Lily itself, the Fritillary, Hyacinth, Star of Bethlehem, &c.; but when they acquire an arborescent stem the size of the flowers contracts, so that the largest trees among them have the smallest flowers. Their leaves are always quite simple and undivided, and usually have the veins of the leaves running straight from the base to the apex; but in some Dracænas they diverge from the midrib to the margin, as in the Plantain. Among other Endogens they are readily known by having a flower of 6 coloured pieces, 6 stamens with the anthers opening inwards, and a superior 3-celled ovary changing to a 3-celled fruit. This order is divided into several sections, of which Dr. Lindley gives the following account in his vegetable Kingdom.—*Eng. Cyc. Vol* III. *p.* 431.

Tulipeæ are the *Liliæ* of Jussieu, and they may be justly regarded as the type of the order of Lilies. Bulbs: annual stems little or not at all branched; flowers usually large and gaily coloured, without membranous spathes, but axillary to leaves but little changed, the calyx and corolla and their parts scarcely united, although often arranged in a tube; anthers swinging lightly by the fine-drawn point of a stiff filament; and finally a dry seed-vessel—separate the group from all that follow. They are amongst the gayest of our garden flowers, as Tulips, Fritillaries, and Dog's-Tooth Violets testify. One of them, the *Lilium chalcidonicum*, a plant that covers the plains of Syria with its scarlet flowers, is most memorable from having been selected by our Saviour as the subject of allusion in his Sermon on the Mount. The *Hemerocalleæ*, or Day-Lilies, differ from the last in nothing except their calyx and corolla being so joined to each other as to form a tube of conspicuous length, and in their want of a bulb in many instances. The *Agapanthus* and the fragrant Tuberose are the more remarkable among them; but *Funkia*, *Hemerocallis*, *Blandfordia*, and the Veltheimias and Tritomas, are also species of familiar occurrence, *Phormium*, which yields the celebrated flax of New Zealand, with its hard perennial leaves and panicles of yellow flowers, must be considered to connect the present division with that of Aloes. There is so little to separate *Aloineæ*, or Aloes, from the Day-Lilies, that scarcely anything can be named except their succulent foliage, and even that disappears in *Yucca*, which has the hard leaves of *Phormium*, with which however its distinct sepals and petals forbid its being associated. With the *Scilleæ*, or Squills, we reach a division of the order abounding in beautiful species, all of which are bulbous, with annual stems. Their peculiarity consists in the anthers not being so lightly attached to the filaments as in *Tulipeæ*, and in the leaves from whose axils the flowers proceed acquiring a membranous condition. *Conantheræ* are squills with the ovary partially adhering to the calyx and corolla, and springing from tubers, not bulbs. They offer a direct transition to Amaryllids. *Anthericeæ*, or Asphodels, agree with the last in having tubers or fleshy fascicled roots, and not bulbs, but their ovary is free; they are therefore tuberous fibrous-rooted Squills. *Chrysobactron*, a genus gathered by Dr. Joseph Hooker in Auckland and Campbell's Islands, is described as dioecious, but apparently is polygamous. The fruit in these three last orders is a capsule.

Aphyllantheæ are plants with the habit of Rushes, and the bracts so membranous and closely imbricated as to give the appearance of Xyrids when the flowers are past. They seem to form a connection between Lilies and some plants of the Juncal or Xyridal Alliances. The genera have been very insufficiently examined. Xanthorrhœas, called Grass-Trees in Australia, are very different in habit from the remainder: their shrubby stems, which emulate small palm-trees in appearance, bear tufts of long wiry foliage at their extremities, from the midst of which rise very long cylindrical spikes of densely-compacted flowers, resembling Bullrushes. [TYPHA],

Asparageæ are Lillies with a succulent fruit. They consist of plants extremely dissimilar in appearance; the Common Asparagus and the Lily of the Valley being associated under this title. In general their leaves are broad; in the genus *Cordyline* they even acquire the expanded form and diverging veins of the Anomal Alliance; their stems, although among the dwarfest that the Lilies comprehend, are in the Common Asparagus branched and of considerable size, and in the Dragon-Tress they acquire the dimensions and age of large trees. A tendency to the separation of sexes occurs here on the part of the genus *Ruscus*, but it is not carried so far as to constitute a diclinous structure. With respect to *Aspidistreæ*, concerning whose structure we have very insufficient information, they are principally known by a large mushroom-shaped stigma. Their foliage is that of *Zingiberaceæ*. Their flowers are dingy purple or green, with a campanulate perianth, on whose sides the stamens are inserted. In many respects they are very like *Orontiaceæ*, to which perhaps they ought to be referred. In like manner the *Ophiopogoneæ*, or Teat-Worts, have a foliage hardly belonging to Lilies, *Peliosanthes Teta* resembling a Ginger more than a plant of this order. They are remarkable for their seeds bursting through the sides of the ovary at a very early period, growing freely though exposed to air, and finally acquiring the succulent appearance of a tuber. It is very uncertain whether they have any claims to the rank of Lilies. The geographical limits of this order are as wide as its differences of structure. Upon the whole however the species are much more abundant in temperate climates than in the tropics, where they chiefly exist in the arborescent state. Aloes are mostly found in the southern parts of Africa; one species is a native of the West Indies, and two or three more of Arabia and the East. Dracænas, the most gigantic of the order, attain their largest size in the Canaries; a *D. Draco* there is described as being between 70 and 75 feet high, 46½ feet in circumference at the base, and was known to have been a very ancient tree in the year 1804. The northern flora comprehends for the most part plants of the genera *Scilla*, *Hyacinthus*, *Allium*, and *Ornithogalum*. In the East Indies Lilyworts are rare; in Australia they form a distinctly-marked feature of the vegetation; and in New Zealand they are represented by the *Phormium*, or Flax-Bush. A very considerable number are employed for useful purposes. Among them are those whose fibre is strong enough to furnish cordage, such as *P. tenax*, New Zealand Flax. The Onion, Garlic, and Leek, long known as articles of diet, Chives, Shalots, and Rocambole, are species of the genus. Aloes and Squills indicate the value of some *Liliaceæ* in medicine. As purgatives the Aloes are in extensive use. Resinous matters are yielded by some species, whence they have been useful in dysenteries. Of these the most celebrated is Dragon's Blood, a tonic astrigent resin. The roots of *Asparagus racemosus* and *A. adscendens* are both employed medicinally in Northern India. *Polianthes tuberosa*, or the Tuberose, is well known for its delicious fragrance. Other species are found to contain special properties, which render them serviceable to man in various ways. There are 133 genera in this order, and 1200 species. (Lindley, *Vegetable Kingdom.*)—*Eng. Cyc.* Liliaceous Plants, from their generally ornamental nature, have attracted attention from the earliest ages to the present time, and our Saviour selected the flower of one of these (*Lilium chalcedonicum*) as a type of the beautiful productions of nature. The plants are usually herbaceous, though some few are shrubby, and even arboreous; most are distinguished by their narrow parrallel-veined leaves: of these, some are soft, herbaceous, and succulent; others hard and perennial. Of the latter many abound in fibre, which may be, and is, extracted for useful purposes; as Aloe, Sanseviera, Phormium, &c. of which we may give the following notices.

True Aloes Fibre.—True Aloes (*Aloe vulgaris, Barbadensis &c.*) The true genus *Aloe*, or the plants which yield the medicinal drug of that name, abound at the Cape of Good Hope, on the west coast of Africa, and on that of Arabia, with one or two species in India. They might be supposed to yield much fibre from the frequency with which we find the name applied to some of those met with in commerce; but these are in general the produce of a species of Agave commonly called American Aloe (*v.* p. 41, &c). The leaves of the true Aloes are, in all the countries where the species are indigenous, as well as in the West Indies, where one or two of them have been long introduced, cut up and boiled down to yield the *extract* called *Aloes*. In some cases the yellow juice is allowed to exude from the cut leaf to form what is called Socotrine Aloes; but nowhere is the fibre which these leaves undoubtedly contain turned to useful account. It is probably, however, that it might, even when the leaves are cut into small pieces, be separated at little expense, for the use of the paper-maker. That the fibre, as well as the tow, of the true Aloes is of a good and useful quality, is satisfactorily proved by the specimens of both prepared in Madras by Dr. Hunter, as those of the *kala-buntha*, or of the species which is there called *Aloe perfoliata*, and which is, probably, the same plant with red flowers which Dr. Royle named *Aloe indica*, and found in dry situations in North-West India. The fibre is white in colour, fine in quality, with sufficient tenacity for textile fabrics, and readily takes colours, as shown by the orange, red, and crimson-coloured specimens sent by Dr. Hunter. The fibres are about two feet in length, and have considerable strength. A bundle of the fibres

bore 106 lb., when a similar one of Petersburgh hemp broke with the same weight.—*Royle, Illustr. plants.*

Moorva Fibre, Marool of Madras (*Sanseviera zeylanica*). Bowstring Hemp.

Moorga and Moorgavee, Ben. | Marul, Tam. Murva, Sans.

Sanseviera is a genus of Liliaceous plants, of which individuals are very abundant on the coast of Guinea and of other parts of Africa; also around Ceylon, and all along the Bay of Bengal, extending thence to Java and to the coasts of China. The leaves are succulent, and abound in fibre remarkable for fineness and tenacity. Dr. Roxburgh purposed that the fibres might be called *Bowstring hemp* in England, because the natives of the Circars make their best bowstrings of them. *Sanseviera zeylanica* is the best-known species, and has been so called as being common on the Ceylon coast. From it has been distinguished *S. Roxburghiana*, common on the coasts of the Bay of Bengal, apparently on insufficient grounds. It is figured by Dr. Roxburgh himself under its former name in his 'Coromandel Plants,' ii, tab. 184. *S. lanuginosa* is probably a distinct species, the *katukapel* of Rheede ('Hort. Mal.,' vol. xi, tab. 42). which grows on the sands of the Malabar Coast, All are closely allied to each other, and to the African *S. guineensis*. Of this the fibres have been occasionally introduced into the markets of Europe, and by some thought superior to New Zealand Flax. They have been called African Bowstring Hemp. ('Himal. Bot.,' p. 391.) The Indian species of Sanseviera was first described by Sir William Jones, in the 'Asiatic Researches,' vol. iv, p. 271, under its ancient Sanscrit name of *Moorva*, and he says, that—"From the leaves of this plant the ancient Hindoos extracted a very tough elastic thread called Maurvi, of which they made bowstrings; and which, for that reason, was ordained by Menu to form the sacrificial zone of the military class." Dr. Roxburgh describes the plant as common on the jungly salt soils along the coasts, growing under the bushes, and easily propagated on almost every soil, from the slips which issue in great abundance from the roots, requiring little or no care, and not requiring to be renewed often, if at all, as the plant is perennial. The leaves, when thus cultivated, are from three to four feet long. The fibre, which extends their whole length, is separated from the pulpy part of the leaves. The natives place them on a smooth board; then press one end of the leaf down with one of their great toes, and with a thin bit of hard stick held between the two hands, they scrape the leaf from them, and very quickly remove every part of the pulp. This can also be removed by steeping the leaves in water till the pulpy parts rot, &c. Dr. Buchanan found apparently the same plant, but which he calls *Aletris nervosa*, employed for making cordage near Bangalore. Before the leaves are beaten to separate the fibres, they are steeped in water fifteen (others say five) days, in order to rot the useless parts; but with Dr. Roxburgh the fibres became discoloured by this process. Dr. Roxburgh sent drawings of the plant and specimens of the fibre (v. 'Obs.,' p. 18) as early as the year 1790 to the Court of Directors, and again in 1800 by Mr. Hebb: after he had cultivated a begah (*i. e.*, third of an acre of ground) with this plant. As full-grown leaves of three to three and a half feet long yielded about one pound of the clean fibre for every forty pounds of the fresh leaves, Dr. Roxburgh concluded that this plant might be cultivated with advantage. By another calculation he found that one acre would yield 1613 pounds of clean fibre at a gathering, two of which may be reckoned on yearly, in a good soil and a favorable season, after the plants are of a proper age. He also ascertained that a line four feet long, made of *moorva* fibre, bore a weight of 120 lb., when a cord of the same size, made of Russian hemp, bore only 105. The former, moreover, after 116 days' maceration, bore a weight of 30 lbs., when the latter was completely rotten. Dr. Roxburgh further observes: "Should it ever become an object of culture, a less expensive and more expeditious method of clearing the fibres from the pulpy parts of the leaves, than that of the natives above mentioned must be contrived." This seems to have been since done. For the Rev. J. Garrow, as quoted by Mr. Murray, states that, in the year 1831, during his residence in Cuttack, in the province of Orissa, he first by mere accident discovered that the leaf of the *Aloe Angustifolia*, it is not easy to ascertain what plant is meant, but it is probably only a variety of Agave, as no species of Aloe is known to be indigenous on that coast, of Linnæus, contained a quantity of long white fibres. Perceiving that this material possessed great strength, clearness, and tenacity, he caused some quantities of the leaf to be beaten out with mallets, and the fibres to be withdrawn, and in this way collected about three hundred weight of fine grass, the fibres severally running about three feet long. On taking this to Calcutta, Mr. Tapley, chief officer of the Thalia East Indiaman, then lying off that port, had some of it manufactured into ropes. On a fair trial of a three-stranded rope of this material with a similar one of Russian hemp, in raising two and a half hundredweight of spelter from the hold, the grass faithfully brought it up on three successive occasions; whereas, in applying the hempen rope, twice out of three times it gave way, and in the third trial lost one strand. Both Mr. Tapley and Capt. Biden, the commander, highly approved of the article, as did many commanders of ships of other nations

then frequenting the port of Calcutta. "On the writer's return to Cuttack he laid waste the whole of the aloe plant he could discover, without respect to species; and to save time and labour, passed the leaves through a *Pressing Mill* similar to that used for expressing the juice from the sugar-cane. He then caused them to be laid in heaps under water for some days, till the fleshy portion of the leaf was decomposed, by which means the fibres were more easily collected; they were then hackled and baled. In the course of a short time afterwards he discovered a short species of aloe, growing wildly and profusely in all the moist woods of the neighbourhood, which the native called *Moorgubbee*. On experiment, this plant produced a most beautiful fibre, as soft and as fine as human hair, but possessing notwithstanding, extraordinary strength and tenacity. He derived a great quantity of flax from this plant, which, when portioned off in hanks, bore a strict resemblance to raw silk; indeed, side by side, the difference could not be distinguished. It was this article that first induced the writer to turn his attention to the manufacture of cloth. He engaged two native 'Tantees,' or weavers, to construct a narrow loom for this purpose. They at first found some difficulty in the undertaking, but in the course of four or five days they produced as fine a piece of cloth as was ever beheld: one portion of it the writer presented to Sir Charles (afterwards Lord) Metcalf." The fibres of the Sanseviera may, from their fineness, combined with tenacity, be applied to a variety of purposes. Dr. Roxburgh at one time supposed, though erroneously, that they were identical with China grass. They are usually about two feet in length, but may easily obtained longer, if plants are cultivated. The fibres are firm, hair-like, and silky, and resemble those of the pine-apple most closely. The tow is excellent for paper-making. The natives of Bengal twist the fibres into a fine thread, upon which they string ornaments to be hung round the neck; those of the coast employ them for making bowstrings; and the Rajpoot thread is sometimes made of its fibres. They readily take dyes, as was some years ago shown by Miss Davy, and specimens dyed red, orange, maroon, and green, were sent to the great Exhibition by Dr. Hunter. who lodged others in the Government Central Museum Madras. Miss Davy, moreover, had some cloth woven with the fibres, after some difficulty, but the fibre was still too wiry, from imperfect preparation. The weaver, moreover, having neglected to separate the coarse from the fine fibres, gave the cloth an uneven and irregular appearance. But if the necessary care was taken with this, as with all other fibres, there seems no reason to doubt that it might be applied to the fabrication of fine cloths, in the same way as pine apple fibre. The fibre has been proposed for the packing of steam-engines, and its tow used to be, and perhaps still is, converted into very good paper at Trichinopoly. As the Moorva fibre is employed by the natives for their bowstrings, there can be no doubt of its possessing sufficient strength for rope-making. In some recent experiments, this fibre, in its untwisted state, bore 280 lb., when Agave fibre broke with 270 lb. Dr. Wight found some string made of the latter, broke with 362 lbs., while the Sanseviera broke with 316 lb., so that these two may may be considered as nearly equal to each other in strength. Attention was called to the fibre of Moorgavie by Mr. A. Bond, Master-Attendant at Balasore, who sent to the Marine Board of Calcutta some of the fibres prepared from the leaves of plants growing in the jungly salt soils along the coast from Kedgeree southward, informing the Board that he had found the fibre useful on board the Hon. Company's schooner Orissa, as it answered excellently for running gear. On the receipt of the samples, the Board having desired the Master-Attendant at Calcutta to submit them to trial, the latter reported that it was "not equal in strength to the Europe or Manilla hemp, but that it seemed to take hot tar as well as the latter, and would answer generally for the same purposes as those to which the Europe and Manilla cordage is applied." The following were the results obtained:—

Europe hemp, made of sewing twine (untarred)...	broke at	212 lb.
Harris's patent colonial bolt rope (tarred) Probably made of New Zealand Flax, v.p.58.	,,	204 ,,
Manilla hemp (untarred)	,,	188 ,,
Europe bolt rope (tarred).....	,,	168 ,,
Balasore fibre (untarred), at Calcutta, ...	,,	137 ,,
Ditto, spun by Capt. Bond (thumb line), ...	,,	135½ ,,
Europe rope (tarred), ...	,,	88 ,,

In a further report, Capt. Bond stated, that forty maunds of the fresh plant produced one maund of fibre. The expenses of the experiment were high, as the plant had to be brought to him from some distance (four miles) to the place where it was dressed, and the best methods of separating the fibre had not been followed. The natives being averse to a work which their forefathers had never taken in hand. The plants having been steeped for eight days, were beaten out on a stone or plank, and then taken to another tank of water to be washed, and then dried and combed. All these processes necessarily increased the expenses. Mr. Bond further ascertained that the steeping spoiled the colour of the fibre, at the same time that it diminished its strength. With some fresh specimens of the fibre he also sent two pieces of cloth, which had been woven from threads spun by

fishermen, which were irregular in thickness, and so, consequently, was also the cloth. From the abundance of this plant in many situations, from the ease with which it may be cultivated, and the facility with which the fibre may be separated and cleaned, there is no doubt that it could be produced as cheaply as any of the other fibres; and it has been shown that it is capable of being used for a variety of purposes, as for textile fabrics, and for string and cordage, as well as for paper-making. It is abundantly diffused, especially along the coasts, and its fibre was sent to the Exhibition from Assam and Cuttack, as well as from Madras, Coimbatore, and the Malabar coast. Besides the foregoing, many other Liliaceous plants might be adduced, as yielding useful kinds of fibre, and in quantities sufficient to repay the trouble of their extraction. But they are not indigenous or sufficiently abundant in India, though the fibres of some have been separated, and specimen submitted. As, for instance, of the

Yucca, or Adam's Needle Fibre.—Adam's Needle, or *Yucca gloriosa, &c.*, like others, seems sometimes to be called an Aloe. The species of *Yucca* are natives of the southern provinces of the United States, and being there exposed to extremes, are capable of living in the open air, both in Europe and India. They are conspicuous for their noble show of lily-like white flowers, as well as for their long sword-shaped leaves, terminated by a thorny point. They no doubt all abound in fibre, as some of a fine quality and strong in nature, has been sent from Madras, separated from the leaves of the *Yucca angustifolia*. Other species flourish as far north as in the Botanic Garden at Saharunpore. The fibres also take colour, as in the specimens sent from Madras, dyed red, orange, purple, and green. Fibre has also been separated from other species of Yucca, as *Y. aloifolia* and *Y. filamentosa*. These are amongst those which have received the name of silk-grass. Those sent from India are from two to four feet in length, and are rather wiry, or resemble those of the Agave more than they do the fibres of Bromelias.

New Zealand Flax, or *Phormium tenax*,—Belonging to this family of plants, may here be noticed, though it is not so well suited as many others, to the general nature of Indian climates, but it will enable us to make some useful comparisons. It was discovered by the celebrated Cook in New Zealand—as he says "the country produced a grass plant, like flags, of the nature of hemp or flax, but superior in quality to either; of this the natives make clothing, lines, nets, &c." It grows both on the north and the south coast. It was introduced in the year 1798 into the south of Ireland, and has been found to flourish on the west coast of Scotland, though European winters are occasionally too severe for it. The native name of the plant is *kowdi* or *kowrey*, while the fibre is called *muka*. The leaves of the plant are perennial, hard, sword-shaped, from five to seven feet in length, with a flower-stalk rising four or five feet above them, and bearing a profusion of yellow flowers, followed by triangular seed-vessels, filled with flat and thin black shining seeds. According to Salisbury, three-year old plants yield on an average, thirty-six leaves, beside offsets from the roots. Six leaves produced one ounce weight of dry fibres, after being scutched and cleaned; and he calculated that an acre cropped with these plants, three feet apart (but they could not be placed so near without interfering with each other), will yield more than sixteen cwt. "The leaves are cut when full-grown, macerated in water for a few days, and then passed under a weighted roller." The natives of New Zealand cut the leaves when full-grown, and separate the fibres while yet green. Mr. G. Bennett states that a lateral incision is made with a large shell on each side of the leaf, merely to cut through the epidermis, which is first removed, and then, what he calls the internal epidermis, probably a part of the cellular tissue, "which agglutinates the fibres, and, if not removed, deteriorates the flax.' The principal operation is scraping with the shell, and then separating the fibres with the thumb-nails, and then employing combs for a more minute separation. The fibres are subsequently dried in the sun, and are perfectly white; some stout and strong, others fine and silky. It is said that "the plant may be shorn of its leaves in the morning, and before the sun has set be ready for weaving into cloth." The same thing may, no doubt, be done with others of these naturally white endogenous fibres. Considerable quantities were at one time imported, and a factory was established by Capt. Harris for their manufacture, but the supply seems to have been irregular, and now to have fallen off rather than increased. Mr. J. Wood, in the year 1844, in a communication to the Agricultnal Society of India, called attention to the New Zealand Hemp, as a plant which was very hardy and would thrive in any soil or climate, but that it preferred swampy lands. He stated that it was often met with in New Zealand, thriving three or four feet under sea-water, (but it is also found at some distance from the sea shore). He therefore thought the locality of the Soonderbunds, extending from near Calcutta to the sea, to be well adapted for this plant; and which would be profitable in a country where labour was so cheap. But it seems to have been forgotten, in this, as well as in a paper in the first volume of the 'Transactions of the Society,' that a plant which flourishes so far south as New Zealand, and succeeds well both in Scotland and in Ireland, is not likely to do well in so tropical

a situation as that of the Goonderlunds. An interesting set of specimens of New Zealand Flax, showing the native method of preparing the fibre and of dyeing it black, were sent to the Exhibition of 1851, by Tohui, a New Zealand chief; and another, a very valuable and suggestive set of specimens of the fibre and its tow, by Mr. E. W. Trent (v. 'Illust. Col.,' xli, p. 197), which he described as having been separated entirely by machinery invented by himself. If this fibre can be so prepared, then it is evident that others of the same nature may be successfully treated in a similar manner. These fibres are applicable to a variety of purposes, either of a textile nature or for cordage, and will, like the other white fibres we have mentioned, take colour. The strength of the fibres is considerable, for in some experiments by De Candolle, in which, however, that of Agave is understated, there is no doubt that the New Zealand Flax, which bore 23-7, was stronger than either Flax or Hemp, which bore respectively 11¾ and 16¾. It has also the advantage of being lighter, but has the disadvantage of many of the white fibres of breaking at a knot. Mr. J. Murray, in his pamphlet on this plant, printed on paper made from its leaves, states that the ship Atalanta, which plied between Southampton and the Channel Islands, was completely equipped with cordage and rigging made of *Phormium tenax*. He further continues—"I have seen specimens of ropes, twine, yarn, lines, sail-cloth, sacking, bedtick, &c., made of *Phormium tenax*; also fine fabrics of various kinds, affording demonstrable evidence that its fibre is susceptible of being woven into tissues of the most delicate description, or manufactured into materials of the strongest and coarsest kind. The sails, cables, and running rigging of the beautiful model of the frigate presented by his late Majesty William the Fourth to the King of Prussia, were entirely formed of *Phormium tenax*. Capt. Harris's yacht, a perfect gem in naval architecture, was supplied with a mainsail composed of three different varieties of New Zealand flax, and the cordage made of *Musa textilis*," that is, of Manilla hemp,—*Royle Fib. Pl.*

(4920) LILIUM, of this genus, Dr. Wight, in Icones, gives, Lilium Neilgherrense, 2031-32: tubiflorum, 2033-4; Wallichianum, 2035.

(4921) LIMES.

Kerna neboo, Beng.	Limboo, Neemboo, Guz.
Cay-Tanh-yen, Coch.chin.	Jerook, Mal. [& Hind.
Dehi, Cyng.	Jambira. Sans.
Citronier, Fr.	Elimitchum pullum Tam.
Citrone Ger.	Nemma pundoo, Tel.

A species of lemon which grows in abundance in most of the West India Islands, and is also met with in some parts of France, in Spain, Portugal, and throughout India. The lime is smaller than the lemon, its rind is usually thinner, and its colour, when the fruit arrives at a perfect state of maturity, is a fine bright yellow. It is uncommonly juicy, and its flavour is esteemed superior to that of the lemon. Dried limes are used by dyers in some parts of India, to fasten and improve colours.—*McCulloch. Faulkner.*

(4922) LIME, ACID. Citrus bergamia,—acida, small lime. In Tenasserim the small acid lime is seen almost every where in abundance.—*Mason.*

(4923) LIME, Calx recens usta. Oxide of Calcium. Quicklime. Caustic or pure Lime.

Chaux, Fr. | Kalk, Ger.

Lime, in its pure form, is a greyish-white, earthy-looking mass, moderately hard, brittle; Sp. Gr. 2·3 – 3·03; having an acrid alkaline taste; corroding animal substances. When fresh burnt, it absorbs both moisture and Carbonic acid from the air; it will abtstract water from most bodies, and is hence often employed as a drying substance. Fresh burnt and slaked Lime, though easily procured, is seldom pure enough for medical use. White Carrara Marble, Calcareous Spar, Chalk, Shells, all yield good Lime. The heat being sufficiently great, the Carbonic acid is expelled and about 56 per cent. of Lime left in a caustic state, and tolerably pure: but, if shells have been employed, mixed with a little Phosphate of Lime and Oxide of Iron. Water being added, Lime cracks and falls to powder; the rest as in Hydrate of Lime.—*Royle.*

(4924) LIMESTONE. Granular limestone, is the marble of which the images of Gaudama are formed, which are usually called alabaster images. It is a primitive limestone which has not hitherto been found in the provinces; but is abundant near Ava.—*Mason.*

(4925) LIMES, SWEET. Sweet limes.

Shouk-cho, Burm. | Meeta Neemboo, Hind.

Are grown in some parts of Pegu to a very small extent, but as this and two other kinds of wild lime are indigenous to the forests in the northern parts of the province, it is probable that oranges might be cultivated with success about Prome and from thence to Meeaday. The same observation applies to the grape, of which several sorts of wild vine are found in the upper part of the province, so as to render the trial of grape vine very desirable.—*McClelland.* This the sweet variety, grows to the size of a large orange. It is easily propagated by seed. The juice of the fruit is very grateful to persons with fever, although rather tasteless. It will grow also from cuttings. The young shoots make a very good stock for orange grafts.—*Riddell.*

(4926) LIMNANTHES Limnanthaceæ. These flowers are from California, and are of yellow colour, with a border of white and ar

slightly fragrant, they are readily grown from seed as others annuals.—*Riddell.*

(4927) LIMONIA, a genus of Plants belonging to the natural order *Aurantiaceæ*, so called from the original Indian names, Neemoo and Leemoo, of the Lemon. Several of those described under this genus by Dr. Roxburgh have been referred to *Atalantia* and *Glycosmis*. The species still included are rather heterogeneous in nature, and will probably require further separation. As most of the family abound in essential oil, so the leaves of some of the Limonias are fragrant, and the fruit, though small, of *L. acidissima* and *L. crenulata* is very acid. *L. laurcola*, referred to this genus by Dr. Wallich, in his 'Plantæ Asiat. Rar.' t. 245, is remarkable as the only plant of this family found on the tops of cold mountains. The people of the Himalayas, remarking its highly fragrant leaves, fancy that it is by feeding on them that the musk-deer acquires its strong and peculiar flavour.—*Eng. Cyc.* Wight gives Limonia missionis, 175.

(4928) LIMONIA ACIDISSIMA. A shrub with pinnate leaves, and winged petioles; fruit small, size of a pea; an article of commerce, used as a tonic.—*Riddell.*

(4929) LIMONIA ALATA. *Aurantiaceæ.* Ill. 41.

Kat yelloo mitch marum, TAM.

Tree small but the wood is remarkably close grained, hard and heavy. It is a pale yellow or straw coloured, if procurable of adequate size would be very valuable.—*Wight.*

(4930) LIMONIA CARNOSA.

Taw-shouk, BURM.

The small fruit of this, not larger than a nut, is a favorite spice, known in the bazars of Bengal under the name of Keklani. It is only found in the Pegu district.—*McClelland.*

(4931) LIMONIA, FRAGRANT LIMONIA. On all the lands near the mouths of the rivers that are occasionally overflowed by the waters, a very handsome shrub of the orange family, with a fragrant white flower, and a small fruit like a lemon in miniature, is quite common; and ought to have a place in Indian garden plots.—*Mason.*

(4932) LIMONIA PENTAGYNA.

Chitraka, TEL.

A large timber tree, a native of the Circars Beng. &c.—*Rohde. M.S.S.*

(4933) LIMONIA PENTAPHYLLA. *Aurantiaceæ.* NAT. ASH-SHOURA. Lin.

Conchie pullum, TAM. | Gonjee pull, DUK.

The five leaved Limonia bears a smooth roundish red fruit about the size of a marble, eaten but not held in any estimation; easily propagated by seed.—*Ainslie, page 223.*

(4934) LIMULUS, a genus of animals belonging to the order *Crustacea*, and which, on account of its anomalous characters, M. Milne-Edwards placed in a family by itself, which he called *Xiphosura*. He arranged these at the end of his system, next to the suctorial Crustaceans. He observes that the singular animals which compose this small group are so remote from all the other Crustaceans that some naturalists have been inclined to exclude them altogether from that class, and arrange them among the *Arachnidæ*, and that in entirely rejecting this opinion it becomes necessary to isolate them as much as possible, and to form a particular sub-class, which is connected with that of the *Branchiopoda* and that of the *Trilobites*, but is distinguished from those Crustaceans and all the other animals of the same class by the character of its organisation. The natural position then of these Xiphosures should, in the opinion of M. Milne-Edwards, have been the Brachiopods, but he has preferred the place which he has assigned to them, in order that he might not break the connection which unites all the Maxillated Crustaceans. The *Limuli* undergo in their youth considerable changes of form. At first their is no sword-like or styliform tail, which in the adult *Limulus* equals, at least, the rest of the body in length; their abdominal buckler is rounded posteriorly, and the last pairs of false feet are not developed. M. Milne-Edwards observed this in the embryos on the point of exclusion from the egg, at which period the abdomen supports only three pairs of appendages. The species of *Limulus* inhabit the sea, and sometimes come upon the sandy beeches. They are found in the Indian and Japanese seas, and in the Atlantic, on the coast of north America; but they do not appear to have a higher range than 44° lat., and seem confined to the northern hemisphere. Their food consists of animal substances: and when stranded, they often bury themselves in the sand as a protection against the heat of the sun, which is soon fatal to them.

I. *Section.*—Species whose second and third pairs of jaw-feet (two first pairs of Latreille) are monodactyle in the male, and in which the moveable spines of the lateral border of the abdomen are of of two sorts, namely, very long and very short.

(4935) LIMULUS LONGISPINA. M. Milne-Edwards notices this as a species closely approximating to *L. Moluccanus*, but having the teeth or posterior angles of the abdominal buckler large and more regularly triangular; the external border of these teeth being nearly as long as the internal border, and their base much less wide than the space left between them and occupied by the caudal stylet. Upper surface of the abdomen covered with small spines; the tooth of its latero-anterior border large, and situated very near that which separates that border from the latero-posterior border; moveable spines of the six pairs in the males and of the first three

pairs in the female very long; last three pairs very short, but sharp in the female. Caudal stylet triangular and spiny on its borders. Frontal border of the male strongly notched and sinuous, so as to appear trilobate. It is found on the coasts of Japan, and probably of China. This is the Kabuto-Gani (Helmet-Crab) of the Japanese; Un-Kiie, or Umi-do Game, of the Chinese. *Section* II.—Species in which the third pair of jaw-feet are cheliform in both sexes, and in which the moveable spines of the latero-posterior border of the abdomen diminish gradually in length in both male and female. Second pair of jaw-feet monodactylous in the male. Caudal stylet triangular and spiny on its upper border.

(4936) LIMULUS MOLUCCANUS, the Molucca or Common King Crab. The cephalo-thoracic buckler is regularly rounded anteriorly in both sexes, and above showing three rows of small spiniform points, situated one on the median crest, the others on the crests which separate the occipital region from the lateral regions; the posterior and lateral borders finely dentilated. The abdominal buckler smooth above, and terminated by two very short teeth, the internal borders of which is very long, and the external border (comprehended between the point and the insertion of the last spine) very short; tooth of the latero-anterior border moderate, and situated towards the middle of that border; moveable spines of the latero-posterior border moderate, and all nearly of the same length in the male; the first three rather long in the female; but the last three extremely short, and much wider than they are long. Caudal stylet triangular, spiny on its upper border, and slightly concave on its inferior surface. Last pair of jaw-feet furnished towards the end with four elongated appendages, which are lamellated, flattened, and sublanceolate. (Milne-Edwards.) This is the *Cancer moluccanus* of Clusius; *C. perversus* of Rumphius; *Limulus Polyphemus* of Fabricius *L. gigas* of Muller; and *L. Moluccanus* of Latreille. M. Milne-Edwards is of opinion that Leach's *L. Latreilli* probably belongs to this species, as well as *L. tridentatus* of the same author, *L. Moluccanus* is apparently the *Cancer* figured by Bontius in the fifth book of his 'Natural and Medical History of the East Indies,' p. 83, in which he notices its sword-like appendages, and states that if any incautious fisherman is wounded by it the pain is like that caused by a scorpion, adding, that its flesh is not so delicate as that of the other Crabs. The chapter is headed by the following verses, which refer to the painful wound inflicted by the tail.

"Quisquis caudati sensisti tela Paguri,
Disce meo exemplo morsus vitare dolosos,
Dentis Icquino quos aula volubilis infert,
A tergo, et pejus retinet fors cauda venenum."

(4937) LIMULUS ROTUNDICAUDA. Cephalo-thoracic buckler wider than in the preceding species, less convex, and deprived of the series of small spines between the great teeth of its upper surface, but with a great number of these spiniform points scattered on the occipital region; terminal teeth of the abdomen short, and having their internal border about twice as long as the external border; the moveable spines nearly as in the preceding. Caudal stylet obscurely triangular, with rounded borders. (Milne-Edwards.) It is found in the Moluccas. It is the *Cancer marinus perversus* of Seba.

(4938) LIMULUS VIRESCENS. M. Milne-Edwards states that this species, the female only of which is known to him, bears a strong resemblance to *M. Moluccanus*, but is distinguished from it by the conformation of the posterior feet, the penultimate joint of which is extremely short, and surrounded at its base with seven spines, which, instead of being flat, very much elongated, and rather wide, are rounded, conic, and very much pointed. The first four pairs of feet were broken in the only individual which M. Milne-Edwards had examined, so that he could not verify the character indicated by M. Latreille, the namer and describer of the species, drawn from the monodactylous conformation of the second pair (the first pair of Latreille). It is also worthy of note, M. Milne-Edwards adds, that the cephalo-thoracic buckler is less convex than in the preceding species. The same author observes that the *Limulus* preserved in the Paris Museum under the name of *Polyphemus heterodactylus*, Lam., and ticketed by Latreille, seems to him to be the male of the preceding species: but the absence of the posterior feet prohibits positive certainty on this point.

(4939) LINARIA CYMBALARIA, Ivy-leaved Snap-dragon.

Karamba, Sans.

Given in India with sugar for the cure of diabetes. Lindley observes that Hamilton's remarks to this effect are probably applicable to the *Lin-ramosisima* of Wallich, a nearly allied species.—*O'Shaughnessy, p.* 477.

(4940) LINARIA RAMOSSISSIMA. In the same valley, the little yellow-flowered *Linaria ramosissima*, may be seen crawling over every ruined wall, as we see the walls of our old English castles clothed with its congener *L. Cymbalaria.*—*Hooker. Him. Jour. Vol.* I, *p.* 42.

(4941) LINARIA, Toad Flax. These are common plants, and may be easily raised from seed; colours, mostly, purple-blue and yellow. —*Riddell.*

(4942) LINDEN, Tribe: family *Tiliaceæ*. The *Tiliaceæ*, or Linden tribe, are so named from the well known European tree—a favorite in parks and public walks, and the source

of an extensive commerce, inasmuch as the mat which are imported in such enormous quanities, are formed of the bark of this tree. But in the same family with the Linden tree, botanists place also the genus *Corchorus*, species of which yield the now well-known Jute of India, as well as the genera *Grewia* and *Triumfetta*, both of which contain species remarkable for the tenacity of their bark. The Tiliaceæ are also remarkable for mucilaginous properties. The leaves of many are edible, and the fruit of some afford pleasantly tasted acid berries. If we inquire into the uses of these plants, we shall find, that as Lime leaves used to be, and still are, employed in some parts of Europe, both in a green and dry state, as fodder for cattle, so in the Himalayas, cattle are fed with leaves of *Grewia didyma*, and some are stacked for winter use, for cattle, sheep, and goats; as Dr. Royle when travelling there observed. As the inner bark of the Linden yields bast for mats, so is the inner bark of *Grewia oppositifolia*, called *bihul*, employed in the same mountains for making ropes. The Linden tree is not found in India; but there are many which belong to the same family of plants found there, some of which probably yield similar products, possibly one or two of those to which I now wish to draw attention. "Among the raw products sent from the province of Arracan, there were six kinds of Bast (which there seems to be called *Shaw*), with specimens of rope made with them. They were named—1, Theng-ban shaw; 2, Pa-tha-you shaw; 3, Shaw-phyoo; 4, Ngan-tsoung shaw; 5, Shaw-nee; 6, Eee-gywot shaw. Some of these, from their strength, flexibility, and softness, were well calculated to answer the purposes of the Bast in ordinary use, and specimens were sent to Dr. Lindley, to have their useful properties ascertained in the Horticultural Society's Garden at Chiswick. Both the Superintendents, Messrs. Thompson and Gordon, reported very favourably. The kinds sent to him were No. 2, Pastha-you shaw; 3, Shaw-phyoo; and one marked *Sanseviera zeylanica*, was probably a specimen from Cuttack. *Report upon new kinds of Bast-matting from India.* Hort. Soc. Gardens, Chiswick, January 11, 1854. "Sir,—The three pieces of Indian Bast sent appear all the same, at least I cannot detect any difference in their qualities or appearance; and I think, when it is made into mats, will prove an excellent substitute for Russian mats. It is very strong, is in broad strands, very pliable and tough when wetted, easily divided into small portions for the purpose of tying, &c., and is entirely free from knotty places; and when worked into mats in the Russian way, will be an excellent winter covering for pits and frames. The material, also, seems more firm and tough, and, I have no doubt, will last at least twice as long (in wear) as the best Russian mats; and, if sold at a less price will in time supersede them. "The price of Russian mats is now from £7 10s. to £8 per 100, wholesale; and from 2s. to 2s. 6d. each, retail. "A full-sized Russian mat weighs about 5 lb. when new and quite dry, is 7 feet long and 4 feet broad, and is made with the rougher and worst strands worked crossways, and the thinner and longer strands longways in the mats. "In making mats, it should be observed never to have any of them under the regular size, for small mats (either shorter or narrower) greatly detract from the value of full-sized ones when mixed with them. These basts were all sent in the state of bast, and twisted into rope, from Akyab in Arracan. The price of all stated to be one rupee a maund, or about 3s. a cwt. A knowledge of the good qualities of these Indian Basts might lead to their employment in India, and to their export to less distant countries than England. And it is possible that merchants in Arracan might wish to make mats in imitation of the Russian. The Arracan basts were as follows:

1. *Theng-ban shaw.*—Coarse-looking, and of a reddish-brown colour, but divisible into a number of very thin layers, with a good deal of flexibility, and some toughness. A portion twisted into rope.

2. *Pa-tha-you shaw.*—Strips seven feet in length, and fine in texture, light-coloured, formed of several easily divisible layers; the outer layers rather dense and compact, and the inner cancellar. A Musæ species (?).

3. *Shaw-phyoo.*—Long, thin, smooth layers, light-coloured, tough, and flexible; easily divisible into still finer layers.

4. *Ngan-tsoung shaw.*—Fibres and rope sent, but mislaid.

5. *Shaw-nee.*—Of a reddish-brown colour, rough and coarse, but twisted into rope.

6. *Eee-gywot shaw.*—Strips five to six feet in length, composed of several layers; of which one side is smooth and compact, but the layers on the other side thin but, cancellars, all having a considerable degree of toughness. Mr. Ripley, in 'Journ. Agri-Hortic. Soc.,' viii, p. 147, describes three barks under the names *Shaw-ne*, *Shawsphrus*, and *Batharan-shaw*. These may be Nos. 5, 3, and 2. But the spelling differs much. He also mentions several useful Rattans at Akyab. There are no doubt a great variety of other basts, which might easily be procured from trees in Assam, Arracan, and all along the Malayan Peninsula, as well as on the Malabar Coast. In an account by Mr. Fenwick of the vegetable products of the Tenasserim he mentions a bast rope of considerable strength, and also that plantains and pine-apples are very abundant there. All the above places are on the sea-coast, or accessible by river. But Akyab, where so many are already produced, seems the most favourable situation for their export to Europe, if it should be found desirable. It is probable

that several might be much improved by a little steeping in water, as practised with the Russian bast. Some of those sent to the Exhibition of 1851, and of which the plants are unknown, may here be mentioned.

Patoo or *Asta* is a bast from Beerbhoom, is like the Putwa from Bhagulpore, and will be noticed with it.

Chehoor, a pale, brownish-coloured cordage from Beerbhoom, coarse, and of moderate strength.

Bark string, made by Hill tribes of Rajmahl, of useful size and strength.

Bark rope with the coarse but strong fibre, of which it is made: also from Rajmahl. Several Bark cloths from the Islands, &c., are mentioned with the Paper Mulberry, formerly *Morus* now *Broussonetia papyrifera*. There is a remarkable cord without name, which seems to be formed of a salvage of fibre, with a yellowish bark folded or laid round it, and of these, two threads so made up are twisted into a cord. A bark like some sent as that of *Odina Wodier*, is full of fibrous material. One of the best of the basts, and seemingly as like one of those from Arracan, was sent from Assam; the strips are from six to seven and eight feet in length, consisting of several layers, easily separable, tough, flexible, and strong. They have the number on them of the box in which it was conveyed, and in which were contained Pine-apple fibre; but their appearance is totally different. Several of the basts of different plants which are used by the natives, and of which the names have been ascertained, will be found mentioned under the heads of *Hibiscus arboreus* or *tiliaceus*, *Sterculia villosa* and *guttata*, *Bauhinia racemosa* and *scandens*, *Celtis orientalis*, *Antiaris Saccadora*. Capt. Thompson reports upon a bast rope made by the Munneepoorees, and on another from Singapore. ('Journ Agri-Hortic. Soc.,' viii, p. 45.) At the Madras Exhibition of 1857, Mr. McIvor exhibited a useful bast prepared from the Acacia robusta growing at Ootacamund, and Mr. Jaffrey of Madras produced one of great strength from the Eriodendron anfractuosum. The inner bark of m ny trees is employed in other parts of India for the same purposes, though it is not easy to identify the plants, from only local names being usually given by travellers. Thus, in the following account given by Capt. Biddulph in a letter to the Agri-Horticultural Society of India, in the year 1843, he states that, near Darjeeling, "the Lepchas make rope from the fibre of the *Kullyhain*, and stout bowstrings and sewing thread from the fibre of the *Ruffickee* tree." "Nothing can be more simple," Capt. Biddulph states, "than their mode of manufacture: the bark is torn off the *Kullyhain* when from five to fifteen years' growth; the inner bark of fibre is then detached, as shown in the specimen, washed for a few minutes in water, and when dry, pared or pulled into narrow strips, and twisted by the hand into rope of any thickness. The bark of the *Ruffickee* is taken off the plant when five or six feet high, and treated in the same manner as the former, except that the outer bark only requires to be scraped off with a knife. All the Lepcha fishing nets are made from the *Ruffickee*, and are remarkably light and strong." Among the Mallow tribe (or *Malvaceæ*), and some allied families, there are several other instances of the same kind. —*Royle Fib. Pl. pages* 233 *and* 236.

(4943) LIME OR LINDEN TREE (*Tilia europæa*). The Lime tree abounds in the forests of Europe, but especially in those of Russia; and is esteemed for its sweet-scented flowers. The wood of the tree is white and light, and employed for making furniture, for turning, and for carved works. The bark of these trees when steeped in water soon separates into thin layers, which are employed for making a coarse kind of rope, for making matted shoes much worn by the Russian peasantry, and also for making the mats which are so largely exported from Russia, and which are so extensively used in England for packing furniture, as well as for gardening purposes, and for covering the floor. A Linden shoot growing in moist situations, is stated by Mr. Tooke as not fit for peeling, for the purpose of being platted into shoes, in less time than three years. To every pair of shoes, from two to four young Linden stems are requisite; and though these grow faster as they are cut, yet the consumption is enormous, and the destruction of the Linden tree is in consequence immense. For the better, larger kind of mats, trees of from eight to sixteen years are cut down when full of sap, and the bark is immediately separated both from the tree and the branches. It is first cut longitudinally, then raised with an instrument made of bone, and then torn off with the hand. When the bark has been removed, it is stretched on the ground to dry, two or three strips being laid one over the other, and kept straight by being tied down to long poles. They are employed for making ropes in some parts of England, and for well-ropes in France. When required for use, they are steeped in water, and the cortical layers readily separate from each other. The best of these layers are those which are in the interior, while the coarser layers are on the outside. The manufacture of mats is nearly confined to Russia and to some parts of Sweden. Trees of from six inches to one foot in diameter are selected in the woods, and in the beginning of summer the bark is stripped from the trees in lengths of from six feet to eight feet. These are afterwards steeped in water, till the bark separates freely into layers; it is then taken out and separated into ribands or strands, which are hung up in the shade—

generally in the wood where the trees grew from which they were taken; and in the course of the summer they are manufactured into mats. The fishermen of Sweden make fishing net out of the fibres of the inner bark. The trees from which the bark is taken are cut down in the summer, and, properly cut, are burnt in heaps into charcoal. The sap is drawn off, and, when evaporated, yields sugar. The honey of the flowers is much sought after by bees. The Lime tree is principally produced in the government of Vialka, Kostroma, and those immediately contiguous and in the months of May and June—the period when the bark is most easily detached from the stem—the villages in the governments in question are almost deserted, the whole population being then in the woods employed in stripping the trees. The academician Koppen, who has carefully investigated this curious subject, estimates the average annual production of mats in European Russia, as follows:

Government of Vialka	6,000,000	pieces.
„ Kostroma	4,000,000	„
„ Kasan	1,000,000	„
„ Nijni Novgorod ...	1,000,000	„
„ Vologda, Tamboff, Simbirsk, and Penza	2,000,000	„
Total	14,000,000	„

Koppen further estimates that about a fourth part of this vast quantity, or 3½ millions, are exported, the rest being consumed at home. Archangel is the principal port for the shipment of mats, and it appears that on an average of the years 1851 and 1852, the export of mats from that port amounted to 615,360 pieces a year. Large quantities are also shipped from Petersburgh, Riga, and other ports. (M'Culloch's 'Com. Dict.') The extent of the Imports of Russia Mats into Great Britain may be judged of by the following statement furnished to Dr. Royle by Messrs. Wrench:

1832 . .	840,000	1847 . .	520,359
1840 . .	817,772	1848 . .	397,553
1841 . .	598,485	1849 . .	576,565
1842 . .	532,401	1850 . .	359,223
1843 . .	861,565	1851 . .	734,659
1844 . .	449,817	1852 . .	333,008
1845 . .	634,041	1853 . .	657,040
1846 . .	898,619		

The price in Jan., 1834, was £4 10*s.* per 100, the duty included; in 1848, 95s. to 100*s.*; and in 1849, under 80*s.* In 1850, 90*s.*; 1851, 87*s.* 6*d.*; 1852, 85*s.* to 100*s.*; and in 1853, 120*s.* per 100.—*Royle Fl. Pl. p.* 233.

(4944) LINEN.

Lynwaat, Dut.	Panno de linho, Port.
Toile, Fr.	Polotno, Rus.
Linnen, Ger.	Tela de lino, Sp.
Tela, It.	

A species of cloth woven from the fibres of

the flax plant; though the term is now understood to comprehend all kinds of hempen cloth. The chief seats of manufacture are, Dundee in Scotland, Leeds in England, and Belfast in Ireland.—*Faulkner.*

(4945) LINSEED, Flax Seed.

Buzruk, Arab.	Tukhm-i kutan, Pers.
Lynzaad, Dut.	Siemie, lniane, Pol.
Horrfroe, Dan.	Linhaca, Port.
Lin, Graine de Lin, Fr.	Semja lenjanie, Rus.
Leinsaat, Ger.	Uma, Atasi, Sans.
Suf, Tisi, Ulsee, Guz. Hind.	Linaza, Sp.
Linseme, It	Alleverei, Sirru sanulverei, Tam.
Lini semen, Lat.	Alivi Tuma, Tel.
Bidgirammee, Mal.	

The produce of the flax plant consists of small, bright, grayish-brown, slippery, elongated bodies, containing a mealy, oleaginous albumen, which yields by expression oil in such great abundance, that the seeds form for this purpose, as well as for reproduction, an important article of trade. It is grown in small quantities in the United Kingdom, but Russia, Prussia, Italy, and India, are the great producing countries; in N. America, Sweden, Denmark, Turkey, and Egypt, it is also grown in small quantities. Linseed is largely exported from Bombay to England and France.—*Faulkner.* The seed of the flax plant, in India, its principal product, is principally used in the manufacture of Linseed oil. The first export from Calcutta was made by Mr. Hodgkinson in 1832, and amounted to only ten bushels, but the increase has been rapidly progressive.

1832,	ten bushels.	
1833,	2,163	maunds.
1834,	2,826	„
1837,	32,327	„
7839,	167,601	„
1850,	765,496	„

In the year 1850-51, the amount of Linseed imported from the Concan into Bombay alone was 59,076 cwt, and in the year 1851 the total imports into England of this product, was 93,814 cwt, and in 1852-53, 114,309 cwt: the one-sixth part of the total amount imported into England in that year. The value of the Bombay exports in 1850-51 was Rs. 170,112, and in 1852-53, Rs. 342,926. See Flax.

(4946) LINSEED OIL. Linum Usitatissimum.

Alliverie yennai, Tam.	Ulsee ke Beenj, Hind.
Aveesee noona, Tel.	

Linseed Oil, is contained in the kernel of the seeds of the flax plant, Linum usitatissimum, and may be either cold drawn, or, as is usual, obtained after the seeds have been subjected to a heat of 200°. The oil obtained by the former process is paler, with less colour and taste, than where heat has been employed. The seeds of different countries yield different proportions of

oil, as the following yields from a bushel of seed wil show:—

	yield of oil. lbs.
East Indian Seed, ...	14¾ to 15.
Egyptian, ...	15
Sicilian, ...	14

When cold drawn, it is greenish-yellow, and more viscid than when hot drawn. It is one of the cheapest fixed oils; and is used in the manufacture of paints, varnishes, and printing inks. It is what is called a drying oil. Linseed oil is imported into Bombay from England. That made in the country is considered much inferior to the English oil.—*Faulkner*. The seed from which this oil is expressed, has long been cultivated to a limited extent in Nagpore, Bellary and other parts of the Madras Presidency. There is an impression that the oil obtained from the Indian plant is inferior to that imported from England, but it will be found on experiment, that this arises from the former having been imperfectly freed from mucilage, which prevents its drying. The seed is now an article of export to the amount in 1852-53, of cwt. 1,106. At the Madras Exhibition of 1855, the Rajahmundry Local Committee, Lieutenant Hawkes, and the Madras Tariff exhibited excellent samples of this oil. It is said to be procurable in Bellary at Rs. 3-8-0 per maund. In the year 1852-53, English Linseed oil to the amount of galls 4-552 and valued at Rs. 8,763 was imported into Madras, whilst at the same time cwt. 1,045 of the seed were exported from hence mostly to England, it appears that it can be made on the spot for much less than the average value of the English oil. This fact, it is hoped, needs only to be pointed out, to be taken advantage of It would, however, be necessary to guard against the adulteration of this oil, with any of the other greasy oils which would of course infallibly destroy its drying properties.—*M. E. J. R.*

(4947) LINSEED OIL CAKE. The substance which remains after the oil is expressed from Linseed, contains the albuminous part of the seed, and is used for fattening cattle.—*Faulkner*.

(4948) LINUM, a genus of Plants which gives its name to the small family of *Linaceæ*, and is characterised by having 5 distinct sepals, 5 petals, 5 stamens, and from 3 to 5 styles, which are either distinct from the base, or united as far as the middle, or even the apex. Capsule globular, divided into 10 cells, each containing a single seed. Herbs or small shrubs; leaves entire, without stipules; flowers having the petals falling off shortly after flowering. The species are chiefly found in Europe and the north of Africa, but a few likewise in other parts of the world. Few of the species of *Linum* are of any importance, except that which has been an object of culture from the earliest times of which we have any record, that is *L. usitatissimum*, the Flax Plant, which is valuable as well for its seed, as for the ligneous fibre of its cortical layer, which forms the tow spun into yarn and woven into linen cloth. It is distinguished by its glabrous capsules within the sepals; ovate pointed ciliated lanceolate leaves, and solitary stem. The flower is blue; stem from one to one and a half feet high; sepals 3-nerved. It is a native of Great Britain. It has been sometimes said that cotton is the substance from which cloth was made in Egypt in ancient times. Cotton was no doubt known to the Hindoos at very early periods, and may have formed an article of commerce to Egypt from India, but that it was not much used is proved by none of the mummy cloth, which has been examined by the best microscopes, being found to be composed of cotton. The seed is valuable for the condensed mucilage contained in its seed-coats, while the almond contains a fixed oil, valuable for burning, and in the arts as a drying oil; the oil-cake is used for fattening cattle. Linseed is extensively imported from Russia, Italy, and Egypt, for crushing, but of late years it has been imported in large quantities from India for the same purpose, this is found to yield a larger proportion of oil than Russian linseed, and the commerce will no doubt continue to increase. Seed is also imported from Holland, America, and other places for the purpose of sowing, as it is found to yield a finer and more abundant crop than the British seed. It is curious that the Hindoos make no use of the ligneous fibre; but the plants, though they there produce fine seed rich in oil, are very dwarfish, and may not therefore be found profitable culture for a people who have cotton in such abundance, and who wove it into cloth in ages when even linen was unknown in Europe.—*Eng. Cyc.*

(4949) LINUM ANGUSTIFOLIUM is found in sandy and chalky places. It has downy capsules within the sepals, elliptical, pointed, ciliated; leaves linear-lanceolate; stems numerous. Flowers of a pale blue; stem one or two feet high.—*Eng. Cyc.*

(4950) LINUM AUSTRIACUM. Some of these flowers are pretty, and may be placed in a border, the flax is well known.—*Riddell.*

(4951) LINUM PERENNE, has obovate-obtuse sepals obscurely 4-nerved, glabrous, leaves linear-lanceolate; stems numerous; fruit stalks erect. Flowers blue; stem one to two feet long, erect, or decumbent. It is found in chalky places in Great Britain.—*Eng. Cyc.*

(4952) LINUM USITATISSIMUM.

Atees, Tisi, Mushina, Hind. and Beng.

Linseed oil is one of the chief ingredients in oil varnishes and in printer's ink; by boiling with litharge its drying properties are much improved. It does not seem improbable that the spurious white "atees" roots of the bazar are occasionally obtained from this article, or from

the *Goolashoopre*, or Linum trigynium, indigenous in the Lower Provinces.—*O'Shaughnessy, p.* 213. At the Madras Exhibition of 1855, several specimens of true Flax from the Linum Usitatissimum were exhibited from Tanjore, Ganjam and the Nizam's Territories, but none of them were clean or of good quality all having been stained by rotting. This is to be regretted as the fibre was of good length and is said to be procurable in large quantities in Goomsoor and the Nizam's territories, if previous notice be given to the cultivators.—*M. E. J. R.*

(4953) LIQUIDAMBAR, a genus of Plants belonging to the natural order *Balsamifluæ* of Blume, which has been altered to *Balsamaceæ* by Dr. Lindley. The name is derived from 'liquidum,' fluid, and 'ambar,' the Arabic name of amber. The genus is closely allied to the Willow and Plane tribes, but distinguished from both by its 2-lobed 2-celled many-seeded capsules, and their albuminous embryo. The species are only three in number, all forming fine trees, and occurring in Java, the Levant, and North America.—*Eng. Cyc.*

(4954) LIQUIDAMBAR. The Liquid-amber of commerce is a product of three species of plants belonging to the natural order of Balsamifluæ of Blume which has been altered to Balsamaceæ by Dr. Lindley. The name of this substance is derived from *Liquidum*, fluid, and *Ambar* the Arabic name of Amber. The three species all form fine trees, and occur in the Levant, Mexico, North America, Java and Tenasserim. Liquidambar altingia is a superb forest tree, occurs on the mountains of Java, at elevations of 2000 or 3000 feet above the level of the sea, also on the coast of the Tenasserim provinces, where it is indigenous, and in some places quite abundant, (Malay, Rasamalay, Burmese nan-tu-yoke). Indeed a considerable stream in the province of Mergui derives its name from this tree in consequence of its growing so thick on its banks. The bark of L. altingia has a hot and bitterish taste, and yields a fragrant balsam or liquid storax although there is no proof that the liquid storax, known in Europe is obtained from it, and it does not grow near the localities where liquid storax has so long been obtained. Liquidambar styraciflua a large, fine tree, is the species found in Mexico, and the United States, in the latter of which it is called sweet gum, and the fragrant liquid exudes, though not very copiously, from incisions in the stem. This is called Liquidambar, oil of Ambar, and Copalm Balsam, and in this form has a pleasant balsamic odour and an aromatic bitter taste. This becoming dry, forms what is called soft or white Liquidambar, which resembles very thick turpentine, has a feebler odour than the liquid balsam, and contains less volatile oil, but more benzoic acid. Liquidambar orientalis is a native of Cyprus and parts of the East Indies. Dr. Pococke, as quoted by Dr. Lindley, states that it is called Xylon Effendi (the Wood of our Lord), in Cyprus, where it produces an excellent white turpentine, especially by incisions in the bark. It is also said to be produced on the islands of Cabross, at the upper end of the red Sea, near Cades, which is three days' journey from Suez. The product of the L. Altingia is said to be mixed with the substance obtained by boiling the branches of Styrax officinale, or acting upon them with oil, spirit or naphtha. The subject is interesting as connected with ancient commerce, inasmuch as old writers mention a liquid with the solid storax, the mia-saileh and Mia yabseh of the Arabs. In all its states Liquid-amber is used to mix with Balsam of Peru.—*Eng. Cyc.* —*Mason.*

(4955) LIQUIDAMBAR ALTINGIA,
Rasamala, Malay.

of Blume, is a native of the forests of Java, at elevations of 2,000 to 3,000 feet above the level of the sea. It forms a gigantic tree, with bark having a hot and bitterish taste, yielding a fragrant balsam, or liquid storax, the Rasamala of the Malayan Archipelago, though there is no proof that the liquid storax known in Europe is obtained from it, and it does not grow near the localities whence liquid storax has so long been obtained. It is therefore probable that some portion is obtained by boiling the branches of *Styrax officinale*, or acting upon them with oil, spirit, or naphtha. The subject is interesting as connected with ancient commerce, inasmuch as old writers mention a liquid with the solid storax. By the Arabs the former is described under the name Mia-Saileh, liquid storax; and the latter, Mia-Yabseh, solid storax. Both are described by Serapion under the head Miha; by Avicenna under the several heads of Lubnee, Astaruk, and Miha. The name Mia-Saileh, with the affix 'rus' (juice), would appear to be the origin of the Malayan Rasamola, and thus one which has been variously corrupted.—*Eng. Cyc.* Mr. Mason writes on this tree as follows: Liquid amber. [Extracted from an article communicated by that author, in the Journal of the Asiatic Society for June 1848.] "Did you ever see in this country the tree which produces the balsam of Tolu?" a gentleman once asked me. "No," I replied, "I never did." "I have one in my compound," he continued; but unfortunately his compound was two hundred miles distant. Years passed away, and I found myself beneath this tree in flower, and soon discovered that it was not *Myrospermum toluiferum*, but *Liquidamber altingia*; and that it produced not balsam of Tolu, but liquid storax. The tree is indigenous on the Coast, and in some sections is quite abundant. A considerable stream in the province of Mergui derives its name from this tree, in consequence of its growing so thick on its banks. It seems to have escaped the notice of Dr. Helfer,

for, if I recollect right, it is not once alluded to in any of his reports, nor has it ever been brought to notice by any one; if we except a Catholic Clergyman, a resident of Rangoon, who has introduced it in a little Burmese medical treatise, that was lithographed a few years ago by Col. Burney, who took a lithographic press with him into Burmah. This gentleman, however, seems to have mistaken the tree, for he describes it as the one that produces the balsam of Peru, *Myrospermum perniferum*, and which belongs to a different natural family. The medicinal properties of their exudations too, are materially different. Liquid storax, the production of this tree, is described by Lindley, merely as "a stimulating expectorant substance—influencing the mucus membranes, especially that which lines the air passages." The writer of the Burmese medical treatise recommends the exudation of the tree for the usual purposes to which the balsam of Peru is applied, under the illusion that it is the same substance. —*Mason.*

(4956) LIQUIDAMBAR CERASIFOLIA OF WALLICH (Sedgwickia cerasifolia of Griffiths) grows in Assam, but it is not known if it yields any balsam.

(4957) LIQUIDAMBAR ORIENTALIS, is a small tree, a native of Cyprus and other parts of the East Indies; was introduced into the Jardin-des Plantes, Paris, from Smyrna, and is said to occur along the Red Sea. Dr. Pococke, as quoted by Dr. Lindley, states that it is called Xylon Effendi (the Wood of our Lord), in Cyprus, where it produces an excellent white turpentine, especially by incisions made in the bark. It is this substance perhaps which is alluded to in many works by the name Rosa malla or mallos, described as a balsamic fluid produced upon the island of Cabross, at the upper end of the Red Sea near Cadess, which is three days' journey from Suez. But there are no recent accounts of this substance, which is thought by some authors to be procured from the following species.—*Eng. Cyc.*

(4958) LIQUIDAMBAR STYRACIFLUA, is the species found in Mexico and the United States, in the latter of which it is called Sweet Gum, and forms a large and fine tree, bearing some resemblance to the lesser maple (*Acer campestre*): the wood is of a hard texture and fine grain, and makes handsome furniture, but the tree is more noted for the fragrant liquid resin which exudes from incisions in the stem, though not very copiously. This is called Liquidambar, Oil of Liquidambar, and Copalm Balsam, which has a pleasant balsamic odour, and an aromatic bitter taste. This becoming dry and opaque, forms what is called Soft or White Liquidambar, which resembles very thick turpentine, has a feebler odour than the liquid balsam, and contains less volatile oil, but more benzoic acid.—*Eng. Cyc.*

(4959) LIQUORICE. The plant which yields the liquorice root of commerce is *Glycirrhiza glabra* or *Liquiritia officinalis*. It is a native of Italy and the southern parts of Europe, but has been occasionally cultivated with success in Britain, especially at Pontefract, in Yorkshire, and at Mitcham, in Surrey. The plant is a perennial, with pale blue flowers. It grows well in a deep, light, sandy loam, and is readily increased by slips from the roots with eyes. The root, which is the only valuable part, is long, slender, fibrous, of a yellow color, and when grown in England is fit for use at the end of three years. The sweet, sub-acid, mucilaginous juice is much esteemed as a pectoral. It owes its sweetness to a peculiar principle called glycrin or glycirrhiza, which appears also to be present in the roots and leaves of other papilionaceous plants, as *G. echinata* and *glandulifera*, *Trifolium alpinum*, and the wild liquorice of the West Indies, *Abrus precatorius*, a pretty climber. The greatest portion of our supplies of the extract, which amount to 7,000 or 8,000 cwts. a year, are obtained from Spain and Sicily. The juice, obtained by crushing the roots in a mill, and subjecting them to the press, is slowly boiled, till it becomes of a proper consistency, when it is formed into rolls of a considerable thickness, which are usually covered with bay leaves. It is afterwards usually re-dissolved, purified, and, when formed into small quills, is known as refined liquorice. In 1839, 1,166 tons of liquorice paste were exported from Naples, valued at £45 per ton. Mr. Poole, in his Statistics of Commerce, states that the consumption of liquorice root and paste in this country averages 500 tons per annum. 110 cwt. of the juice and 100 cwt. of the root are annually brought into Hull from the continent.—*Simmonds.*

(4960) LIQUORICE. GLYCYRRHIZA GLABRA. Dried liquorice is found among native drugs, of Tenasserim, but Mr. Mason has never seen the plant growing.—*Mason.*

(4961) LIQUORICE JUICE, SPANISH JUICE.

Arak Soos, ARAB.	Sugo di regolizia, IT.
Jettimad-ka-rus, GUZ. HIND.	Regaliz en bollos opastillas, SP.

Is the inspissated juice of the fresh roots of the liquorice tree. It should be quite black, brittle, and break with a smooth glossy fracture; have a sweet taste, and be almost entirely soluble in water. The best description is the Spanish Liquorice. An inferior kind, in rolls about the thickness of the little finger, is imported into Bombay from the Persian Gulf.—*Faulkner.*

(4962) LIQUORICE LOZENGES, EXTRACT OF LIQUORICE, or of goonch, gum arabic, each six ounces, pure sugar one pound. Dissolve in boiling water, and concentrate to a proper consistence. *Use.*—Demulcent in irritating coughs.—*Beng. Phar. p.* 435.

(4963) LIQUORICE ROOT.

Ussulsoos, Arab.	Uratmanis, Mal.
Wellmie, Olinde, Cing.	Bikh-meeth, Pers.
Bois de reglisse, Fr.	Pao doci, Port.
Sussholz, Ger.	Madhuka, Yashtimadhuka, Sans.
Jettimud, Guz. Hind.	Regaliz Orozuz, Sp.
Legorizia, It.	Addimodaum, Tam.
Oyotmaus, Jav.	

The roots of a perennial plant (*Glycyrrhiza glabra*), a native of the South of Europe, and Persia, but cultivated in some parts of England. They are very long, about an inch thick, flexible, fibrous, of a brown colour, and when fresh, juicy; taste sweet. They are apt to spoil, and it is necessary to pack them in sand, when not required for immediate use. They are an article of the *Materia Medica*, particularly in coughs, colds, &c., and are also in demand by brewers and druggists. Liquorice root is imported into Bombay from the Persian Gulf.—*Faulkner.*

(4964) LIQUORICE PLANT OF INDIA. Abrus Precatorius.

(4965) LIQUORICE OF TENASSERIM. Acacia. Wild Liquorice of Tenasserim. There is an indigenous plant in the forests, the bark of whose roots have the taste of liquorice, but it does not belong to the same genus, though often supposed to be the same tree. I have not seen the flower, but the leaf and fruit would indicate it to be a species of Acacia.—*Mason.*

(4966) LIRIODENDRON. Magnoliaceæ. The tulip tree. This tree is highly ornamental growing to a large size and well adapted for a plantation or lining an avenue, the flowers are large and of a yellow and red color which appear in the rains, it is easily raised from seed. The bark is a strong tonic and is said to be equal to the Peruvian. The wood is fine grained and smooth, used by Coach makers and carpenters. —*Riddell.*

(4967) LISIANTHUS. Gentianeæ. Lisianthus Russellianus. This is a handsome plant, with purple flowers, the other species are white and yellow, the seed should be sown in a light vegetable mould, in pots, and transplanted when about three inches high, the flowers are large and handsome and continue perfect for many days.—*Riddell.*

(4968) LITCHI, or LEECHEE, a fruit commonly sold in the markets of China, and occasionally brought to England. It is the produce of the *Euphoria* (*Nephelium*) *Litchi* of botanists, a tree belonging to the natural order *Sapindaceæ*. The eatable part is a pulpy flesh, which covers a stone inclosed in a hard dry tesselated prickly pericarp. The Rambutan and another fruit, called the Long yen, or Longan, are yielded by species of the same genus. The Chinese cultivate many varieties of each.—*Eng. Cyc.* The lichi, originally from China, is a favourite fruit in Bengal, but did not succeed on the Tenasserim Coast until recently.—*Mason.* See Leechee.

(4969) LITHARGE.

Gelit, Dut.	Lithargyrium, Lat.
Litharge, Fr.	Murdarsang, Pers.
Glotte Glattee, Ger.	Glet, Rus.
Murdarsang, Boodar. Hind, Guz.	Almartaga, Sp.
Litargirio. It.	Marudarsinghie, Tam.

A semi-vitrified oxide of lead, in the form of small shining heavy scales, or more or less agglutinated masses. It is usually produced in the purification of silver from lead, and the refining of gold and silver by means of this metal. According to the degree of fire and state of oxidation, it has a pale or a deep colour. The one is called litharge of silver, and the other litharge of gold. Litharge is used for various purposes in the arts, by potters, glassmakers, painters, &c., it is also employed in medicine. Crude litharge is procurable in most Indian bazars.—*Faulkner.*

(4970) LITHOSPERMUM OFFICINALE. The seeds are long, very white, and like small stones or pearls, on which account they have been popularly used as a remedy for stone. They are known in India by the name of Lubisfirmun. (*Royle.*)—*O'Shaughnessy, p.* 497. The roots of some species of Lithospermum afford a lac for dyeing and painting.—*Cyc. of India.*

(4971) LITMUS.

Tournesol, Fr.	Lackmus, Ger.

A violet-blue dye, prepared chiefly in Holland from a lichen (*Lecanora tartarea*), which grows in the Canary and Cape de Verde Islands. It is met with in small cubical cakes, of a dusky blue colour, light, and easily pulverized. It is employed to stain marble; also as a chemical test of acidity, being reddened by acids, while the blue is restored by alkalis; for this purpose it is employed either in the form of a tincture, or of unsized paper coloured with it.—*Waterston.*—*Faulkner.*

(4972) LIVISTONIA, a genus of palms, natives of Eastern Asia and Australia of noble aspect and elegant foliage. The L. Jenkinsiana Griff., furnishes the "Toko-pat" of the Assamese, an indispensable article in every native gentlemans house; The leaves are in universal use throughout Assam for covering the tops of the peculiar umbrella-hats (*Jhapees*) of the Assamese, the tree does not occur in a truly wild state, and in some parts they are rare, and then of great value.—*Seeman.* There is large stately palm very abundant in the Karen jungles, the leaves of which the Karens use for thatch. In some sections of the country the Karens thatch their houses with large palmated leaves of a tall wild palm, probably a specie of livistonia: sometimes the leaves of a species of rattan are used; but the Burmese and Europeans almost univer-

sally thatch their houses with the leaves of the Nipa.—*Mason.*

(4973) LLAMA, (*Auchenia* of Illiger; *Lama* of Cuvier and others,) the generic name for that form of the *Camelidæ* which is confined to the New World. Dentition:—

$$\text{Incisors, } \frac{2}{6}; \text{ Canines, } \frac{1-1}{1-1}; \text{ Molars, } \frac{5-5}{4-4} = 30.$$

The difference between the dentition of the two sub-families of *Camelidæ*, *Camelus* and *Auchenia*, appears to consist mainly in the absence of the two small pointed teeth, which are found in the interval or 'bar' between the canines and the molars in the Camels, from the jaws of the Llamas. Thus the Llamas have four false molars, as they may be termed, less than the Camels. In other respects the dentition of the one is, as nearly as may be, the dentition of the other. The difference was considered by F. Cuvier to be of such small importance that he has not considered it necessary to give a figure of the dentition of *Auchenia*. We need not here repeat those uses to which these animals have been applied by man. Cords and scales, as well as stuffs for ponchos, &c., are fabricated from the wool, and the establishments for their manufacture in England employ thousands of artisans. In Mexico the bones are converted into instruments for weaving the wool. Nor is even the dung neglected, for it is used as fuel. These animals seem to have been to the aborigines what the reindeer (with the exception of the milk) is to the Laplander. Surrounded by herds of such animals which required almost no care, and by the spontaneous productions of the soil, the Indian had no incentive to improvement. Humboldt has an eloquent passage on this subject. "When we attentively examine this wild part of America, we seem to be carried back to the first ages when the earth was peopled step by step; we appear to assist at the birth of human societies. In the Old World, we behold the pastoral life prepare a people of huntsmen for the agricultural life. In the New World, we look in vain for these progressive developments of civilisation, these moments of repose, these resting-places in the life of the people. Those species of ruminating animals which constitute the riches of the people of the Old World are wanting in the New. The bison and musk-ox have not yet been reduced to the domestic state; the enormous multiplication of the Llama and the Guanaco have not produced in the natives the habits of the pastoral life." These multitudes are already lessened, and the form itself will probably ere long be extinct. Civilisation has brought with it the animals of the Old Continent. The horse and the mule have mostly entirely superseded the Llamas as beasts of burden, and the sheep and the goat, in a great measure, as contributors to the food and raiment of man.—*Eng. Cyc.*

(4974) LOADSTONE, MAGNET. Native Landstone. Oxydulous Iron.

Magneet, DUT.	Ahansubah, PERS.
Aimant, FR.	Magnit, RUS.
Magnet, GER.	Muzere meknates, ka-
Chumuk-Puttur, GUZ.	untum, SANS. TEL.
HIND.	Iman, SP.
Calamita, IT.	Kaundum, TAM.
Magnes, LAT.	

A combination of the protoxide and peroxide of iron. It is found in considerable quantities in Germany, Sweden, Norway, Spain, Italy, India, China, and other places.—*Faulkner.*

(4975) LOASA, LOASACEÆ. This is an interesting genus of plants, some of the species possessing the properties of nettles, the flowers are red, white and yellow, they are grown from seed, and any common soil suits them.—*Riddell.*

(4976) LOBAN, STYRAX BENZOIN: GUM BENJAMIN. Imported Via Pali: used as a stimulant, and eaten in pawn leaves; the "attars" sublime the benzoin acid very purely, and administer it as an aphrodisiac: one seer costs from two rupees to two and a half. The gum resin of the Boswellia thurifera is also considered as "luban" by the community.—*Gent. Med. Top. p.* 144.

(4977) LOBELIA. LOBELIACEÆ. This is an interesting genus of plants, easily cultivated in Southern Asia by seed, the blossoms are extremely beautiful from their variety of colours, they require a light rich soil, with a moderate quantity of water.—*Riddell.* Dr. Wight in Icones gives Lobelia aromatica, 1172; excelsa, 1172-3-4; gives *nicotianæfolia*, 1172; trichandra, 1171; trigona, 1170.

(4978) LOBELIA CARDINALIS. An annual creeping glabrous plant, a native of China. Flowers of a pink colour. In gardens it spreads over the soil, rooting at every branch, and is well adapted for borders to parterres.—*Riddell.*

(4979) LOBELIA ERINUS, and varieties.—Pretty little procumbent plants, generally having blue flowers, succeed well in the flower beds, raised from seeds. Will not live through the hot weather.—*Jaffrey.*

(4980) LOBELIA INFLATA, INDIAN TOBACCO. A native of the United States; an acrid narcotic, and violent emetic; in small doses diaphoretic and expectorant. A popular remedy in the United States, where from incautious use it has often proved fatal. Its chief employment is in asthma, and in the form of enema in strangulated hernia.—*OShaughnessy, page* 423.

(4981) LOBELIA NICOTIANIFOLIA.—Erect, leaves sub-sessile, lanceolar, acute, entire, raceme terminal. A stout tall species, occurring in the vicinity of Bangalore.—*O'Shaughnessy, page* 424.

(4982) LOBELIA RADICANS. Acciden-

tally introduced from China into the Calcutta Garden, where it flowers during the rains; small, much branched, spreading over the ground, and sending forth roots from each branchlet. Dr. O'Shaughnessy instituted numerous experiments with this species, but found it to be altogether inert.—*O'Shaughnessy, page* 425.

(4983) LOBELIA TRIGONA: A small annual ramous plant which delights in wet pasture ground, and flowers during the wet and cold seasons.—*O'Shaughnessy, page* 426.

(4984) LOCK.

Sloten. Dut.	Serrature, It
Serrures, Fr.	Kufl, Pers.
Schlosser, Ger.	Fechaduras, Port.
Tala, Kufl, Kulf, Guz. Hind.	Samki, Rus.
	Cerraduras, Cerrajos, Sp.

Well known instruments, of which there are a great variety. In England they are principally manufactured at Wolverhampton in Staffordshire, Birmingham, and London. In India, locks of an inferior description are made at Surat, chiefly in imitation of English ones.—*Faulkner.*

(4985) LOCUSTS, the principal genera contained in the family *Locustidæ* are the following:—*Locusta* (Leach), in which the hinder legs are about equal to the whole body in length, and the antennæ filiform or terminated in a club. Upwards of twenty species of this genus are enumerated by Mr. Stephens in his 'Catalogue of British Insects,' and it is to this group that the *Gryllus migratorius* of Linnæus belongs, a large species which has occasionally been found in Britain, and which in some parts of Europe sometimes multiplies to such a degree as to devastate large districts. Africa at all times appears to have been peculiarly subject to the ravages of these insects. Of their extraordinary devastations in this portion of the globe we have records from the earliest authors, and the works of the most recent travellers confirm them. Mr. Barrow in his 'Travels' states, that "in the southern parts of Africa an area of nearly two thousand square miles might be said literally to be covered with them. When driven into the sea by a north-west wind they formed upon the shore for fifty miles a bank three or four feet high, and when the wind was south-east the stench was so powerful as to be smelt at the distance of 150 miles." In Messrs. Kirby and Spence's 'Introduction to Entomology' numerous accounts of a similar nature will be found. In some parts of Africa they are cooked and eaten by the natives. The natives of Senegal are said to dry them, and, having reduced them to powder, use them as flour.—*Eng. Cyc.*

(4986) LODOICEA. DOUBLE COCOA-NUT. The Double Cocoa-nut of the Seychelles or Mahe islands, is the fruit of the Lodoicea Palm. When preserved whole, and perforated in one or two places, the nut serves to carry water, and some of them hold six or eight pints; and by slicing them in different directions, they are formed into plates, dishes, drinking cups &c. known in the Islands as Vaisselle de l' isle Praslen. The crown of the trunk is eaten like the American cabbage palm. The down attached to the young leaves serves for filling mattresses and pillows; the ribs of the canes and fibres of the petiole are fabricated into baskets and brooms, and the young canes are plaited to form hats. The Lodoicea attains a height of eighty or ninety feet. It might be introduced into India with advantage. Germinating nuts were sold in London in 1854 for £10 a piece.—*Seeman.*

(4987) LOGWOOD.

Bois de Campeche, Fr.	Campeggio, It.
Blauholz, Ger.	Palo de Campeche, Sp.

A dyewood, hard, heavy, of a deep orange colour, a sweetish astringent taste, and peculiar odour. Logwood is extensively employed for compound colours, but its chief use is for blacks, and certain shades of gray; an extract from it is also used in medicine.—*Faulkner.* The logwood of commerce is the red heart wood, or duramen, of a fine lofty growing tree (*Hæmatoxylon campechianum*), growing in Campeachy and the bay of Honduras, which is also now common in the woods of Jamaica and St. Domingo, and has been introduced into India. It is principally imported as a dye wood, cut into short lengths. We chip, grind, and pack it into casks and bags, ready for the dyers, hatters, and printers' use, who esteem it as affording the most durable deep red and black dyes. It is sometimes used in medicine as an astringent. That grown in Jamaica is least valued; that of Honduras, Tobiasco, and St. Domingo, fetches a somewhat higher price; but that imported from Campeachy direct, is the most esteemed. The annual imports into Liverpool are about 1,300 tons from Honduras, 1000 from Tobiasco, and 1,800 from Compeachy.—*Simmonds.* Logwood, is scarcely used for turning, and is a dark purple-red dyewood, that is consumed in large quantities: *Tredgold.* In Tenasserim, the log-wood tree is cultivated in a few gardens, and appears to flourish as well as an indigenous plant.—*Mason.*

(4988) LOMARIA SCANDENS. Scandent Lomaria. The low lands near the mouths of rivers and nullahs, in Tenasserim, are often fantastically dressed with a species of lomaria which creeps up to the tops of the tallest trees.—*Mason.*

(4989) LONCHURA, a genus of *Fringillidæ*, separated from *Fringilla* (Temm.) by Lieut.-Colonel Sykes. The bill is strong, short, broad; mandibles entire, the upper one extending in an angle on the forehead, and with it forming the arc of a circle. Wings moderate, subacuminate; first quill very short and subspurious; the second,

third, and fourth nearly equal and longest. Tail graduated; lanceolate; middle tail-feathers a little exceeding the others in length. Feet moderate, rather slender. Colonel Sykes observes that the peculiar spear-head form of the tail, and the ridge of the upper mandible and the forehead, forming a segment of the same circle, together with the habits of *Lonchura nisoria*, *L. Cheet*, and *L. leuconota*, afford sufficient characteristics for their separation. Colonel Sykes adds that the Gros-Bec Longicone of the Pl. Col. 96 *Emberiza quadricolor*, Lath.), belongs to the same group. The three species are found in the Deccan. The first two are recorded as found only in the Ghauts.—*Eng. Cyc.*

(4990) LONCHURA CHEET, (Sykes) is described as of a pale cinnamon-brown; the body below and the rump white; quills and tail-feathers deep brown. Irides deep red-brown. Female with the colours less intense. Length of the body $3\frac{3}{4}$ inches: of the tail 2 inches. Colonel Sykes states that these birds live in small families, and that he frequently found them in possession of the deserted nests of the *Plocens Philippensis*; their own nest, which he exhibited on a subsequent occasion, is a perfect hollow ball, made of a delicate Agrostis, with a lateral hole for the entrance of the birds. It was found in the fork of a branch of the *Mimosa Arabica*, and contained ten oblong minute white eggs, not much larger than peas, being $\frac{13}{20}$ths of an inch long by $\frac{9}{20}$ths in diameter. The cry of the bird is 'cheet, cheet, cheet,' uttered simultaneously by flocks in flight. ('Zool. Proc.')—*Eng. Cyc.*

(4991) LONICERA LESCHENAULTII. CAPRIFOLIACEÆ.

Moullee-quedi, TAM.

A twining villous shrub native of the Neilgherries, is found in many gardens of the Deccan where it grows in great luxuriance, it is easily propagated by cuttings or layers.—*Jaffrey.* Wight gives Lonicera (X.) ligustrina, 1025.

(4992) LONG PEPPER.

Dar-Filfil. ARAB.	Piper Longum, LAT.
Tipili, CYNG.	Tabee, MAL.
Poivre long FR.	Filfill-i-daraz, PERS.
Lange Pfeffer, GER.	Pippali Krishna, SANS.
Pepeelee, GUZ. HIND.	Pimenta larga, SP.
Pepe lungo, IT.	Tipili, TAM.
Chabi jawa, JAV.	Pipuloo TEL.

This species of pepper is the produce of a perennial plant (*Piper longum*), a native of Bengal, Siam &c. The fruit is hottest in its immature state, and is therefore gathered whilst green, and dried in the sun. It is met with in entire spikes about an inch long, possessing a darkish brown, or gray colour. It has a weak aromatic odour, an intensely fiery, and pungent taste, and its properties correspond closely with those of black pepper.—*Faulkner.*

(4993) LOONAR LAKE, in the circar of Meinker Soubah of Berar, about 45 miles N. W. of Hingolie, in Lat. 20° N. is at the bottom of a crater like depression, about 510 feet below the level of the surrounding country, and is 3 miles in circumference with a depth varying from 5 feet to 14, according to the season of the year. The lake presents a still sheet of water, emitting an intolerable stench of Sulphuretted Hydrogen, which, especially during the heat of the day, rises in millions of bubbles to the surface. Near the centre are two saline springs, containing muriate of soda, the water of which coming in contact with earthy carbonates in solution, a deposit takes place of carbonate of Soda or Natron Salt, in greater or less purity. The deposit is raised by diving, the purest being found close to the springs and the following are the names of the principal varieties. 1, Dulla, carbonate of Soda containing 83·8 per cent of Soda. 2. Nimuck Dulla, Nearly pure salt, containing 92·8 per cent of chloride of Sodium. Dulla, and Nimuck Dulla are used for dyeing silks, fixing colours, as medicine, and in the manufacture of bangles, of which there are two manufactories near the lake, where 600 or 700 are made by each man daily. 3. Khuppul, contains 72 per cent of carbonate of Soda, is used in fixing the red dyes of cloths. 4. Pappree contains 72 per cent of carbonate of Soda, is used in making bangles: in baking the cake called papur and in medicine as an antacid. 5 and 6. Bhooskee are neutral carbonates of Soda containing 29 and 27 per cent: is left as a deposit on the margin of the lake, and used in the manufacture of soap. The salt is raised by the divers, who rise with it in their hands: it is much prized and finds a ready sale in the bazar of Candesh, Nagpore and Poonah. The average quantity is 213 candies per annum valued at Rs. 608. —*Dr. G. Smith. Dr. J. E. Mayer.*

(4994) LOORY, but correctly Nuri in Malay, and Nor in Javanese, is the generic name for 'parrot." The sub-family of parrots, to which naturalists have given the name of Lorius, is not found in any island of the Archipelago west of New Guinea, nor at all in the Philippines. The loories of naturalists are, in fact, confined to New Guinea and its adjacent islands.—*Crawfurd Dict. page 222.*

(4995) LOPEZIA. ONAGRACEÆ, Lopezia Cordata.—This is a genus of pretty plants, annuals and biennials, their colours are purple and red, raised from seed, and grown in any good soil.—*Riddell.*

(4996) LOPHOSPERMUM. SCROPHULARINÆ. Lophospermum Scandens.—Beautiful climbing plants with large purple or rose coloured bell shaped flowers, this plant is of fast growth, and well adapted for covering trellis work, easily grown from seed at the commencement of the

rains, and lasts throughout the year, the soil should be rich and light.—*Riddell.* Mr. Jaffrey adds *Lophospermum Scandens* and *L. Hendersonii* are herbaceous climbing plants with pink bell flowers, raised from seeds and cuttings, require a sandy soil or they will not flower freely. Natives of Mexico.—*Jaffrey.*

(4997) LOQUAT. ERIOBOTRYA JAPONICA. Pomaceæ.

Young-ma, CHIN.

This tree is now introduced all over the Deccan, and bears fruit twice in the year. It is highly esteemed both for desert and preserves. It is a native of Japan, but grows in great perfection in New South Wales. The finest fruit is produced at the second crop, at the end of the cold season, and requires protection day and night; from birds in the former, and flying foxes in the latter. The fruit is a yellow color, with thin skin, a sweet acid pulp, one or two seeds in the centre—sometimes more. The seeds grow easily. Proper attention does not seem to have been given to this fruit, as it appears to be capable of great improvement.—*Riddell.* In Ajmere, it is cultivated in gardens but does not thrive well.—*Gen. Med. Top. p.* 195. It is very common in China and is often mentioned by Fortune, for instance, at one place, he found, (*Eriobotrya japonica*), the loquat or young-mai, (*Myrica Sp.*), peaches, plums, and oranges.—*Fortune's Tea. Districts, p.* 30; and there were other fruits—such as the loquat (*Eriobotrya japonica*), the Chinese gooseberry (*Averrhoa Carambola*), the wangpee (*Cookia punctata*), and the longan and leechee.—*Tea Districts, page* 7.

(4998) LORANTHACEÆ. 1419 Dr. Wight gives, in Icones, Loranthus amplexifolius, 30: capitellatus, 304; elasticus, 343,1063; (St.) euphorbiæ, 1063; lageniferus, 306; longiflorus, 302; loniceroides. 303; memecylifolius, 142; Neilgherrensis, 1020; tomentosus, 305,378; Wallichianus, 143.

(4999) LORANTHUS. Many of the Tenasserim trees are covered with different species of the parasitical genus loranthus, so abundant in most tropical climates; and the numerous small red flowers of one or two species in four forests are quite ornamental.—*Mason.*

(5000) LORANTHUS FALCATUS.

Wotu, CAN.

Wotu is the Canarese name of a shrub, the bark of which Dr. Buchanan tells us the Natives of Mysore sometimes use in place of Betel nut in conjunction with chunam, it tinges the saliva and mouth red.—*Ains. Mat. Med. p.* 269.

(5001) LOTA, a small metal pot, made of brass or copper or iron tinned.

(5002) LOTUL. OSTRIS WIGHTIANA.

(5003) LOTUS *of the Ancients.* The plant or plants referred to by classical authors under the name of *Lotus* is a subject which has engaged the attention of numerous commentators as well as of botanists. To the difficulty of ascertaining the identity of a plant but imperfectly described has in this case been added that of the same name having been applied to several very distinct plants. Fee, the latest author ('Flore de Virgile'), enumerates no less than eleven to which the name *Lotus* was applied; it is unnecessary here to enumerate more than the most remarkable. Of these some are herbaceous, others perennial. Among the former are the *L. sativa* and *L. sylvestris* of Dioscorides; the first, he states, is also called *L. trifolium*; it is supposed by some botanists to be *Melilotus officinalis*, and by others to be *M. cærulea*. Dr. Sibthorp has fixed upon *M. Messanensis* as the plant. The *L. sylvestris* of Dioscorides, also called L. *Libyan*, a native of Libya, and about two feet high, with leaves like those of *L. trifolium*, and fruit like that of Fenugreek, is thought to be the *Trigonella elatior* of Sibthorp, which he found in Asia Minor and in Cyprus. Both kinds are described by the Arabs under the name of Handachocha, or Hundkookee, with Garch and Thusf as other Arabic names. From the great number of similar plants of the tribe of *Loteæ*, which are employed by Asiatics as articles of diet or as medicines it is impossible, without specimens, to identify either of the above, but they are probably allied to the *Melilotus*.—*Eng. Cyc.*

(5004) LOTUS ÆGYPTICA, or the Egyptian Lotus, is no doubt one of the *Nymphæaceæ*, being described as springing up in Egypt in fields inundated by the river, with a stem like that of the Κύαμος, or Egyptian Bean (*Nelumbium speciosum*), and a white liliaceous flower, which rises out of the water at sunrise and sinks down again at its setting; a capsule like that of poppy, in which are contained seeds which the Egyptians roast and make into bread; with a root which is likewise eaten, both in a dressed and undressed state. The plant is no doubt the *Nymphæa Lotus* of botanists; but as in the most ancient monuments a blue-coloured lotus is likewise represented, there is no doubt that the Egyptians were also acquainted with the *Nymphæa cærulea*. At the present day the seeds of several Nymphæas roasted in sand are eaten by the natives of India, as are likewise the stalks and the rootstocks, which is said to have been the case with the Egyptian species. As the flowers of the *Nymphæaceæ* are so highly esteemed by the Hindoos, and notices respecting them constantly occur in their poetry and mythology it is possible that an Eastern legend may have given origin to the transformation of the nymph Lotis flying from Priapus into the 'aquatice lotos.' (Ovid, 'Metamorph.' ix. 341.) The Egyptian *Lotus* however is not so celebrated as another less-

known tree, to which exaggerated description has assigned a fruit of the most delicious kind, upon which the Lotophagi lived, and which, when strangers had once tasted, they ceased to wish to return to their native country. This is specially described as a tree, but there is no doubt that several have been confounded under this name. One is described both by Dioscorides and Pliny as a native of Italy of great size, forming excellent wood, with fruit about the size of pepper and resembling that of the cherry. This description applies very closely to the *Celtis australis*, or European Lote or Nettle-tree, which is one of the largest timber-trees of the south of Europe, with wood of considerable hardness and toughness. It produces berries about the size of small cherries, and with long stalks like them, eaten both by birds and children. This however comes far short of the character of the *Lotus* of the Lotophagi, of which the best description, according to Sprengel, is that of Polybius, who states that it was a moderate-sized thorny tree, with leaves like those of *Rhamnus*, but broader; that the fruit at first was like the white berries of myrtle, but became as large as an olive, of a reddish colour, and containing a small nut; taste sweetish, resembling that of figs or dates; and that a wine was prepared from it. That this tree was a native of Africa we know from the Lotophagi, who employed the fruit as their chief food, being a people of the African coast near the Syrtes. (Herod., iv. 177.) Arabian authors, in their translation of the works of the Greeks, give the synonyms in both languages, and we have, in the chapter of Serapion, retranslated into Latin, 'De Loto Arbore,' the name Sidr or Sidar, given as the Arabic name of the tree, and Nabach, Nibuk, or Nabk as that of its fruit. This name has been long known as that of a species of *Zizyphus*, and has been applied by botanists to one species, *Z. Napeca*. Dr. Shaw, in his 'Travels in Barbary,' figures a species of *Zizyphus*, which he calls 'Seedra Arabum, quæ et Lotus Veterum.' It is a prickly branching shrub, with fruit of the size of a wild plum, and of a sweetish taste and saffron colour. He found it sold in the markets, cattle fed with it, and a liquor drawn from it. Desfontaines also found this *Z. Lotus* on the same coast, and has fully described it. Mungo Park found a species of *Zizyphus* in the interior of Africa, which forms a large tree with yellow farinaceous berries of a delicious taste. The natives, he says, convert them into a sort of bread, by exposing them some days to the sun, and afterwards pounding them gently in a mortar until the farinaceous part is separated from the stone. This meal is then mixed with a little water and formed into cakes, which when dried in the sun resemble the sweetest gingerbread. It may be added, that the fruit of several species of *Zizyphus* is eaten in India. One kind, commonly known by the name Ber, forms a moderate-sized tree in a cultivated state, wi oval fruit of a yellowish or reddish colour, a about the size or somewhat smaller than a co mon plum, which is much esteemed. The ta is mild and sweet, with a slight degree of acidi probably coming nearer in the taste of dates th any other fruit. In Persian works Berce a Harree are given as its Hindustanee, Kinar a Khiel as its Persian, and Sidr as its Arabic nam with Nebbe for the fruit. The fruit of the wi kind is dried and powdered, as was done wi the *Lotus* of the Lotophagi. This powder, Arabic, is called Savikoon-Nebbek; in Persia Arud-i-Kinar; and in Hindoo, Ber-Choonee.—*Eng. Cyc.*

(5005) LOUGH DIVER, a name for *Merg albellus*.

(5006) LOVE-APPLE, OR TOMATO. T produce of South America and of a genus of t same family as potatoes. There are two sorts, si gle and double: they may be sown immediat the rains commence, in beds; afterwards tra planted in rows, two feet apart, and trailed up sticks of a strong description. If the soil good, they will grow to seven or eight feet height. The double, which are the finest, if so in June, ripen in October. The lower branch should be pruned, and a succession of crops m be kept up until April. The small single toma with a slight protection from the dry winds, w continue until the rains.—*Jaffrey*.

(5007) LOVE LIES BLEEDING.—Amara thus.

(5008) CROSSBILL. There are many w consider the Parrot Crossbill (*Loxia pityopsitt cus*) to be merely a larger and more robust vari ty of the Common Crossbill (*L. curvirostr* By the same rule, the Himalayan Crossbill (*himalayana*) should be regarded as a smaller a considerably less robust variety of the same sp cies; in which case, the amount of variati would indeed be extraordinary, and we shou expect to find every intermediate gradation. T Crossbills, in a general way and with unimpo tant exceptions, may be said to inhabit wherev there are pine-forests; however rare, comparativ ly, in those of the Himalaya: and they are bir of remarkably vagrant habits, which therefo should not be particularly subject to climatal local influences, whatever these may be, to indu permanent variation, as manifested by a series distinct races.

(5009) LUCERN. MEDICAGO SATIVA. S GRASSES.

(5010) LUCULIA, a genus of Plants belon ing to the natural order *Cinchonaceæ*, tribe *Ci choneæ*, and sub-tribe *Eucinchoneæ*: thus ind cating the close affinity of this genus to that the trees yielding Peruvian Bark, or true Ci chonas, in which indeed the only known speci *L. gratissima* was placed by Dr. Wallich a figured in his 'Tent Fl. Nepal,' t. 21. It

found in great abundance on Nag-Urjoon and some of the other smaller hills in the valley of Nepaul; also at Bechiaco and Koolakam. It delights in exposed rather naked situations, blossoming, according to the situations where it is found, nearly the whole year round. It is also found on the Pandoon Hills in Silhet, flowering in the month of September. As seen by Dr. Wallich it attains a height of 16 feet, but he was informed of its growing to a larger size. It has been introduced into and has flowered in Great Britain; but from the nature of the climate where it is indigenous, it is only suited to the greenhouses of England. Its locality and affinity are interesting, particularly when coupled with the prevalence in the same mountains of two other genera, *Hymenodictyon* and *Hymenopogon*, belonging to the same sub-tribe *Eucinchonea*, and therefore equally allied to the true Cinchonas; all indicating the part of the Indian territory where these valuable plants might most certainly be grown, and yield a profitable article of commerce. "It is impossible to conceive anything more beautiful than this tree when covered with its numerous rounded panicles of pink-coloured very fragrant large blossoms." (Wallich.) —*Eng. Cyc.*

(5011) LUCULIA GRATISSIMA, one of England's common hot-house ornaments, grew in profusion on the dry micaceous rocks at the Tambur River in East Nepaul: its gorgeous heads of blossoms scenting the air, and *Thunbergia*, Convolvulus and other climbers, being in graceful festoons on the boughs.—*Hooker, Him. Jour. Vol. I. p.* 193.

(5012) LUCULIA PINCEANA, makes a gorgeous show in the Khasia Hills in October. —*Hooker, Him. Jour. Vol.* II. *p.* 286.

(5013) LUDWIGIA PARVIFLORA. In stagnate water, in Tenasserim, a species of ludwigia which bears a pretty flower, is quite common.—*Mason.*

(5014) LUFFA, a genus of plants belonging to the natural order *Cucurbitaceæ*. The male flowers are panicled and yellow; the tube of the calyx hemispherical, segments longer than the tube; petals distinct, dropping off by the base stamens 5, distinct; anthers very wavy. The female flowers are solitary; the tube of the calyx oblong, clavate, segments shorter than the tube; stamens abortive; stigmas reniform; gourd ovate, 3-celled, fibrous, internally operculate.—*Eng. Cyc.*

(5015) LUFFA. ACUTANGULA ANGULAR FRUITED LUFFA.

Chanlaturai. HIND. *Genl. Med. Top. p.* 209.

The leaves of *L. acutangula* are a favourite potherb of the natives of India and are esteemed very wholesome. This luffa gourd has ten sharp ridges by which it may be easily recognized, and Roxburgh says that with a little butter, pepper and salt, "it is little inferior to green peas."—*Mason.*

(5016) LUFFA AMARA. Syn. CUCUMIS INDICUS.

Kerula, HIND.

Is found in hedges and dry uncultivated places in the East Indies. It has several stems, slender, running to a great extent, but with few branches, pretty smooth, 5-sided; tendrils 3-cleft; leaves slightly 5-7-lobed, rough; stipules axillary, solitary, cordate, with glandular marks on one side. Male flowers pretty large, yellow, on long erect axillary racemes; the pedicels with a glandular bract near the base, and articulated a little above it. Female flowers rather larger axillary, solitary, pedunculated; fruit oblong, 3 or 4 inches long, and 1 inch in diameter, tapering equally towards each end, 10-angled: when ripe dry, gray, filled with dry fibres; the operculum deciduous: seeds blackish gray, with elevated minute black dots; every part is extremely bitter. The fruit is violently cathartic and emetic; the juice of the roasted young fruit is applied to the temples to cure headache by the natives of India; the ripe seeds are used either in infusion or substance by them to vomit and purge.—*Eng. Cyc.*

(5017) LUFFA BINDAAL, is a native of Hindustan. It is a climbing dioecious plant; the leaves are toothed and 5-angled. Male flowers in racemes. Female flowers solitary; fruit round, echinate, with long, straight, ciliate bristles. It is considered in northern India a powerful drastic in cases of dropsy.—(*Roxb. Fl. Ind.* iii. p. 717.)—*O'Shaughnessy, p.* 546.

(5018) LUFFA FŒTIDA.

(5019) LUFFA PENTANDRA.

Gheeaturai HIND.

Five stamined much cultivated in the rains.—*Genl. Med. Top. p.* 209. Pentandrous Luffa, is a long gourd with a striped skin, considered by the natives a delicious vegetable.

(5020) LUFFA PENTANDRA, ACUTANGULA CLAVATA, and *racemosa*, the two first called *Ghia* and *Kalee-tori*, are cultivated or found wild in all parts of India.—*O'Sh. p.* 346.

(5021) LUFFA TENERA, receives also from Royle the name of *Kalitori.—O'Shaughnessy, p.* 346.

(5022) LUPINUS. LEGUMINOSÆ. Lupinus bicolor.—These flowers blossom during the latter end of the cold season, and should never be sown until the rains are over. Some of the species are very delicate, but the small blue, white lupin, rose lupin, and Egyptian, flower freely. Some of the species are very common in Egypt, and grown for food, the seed being ground into flour. Is propagated by seed, and should be sown in pots; and if in beds, about one foot apart.

(5023) LUTRA, a genus of *Mammalia* belonging to the family *Mustelidæ*. The species are known by the common name of Otters. They form a natural group of Carnivorous Animals whose habits are acquatic and whose food is fish. The common term Otter is applied to two forms and nearly allied: the first, including the River-Otter *Lutra*, of Stoor; the second, the Sea-Otter, *Enhydra* of Fleming.

Enhydra.—Dr. Fleming gives the following generic character of the Sea-Otter under the above name:—Six incisors above, and four below. Tail much shorter than the body. No anal scent-bags. In Cook's 'Voyage' it is stated that a young Sea Otter was brought on board with six lower incisors. Steller and succeeding systematists give four as the number in the lower jaw. Sir John Richardson suggests that two of the lower ones may drop out before the animal becomes adult. The fur is thick, woolly, and very soft, with the addition of a few silky hairs of a lustrous black; most of the upper parts are of a deep velvety maroon-brown, and the anterior parts silvery-gray. Body elongated; tail short and stout; hinder feet very short.

Enhydra marina is the Sea-Beaver of Kraschenikoff the Sea-Otter of Cook, Pennant, Mears, Menzies, and Godman: the Kalan of the Kamtchatkadales; *Mustela Lutris* of Linnæus; *Lutra marina* of Steller, Erxleben, and Harlan; Loutre du Kamtchatka of the French. Captain Cook in his last voyage (chapter on King George's Sound Nootka), says: "It might have been sufficient to have mentioned that this animal (the Sea-Otter) abounds here, as it is fully described in different books, taken from the accounts of the Russian adventurers in their expeditions eastward from Kamtchatka, if there had not been a small difference in one that we saw. We for some time entertained doubts whether the many skins which the natives brought really belonged to this animal; as our only reason for being of that opinion was founded on the size, colour, and fineness of the fur; till a short while before our departure, when a whole one, that had been just killed, was purchased from some strangers who came to barter; and of this Mr. Weber made a drawing. It was rather young, weighing only 25 lbs.; of a shining or glossy black colour, but many of the hairs being tipt with white give it a grayish cast at first sight. The face, throat, and breast were of a yellowish-white or very light brown colour, which in many of the skins extended the whole length of the belly. It had six cutting teeth in each jaw; two of those of the lower jaw being very minute, and placed without, at the base of the two middle ones. In these circumstances it seems to disagree with those found by the Russians, and also in not having the outer toes of the hind feet skirted by a membrane. There seemed also to be a greater variety in the colour of the skins than is mentioned by the describers of the Russian Sea-Otters. These changes of colour certainly take place at the different gradations of life. The very young ones had brown hair, which was coarse, with very little fur underneath; but those of the size of the entire animal which came into our possession, and just described, has a considerable quantity of that substance; and both in that colour and state the Sea-Otters seem to remain till they have attained their full growth. After that they lose the black colour, and assume a deep brown or sooty colour; but have then a greater quantity of very fine fur, and scarcely any long hairs. Others, which are suspected to be still older, were of a chestnut brown; and a few skins were seen that had even acquired a perfectly yellow colour. The fur of these animals, as mentioned in the Russian accounts, is certainly softer and finer than that of any others we know of; and therefore the discovery of this part of the continent of North America, where so valuable an article of commerce may be met with cannot be matter of indifference." The Sea-Otter haunts sea-washed rocks, lives mostly in the water, and approximates to the seals more than to the otters in its habits. The food is fish. The female brings forth on land, and notwithstanding the general marine habits of the animal it has been occasionally seen very far from the shore. It is found in the North Pacific, from Kamtchatka to the yellow Sea on the Asiatic side, and from Alaska to California on the American coast. (Richardson.) The fur was eagerly sought after, and is still prized, but not so highly as formerly. Coxe quotes Pallas for the fact that the old and middle-aged sea-otter skins were sold at Kiachta by the Russians to the Chinese at from 80 to 105 roubles a skin, or from 16*l*. to 20*l*. each. Sir John Richardson obsrves that the trade was for a considerable period in the hands of the Russians, who, soon after the discovery of the north-west coast of America by Behrin and Tschirikow, sent mercantile expeditions there. The passage above quoted from Captain Cook's 'Third Voyage' drew the attention of the English, and both private merchants and the India Company sent vessels to collect skins on the American coast and transport them to Canton. Pennant's hint at the profitable trade which might be carried on with China by a colony, were it possible to penetrate to that part of America by means of rivers and lakes, seems not to have been lost. Sir Alexander Mackenzie having traversed the continent of America and reached the Pacific, his partners in trade established fur ports in new Caledonia and a direct commerce with China; but, as Sir John Richardson remarks in conclusion, the influx of furs into that market soon reduced their price.

(5024) LUSTRICOLA. [PTILONIDÆ.]

(5025) LUTRARIA. [PTILONIDÆ.]

(5026) LUZULA, a genus of Plants belonging to the natural order *Juncaceæ*. It has a 1-celled 3-valved capsule, without dissepiments, with three seeds at the base of the cell. Several species of this genus have been described.

(5027) LUZULA CAMPESTRIS, has a panicle of 3 or 4 ovate, dense, sessile, or stalked clusters; filaments much shorter than the anthers; seeds nearly globular, with a basil appendage. The root of this species has a popular reputation as a diuretic, and is used in China and the north of Europe.—*Eng. Cyc.*

(5028) LYCHAIS CORSICA. There are three sorts—scarlet, white and fulgens. The first is an extremely showy flower, and ornamental either in a border or pot. It seldom exceeds eighteen inches in height, and after flowering, if cut down, will shoot out and blossom again. The seed should be sown either in or after the rains,—moderate care is all that is necessary.—*Riddell.*

(5029) LYCHNIS (from λύχνος, a lamp), a genus of Plants belonging to the natural order *Caryophyllaceæ*, and to the sub-order *Sileneæ*. It has a 5-toothed naked calyx; 5 petals, clawed; 10 stamens; 5 styles; the capsules 1 celled, or half 5-celled, opening at the top with 5 or 10 teeth. The species are smooth, hairy, or woolly herbs, with terminal corymbs of flowers, rarely solitary.—*Eng. Cyc.*

(5030) LYCHNIS CHALCEDONICA, the Scarlet Lychnis, is a smoothish clammy plant, with corymbose flowers in bundles; the calyx cylindrical, clavate, ribbed; the calyx 2-lobed, the carpophore long; the leaves lanceolate, slightly cordate at the base, and clasping the stem. This plant, which produces scarlet, rose-coloured, or white flowers, and is a great favourite in gardens, is a native of Siberia and Japan. Several varieties of this plant have been named.—*Eng. Cyc.*

(5031) LYCHNIS GRANDIFLORA is a glabrous plant, the flowers solitary or ternate, terminal and axilliary; the calyx terete, clavate, ribbed; the petals lacerated; carpophore elongated: the leaves ovate, almost sessile. It has large beautiful scarlet flowers, and is a native of China and Japan.—*Eng. Cyc.*

(5032) LYCIUM, a genus of Plants belonging to the natural order *Solanaceæ*. It has an urceolate calyx regularly 5-toothed, or irregularly 3-5-cleft; permanent corolla funnel-shaped or tubular; limb 5- or 10-cleft, or toothed, imbricate in æstivation, sometimes plicate; stamens 5, usually exserted; filaments bearded and widened at the base; stigma peltately depressed, or capitate, bisulcate; berry roundish, 2-celled, propped by the permanent calyx; placentas adnate; seeds numerous, reniform. The species are trees or shrubs usually spinose. Corollas white, yellow, rose-coloured, purple, blue or scarlet. Dr. Wight, in *Icones*, gives Lycium Afrum, 1402; Europeum, 1403; Indicum, 1403 Ruthenicum, 1403. There are about 30 species of this genus described, many of which are to be found in gardens. They are commonly known by the name of Box-Thorn. Many ancient authors, and among others Dioscorides describe under the above name a substance as used in medicine which is stated to be of two kinds; one obtained from Lycia and Cappadocia, and the other from India. The former is said to be the produce of a thorny shrub called *Pyxacantha*. The latter is stated to be more valuable and efficacious as a medicine, and to be produced also by a thorny shrub which is called *Lonchitis*. Most modern authors have stated these plants and the substance they produce to be totally unknown; others consider species of *Rhamnus*, or the common Box, to be alluded to. Prosper Alpinus thought *Berberis Cretica* to be one of the plants; while Garcias ab Orto thought Catechu to be the substance, and *Acacia Catechu* the plant yielding it. It is possible that some species of *Rhamnus*, as *R. infectorius*, of which both the root, wood, and berries possess medicinal properties, and which are in the present day used for dyeing yellow, may have formed one of the kinds of Lycium, as it is common in the countries where the first kind is said to have been produced, and some species of *Rhamnus* were by the older botanists called *Lycium*. Though there is uncertainty about the Lycium of Asia Minor, that of India seemed to have been quite unknown until the publication of a paper 'On the Lycium of Dioscorides,' by Dr. Royle, in the 'Linnæan Society's Transactions' for 1833, where it is stated that there is no proof that Catechu was the Ἄνκιον, Ινδικόν, (*Lycium Indicum*) of the ancients; in fact is incompatible with the evidence adduced on the subject from Oriental writers. The Greek authors on medicine having been translated into Arabic, and from this language into Persian, and these, with additions, forming the works now in use in India, we may expect to find in them some trace of Lycium; and in fact in that called Makhzun-al-Udwieh, Loofyon is mentioned as the plant which yields Huziz, and in Persian it is called Feel-Zuhreh. Loofyon is evidently written for Lookyon, through an error of the transcriber in a diacritical point, in the same way that Filafoos (Philip of Macedon) has been changed in some of these work into Filakoos. This is further evident indeed from referring to the Latin translations of Serapion and Avicenna, where Haded and Feel Zuhuruj are translated *Lycium* and *Lycium Indicum*. In the Persian work, Hoozuz or Hooziz (the same word as Hadad) is described as being of two kinds: one from India, of which the Hindoo name is Rasot; and the other from Arabia. The Persian name Feel-Zuhreh is translated in our best dictionaries 'box thorn,' that is, *Pyxacantha*. The best kind of

Rusot is said, in the Makhzun-ul-Udwieh, to be brought from Nuggur Kote in the neighbourhood of Lahore, and that it is an extract made from a decoction of the fresh wood of Dar-Huld. On inquiring in the shops of the druggists in the bazars of India, Dr. R. learned that both the wood Dar Huld and the extract Rusot were imported into plains of India from the Himalayas. On travelling in these mountains, and on wishing to be shown the plant which produced the wood called Dar-Hnld as well as that from which the Rusot was procured, species of Barberry were immediately pointed out, and it was stated that both the wood and the extract were procured indifferently from *Berberis Asiatica*, *B. aristata*, *B. Lycium*, and *B. pinnata*. On cutting into the wood of each, and having some converted into extract, he found both to correspond in every respect with what he had bought in the plains under the name of Dar-Huld and Russot. The extract Russot is procurable in the bazars of India, being much employed by the native practitioners of medicine in India, as an external application rubbed over the swollen eye-lid either simply or in combination with opium and alum and a little water or oil, both in incipient and chronic inflammation of the eye. The wood of Barberry being employed both in Europe and India as a yellow dye, it has been suggested by Mr. E. Solly, in a paper read before the Royal Asiatic Society, that the root, wood, or extract might be imported from India for the use of the manufacturers of Europe. This notice may appear disproportioned to the importance of the subject, but it is interesting as showing the knowledge which the Greeks had of the products of India, at the same time that it proves the great extent to which the influence of their own works has spread.—*Eng. Cyc.*

(5033) LYCOPERSICUM. The Tomato or Love apple. The tomato or love-apple, a delicious vegetable abounds in Ava and is cultivated to a limited extent in many gardens. The produce of South America a genus of the same family as potatoes. There are two sorts, single and double; may be sown immediately the rains commence, in beds; afterwards transplanted in rows, two feet apart, and trailed upon sticks of a strong description. If the soil is good they will grow to seven or eight feet in height. The double, which are the finest, if sown in June, ripen in October. The lower branches should be pruned, and a succession of crops may be kept up until April. The small single tomato, with a slight protection from the dry winds, will continue until the rains.—*Riddell.* See Love-apple.

(5034) LYCOPODIUM. An inflammable powder used in fire works, obtained from a common moss-like plant of the same name.—*Wedderston.* Lycopodium a genus of Plants belonging to the natural order *Lycopodiaceæ*. It has 1-seeded 2 valved capsules, containing powder, or 3-valved contain.

(5035) LYCOPODIUM. Club moss. The green woods of the Tenasserim southern provinces are often carpeted with the club moss, or ground pine, of which we have one or two handsome species.—*Mason.* Mr. Fortune writes of a species as follows:—When I was travelling on the hills of Hong-Kong, a few days after my first arrival in China, I met with a most curious dwarf Lycopodium, which I dug up and carried down to Messrs. Dent's garden, where my other plants were at the time. "Hai-yah," said the old compradore, when he saw it, and was quite in raptures of delight. All the other coolies and servants gathered round the basket to admire this curious little plant I had not seen them evince so much gratification since I shewed them the "old man Cactus" (*Cereus Senilis*) which I took out from England, and presented to a Chinese nurseryman at Canton. On asking them why they prized the Lycopodium so much, they replied, in Canton English "*Oh he too muchia handsome; he grow only a leete and a leete every year; and suppose he be one hundred year onla he only so high*" holding up their hands an inch or two higher than the plant. This little plant is really very pretty, and often naturally takes the very form of a dwarf tree in miniature which is doubtless the reason of its being such a favourite with the Chinese.—*Fortune's Wanderings, page* 95.

(5036) LYCOPODIUM CLAVATUM, of the British moors; grows at Chakoong in the Lachen Lachoong valley, Sikkim, and amongst mosses, the superb Himalayan *Lyellia* crispa, with the English *Funaria hygrometrica.—Hooker. Him. Jour. Vol.* II, *page* 19.

(5037) LYELLIA CRISPA, grows at Chakoong in Sikkim, in the Lachen Lachoong valley, it is one of the most remarkable mosses in the Himalaya mountains, and derives additional interest from having been named after the late Charles. Lyell, Esquire of Kinnordy, the father of the most eminent geologist of the present day.—*Hooker, Him. Jour. Vol.* II. *p.* 19.

(5038) LYGODIUM SCANDENS. Ophioglossum. One of the most elegant climbers on the Tenasserim Coast is a terrestrial species of fern, easily recognized by its habit of running over other plants, and by the fringed margin of its leaflets, from which it is sometimes called "fringed fern." An allied species is found in the United States.—*Mason. Tavoy.*

(5039) LYMNÆA HOOKERI. The waters of the Lachen in Tibet contained many shells of a species of Lymnæa. This is the most alpine living shell in the world, many specimens being from nearly 17,000 feet elevation; it is the *Lymnæa Hookeri*, Reeve ("Proceedings of the Zoo-

logical Society." No. 204).—*Hooker, Him. Jour. Vol.* II. *page* 156.

(5040) LYTHRAM HUNTERI. Hunter's Loosestrife, is a native of the East Indies. The leaves are opposite, the calyx tabular and 6-lobed, the stamens 12, and the style subulate. The petals, 6 in number, are of a very beautiful red-colour, and are used for dyeing in India. The hardy perennial species of *Lythrum* are handsome garden-flowers; they grow in any common soil, and are easily propagated by dividing at the root. The seeds of the annual kinds require to be sown in moist situations in the spring. (Don, *Dichlamydeous Plants*; Babington, *Manual of British Botany*.)

(5041) LYTHRUM, (from λύθρον, 'black blood,' from the purple colour of the flowers), a genus of Plants belonging to the natural order *Lythroceæ*. It has a tubular cylindrical calyx, with from 8 to 12 teeth; from 4 to 6 of the teeth are broader than the rest and erect, the alternate ones being subulate and opposite to the petals. It has from 4 to 6 petals and very short style. The capsules are 2-celled and many-seeded.

(5042) LYTHRUM. LYTHRACEÆ. This is a common plant, native of Great Britain, it thrives in any common soil, and easily cultivated from seed.—*Riddell.*

M.

(5043) MACACUS, a barbarous word founded on the term Macaco (written by the French Macaque), which, according to Cuvier and the author of 'Natural History of Monkeys, Lemurs and Opossums,' appears for the first time in Marcgrave's 'Natural History of Brazil,' as the native appellation of a kind of monkey found in Congo and along the coasts of the Gulf of Guinea. Dr. J. E. Gray arranges the genus as the last of his sub-family *Cercopithecina* (family *Hominidæ*). M. Lesson, who makes the characters of the genus consist in a facial angle of from 40 to 45 degrees; in a very strong development of the supraciliary and occipital crests; the presence of pouches and callosities, and a tail more or less long, gives as its dental formula that which is common to so many of the *Simiadæ*, namely:—

$$\text{Incisors, } \frac{4}{4}; \text{ canines, } \frac{1-1}{1-1}; \text{ molars, } \frac{5-5}{5-5} = 32;$$

and he arranges under it the following species:—*Silenus, Sinicus, S. carbonarius, S. radiatus, S. cynomolgus, S. Rhesus, S. nemestrinus*, and *S. speciosus*. Sir William Jardine adopts the genus with the following species:—*Macacus Silenus, M. Sinicus, M. radiatus, M. cynomolgus, M. Rhesus, M. nemestrinus*, and *M. niger*. Reverting to the arrangement of the author of the 'Natural History of Monkeys,' &c., we find the Papios divided into two small groups, distinguished by the greater or less length of the tail on the one hand and its tuberculous form or total absence on the other; of the latter the well-known Magot, or Barbary Ape, is an example, and the Wanderoo (*Macacus Silenus* of authors, *Papio Silenus* of the author of the 'Nat. Hist. of Monkeys') is an illustration of the former. The Wanderoo has its hair deep black throughout, with the exception of the long beard or mane, which descends on each side of the face in the form of a ruff, extending downwards over the chest, and varying from an ash-gray to a pure white. The upper part of the face between the eyes naked and flesh-coloured: the muzzle perfectly black. Cheek-pouches large, callosities of considerable size, and flesh-coloured. Tail about half as long as the body, and when perfect, which in captivity is not often the case, terminating in a brush of tufted hairs. (Bennett.) It is the Lion-Tailed Baboon of Pennant. It is an inhabitant of the peninsula of India, Ceylon [Knox] M. Duvaucel saw the animal in the Menagerie at Barrackpore.—*Eng. Cyc. Vol.* III. *page* 567. The following species of *Macacus* are given in the 'British Museum Catalogue:'—

M. radiatus, the Zati, or Capped Macaque.
M. Sinicus, the Munga, or Bonnet-Macaque.
M. nemestrinus, the Bruh.
M. cynomolgus, the Macaque.
M. Rhesus, the Rhesus.
M. Oinops, the Oinops.
M. speciosus.
M. Juncus, the Magot.
M. niger.

In the same Catalogue the Wanderoo is referred to *Silenus veter*. In his 'British Fossil Mammals,' Professor Owen describes a species of *Macacus* under the title of *M. eocenus*; teeth of these extinct species having been found in the Tertiary clay at Kyson, near Woodbridge, Suffolk. The following is given by M. F. Cuvier as the dental development of the Macaques and Cynocephales, and is taken from the Chinese Bonnet-Monkey (Macaque Bonnet Chinois).

(5044) MACACUS PELOPS, HODGSON. On arriving at Lamteng, in Sikkim, Dr. Hooker saw a troop of large monkeys gambolling in a wood of *Abies Brunoniana*: this surprised him, as he

was not prepared to find so tropical an animal associated with a vegetation typical of a boreal climate. This *Macacus Pelops*? Hodgson, is a very different species from the tropical kind seen in Nepal.—*Hooker, Him. Jour. Vol.* II. *p.* 37.

(5045) MACCARONI.

Save, Guz. Hind. | Semeean, Tam.

A wheaten paste, formed into long, slender, hollow tubes, and used in soups, &c. Maccaroni is the same substance as vermicelli, the only difference consisting in the latter being made into thinner and smaller tubes. The Indian variety is a commoner kind than either of the above, and is not in the tubular form : it is properly served up in a boiled state, mixed with milk and sugar.—*Faulkner.*

(5046) MACE.

Talzuffar, Arab.
Bunga-pala, Bali.
Wassawassie. Cyng.
Foely. Foelie, Muscaatblooin, Dut.
Fleur de muscade Fr.
Macis, Ger.
Jaiwantry. Jaiputree, Guz. Hind.
Mace, It.
Kambangpala, Jav.
Macis Lat.
Bunga-bua-pala, Mal.
Bez-baz, Pers.
Maxcis, Port.
Jatipatri Sans.
Macio, Sp.
Jadiputrie, Tam
Japatri, Tel.

A thin flat branching membranous substance enveloping the nutmeg, of a lively reddish-yellow colour, a pleasant aromatic smell, and a warm bitterish pungent taste. It is the arillus of the nutmeg and is chiefly used for culinary purposes and in pickling ; it is also a favourite medicine of the Hindu physicians, who prescribed it in the slow stages of fever, &c. It is imported into India from Singapore, Batavia, and the Banda Islands. That procurable in Bombay is imported exclusively from the former place.—*Faulkner.* *Mace* is a valuable article, but wild mace is occasionally used for adulterating the true mace — *M. E. J. R. Mace* forms around the shell of the nutmeg a fleshy, branching, and when recent, bright, scarlet covering but in the process of drying it changes to yellow, orange yellow, or what is considered best, golden yellow, and becomes transparent and horny. It is prepared by drying in the sun for some days. The aril is sometimes flattened out, and dried in a single layer, but frequently it is pressed together, in which case it forms two layers. The Dutch sprinkle mace with salt water prior to packing it in sacks. As there are two kinds of nutmegs, so are there two kinds of mace, the produce of the same plants ; thus, there is true or cultivated mace, and false or wild mace. The London dealers distinguish three sorts of true mace : —

"1. *Penang Mace.*—This fetches the highest price. It is flaky and spread. The annual quantity produced in Penang is about 130 piculs (of 133⅓ lbs. each.)

"2. *Dutch or Batavian Mace.*—This is a fleshy sort. It scarcely fetches so high a price as the Penang sort.

"3. *Singapore Mace.*—This is a somewhat inferior kind.

Wild or false mace is of a dark red colour, and deficient in flavour and aroma. Viewed under the microscope, mace presents a structure very distinct from that of the nutmeg itself. Of twelve samples of mace examined by Dr. Hassall, all were genuine but much difference was observed in the quality of several of the samples. The duty on genuine mace is nearly the same as that on nutmegs, namely 2s. 6d. per pound, and five per cent. It is now 1s. per lb. Wholesale price, 2s. to 2s. 6d. ex-duty. Entered for home consumption in 1852, 21,485 lbs : in 1853, 23,558 lbs.—*Food and its adulteration, p.* 412.

(5047) MACE, FALSE.

Ramputree. Guz. Hind.

The mace of the male or false nutmeg is distinguished from the true mace by being formed of three or four regular bands united at the summit. The chemical properties of this article are analogous to that of the true mace, but the oil is so inferior in proportion, that the male mace is but of little commercial value. Owing to its comparative cheapness, false mace is used in India only among the lower orders of the natives. It is procurable in most bazars.—*Faulkner.*

(5048) MACE OIL.

Jaiwantry, or Jaiputrie-kateil, Hind. | Jaiputrie tailum, Tam. Wassa Wasitalf, Cyng.

This fixed oil is obtained by expression ; it is of a butyraceous consistence, brown colour, and highly fragrant. It is very stimulant, and is much employed as a liniment and embrocation in rheumatism.—*Faulkner.*

(5049) MACAW TREE, Acrocomia sclerocarpa, Mart. The great Macaw tree of the West Indies, belongs to a genus of palms some of which are important in commerce. The value of the Macaw Tree is chiefly owing to its fruit, which yields an oil. In the process of extraction, the fruit is slightly roasted and ground to a paste, first in a mill and then on a levigating stone. This paste, having been heated, and mixed with 3/10ths of its weight of boiling water, is put in a bag, and pressed between two heated plates of iron, it yields about 7/10ths or 8/10ths of oil. The oil, if discoloured, can be purified, when melted, by filtration. It is then of the consistence of butter, of a golden yellow hue, has an odour like violets and a sweetish taste. If well preserved it will keep several years, if spoiled, it loses its golden hue and delightful aroma. It is frequently sold in the shops as "*palm oil*" and at present enters largely into the composition of toilet soaps. It might be usefully introduced into the East Indies.—*Seeman.*

these spread the roots about two inches thick for drying in the sun. Carry the platforms to a convenient place, not far from the house, and place them side by side, in rows east and west, and with their ends north and south, leaving room to walk between the rows. Elevate the south ends of the platforms about eighteen inches, and the north ends about six inches from the ground, putting poles or sticks to support them —this will greatly facilitate drying. After the second or third day's drying, the madder must be protected from the dews at night, and from rain, by placing the platforms one upon another to a convenient height, and covering the uppermost one with board. Spread them out again in the morning, or as soon as danger is over. Five or six days of ordinarily fine weather will dry the madder sufficiently, when it may be put away till it is convenient to kiln-dry and grind it.

Kiln-drying.—The size and mode of constructing the kiln may be varied to suit circumstances. The following is a very cheap plan, and sufficient to dry one ton of roots at a time. Place four strong posts in the ground, twelve feet apart one way, and eighteen the other: the front two fourteen feet high, and the other eighteen: put girts across the bottom, middle, and top, and nail boards perpendicularly on the outside as for a common barn. The boards must be well seasoned, and all cracks or holes should be plastered or otherwise stopped up. Make a shed-roof of common boards. In the inside put upright standards about five feet apart with cross-pieces to support the scaffolding. The first cross-pieces to be four feet from the floor; the next two feet higher, and so on to the top. On these cross-pieces lay small poles, about six feet long and two inches thick, four or five inches apart. On these scaffolds the madder is to be spread nine inches thick. A floor is laid at the bottom to keep all dry and clean. When the kiln is filled, take six or eight small kettles or handfurnaces, and place them four or five feet apart on the floor (first securing it from fire with bricks or stones), and make fires in them with charcoal, being careful not to make any of the fires so large as to scorch the madder over them. A person must be in constant attendance to watch and replenish the fires. The heat will ascend through the whole, and in ten or twelve hours it will all be sufficiently dried, which is known by its becoming brittle like pipe stems.

Breaking and grinding.—Immediately after being dried, the madder must be taken to the barn and threshed with flails, or broken by machinery (a mill might easily be constructed for this purpose), so that it will feed in a common grist-mill. If it is not broken and ground immediately, it will gather dampness so as to prevent its grinding freely. Any common grist-mill can grind madder properly. When ground finely it is fit for use, and may be packed in barrels like flour for market.

Amount and value of product, &c.—Mr. Swift measured off a part of his ground, and carefully weighed the product when dried, which he found to be over two thousand pounds per acre, notwithstanding the seasons were mostly dry and unfavourable. With his present knowledge of the business, he is confident that he can obtain at least three thousand pounds per acre, which is said to be more than is often obtained in Germany. The whole amount of labor he estimates at from eighty to one hundred days' work per acre. The value of the crop, at the usual wholesale price (about fifteen cents per pound), from three to four hundred dollars. In foreign countries it is customary to make several qualities of the madder, which is done by sorting the roots; but as only one quality is required for the western market, Mr. Swift makes but one, and that is found superior to most of the imported, and finds a ready sale. Madder is produced in Middle Egypt to some extent, for the consumption of the country, principally for dyeing the *tarbouche* or skull caps which are universally worn. Its culture was introduced in 1825. In 1833 300 acres in Upper Egypt, and 500 in the Delta and the Kelyout, were devoted to madder roots. New S. Wales is eminently suited to the culture of this valuable root, and as the profits upon its cultivation are very large, it is strongly recommended to the attention of agriculturists there. The article produces to France an annual sum of one million sterling; the price of the finest quality in the English market being £60 per ton. Its yield varies from £40 to to £50 per acre, and the expenses upon its proper culture should not exceed one half that amount. The colonists would find it to their interest to turn their attention to such articles as this, for which there is an extensive demand at home, instead of confining themselves exclusively to the commoner and bulkier products, which they export at a much less profit, and which when once the market is fully supplied, may fall to a price at which they cannot afford to sell. The following is a calculation of the expenses generally supposed to attend a crop according to the mode of cultivation practised in Vaucluse:—

				£	s.	d.
Rent per hectare (2½ English acres), 3 years, at 165 francs,.....				19	17	6
Manure, 440 francs,.....	£17	12	6			
Carriage of ditto, 132 francs,.....	3	5	10			
				22	18	4
				£42	15	10

These expenses may almost be dispensed with in our colonies, as the soil at Vaucluse has long been exhausted.

(5050) MACLURA. A genus of plants belonging to the natural order Moraceæ. The fruit of Maclura aromatica, the Osage orange, is as large as the fist, orange coloured, and filled with a yellow fœtid slime, with which the native tribes smear their faces when going to war. The wood of *M. tinctoria* is the dye-wood called Fustic; it contains morine, a peculiar colouring substance; its fruit is pleasant, and used in North American medicine for the same purposes as the black mulberry in Europe. According to Martius, both the other species of the genus yield fustic in Brazil. (Lindley, *Vegetable Kingdom*).—*Eng. Cyc.*

(5051) MACLURA TINCTORIA. Urticaceæ.—This tree grows to the height of thirty or forty feet, from the wood Fustic, a yellow dye is obtained.—*Jaffrey.*

(5052) MACROCLADUS, Karen cabbage palm. A wild palm is found in many parts of the Tenasserim Provinces, which the Karens often cut down for the unexpanded bunches of young leaves found in its summit, and which has the taste of cabbage. The tree does not however, belong to the same genus as the cabbage tree of America, but from the imperfect specimens of its fructification that I have seen, appears nearly related to Griffith's genus.—*Mason.*

(5053) MACROPODIDÆ, a tribe of Brachyurous Decapodous *Crustacea* being the first of the family of *Oxyrhynchi* (Milne-Edwards), and nearly corresponding with the genus *Macropus* of Latreille, remarkable for the enormous length of their feet, which has obtained for them the name of Sea-Spiders and Spider-Crabs. This tribe is sometimes called *Leptopodiadæ*, after the genus *Leptopodia.*

Composcia (Leach; Latreille).—Carapace convex and nearly pyriform, but truncated anteriorly; rostrum rudimentary and scarcely reaching beyond the internal canthus of the orbits. Eyes supported upon peduncles, which are rather long, recurved anteriorly, and very large at their base; they are capable of being reflected backwards, but they are not retractile, for there is no post-foraminary orbital cavity for lodging them, their extremity being only protected by a spine of the lateral part of the carapace. The internal antennæ are reflected a little obliquely forwards; the fossets which lodge them have this particularity, namely, that they are not separated, as they are ordinarily, by a longitudinal portion, and form only a quadrilateral cavity. The first joint of the external antennæ is long and delicate, and is continued nearly as far as the rostrum, carrying at its extremity a moveable stem, which is consequently completely exposed. The epistome is nearly square, and the external jaw-feet are very much elongated, and only close the mouth imperfectly. The feet are slender and very long; in the female the first pair are the shortest, and are not stouter than the succeeding ones; those of the third, the fourth, and the fifth pair are a little longer, and are also terminated by a cylindrical nail slightly curved downwards. Form of the feet of the male, and disposition of the abdomen in this genus, not known. (Milne-Edwards.) The species are found in the seas of Asia. *C. retusa* may be taken as an example.

Egeria.—This genus is Asiatic in its geographical distribution, and M. Milne-Edwards divides it into two sections: the first with the third joint of the external jaw-feet deeply notched at its anterior and external angle (*E. arachnoides* and *E. Herbstii*), and the second with third joint of the external jaw-feet not notched at its anterior and external angle (*E. Indica*). *Doclea*—(Leach).—Carapace nearly globular, hairy, and more or less beset with spines; front raised. M. Milne-Edwards, who gives the specific character here stated, observes that the *Doclææ* bear the greatest anology to the *Egereæ*, and establish the passage between those *Macropodidæ* and *Libiniæ* which belong to the tribe of *Maiiadæ*. The species are found in the Indian Seas. *D. Rissonii*, whose locality is unknown, is given as an example.—*Eng. Cyc.*.

(5054) MACROURA, or MACRURA, the scientific name for that section of Crustaceans which have the abdomen, usually called the tail, long, in contradistinction from that section (*Brachyura*) which have the tail short. The Common Lobster is an example of a Macrurous Crustacean, and the Common Crab of a Brachyurous Crustacean, [Crustacea.]—*Eng. Cyc.*

(5055) MADDER.

Fuh, Arab.	Ru-nas, Pers.
Well-mudutta, Cyng.	Granca, Port.
Mee. Dut.	Mariona, Krap, Rus.
Alizari Garance Fr.	Manjishtha, Sans.
Farberothe Ger.	Granza, Rubia, Sp.
Munject. Guz. Hind.	Man-jittie, Tam.
Robbia, It.	Mandestie, Tel.
Pooutvyar, Maleal.	*Faulkner.*

This substance, which is so extensively used in dyeing red, is the product of the long slender root of the *Rubia tinctorum*, a plant of which there are several varieties. For England, the principal supplies of this important article of commerce are obtained from Holland, Belgium, France, Turkey, Spain, and the Balearic Isles, the Italian States, India, and Ceylon. The plant is generally raised from seed, and requires three years to come to maturity. It is, however, often pulled in eighteen months without injury to the quality; the quantity only is smaller. A rich soil is necessary for its successful cultivation, and when the soil is impregnated with alkaline matter, the root acquires a red color; in other cases it is yellow. The latter is preferred in England, from the long habit of using Dutch madder, which is of this color, but in France the red sells at two francs per cwt. higher, being used for the Turkey-red dye. Madder does not deteriorate by

keeping, provided it be kept dry. It contains three volatile coloring matters, madder purple, orange, and red. The latter is in the form of crystals, having a fine orange red color, and called Alizaine. This is the substance which yields the Turkey-red dye. The cheap root is employed in the East Indies as a substitute for madder, and so is the root of *Morinda citrifolia*, under the name of Sooranjee. Turkey madder roots realise about 30s. per cwt. About 1,100 tons are annually shipped from Naples, worth about £30 per ton. Madder has become an article of great request, on account of the fine scarlet colour produced from its roots, and is so essential to dyers and calico printers that without it they cannot carry on their manufactures. It is cultivated extensively in Holland, from whence it is imported in large quanties into both England and France, though it is cultivated to some extent in both countries. It has also been raised as a soiling crop, but the coloring matter is of so penetrating and subtile a character, that the flesh, milk, and even the bones of animals fed upon it are said to be tinged to a considerable degree with it. The soils best adapted, and which should be selected for its cultivation, are dry, fertile, and deep sandy loams ; the roots are long and fibrous, and descend to a depth of from two to three feet. It may be propagated by seed which, by some, is thought the best method, but the more usual mode is by the division of, and transplanting, the roots. The ground should be thoroughly and deeply pulverised, clean, and well-manured for the preceding crop, that the manure may be thoroughly rotted and incorporated with the soil : in April or May the suckers will be fit for taking from the older plantations — those of two or three years producing the best. The sets should have roots four or five inches long. Mark out rows two feet apart, with a line, and set the plant with a dibble, one foot apart in the rows. The roots should be dipped in a puddle of fine rich earth and water, beaten to the consistence of cream, previous to planting ; let the crown of the plant be clearly over ground, and secure the earth well around the root, to keep out drought. The plantation requires nothing more but to be kept perfectly clean and well-hoed during the summer months ; and after the top decays in the autumn, to be earthed up by the plough for the winter, each year, till the plants are three years old, when they are of the proper size and age for lifting, which must be done by trenching the land two feet deep—several hands accompanying the digger to pick out the roots, which must be thoroughly cleaned and dried on a kiln till they are so brittle as to break across, when they are fit to be packed in bags, and sold to the dye-stuff manufactures who grind and reduce them to powder for use. The produce is variable ; usually from eight to twenty cwt. per acre, but as much as 3,000 to 6,000 lbs. is frequently obtained. The forage amounts to about 15,000 lbs. the first year, and 7,500 lbs. the second year. In a new and good soil manure may be dispensed with for the first crop. Some cultivators interline and grow other crops between the rows, but the best cultivators state that such a practice is objectionable. The breadth of land under this crop in England is much reduced, in consequence of the reduction in price from the competition of the Dutch growers. Madder is extensively grown on the central table land of Affghanistan, forming one of the leading products of Beloochistan ; and, according to Mr. Pottinger, it sells in the Kelat bazar at about 10 lbs. for 2s. The cultivation there pursued is as follows : —The ground is repeatedly ploughed, and laid out finally in small trenches, in which the seed is sown, covered slightly with earth, and then the whole is flooded. Whilst thus irrigated, the trenches are filled with a mixture of rich manure and earth. The plants appear in about ten days, and attain a height of three or four feet during the first summer. They are cut down in September and used as a fodder for cattle. Subsequently, and until spring arrives, the ground is manured and repeatedly flooded. During the second year's growth, the plants which are intended to produce seed are set apart, but the stems of the remainder are cut every four or six weeks, in order to increase the size and goodness of the roots. Madder is said to repay a nett profit of 200 dollars to the acre, when properly managed. It produced on the farm of a gentleman, who has devoted some attention to this product in Ohio, at the rate of 2,000 lbs. per acre, and it may be made to produce 3,000 lbs., which is a greater yield than the average crops of Germany and Holland. Nine acres were planted by another person in the United States, in 1839, which he harvested in 1842. The labor required is said to be from 80 to 100 days work per acre. In the third year the stems are pruned as in the two preceding, and in September the roots are dug up. The roots are fusiform and thin, without any ramifications, and usually from three to five feet long. As soon as raised, they are immediately cut into small pieces and dried, and are then merchantable. Mr. Joseph Swift, an enterprising American farmer, of Erie county, Ohio, who occupies about 400 acres of choice land, mostly alluvial, in the valley of the Vermilion river, seven miles from Lake Erie, has detailed his practice in the "New Genesee Farmer" (an agricultural periodical), for March, 1843. His directions must be understood as intended for those who wish to cultivate only a few acres, and cannot afford much outlay of capital. Those who desire to engage in the business on an extensive scale, would need to adopt a somewhat different practice : —

Soil and preparation.—"The soil should be a deep, rich, sandy loam, free from weeds, roots, stones, &c., containing a good portion of vegetable earth. Alluvial "bottom" land is the most suitable, but it must not be wet. If old upland is used, it should receive a heavy coating of vegetable earth, from decayed wood and leaves. The land should be ploughed very deep in the fall, and early in the spring apply about one hundred loads of well rotted manure per acre, spread evenly, and ploughed in deeply; then harrow till quite fine and free from lumps. Next plough the land into beds four feet wide, leaving alleys between three feet wide, then harrow the beds with a fine light harrow, or rake them by hand, so as to leave them smooth and even with the alleys; they are then ready for planting.

Preparing sets and planting.—Madder sets or seed roots are best selected when the crop is dug in the fall. The horizontal uppermost roots (with eyes) are the kind to be used; these should be separated from the bottom roots, and buried in sand in a cellar or pit. If not done in the fall, the sets may be dug early in the spring, before they begin to sprout. They should be cut or broken into pieces, containing from two to five eyes each; *i. e.*, three or four inches long. The time for planting is as early in the spring as the ground can be got in good order, and severe frosts are over, which in the climate of America is usually about the middle of April. With the beds prepared as directed, stretch a line lengthwise the bed, and with the corner of a hole make a drill two inches deep along each edge and down the middle, so as to give three rows to each bed, about two feet apart. Into these drills drop the sets, ten inches apart, covering them two inches deep. Eight or ten bushels of sets are requisite for an acre.

After culture.—As soon as the madder plants can be seen, the ground should be carefully hoed, so as to destroy the weeds and not injure the plants; and the hoeing and weeding must be repeated as often as weeds make their appearance. If any of the sets have failed to grow, the vacancies should be filled by taking up parts of the strongest roots and transplanting them; this is best done in June. As soon as the madder plants are ten or twelve inches high, the tops are to be bent down on the surface of the ground, and all except the tip end covered with earth, shovelled from the middle of the alleys. Bend the shoots outward and inward in every direction, so as in time to fill all the vacant space on the beds, and about one foot on each side. After the first time covering, repeat the weeding when necessary, and run a single horse plough through the alleys several times to keep the earth clean and mellow. As soon as the plants again become ten or twelve inches high, bend down and cover them as before, repeating the operation as often as necessary, which is commonly three times the first season. The last time may be as late as September, or later if no frosts occur. By covering the tops in this manner, they change to roots, and the design is to fill the ground as full of roots as possible. When the vacant spaces are all full, there is but little chance for weeds to grow; but all that appear must be pulled out.

The second year.—Keep the beds free from weeds: plough the alleys and cover the tops as before directed, two or three times during the season. The alleys will now form deep and narrow ditches, and if it becomes difficult to obtain good earth for covering the tops, that operation may be omitted after the second time this season. Care should be taken, when covering the tops, to keep the edges of the beds as high as the middle; otherwise the water from heavy showers will run off, and the crop suffer from drought.

The third year.—Very little labor or attention is required. They will now cover the whole ground. If any weeds are seen, they must be pulled out; otherwise their roots will cause trouble when harvesting the madder. The crop is sometimes dug the third year; and if the soil and cultivation have been good, and the seasons warm and favorable, the madder will be of a good quality; but generally it is much better in quality, and more in quantity, when left until the fourth year.

Digging and harvesting.—This should be done between the 20th of August and the 20th of September. Take a sharp shovel or shovels, and cut off and remove the tops with half an inch of the surface of the earth; then take a plough of the largest size, with a sharp coulter and a double team, and plough a furrow outward, beam deep, around the edge of the bed; stir the earth with forks, and carefully pick out all the roots, removing the earth from the bottom of the furrow; then plough another furrow beam-deep as before, and pick over and remove the earth in the same manner; thus proceeding until the whole is completed.

Washing and drying.—As soon as possible after digging, take the roots to some running stream to be washed. If there is no running stream convenient, it can be done at a pump. Take large round sieves, two-and-a-half or three feet in diameter, with the wire about as fine as wheat sieves; or if these cannot be had, get from a hardware store sufficient screen wire of the right fineness, and make frames or boxes, two and-a-half feet long and the width of the wire, on the bottom of which nail the wire. In these sieves or boxes, put half a bushel of root at a time, and stir them about in the water, pulling the branches apart so as to wash them clean; then, having a platform at hand, lay them on to dry. (To make the platform, take two or three common boards, so as to be about four feet in width, and nail deals across the under side). On

these spread the roots about two inches thick for drying in the sun. Carry the platforms to a convenient place, not far from the house, and place them side by side, in rows east and west, and with their ends north and south, leaving room to walk between the rows. Elevate the south ends of the platforms about eighteen inches, and the north ends about six inches from the ground, putting poles or sticks to support them —this will greatly facilitate drying. After the second or third day's drying, the madder must be protected from the dews at night, and from rain, by placing the platforms one upon another to a convenient height, and covering the uppermost one with board. Spread them out again in the morning, or as soon as danger is over. Five or six days of ordinarily fine weather will dry the madder sufficiently, when it may be put away till it is convenient to kiln-dry and grind it.

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				22	18	4
				£42	15	10

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Two and a-half acres require 170 lbs. seed, at 2½d. per pound, which, with the labor afterwards bestowed, including the cost of spade trenching, will be,.....	30	0	0
	£72	15	10

The average produce per hectare is 77 cwt., which, at £1 4s. 2d. per cwt. (the price on the spot), is £93. The price is now much lower, but still it is clear a most profitable return would be derived from the first crop, and a proportionately larger one afterwards. A considerable portion of the madder roots, instead of being ground and exported in that form, as heretofore, is now exposed, after being invested with dilute sulphuric acid, to a boiling heat by means of steam, by which the coloring matter is considerably altered and improved in quality for some dyeing processes, while the quantity rendered soluble in water is greatly increased. The madder so prepared is known as "garancine," and forms an important branch of manufacture in the south of France, which was well illustrated at the Great Exhibition in 1851, by a collection of specimens supplied by the Chamber of Commerce of Avignon. The spent madder, after being used in dyeing, is now also converted by Mr. H. Steiner, of Accrington, into a garancine (termed *garancense* by the French) by steaming it with sulphuric acid in the same manner as the fresh madder, and thus a considerable quantity of coloring matter is recovered and made available which was formerly thrown away in the spent madder. Both varieties of garancine give a more scarlety red than the unprepared madder, and also good chocolate and black, without soiling the white ground, but are not so well fitted, particularly the garancine of spent madder, for dyeing purples, lilacs, and pinks. The value of the garancine imported from France in 1848 was £59,554, and of that imported in 1851, £93,818. This preparation of ground madder is imported into Liverpool to the extent of from 500 to 600 tons annually from Marseilles, for the use of calico printers in the manufacturing districts. The price is £7 to £8 the ton. This important root is already cultivated to considerable extent in Russia, but not nearly in sufficient quantity to meet the local demand; so that large quantities are imported from Holland and elsewhere, every year. The quantity of madder, madder-root, and garancine annually imported into the United Kingdom is exceedingly large, over 15,000 tons, as is shown by a reference to the following figures:—

	Madder. cwts.	Madder roots. cwts.	Garancine. cwts.	Total. cwts
1848	81,261	39,463	5,955	276,679
1849	92,736	161,986	4,969	259,691
1850	100,248	161,613	5,845	267,706
1851	92,925	202,091	9,382	304,398
1852	84,385	179,813	—	—

We imported from France, duty free, the following:—

	Madder. cwts.	Official value. £	Madder root. cwts.	£
1848	54,084	122,851	25,068	70,749
1849	57,108	131,050	23,459	81,274
1850	54,559	123,628	13,693	55,265
1851	65,577	151,502	34,017	107,721

The price in the Liverpool market, in June 1853, for Bombay madder-roots was £1 18s. to £2 14s the cwt. Indian madder, from the *Rubia cordifolia*, or *Munjestha*. This is a variety with white flowers, a native of Siberia, is cultivated largely in the East, particularly about Assam, Nepaul, Bombay, Scinde, Quetta, China, &c., for its dyestuff, and is known as Munjeet. A small quantity is exported from China and India; about 338 Indian maunds were shipped from Calcutta in 1840, and 2,328 in 1841. It fetches in the London and Liverpool markets from 20s. to 25s. and 30s. per cwt., duty free; 405 tons were imported into Liverpool from Bombay and Calcutta in 1846, and 525 tons in 1850, but none was imported in 1851 and 1852. It was remarked by the Jury in 1851, at the Great Exhibition, that this is a valuable dye-stuff, and hitherto not so well appreciated as it deserves, for some of the colours dyed with it are quite as permanent as those dyed with madder, and even more brilliant. Its use however is gradually increasing, and it is unquestionably well worthy the attention of dyers.—*Simmonds.*

(5056) MADEIRA WINE. So called from the island bearing that name, where it is made. The wines of Madeira have latterly fallen into disrepute in England, owing partly to the frequency of adulteration, and partly to the preference given to Sherry and French Wines.—*Faulkner.*

(5057) MADIA ELEGANS. Compositæ. This is a plant of no particular beauty, the flowers of which are yellow, and may be grown easily from seed, in any common soil.—*Riddell.*

(5058) MADOORKATI. Papyrus Pangorei, is a Sedge, extremely common about Calcutta, and is very extensively employed in Bengal for making the elegant, shining useful mats for which the Capital of India is famous, and which are frequently imported into Europe. Strips of this sedge are suited for platting.—*Royle.*

(5059) MAGNESIA.

Gebraunte magnesia, Ger.	Magnesia, It. Magnesie, Fr.

A well-known medicinal and primitive earth, having a metallic base. It is not found native in a state of purity, but is commonly prepared by burning the carbonate of magnesia, whence it is sometimes termed *Calcined magnesia*. It is a white, soft powder, possessing neither taste nor smell. The carbonate of magnesia is found in a natural state in Piedmont, Moravia, Hoboken in

North America, and Southern India, but it is chiefly manufactured from the bittern of sea-salt works.—*Faulkner*. This *bittern* of sea-water, after the crystallization of Common Salt, contains Sulph. Magnesia and Chlor. Magnesium. By simple evaporation the Sulph. Magnesia may be separated by crystallization. Sometimes Sulphuric Acid is added to convert the Chloride into a further quantity of Sulp. Magnesia. At Lymington, in Hampshire, two kinds of Epsom Salt are manufactured. The first, called *single*, obtained by the cooling down of a concentrated solution in wooden troughs, is moist, and contains a considerable quantity of Chloride. When redissolved and recrystallized, the second, which is called *double* Epsom Salt, is obtained; this is pure, and permanent in ordinary states of the atmosphere. Sulph. Magnesia is also prepared from Dolomitic Limestone, that is, Carbonates of Lime and Magnesia mixed together in various proportions. One method is to heat this Magnesian Limestone and to decompose it with diluted Sulphuric Acid. Sulphate of Lime, which is insoluble, is formed, as well as Sulph. Magnesia which, being soluble in water, is easily separated and purified by crystallization; or the mineral may be calcined, when the Carbonic Acid, being expelled, the caustic Lime and Magnesia are first hydrated by being moistened with water, and then the Lime converted into Chloride of Calcium, by adding only sufficient H. Cl. to effect this object. The Chloride being readily soluble in water, is by its means easily separated from the Magnesia, which is converted into the Sulphate by the addition of Sulphuric Acid, or of Sulphate of Iron; or the Hydrated Lime and Magnesia may be boiled with bittern. Chlor. Calcium is formed and remains in solution while the magnesia and the bittern is separated and obtained tolerably pure with the Magnesia of the dolomitic limestone and may be converted as before into sulphate of Magnesia.—*Royle*.

(5060) MAGNESIA ALBA. MAGNESIÆ SUBCARBONAS. Kohlensaure Talkerde.

Carbonate de Magnesie, Fr. | Kohlensaure Bittererde. Ger.

Carbonate of Magnesia (Mg_0,C_{02} =42), at first called *Magnesia alba*, and *Comitissæ Palma pulvis*, was used as a medicine by the Count de Palma at Rome, whence it was also called *Pulvis albus Romanus*. It was introduced into the list of the Materia Medica by F. Hoffman. It is found in nature in some mineral waters, in some of which, however, it may exist in the form of the Bicarbonate. In an impure state it forms a constituent of Dolomitic, that is, of Magnesian Limestone, and in a comparatively pure state, a hill in the Peninsula of India, consisting of Magnesia 46, Carbonic Acid 51, Insoluble Matter 1.5, Water 0·5, loss 1=100. Pure Carbonate of Magnesia is sometimes found in nature in rhombohedral crystals.—*Royle*, *page* 121.

(5161) MAGNESIA LOZENGES. Carbonate of magnesia six ounces, sugar three ounces, nutmeg one scruple. Pulverize and with tragacanth mucilage make into lozenges.—*Beng. Phar. p.* 435.

(5062) MAGNESIA, SULPHATE OF. To prepare the sulphate of Magnesia from the Magnesite of Southern India, take Magnesite powdered two pounds, sulphuric acid one pound, and water one gallon. Mix the acid and water and boil in a porcelain vessel. When boiling, add the powdered magnesite gradually and boil, stirring with a glass-rod till a slip of reddened litmus paper recovers its blue colour in the solution; filter while hot, and concentrate in a porcelain capsule till a pellicle begins to form on the surface of the liquor. Set aside for twenty-four hours to crystalize. Any corresponding quantities of the ingredients may be used, and in large operations leaden pans may be employed. The magnesite of Madras is a white, hard mineral, composed of one equivalent of carbonic acid and one equivalent magnesia. It contains no water is very brittle, and is readily reduced to a fine powder by stamping in a metal or stone mortar; one of stone should be preferred with a heavy stone or hardened iron pestle. In the above process, the sulphuric acid displaces the carbonic acid. The solution is slow, unless promoted by heat, and with the quantity of water specified, gives more rapid decomposition than with a greater or less proportion. Where carbonate of magnesia is to be manufactured, the thick mother liquor from which this salt has crystalized, may be used for precipitation by the carbonate of soda, the quantity required being ascertained by an experiment on one fluid ounce. In England this salt is prepared from magnesian limestone by a much more tedious and troublesome process than that above recommended. Formerly it was manufactured from the bittern of salt works, but this method has been long abandoned, as the product was found, notwithstanding every precaution, to deliquesce on exposure to moist air. Bittern can be found in many localities in Southern Asia, while magnesite must be obtained from Madras. Bittern is the liquor which remains at the salt works after common salt has been separated by boiling. It is acrid and bitter; of yellowish colour, strongly impregnated with iron, contains muriates of lime and magnesia, and bromide (and often iodide and chloride of sodium, potassium, and other metallic bases. To prepare the sulphate of magnesia, take of bittern one gallon, solution of carbonate of soda as much as required. Mix the solutions intimately adding the carbonate of soda while any precipitate occurs, filter through cloth and wash Magnesia with water till the washings are tasteless, and do not precipitate with nitrate of

of baryta, compress the precipitate by screw pressure. The precipitate is a mixture of carbonate of magnesia and carbonate of lime in variable proportions. Dry one hundred grains of the pressed precipitate on a water bath, and ascertain thus the proportion of water. Take of the press-cake as much as would give in the dried state two pounds, sulphuric acid one pound, water one gallon, dissolve by a gentle heat, filter and concentrate till it becomes turbid, Allow it to cool and filter again, this separates much of the sulphate of lime, now boil down till a pellicle forms, and set aside to crystalize. The mother liquor should be rejected This process is troublesome and comparatively unproductive. The product is always contaminated by sulphates of lime and iron, and although by the modification introduced of precipitating by carbonate of soda, it is freed from muriate of lime, still the article is in every repect inferior to that prepared from magnesite. Magnesian limestone, abounds in Sylhet. The sp. gr. is 2·86 ; it is of yellowish-brown or greyish colour, soluble slowly in dilute muriatic acid with effervescence. It contains one eq. of carbonate of lime=50, and one eq. carbonate of magnesia=42. In order to prepare from it the sulphate of Magnesia, it should be stamped to coarse powder and boiled in dilute sulphuric acid in leaden pans, the sulphate of lime will gradually deposit, and the sulphate of magnesia will crystalize from the concentrated solution. The process is difficult, the product never so pure as that from the magnesite. Dr. Henry first subjects the powdered stone to the action of dilute muriatic acid, which acts on the lime before the magnesia. The liquor should be tested from time to time, and when a little precipitates copiously by ammonia, the muriatic acid should be decanted, the powder well washed with soft water, and then disolved by boiling dilute sulphuric acid on the plan mentioned under the first head. Where acids are very cheap, this process, although more tedious, is the most economical of all, and affords a very pure product.—*Beng. Phar. p.* 334.

(5063) MAGNESITE, CARBONATE OF MAGNESIA, occurs in acicular crystals, massive, and in powder. Its colour is usually white, occasionally grayish and yellowish. The massive varieties are found amorphous, reniform, nodular, and stalactitic. Fracture splintery, or flat conchoidal. Its hardness exceeds that of calc-spar. It is dull, nearly opaque. Specific gravity 2.8. It is found in several parts of Europe, as Styria, Moravia, Spain, and Silesia, in Peninsular India, and at Hoboken, in New Jersey, North America. Its analysis by Rammelsberg gives—

Carbonic Acid	52.214
Magnesia	47.786
	——100

Eng. Cyc.

(5564) MAGNET, NATIVE. [IRON][Loadstone.

(5065) MAGNOLIA, a genus of Plants named in honour of Pierre Magnol, who was professor of medicine and prefect of the botanic garden of Montpellier. He was born in 1638, and died in 1715. He gave an account of the plants growing wild about Montpellier, in a work entitled 'Botanicum Monspeliense; seu Plantarum circa Monspelium nascentium Index,' 8vo., 1686. This work, illustrated with plates, as well as one published in 1689 with the title 'Prodromus Historiæ Generalis Plantarum in quo Plantæ per Families disponuntur,' was arranged according to a natural system of his own. In another work embracing the plants growing in the Montpellier Garden, entitled 'Hortus Regius Monspeliensis,' he has arranged the plants according to the system of Tournefort. The genus *Magnolia* is the type of the natural order *Magnoliaceæ*. It has a calyx of 3 deciduous sepals that resemble petals; the corolla is composed of 6 to 9 petals; the stamens and pistils numerous; the carpels are disposed compactly in spikes, opening by the external angle, 1-2-seeded, permanent; the seeds baccate, somewhat cordate, pendulous, hanging out beyond the carpels by a very long umbilical white thread. The species of *Magnolia* are trees or shrubs, with alternate, stipulate, deciduous, or evergreen simple leaves, and large terminal solitary odoriferous flowers. They are all natives of North America and Asia.—*Eng. Cyc.*

(5066) MAGNOLIA ACUMINATA, a deciduous tree with oval acuminate leaves, the under surface pubescent, the flowers with from 6 to 9 petals: It is a native of North America, from Pennsylvania to the Carolinas. The flowers are large, 3 or 4 inches in diameter, of a yellowish colour, mixed with faint blue or pea-green, but not remarkable for their beauty. The fruit is about 3 inches long, and resembles a small cucumber, whence in America it is called Cucumber-Tree. A tincture is made of the fruit, and is used in cases of rheumatism. Several varieties of this plant have been described. It is often used in the London nurseries as a stock on which to engraft the other species. There are several other species of this magnificent genus found in the forests of North America, all of which are valued in Great Britain for ornamental culture. The best known of these are *M. cordata*, the Heart-Leaved Cucumber-Tree, with yellow flowers streaked with red, and having a disagreeable odour; and *M. auriculata*, Indian Physic, or Long-Leaved Cucumber-Tree, having white flowers and a bitter bark, which is used as a medicine by the Indians.—*Eng. Cyc.*

(5067) MAGNOLIA EXCELSA. Near Darjeling, the white-flowered magnolia (*M. excelsa*, Wall,) forms a predominant tree at 7000 to 8000 feet; and in 1848 it blossomed so profuse-

ly, that the forests on the broad flanks of Sinchul and other mountains of that elevation, appeared as if sprinkled with snow. The purple-flowered kind again (*M. Campbellii*) hardly occurs below 8000 feet, and forms an immense, but very ugly black-barked, sparingly branched tree, leafless in winter and also during the flowering season, when it puts forth from the ends of its branches great rose-purple cup-shaped flowers, whose fleshy petals strew the ground. On its branches, and on those of oaks and laurels, *Rhododendron Dalhousiæ* grows epiphytically, a slender shrub, bearing from three to six white lemon-scented bells, four and a half inches long and as many broad, at the end of each branch. In the same woods the scarlet Rhododendron (*R arboreum*) is very scarce and is outvied by the great *R. argenteum*, which grows as a tree forty feet high, with magnificent leaves twelve to fifteen inches long, deep green, wrinkled above and silvery below, while the flowers are as large as those of *R. Dalhousiæ*, and grow more in a cluster. Dr. Hooker knows nothing of the kind that exceeds in beauty the flowering branch of *R. argenteum*, with its wide spreading foliage and glorious mass of flowers.—*Hooker Him. Jour. Vol.* I. *p.* 125.

(5069) MAGNOLIA GLAUCA, deciduous Swamp Magnolia, is an almost deciduous plant, with obtuse elliptical leaves, glaucous on the under surface: the flowers from 9-14-petalled, contracted; the petals ovate, concave. This species is a tree rising from 15 to 20 feet in height. It is a native of North America, in low, moist swampy ground at a little distance from the sea, from Massachusetts to Florida and Louisiana. This plant is also cultivated, and a number of varieties have been described. The bark has a bitter and aromatic odour resembling sassafras. On this account it has been used in America as a substitute for other aromatic bitter barks as Cascarilla, Canella &c., and, it is said, with great success. Although not much used in Europe, very favourable reports of its efficacy in chronic rheumatism, ague, and remittent fever have been given. All the species of *Magnolia* possess more or less the properties which are most evident in *M. glauca*. When used, a tincture made from the bark, seeds, or cones is equally efficacious. It is said that when the tincture is made from the leaves and cones whilst green, it is more efficacious. In America this tree is known by the names White Laurel, Swamp Laurel, Swamp Sassafras, Sweet Bay, and Beaver-Tree. The last name is given to it on account of the fondness of the beaver for it. The flowers are of a cream colour and have a sweet scent, which Kalm says may be perceived at a distance of three miles. The flowers are followed by red berries, which give the tree a handsome appearance. The berries are steeped in brandy and used as a domestic medicine for various complaints.—*Eng. Cyc.*

(5070) MAGNOLIA GRANDIFLORA, many varieties; they are scarcely hardy enough to live in Britain away from the shelter of a wall, except quite in the south; unprotected specimens exist however near Edinburgh. *Magnolia grandiflora* has been introduced into China from America and promises to be a very ornamental tree.—*Fortune's Tea Districts, p.* 16.—*M. grandiflora*, The Great-Flowered Magnolia, or Laurel Bay, is an evergreen tree, reaching sometimes a height of 70 feet. It has oval-oblong coriaceous leaves with the upper surface shining and the under surface rusty; the flowers erect, with from 9 to 12 petals expanding. This plant is one of the tallest and handsomest trees of North America. It has large pale-green shining leaves, nearly 10 inches long, with large white flowers. It has been cultivated in England for the last century, and in that country attains a height of from 30 to 40 feet. Several varieties of this species have been named and described. Amongst the most constant and best known varieties are—1, *M. g. obovata*; 2, *M. g. Exoniensis*; 3. *M.g. angustifolia*; 4, *M. g. præcox*. The first is known in the Carolinas by the name of the Big Laurel; the second is the Exmouth Magnolia; the third and fourth are varieties which have been produced in France. In the cultivation of this species a deep sandy loam, dry at bottom, and supplied with vegetable mould, suits all the varieties. In planting it against a wall, almost any aspect may be chosen except a north-east. This plant may be propagated by stools, which should be laid down in autumn, and require two years before they are fitted for separation. They are then potted, and kept in pits or under glass during the winter. It may be also propagated by seeds from America.—*Eng. Cyc.*

(5071) MAGNOLIA PURPUREA, the Purple-Flowered Magnolia, is a deciduous shrub, with obovate-acute reticulately-veined leaves, almost smooth; the flowers erect, of 3 sepals and 6 obovate petals: the styles very short. This plant is a native of Japan, and seldom attains a greater height than 10 feet. The bark when bruised has an aromatic odour. The flowers are more or less purple without, and always white within. It is a very ornamental species and worthy of cultivation. The best situation for it in England is against a wall, when its branches will reach from 15 to 20 feet.—*Eng. Cyc.*

(5072) MAGNOLIA UMBRELLA is a deciduous tree with lanceolate spreading leaves, the adult ones smooth, the younger ones pubescent underneath; the petals 9-12, exterior ones pendent. It is a native of North America, in the Carolinas, Georgia, Virginia, and New York. The leaves are one to two feet long, placed at the ends of the branches in a circular manner, somewhat in the form of an umbrella, from which circumstance it has been called the Umbrella-Tree. The wood is soft and spongy, and on the

mountains of Virginia is called Elmwood.—*Eng. Cyc.*

(5073) MAGNOLIA YULAN, OR MAGNOLIA CONSPICUA, a deciduous tree with obovate abruptly acuminated leaves, the younger ones pubescent, expanding after the flowers; the flowers erect, 6-9-petalled; the styles erect. This plant attains a height of 30 or 40 feet in its native country, but reaches only 8 or 10 feet in English gardens. It grows in China, where it has been cultivated since the year 627. Its native name is Yulan. It is a very showy tree, having white flowers sometimes suffused with purple, which give out a most delicious perfume. It blossoms in England from February to April, and is distinguished from the other species by the flowers appearing before the leaves. It is not quite so hardy as the American species; still, unless the weather is unpropitious, it will put forth an abundance of blossoms during the dreary months of February and March.—*Eng. Cyc.*

(5074) MAGNOLIACEÆ: MAGNOLIADS, an important natural order of albuminous polypetalous Exogenous Plants, consisting of bushes and trees, inhabiting the temperate parts of both the Old and New World. They have the numerous disjoined carples and hypogynous stamens of *Ranunculaceæ*, to which they are closely allied; they differ not only in their arborescent habit, but in the young leaves being enveloped in stipules, either horn-like and convolute, or bivalved, which are thrown off as the leaves unfold. The flowers are usually large and sweet-scented, and the leaves are firm, broad, and large, in consequence of which many of the species are objects of cultivation in all civilised countries. In England, where they are exotics, they are among the most highly-valued of ornamental plants, and every species which can bear the climate, or which will thrive in conservatories, has been collected with great care, whenever opportunities have offered, so that few now remain to be imported. Among the most ornamental of the hardy kinds are the *Magnolia grandiflora* of Caroiina; *M. glauca*, of which there are many varieties; *M macrophylla*, the flowers of whch are among the largest in the vegetable kingdom; and the Tulip-Tree, *Liriodendron tulipifera*, a large tree with singular truncate leaves. In Bengal the air is often perfumed with the fragrance of the Champac, a species of *Michelia*; while in China and the Malayan Archipelago others are equally well known for their ornamental characters. Nor are the plants of this order less useful than beautiful. It is probable that they are all valuable for the febrifugal qualities of their bark. *Magnolia glauca* is among the best bitter and aromatic species known in medicine, and the Tulip-Tree affords to the North American settler a substitute scarcely inferior to it. The genera *Talauma* and *Magnolia* have the very singular property of dropping their seeds out of the back of the seed-vessels when ripe, allowing them to hang down, each suspended by a long extensible elastic cord, composed of delicate spiral vessels. In consequence of the seeds of *Magnoliaceæ* containing an abundance of oil which often becomes rancid soon after they are gathered, it is difficult to transport them to a considerable distance in a living state. The best method of succeeding in that object is to pack the seeds in earth as soon as they are ripe, pressing them close and securing them in a box. Under such circumstances they will preserve their vitality for several months. There are 11 genera and 65 species of this family.—*Eng. Cyc.*

(5075) MAHASER, A very large Carp, found by Dr. Hooker in the Teesta River, near Rangamally in the Terai.—*Hooker. Him. Jour. page* 398 *Vol.* 1.

(5076) MAHOGANY.

Caoba, Sp.

Swietenia mahogani, indigenous in the West Indies and Central America, and naturalized in some parts of India. There are two East Indian species of this genus the, *S. febrifuga*, a gigantic tree, growing in the mountainous parts of Central Hidoostan; its wood is of a dull red colour, hard, heavy, and durable; and the *S. choloroxylon*, a smaller tree found in the mountains of the Circars; its wood is of a yellow colour resembling box.—*Faulkner.* Mahogany however (Swietenia Mahogani) is the most important species of this small genus of plants, named in honour of Gerard van Swieten, a physician of Leyden. It is a native of Campeachy and of the West Indies, where it is a lofty tree with a large spreading head and glossy pinnate leaves. The trunk frequently exceeds 40 feet in length, with a diameter of 6 feet. The timber, well known for its general use in furniture and cabinet making, is of a rich red-brown, of different shades and markings, capable of a brilliant polish, close-grained, very little liable to warp or shrink, and having a semi-resinous juice which preserves the wood from the attacks of insects. Mahogany is imported from several of the West India islands, and from the Spanish main. It arrives in logs about 10 feet long and 2 feet square. Honduras mahogany is imported in logs from 2 to 4, or even 6 feet square, and from 12 to 28 feet long. This variety is lighter in colour, and more open and irregular in grain than the Spanish. By some botanists the Honduras mahogany has been described as a different species; but it appears probable that differences of soil and situation have produced the variations in quality. These woods called mahogany, brought from Africa and the East, belong to other genera, and are decidedly inferior to the true mahogany. A specimen of the latter, however, was sent from the Botanic Garden, Calcutta, to the Great Exhibition

and its fine quality proved that the true variety may be raised in the East Indies. The value of the best Spanish mahogany may be judged of by the fact, that the Messrs. Broadwood gave £3,000. for three logs of fine mahogany, each 15 feet long and 38 inches square. These logs were the produce of a single tree. The wood was exceedingly beautiful, and when polished, it reflected the light in a varied manner, offering a different figure in whatever direction it was viewed. These logs were brought to England with a full knowledge of their value; but generally speaking, the purchase of this wood is a sort of lottery. Dealers in mahogany often introduce an auger before buying a log: but this does not always enable them to judge with precision respecting the quality of the timber. Honduras mahogany grows mostly upon moist low land, is generally soft, coarse, and spongy. It has, however the advantage of holding glue admirably, and is in consequence, much used as ground on which to place veneers of the finer sorts of mahogany. The cutting of mahogany at Honduras is carried on twice a year—at Midsummer and soon after Christmas. The mahogany of Cuba and Hayti, and of the islands in general, is close-grained, dark coloured, and sometimes highly figured: it is known as Spanish mahogany. The general appearance of the tree is extremely beautiful, and has been thus described:—"In the rich valleys among the mountains of Cuba, and those that open upon the bay of Honduras, the mahogany expands to so giant a trunk, divides into so many massy arms, and throws the shade of its shining green leaves, spotted with tufts of pearly flowers, over so vast an extent of surface, that it is difficult to imagine a vegetable production combining in such a degree the qualities of elegance and strength of beauty and sublimity." Mahogany may be safely pronounced the most useful of all furniture wood, for which it is particularly adapted on account of its size, abundance, durability, and beauty, and from the fact that it holds the glue better that any other wood. It is much used for founders' patterns, and other works in which permanence of form is of great consequence. It is also employed for a variety of turned works. Mahogany, in common with all other large foreign woods, requires to be carefully dried after it is cut into planks, as, notwithstanding the long time which may intervene between the felling and the using, it continues, so long as it is in the log, to retain much of its moisture. Well-seasoned Spanish mahogany cuts well, takes a brilliant polish, resists scratches, stains, and fractures much better than inferior sorts, and is worth the trouble and delicate workmanship which are often expended upon it. The colours are brought out by the application of oil or varnish, but much washing or soaking of the wood in water will destroy its beauty and render it of a dingy brown. The colour of mahogany is often artificially deepened by alkaline applications, but the best effect is produced by the use of a colourless varnish, which allows the natural tints of the wood to be displayed unaltered. From the resemblance of the seed-vessel of the mahogany-tree to that of the Barbadoes cedar, the name of cedar has been sometimes erroneously applied to it. There is so far a correspondence in the nature of these trees that the mahogany, like the pine tribe, succeeds best upon the coldest soils and in the most exposed situations. When it grows on moist soils and warm lands, it becomes coarse and spongy, and the timber is not secure from the attacks of worms. The first mention of this beautiful timber occurs in 1597, when it was used to repair some of Sir Walter Raleigh's ships at Trinidad. Yet the timber was not brought to England until about the beginning of the last century, when a few planks brought over as ballast in a vessel from the West Indies, were given to Dr. Gibbons, and would have been used, but for their hardness, by his workmen in erecting a house in Covent Garden. Having been rejected by them, a piece was given to a cabinet maker, named Wollaston, with the request that he would make a candle-box of it. This being done, the candle-box proved so beautiful that it became an object of curiosity, and the despised mahogany came into great request, and was soon established as a valuable material for household furniture.—*Tomlinson.* The genuine mahogany tree may be seen in some Tenasserim gardens, where it appears to flourish.—*Mason.* The Mahogany grows as well in Bengal as in its native country, and though inferior in fineness of grain to the best kinds, it is at least equal in quality to that of Jamaica. As an instance of the imperceptible manner in which useful plants are introduced into, and distributed through a country, we may adduce the Mahogany, as Dr. Roxburgh in a paper presented to the Society of Arts in 1806, on the growth of Trees in the Botanic Garden at Calcutta, mentions that two plants (and these were the first introduced into India) were sent by the Honourable the Court of Directors to the Botanic Garden in 1795, and by the end of 1804, above five hundred plants had been reared from these two. It succeeds so perfectly well in the East Indies, that the tree will, without doubt, in a few years, form a valuable acquisition to that country.—Soc. of Arts Trans. vol. xxiv. p. 154 —The tree is now common in Northern as well as Southern India, yet so little is known of such subjects, that some seed was sent to India only a few years ago by the overland mail.—*Royle's Productive Resources of India.*

(5077) MAIDEN HAIR, the common name of the *Adiantum Capillus Veneris*, a fern found wild in many parts of Europe, on damp shaded rocks. It is the Adianton (Ἄδιαντον) of the

Greeks, and has probably gained its trivial name from its having formed a part of the preparations used by the ladies for stiffening their hair. (Dioscorides, l. iv. c. 136.) [ADIANTUM.]—*Eng. Cyc.*

(5078) MAIN-PHUL, Vanguiera spinosa. The tree grows in Marwar: the dried fruit which is used, is considered stimulating; and when given to cattle in the cold weather prevents their suffering from the cold: not given to mankind; three seers for one rupee,—*Gen. Med. Top. p.* 146.

(5079) MAI RUBIYA, a dried fish brought from Delhi: considered good in impotency; four tolas for one rupee.—*Gen. Med. Top. p.* 147.

(5080) MAI-SUTR-ARABI, blood which has congealed in the belly of a young camel; after being overfed, the young camel is driven about violently, and then killed, and the blood extracted; is brought from Bombay and Delhi; supposed to benefit in impotency: one tola costs three rupees.—*Gen. Med. Top. p.* 147.

(5081) MAIZE. INDIAN CORN, ZEA-MAYS.

Mokka, BENG.	GranoTurcoo Siciliano, IT.
Bled de Turquie, FR.	Jagung Malay, JAV.
Turkisch korn, Mays, GER.	Trigo de Indias, Trigo de Turquia, SP.
Boota, GUZ. HIND.	*Faulkner.*

The Zea mayz of botanists is at present well known and much cultivated in all the islands of the Asiatic Archipelago, taking among several corns the next rank to rice. The Malay name for this plant is jagung, which appears to be a native word, but it is not traceable to any root. The same name is found for it in many of the other languages, and extends to the Javanese.—*Crawd. Dict. page* 237. Maize (*Zea Mays*), is the common well-known Indian corn, forming one of the most important of the grain crops, and has a greater range of temperature than the other cereal grasses. It was found cultivated for food by the Indians of both North and South America, on the first discovery of that continent, and thence derived its popular name. Maize succeeds best in the hottest and dampest parts of tropical climates. It may be reared as far as 40 degrees north and south latitude on the American continent; while in Europe it can grow even to 50 degrees or 52 degrees of latitude, some of the numerous varieties being hardy enough to ripen in the open air, in England and Ireland. It is now cultivated in all regions in the tropical and temperate zones, which are colonized by Europeans. It is most largely grown, however, about the Republics bordering on the northern shores of South America, California, the United States and Canada, the West India islands and Guiana, on the coasts of the Mediterranean, and partially in India, Africa, and Australia. We see the singular fact in Mexico of land which, after perhaps thousands of years' culture is so little exhausted, that with a very little labor bestowed on it, a bad maize harvest will yield two hundred fold profit, whilst a good crop return 600 fold. This grain adapts itself to almost every variety of climate, and is found growing luxuriantly in the low country of Mexico, and nearly equally well on the most elevated and coldest regions of the table-land in the rich valleys of the Cordilleras or the Andes, and on the sandy heights of those mountains wherever a rill of water can be brought to nourish its roots. In short, it ripens under the sun of America, in every part of both continents. Though wheat is characterised as the most nutritious food for man in all quarters of the world yet the Indian corn crop of the United States is not second in value to any product of the earth; cultivated in the middle and Eastern States, nay, even in the rich cotton-growing districts Indian corn is fast rising in importance and will soon equal in value that important commercial staple. This indigenous grain yields to that nation an annual average of five hundred millions of bushels, and has, within the last five years, attracted much attention as a life-sustaining food, more particularly at the period of Ireland's severe suffering, in 1847, and the following years. Nations, as well as statesmen and farmers, have found it an object worthy of their consideration and esteem. When due regard is paid to the selection of varieties, and cultivated in a proper soil, maize may be accounted a sure crop in almost every portion of the habitable globe, between the 44th degree of north latitude and a corresponding parallel south. Among the objects of culture in the United States, it takes precedence in the scale of cereal crops, as it is best adapted to the soil and climate, and furnishes the largest amount of nutritive food. Besides its production in the North American Republic, its extensive culture is limited to Mexico, the West Indies, most of the States of South America, France, Spain, Portugal, Lombardy, and Southern and Central Europe generally. It is, however, also cultivated with success in Northern, Southern, and Western Africa, India, China, Japan, Australia, and the Sandwich Islands, the groups of the Azores, Madeira, the Canaries, and numerous other Oceanic isles. Maize is not a favorite grain as bread-corn with the European nations, for although it abounds in mucilage, it is asserted to contain less gluten, and is not likely to be much used by those who can procure wheaten flour, or even rye bread. The large importations which were made by the English Government during the prevalence of the potato disease, brought it into more general use among some classes, and the imports for home consumption are still extensive, having been as follows in the last few years:—

	1848.	1849.
Indian corn, quarters,	1,582,755	2,249,571
,, meal, cwts.	233,880	102,181

	1850.	1851.
Indian corn, quarters,	1,286,264	1,810,425
„ meal, cwts.	11,491	

The trade in maize, or Indian corn, is totally new since 1846. The famine in Ireland in that year, and the potato rot in almost every successive year since, have now fully established it. Like the gold discoveries, the potato rot may be regarded as a providential means of effecting a great change in the condition of society. Those discoveries are not without their influence in the East, and, combined with the potato rot, they have rapidly increased the commerce between the East and West of Europe, while they are spreading broad paths between all Europe and the lands in the Southern Ocean. The imports of maize from all parts, in 1852, amounted to 1,550,000 quarters, of which about 1,100,000 quarters arrived in vessels from the Mediterranean, calling at Queenstown or Falmouth for orders. The balance consists of imports from America, France, Portugal, and also of cargoes addressed direct to a port of discharge, without

first calling off the coast for orders. The quantities received in 1851 and 1852 from the Mediterranean were as follows:—

Received from	1852. qrs.	1851. qrs.
Galatz, ...	223,000	286,067
Ibraila, ...	362,600	211,779
Salonica, ...	35,640	95,377
Odessa, ...	219,170	74,065
Egypt, ...	50,960	86,260
Italy, ...	8,250	162,544
Constantinople, Malta, Trieste, and other ports in the Mediterranean, ...	190,720	286,358
	1,090,340	1,202,450

The various quarters from whence England derives supplies of this grain, are shown in the following table of the imports for the last three years, compiled from the most recent Parliamentary returns.

INDIAN CORN AND MEAL IMPORTED INTO THE UNITED KINGDOM.

Places.	1849.		1850.		1851.	
	Corn. qrs.	Meal. cwts.	Corn. qrs.	Meal. cwts.	Corn. qrs.	Meal. cwts.
Russian Ports in Black Sea, ...	25,519		19,721		98,176	
Denmark, ...	1,300		250		5	
Hanover, ...	1,344					
Belgium, ...	67					
France, ...	135,115	510	102,978	26	164,128	29
Portugal Proper, ...	61,446		67,518	53	21,922	
Azores and Madeira, ...	17,214	7	7,794	6	4,356	1
Spain and Bahama Islands, ...	26,856	48	19,982	48	34,771	
Sardinian Territories, ...	13,357		25	2	1,302	1
Tuscany, ...	11,481	95	15,612	94	34,760	
Papal Territories, ...	8,927		1,876		75,588	
Naples and Sicily, ...	18		10,066		101,489	
Austrian Territories, ...	90,540		45,748		73,966	
Malta and Gozo, ...	18,198		4,969		11,002	
Ionian Islands, ...	5,390		7,324		5,967	
Greece, ...	57,520		8,712		3,252	
Egypt, ...	12,767		71,808		127,692	
Turkish dominions, including Wallachia, Moldavia, and Syria, ...	563,799		348,456		748,180	
Morocco, ...	760					
West Coast of Africa, ...	889		2,322			
B. N. A. Colonies, ...	1,645	164	1,530		4,377	7
U. S. of America, ...	1,170,154	100,859	538,155	11,253	295,978	9,522
Brazil, ...	1,253		468		725	
Other places, ...			1,756			
						1
	2,225,459	101,683	1,277,070	11,482	1,807,636	9,561

(Parliamentary Paper, No. 14, Sess. 1852.)

The many excellent properties of Indian corn, as a wholesome nutritious food, and the rich fodder obtained from the stalk and leaf for the nourishment of cattle, invite more earnest attention from the farmer and planter in the Colonies to its better and extended cultivation. Though the average quantity of grain from each acre in the United States is not more than thirty or forty bushels, yet it is known that with due care and labor 100 to 130 bushels may be obtained. In feeding cattle little difference is discoverable between the effects of Indian corn meal and oil cake meal, the preference rather preponderates in favor of the latter. Corn cobs, ground with the grain, have advocates, but this food is not relished, and swine decline it. Indian corn contains about the same proportion of starch as oats (sixty per cent.), but is more fattening, as it contains about nine or ten per cent. of oily or fatty ingredients The following analysis of maize is given by Dr. Samuel David, of Massachusetts :—

FLESH FORMING PRINCIPLES.

Gluten, albumen, and casein,.....	12·60

FAT FORMING PRINCIPLES.

Gum, sugar, starch, woody fibre, oil, &c...	77·09
Water,.....	9·00
Salts,.....	1·31
	100·

Professor Johnston supplies a table, which, he says, exhibits the best approximate view we are yet able to give of the average proportion of starch and gluten contained in 100 lbs. of our common grain crops as they are met with in the market. From this table I extract the following :—

	Starch, gum, &c.	Gluten, albumen, &c.
Wheat flour,.....	55 lbs.	10 to 15 lbs.
Oats,.....	65 ,,	18 lbs.
Indian corn, ...	70 ,,	12 ,,
Beans,.....	40 ,,	28 ,,
Peas, ...	50 ,,	24 ,,
Potatoes,.....	12 ,,	2⅛ ,,

The Professor remarks that the proportion of oil is, in 100 lbs. of

Wheat flour, ...	2 to 4
Oats, ...	5 ,, 8
Indian corn, ...	5 ,, 9
Beans and peas, ...	2½ ,, 3
Potatoes,...	0¼

Of the whole family of cereals, *Zea Mays* is unquestionably the most valuable for cultivation

in the United States. When the time shall come that population presses closely on the highest capabilities of American soil, this plant, which is a native of the New World, will be found greatly to excel all others in the quantity of bread, meat, milk, and butter which it will yield from an acre of land. With proper culture, it has no equal for the production of hay, in all cases where it is desirable to grow a large crop on a small surface. Although there has been much written on the Eastern origin of this grain, it did not grow in that part of Asia watered by the Indus, at the time of Alexander the Great's expedition, as it is not among the productions of the country mentioned by Nearchus, the commander of the fleet; neither is it noticed by Arian, Diodorus, Columella, nor any other ancient author; and even as late as 1491, the year before Columbus discovered America, Joan di Cuba, in his "Ortus Sanitatis," makes no mention of it. It has never been found in any ancient tumulus, sarcophagus, or pyramid; nor has it ever been represented in any ancient painting, sculpture, or work of art, except in America. But in that country, according to Garcilaso de la Vega, one of the ancient Peruvian historians, the palace gardens of the Incas, in Peru, were ornamented with maize, in gold and silver, with all the grains, spikes, stalks, and leaves; and in one instance, in the "garden of gold and silver," there was an entire cornfield, of considerable size, representing the maize in its exact and natural shape; a proof no less of the wealth of the Incas, than their veneration for this important grain. In further proof of the American origin, it may be stated that this plant is still found growing, in a wild state, from the Rocky mountains in North America, to the humid forests of Paraguay, where, instead of having each grain naked, as is always the case after long cultivation, it is completely covered with glumes or husks. It is, furthermore, a well authenticated fact, that maize was found in a state of cultivation by the aborigines, in the island of Cuba, on its discovery by Columbus, as well as in most other places in America, first explored by Americans.

Culture in the East Indies.—The growers on the hills of Nepaul reckon three kinds of maize: a white grained species, which is generally grown on the hills sides; a yellow grained one, grown in the low and hot valleys; and a smaller one, called "Bhoteah," or "Murilli Makii," which is considered the sweetest of the three, but from being less productive is not generally grown on good lands. Maize thrives best on a siliceous, well-drained, rich soil. A correspondent in Simmonds' "Colonial Magazine," vol. ii. p. 309, says the finest Indian corn he ever saw was in the Hamalayas of the Sikkim range, where the soil consists of a substratum of decomposed *mica* from the under or rocky stratum,

with a superstratum of from three to six inches of decayed vegetable matter, from leaves, &c., of the ancient forests. Throughout Hindostan, June is the usual time for sowing. In Behar, about two seers are usually sown upon a beggah; in Nepaul, twenty-four seers upon an English acre; in the vicinity of Poonah, one and a-half seer per beegah. Before the seed is sown the land is usually ploughed two or three times, and no further attention given to the crop than two hoeings. In Nepaul, where it is the principal crop cultivated, the seed is sown, after one delving and pulverisation of the soil, in the latter end of May and early part of June, the seeds being laid at intervals of seven or eight inches in the drills, and the drills an equal space apart. The drills are not raised as for turnip sowing, but consist merely of rows of the plant on a level surface. The seed is distributed in this manner with the view of facilitating the weeding of the crop, not for the purpose of earthing up the roots, which seems unnecessary. The Indian corn sowing resembles that of the *gohya* (or upland) rice, in the careful manner in which it is performed; the sower depositing each grain in its place, having first dibbled a hole for it five or six inches deep, with a small hand hoe, with which he also covers up the grain. The after-culture of this crop is performed with great care in the valleys, but much neglected in the hills especially on new and strong lands. In the former it undergoes repeated weeding during the first month of its growth, the earth being lossened round the roots, at each weeding, with the hand hoe. After the first loosening of the soil, which is performed as soon as the plants are fairly above ground, a top dressing of ashes or other manure is given. By this mode the crop gets the immediate benefit of the manure, which otherwise, from the extraordinary rapidity of its growth, could not be obtained by it. In three months from the time of sowing, the seed is ripe. The crop is harvested by cutting off the heads. In Nepaul these are either heaped on a rude scaffolding, near the cultivator's house, or, more commonly, they are suspended from the branches of the trees close by, where, exposed to wind and weather, the hard and tough sheath of the seed cones preserves the grain for many months uninjured. Cattle are voraciously fond of the leaves and stems, which are very sweet, and even the dry straw, which Dr. Buchanan surmises may be the reason why it is not more generally cultivated by the natives, as the difficulty would be great to preserve the crop. So slow is the progress of changes in the regions of India, that near Kaliyachak, though the people give all other straw to their cattle, yet they burn that of maize as unfit for fodder. In Nepaul the stalks, with the leaves attached, often twelve feet long, cut by the sickle, are used as fodder for elephants, bedding for cattle, and as fuel. The maize crop within the hills of Nepaul suffers much from the inroads of bears, which are very numerous in these regions, and extremely partial to this grain. The average return from this crop is seldom below fifty seers, ranging frequently far above it. [Transactions of "Agri.-Hort. Society, of Calcutta," vol. iv. p. 125.] Maize is increasing in cultivation in Java, and some of the Eastern islands. It is found to have the advantage there over mountain rice, of being more fruitful and hardy, and does not suffer from cold until the mean temperature falls to 45 deg. of Fahrenheit, and no heat is injurious to it. Several varieties of it are known, but for all practical purposes these resolve themselves into two kinds: one, a small grain, requiring five months to ripen, and a larger one, which takes seven to mature. In some provinces of Java it yields a return of 400 or 500 fold. Mr. Crawfurd found, from repeated trials, that in the soil of Mataram, in Java, an acre of land, which afforded a double crop, produced of the smaller grain 848½ lbs. annually.—*Simmonds, page* 283.

(5082) MAJOOM.

Majoom, Duk. Guz. Hind. Sans. Tam. | Madjoon, Turk.

An intoxicating electuary formed of ganjah leaves (*Cunabis sativa*), milk, ghee (clarified butter), poppy seed, flowers of the thorn apple (*Vern.*, Datura), the powder of the nux vomica, and sugar, sometimes also cloves; nutmegs; mace; saffron and sugar candy. It is used by the Mahomedans and Hindus, particularly the more dissolute, who take it to intoxicate, and ease pain.—*Faulkner.*

(5083) MAKLEUA. A berry called *Makleua* grows on a large forest tree at Bankok, which is used most extensively by the Siamese as a vegetable black dye. It is merely bruised in water, when a fermentation takes place, and the article to be dyed is steeped in the liquid and then spread out in the sun to dry. The berry, when fresh, is of a fine green color, but after being gathered for two or three days it becomes quite black and shrivelled like pepper. It must be used fresh, and whilst its mixture with water produces fermentation.—See Diospyros.

(5084) MAKO.

Pulidun: Gurkhi, Hind.

Solanum nigrum; and solanum rubrum. The dried black and red berries are indiscriminately sold as medicine: are also eaten fresh by the poor: the leaves are given in flatulency, and are eaten as a vegetable in dropsical swelling of the hands and feet: are also pounded with ginger to rub the hands and feet, do not seem to be poisonous in India.—*Gen. Med. Top. p.* 145.

(5085) MADRAS.

Madras Custom House Abstract Statement for Seven Years, of the Port of Madras.		1848-49	1849-50	1850-51	1851-52	1852-53	1853-54	1854-55	1855-56
Number of Vessels, including Dhonies	Inwards	1,310	1,222	1,357	1,142	1,114	1,326	1,308	1,510
	Outwards	1,303	1,198	1,345	1,153	1,005	1,294	1,305	1,530
	Total	2,613	2,420	2,702	2,295	2,119	2,620	2,613	3,040
Tonnage of Vessels, including Dhonies	Inwards	2,42,294	2,22,971	2,66,513	2,35,051	2,78,851	3,17,341	2,98,482	3,39,797
	Outwards	2,24,633	2,24,868	2,66,474	2,35,190	2,52,359	3,13,598	2,82,855	3,34,891
	Total	4,66,927	4,47,839	5,32,987	4,70,241	5,31,210	6,30,939	5,81,337	6,74,688
Value of Imports, including Treasure		84,76,558	84,83,332	1,02,22,945	1,03,12,625	1,21,96,753	1,55,25,861	1,61,64,640	2,41,49,293
Value of Exports do. do.		1,18,97,006	94,92,070	1,05,04,055	1,27,46,249	1,26,37,612	1,93,48,364	1,44,62,938	1,27,60,080
	Total	2,03,73564	1,79,75,402	2,07,27,000	2,30,58,874	2,48,34,365	3,48,64,225	3,06,27,578	3,69,09,373
Custom dues, Imports		4,04,626	3,85,924	3,86,677	4,01,649	3,40,644	3,92,434	4,31,118	5,09,862
Exports		89,178	1,04,842	1,22,031	1,20,672	1,95,543	1,78,956	1,15,289	1,58,616
	Total	4,93,804	4,80,766	5,08,708	5,22,321	5,36,187	5,71,390	5,46,407	6,68,478
Port dues collected		36,268	32,628	41,114	32,859	27,546	32,279	30,758	35,915

SEA CUSTOM HOUSE.
Madras, 5th December 1856.

Collector, Sea Customs.

(5086) MALABAR CREEPER.—IPOMEA TUBEROSA.

(5087) MALABAR NIGHT-SHADE.—BASELLA RUBRA.

(5088) MALABATHRUM, a name which occurs frequently among the writings of the ancients, and which was applied to a leaf imported from India, whence it was likewise called φύλλον Ἰνδικόν, and also simply Folium. It was employed by them both as a medicine and as a perfume. From it there was prepared both an oil and a wine by maceration of the leaves in these menstrua. Many fabulous statements accompany the earliest accounts, as that of Dioscorides, by whom it is stated that by some they are thought to be the leaves of the Indian Nard; that they are moreover found floating on Indian marshes, and that they grow without roots (lib i., c. 11), and that (lib. ii c. 10) it is by feeding on them that the animal affording the Onychia or Unguis Odoratus of the ancients, becomes aromatic. In the works of the Arabs Saduj is given as the synonyme of *Malabathrum*; and Saduj, both in Persian works and in India, is applied to Tej-Pat, or the leaf of the Tej, which is a species of *Cinnamomum*, *C. albiflorum*, growing in the dense forests of the valleys of the Himalaya, which extend from Rungpore to the Deyra Doon in 30° N. lat. Dr. Hamilton found the same name applied to a very nearly allied species, the *C. Tamala*. Both species most probably yield the leaves which were so highly esteemed in ancient times, and are still as extensively employed in eastern countries, and may be found in every Indian bazaar under the names of Tej, or Tej-Pat, or by the Arabic name of Saduj-Hindee. They are analogous in all respects to bay-leaves produced by the *Laurus nobilis*, and are in fact the bay-leaves of India. The name *Malabathrum* no doubt is derived from Tamala-putra, or Tamala-leaf, as was first indicated by Garcies: "Appellant autem Indi folium *Tamalapatra* quam vocem Græci et Latini imitantes corrupte *Malabathrum* nuncuparunt." These are brought from the interior of almost inaccessible forests, and necessarily stripped from the branches for the facility of carriage; hence most probably originated the fables with which their early accounts are accompanied.—*Eng. Cyc.*

(5089) MALACCA CANES. The late Dr. Griffith believed these Canes to be produced from the *Calamus Scipionum*, the *Heotan* of Cochin-China. They do not occur about Malacca, but are imported from Siak, on the opposite Coast of Sumatra. Some of them are simply mottled or clouded, others of a brown colour, in consequence, it is said, of their having been smoked. The most slender specimens, with the longest internodes, are the most valued.—*Seeman.*

(5090) MALACHITE. The mines of Siberia, at Nichne Tagilsk have afforded great quantities of this ore. A mass partly disclosed measured at top 9 feet by 18 feet; and the portion uncovered contained at least half a million pounds of pure malachite. Other noted localities are Chessy in France, Sandlodge in Shetland, Schwartz in the Tyrol, Cornwall, Australia, and the island of Cuba. This mineral receives a high polish, and is used for inlaid work, and also ear-rings, snuff-boxes, and various ornamental articles. It is not much prized in jewellery. Very large masses are occasionally obtained in Russia, which are worked into slabs for tables, mantel pieces, and vases, which are of exquisite beauty, owing to the delicate shadings and radiations of colour. In the Great Exhibition of 1851 there were magnificent specimens of this material in the shape of doors and vases sent thither by the Emperor of Russia. At Versailles there is a room furnished entirely with tables, chairs, &c., wrought in malachite, and the same are to be found in other European palaces. At

Nichne Tagilsk, a block of malachite was obtained weighing 40 tons. Malachite is sometimes passed off in jewellery as turquoise, though easily distinguished by its shade of colour and much inferior hardness. It is a valuable ore when abundant, but it is seldom melted alone, because the metal is liable to escape with the liberated volatile ingredient, carbonic acid.—*Eugl. Cyc. page* 134.

(5091) MALDY. A fabric made at Maldah of a mixture of silk and cotton, very durable and which washes well. It is exported through Sikkim to the North West provinces and Tibet.—*Hooker, Vol.* II *p.* 251.

(5092) MALJHUN, OR MALOO CLIMBER, BAUHINIA RACEMOSA (LEGUMINOSÆ). Along the forests of the Sewaliks and the hot valleys of the Himalayas, from the doons of the North-West to the valley of Assam, may be seen a magnificent climber, called *Maljhun* or *Maloo*, with a two-lobed leaf. Of this, Dr. Royle observed, in his 'Himalayan Botany,' p. 184, that *Bauhinia racemosa* hangs in elegant festoons from the tops of lofty trees, which one is at a loss to conceive how, from the distance of its root from the stems, it could ever have ascended; but occasionally a half-killed tree displays the mode of its progress, and indicates the destruction it must have created in the forest. With the bark of this plant, which, when stripped off, is of a reddish-brown colour, the natives of these mountains make ropes. It was one of those to which Dr. Roxburgh turned his attention, and which has been frequently noticed by travellers in the Himalayas. Capt. Huddleston states that the stems are usually cut in July and August; the outer bark being stripped off, is thrown away, and the inner is used for ropes, as wanted, by being previously soaked in water, and twisted when wet. It is also said to be boiled and beaten with mallets, which renders it soft and pliable for being twisted into ropes and strings for charpaes. Though the fibre makes very strong ropes, it is not over-durable, and rots if kept constantly in water. Though not collected for sale, it is very abundant all along the foot of the mountains. Major Swetenham, formerly of the Bengal Engineers, on the 11th of November, 1840, despatched to the late Mr. Thomason some of the fibres of the Maloo creeper, and a specimen of a rope made from it, which he obtained from the valley of the Jumna River within the hills. He describes it as making strong coarse ropes, which he had found to answer well for suspension bridges, though he was unable to say how long they would bear exposure to moisture, for "they had been in use only for two or three years, and iron suspension bridges substituted." Specimens of the fibre, and rope made from it, were sent to the Exhibition of 1851, from Bhagulpore, and called *Patwa* or *Mawal* fibre.

Bauhinia scandens.—Similar in properties and uses to the above, is another species of the same genus, of which we find the following notice in the 'Journal of the Agri-Hortic. Society,' vi. p. 185. Specimens of the fibre of *Bauhinia Scandens*, and cloth made therefrom, were sent to Major Jenkins by Major Hannay, who mentions that the fibre is used by the Nagas. The plant, Major Jenkins adds, is not uncommon about Gowhatti. It was recognized by Dr. Falconer, from a few leaves forwarded by Major Jenkins, to belong to *Bauhinia scandens*, a common species in Silhet. Captain Thomson having tested this fibre, reports on it to the following effect: "The line made from the fibre sent by Major Jenkins, sustained for forty-five minutes, 168 lb., having stretched six inches only in three feet, and therefore is about the same strength with our best *Sunn* Hemp. But, whether from the mode of preparation or the nature of the material, is so harsh and stubborn, and the fibres stick so close together, that the heckles tear it to pieces, and injure its strength." Dr. Buchanan, in his 'Survey,' mentions both these species as used for many of the same purposes.—*Royle Fl. p.* 295.

(5093) MALKUNGUNEE, OR STAFF TREE OIL.—CELASTRUS PANICULATA. Oleum Nigrum.—Valuluvy tylum.

Valuluvy yennai, TAM. | Malkungunee ka tael HD.
Bavungie noona, TEL. | Vaylarie tylum, TAM.

An empyreumatic oil obtained by the destructive distillation of the seeds of this Celastrus, either alone or in combination with other ingredients. It was much used in the treatment of Beri-beri, Malcolmson's Essay p. 312.—*M. E. J. R.*

(5094) MALMSLEY. A very rich luscious species of Madeira wine, made from the grapes grown on rocky grounds exposed to the full influence of the sun's rays, and allowed to remain on the vine till they are ripe.—*McCulloch. Faulkner.*

(5095) MALONI BAPCAI, seed of a small plant found about Ajmeer; tasteless; has a fine scent: is of a warm nature, a dram is given in medicine used externally with other medicines to cure the itch.—*Med. Top. of Ajmeer, p.* 127.

(5096) MALOPE GRANDIFLORA, a malvaceous plant growing in India, which yields fibres.

(5097) MALOPE. MALVACEÆ. These are very beautiful annual plants, and grown readily from seed at the commencement of the rains the colour of flowers purple, and violet, the plant grows to the height of seven or eight feet and is better adapted for a shrubbery than the flower garden.—*Riddell.*

(5098) MALLOW, KHITMEE. Khungee. Malva. Root of Malva sylvestris or Mauritiana. In making the Compound decoction of Mallow,

the dried capsules of the okra, Hibiscus esculentus, may be substituted.—*Beng. Phar. p.* 277.

(5099) MALLOW WORTS. MALVACEÆ. A family of plants, extremely numerous in species many of which are employed in different countries as sources of commercial products, the genera *Malva*; Hibiscus: Sida; Althœa; Lavatera; Urena and Gossypium, yielding tenaceous fibre suited for cordage and other purposes.

(5100) MALPIGHIA COCCIFERA. MALPIGHIACEÆ. A small stunted shrub, with leaves resembling the box; common in gardens.

(5101) MALPIGHIA HETERANTHERA. A handsome shrub of the genus malpighia, with leaves like the holly, and nearly related to the Barbadoes cherry, is occasionally cultivated in European gardens.

(5102) MALPHIGIA PUNICIFOLIA. BARBADOES CHERRY. An ornamental shrub introduced from the West Indies. Hort. Garden, 25.

(5103) MALT.

Mout, DUT.	Maltum, LAT.
Mal, Bledgerme, FR.	Solod, RUS.
Maly, GER.	Cebada retonada o entallecida, SP.
Malto, IT.	

The term malt is employed to designate grain, which, being steeped in water, is made to germinate to a certain extent, after which the process is checked by the application of heat. This evolves the saccharine principle of the grain, which is the essence of malt. Rice, and almost every species of grain, has been used in malting; but in Europe, and especially in England, malt is almost entirely prepared from barley. It is the principal ingredient in the manufacture of beer, and is little used except in brewing and the distillation of spirits.—*McCulloch. Faulkner.*

(5104) MALTHA, SEA WAX. A solid, whitish, inflammable, vegetable substance, not unlike tallow, and may be impressed with the nail. It swells when heated, and on cooling assumes the consistence of white cerate. It affords a better light than petroleum, and emits a less disagreeable smell. It is found on the surface of the Baikal lake in Siberia, at the foot of the mountains of Bucktiari in Persia, and other places.

(5105) MALVA CUNEIFOLIA. This is an annual found growing in single plants here and there all over the Burmese country, but chiefly in the jungle. It affords a strong yellowish white fibre, but from the scattered way in which it grows in a wild state, it would be difficult to collect it in any quantity.—*McClelland.*

(5106) MALVA MAURITIANA.

Kungee ke pat, LAT.

The seeds of this are brought from Hydrabad. It is cultivated in most parts of this country, may be used.

(5107) MALVA MINIATA. This is an extensive genus of plants of easy culture and every variety of colour, easily propagated by seed, cuttings, or dividing the suckers.—*Riddell.*

(5108) MALVA ROTUNDIFOLIA, L. is likewise cultivated in India. V. Roxb. vol. ii. p. 181.—*O'Shaughnessy, page* 214.

(5109) MALVA SYLVESTRIS. MARSH-MALLOW.

Khabazee and Anjil, ARAB. | Khitmie, PERS.

The seed, towdric.—*O'Shaughnessy, p.* 214.

(5110) MALVA TILLÆFOLIA is a straggling annual during the rains and is found widely dispersed in Burmah. The fibre of this plant resembles jute.—*McClelland.*

(5111) MALVACEÆ. As many plants have flowers and seed-vessels which closely resemble the Mallow, they have been united by botanists into a natural family of plants, which they have called *Malvaceæ*, or Mallow-worts. Some other families, such as the *Tiliaceæ* or Linden Tribe elsewhere described, and the *Sterculiaceæ* and *Byttneriaceæ*, also noticed, having also a considerable resemblance to each other and to the *Malvaceæ*, have been further grouped into a larger class which has been called *Malavales*. These groupings are interesting, inasmuch as they bring together, though in these different families, a number of plants which resemble each other in properties; for the greater number of the species not only abound in mucilage, but their barks in fibres which are manufactured into cordage. Of these, numerous instances are mentioned in these pages, but still more will probably remain to be enumerated and reported on by subsequent observers; and, therefore, colonists in tropical countries may search among these for fibre-yielding plants with considerable certainty of finding many possessed of very valuable properties. The family of Malvaceæ or Mallow-worts is extremely numerous in species, which abound chiefly in tropical parts of the world in the form of trees and shrubs, though species, as the Mallow and Marsh Mallow, do extend to temperate climates. The known fibre-yielding plants belong to the genera *Malva, Hibiscus, Sida, Althœa, Lavelera, Urena*, &c.; besides *Gossypium*, the genus yielding Cotton. Of these many are employed in different countries for yielding fibre for cordage and for other purposes. *Royle Fib. Pl. p* 254. *Urena lobata* and *U. sinuata*, two weeds also belonging to the family Malvaceæ the one called *bun-ochra* and the other *kunga*, are common in most parts of India, also abound in strong fibre and a tolerable fine substitute for Flax.

If the common Mallow (*Malva sylvestris*, &c.,) of Europe, or the Marsh-mallow (*Althæa officinalis*), are examined, it will be found that they abound in fibre; others of these genera are valued for their fibres in different countries. as *Malva crispa* is said by Cavannilles to have its fibre separated in Syria, and *Althæa cannabina*, is sometimes so employed in the South of Europe; so *Lavatera arborea*, or Tree Mallow, will be found to abound in fibre.—*Royle, Fib. Plants.* The *Malvaceæ*, or *Mallow-worts*, are a large natural order of Exogenous Plants, the distinguishing marks of which are polypetalous flowers, monadelphous stamens, unilocular anthers, and a valvate calyx. They also have alternate leaves, the hairiness of which, if present, is usually stellate; and conspicuous stipules. A large proportion of the order consists of herbaceous or annual plants, inhabiting all the milder parts of the world, but much the most plentiful in hot countries, where alone a comparatively small number of species become trees. In many cases they are remarkable for the large size and beautiful colours of their flowers, which are however fugitive, expanding for a single day only; but the great number of them and the regularity of their succession during the flowering season make this of little importance. Among the very numerous species several are of essential service to man. As emollients they are well known in medical practice, the Marsh-Mallow (*Althæa officinalis*) being one of the most useful among this kind of remedial substances, and a large proportion of the whole order being capable of supplying its place. The hairy covering of the seeds of the various species of *Gossypium* forms the raw cotton so important to manufacturers. *Malva tricuspidata* is used by the negroes in the West Indies as a substitute for soap. The seeds of *Hibiscus abalmoschus* are warm and musky, and are employed in perfumery as a substitute for musk; those of *H. esculentus* form the ochra, so much used in hot countries as a mucilaginous ingredient in soups. A few species are acid, especially *H. sabdariffa*. Finally the tenacious fibres procured from the inner bark of many kinds of Malvaceous Plants form a good description of cordage. *H. elatus* and *H. tiliacea*, and several kinds of *Sida*, are principally used for this purpose. The order is related to *Sterculiaceæ* and *Byttneriaceæ*. There are 37 genera and 1000 species. The only modern systematical account of the genera and species of the order is to be found in the first volume of De Candolle's 'Prodromus;' but the genera have been since constructed upon principles so much more precise, and the number of species has been so very considerably increased, that this enumeration is of little use at present. There is a good account of Indian species in Wight and Arnott's 'Prodromus Floræ Peninsulæ Indiæ Orientalis;' of Brazilian species in Auguste de St. Hilaire's 'Flora Braziliæ Meridionalis;' and of Mexican kinds many are described in the various volumes of the 'Linnæa.' A few African species are also to be found in Guillemin and Perrottet's 'Flora Senegambiæ,' vol. i.—*Eng. Cyc.*

(5112) MAMEERA MAMEERAN, are of two different kinds in the Lahore bazaar, the one from Cashmere, the other from China, called Khutai (Scythea). The latter is officinal all over the East, being much used by the Hakims, who deem this root to be a specific in ophthalmies; but, they say, that the genuine drug is seldom to be met with, and this I believe, as it has many substitutes. (Chelidonium majus and Glaucum.) Dr. Royle affirms Ranunculus ficaia or ficaria to be the plant from which the Cashmerean mameera is produced. Both, sorts are used, in general externally, and in composition with other dugs, are applied to the eyes as a dry collyrium.—*Honigberger, p.* 304.

(5113) MAMMALIA, MAMMALS, a term employed by Linnæus to designate those animals which suckle their young, and which seems preferrible to the term Mammiferes generally used by the French zoologists. Mammals are vertebrated animals whose blood is red and warm, and whose system of circulation is double; whose fœtus, in most species, is nourished in utero by means of a placenta; whose young, when born at the proper period, give signs of life at their birth, and are in a state of nature, afterwards fed with milk secreted by the mammæ of the mother till they are old enough to procure their food, or to have it supplied from other sources. Linnæus, who makes the *Mammalia* the first class of the Animal Kingdom, gives the following definition:—Heart with two auricles and two ventricles; blood warm, red; lungs respiring reciprocally; jaws incumbent, covered: armed with teeth in most; penis intrans, viviparas, lactiferas; senses—tongue, nostrils, eyes, ears, papillæ (touch); covering—hairs, &c.; support (fulcra)—four feet, except in those which are entirely aquatic, in which the posterior feet are bound together (compedes) into the fin of the tail; a tail in most. This class Linnæus divides into orders, principally resting on the bases of dentition. His name for the incisor teeth is Primores; for the canine or cuspidate-teeth, Laniarii: and for the back or grinding teeth, Molares. The orders, which are six in number, are comprised in three sections, depending on the nature of the extremities;—1. The *Unguiculata*, containing the orders *Bruta*, *Glires*, *Primates*, and *Feræ*. 2. The *Ungulata*, comprising the *Belluæ* and *Pecora*. 3. The *Mutica*, consisting of the order *Cete* (Whales) only. 1. The *Primates* consist of the genera *Homo*, *Simia*, *Lemur*, and *Vespertilio*. 2. The *Bruta* comprises the genera *Elephas*, *Trichechus*, *Brachypus*, *Myrmecophaga*, *Manis*, and *Dasypus*.

3. Under the *Feræ* are arranged the genera *Phoca*, *Canis*, *Felis*, *Viverra*, *Mustela*, *Ursus*, *Didelphis*, *Talpa*, *Sorex*, and *Erinaceus*. 4. The *Glires* embrace the genera *Hystrix*, *Lepus*, *Castor*, *Mus*, *Sciurus*, and *Noctilio*. 5. The *Pecora* comprehend the genera *Camelus*, *Moschus*, *Cervus*, *Capra*, *Ovis*, and *Bos*. 6. To the *Belluæ* belong the genera *Equus*, *Hippopotamus*, *Sus*, and *Rhinoceros*. 7. Under the order *Cete* are arranged the genera *Monodon*, *Balæna*, *Physeter*, and *Delphinus*. The following Table exhibits the geographical distribution of the species of *Mammalia* contained in the collection of the British Museum, one of the most extensive collections in the world:—

	Europe.	North Asia.	South Asia.	Africa.	North America.	Tropical America.	South America.	Australasia.	Not known.
PRIMATES.									
Simiadæ	1	—	27	32	—	—	—	—	—
Cebidæ	—	—	—	—	—	41	—	—	—
Lemuridæ	—	—	3	14				—	—
Galeopithecidæ			1	—	—	—	—	—	—
Vespertilionidæ	14	—	47	19	1	42	—	11	7
FERÆ									
Felidæ	13	5	70	47	21	15	5	1	—
Ursidæ	1	—	6	—	4	5	—	—	—
Talpidæ	10	1	12	14	1	—		—	
Macropidæ	—	—	3	—	1	8	—	79	—
Phocidæ	3	—	—	—	1	—	3	1	—
CETE.									
Balænidæ	3	—	—	1		—	—	—	—
Delphinidæ	4	—	4	3		—		1	3
Manatidæ	—	—	—	1	—	1		—	—
Halicoridæ	—	—	1	—		—	—	—	
Rytenadæ	—	—	—	—	—	—	—	—	—
GLIRES.									
Muridæ	11	1	19	20	10	10	1	14	—
Hystricidæ	1	—	1	1	1	15	2	—	—
Leporidæ	5	4	6	4	5	—	—	—	1
Jerboidæ	7	7	43	19	24	4	1	—	—
Aspalacidæ	1	1	3	6	2	1	—	—	—
UNGULATA.									
Bovidæ	8	8	36	49	6	2	2	—	1
Equidæ	—	1	—	3	—	—	—	—	—
Elephantidæ	1	—	6	11	—	3	—	—	1
Dasypidæ	—	—	2	3	—	9	—	3	—
Bradypdæ	—	—	...	—	—	4	—	—	—
Total	83	28	290	247	89	200	14	110	13

Mammalogy is the science which has for its object the study and classification of animals with mammæ, or beasts, that is to say, Man, and Quadrupeds properly so called, including the Quadrumanous Animals and Whales. The objects of this science are numerically much less than those which constitute the other classes of animated beings; their bulk, as compared with that of the others, is generally speaking of greater volume, and their structure is more readily laid open by the knife of the zootomist; whilst, with the exception of those passages by which nature gradually passes from one form to another, their differences are more strongly marked. The habits too are better known, and consequently they afford materials for classification capable of a comparatively certain arrangement. To a certain extent the knowledge of *Mammalia* and their nominal distinctions, as regards their habits and economic uses, must have been of the earliest date. The Holy Scriptures abound with passages to confirm this statement, if indeed it needed confirmation. Ancient monuments too, long anterior to the times of the Greeks and Romans, speak the same language. When we come down to the time of Aristotle, we find that the science had not proceeded further than a knowledge of the external and internal structure of these animals, without any attempt at a systematic arrangement of them. If we descend lower, we find the science in the same state whether we consult the works of Pliny or of the other ancient writers who followed Aristotle. Our limits will not permit us to do more than allude to the authors, and they were not few, who entered upon this branch of the science after Ray. Of these Seba may be considered one of the principal, and his work is justly appreciated for the number, and generally speaking for the accuracy of the well-executed plates which illustrate his voluminous work. But there then arose one who was eminently distinguished from the crowd of zoological authors. Linnæus, an outline of whose system is given above, fixed the science upon a basis which his penetrating genius immediately saw was the secure one. He may be said to have invented a language admirably adapted to the wants of that science; and it is in this department that the great Swedish naturalist shines pre-eminently as a zoologist. In vain was the splendid genius of Buffon arrayed against him and his pupils; in vain did Klein, who seemed to live for no other purpose than to attack the Swede, publish his 'Quadrupedum Dispositio brevisque Historia Naturalis' (1751), wherein he separated the *Mammalia* into two groups, the Ungulated and the Unguiculated, each consisting of five families; in vain did Brisson (1756) publish his 'Animal Kingdom divided into Eleven Classes,' containing 18 orders and 42 genera, some of the latter well defined and still admitted; the philosophical system of Linnæus daily gained ground, and at length became almost the universal language of zoology.—*Eng. Cyc.*

Notices of the more important of the Mammals of Southern and Eastern Asia will be found entered under their several heads, but we give here a Catalogue of the Species of Mammalia found in the Southern Mahratta Country; with their Synonimes in the native languages in use there, —By Mr. WALTER ELLIOT, of the Madras Civil

Service, and October in the Madras Literary Society's Journal, July 1839. The district of India, in which the animals contained in the following list were procured, is a part of the high table-land towards the south of the Dekhan, commonly called the Southern Mahratta Country, and constitutes the British zillah of Dharwar. It ought, likewise, geographically speaking, to include the small province of Sunda, which, according to the political arrangement of the country, is placed under the zillah of Canara, in the presidency of Madras. The general boundaries are the rivers Kistnah and Bhima on the north and N. E.: the Tumbhoodra river on the south; the Nizam's territory on the east, and the Syhadri range of mountains on the west The latter are generally called the Ghats; a term which however properly applies only to the passes leading through them. The general face of this tract is much diversified, and affords a great variety of elevation and of geological structure, thereby materially affecting the distribution and the habitat of the different species of animals existing within its limits. The whole of the western portion is a thick forest, extending from the outskirts of the mountainous region of the Ghats to their summits, and clothing the valleys that extend between their different ridges. It abounds with the teak and various other lofty forest trees, festooned by enormous perennial creepers. The bamboo forms a thick and luxuriant underwood in some places, while others are entirely open, and the banks of many clear and rapid streams flowing through it, abound with the black pepper plant, the wild cinnamon and other oderiferous shrubs. Portions of this forest are often left entirely untouched by the axe or knife, forming a thick impervious shade for the growth of the black pepper, cardamom and Mari palm—(*Caryota urens*). These are called *kans* and are favourite resorts of wild animals. To the east of the regular forest lies a tract called the *Mulnad*, or *rain-country* (though the natives of the plains often include the *jhari*, or *forest*, under the same denomination), in which the trees degenerate into large bushes, the bamboo almost entirely ceases, and cultivation, chiefly of rice, becomes much more frequent. The bushes consist chiefly of the *karunda*, the *pallus*, &c. It abounds in tanks and artificial reservoirs for purposes of irrigation. East of the Mulnad is a great extent of alluvial plain, producing fine crops of wheat, cotton, maize, millet, &c. [Holcus sorghum, Panicum Italicum, Cicer arietinum.] And on the Nizam's frontier are found a succession of low dry hills, with tabular summits, often rising in abrupt scarped precipices, and intersecting and traversing the plains in various directions. They are clothed with low thorny jungle of *babul* and *acacia*, and their bases, and the valleys between, composed of a light sandy soil, are cultivated with millet vetches, &c. [Panicum spicatum, Panicum miliare, Phaseolus max, Phaseolus mungo, &c.] The first or mountainous division consists chiefly of micaceous, clay, and other schists, which to the northward are succeeded by basaltic or trap formation. The Mulnad is composed of undulating clay-slate hills, which become covered with basalt to the north. This trap formation extends in a slanting direction from S. W. to N. E. nearly coinciding with a line drawn from Sadasheaghur on the coast, to Beejapoor and Sholapoor—and, what is remarkable, is almost coincident with that marking the separation of the two great tribes of the population using totally distinct languages,—the Mahrattas and Canarese. The hills to the N. E. and E. are all of primitive sandstone sometimes resting on schists, sometimes immediately on granite, which latter is the rock nearest the surface in the central and eastern plains. But a well defined range of hills to the S. W., called the Kupputgud, is entirely composed of micaceous and clay slates, resting on granite. The hills more to the N. and N. W. are basaltic. The extensive plains lying between these different lines of hills and eminences are composed of the rich, black mould, called *regur*, or cotton ground, resulting from decomposed basaltic rocks. To the N. E. a considerable tract of limestone is found, resting on the sand stone, about Bagalcote, Badami, Hungund, Mudibihal, &c. The distribution of species throughout these different tracts is shown in the following table: those marked are confined to one tract only.

Distribution of Species.

Common to all.	Mountain Forest.	Mulnad.	Black Plains.	Sandstone Hills and red sandy soil.
Simia radiatus	Simia Entellus	Cynopterus Marginatus	Canis Lupus	Simia Entellus (rare)
Rhinolophus	* Mangusta Vitticollis	Megaderma Lyra or Carnatica	—— Aureus	Cynopterus marginatus
Vespertilio	* Felis Wagatee	Rhinolophus Speoris	—— Bengalensis	* Rhinopoma Hardwickii
Pteropus edulis	Mus Longicaudatus	———— Marinus	Felis Jubata	Rhinolophus Speoris
Ursus (Prochilus) labiatus	Sciurus Palmarum	———— Fulgens	—— Chaus	* Taphrozous ——
Sorex Indicus	* —— (*dark variety*)	Canis Lupus	Mus Indicus, (black variety)	Canis Lupus
Lutra Nair	* —— Maximus	—— Aureus	—— Mettade do.	—— Aureus
Canis ferus Dukhunensis	* Pteromys Philippensis	—— Bengalensis	—— Musculus Indicus	—— Bengalensis
	Manis Pentadactyla			Hyæna Vulgaris
				Felis Jubata

Common to all.	Mountain Forest.	Mulnad.	Black Plains.	Sandstone Hills and red sandy soil.
Hyæna vulgaris	* Elephas Asiaticus...	Felis Jubata.....	* Antilope Cervicapra.....	——"Chaus
Viverra Indica or Rasse	* Moschus Memina...	—— Chaus.....	* Damalis Risia... ...	Mus Leggyade
Paradoxurus Typus. ...	Cervus Hippelephas.	Hyœna Vulgaris	.....	—— Budoga
Mangusta Grisea	—— Axis...	Mus Indicus (red variety, rare)	.....	—— Gulandi
Felis Tigris...	* Muntjak.....	—— Mettade, (rare)	.....	—— Longicaudatus
—— Pardus...	* Bos Gaurus or Frontalis...	—— Leggyade	.....	—— Musculus
Mus giganteus...	.....	—— Budaga...	.....	Gerbillus Indicus
—— Rattus.....	.....	—— Gulandi...	.....	Cervus axis
—— Decumanus... ...	.....	—— Longicaudatus ..	.....	* Antilope Arabica
Sciurus Palmarum.....	.....	—— Rufus..... ...		
Hystrix cristata.....	.....	—— Musculus Indicus.....		
Lepus Nigricollis... ...	.....	Gerbillus Indicus....		
Sus Scrofa ferus... ...	.....	Manis Pentadactyla ..		
		Cervus Axis...		
		* Antilope quadricornis.....		

(5114) *Simia* (*Macacus*) *radiatus.*—*Cercocebus Radiatus*, Geoff.

Koti, Munyga, Munga,	Can.	Bandar, Dek. Makada, Mah. Kerda, do. of the Ghats.

This species abounds over the whole country, sometimes inhabiting the wildest jungles, at others living in populous towns, and carrying off fruit and grain from the shops of the dealers, with the greatest coolness and address.—*Elliot M. L. S. J. July* 1839, *p.* 95.

(5115) *Simia* (*Semnopithecus*) *entellus.*—*Cercopithecus entellus*, Geoff.

Moosya, Can. Langur, Dek.	Wanur, Mah.

The black-faced monkey of Europeans,—Abounds more particularly in the forests, where its loud wild cry is particularly striking. They are both useful and troublesome to the sportsman, who may often judge by their agitation and chattering of the vicinity of some beast of prey; while he himself is apt to be assailed in a similar manner when trying to steal upon the more timid kinds of game. The species is celebrated in Hindu mythology, for having, under their leader Hanuman, assisted the hero and demi-god Rama, the first Hindu conqueror of the forests of Southern India, as related in the Ramayana. The *Entellus* appears to want the check pouches characteristic of *Semnopithecus*. An adult male measured, from muzzle to insertion of tail, 1 foot 10½ in.—length of tail alone 3 feet 2½—height from heel to crown 3 feet 2½—weight 22 lbs.—do. of an adult female 18 lbs.—*Elliot M. L. S. J. July* 1839, *page* 95.

(5116) *Pteropus edulis medius.*—*Pteropus Medius*, Temminck; *Monog. de Man.* 1. 176.

Toggal Bawli, Can. Sikatyelle, Do. of the Wuddur caste.	Guddal. Dek. Barbagal, Do.

The flying-fox of Europeans. Its flesh is esteemed good eating. The tongue of this animal is remarkable, being covered with large papillæ, pointing backwards, and each one terminating in a brush or collection of bristly points. Length of the male, 12 to 13 inches—weight 29oz—of a female, 20 oz. Expanse of wings upwards of 4 feet. When disturbed during the day, they fly slowly round and round, with a low screaming noise, and soon settle again; hovering for a moment over a bough, they catch suddenly with the claw on the angle of the wing, and, allowing the body to drop, they swing with a single hold. They vary considerably in shade and colour.—*Elliot. M. L. S. J. July* 1839.

(5117) *Pteropus* (*Cynopterus*) *marginatus*, Fr. Cuvier.—*Pteropus marginatus*, Temminck; *Monog. de Mam*, I. 202. Length, 4½ inch. Weight, 2oz. a male. The dentition agrees with the statement of Fr. Cuvier, which he adopts as the character of his genus *Cynopterus*. Incisors $\frac{4}{4}$ canines $\frac{1}{1}$ $\frac{1}{1}$ molars $\frac{4}{5}$ $\frac{4}{5}$ = 30; is somewhat rare; found in clusters on the folded leaves of the plantain, the palmyra, &c.—*Elliot M. L. S. J. July* 1839.

(5118) *Vespertilio* (*Megaderma*) *carnatica*? —New species? *M. lyra.*

General name for all bats, Kankapeli, Can.	Shamgidar, Shab parak, Dek.

This species differs from the dentition commonly assigned to *Megaderma*, in having incisors $\frac{2}{4}$ canines $\frac{1}{1}$ $\frac{1}{1}$ molars $\frac{3}{5}$ $\frac{3}{5}$=24; whereas the molars according to the Geoffroy are $\frac{4}{5}$ $\frac{4}{5}$. Above, mouse colour; beneath, paler. Nasal appendage, large, oblong, reaching to the base of the ears, with a plait or fold down in the centre. Oreillon cordate, the anterior lobe high and pointed, the posterior rounded; the muzzle truncate, the under lip cleft. Four mammæ. Female generally larger. Temminck states that the females and young of some bats live apart from the males at certain seasons, which may account for this. Mon. de mam. Tom. ii. p. 5.

	Female.	*Male.*
Length.....	3½ inches	3 inches.
Expansion of wings.	19½	18
Ear (behind),.....	1 2/10	
Ear (before),.....	1 4/10	
Carpus	2½	
Tarsus, ...	1-3½10ths.	
Head,.....	1½	
Additional length of the interfemoral membrane,	1½	
Weight,.....	1oz. 10drs.	1oz. 3drs. 10g.

These were the largest dimensions ascertained from 14 females and 7 males, obtained at various times. They are common in the Mulnad, in old temples, caves, &c.

(5119) *Vespertilio* (*Rhinopoma*) *Hardwickii.*

	Male.	Female.
Weight...	10 drs.	8 drs. 13 grs.
Length of body,.....		2 6/10 inches,
——— tail.....		2 5/10
		5 1/10
——— carpus		2 4/10
——— tarsus		2 5/10
Expanse of wings...		13.

This is probably the species already described by General Hardwicke, but the means are not at hand of verifying his description. The species has the muzzle long, thick, truncated and surmounted with a small leaf. Oreillon oblong, bi-acuminated; forehead concave, with a fossa or channel running down the centre. The nostrils are placed in the truncated plane of the muzzle, being covered with a membrane slit transversely, and with a small round puncture in the middle of the slit. By means of this apparatus the animal is enabled to open or shut its nostrils at pleasure. The leaf-like process rises from the same plane of the muzzle. Found in old ruins to the eastward of the province.

(5120) *Rhinolophus*, Geoff. This, and the two following species, seem to form a subdivision of the section *Rhinolophus* (Geoffroy), differing in the number of teeth and having in common a remarkable peculiarity common to all, not included in his specific characters, which may be described as a circular cavity, or sac, behind the nasal crest. This cavity the animal can turn out at pleasure, like the finger of a glove; it is lined with a pencil of stiff hairs, and secretes a yellow substance like wax. When alarmed, the animal opens this cavity and blows it out, during which it is protruded and withdrawn at each breathing. Temminck notices it under the name of a syphon, or purse in *R. Insignis* and *Speoris*. Dentition, incisors 2/4; canines 1/1 1/1; molars 5/5 5/5 28; whereas in Geoffroy's group the molars are 5/5 5/5, and the total number 30. But Temminck makes them vary from 4/5 to 5/6. The upper incisors are distant, placed near the canines and triangular, broad at the edge and sloping to the root, the lower ones are close together, crenelate at the edge, each having three points. In all other respects, the characters are the same as *Rhinolophus*. Nose furnished with a complicated crest. Ears distinct, marked with transverse distinct wrinkles. Interfemoral membrane large. Warts on the pubes.—*Elliot M. L. S. J. p.* 98. *July* 1839.

(5121) *Rhinolophus speoris ?—R. Crumenifere*, Peron.—*R. Marsupialis*, Geoff.—*R. Dukhunensis*, Sykes. Ears large, erect, acuminate, rounded to the base. Muzzle short, crest very complicated, consisting of a simple transverse membrane, or leaf extending between the eyes, behind which is the circular sac. In front is a cavity, in which are pierced the complicated nostrils, and surrounded by another smaller membrane; the upper portion next the frontal leaf thick and fleshy, the lower, above the lip, fine. On either side without this are three smaller parallel membranes or fringes, reaching from the eyes downwards. Body short thick, of a light mouse colour. Interfemoral membrane, narrow, square, including the tail, which consists of about four joints, the half of the last joint being free at the point. Pubes naked, large, with one or two warts. Two pectoral mammæ, two inguinal. Whether the latter are false or real is doubtful. It has been said they have no lacteal glands, but I have constantly remarked them, and that they are smaller in the young female. Females with the frontal sac less developed. On a comparison of about 18 specimens, the measurement of the largest was—

	Male.	*Female.*
Length.....	2 3/10 inches...	2 2/10
——— of tail.....	1	... 1
Total.....	3 3/10	3 2/10
——— of exserted portion of tail.....	1½ 10ths.	
——— of ear.....	6/10	
——— of carpus.....	2	
——— of tarsus	9/10	
Expansion of wings.....	13.....	12½
Weight.....	6 drs. 13 grs.	6 drs.

Found in old buildings, wells, &c. The *R. Dukhunensis* of Sykes is said to differ from *R. Speoris* in the length of the carpus, but in Temminck, Monog. de Mam. T. 11. p. 17, the fore arm is stated to be shorter than the whole length, and the difference of colour is not sufficient to constitute a specific difference.—*Elliot, M. L. S. J. July* 1839.

(5122) *Rinolophus Murinus.*—New Species. Ears large, erect, rounded: muzzle short, with a tranverse frontal leaf or membrane and the sac behind it as the last, and in front a simple membrane round the nostrils. Body short, and thick. Interfemoral membrane large,

including the tail, all but the extreme tip. Pubes small covered. Mammæ as in the preceding, colour dusky brown, paler beneath.

Male.—Length $1\frac{9}{10}$; tail $1\frac{9}{10}$—$3\frac{1}{10}$; ear $\frac{7}{10}$; carpus $1\frac{6}{10}$; tarsus, barely $\frac{8}{10}$; expansion of wings $10\frac{1}{2}$; weight 4 drs. 20 grs.—The sexes nearly alike.—*Elliot, M. L. S. J. July* 1839.

(5123) *Rhinolophus fulgens.*—New Species. This resembles the last in every respect, but the membranes of the crest are more developed. Color a bright fawn above, and golden beneath. Membrane of the wings blackish.

Length $1\frac{9}{10}$; tail $\frac{9}{10}$—$2\frac{8}{10}$; ear $\frac{7}{10}$; carpus $1\frac{6}{10}$; tarsus barely $\frac{6}{10}$; expansion of wings $10\frac{1}{2}$; weight 4 drs. 24 grs.

Very rare. The above is the description of an adult male.

It cannot be identified with the *R. larvatus* of Horsfield, which it resembles in colour, because it (the *Larvatus*) has the complicated crest and dimensions of *Speoris.*—*Elliot, M. L. S. J. July* 1839.

(5124) *Taphozous* Of this only one specimen was obtained of which the description has been lost.—*Elliot, M. L. S. J. July* 1839.

Vespertilio Proper.—Two small species are common, but neither of them have been identified. —*Elliot, M. L. S. J. July* 1839.

(5125) *Vespertilio*—Ears small, sub-triangular, shorter than the head; oreillon oblong, rounded, colour above pale dusky brown, beneath lighter. Length 2 inches; tail $\frac{7}{10}$—$2\frac{7}{10}$; carpus $1\frac{3}{10}$; expansion of wings 10 inches.—*Elliot, M. L. S. J. July* 1839.

(5126) *Vespertilio*—Smaller than the last. Ears larger, rounded, nearly as long as the head. Oreillon curved and rounded at the end. Colour dark brown above and below. Length $1\frac{9}{10}$; tail $\frac{7}{10}$—$2\frac{1}{10}$; carpus 1; expansion of wings $7\frac{3}{4}$. —*Elliot, M. L. S. J. July* 1839.

(5127) *Sorex Indicus*, Geoff.

Sondeli, Can. | Chachundar, Duk.

(5128) *Ursus* (*Prochilus*) *labiatus.*—*Ursus labiatus*, Blainville.

Kaddi, Karadi, Canarese. | Reech, Dukhani.
Aswal, Mahratta. |

The peculiar dentition of this animal, distinguishing it from Gen. *Ursus*, has been remarked by Colonel Sykes. There are never more than 4 incisors in the upper jaw. I possess several crania, one of them with the milk teeth just giving way to the adult ones, all agreeing in this peculiarity. Their food seems to be black ants, termites, beetles, fruit, particularly the seed of the *Cassia Fistula*, of the date tree, &c., honey. When pursued, they carry their cubs on their back. In 1333 a bear was chased and killed having carried her two cubs in this manner, nearly three miles. It appears to be a long-lived animal. Instances are known of their living in a state of captivity for 40 years.—*Elliot M. L. S. J. July* 1839.

(5129) *Lutra Nair.*—Fr. Cuvier.

Nirnai, Can. (literally "water dog.") | ally "water dog.")
Datwai bekk Do. of the Wuddar tribe. | Hud or Hada, Mah. of the Ghats.
Pani kutta, Duk. (liter- | Jalmanus and Jalmanjar, Mah.

Elliot, M. L. S. J. July 1839.

(5130) *Canis Familiaris, (wild variety).*—*Canis Dukhunensis* of Sykes.

Jungli Kutta, Duk.

The wild dog was not known in the Southern Mahratta Country until of late years. It has now become very common. The circumstance of their attacking in a body and killing the tiger, is universally believed by the natives. Instances of their killing the wild boar, and of tigers leaving a jungle in which a pack of wild dogs had taken up their quarters, have come to my own knowledge; and on one occasion a party of the officers of the 18th regiment M. N. I. saw a pack run into, and kill, a large Sambar stag near Dharwar. I once captured a bitch and seven cubs of this species, and had them alive for some time.—*Elliot, M. L. S. J. July* 1839.

(5131) *Canis lupus.*

Tola, Can. | Landgah, Duk.

This species does not appear to differ from the common wolf. Three young ones which I had alive for some time agreed very much with the description of the *Canis pallipes* of Colonel Sykes, but several adults that I shot differed in their colours and general character. The head was large, the muzzle thicker, the colours in some cases more inclining to rufous, particularly on the fore legs; which in some cases were deep red; and the same colour was found on the muzzle from the eyes to the nose. Others have more rufous on the hind legs, together with some black on the thighs, rump, and tip of the tail. Length from muzzle to insertion of tail 36 to 37 inches; do. of tail 16 to $7\frac{1}{2}$: height at shoulder 24 to 26; length of head 10; circumference of do. 16 to 17; weight of an adult female 42 lbs. The wolves of the Southern Mahratta Country generally hunt in packs, and I have seen them in full chase after the goat antelope (*Gazella arabica*). They likewise steal round the herd of *Antelope cervicapra*, and conceal themselves on different sides till an opportunity offers of seizing one of them unawares, as they approach, whilst grazing, to one or other of their hidden assailants. On one occasion, three wolves were seen to chace a herd of gazelle across a ravine, in which two others were lying in wait. They succeeded in seizing a female gazelle which was taken from them. They have frequently

been seen to course and run down hares and foxes; and it is a common belief of the ryots that in open plains, where there is no cover or concealment, they scrape a hole in the earth, in which one of the pack lies down and remains hid, while the others drive the herd of antelope over him. Their chief prey however is sheep, and the shepherds say that part of the pack attack and keep the dogs in play, while others carry off their prey; and that, if pursued, they follow the same plan, part turning and checking the dogs, while the rest drag away the carcass, till they evade pursuit. Instances are not uncommon of their attacking man. In 1824 upwards of 30 children were devoured by wolves in the Purgunnah of Rone. Sometimes a large wolf is seen to seek his prey singly. These are called *woo-tola*, and reckoned particularly fierce.

(5132) *Canis Aureus*, Lin.

Nari, CAN.; Kolah also Shighal, DUKHANI. The native sportsmen universally believe that an old jackal, which they call *bhalu*, is in constant attendance on the tiger, and whenever his cry is heard, which is peculiar and different from that of the jackal generally, the vicinity of a tiger is confidently pronounced. I have heard the cry attributed to the *bhalu* frequently.—*Elliot M. L. S J. July* 1839.

(5133) *Canis bengalensis*, Shaw and Pennant. —*C. Kokree*, Sykes.

Konk,
Kemp nari (red jackal) } CANARESE.
Chandak nari,
Lomri, Nomri. DUKHANI. Kokri, MAHRATTA.

Length from nose to insertion of tail 20 inches; do. of tail 14 in.; weight, male 7½ lb.; female 6¼ lb.—both large specimens. Shaw's animal appears to be identical with the *Canis Kokree* of Colonel Sykes. Its principal food is rats, land crabs, grasshoppers, beetles, &c. On one occasion a half devoured mango was found in the stomach. It always burrows in open plains, runs with great speed, doubling like a hare; but instead of stretching out at first like that animal, and trusting to its turns as a last resource, this fox turns more at first and if it cannot fatigue the dogs, it then goes straight away. It is remarkable that though the brush is generally tipt with black, a white one is occasionally found, while in other parts of India, as in Cutch, the tip is always white.—*Elliot M. L. S. J. July* 1839.

(5134) *Viverra Indica*, Geoff.—*Rasse*, Horsfield.

Punagin bekk, CAN. | Kasturi, MAH.
Mushk billi, DUK.

Length from the nose to insertion of tail 22 inches; do. of tail 15¾ in.—total 37¾—weight 5¼ lb.—an adult female. Varies much in the distribution of the marks on the fur. Specimens from the Southern Mahratta Country illustrative of this variety have been deposited in the British Museum.—*Elliot, M. L. S. J. July* 1839.

(5135) *Mangusta Mungus.—Herpestes Griseus*, Desm.

Mungli, CAN. | Mangoos, DUK.

There does not appear to be any difference between the *Mangusta Mungos* and *Mangusta Cafra*, both of which are referrible to the *Herpestes griseus* of Desmarest.—*Elliot. M. L. S. J. July* 1839.

(5136) *Mangusta Vitticollis.—Herpestes Vitticollis*, Bennett, Proceed. Zool. Sec. 1835, Part iii. p. 67. A specimen of this animal was procured in the thickest part of the ghat forests by accident, in 1829, and is now deposited in the British Museum. It is very rare, inhabits only the thickest wood, and its habits are little known. Size the same as *M. Grisea*. The animal was figured, first in 1839.—*Elliot. M. L. S. J. July* 1839.

(5137) *Paradoxurus Typus.*—Fr. Cuv.

Kera bek, CAN. | Menuri, DEK.

Common in the Mulnad, living in trees, thatched roofs of houses and huts, &c.

	Dimensions.			
Male.	Ft.	inch.	Female.	Ft. inch.
Length of body...	1	10½		1 5 7/10
Do. tail..... ...	1	7½		1 6
	3	6		2 11 7/10
Length of head.....	5 8/10		.....	5 8/10
Do. ear.....	1 8/10		.....	1 7/10
Distance between the ears.	3 7/10		.....	
Length of sole of fore foot	2 4/10		.....	1 9/10
Do. do. hind do...	3 1/10		.....	2 8/10
Weight	8½ lbs		.....	5¼ lbs

—*Elliot, M. L. S. J. July* 1839.

(5138) *Hyæna vulgaris.*

Kirba,
Kutt kirba, } CAN. | Taras, DUK.

Length from nose to insertion of tail 3 ft. 6 in.; do. of tail 1 ft. 5 in.—total 4 ft. 11 in.; do. of head 1 ft. 10 in.; circumference of do. 1 ft. 8½ in.; weight 74 lb.—*Elliot, M. L. S. J. July* 1839.

(5139) *Felis Tigris*, Lin.

Huli, CAN. | Patayat Bag, DUK.
Bag, DUK. | Wahag. MAH.

The tiger is common over the whole district, breeding in the forest and mountain tracts, and coming into the open country when the grain is on the ground. In some places they do much mischief, and have been even known to carry off the inhabitants out of the villages, whilst sleeping in their verandahs during the night. The following are the largest dimensions of any tiger, male and female, killed in the Southern Mahratta Country, between the years 1829 and 1833

inclusive, and in affording a comparison of from 70 to 80 individuals.

	Adult Male. ft	in.	Do. ft.	in.	Adult Female. ft.	in.	Do. ft.	in.
Length from nose to insertion of tail,	6	2	5	6	5	3¼	5	2
—— of tail,	3	1½	3	3	2	11½	3	2
Total,	9	3½	8	9	8	2¾	8	4
Height at the shoulder,	3	2	3	0	2	9	2	9
Length from top of shoulder to end of toes,	3	7¾	3	7	3	2½	,,	,,
—— from the elbow to the extremity of the toes,	1	10	,,	,,	1	8¾	,,	,,
Circumference behind the shoulder,	4	3	3	11½	3	6	,,	,,
—— of the forearm below the elbow,	7	8	1	7	1	2¾	,,	,,
—— of the neck,	2	8	2	10½	2	1½	,,	,,
—— of the head,	2	9	3	1	3	2	,,	,,
—— of forearm above the elbow	2	3	,,	,,	,,	,,	,,	,,
Weight,	380 lbs.		360 lbs.		249 lbs.			

I have been thus particular in detailing the measurements of this species, because nothing is more common than to hear of tigers of 12, 14, and even 15 feet in length. Most persons content themselves with measuring the skins of an animal after it is taken off; and I once measured a lion of 9 feet 4 inches, which was noted by another of the party in his journal, as 11 feet: and by a third as 12—the one having measured the skin newly taken off and pulled out, the other when it was stretched to the uttermost by pegs, to dry. I do not believe that any tiger has ever been known that would exceed ten feet. The following particulars relative to the habits of the tiger were collected during several years. The female has from 2 to 4 young, and does not breed at any particular season. Their chief prey is cattle, but they also catch the wild hog, the *samber*, and, more rarely, the spotted deer. It is naturally a cowardly animal and always retreats from opposition until wounded or provoked. Several instances came to notice of its being compelled to relinquish its prey by the cattle in a body driving it off. In one case an official report was made of a herd of buffaloes rushing on a tiger that had seized the herd-boy and forcing it to drop him. Its retiring from the wild dog has already been adverted to. Though the wild hog often become its prey, it sometimes falls a victim to the successful resistance of the wild boar. I once found a full grown tiger newly killed, evidently by the rip of a boar's tusk; and two similar instances were related to me, by gentlemen who had witnessed them, one of a tiger the other of a panther. It is generally believed that a tiger always kills his own food and will not eat carrion. I met with one instance of a tigress and two full grown cubs devouring a bullock that had died of disease. I saw the carcass in the evening, and next day, on the report of tigers having been heard in the night, I followed their track, and found they had dragged the dead animal into the centre of a corn-field and picked the bones quite clean, after which they found a buffalo, killed it, and eat only a small portion of it. Another instance was related in a letter from a celebrated sportsman in Kandeish, who having killed a tigress, on his return to his tents, sent a pad elephant to bring it home. The messenger returned reporting that on his arrival he found her alive. They went out next morning to the spot and discovered that she had been dragged into a ravine by another tiger and half the carcass devoured. They found him close by and killed him also. The Bheels in Kandeish say, that in the monsoon, when food is scarce, the tiger feeds on frogs, and an instance occurred some years ago, in that province, of one being killed in a state of extreme emaciation, from a porcupine's quill that had passed through his gullett and prevented his swallowing, and which had probably been planted there, in his attempts to make one of these animals his prey. Many superstitious ideas prevail among the natives regarding the tiger. They imagine that an additional lobe is added to his liver every year; that his flesh possesses many medicinal qualities; that his claws arranged together so as to form a circle, and hung round a child's neck, preserves it from the effect of the evil eye. That the whiskers constitute a deadly poison, which for this reason are carefully burnt off, the instant the animals are killed. Several of the lower castes eat his flesh.

(5140) *Felis Pardus*, Lin.

The large variety—Honiga, CAN.
Tendwa, DUK.
Tendowa, of the Bauris or Chita catchers.
Asnea. Mahratta of the Ghats.

The smaller one—Kerkal. CAN.
Gorbacha DUK.
Bibla, of the Bauris.

Of this species there appear to be two varieties, a large and a small kind, though others are of opinion, that the smaller animal is the leopard. Col. Sykes also distinguishes two kinds of *cheta*, but considers the larger one to be the leopard. The natives distinctly recognize the two kinds by different names. Shaw says, the leopard is distinguished from the panther by its paler yellow colour, and again that the leopard is considerably the smaller of the two. Here the paler is the larger. The most remarkable difference between these seems to be that of size, but on a careful inspection, other particulars are detected. An examination of a large collection of skins, that had been brought for the Government reward, and were deposited in the office of the district, gave the following characters. The large skins measured from 4½ to 5 feet; the tail 2¾—7¾; the height appeared to be 2½; the smaller ones were 3 to 3½ ft. long; the tail 2½—6; the height was from 1½ to 2. The colour of the larger skins was generally pale fulvous yellow, the belly white, whilst others were deeper and more tawny, some being a sort of reddish yellow, without any white at all, beneath. In the *Kerkal* there is also a great variety of shade. But generally the

greater number of *Honigas* are pale coloured and of the *Kerkals* dark; whence probably the name of the latter from *kera*, dark or black. As a general rule too, the fur of the *Honiga* is shorter and closer: that of the *Kerkal* longer and looser. The character of the spots is always the same. They may be characterised as imperfect annuli, consisting of groups of spots, arranged in imperfect circles; but sometimes approximating more and becoming like trifoils ∴, squares : : or like the impression of a dog's foot, particularly along the dorsal line, and on the head, neck, shoulders, loins and legs. Where the ground colour is dark, the spots are more confused. The tail is without annuli, spotted throughout, but sometimes the spots run into each other at the end, giving the appearance of a black tip. The large variety is found chiefly among the rocky hills to the eastward, the smaller is more common in the wooded country of the Mulnad. The former is a taller, slighter, more active animal, exceedingly strong and fierce, the latter is smaller, and stouter, and varies much in size, some being not bigger than a large tiger-cat, though the skull proved them to be adult animals. The latter may be killed easily, while the *Honiga* is a very formidable assailant; and several instances occurred of as many as four men having been killed by one, before it was put *hors de combat*. The strongest marked difference of character that I observed, was in the skulls, that of the *Honiga* being longer and more pointed, with a ridge running along the occiput, and much developed, for the attachment of the muscles of the neck—while those of the *kerkal* were rounder and the bony ridge was wanting. If this character is universal and permanent, it will afford a good ground of distinction. At present I should be disposed to consider the Indian species as consisting of three varieties:

(*a.*) The larger or *Honiga*.

(*b.*) Ditto of a uniform black colour, the spots appearing when the light shines strongly on the skin, from the Malabar Coast.

(*c.*) The smaller variety or *kerkal*.

The following are the dimensions of a very large *honiga* killed in the *Mulnad*: length of body from nose to insertion of tail 4 ft. 6 in: tail 3-2; in all, 7-8; height at the shoulder 2 ft. 3½in. from ends of toes to top of shoulder 2—7; circumference of the arm below the elbow 1-3; head 7-11. This was a very large male called by the natives a *Marhoniga*, stouter than the generality of the larger kind.—*Elliot, M. L. S. J. July* 1839.

(5141) *Felis Jubata*, Lin.

Chircha, Chirtsa, CAN.	Yuz, Hindustani of the trainers.
Siwungi, do.	
Chita, DUK.	

They are caught in the district and trained to kill the *Antelope cervicapra*. They are taught always to single out the buck, which is generally the last in the herd; the *Meer Shikaries* are unwilling to slip until they get the herd to run across them, when they drive on the cart, and unhood the *cheeta*.—*Elliot, M. L. S. J. July* 1839.

(5142) *Felis chaus*, Gould.—*Felis affinis*, Gray.

Maut bek, CAN.	Waddar caste, who eat them.
Kadu bek or Kar bek,	
Bella bek, Do. of the	Jangli billi, DAK.
	Bhaoga, MAH. of Ghats.

From an examination of a number of skins deposited by me in the British Museum, Mr. Gray seems to consider the *Affinis* to be identical with *Chaus*.—*Elliot, M. L. S. J.*

(5143) *Felis. Wagatee.*

Wagati, MAH. of the Ghats.

This animal I was unable to identify with any of the species described so it may perhaps be a new one. It seems to differ both in size and colour from the *Felis Viverrinus* sent home by Mr. Heath, and described by Mr. Bennet. Proceed. Zool. Soc. 1833, Part I. p. 68. It is peculiar to the western ghat forests It approaches most nearly to the *Felis Tigrina* or *Margay*, Gm.; the *Felis Javanensis* or *Kuauk*, Horsf.; and the *Felis Diardi*. The *Wagati* (an adult male) is 26 inches long, from the muzzle to the insertion of the tail, which is nearly 11 more—in all nearly 37 inches. The colour is pale yellowish grey—darker on the back—yellowish white or pale yellow on the sides—white on the under parts of the body. The forehead has 4 longitudinal spots. In a line with these, from the vertex, four lines run to the shoulders, the outer broader, the centre ones narrower, and these two last are continued almost uninterruptedly to the tail; the others break diagonally into large longitudinal spots, which are continued in rows of smaller rounder spots to the centre of the belly. There are about six rows on each side, exclusive of the two dorsal lines. Two smaller bands run from the eye, and along the upper lip, to a throat-band running transversely below the ears. Two other similar transverse bands cross the breast with a row of spots between. The inside of the arm has two broad bands, and the soles are dark brown or nearly black. The tail is spotted on the upper half and indistinctly annulate towards the tip. It is very fierce—living in trees in the thick forests; and preying on birds and small quadrupeds. A *shikaree* declared that it drops on larger animals. and even on deer, and eats its way into the neck; that the animal in vain endeavours to roll or shake it off, and at last is destroyed.

(5144) *Mus.* The different Indian species of this family have hitherto been classed under three groups, *Mus*—*Arvicola*—*Gerbillus*. The species described are—

Mus Giganteus, ...Hardwicke.

—— Decumanus, ...Pallas.

—— Rattus, ...Lin.
—— Platythrix,.....Sykes.
—— Oleraceus, ...Sykes.
—— Musculus, ...Lin.
Arvicola Indica, ...Gray and Hardwicke.
Gerbillus Indicus, ...Hardwicke.

None of these, however, except the species common to Europe, seem to have received more than a general description of their outward form, and accordingly, on looking closer into the details of their structure, and particularly to the character of their teeth, a different disposition seems necessary. Of *Arvicola* there is no example; the species characterised by Gray having molars with flat coronals, and strong radicles, in this respect assimilating with the sub-genus *Neotoma*, established by Messrs. Say and Ord in the Philadelphia Journal.

The *Mus Giganteus* of Hardwicke exhibits similar characters, but they both differ from the Florida rat, the type of *Neotoma* (as figured), in having the naked scaly tail of the common rat, whereas in the Florida species it is covered with hair.

The *Gerbillus Indicus* of Hardwicke unites both these characters, the surface of the molars being the same as that of the two Indian species indicated above, while the tail has the same peculiarity as the Florida rat, with the addition of a tuft at the extremity. But it is separated from the latter by the length of the hind foot, and the disposition of the toes, and by the carinated upper incisors; characters peculiar to *Gerbillus*. These common points of resemblance, however, show how intimately the different groups are connected and how gradually they pass into each other. The remaining species all belong to the group of *Mus* proper, with tuberculated cheek teeth.

Of the other species, not included, that have been indicated by authors, no examples have been observed. These are *Mus Indicus* of Geoffrey, Cat. Mus. Par. Desm. VI. 299, which may perhaps be identified with Gray's *Arvicola*. The *Mus striatus* of Seba, [These II. 22.] adopted by Linnæus, Shaw, [Zool. VI. t. 133.] and the French Naturalists, [Ency. Meth. t. 68, f. 6.] has never been observed; neither has the spiny rat of Pondicherry (M. Perchal).

The species observed in the Southern Mahratta Country were—with flat molars:

a. scaly tails—short metatarsi (*Neotoma*).
Mus giganteus.
Arvicola indica.

b with hairy tail—long metatarsi (*Gerbillus*).
Gerbillus Indicus.

With tuberculated molars:

a. Covered with soft hair (*Mus*).

Mus Decumanus..... Lin.
„ Rattus..... Lin.
„ Mettade..... New sp.
„ Golundee..... New sp.
„ Oleraceus..... Sykes.
Mus Rufus..... New sp.
„ Musculus..... Lin.

b. Covered with hair and spines.

Mus Platythrix..... Sykes.
„ Boodaga..... New sp.

The first division have 3 molars in each jaw, with strong alveolar processes; the anterior or largest one divided into three sections by transverse ridges of enamel; the middle into two, and the third partly, or entirely so, as the centre ridge of enamel extends altogether, or only partly across the surface. In *Giganteus* and *Gerbillus* the enamel of the posterior molar of the upper jaw generally forms only a deep indentation. In *Gerbillus* the incisors are more prismatic, the upper ones divided by a longitudinal furrows passing down the centre. In the other two species the incisors are smooth, rounded, with a longitudinal mark on the worn under surface. The upper incisors in *Gerbillus* also are much more curved downwards than in the other two. In the former the usual and superior maxillary bones project considerably beyond the incisors; in the latter the incisors extend beyond these bones.

(5145) *Mus* (*Neotoma*) *giganteus*, Hard. Lin. Trans.—*Mus. Malabaricus*, Pennant, Quad.

Heggin, Can. | Ghons, Duk.
Pandi koku, Tel. |

The English name, bandicoot, is a corruption of *pandi-koku*, literally pig-rat. Lives in granaries and stack-yards; feeds entirely on grain. Fierce, bold, easily killed. Makes a peculiar grunting noise when frightened or angry. Female with 12 teats. Incisors dark olive green at the base; becoming yellow at the extremities.

(5146) *Mus* (*Neotoma*) *providens*.—*Mus Indicus*, Geoff.—*Arvicola Indica*, Gray.

Kok, Canarese.

It seems necessary to distinguish this species by a new name, that of *Indicus* being too general and indefinite. Geoffroy's animal is not sufficiently particularized to indicate which of the Indian species he meant; and Gray's was given under the supposition that it applied to an *Arvicala*, which he subsequently discovered it did not: Journal Zool. Soc. July 28, 1835, p. 108. The present term seems sufficiently applicable to its habit of laying up a large store of grain for its winter food. The *kok* is from 13 to 14 inches in length, and weighs upwards of 6 oz. Its figure is thick and strong, with powerful limbs, the head short and truncated, the ears small, subovate or nearly round, and covered with a fine down or small-hairs. The tail naked and nearly as long as the body, whiskers long and full. Fur long and somewhat harsh, brown mixed with fawn, the short fur softer and dusky. The colour generally being something like that of the brown rat, with more fawn or red intermixed, and

lighter beneath. In its habits it is solitary, fierce, living secluded in spacious burrows, in which it stores up large quantities of grain during the harvest, and when that is consumed lives upon the *kuryalee* grass and other roots. The female produces from 8 to 10 at a birth, which she sends out of her burrow as soon as able to provide for themselves. When irritated, it utters a low grunting cry, like the bandicoot. Incisors entirely of an orange yellow colour. The dimensions of an old male were as follows :— length of body 7 inches; of tail $6\frac{1}{2}$; total $13\frac{1}{2}$: of head $1\frac{8}{10}$; of ear $\frac{9}{10}$ths; of fore palm $\frac{4}{10}$ths; of hind $2\frac{4}{10}$ths. Weight 6 oz. 5 drs. The race of people known by the name of *Wuddurs*, or tank-diggers, capture this animal in great numbers as an article of food; and during the harvest, they plunder their earths of the grains stored up for their winter consumption, which, in favourable localities, they find in such quantities, as to subsist almost entirely upon it, during that season of the year. A single burrow will sometimes yield as much as half a seer (about a lb) of grain, containing even whole ears of *jowaree* (*Holcus sorghum*). The *kok* abound in the richly cultivated black plains or cotton ground but the heavy rains often inundate their earths, destroy their stores and force them to seek a new habitation. I dug up a winter burrow in August 1833, situated near the old one, which was deserted from this cause. The animal had left the level ground, and constructed its new habitation in the sloping bank of an old well. The entrance was covered with a mound of earth like a mole-hill, on removing which the main shaft of the burrow was followed along the side of the grassy bank, at a depth of about 1 or $1\frac{1}{2}$ foot. From this, a descending branch went still deeper to a small round chamber; lined with roots and just large enough to contain the animal. From the chamber a small gallery ran quite round it, terminating on either side in the main shaft at the entrance of the chamber; and the passage then continued down to the bottom of the bank, and opened into the plain. Near the upper entrance, and above the passage to the chamber, was another small branch, which terminated suddenly and contained excrement. But these burrows are by no means on a uniform plan. Another occupied by an adult female was likewise examined in the same neighbourhood. It was much more extensive, and covered a space of about 15 feet in length, about 8 in breadth, also in a grassy mound, of which it occupied both sides. Six entrances were observed, and there may have been more, each covered with loose earth. The deepest part of the burrow near the chamber was about three feet from the surface; the chamber raised a little above the shaft, which terminated abruptly and was continued from the upper part of the chamber. The chamber lined with roots of grass and bark of the date-tree. The branching galleries, of which there were six, from the principal shaft, appeared to have been excavated in search of food. A variety found in the red soil is much redder in colour than the common *Koku* of the black land. Another variety is said to frequent the banks of nullahs and to take the water when pursued, but the specimens I have seen differed in no respect from the common kind (of which they appeared to be young individuals), except in size.

(5147) *Mus* (*Gerbillus*) *Indicus*, Hardw.

Billa Ilei, CAN.
Yeri yelka, Tel yellka } of Wuddurs.

This species has already been fully described, and some peculiarities in its cranium have been noticed above. The muzzle appears to be more pointed than stated by General Hardwicke, who characterizes it as "very round," and the colour is always of uniform bright fawn, without any admixture of brown spots, which have never been observed. The incisors are always of a deep yellow colour; the eyes very large and full, the tail longer than the body. A large adult male measured—length of body 7 inches; of tail $8\frac{1}{10}$; of head $2\frac{1}{10}$; of ear $\frac{2}{10}$; of fore foot $\frac{5}{10}$; of hind foot 2. Wight $6\frac{5}{4}$ oz. They are said to be very prolific, bringing forth 16 to 20 at a birth, but this seems an exaggeration, and the litter probably seldom exceeds 12. It is the common prey of foxes, owls, snakes. Lives in numerous societies, making extensive burrows in the red gravelly soil of the Mulnaad, generally in or near the root of shrubs or bushes. The entrances, which are numerous, are small, from which the passage descends with a rapid slope for 2 or 3 feet, then runs along horizontally, and sends off branches in different directions. These galleries generally terminate in chambers from $\frac{1}{2}$ a foot to a foot in width, containing a bed of dried grass. Sometimes one chamber communicates with another, furnished in like manner, whilst others appear to be deserted and the entrances closed with clay. The centre chamber in one burrow was very large, which the *Wuddurs* attributed to its being the common apartment, and said that the females occupied the smaller ones with their young. They do not hoard their food, but issue from their burrows in the evening, and run and hop about, sitting on their hind legs to look round, making astonishing leaps; and, on the slightest alarm, flying into their holes. The Wuddurs eat this species also. —*Elliot, M. L. S. J. Oct.* 1839.

(5148) *Mus Decumanus*, Lin.

Manei ilei, CANARESE.
Chooha, and Ghur ka chooha. } DEKHANI.

Not so common above the Ghats as below.—*Elliot M. L. S. J. Oct.* 1839.

(5149) *Mus Rattus*, Lin. Rare.—*Elliot M. L. S. J. Octr.* 1839.

(5150) *Mus lanuginosus.*—New species.

Mettade, of the Wuddurs. | Kera ilei, CAN.

The name adopted to designate the species is taken from the word *mettade*, meaning soft, in allusion to its fur, which is fine and soft—*mettani* meaning soft in Telugu. It is also called *mettau-yelka, mettan-ganda*, from the same cause. It is about half the size of the *kok*, which it somewhat resembles. The head is short, but the muzzle, instead of being square and truncated, is sharp; the ears are larger in proportion and more ovate. The general form is not so stout. The tail is shorter than the body. The colour above is reddish brown, with a mixture of fawn; lighter beneath, close and soft, with a few longer hairs projecting. A large adult male measured:—length of body, $5\frac{6}{10}$th inches; of tail, $4\frac{3}{10}$ths; total $9\frac{9}{10}$ths; of head $1\frac{4}{10}$th; of ear $0\frac{8}{10}$th. Weight $2\frac{1}{2}$ oz. The *mettade* lives entirely in cultivated fields, in pairs, or small societies of five or six, making a very slight and rude hole in the root of a bush, or merely harbouring among the heaps of stones thrown together in the fields, in the deserted burrow of the *kok*, or contenting itself with the deep cracks and fissures formed in the black soil during the hot months. Great numbers perish annually, when these collapse and fill up at the commencement of the rains, The monsoon of 1826 having been deficient in the usual fall of rain, at the commencement of the season, the *mettades* bred in such numbers as to become a perfect plague. They ate up the seed as soon as sown, and continued their ravages when the grain approached to maturity, climbing up the stalks of *jowaree*, and cutting of the ear to devour the grain with greater facility. I saw many whole fields completely devastated, so much so, as to prevent the farmers from paying their rents. The ryots employed the *Wuddurs* to destroy them, who killed them by thousands, receiving a measure of grain for so many dozens, without perceptibly diminishing their numbers. Their flesh is eaten by the Tank-diggers. The female produces from 6 to 8 at a birth.—*Elliot, M. L. S. J. October* 1839.

(5151) *Mus hirsutus.*—New species.

Gulandi or Gulat yelka, CAN. of the Wuddurs.

The *Gulandi* is about the size of the last species, or a little larger—but differs from it in living entirely above ground, in a habitation constructed of grass and leaves, generally in the root of a bush at no great height from the ground, often indeed touching the surface. The head is longer than that of the *Mettade*, but the muzzle is blunt, rounded, and more obtuse, and covered with rough hair. The face and cheeks are also rougher than those of the other rats; the ears round and villose; the eyes moderate; the whiskers long and very fine. The tail naked and scaly, somewhat villose. The colour is an olive-brown above, mixed with fulvous; beneath yellowish tawny; sometimes paler, or light yellowish grey. A male *Gulandi* measured:—length of body, $6\frac{2}{10}$th; of tail, $4\frac{3}{10}$th; total $10\frac{5}{10}$th: of head, $1\frac{1}{10}$th; of ear, $0\frac{6}{10}$th. Weight nearly 3 oz. The *Gulandi* lives entirely in the jungle, choosing its habitation in a thick bush, among the thorny branches of which, or on the ground, it constructs a nest of elastic stalks and fibres of dry grass, thickly interwoven. The nest is of a round or oblong shape, from 6 to 9 inches in diameter, within which is a chamber about 3 or 4 inches in diameter, in which it rolls itself up. Around and through the bush are sometimes observed small beaten pathways, along which the little animal seems habitually to pass. Its motion is somewhat slow, and it does not appear to have the same power of leaping or springing, by which the rats in general avoid danger. Its food seems to be vegetable, the only contents of the stomach that were observed being the roots of the *huryalee* grass. Its habits are solitary (except when the female is bringing up her young), and diurnal, feeding during the mornings and evenings.—*Elliot, M. S. L. J. Oct.* 1839.

(5152) *Mus olerareus*, Sykes.

Meinalka, or Meina yelka, CAN. of the Wuddurs.
Marad ilei, CAN.

This species has, by mistake, been designated as *M. Longicaudatus* in the distribution list at page 94, a term applied to it in Mr. Elliot's notes, some years ago, when he believed it to be undescribed, as in fact it was at the time, but it was subsequently noticed by Mr. Bennet from a specimen taken home by Colonel Sykes. [Proceedings, Zool. Soc. July 26, 1832.—P. 121.] Its colour is a bright chesnut above, beneath pure white. Head moderate, muzzle somewhat obtuse, ears ovate, tail naked. The dimensions of a young female were:—length of body, 3 inches; of tail, $4\frac{3}{10}$ths; total $7\frac{2}{10}$ths; of head, 1; of ear, $0\frac{5}{10}$ths. The *Meinalka* is extremely active and agile, and difficult to catch. I never procured its nest, but was told by the Wuddurs it lived always in bushes or trees, up which it is able to run with great facility. Colonel Sykes merely observes that "it constructs its nest of leaves of oleraceous herbs, in the fields." Whence the designation he has adopted for it.—*Elliot, M. S. L. J. Oct.* 1839.

(5153) *Mus flavescens*,—New species. This species somewhat resembles the last, but is nearly double the size, is of a paler yellow colour, and was met with only in out-houses and stables at Dharwar, but there in considerable numbers. Habits social. It has been designated as *Mus rufus* in the list at page 94; but besides that, this term has been appropriated to other species, it does not express the particular colour so well as that now adopted. This is a pale yellowish

brown above, and white beneath. The head is long, the muzzle pointed, the ears very large, sub ovate. Dimensions of an adult male :— length of body 5½ inches ; of tail 6½ ; total 12. Weight 12½ oz.—*Elliot, M. L. S. J. Oct.* 1839.

(5154) *Mus musculus*, Lin.

Manei Buduga, CAN.

This I always considered to be the common mouse, but Mr. Gray considered a specimen given to the British Museum to differ from the European species.—*Elliot, M. L. S. J. Oct.* 1839.

Spiny Rats.

(5155) *Mus platythrix*, Sykes.

Leggyade, Kal yelka, of Wuddurs	Kul ilei, CAN.

The *leggyade* has also been described by Mr. Bennet from Colonel Sykes' specimen. [Proceedings, Zool. Soc. June 26, 1832.—P. 121.] I had proposed to call it *M. Saxicola* as better expressive of its habits, and as being exactly equivalent to its native name ; *platythrix* expressing a generic rather than a specific character. It has the head oblong, the muzzle pointed, the ears rather large, oblong, rounded. Incisors yellow. Colour light brown, mixed with fawn ; beneath pure white ; the white separated from the brown by well defined pale fawn line. The flattened spines are transparent on the back, beneath smaller, and forming with a fur a thick close covering. The dimensions of an

	Adult Male.	do.	Female.
Length of body	3 4/10 inch	3	inches.
——— of tail	2 5/10	2 4/10	
Total	5 9/10	5 4/10	or nearly 5½
——— of head	1 4/10	1 3/10	
——— of ear	5/10	,,	
——— of fore palm	,,	,, 4/10	
——— of hind palm	,,	,, 7/10	
Weight	1 oz.	15 drs.	

The *leggade* lives entirely in the red gravelly soil, in a burrow of moderate depth, generally in the side of a bank. When the animal is inside the entrance is closed with small pebbles, a quantity of which are collected outside ; by which its retreat may always be known. The burrow leads to a chamber, in which is also collected a bed of small pebbles, on which it sits, the thick close hair of the belly protecting it from the cold and roughness of such a seat. Its food appears to be vegetable. In its habits it is monogamous and nocturnal. In one earth which I opened, and which did not seem to have been originally constructed by the animal, but to have been excavated by ants, I found two pairs ; one of which were adults, the other young ones about three parts grown. The mouth of the earth was very large, and completely blocked up with small stones ; the passage gradually widened into a large cavity, from the roof of which some other passages appeared to proceed, but there was only one communication with the surface, viz. the entrance. The old pair were seated on a bed of pebbles, near which, on a higher level, was another collection of stones, probably intended for a drier retreat. The young ones were in one of the passages likewise furnished with a heap of small stones.—*Elliot, M. L. S. J. Oct.* 1839.

(5156) *Mus lepidus.*—New species.

Buduga, CAN. ; Chitta, burkani, Chit yelka, Chitta ganda, TEL. of Wuddurs.

This pretty little species resembles the preceding, but is only about one third of the size. The colour is similar, but paler, and it has the same pure white under surface, separated from the upper by an exact line. The spines are small, fine, transparent, and of a dusky tinge, tipt with fawn. The head is very long, being nearly one third the length of the body, and the muzzle pointed. The ears are large, ovate, naked. Incisors white. Tail naked, scaly. Limbs rather long, fine ; the 3 middle digits of the hind foot produced, as in *Gerbillus*, the two outer ones much shorter and nearly equal. The dimensions of an old male were—length of body 2 9/10th inch ; of tail, 2 7/10th ; total 5 6/10th ; of head 9/10th ; of ear 4½-10th ; of fore palm 2½-10th ; of hind palm 6/10th ; weight 6 drs., but in general it does not exceed a ¼ of an oz. (or 4 drs.) Lives generally in pairs in the red soil, but sometimes a pair of young ones is found in the same burrow with the old ones. Does not produce more than 4 or 5 at a birth. —*Elliot, M. L. S. J. Oct.* 1839.

(5157) *Sciurus Palmarum*, Gmel.—*Rat Palmiste*, Brisson.

a. common variety.

b. darker coloured, peculiar to the Ghats.

Alalu, CAN. Gilheri. DUK.	Urta, of the Wuddurs.

The common species is sufficiently well known ; the other, found only in the forests of the Ghats, is darker, the front and the back between the stripes reddish brown, the stripes small, narrower than in the common kind, and not extending the whole length of the back. The size of both is the same.—Length, 13 to 14 inches ; weight of males, 4 oz. 12 drs. ; females 4 oz. 11 drs. The young are born without any hair, but three dark lines are visible along the back indicating the position of the future stripes.—*Elliot, M. L. S. J. Oct.* 1839.

(5158) *Sciurus maximus*, Gmel.—*S. Elphinstonii*. Sykes.

Shekra, MAH. of the Ghats.	Kes Annalu, CAN. of the Halapyks.

I have observed the same uniformity of colour in the Ghat variety that has been described by Colonel Sykes ; but it seems doubtful whether mere difference in colour, constitutes sufficient

grounds for the formation of a new species. I have had both the black and the red kinds alive, and tame, in my possession, for months together, and I observed the most perfect similarity in their habits, cry, and in every particular except in that of colour. Though I never met with individuals of the *S. Maximus* in the forest, I have often obtained them from the people of the country, who said they caught them in the Southern parts of the mountain range. The same disposition to vary in the shade and distribution of colour has been remarked by Dr. Horsfield in the Java congener of the Indian species, the *Jeralang*, or Leschenault's squirrel, a specimen of which has been described by Geoffroy as *S. Albiceps* from a casual difference of this kind. These varieties probably depend on locality, and have given rise to a great multiplication of species. Thus we have the *S. Macrurus* : of Gmel., identified by Cuvier with *S. Maximus S. Ceylonensis* of Ray ; *S. Indicus* said to come from Bombay, &c. Fischer makes the distinction between *S. Maximus*, and *Macrurus* to consist in the former having the cheek stripe terminating simply, while in the latter it is forked. J. B. Fisch. Syn. p. 363.—*Elliot, M. L. S. J. Oct.* 1839.

(5159) *Pteromys Philippensis ?*—New species.

Pukhya or Pakya, MAH. of the Ghats.

Mr. Gray designated the specimens of this species presented to the British Museum by the specific name of *Philippensis*, and showed a former description of them under this title, the source of which I have mislaid. I cannot however find any such species indicated in Griffith's Synopsis, in Fischer's Mammalia, nor in any works to which I have access. The length of the male is 20 inches, and the tail 21=41 inches : that of the female 19, and the tail 20=39 inches. The colour above is a beautiful grey, caused by the intermixture of black with white and dusky hairs ; beneath it is white, the legs and posterior half of the tail black. The male is distinguished by an irregular patch of rufous on the sides of the neck, which in the female is a sort of pale fawn. It is very gentle, timid, and may be tamed ; but from its delicacy is difficult to preserve. Lives in the holes of trees in the thickest part of the forest.—*Elliot, M. L. S. J. Oct.* 1839.

(5160) *Hystrix leucurus*, Sykes.

Yed, CAN.		Salendra,	MAH. of the Ghats.
Sirsel,	DUK.	Saori or Chaodi,	of GUZ.
Sayal,			
Sahi ?			

(5161) *Lepus Nigricollis*, Fr. Cuv.

Malla, CAN.	Kahrgosh, DUK.
Sassa, MAH.	

(5162) *Manis crassicaudata*, Griffiths—*M. Pentadactyla*, Lin.—*Pangolin a Queu Courte*, Cuv.—*Broad-tailed Manis*, Pen.

Kowli Mah, Mah, of the Ghats.		Alavi,	of the Wuddurs-
T'hiriya do.		Alawa,	
		Shallama,	of the Bauris.
		Shalma,	

The Manis burrows in the ground, in a slanting direction, to a depth of from 8 to 12 feet from the surface, at the end of which is a large chamber, about 6 feet in circumference, in which they live in pairs, and where they may be found with one or two young ones about the months of January, February, and March. They close up the entrance of the burrow with earth, when in it, so that it would be difficult to find them ; but for the peculiar track they leave. A female that I kept alive for some time, slept during the day, but was restless all night. It would not eat the termites or white ants put into its box, nor even the large black ant (*Myrmex indefessa*, Sykes) though its excrement at first was full of them. But it would lap the water that was offered to it, and also conjee or rice water, by rapidly darting out its long extensive tongue, which it repeated so quickly as to fill the water with froth. When it first came it made a sort of hissing noise, if disturbed, and rolled itself up, the head between the four legs, and the tail round the whole. The claws of the forefeet are very strong, and in walking are bent under, so that the upper surface is brought in contact with the ground ; its gait is slow, and the back is curved upwards. After its death a single young one was found in it (Sept. 15th), perfectly formed, and about 2 inches long. The marks of the future striated scales were distinctly visible, and its long tongue was hanging out. The tongue of the old one was 12 inches in length, narrow, flat fleshy to the tip, the muscle along the lower surface very strong. The length of the animal was 40 inches. The weight 21-lbs. *Elliot. M. L. S. J. Oct.* 1839.

(5163) *Elephas Indicus*, Cuv. *Mem. de l'Inst.*

Anei, CAN. | Hathi, DUK.

The elephant is rare above the ghats, but occasionally a stray male makes his way up, and does much mischief to the rice-fields and gardens. —*Elliot, M. L. S. J. Oct.* 1839.

(5164) *Sus Scrofa*, Lin.

Handi,		Boorra Janwar,	
Mikka,	CAN.	Sur,	DUK.
Jevadi,		Dukur,	MAH.

The Indian wild hog differs considerably from the German. The head of the former is longer and more pointed, and the plane of the forehead straight, while it is concave in the European. The ears of the former are small and pointed, in the latter larger and not so erect. The Indian is altogether a more active looking animal ; the German has a stronger heavier appearance. The same differences are perceptible in the domesticated individuals of the two countries.—*Elliot, M. L. S. J. Oct.* 1839.

(5165) *Moschus Memina*, Erxleben.—*Memina*, Knox.—Ceylon p. 21.—*Pissay*, Ham. Voy. E. Ind. I. p. 261.

Berka, Burka,	CAN.	Pisei, Pisuri,	MAH. of the Ghats.

Common in the forest and even occasionally seen in the Mulnad.—*Elliot, M. L. S. J. Oct.* 1839.

(5166) *Cervus* (*Rusa*) *Hippelaphus*, Cuv.

Kadavi, CAN. Samber, MAH. and DUK.	Bara Singh Erroneously of Mahomedans, Meru, MAH. of the ghats.

There is only one species of *Rusa* found in the Western forests, which is common also to all the heavy jungles of Southern India. None of the descriptions given by Hamilton Smith to the different Indian species, under the names of *Hippelaphus*, *Aristotelis*, *Equinus*, apply exactly to it: but I have little doubt that all three are only varieties of the great Indian stag, originally described by Aristotle under the designation of *Hippelaphus*, and discriminated as such by Mr. Duvancel, in the Asiatic Researches, vol. xv. p. 174; to which it is not improbable the *C. Unicolor or Gona* of Ceylon, is also referrible. The points of distinction that have been noticed are, the characters of the horns, size, colour, absence or presence of a disk on the buttocks, canine teeth, and minute distinctions in the proportions of the bones of the skull. The horns of different individuals present great diversities of form. The only common characters are those of a basal antler, springing directly and equally with the beam from the bur; and the beam terminating in a bifurcated extremity, formed by a branch or snag separating posteriorly and pointing obliquely to the rear. But I have met with instances of medial antlers, of trifurcated extremities, and in one case, with the extremity showing a fourfold division, as in a *Samber* killed by Captain Green, Madras Engineers, in the Bellarungin Hills between Mysore and Coimbatore. Plate 4 fig. 1. The size of the Southern *Rusa* is large, sometimes exceeding 14 hands in height. The colour varies from dark greyish black or slate-black; with the chin, the inner sides of the limbs, the under part of the tail, and the space between the buttocks, yellowish white, passing into orange yellow, but never extending into a large circular disk on the buttocks. In several instances I have met with the hinds of a pale yellow or light chesnut colour. These were young individuals, but the *shikaries* always declared them to be the same as the common kind, and no other difference was perceptible. The cranium of one of these light coloured females presents no structural differences from that of a young black female. Both sexes have canine teeth in the upper jaw, springing from the suture between the maxillary and intermaxillary bones. The neck and throat are clothed with a long mane. The suborbital sinus is very large. When the animal is excited, or angry, or frightened, it is opened very large, and can be distended at pleasure. The new horns are soft and tender during the mousoon, from June to September, about which time the rutting season commences. The stags are then fierce and bold. I have seen one, when suddenly disturbed, face the intruder for a moment, shaking his head, bristling his mane, distending the suborbital sinus and then dashing into the cover.—*Elliot, M. L. S. J. Oct.* 1839.

(5167) *Cervus Axis*, Erxleben.

Sarung Saraga, CAN.	Chital. MAH. and DUK.

(8168) *Cervus Muntjak*, Zimmermann.

Kankuri, CAN. Bekra, MAH.	Jungli Bukra, DUK.

This animal does not seem to differ in any respect from the *Kijang* of the Eastern Islands. A young male of this species was in my possession for many months, and was quite tame. It was of a deep chesnut colour, which becomes browner as the animal grows older. On the face appeared the plaits or ribs of skin between the eyes, running up to the fore-head and ending in a triangular patch of stiff hairs of a dark brown colour, at the upper side of which the horn afterwards sprouted, making its first appearance in the month of August. It had white spots in front of the fetlocks of all the four legs, and a little white likewise on the chin, upper throat, inside of arm-pits and thighs, and under the tail, but none on the lower part of the throat or on the belly. It used to lick its face with its tongue, which was remarkably long and extensible, reaching back over the eyes and the whole face, and frequently uttered a short, small cry, sharper than that of a kid. It obtains its Canarese name from its habit of frequenting the *Kans*, or natural forest gardens.—*Elliot M. L. S. J. Oct.* 1839.

(5169) *Antilope cervicapra*, Pallas.

Chigri	CAN.	
Mriga, ...	SANS.	
Hurn, ...	MAH. and DEK.	
Kalweet, ...	MAH. and DEK.	The Buck.
Phundayat	MAH.	
Hurneen	MAH. and DEK.	The Doe.
Alali of the Baoris. The *Baorees* or *hurn shikarees*, called also *Aravi-Chinchers*, are a singular nomade tribe who live entirely by capturing antelope by means of springes, in which they are very successful. They also catch the Chita (*Felis Jubata*) for the *Meer Shikaries*. They wear a dress of a sort of brown coloured cloth peculiar to themselves and speak a dialect of Hindu with a very singular intonation.		the Buck.
Gundoli, of the Baoris, ...		the Doe.

Frequents the black plains, in herds of sometimes 20 or 30, each of which has only one buck of mature age, the others being young ones. The buck of the herd always drives off the others, as soon as they begin to turn black, in the course of which desperate combats ensue, by which their horns are often broken. The horns of the male in the Southern Mahratta Country seldom exceed 19 or 20 inches. The longest I have seen of a great number of specimens is 22 inches, with 4 flexures in the spiral twist; but I have seen a pair of horns from Hydrabad, 24 inches long, with 5 flexures and 50 rings or annuli; and another pair from Kattewar which were 25 inches. The rutting season commences about February, or March; but fawns are seen of all ages, at every season. During the spring months the buck often separates a particular doe from the herd and will not suffer her to join it again, cutting her off and intercepting every attempt to mingle with the rest. The two are often found alone also but on being followed always rejoin the herd. When a herd is met with, the does bound away for a short distance and then turn round to take a look—the buck follows more leisurely, and generally, brings up the rear. Before they are much frightened they always bound or spring, and a large herd going off in this way is one of the finest sights imaginable. But when at speed the gallop is like that of any other animal. Large herds are found about Hookerry, and thence towards the Kistna, keeping to the high rocky basaltic eminences, called by the Natives *mal*. It is remarkable that the gazelle is rare on these situations so well adapted to their habits. Some of the herds are so large, that one buck has from 50 to 60 does, and the young bucks driven from these large flocks are found wandering in separate herds, sometimes containing as many as 30 individuals of different ages. They show some ingenuity in avoiding danger. In pursuing a buck once into a field of toor, I suddenly lost sight of him and found after a long search that he had dropt down among the grain and lay concealed with his head close to the ground. Coming, on another occasion, upon a buck and doe with a young fawn, the whole party took to flight, but the fawn being very young, the old ones endeavoured to make it lie down. Finding however, that it persisted in running after them, the buck turned round and repeatedly knocked it over in a cotton field until it lay still, when they ran off endeavouring to attract my attention. Young fawns are frequently found concealed and left quite by themselves.

(5170) *Antilope arabica*, Hemprich and Ehrenberg. Fischer's Synopsis *b*.5. p. 460.—*A. Bennettii*, Sykes.

Budari, CAN. of southern talooks.	Chikara, DEK.
Tiska, CAN.	Porsya, of Baoris, the Buck.
Mudari. CAN. of northern talooks.	Chari, ditto. Doe.

The Indian gazelle always appeard to me to be new and undescribed, until I met with the Arabian species on the Southern and Eastern shores of Arabia in 1833; a careful examination of several individuals, both in a state of captivity, and that had been shot, convinced me that they were identical with the Indian species. And in this, I was confirmed by the opinion of M. Ruppell, formed on inspection of a stuffed skin taken home by me. They abound also in the islands of the Red Sea, particularly in Dhalak, and on the western shore about Massowa, and probably all along the Abyssinian Coast. The gazelle of the Hauran and of Syria, appeared also to be of this species; but I never had an opportunity of examining one closely. If this be the case, the *Chikara* possesses an additional interest, in being the same animal as the roe and the roe buck of Scripture. The modern name for the gazelle in Yemen is ضبي Dabi or Dzabi which is the same as the Hebrew word translated "Roe." Deut. 14, 5. It is likewise the gazelle of the Arabian poets, as appears from the common saying احور من كل الضبي "The eyes of the Dabi are the most beautiful of all." It is found on the red sandy plains, or among stony open hills, and abounds in the basaltic formation of the Dekhun, in the valleys of the sandstone formation, and generally among the jungles of the red soil to the eastward of the Southern Mahratta Country. It is never seen on the black plains, nor among the western jungles, nor in the Mulnad. It is found frequently in herds of three, generally a buck with two does; also of 5, 6, or more. The young expelled bucks are also found in separate herds like those of *A. cervicapra*. When two bucks fight they butt like rams, retiring a little and striking the foreheads together with great violence. When alarmed it utters a sort of hiss by blowing through the nose and stamps with the fore-foot, whence its Canarese name of *Tiska*. The dimensions of an adult male procured at Dumbal in the Southern Mahratta Country, the skin of which is now in the British Museum, were as follows: height at the shoulder 2 feet, 2 inches; at the croup 2 feet 4½ inches; length from the nose to insertion of the tail 3 feet, 5½ inches; of tail 8½ inches; of ear 6 inches; of horns 11 in.; of head 9 in. Weight 48-lbs. But these are by no means the largest dimensions observed. At Deesa in Goozerat, where it is much more common, I measured three crania, the dimensions of the horns of which were—

Length,	10½ in.	10¾ in.	11½ inches.
Distance between the points,	6½	6½	5
Number of annuli.	14	16	18

including the two imperfect ones near the tip. The third or largest were very little lyrated; the 2d were the strongest and thickest. I have also killed the buck weighing 51-lbs., the does weighed from 35 to 40-lbs. This is about half the weight of *Cervicapra* which varies from 90 to 100-lbs. The adult female has the horns inclining more to the rear, curved backwards, the tips forwards, slightly wrinkled at the base, the rest smooth and black, and nearly equi-distant. In both, the lachrymatory sinus is small and black. There is a dark spot on the nose, and a line from the eyes to the mouth surmounted by a light one. Knee-brushes, tail and fetlocks behind, black; chin, breast, and buttocks behind, white. Rest of the body, dark fawn deeper where it borders the white on the sides and buttocks. Ears long, 3 ridges of hair along the inner surface. Inguinal pores, 2 mammæ. Horns of the female sometimes with a few imperfect annuli, and never corresponding with each other.

(5171) *Antelope Sub-4-Cornutus* ?—New species ?—*Antelope Chikara* Hardwicke.—*Brown Antelope*, Sykes.

Kondguri, Can. | Junglibukra, Dek.

It is not improbable that the *chikara* (a name, by the way most incorrectly applied to this species, being restricted by all natives to the preceding one), the *Quadricornis* of Blainville, and the *Striaticornis* of Leach—all refer to the same animal. But the descriptions being only from isolated individuals, have not been sufficiently discriminated to determine the point. The detailed description of General Hardwicke in the Linnæan Transactions, differs in many important particulars from the characters of the Dekhan species. This is much larger, and the colour varies considerably both from the Hindostan *chikara*, in which it is of a "uniform bright bay," and in the shades of individuals of different ages in the Dekhan. The spurious horns are so small, as rarely to be met with in adult individuals, and are situated on two osseous bumps or risings (strongly marked in the cranium) from which they seem to be easily detached. These osseous risings are immediately in front of the true horns, between the orbits, rather in front of a line drawn across the forehead through the centre of the eyes, and become covered with black callous skin, after the loss of the corneous tips. The true horns are situated behind the eyes or between the eyes, and the ears, inclining backwards with a scarcely perceptible curve forwards, straight, parallel, round, smooth, thick, and strong at the base which has a few wrinkles, and tapering to a point, their colour black. Those of a very old male were 4¾ inches in length and had 3 strong wrinkles, and one imperfect one at the base. The dimensions of a young adult male were: Height at the shoulder, 2 feet 1½ inch; croup 2 feet, 3 inches; length from the muzzle to the insertion of the tail, 3 feet, 6 inches; of tail 5 inches; ear 4¼; horn 4; from the muzzle to the base of the horn, 6; of head 8; leg 1 foot, 5 inches. Weight 43-lbs. But I have found them even heavier. The doe is about the same size and has no horns, nor any bony projection above the eyes. The mammæ are four in number. The colour is brown, of various shades, not bright, but sometimes so light as to approach a dull fawn, darker than the *Cervicapra*, but not so bright and deep as in the gazelle. The shade is browner on the hind quarters, and darkest on the middle of the back. It becomes lighter on the sides till it passes gradually into white in the middle of the belly, without the well defined dark line of separation, observable in the other two species. The forelegs, particulary above the knee, the inside of the fetlocks, the nose and edge of the ears, are very dark. A narrow line between the fore-legs which gradually widens towards the hinder flanks, the inside of the arms and thighs, are white as is the inside of the ear, in which the hairs are long, and arranged in indistinct ridges. The lachrymatory sinus is long, narrow and parallel with the line of the nose. In its habits, it is monogamous, and is always found in pairs, frequenting the jungles among the undulating hills of the Mulnad. It is never found in the open country, or among the hills on the eastern side of the district, neither does it ever penetrate into the western forests. The droppings are always observed in heaps in particular spots. It is said to be fond of licking the salt efflorescence of the soil, from which habit the incisors of old individuals are often found to be much worn, and sometimes wanting altogether. —*Elliot, M. L. S. J. Oct.* 1839.

(5172) *Damalis Risia*, Hamilton Smith.—*Antelope picta*, Pallas.—*Neelgao*, Buffon and Shaw.

Maravi Can. | Ruhi, Mah.
Rojoh, Duk. |

It is found in the thick low jungles of the Rone and Chudi Pergunahs, in those of Goonjeehal near the junction of the Kistnah and Ghatparba rivers, the Mubiluhal talook, and in the Moolwar Nala towards Beejapoor, but never in the open black plains, the Mulnad, or the Ghat forests. It is comparatively rare, and is becoming more so, every day. The country people are apt to confound it with the *Sambur*; but the localities frequented by the two animals are totally different. The *Sambur* is impatient of heat, and requires shade and deep cover, the *Neelgao* is indifferent to the sun, and in the open plains, at noon, it requires a good horse and a long run to come up with it. I had a tame female of each kind for a long time in the same paddock. The *Neelgao* used to drop on its knees to feed, and attacked and defended itself by butting with the head. The *Sambur* on the other hand never knelt, and when irritated, used to rise on its hind legs, and strike with the fore-feet. In Goozerat the *Neelgao* is found in the

open, grassy plains; the herd marches in a line, the bull leading with 8 or 10 cows following.

(5173) *Bos* (*Bibos*) *Cavifrons*, Hodgson—Journal Asiatic Society Bengal, vol. VI. (1837) pp. 223, 499, 745.—*Elliot, M. L. J. Oct.* 1839. *Bos Gaurus*, Griffiths.—*Gour*, Geoff.

Kar kona, CAN. | Jangli khoolga, DUK.
Gaviya, MAH. | Uana, Do,

It is somewhat remarkable that one of the largest animals of the Indian Fauna, frequenting all the extensive forest tracts from Cape Comorin to the Himalayas, should only have been indicated distinctly, within the last two years. I have seen specimens from Tinnevelly, and likewise from the whole range of the Syhadree mountains up to Mahableshwar, and I know that the animal has been killed near Vellore, in the Sherwaroyah hills near Salem, at Aseergurh, in Kandes, Rajahmundry, and I doubt not that it will likewise be found in all the deeper recesses of the eastern ghauts, and on the banks of all the great rivers passing through them. An imperfect cranium which seems to belong to a female of this species, in the United Service Museum, is labelled thus "Head of a Bison from Kuddah, Straits of Malacca, presented by Lieutenant Colonel Frith, Madras Artillery." The following memoranda were made in 1833 in the Southern Mahratta Country at a time when I had frequent opportunities of seeing the animal. "It is called *Gaviya* by the Mahrattas, *Jungli khoolga* and *Urna* by the Mahommedans (though it has not the slightest affinity with the buffalo to which both of these names apply), and *Karkona* by the Canarese, which is of similar import, from *Kadu*, a forest, and *Kona*, a buffalo, It differs also very remarkably from the common ox, and though it approaches considerably more to the description of the bison, the name generally applied to it by English sportsmen, it exhibits marked structural differences excluding it from the Bisontine group as defined by Cuvier. These consist in the plane of the forehead being "flat and even slightly concave," and in the possession of only 13 pairs of ribs. It is not improbable that it will be found to constitute a connecting link between the Bisontine and Taurine groups. The most remarkable characters in the animal are an arched coronal, or convex bony ridge, surmounting the frontal bone, and projecting beyond it so as to make the line from the vertex to the orbit a concave sweep; the continuation which form the orbit to the muzzle is slightly convex. The other distinctive mark is the prolongation of the spinous processes of the vertebræ of the back, from the withers to the loins where they cease abruptly. These processes are 12 in number and their prolongation gives the animals a very extraordinary appearance. The largest individual I met with was killed in an island of the Kala Nuddee in the district of Soonda, in 1827. A noted shikaree, the Patel or head-man of Alloor (a Hubshee or negro descendant of some of the numerous African slaves imported in the 15th century by the Mahommedan kings of Beejapoor, and who still exist as a distinct race, in this district), called us at day light and promised to show us one of the animals described by him as a wild buffalo. Crossing the river in a canoe, we struck into the forest and soon came upon a track, which he pronounced to be that of a large bull. On this he proceeded with the steadiness and sagacity of a blood hound, though it was often imperceptible to our eyes. At times when a doubt caused us to stop, he made a cast round, and on recovering the track summoned us to proceed by a loud whistle, or by imitating the cry of the spotted deer, for not a word was spoken, and the most perfect silence was enjoined. As we advanced he pointed silently to the broken boughs or other marks of the passage of a large animal, and occasionally thrust his foot into the recent dung, judging by its warmth of the vicinity of the game. We followed his steps for three miles to the river, then along the banks towards Dandelly, where the animal appeared to have passed to the other side. Wading across, we ascended the bank of a small island covered with thick underwood, and some large trees, amongst which it had lain down, about fifteen yards from where we stood. The jungle was so thick that we found it difficult to distinguish more than a great black mass among the underwood. On firing the animal got on his legs, received two balls more, and rushed into the jungle where he became very furious, and we were obliged to shelter ourselves behind the trees, to avoid the repeated charges he made, though one ball through the shoulder which had broken the bone above the elbow, prevented his moving with facility. He then became exhausted and lay down snorting loudly and rising to charge when any one approached. A ball in the forehead caused him to roll over the precipitous bank into the river. Still however he was not dead and several balls were fired into his forehead behind his ear and the junction of the head and neck without life becoming extinct, one ball which had struck the vertebræ of the neck was taken out almost pulverized. When drawn ashore and examined more minutely, the first sentiment produced in all present was astonishment at his immense bulk and size; but on measuring his height we found him much taller than his breadth at first led us to imagine. The head is very square and shorter than in the common ox, the forehead ample, the bony ridge rising about five inches in height from the plane of the frontal bone over which it inclines. When viewed behind it rises suddenly and abruptly from the nape of the neck, from whence to the vertex it measures seven inches, the horns make a wide sweep in continuation of the arched bony

ridge, and turn slightly backwards and upwards forming an angle of about 35° with the frontal bone, the whole of the head in front, above the eyes, is covered with a coat of close short hair of a light greyish brown colour, which, below the eyes, is darker, approaching almost to black. The muzzle is large and full, and of a greyish colour, the eyes are smaller than in the ox, with a fuller pupil of a pale blue colour, the ears are smaller in proportion than in the ox, the tongue is very rough and covered with prickles, the neck is short, thick and heavy, the chest broad, the shoulder very deep and muscular, the forelegs short, the joints very short and strong, the arm exceedingly large and muscular. Behind the neck and immediately above the shoulder rises a fleshy gibbosity or hump, the same height as the dorsal ridge, which is thinner and firmer, rising gradually as it goes backwards and terminates suddenly about the middle of the back. The hind quarters are lighter and lower than the fore, falling suddenly from the termination of the ridge, the tail very short, the tuft only reaching down to the hocks. The dimensions of this individual were carefully noted as follows:—

	feet.	in.
Height at the shoulder	6	1½
Do. at the rump (taken from hoof to insertion of tail), ...	5	5
Length from the nose to the insertion of the tail, ...	9	6½
Do. do. to the end of the tail which was 2 ft. 10 in., ...	12	4½
Do. of dorsal ridge including the hump, ...	3	4
Height of do. do. ...	0	4½
Girth (taken behind the forelegs), ...	8	0
Breadth of the forehead, ...	1	3½
From the muzzle to the top of the arched bony ridge, ...	2	1¾
Distance between the points of the horns, ...	2	1
Circumference of horn at base, ...	1	7½
Between the roots of horns, ...	0	13½
Length of the ear, ...	0	10½
Circumference of the neck, ...	4	4
Depth of the shoulder (from the elbow to the end of the spinal ridge), ..	4	2½
From the elbow to the knee (i. e. the fore-arm), ...	1	5¾
From the elbow to the heel,... ...	2	7
Circumference of the arm, ...	2	6

The skin on the neck and shoulder and on the thighs is very thick, being about two inches in this one, which has already shrunk from lying in the sun. It is used for making shields, which are much prized. On examining the skeleton picked clean by the vultures, we could only distinguish thirteen pairs of ribs. The cows differ from the male in having a slighter and more graceful head, a slender neck, no hump, a less defined dew-lap and the points of the horns do not turn towards each other at the points, but bend slightly backwards, the horns are smaller too, and the frontal bone narrower, but the coronal or ridge is distinctly marked. The bulls have the forehead broader in proportion to their age. In the young bull it is narrower than in the cow and the bony ridge scarcely perceptible. The horns too in the young specimen turn more upwards. The general colour is dark brown, the hair thick and short and in old individuals the upper parts are often rather bare. That on the neck and breast and beneath is longer, the skin of the throat is somewhat loose giving the appearance of a slight dew-lap. The legs are white with a rufous tint on the back and side of the forelegs. The skin of the under parts when uncovered is a deep ochrey yellow. The cow has the legs of a purer white. The breeding season is said to be early in the year and the calves are born after the rain. The bulls are often found separate from the herd which consists generally of from ten to fifteen cows and a bull. They generally feed during the night browzing on the young grass and the tender shoots of the bamboos of which they are very fond. In the morning they retire to some thicket of long grass or young bamboos where they lie down to ruminate. When disturbed the first that perceives the intruder stamps loudly with its foot to alarm the rest, and the whole rush through the forest breaking down every obstacle and forcing their way with a terrific crash,

dat euntibus ingens
Silva locum et magno cedunt virgulta fragore.
Æn. vii. 676.

When suddenly approached in the night they start off with a loud hissing snort. In 1831, I saw a young Bison calf in the possession of some Gowlees, the owners of large herds of buffaloes in the Hangul talook. It was caught when just dropt, in the month of May, and, when I saw it, was seven months old, very tame and gentle, though timid, licking the hands of the Gowlees and frisking about with the buffalo calves. It was the same colour as the old animal, very dark brown with white legs. The head small, the forehead wanting the breadth so remarkable in the adult, and the bony ridge of the crown was hardly perceptible. The horns were just beginning to sprout, the ears were larger and rounder than those of the buffalo, the eyes a pale grey or cerulean colour. The hair on the throat was long and the dew-lap slightly indicated. No hump was perceptible, but the dorsal ridge was distinctly marked. The Gowlees say they see great numbers of Bison when pasturing their herds in the neighbouring forest. They describe them as very timid and watchful, more so than any other wild animal, always reposing in a circle with their heads turned outside, ready to take alarm. They add that they see most calves from June to October but the greatest number

about August. They do not know how long the cow goes with calf, but suppose the period of gestation to be the same as that of the buffalo, or ten months and ten days The old male drives the others from the herd at the breeding season, and the single ones seen in the jungle are young males of this description, and it is probable the very old bulls are sometimes expelled also by younger and stronger males." For the following particulars derived from the observation of the animal in the Shervaroyah hills, I am indebted to Mr. Fischer. of Salem: "The Bison ordinarily frequents the hills, seeking the highest and coolest parts, but during the hottest weather, and when the hills are parched by the heat, or the grass consumed by fire, the single families, in which they commonly range the hills, congregate into large herds, and strike deep into the great woods and valleys; but after the first showers, and when verdure begins to re-appear, they again disperse, and range about freely. In wet and windy weather, they again resort to the valleys, to escape its inclemency, and also to avoid a species of fly or gnat which harasses them greatly. In the months of July and August, they regularly descend to the plains, for the purpose of licking the earth impregnated with natron or soda, which seems as essential to their well-doing as common salt is to the domestic animal when kept in hilly tracts. The chief food of the Bison seems to be the following grasses and plants:

Yadanjan cody.....	
Vallaum pilloo.....	A apecies of Saccharum, used for thatch.
Odeserengam pilloo.....	
The cottay moottoo leaf	Ricinus Communis, Castor oil Plant.
Mullum pilloo.....	Anthystiria polystachia, Roxb.
Canavam pilloo,... .../...	Sorghum muticum, Wild Cholum.
Cheevum pilloo,...	Broom grasa (Aristida).
Cattoo Corangan, leaf, ...	A species of Convolvulus Ipomœa Staphylina?

but they will eat with avidity every species of grain commonly cultivated on the hills or plains, as the ryots find to their cost. The Bison particularly is so fond of the *avaray cottay* (*Dolichos lablab*, Ainslie), Country bean, when in blossom, that they will invade, and destroy fields of it, in open daylight, in despite of any resistance the villagers can offer. In other respects it is a very inoffensive animal, very rarely attacking any one it encounters, except in the case of a single bull driven from the herd. Such a one has occasionally been known to take up his location in some deep bowery jungle, and deliberately quarter himself on the cultivation of the adjacent villages. The villagers, though ready to assist Europeans in the slaughter of Bison, will not themselves destroy them (the inviolability of the cow extending to the Bison); and so bold does this free-booting animal become in consequence, that he has been known to drive the ryots from the fields, and deliberately devour the produce. But in general it is a timid animal, and it is often difficult to get within gun shot of them. The period of gestation is with the Bison the same as with the domesticated animal; they drop their young in the months of September and October. I once had one brought to me so young the navel string was still unseparated. I should think it was then about the size of a common country cow's calf of four months old. It seems a slow growing animal. A calf I had for three years was evidently in every respect still a mere calf. They seem very difficult to rear. I have known it attempted at different ages, but never knew the animal to live beyond the third year. Mr. Cockburn has tried it in vain, in its native climate, the Sherwaroyah hills, and I have made the attempt at Salem repeatedly. At one time I had five in my farm-yard; one lived for three years: but this one, with all the others, died suddenly in the same week from some disease, marked by refusal of food, running from the nose, and an abominable stench from the mouth. A similar disease, it may be noted, prevailed, I was informed, at the same time, among the Bison of the Sherwaroyah, Shandamungalum and Neilgherry hills. The calves I had, never became in any degree domesticated: the domesticated cow could never be induced to suckle them." I may add, that the persevering ferocity of the Bison of the Sub-Himalayan range, described by Mr. Hodgson, is quite foreign to the character of the animal in the southern forests. When wounded, it is true, it charges its assailant with determined courage, and many instances have come to my knowledge of its doing so with fatal effect, among which I may cite those of two officers within the last few years, both of whom were killed at the Mahabaleshwar hills; but in general it will always seek its safety by flight, if permitted. Of a drawing of one of these it is remarked, the figure at plate 5 is taken from an indifferent sketch made of the very old bull, described at page 229, and gives a tolerable idea of the character of such an animal, though not quite correct in all its details. The dorsal ridge is too prominent; the expression of the head, particularly about the muzzle, is too heavy, and the hoofs of the hind feet are too large, this being in reality only half the size of those on the fore-feet. Plate 6 shows the crania in front and profile of another very old bull, killed on the Neilgherry hills, now in my possession; and of a young cow. The difference produced in the shape of the horns by age is distinctly shown. The great expansion of the bull's horns is entirely the effect of age, in the young males they are most erect, and the points turned to each other, while in this individual they are altogether divergent, one being half broken off, and the point of the other worn and ragged, which is always found to be the case with adult bulls. The dimension of this cranium are—

MANGANESE.

Height from the end of the maxillary bone to the vertex, ...	Inches 22
Breadth of front between the edges of the horns, ...	13 to 14
Length of horn from base to point in a straight line, ...	21
Do. do. along the curve,	30
Diameter (longest section) inside,	6½
Do. (broadest do.)... ...	4¾
Circumference at the base, ...	18⅓
Distance between the points, ...	39

The above catalogue is confined to the animals of a single province, and does not comprise the whole number of species found in Southern India; but, from the very diversified character of its surface, it includes by far the greatest proportion.—*Elliot, Madras Lit. Soc. Journal, Oct.* 1839.

(5174) MANDRAKE. ATROPA MANDRAGORA.

Usul-ul-lufah Ustrung, ARAB.	Murdum-i-geeah, PERS.
Yebrooj, BENG.	Caat-jootie, TAM.
Mandragen, GER.	
Luckmoona, Luckmoonee, GUZ. HIND.	

The fetid root of the mandrake plant has various names, arising from its fancied resemblance to the human form. It was formerly an article of the Materia Medica, but is now exploded; though the leaves are still sometimes employed in preparing anodyne fomentations.—*Ainslie. Faulkner.* It is found in many parts of the South of Europe, is of poisonous qualities and its smell is very fetid.

(5175) MANGANESE.

Bruinsteen, DUT.	Manganesia, IT.
Manganete, Magalese, Savon du Verre, FR.	Magnesia Nigra, Manganesium, LAT.
Braunstein Glasseise. GER.	Manganesia, SP.

A very brittle metal of a dusky white colour, and without either malleability or ductility. The substance known in commerce under that name, however, is the peroxide, or black oxide of the metal. It occurs native in the Mendip hills, Somerset, in the counties of Devon and Aberdeen and in many parts of India. It is found in a variety of forms; most commonly it is of an earthy appearance, and mixed with other ingredients; but sometimes, in crystals of a black colour and metallic lustre. Peroxide of Manganese is largely consumed in the manufacture of bleaching compounds; it is also used by potters and glassmakers, and in the laboratory it is considered the chéapest material from which to procure oxygen.—*Waterston. Faulkner.* Manganese occurs very abundantly in the Madras Presidency. At the Madras Exhibition of 1857, some very large samples of the *silicated sesquioxide* were exhibited by His Highness the Rajah of Vizianagrum, who contributed two tons in blocks, weighing from 2 cwt. to 3 cwt. each. The Metal was carefully examined by Dr. Scott, who reported upon the contributions sent to the Exhibition of 1855 as containing from 53 to 54 per cent of metallic manganese. The substance is well suited for glazing Pottery, along with Galena, and Felspar. A great variety of pleasing colors can be imparted to the glaze by varying the proportions of the Manganese: thus, in small quantities it gives a yellow color, in large, brown, then a blood-red, purple or black, as the proportion of Manganese is increased. It has also the property of hardening the glaze, so as to resist vinegar and weak acids: concentrated mineral acids however will corrode it. Manganese is used in small quantities by the Natives of India in giving purple, brown, and black colours to glass for Bangles. Large samples have been shipped to England for report as to its applicability to manufacturing purposes. Some good samples of the same ore were forwarded from Kurnool, and Toomkoor in Mysore.

Peroxide of Manganese.—This substance, which occurs in the form of a compact black stone, with a smutty brown or black powder on the surface, is of more value than the preceding, being largely employed for manufacturing purposes. Good but small samples have been forwarded from Soondoor, and from Roodrar in the Coilcoontlah Talook, Cuddapah: as also from Bimlipatam. A specimen from the latter locality examined by Dr. Scott contained about 30 per cent of peroxide, which, although impure, would certainly be of some commercial value. Another specimen from Bellary was also found to contain a good deal of the Peroxide. Brown wad and brown fibrous Manganese were exhibited from the Red Hills, Bangalore and Cuddapah, ores of Manganese occur at the Neilgherries. Many of the Iron ores and Iron sands contain Manganese. —*M. E. J. R.* Captain Tremenheere has given a full report on the manganese of Mergui, on the Tenasserim; and Mr. Mason has seen specimens of manganese mixed with iron from one of the islands south of Mergui. Captain Tremenheere wrote: "During my stay at the Tenasserim coal basin, a piece of manganese ore, (black wad), of good quality, was brought to me by a Karen, who stated, that it had been found accidentally in the bank of a stream called the Thuggoo, which enters the Great Tenasserim, seventeen miles below the coal site. Subsequently, several other pieces of the same ore were brought to Mr. T. A Corbin, Assistant to the Commissioner from the the Therabuen river, five miles above the Thuggoo, and from an intermediate spot, the locality of which have been previously known, and had been, I believe, originally pointed out by Lieutenant Glover of the Madras Army. In proceeding down the river, I visited these spots, and found at each, that a valuable bed of manganese ore existed close to the surface of the country. It had been apparently cut through by

the action of the stream and river before mentioned, leaving a section of the bed of ore in their banks, covered only by the debris of the banks themselves, Large quantities might have been carried away, but a few hand specimens only were taken, which sufficiently shew the nature of the deposit, and fair samples of what might be easily collected. Of the extent of these manganese beds it is difficult to pronounce. The face of the country in which they are situated is flat, thickly overved with soil, and with the densest jungle. It is not, as far as I could perceive, intersected by many streams which would afford the means of tracing the mineral deposit. The Great Tenasserim river has passed through the manganese bed in one spot, 2½ miles removed from two other points at which it occurs to the north and south, at both of which it is likewise discovered near the surface by the action of the streams Thuggoo and Therabuen. The probability therefore, is, that it is a horizontal deposit covering many square miles, But without indulging in conjecture, there is sufficient at the localities referred to, to indicate large quanties of manganese ore which could be collected by penetrating through the soil lying above it, and immediately near the spots in which it is now exposed to the day. It occurs in the form of the black oxide, and is the manganese of commerce. It is largely consumed in Europe in the preparation of bleaching compounds, and when pure, is valuable to the manufacturer of glass. The soft black ore, No. 1, is a hydrate of the peroxide of manganese, known under the name of wad. It contains of water two equivalents, or 29 per cent: Iron, 196 grains by analysis; its specific gravity is 1.47. The specific gravity of the grey peroxide, No 4, is 1. 46."—*Mason.*

(5176) MANGEL WURZEL, FIELD BEET.

Betteraves. FR.	Bietola. IT.
Mangold Wurzel, GER.	

A variety between the red and white beet. It has been a good deal cultivated in France, Germany, and Switzerland, partly as food for cattle. and partly to be used in distillation, and in the extraction of sugar. Its culture, in Great Britain is recent, dating only from the end of the last century, and is employed almost entirely in the fattening of stock, and the feeding of milch cows.—*Faulkner*

(5177) MANGIFERA, a genus of Plants belonging to the natural order *Anacardiaceæ*. Three or four species of this genus are enumerated—as *M. fœtida* of Loureiro, a native of Cochin China and the Moluccas; *M. laxiflora*, indigenous in Mauritius; and *M. sylvatica* of Roxburgh, a native of the hilly districts bordering on Silhet, where it grows to a great size, and is called Fukshmee-Am. It bears a fruit which ripens in February and March, and is eaten by the natives, though not so palatable as even a bad mango. It is also dried and kept by them for medicinal purposes. *M. oppositifolia*, Roxburgh, a native of Rangoon, is proposed by Messrs, Wight and Arnott to be formed into a distinct genus.

(5178) MANGIFERA ATTENUATA.

Tawsa-thayet. BURM.

Scarce, but found in the Pegu and Toungkoo Forests: bark brown.—*McClelland.*

(5179) MANGIFERA FÆTIDA, HORSE MANGO. This is a large mango multiplied at Mergui, and quite a favorite with the natives. It has an odour resembling the dorian, and like that has been introduced from the Straits.—*Mason.*

(5180) MANGIFERA INDICA.

Am, BENG.	Mampalam, MALAY.
Mango, ENG.	Kapalam, LAMPUNG.
Maumedee Chettoo, TEL.	Palam, JAV.
Mango maram, TAM.	Mavena, CAN.

A tree of large growth, and generally diffused all over India, and in all the warmer parts of Asia. Is generally raised from seed though sometimes by layers or grafting by approach which are the only methods of certainly continuing a good sort, probably of improving them. The stones must be sown soon after they are taken from the fruit, otherwise they do not vegetate, but there is no depending on the quality of the fruit so raised The seed of a very superior sort will produce fruit of a bad kind. Flowering time January, February and March: the fruit is ripe in May, June and July. The kernels are large and seem to contain much nourishment, however, they are made no use of excepting during times of scarcity and famine, they are then boiled in the steam of water and used as an article of diet. The wood is of a dull gray colour, porous, yet pretty durable if kept dry, but soon decays if exposed to wet, of the effect of which it is very sensitive. In very large old trees it acquires a light chocolate colour towards the centre of the trunk, and larger branches. This is hard, closer grained and much more durable. It is generally used for constructing Massoolah boats and for packing cases, the cabinet makers at Madras prefer it to other wood for veneering on: it is also generally used where common light wood is required by Coach builders, Cabinet makers and others, being the cheapest wood obtained.—*Rohde M.S.S.* The wood has the property of holding a nail faster than any other wood I know, as those may have found who have to open chests of indigo, &c. it is one of the most common woods for backs and linings of furniture in Madras. —*Rohde.* Of this genus, the Mango-Tree, is alone of any consequence, and this as forming one of the most grateful fruits of the tro-

pical parts of Asia; it extends also as far north as 30°, and has been successfully introduced into the west Indies. The tree grows to a great size, with an erect trunk, and dark-coloured cracked bark. The wood is of a whitish or dull-grey colour, porous, yet pretty durable if kept dry. The leaves are alternate, petioled, lanceolar, entire, often a little waved at the margins, firm, smooth, shining, and having, when bruised, a pleasant resinous smell. The flowers are yellow coloured, and small, but produced in great numbers, on large terminal erect panicles. Many perfect male flowers are often found intermixed with the hermaphrodite ones. Calyx 5-leaved; petals 5, lanceolate, twice the length of the calyx, furnished in the inside with a lobed granular scale or crust; stamen, a single fertile one, with three or four filament like bodies, which represent the abortive stamens; ovary with its base immersed in the torus, obliquely oval, 1-celled, with a single ovule attached to the side of the cell; style one, from the upper edge of the ovary, curved downwards; drupe oblong, or somewhat kidney-formed, also a little compressed like a kidney, fleshy, with smooth rind, yellow or reddish when ripe, size varies, but in general about as large as a goose's egg; nut conformable to the drupe, but compressed, woody, 1-celled, 2-valved, covered on the outside with many fibrous filaments, particularly in the worst sorts; the kernels are large. Embryo between erect and transverse; cotyledons thick, fleshy; radicle opposite to hilum. The Mango is so well known as one of the most highly esteemed fruits of the East, that one is surprised to find it sometimes described as like nothing so much as a mixture of tow and turpentine. The latter is a secretion abounding in the family to which the Mango belongs, and may be secreted in larger quantities in neglected varieties, where also the filaments of the nut will likewise abound. But in well cultivated varieties the fruit is sweet and rich-flavoured, juicy, and nearly as free of fibres as a melon. The kernels contain much nourishment, but are never used for food except in famines, when they are cooked in the steam of water, and used as an article of diet. From wounds made in the bark of the tree there issues a soft reddish-brown resin, which ago hardens. Burnt in a candle, it emits a smell like that of a Cashew nut when roasting. It softens in the mouth, and adheres to the teeth. The taste is slightly bitter, with some degree of pungency. It dissolves almost entirely in spirits, and to some degree in water. The tree is generally raised from seeds which should be sown soon after they are gathered, but this is a very uncertain way of getting the finer varieties. Propagating by layers, and grafting by approach, are the only modes of certainly continuing the sorts, as well as of improving them. These have the advantage also of bearing when small in size, that is, only a few feet in height, and therefore well suited to culture in the hothouses of Europe. Sweet states "that the Mango ripens in England when the plants are of a good size. Sandy loam, or a mixture of loam and peat, is most suitable to it; and the pits should be well drained, as the plants are apt to get sodden with too much water. Fresh seeds from the West Indies vegetate freely. The plant may also be increased from cuttings, which root best in sand under a hand glass." It would be advisable also to imitate its native climate as much as possible, that is, after winter, giving it dry heat with watering for some months, and then removing it into an orchideous house in the season of ripening its fruit.—*Eng. Cyc.*

(5181) MANGIFERA. SPONDIAS MANGIFERA. Lin.

Wild Mango, Eng.	Cat Ambalam, Hort Mal.
Caat Maam pullum Tam.	Canana Amra. Sans.
Junglie Aam, Duk.	Adivie Mamedie pundoo Tel.
Condondong, Rumph.	

This fruit has got its name from its resemblance to a Mango. It is harsh and little deserving of notice. Rheede informs us that on the Malabar coast, the root of the tree is considered as emmenagogue that the bark is supposed to be of use in dysenteric affections and that a decoction of the wood is serviceable in gonorrhœa.—*Ainslie p.* 222.

(5182) MANGLETIA, a genus of Plants belonging to the natural order *Magnoliaceæ*, one of the species of which, *M. glauca*, has a white solid wood, which is largely employed in Java, and supposed to prevent the decay of corpses put into coffins made of it.—*Eng. Cyc.*

(5183) MANGO. Mangifera Indica. Lin,

Maam pullum, Tam.	Manga, Mal.
Aam, Duk.	Ampullum Malay.
Mamedie pundoo, Tel.	Amra, Sans.
Carce, Guz.	

Mango Flower.

Maam poo Tam.	Mamdie poo, Tel.
Aam ka pool, Duk.	Amra, Sans.
Thayet, Burm.	

Ainslie's Mat. Med. p, 260.

Of this fruit there is a great variety in India. Two of the most esteemed sorts are the Alphonso and the Massagong. The practice of engrafting the Mango, as first introduced at Madras, some years ago, by the late Dr. James Anderson, and since so happily followed up by Mr. Andrews and others, has improved it in so great a degree as to have gained it, and perhaps, justly, the title of "The finest of all fruits." Rumphius is of opinion that Mangoes heat the blood and produce exanthematous affections. Vide Rumphius Tom. I. Cap. XXI page 95.—*Ainslie, p.* 226. The far-famed and delicious fruit of the *Mangifera Indica* is plentiful in Bombay, the Concans, Deccan, &c. Those produced in Bombay and its immediate vicinity are held in greatest

repute. The fruit, when ripe, is served up at dessert, and when green, is used for making preserves, pickles, tarts, &c.—*Faulkner.* The Mango may be procured twice in the year only, in Bombay. Propagation may easily be effected by seed and cuttings, &c.; but the process is slow, as a tree thus raised will not bear fruit before the 5th or 6th year, whereas those that are grafted produce in the 2d or 3d, although it is injurious to the tree to let it bear so early, and the blossoms should be removed. Young grafts will sometimes, indeed very often, blossom the first season they are removed, and if allowed to bear fruit, it checks them for a length of time after. A mango graft may be applied at any time of the year, but the stock must be kept continually moist by watering. When the graft and stock have become united, the former must be partially divided by a notch with a sharp knife: this may be done after six weeks have elapsed from the time of its first being united: a second cutting may be effected a fortnight later, and the complete removal from the parent tree at the expiration of nine or ten weeks. After this, remove the graft into the shade for a fortnight longer, when it may be put into the spot where it is to remain. A graft tree never attains the size of a seedling, neither will it continue to live or bear so long, and it is doubted if the seed of a graft mango would produce the same fruit, whereas a seedling often does so. The time that a seedling takes to produce fruit is the great objection to this mode of rearing trees: nevertheless a young tree of three years old might have one of its branches brought into blossom by ringing; this would enable the cultivator to judge if the tree was worth preserving or not. The finest flavoured sorts of Mango grown in Western India, are the Alphonso, Raspberry, Mazagon, Doriah, and Malgrobah: this latter variety is of a greenish tinge inside when ripe, and by far the largest of the whole, being three times the size of an Alphonso; and it ripens the last. When the graft is planted out, it requires only a moderate proportion of care, clearing the ground of all weeds, and removing any buds that shew themselves. Within the space from the ground to where the first branches are to rise from, all superfluous and weak shoots should be removed, more particularly those from the centre of the tree, as also all branches that trail on the ground, unless required for grafting from. The tree is better for being pruned, and whenever the interior of a tree may contain superfluous branches or when there is not sufficient room for the growth of the young and fruit bearing shoots, a clear space must be provided,—and this can only be done by pruning. The best time for this operation is soon after the tree has done bearing fruit. No old and decayed wood should be allowed to remain, and great care be taken to remove on the first appearance the Borer, should they indicate their presence by their appearance on the bark. When trees are old and have their bark injured, it must be all cleared away, and the parts covered with the composition recommended for that purpose. Dr. Riddell was favoured with the following information from a friend at Aurungabad. Take slips from the healthy branch of a mangoe, at least two feet long, taking care to cut it one inch above the joint at the top and the same below the joint at the bottom. The cuttings will not all be equal, as in some branches the joints are short and in others long. The thickness of the slip is to be from three quarters to three inches in diameter. Half the length of the slip is to be slightly punctured with an awl, and then inserted into the ground to that depth (half of the slip) perfectly perpendicular; and then make a knob at the top of the slip with plain cowdung. The cuttings must be well watered in such a manner as to keep up an uninterrupted moisture in the ground; and moreover the cutting are to be well shaded, and the coverings only to be removed by degrees as the plants attain leaves and strength, and not to be transplanted on any account until the next monsoon. The slips begin to bud within a month generally, but sometimes take a much longer period. In all cases the punctures are indispensably necessary, to admit of root fibres being thrown out from them, The tree and fruit may both be improved, if, during the cold season, the ground is dug all round the roots, and by the addition of a suitable quantity of good old manure. The seed will only grow when fresh, and seldom after six weeks. From twenty to twenty-four feet of space should be allowed between each tree if a graft: double the space is required for a seedling.—*Riddell.* The Mango deserves the first place among the indigenous fruits, of Tennasserim, being, as Mr. Lindley truly says, "to the inhabitants of India what the peach is to Europeans; the most grateful of all fruits. Its flesh is filled with a rich luscious juice; but the inferior kinds have also so much turpentine flavour as to be uneatable." Unfortunately, Tenasserim Mangoes are notoriously inferior; and to say nothing of the turpentine flavor that some of them occasionally have, half, if not three fourths of all that are sold in the bazar, are worm eaten, though that is not at all apparent, when they are bought. There are two different species, Mangifera indica, and M. sylvatica, both of which the natives say grow wild, and several varieties are cultivated in the Provinces. The finest is a variety from Siam, which produces a large fruit with a very thin stone.—*Mason.* This fruit is very plentiful throughout Pegu, but more especially in the Thanwaddy and Toungboo districts.—*M'Clelland.*

(5164) MANGO FISH, POLYNEMUS PARA-

DISEUS. R. Rasul. This is a splendid fish and a favorite with many. It is nearly related to the mullets, and remarkable for the long filaments to the pectoral fins.—*Mason.*

(5185) MANGO-PICKLES, are much in use, amongst both Europeans and Natives. Take about 300 green mangoes, divide into two, and dry in the sun for three days:

Take of Turmeric, ...	4½ oz.	
Garlic, ...	3 „	3 drs.
Salt, ...	6 lbs.	
Mustard, ...	1½ oz.	

Coriander seed toasted oz. 1½: mix the spices together, and lay the mixture in alternate layers with the mangoes; and add 9 oz. of gingelly oil —*Herklots.* Indeed the green fruit of the Mango is used in making chatnies, pickles and curries. In the Bombay Territories, the mangoes when full grown are cut into slices, dried in the sun and preserved, they form an article of commerce; used in acidulating curries, mulligatawnies, &c. —*Jaffery.*

(5186) MANGOSTIN. GARCINIA MANGOSTANA.

Manggusta, MAL.	Manggis, BALI. JAV.
Manggos, LAM.	Manggisi, BUGIS.
Mangu, SUND.	

According to Crawfurd, p. 265, The plant which produces this famed fruit has not been traced to any of the Garcinias, as the parent stock, the plant is about the size of a cherry tree and very handsome. It grows in perfection as far as 14° N. of the equator and 7° south of it. A congenial proportion of heat and moisture throughout the year seems much more requisite than soil or latitude for the successful growth of this fruit.—*Crawfurd's Dict.* "Malaya's nectared mangosteen" is truly a delicious fruit, and by many esteemed as "the most palatable of known fruits," but though very delicate it is not to be compared to an American peach. It is cultivated to a considerable extent in Mergui, but is rarely seen in the northern Provinces.—*Mason.*

(5187) MANGROVE. RHIZOPHORA. Mangrove abounds on the coasts of the Bay of Bengal; the Indian Islands and at the mouth of the Indus. Its bark is employed in tanning. In the West Indies, cordage is made of the bark of a species of Mangrove, which is hence called Rope Mangrove. Its bark has been used for tanning purposes, for which it is probably more suitable than for cordage.—*Royle, Fib. Pl. p.* 301. The species of mangrove most abundant along the Tenasserim shores furnishes a hard and durable timber. The tree is easily distinguished from its associates, for it drops no roots from its branches, but the trunk is divided into numerous roots for half its height, like a small bamboo pavilion.—*Mason.*

(5188) MANGROVE MORDANT. The bark of a small tree from the mangrove swamps is used by the Tavoy women in dyeing red, but Mr. Mason thinks as a mordant.—*Mason.*

(5189) *Rhizophora gymnorhiza.*

Kayu-api-api, MAL.

Is used for fuel in the Indian Archipelago.

(5190) *Rhizophira mangle.* Common or black mangrove grows in the Indian Archipelago, and is used in tanning, its wood gives a red dye.—*Crawfurd, page* 266. The tree forms a striking feature in the physical geography of the Archipelago and does indeed of all tropical countries, for a belt of it as deep as the reach of the tide is always found wherever there is a shallow and muddy shore. The tree which rises to the height of forty or fifty feet is invariably found in such situations, constituting a dense, and almost impenetrable forest. Each tree stands on a cradle of its own roots from five to six feet high, bare at low water covered so as to give the appearance of trees growing in the sea. The mangrove jungle is the favorite resort of musquitos and crocodiles, and affords a convenient and almost inaccessible retreat to the pirate.—*Crawfurd*, 266.

(5191) MANGROVE BARK (RHIZOPHORA MANGLE), is used to dye chocolate color in the East and West Indies. This was one of the colors introduced by Dr. Bancroft, and for the exclusive use of which he obtained an Act of Parliament. It is procured in plenty at Arracan, Malabar, and Singapore in the East—*Mason.*

(5192) MANGO-GINGER. [CURCUMA.]

(5193) MANGO-TREE. [MANGIFERA.]

(5194) MANGOSTEEN. [CLUSIACEÆ.] GARCINIA.]

(5195) MANGOUSTE. [HERPESTES.]

(5196) MANGROVE. [RHIZOPHORA.]

(5197) MANIHOT. [JATROPHA.]

(5198) MANIOC. [CASSAVA.]

(5199) MANIS. [MAMMALIA.]

(5200) MANNA.

Mun, Terunjabeen. ARAB.	Manna, IT.
Manna, DUT.	Gambing, JAV.
Manne, FR.	Sheer-i khist, PERS.
Mannaesche, GER.	Manna, PORT.
Sheer-Khist, GUZ. HIND.	Kapurrimba, MAL.

The concrete juice of the *Ornus Europeus*, a species of Ash, native of the south of Europe. Other sweetish secretions exuded by some other plants are usually considered to be kinds of Manna. These appear to be all produced in warm and dry parts of the world. The kind which is most abundant is by the Arabs called Toorunjbeen, which is often translated 'Persian Manna,' and is produced by the thorny plant, called by botanists *Alhagi Maurorum*. The genus *Alhagi* (a name compounded of haj' and the article al) of botanists contains two species, *A. Maurorum* and *A. desertorum*, found in India

Egypt, Arabia, the north of Persia, and Syria. Both species are also called Oushturkhar, or Camel's Thorn. *A. Maurorum* is alone remarkable for yielding a kind of Manna, which by some authors has been supposed to be the Manna of the Wilderness; hence the plant itself was called *Manna Hebraica* by Mr. Don. The climate of Persia and Bokhara seems alone suited for the secretion of this Manna, which in the latter country is employed as a substitute for sugar, and is imported into India from Cabul and Khorassan. A second kind, which, though less abundant, is more esteemed than the former, is called Sheer Khisht, and is mentioned by Garcias under this name, and described as produced in the country of the Uzbecs. A Cabul merchant reported to Dr. Royle that it was produced by a tree called Gundeleh, which was about 12 feet high, had a jointed stem, and grew in Candahar. A third kind of Manna is called Guzunjbeen, the produce of a species of Tamarisk, called Guz, which is considered by Ehrenberg to be only a variety of *Tamariscus gallica*, growing on Mount Sinai, but which has been called *T. mannifera*: by some authors this is supposed to be the Manna of the Wilderness. It is said to be produced also in Laristan and in Irak Ajemi. A fourth kind of Manna is produced on *Calotropis procera*, called Ashur, and its sweet exudation or sugar Shukur-al-Ashur, under which name it is described by Avicenna; Zuccarun-al-Husur in the Latin translation, ch. 758. A fifth kind, called Bed-Khisht, is described in Persian works as being produced on a species of willow in Persian Khorassan. Besides these comparatively little known kinds of Manna, a sweetish exudation is produced on the Larch (*Larix Europæa*), which forms the *Manna Brigantiaca*, or Briancon Manna of some Pharmacopœas. [ORNUS; ALHAGI; TAMARISCUS; LARIX].—*Eng. Cyc.* There is a tree scattered on the Baien mountains, which in the dry season exudes a sweet substance resembling the manna of the shops. Mr. Mason observed it in some instances, where it had dropped from the branches all around the base of a large tree like rain; and again, where it had gushed out of the trunk like a large mass of gum arabic. He had never seen the tree either in flower, or fruit, but thinks it belongs to the myrtle tribe, a family that produces manna in New Holland.—*Mason.* According to Dr. Royle, the word manna seems to be derived from the Arabic *mun*, signifying the same thing. But as there are several other sweetish exudations (*v.* Manna, *Penny Cycl.*), it is difficult to determine when Manna was first known and used.—*Royle.* Capt. Drury however says, that the way the word manna came first to signify what we now understand by that name, was solely from an erroneous translation of Exodus xvi. 15, which runs thus: "And when the children of Israel saw it, they said to one another, 'It is manna,' for they wist not what it was." So clear a contradiction in the text does not require to be pointed out. The fact is that the words in the original were *Man-hu*, meaning What is it? which, instead of being correctly rendered, was given us, 'It is *Man-hu*,' or manger, an error which has been preserved in our version of the Septuagint to the present time.—*Useful Plants.*

(5201) MANTIDÆ, a family of Orthopterous Insects, the species of which may be distinguished by the following characters:—Head exposed (not hidden by the thorax), furnished with three ocelli, or simple eyes, besides the ordinary pair of compound eyes; palpi short slender and cylindrical; antennæ generally setaceous, but sometimes pectinated; short in the females and long in the males; body elongated; the thorax usually very long, often dilated at the sides and dentate; abdomen long, and with the terminal segment small in the male sex, more or less dilated, and with this terminal segment large in the females; the apex furnished with two small appendages; legs long; the four posterior legs slender, the anterior legs with the coxæ very large and elongated; the femora also very large, dilated, and furnished with a double series of spines on the under side, between which (when the animal is in a state of repose) the tibiæ are placed: the tibiæ are rather short, armed with spines, and having a strong spine at the apex, which is recurved; tarsi usually 5-jointed, but in some species the posterior tarsi have only three joints; wings horizontally folded when at rest. The principal genera contained in this family are:—*Heteromytarsus*, *Eremiaphila*, and *Mantis*. The *Mantidæ* are found in all warm countries, are exceedingly numerous, and remarkable for the grotesque forms which they usually assume. Their resemblance to a portion of a plant is often so great, that it is only by their motions they can be discovered. The names *M. religiosa*, *M. precaria*, *M. sancta*, Praying Mantis, &c. have been applied to certain species on account of a peculiarity in their habits—that of erecting the thorax at an angle with the body, and placing together the large fore-legs, like the hands of a person engaged in prayer; in this position they will sometimes remain perfectly motionless for several hours. Their food consists of flies and other insects, which they are exceedingly dexterous in catching by means of their fore-legs; the prey is held by the fore-leg by bending back the tibia against the femur; the opposing surfaces of these two portions of the legs being covered with spines, enable them to retain their prey in this manner, and to convey it to the mouth. The eggs are deposited by the female *Mantis* upon plants, and are [illegible] by a glutinous substance, which [illegible] hard and forms a kind of case, in which [illegible] are arranged in a symmetrical manner. The form of the case varies according to the species. The

ning, when hatched, resemble the parents, except in size and in being destitute of wings. *Lantis gingalica* illustrates a common form of the insects of the present family. This insect inhabits the East Indies, and when live is of a green colour. The female is about 4 inches, and the male is 3½ inches in length.—*Eng. Cyc.*

(5202) MANILLA NUT. [GROUND NUT, ARACHIS HYPOGEA.]

(5203) MANILLA HEMP. MUSA TEXTILIS. The power possessed by this fibre of bearing great strains, as well as being very durable, lighter, and also cheaper than Russian Hemp, has latterly attracted much attention to it and it has been much employed for cordage of various kinds, especially those required to bear considerable strain. Many American vessels have the whole of their rigging made of it, and when worn out it can be converted into an excellent quality of paper. The plant which yields this hemp was formerly introduced by Dr. Roxbourgh into the Northern Circars, and Lord Harris has recently made a second effort to obtain a supply of its roots. It is a native of the Philippine Islands where it is called "abaca" and by the Bisayas "Lamot," but there are several varieties known here under different names. The Abaca brava, or wild abaca, is called by the Bicoles, Agotai, the fibres of the mountain abaca only serve for making ropes, which are called by them "Agotag" or Amoquid." The Sagig and "Laquis" of the Bisayas are other varieties. Rumphius states that the Malay name of the "Laquis" is Pissang Utan," thus it is called in Amboyna Kula abbal; in Ternate "Fana"; and in Mindinano "Coffo": also the cloth made from it. The "abaca" is abundant in the volcanic region of the Philippine Islands from Luzon to Mindinao, as also in the neighbouring Islands as far south as the Moluccas. It therefore extends from the Equator to 20° North, and may, probably, be easily cultivated in Travancore, Arracan, Assam and Northern Circars. The "Abaca" should be cut when 18 months old, just before its flowering or fructification appears, at which period the fibres are shorter and finer and they are said to became weaker afterwards. It is cut near the roots, and the leaves cut off first before their expansion: it is then slit open longitudinally and the sheathing fibers removed, as it is from them that the fibres are formed as in all the plantains. The fibres from the outer layers are harder and stronger, and form the "bandala" of commerce, which is employed in the fabrication of cordage. The finer fibres from the inner layers are called lupis, and the "nipis" and other delicate fabrics are made from them: while the intermediate layers produce the "tupos" which are made into cloths and gauzes of different degrees of fineness, and four yards long, and are universally used as clothing. Dr. Hunter's general principles of cleaning explained under the head of fibres, is doubtless well capable of application here, and it is hoped that Lord Harris' present effort to introduce so useful a fibrous plant may be successful. When well scraped, shaken and washed, they require to be dried and picked; those for cordage require no further preparation, but the fibres to be employed by the weavers, are made up into a bundle and made soft and pliant by beatings with a wooden mallet, and their ends are then gummed together as is done with pine apple fibre, and they are rolled up for the loom. The stuffs, when woven, are soaked in warm water, (or lime water) for 24 hours, after which they are soaked in cold water then put into rice water and lastly washed as before, by which means they acquire lustre, softness and a white colour. Some are dyed into blue red colours, some are embroidered: and they seem in Europe to be confounded with grass cloth. Manilla Rope is sold in England at a nett price of £ 32 per ton, on the average of the ten years prior to 1852; but it rose in that year to £ 44 and £ 50 for the average kinds, and in the rise in 1854 it was quoted at £70 to £76. Dr. Oxley of Singapore states that the Musa textilis grows freely in Singapore. See MUSA.

(5204) MANILLA DRAGON CANES. The white and brown Manilla Dragon's canes of commerce are supposed to be made from the stem of the Calamus Draco, the Dragons' blood Palm.

(5205) MARANDA, the *Tamil* name of a tree which is very heavy and close grained. It is one of the best sorts of Ceylon wood; of a dark-brown colour, and grows to about twenty inches in diameter, and twenty feet in height.—*Edye. Cey.*

(5206) MARATINA, the Tamil name of a tree which grows to about twenty inches in diameter, and from fifteen to twenty feet in height. It is sometimes used by the natives for house and boat-work.—*Edye. Ceylon.*

(5207) MARABOU. [CICONIA.]

(5208) MARANTA, a genus of Plants belonging to the natural order *Marantaceæ*. The root stock is white, horizontal, annulated, from which proceed root-fibres, some of which swell into tubers and become jointed stocks, similar to the rhizoma, but covered with scales. These often elongate, curve upwards, and rising out of the ground become new plants. The stem is 2 or 6 feet high, much branched, slender, finely hairy, tumid at the joints; leaves alternate, with long leafy hairy sheaths, ovate-lanceolate; panicles terminal, lax, spreading, with long linear sheathing bracts at the ramifications; calyx green and smooth; corolla white, small, unequal, one of the inner segments in the form of a lip; anther attached to the petaloid filament; style hooded, petal-shaped; ovary 3-celled, smooth; stigma 3-sided; fruit even, dry, 1-seeded.—*Eng. Cyc.*

(5209) **MARANTA ARUNDINACEA** yields the arrow-root of commerce, but it is also procured in large quantities from a variety of closely-allied, and even many distinct, plants. Thus the Surinam and Bermuda arrow-root is the produce of the *M. arundinacea*, while the Jamaica arrow-root is obtained from the *M. Indica* (Tussac); which plant, along with several Curcumas, yields also the East Indian arrow-root. The West Indian arrow-root has mostly a pure white colour, the East Indian a yellow tinge. The tubers, root-stocks, or offsets, are grated or bruised and repeatedly washed with water, which is passed through a fine hair-sieve, so long as it runs off with a milky appearance. It is allowed to subside, the supernatant water drained off, and the powder dried: 100 parts of the fresh plant yield 10 parts of arrow-root; but Benzon states 100 parts to yield 23 or 26 parts. According to the analysis of this chemist it consists of —

Volatile oil, ...	0·07
Starch, ...	26·00
Vegetable Albumen, ...	1·58
Gummy Extract, ...	0·60
Chloride of Calcium, insoluble fibre, ...	6·00
Water, ...	65·60
	99·85

The volatile oil imparts a slight odour to the solution in warm water which helps to distinguish genuine arrow-root from several of the articles substituted for it. Maranta Arrow-root has scarcely any taste, being bland and insipid; the powder, when pressed in the hand, emits a crackling noise, and retains the impression of the fingers, which common starch from wheat does not. Cassava (Manioc, from *Jatropha*, or *Janipha Manihot*) also retains the impression of the fingers, but it has more odour and a somewhat acrid taste. The meals of any cereal grain may easily be distinguished from arrow root by the nitrogen which they contain, and the ammoniacal products which they yield by distillation. Potato-starch is however most frequently used to adulterate arrow-root, or a substitute for it. Microscopic observation of the form and size of the grains will point out the difference, as first indicated by Raspail (Annales des Sciences Nat.,' t. v.), those of arrow-root being smaller; the different habitudes of the starch with reagents will also do this. (See Messrs. Payen et Chevalier, 'Traite de la Pomme de Terre,' p. 126; also 'Journal de Pharmacie,' Aout, 1833.) Potato-starch is not soluble in cold water, which is the case with arrow-root. Dissolved in absolute alcohol, arrow-root separates into two distinct portions, which neither wheat nor potato-starch does. In equal proportions dissolved in warm water, arrow-root yields a thinner solution, with a more slimy aspect than wheat-starch. Arrow-root dissolved in water, milk, or any other appropriate vehicle,

MARANTA ARUNDINACEA.

constitutes, from its easy digestibility, a most excellent article of diet for delicate persons and young children. It may be given plain, or with wine or spices, according to circumstances. The valuable property just mentioned does not belong to either wheat or potato-starch. The latter, if prepared from potatoes in spring, is very liable to disturb the stomach; but less so if prepared in October or November. Potato-starch may be prepared at a very cheap rate, and kept for a long period unchanged, thus affording a protection against times of scarcity. (Sir John Sinclair, *On the Culture and Use of Potatoes*, Edinb., 1828. — *Eng. Cyc.* In India, *Maranta arundinacea* has been sucessfully cultivated near Calcutta. Some Arrow-root is yielded by another species, *M. ramosissima*. Besides these, much is yielded by *Curcuma angustifolia*, *leucorhiza*, *rubescens* &c.; but the greater portion of the Arrow-root which is exported is produced in Travancore, and we have no information respecting the species which yields it as *Curcuma angustifolia* has not been proved to be indigenous there. Some is also made in India from the tubers of *Ipomea batatas*. The Arundinacea plants are propagated by parting the roots; a light loamy soil is most favourable to their growth; when a year old they are fit for use, being taken out of the ground they are washed, and either grated or pounded, in this state the pulp is put into and intimately mixed with water, which washes the farinacious parts from the fibrous which is thrown aside, the white turbid fluid is strained to free it from all fibrous particles and is left for the starchy matter to subside, the supernatant liquor is then drawn off, fresh water is again added, the mixture left at rest, and the water poured off as before, this process may be repeated. The starch being left in a state of purity, the moisture is evaporated by placing it on clean cloths and exposing it to the sun's influence, when thoroughly dried it is fit for use. — *Rohde*. Maranta arrow-root says, Hassal, is obtained from the rhizomes of the Maranta arundinacea. A rhizome is an under ground jointed stem placed horizontally in the earth, giving off from its upper surface, branches, and from the lower, roots: the starch or fecula is contained in the joints of the rhizome, being deposited in innumerable minute cells. The following account of its preparation is given by Dr. Pereira in the new and greatly improved edition of his "Materia Medica." — "The starch, or fecula, is extracted from the roots (tubers), when these are about ten or twelve months old. The process is entirely a mechanical one, and is performed either by hand or by machine.

"*In Jamaica*, it is procured as follows: — The tubers are dug up, well washed in water, and then beaten in large, deep, wooden mortars to a pulp, this is thrown into a large tub of clean water. The whole is then well stirred, and

e fibrous part being cut out by the hands and rown away. The milky liquor being passed rough a hair sieve, or canvas cloth, is suffered settle, and the clear water is drained off. At e bottom of the vessel is a white mass which again mixed with clean water, and drained; ain dry, the mass is dried on sheets in the sun and pure starch.

In Bermuda, the roots are first deprived of eir paper-like scales and then rasped by the id of wheel-rasp, and the fecula well washed rough sieves and carefully dried.

In St. Vincent, upon the Hopewell estate, in is island, the carefully skinned tubers are wash-l, then ground in a mill, and the pulp washed in nned copper cylindrical washing machines. The cula is subsequently dried in drying-houses. In der to obtain the fecula free from impurity, re water must be used, and great care and tention paid in every step of the process. The inning or peeling of the tubers must be per-rmed with great nicety as the cuticle contains resinous matter, which imparts colour and a sagreeable flavour to the starch. German silver dettes are used for skimming the deposited cula, and shovels of the same metal for packing ie dried fecula. The drying is effected in pans overed by white gauze to exclude dust and in-ects." Pure and unadulterated Maranta arrow-ot should be of a dull and opaque white-colour, epitating or crackling when pressed between ie fingers, and treated with about twice its eight of concentrated hydrochloric acid it should eld an opaque paste. The above characters id appearances may all, however, be as-umed by certain of the other arrow roots; ie microscope, therefore, affords the only ready id certain means of distinguishing this arrow-ot from all other species, and these again from ch other. The appellations which have been estowed upon Maranta arrow-root are very nu-erous, their use ought to be wholly discontinu-l for the reasons already assigned; thus it is metimes called West India arrow-root, Jamaica, emerara, Bermuda, Berbice, St. Vincent arrow-ot, &c. The impropriety of denominating it est India arrow-root is shown by the circum-ance that the Maranta plant is cultivated in e East as well as the West Indies.

Curcuma arrow-root, is obtained from the ubers of Curcuma angustifolia one of the family f the Zingiberaceæ. The mode of its prepa-ation does not differ materially from that mployed in obtaining the fecula from the ubers of Maranta arundinacea, and which has eady been described. Two qualities of urcuma arrow-root are imported into great ritain from the East Indies, principally from alcutta a white and a brown variety. The hite is the best; the powder when pressed etween the fingers feels less firm and does not repitate to the same extent as Maranta arrow-root, the two species can however be distinguished from each other only with certainty by means of the microscope.

Tacca arrow-root, is obtained from the tubers of the Tacca oceanica, a native of the South Sea Islands after the chief of which, Tahiti or Otaheite, it is usually designated. According to Ellis, it grows in the high sandy banks near the sea, or on the sides of the lower mountains. In Pereira's elements of Materia Medica the following account is given of the preparation of the fecula. "At Tahiti this is procured by washing the tubers, scraping off their outer skin and then reducing them to pulp by friction on a kind of rasp made by winding coarse twine (formed of the cocoa-nut fibre) regularly round a board. The pulp is washed with sea water through a sieve made of the fibrous web which protects the young frond of the cocoanut palm. The strained liquor is received in a wooden trough, in which the fecula is deposited and the supernatant liquor being poured off, the sediment is formed into balls, which are dried in the sun for twelve or twenty-four hours, then broken and reduced to powder, which is spread out in the sun to dry." Tacca arrow-root is a white starch like powder, having a slightly musty odour. The granules resemble somewhat those of sago-meal, but are very much smaller: when viewed sideways, they are muller-shaped, with truncate or dihedral bases, and when seen end-ways they appear circular, and occasionally angular or polyhedral. The rings are few and indistinct, and the hilum circular, sometimes fissured in a stellate manner. "Tacca arrow-root has been sold in London for some years, in packages, as arrow-root prepared by the native converts of the missionary stations in the South Sea Islands." It is sometimes spoken of as "Williams' arrow-root," after the missionary of that name. The slightly musty odour which it usually possesses show that it is not in general prepared with quite the same amount of care as is bestowed on Maranta arrow-root.

Manihot Arrow-root.—The flour or farina of Manihot utilissima, the plant which yields "tapioca," is sometimes imported into England, under the name of "Brazilian arrow-root." To the application of the word arrow-root to the fecula of this plant there exists no objection, since it resembles closely the other arrow-roots in its properties. *Manihot arrow-root* like the other kinds already described, may be distinguished by the size, and other characters of its constituent granules, which resemble somewhat closely those of Tacca arrow-root, but are considerably smaller, with a larger proportion of granules which exhibit a circular outline as seen in the field of the microscope: the hilum is usually fissured. The price of tapioca to the public varies from 6d to 10d. the pound; now, as greater time and la-

bour are expended in the manufacture of this substance than is required for the preparation of the arrow-root, the price of the latter ought to be still less than this.

Potato Arrow-root. Potato flour, or arrow-root, sometimes called British or English arrow-root, is prepared by rasping and grinding the well cleansed tubers of Solanum tuberosum into a pulp. This is repeatedly washed, and the waters strained through a sieve, which retains the cellular tissue, and allows the starch to pass through. After a time, the starch is deposited at the bottom of the vessel, is again well washed, and finally dried. Potato strach forms a white and somewhat glistening powder, which crackles like genuine Maranta arrow root when pressed between the fingers. Potato arrow-root is the cheapest of all the starches regarded as arrow-roots, the retail price varying from 4d to 6d per pound. Although a cheap and useful article of diet, it is of course inferior to Maranta arrow-root.

Arum arrow-root is procured from the tubers of Arum maculatum, the common "cuckoo pint," "wake robin" and "lords and ladies." It is prepared chiefly in Portland island; hence it is generally called "Portland arrow-root." The mode of its preparation is very similar to that adopted with the other arrow-roots: the tubers are pounded in a mortar the pulp repeatedly washed, and the water subsequently strained. As the tubers are very acrid, great care is required in the washing and straining of this arrow root, so that the acidity may be completely removed. The starch granules of arum arrow-root, are very small, and, except in size, they resemble very closely those of Tacca arrow-root; but this difference is sufficiently constant and considerable to ensure the ready identification of the two kinds. The adulteration, by mixing together Arrow-roots of different qualities and prices in various proportions most frequently consists in the addition of potato flour or arrow-root to Maranta arrow-root, the proportion being subject to every variation, the potato-flour in many cases forming the largest portion of the article. In some cases Manihot or tapioca starch or arrow-root is added to Maranta Arrow-root; and in other instances, again, this as well as potato-flour are employed together. The fraud of the substitution of an inferior for a superior Arrow-root, is most commonly practised by the substitution of potato-flour for Maranta arrow-root. In some few cases, Tapioca or Brazilian arrow-root has been substituted for Maranta arrow-root, and in others both it and potato flour have been used. The adulteration of arrow-root is also in all by the addition to a genuine Arrow-root of other but inferior starches, not usually recognised as Arrow-root. The starch usually had recourse to in this adulteration of arrow-roots is sago starch or meal, indeed, indeed, indeed

ing veins, and whose flowers are constructed with an inferior ovary surmounted by a 3-leaved calyculus; very irregular flowers, white, red, or yellow; and a single stamen, whose anther has but one lobe. With the exception of the genus *Calathea*, and of *Canna*, which is commonly cultivated under the name of Indian Shot, because of its beautiful flowers, the species included in this order are of small size, and by no means attractive, but the fleshy tubers of some of them abound in starchy matter, which renders them nutritious. Arrow-root of the finest quality is obtained from *Maranta arundinacea*, and a similar product is yielded by *Canna edulis* and others. The order is known from *Zingiberaceæ* by the anther having but one lobe instead of two. All the species are found wild in tropical countries only. The species are natives of the tropics of America Africa, and Asia. Amylaceous qualities prevail in this order, and starch is prepared from many of the species. The fleshy corms of some species of the *Canna* are eaten in Peru, and a sort of arrow-root, called Tous le Mois, is extracted from some of the species. The seeds of others, called Indian shot, have been used as a substitute for coffee, and yield a purple dye. (Lindley, *Vegetable Kingdom.*)—*Eng. Cyc.* Of these plants, though little known for their herbaceous parts containing any useful quantity of fibre, one of the South American genera has been named Calathea, in consequence of its leaves being employed in basket-making. In India, the stems of *Moocta patee* of the Bengalees, *Maranta* (*Phrynium*, Roxb.) *dichotoma* of botanists, which are straight and tapering, about as thick as a man's thumb, and from three to five or six feet high, of a beautiful, highly polished, green colour, are said to be employed in making some of the mats for which Calcutta is famous. Mr. Colebrook says: "Mats made of the split stems of this plant being smooth and particularly cool and refreshing, are termed in Hindoo *Sital-pati*, which signifies a cool mat; whence the plant itself is said to bear the name. Suspecting, however, this to be a misappropriation of the term, I have inquired of natives of the eastern parts of Bengal, who assure me that the plant is named *mucta-pata* or *patti-pata*, and the mat only is called 'sital-pati.'" The split stems, as prepared for making mats, are about four feet in length, one twentieth of an inch in breadth, thin as paper, greyish coloured, compact and shining almost like cane on the outside; finely striated on the inside, and apparently made up by the agglutination of very fine fibres. They seem admirably adapted for platting of all kinds. Many of these plants, no doubt, contain a sufficient quantity of fibre to be usefully extracted for the paper-maker. The same may be said of the innumerable plants of Ginger, Turmeric, Cardamom, and others of the nearly allied family of Zingiberaceæ, which are similarly cultivated entirely for their roots and seeds, and the herbaceous plants thrown away. These from their nature cannot but abound in useful fibre, applicable to the purpose of the paper-maker.—*Royle Fib. Pl. p.* 60.

(5212) MARA-VERIE, the Tamil name of a Ceylon tree which is much the same as the Vell-verie in size and quality. It is used for natives' huts, &c. but is not of much value.—*Edye. Ceylon.*

(5213) MARBLE.

Marmer, Dut.	Marmor, Lat.
Marbre, Fr.	Sung-i-Murmur, Pers.
Marmor, Ger.	Marmor, Rus.
Murmur, Guz. Hind.	Marmol, Sp.
Marmo, It.	

The granular limestone, or carbonate of lime of mineralogists. It is hard, compact, of a fine texture, and readily takes a fine polish. The colours by which marbles are distinguised are almost innumerable; some are quite black, others again are of a snowy white; some are greenish; others grayish, reddish, blueish, yellowish, &c.; while some are variegated and spotted with many different colours and shades of colours. Marble is found in many, if not most, primitive countries; it sometimes forms entire mountains, but more often occurs in beds. The finest solid marbles are those of Italy, Blackenburg, France, and Flanders. A strict definition of this term is perhaps impracticable, unless, with Da Costa, we limit it to th calcareous rocks "of very lively colours, and of a constitution so fine that they will readily take a good polish." In a vague sense other ornamental stones, as granite and porphyry, may be ranked among marbles, but the catalogue of the typical or calcareous marbles is long enough without these somewhat inconvenient additions. A limestone which will admit of being worked easily and equally in all directions is properly called 'freestone,' as the Bath or Ketton freestone; a rock of similar chemical composition, generally capable of being worked equally in all directions, and also of taking a good polish, deserves the title of marble; when it is granular and of a white colour, it may be useful in statuary. Da Costa, in his 'Natural History of Fossils' gives a large catalogue of marbles, disposed in methodical order, which we shall follow in the subsequent brief notices of this extensive subject.

Division 1. Marbles of one plain Colour.

Section 1. Black Marbles. Most of these contain bitumen, and are fetid when bruised.

Examples. The Namur marble, the marble of Ashford in Derbyshire, Dent in Yorkshire, near Crickhowell, Tenby, Kilkenny, &c. The marble, anciently called Marmor Lucullæum, and now Nero Antico.

Section 2. White Marbles.

Examples. The marble of Paros, in which the Laocoon and Antinous are executed; the

Carrara marble, of finer grain, much used in modern sculpture; the skye marble, noticed by Dr. M'Culloch; that of Inverary, Assynt, Blair Athol, &c.

Section 3. Ash and Gray Marbles.

Examples. A beautiful marble, of compact oolitic texture at Orelton, near the Clee Hills in Shropshire, deserves mention.

Section 4. Brown and Red Marbles.

Examples. The Rosso Antico; a rival, to which, at least in colour, has been found on the estate of the Duke of Devonshire, near Buxton. The mottled brown marble of Beetham Fell, near Milnthorp, is of good quality.

Section 5. Yellow Marbles.

Example. The Giallo Antico. Siena marble also dug at Mafra, near Lisbon. That used in ancient Rome is said to be from Numidia.

Section 6. Blue Marbles.

Example. Near St. Pons, in Languedoc.

Section 7. Green Marbles.

Example. The Marmor Lacedæmonicum of Pliny. It is dug near Verona.

Division II. Marbles of two Colours.

Section 1. Black Marbles variegated with other colours.

Example. Near Ashburton in Devonshire, Torbay in the same county, Bianco e Nero Antico, the Africa Breccia of the ancients, Giallo e Nero Antico.

Section 2. White Marbles variegated with other colours.

Example. Marble exported from Italy. Marbles of this general character occur in Siberia, at Plymouth, at Killarney, in Sweden, &c.

Section 3. Ash and Gray Marbles variegated with other colours.

These are very numerous, and occur in various parts of Europe.

Section 4. Brown and Red Marbles variegated with other colours.

Section 5. Yellow Marbles variegated with other colours.

Section 6. Green Marbles variegated with other colours.

Example. Egyptian Marbles—the Marmor Tiberium and Augustum of Pliny; some Verde Antico, as that dug near Susa in Piedmont, the beautiful marble of Anglesey (called Mona marble), the marble of Kolmerden in Sweden.

Division III. Marble with many Colours.

Example. Some of the Plymouth marble, the beautiful Brocatello or Brocade marble of Italy and Spain.

Division IV. Marbles containing Shells, Corals, and other extraneous bodies.

The Marble slabs, of China are about a foot square, and are exported to India, Sydney, South America, &c. for pavement or floors. It is a blue clouded marble, obtained to the northwest of Canton: there is also a red breccia marble brought to Canton, which is employed in tables, stone stools,

&c it is seldom sent abroad. The exportation of these slabs was formerly prohibited, and the trade henceforth is likely to increase somewhat. Ten slabs are estimated to weigh a pecul. Tiles of various sorts have in some persons been largely exported. The large square tile is about the same size, and is used for the same purposes, as the marble slabs. The tiles used by the Chinese in roofing are of two sorts, an upper and a lower piece; these are not so often sent abroad. Comp. *Dek.* The Marbles of the Madras Presidency deserve prominent notice on account of their rare color, and fine quality. The specimens sent to the British Exhibition were favorably reported upon as indicative of a valuable material, well adapted to sculptural and ornamental purposes. At present the Indian manufacture in this article is comparatively insignificant and chiefly confined to small miscellaneous articles for domestic use. It may be well worth the consideration of persons of capital and taste to endeavour to further develop the resources of this Presidency as regards this beautiful stone, and to improve the practical means of obtaining it in greater size and perfection. Marble tables, pedestals, vases, baths, and fountains are particularly refreshing, and suitable to an oriental climate and possessing as this Presidency does such an abundance of the raw material, and where labour is comparatively cheap, it seems an anomaly that so much should be imported from foreign countries at a great cost, and of a quantity not superior to some of the marble found in India. (See Report upon the Marbles of Southern India by Edward Balfour, Esq., and the interesting and valuable collection of sculptures in marble from Amrawattee in Guntoor.) The last year the purest white statuary marble and alabaster were discovered in great quantities between Nagpore and Jubbulpore; and it is reported that very large slabs can be easily quarried there at a moderate price. The Rev. S. Hislop writes to say "that the cost of slabs of granular white marble from Korhadi 3 feet by 2 and 9 inches thick is Company's Rs. 2. As soon as the navigation of the Godavery is opened up, this marble and the sandstone and coal of the same locality with the alabaster, gypsum and dolomite of Jubbulpore, will probably become articles of export. At Tinnevelly also, there is an excellent description of white marble, but considered rather too hard for statuary purposes, and Guntoor and the Ceded Districts abound with marbles of great variety of colors being tints of grey yellow and red. *A Cup and Butter Pot of Bellary marble*, exhibited by Lady Montgomery, at the Madras Exhibition of 1855, attracted deserved attention, and some *Egg Cups*, and other small domestic articles exhibited by Captain Applegath were equally worthy of commendation. The natives of Bellary have improved in this useful branch of art, and the above articles are handsome specimens of

taste, and industrial execution. The butter pots cost eight or nine, and the egg cups, two Rupees each. This is rather dear, and a drawback to their general use.—*M. E. J. R.*

(5214) MARGOSA, the Portuguese name, and Vembu the Tamil and Malayala names of a tree which grows from eighteen inches to three and a half feet in diameter. In appearance it is much like mahogany, and is used by the natives for general purposes. It produces a fruit from which an oil is extracted which is used medicinally.—*Edye Ceylon.*

(5215) MARGOSA BARK.

Nim, BENG.	Nimba, SANS.
Bewa, CAN.	Vaypum puttay, TAM.
Tel-kohumba, CYNG.	Vaympa puttay, TEL.
Nim-ka-chall, HIND.	

The bark of the *Nim* tree is bitter, and not unpleasant to the taste, and is considered by native practitioners a valuable tonic. This bark has been tried by European physicians with a success nearly equivalent to what might have been expected from the cinchona bark. The *Nim* tree is common in gardens in Bombay, and the bark is procurable in most bazars.—*Faulkner.*

(5216) MARGOSA OR NEEM OIL AZADERACHTA INDICA; AND MELIA AZADIRACH.

Vaypum Yennai, TAM.	Neem ka Tael, HIND.
Vapa noona, TEL.	

This valuable and much used medicinal oil is obtained by either expression or boiling, from the seeds of the abovementioned trees, which are common throughout the Presidency. The fruit of the *Nim* tree, is not unlike a small French olive in size and appearance. It enters much into the practice of native Physicians. The oil is very bitter, and is much esteemed by native doctors as a warm medicine, as an external application in foul ulcers, and as a liniment in rheumatic and spasmodic affections, &c. The oil is of a deep yellow colour, has a strong smell and an unpleasant bitter taste. In the year 1847-48 galls. 1,587 were exported, and in the year 1851-52, galls. 1, 917, in 1852-53, galls. 3-111. The chief market is Ceylon, but the demand is not constant. It is frequently burnt in lamps, and is sold in the bazar, under the name of "bitter oil."—*M. E. J. R.* It is cheap and easily procurable in Ceylon. Dr. Maxwell, garrison surgeon of Trichinopoly, states that he has found this oil equally efficacious to cod-liver oil in cases of consumption and scrofula. He began with half-ounce doses, morning and evening, which were gradually reduced.—*Simmonds' Comml. Product, p.* 587.

(5217) MARJORAM, SWEET.

Mir-zun-joosh, ARAB.	Murwa, GUZ. HIND.
Marjolaine, FR.	Marroo. TAM.
Majoram, GER.	

Sweet marjoram is a native of Portugal, and Palestine, but is cultivated in most parts of lower India, and may be frequently met with in gardens. The flowers are considered by Hindoo doctors as possessing cephalic qualities, and the plant is known to possess tonic virtues. It is now chiefly used in Europe as a culinary herb.—*Faulkner.* Marjoram, is very easily reared, in beds or pots, either by slips from the roots, or seed. It is used for flavoring ragouts, sauces, &c.—*Jaffrey.*

(5218) MARIGOLD, TAGETES PATULA AND ERECTA. Any of the species will do well on the plains, they require to be sown thinly in boxes or pots during the rains, when two or three inches high, they should be transplanted into the flower beds, called French and African Marigolds.—*Jaffrey.*

(5219) MARINE GLUE, patented by Mr. Jeffery in 1842, possesses very powerful cementing properties. It is formed by dissolving 7 lb. of caoutchouc in small pieces, in 4 gallons of coal naptha with frequent stirring, the solution occupying 10 or 12 days: 2 parts shell lac are then fused in an iron vessel, and 1 part of the solution being stirred well in, the glue is poured out on slabs to cool. When two pieces of wood or glued or cemented by its means, the joint becomes stronger than the fibres of the wood itself. Large masts being formed of pieces cemented or jointed together, it has been proposed to Mr. Jeffery to employ his marine glue for this purpose; but, from a Report made to the Admiralty by a board of Dock-yard Officers, in 1843, it appears that this glue is even too good for the purpose; if any part of a mast decays, it is customary to take the mast to pieces, and re-employ all the sound pieces, but it was found that a mast which had been formed by aid of the marine glue was with such difficulty separated, that the pieces were scarcely available again. The marine glue also constitutes an excellent substance for pitching or paying the seams of ships An inferior but strong marine glue is formed by simply dissolving shell-lac in naphtha. —*Tomlinson.*

(5220) MARKING NUT, MALACCA BEAN.

Beladur, ARAB.	Bhallataka Arushkara, SANS.
Gheru, CAN.	Shayng Cooty, Shayrang coitay. TAM.
Bellawane, Bhela, DUK.	Nellajiedie, Jeedighenzalo, TEL.
Bellama, GUZ.	
Bellama, Bheela, HIND.	

The tree bearing this nut (*Semecarpus Anacardium*), is a native of all the mountainous parts of India. The nuts are black, smooth, shining, and flattened on both sides. The acrid black-juice of the nut is employed by the natives externally to remove rheumatic pains, aches, and sprains, by rubbing a little over the affected part. It is also universally used for marking cotton cloth, whence its name of marking nut, the colour being improved, and prevented from running, by being mixed with lime water.

(5221) MARKING NUT OIL. SEMECARPUS ANACARDIUM.

Shayng Cottay Yennai, TAM. | Bhallahwan ka tael, HIND.
Nellajiede Noona, TEL.

The acrid and vesicating oil which is found between the two laminæ of the pericarp of the marking nut is collected and used, as a preventive against the attacks of white ants, and by native practitioners in Rheumatic and Leprous affections. By boiling the whole nut, not divested of its pericarp, an oil is also obtained which acts as a blister. The qualities of the oil of the kernel of the nut, of which a good specimen is shown by Lieut. Hawkes, require investigation. The preparation or collection either of the oil or acrid juice is liable to cause much irritation and inflammation of the hands, face, &c. of those engaged in the work. Specimens of the acrid juice (improperly called oil) were shown by the Tanjore and Goa Local Committees, Madras Tariff and Major Miller.—*M. E. J. R.*

(5222) MARMALA WATER. A fragrant perfume distilled in Ceylon from the flowers of the Ægle marmalos, and used in the ceremonial sprinkling of visitors.

(5223) MARMALADE. A confection generally made of oranges, citrons, &c., cut into very thin slices, and boiled with sugar.

(5224) MAROR PHULL, HELICTERES ISORA SCREW-TREE. This small tree grows at Ajmeer: the twisted pods are used: considered refrigerant and astringent, taken in curds in diarrhæa; one pice's size is the dose.—*Genl. Med. Top. page* 146.

(5225) MARSDENIA TENACISSIMA, MARSDENIA ROYLEI. Asclepias tenacissma.

Tongoose, ENG.
Tungoos, HIND.
Jetee Fibre,
Rajmahl Bowstring Creeper,
Asclepias, now Marsdenia tenacissima.
Asclepiadeæ.
Tungoos, TAM.
Simmonds. Mason.

This comparatively small climbing plant, with greenish yellow flowers, was found by Dr. Roxburgh's son growing in dry and barren places in the Rajmahl Hills; since then also near Chittagong. Of the fibres of the bark of this plant, the Rajmahl mountaineers make their bowstrings. These are said to last for five years, though in constant use and exposed to all sorts of weather. A drawing and full description of this plant is given by Dr. Roxburgh in his 'Coromandel Plants,' iii, t. 240. In preparing the fibres of this plant, the Hill people do not put the stems in water, but let them stand in the sun for a day till drier; from the ends, when cut, there exudes a milky juice, which thickens into an elastic substance, like, indeed forming one kind of, caoutchouc, acting in the same way in removing black lead marks. According to Dr. Roxburgh, the fibres of this plant are not only beautiful in appearance and durable, but the strongest of any he had met with. Some twine made with it bearing 248 and 343 lb. in the dry and wetted states, when Hemp twine bore only 158 and 190 lb, in the same state. Mr. W. C. Taylor since then met with the same plant near the Palamow coal-mines, having observed his boatmen twisting a substance into thread, which they called *chittee*, of which they made nets, finding it much stronger and more durable then Hemp, and not so liable to rot by being kept in water. Mr. Taylor mentions that the stems are cut into lengths, and then cut down the middle; then dried, and afterwards steeped in water for about an hour or more which enables the bark to be separated with greater ease; when the fine silky filments are separated. A 1½-inch rope having been made and sent to Calcutta, was there tested in the Master-Attendant's Office, and found to break with 903 lb., when even Europe rope broke with 1293 lb., and others with greater weights. Its elasticity was considerable, as it stood ninth in strength, but second in elasticity. It was supposed that this might possibly be caused by its being laid up by hand; and it was also observed that the result might have been better, if the yarns had been more easily (evenly)? laid up." But the plant is suited for better purposes than rope-making besides not being eligible for this purpose, from its comparative rarity and mode of preparation. Mr. Taylor states it might be easily cultivated. (*v.* 'Journ. Agri-Hortic. Soc.,' 1844, p. 22.) Specimens of the fibre of another species of *Marsdenia*, which has by Dr. Wight been named *M. Roylei*, are stated in the Catalogues to have been sent from Nepal to the Exhibition of 1851. Though the specimens have not been found, we may infer that the fibres of this species are made use of in Nepal.—*Royle Fil. Pl. p.* 304.

(5226) MARSDENIA TINCTORIA, ASCLEPIAS TINCTORIA BLUE DYE. The Karens, and sometimes the Burmese, plant a creeper that is indigenous in some sections, and which makes quite a good indigo blue, though not equal to the Ruellia dye.—*Mason.* The Javanese, who of all the Malayan race, have certainly made the highest progress in all the useful arts, have a specific term for dyeing or tinting,—"madal;" but the Malays express it only by the word for dipping, "*chalup.*" Yet the only generic words which either of them possesses for "colour," are the Sanscrit, warna; and the Portuguese, tinta. Their colours are usually sombre,—little varied, but generally fast. Blues are always produced from indigo, yielded for the most part by the Indigofera tinctoria, as in other parts of India, but in Sumatra, occasionally, from this plant the Marsdenia tinctoria, a plant of the natural order of the Asclepiadeæ. Yellows are produced from the woods of two species of Artocarpus, the jack

and champadah, and from turmeric; and reds from the bark of the root of the "*mangkudu*," the Morinda umbellata,—from the "*kusumba-jaiva*," safflower or Carthamus tinctorius, from the "*kusumba-kling*," which is the annatto, or Bixa orellana, from the sapang, or sapan-wood, Cæsalpinia sappan, and from the nidus of the lac insect. Black is produced from the rinds of the mangostin fruit, and of the "*Katapang*," Terminalia catappa, with sulphate of iron. Sails and nets are dyed, and perhaps also tanned with a wood called in Sumatra "*ubar*" which is the Ricinus tanarius of botanists. The mordants used are rice-bran, alkalis from the combustion of some vegetable matters, as the fruit stalks and mid-ribs of the cocoanut palm and alum brought from China.—*Crawfurd.*

(5227) MARSH DATE OR GROUND RATTAN, CALAMUS ROTANG: its leaves are used at Cuddalore for making ropes and mats.

(5228) MARSH MALLOW. ALTHÆA OFFICINALIS.

(5229) MARSH MALLOW, SYRUP OF: This is a mucilaginous demulcent, and for the same purposes may be prepared Syrup of Bombax malabaricum root,—of dried Abelmoschus esculentus capsules, (okra,)—of Asparagus sarmentosus, (soota moolli,)—of Bilva fruit, (bel.) Ægle marmalos. These syrups all spoil very readily. —*Beng. Phar. p.* 407.

(5230) MARSILEA QUADRIFOLIA. Lin.

Awrei keeray, TAM.	Ara koora, TEL.
Chuppati ke banjee, DUK.	Chittoor Dulla, SANS.

Ainslie, p. 252.

(5231) MARTYNIA. PEDALIACEÆ. These are handsome plants, common in India, the leaves are covered with a glutinous soft substance, the flowers are red, and pale purple, the capsule of the seeds is hard, with a hooked bill at the end. The plant thrives luxuriantly in any light rich soil.

(5232) MARTYNIA DIANDRA. An herbaceous plant with large cordate leaves, covered with a glutinous dew like substance; flowers diandrous, much like those of the sesamum. Capsule, with a curious double hooked bill.—*Ridd.*

(5233) MASK FLOWER. ALONSOA.

(5234) MASLIN. A mixture of rye and wheat. It is extensivsly grown in Durham, where bread made of this compound is in general use.

(5235) MASSALA, garm, or warm spices, includes pepper; cloves, cardamoms; cummin and cubebs:—the thunda or cold spices, comprize chillies, onions, garlic, ginger; turmeric; coriander and cummin seed, tamarand, &c.

(5236) MASSICOT. An oxide of lead, prepared from the dross of the melted metal. It is of a pale yellow colour, and is used as a pigment. —*Waterston. Faulkner.*

(5237) MASTIC, (GUM), Turkish Olibanum.

Arah, Auluk Bagdadie, ARAB.	Mastico, IT.
Mastik, DUT.	Kinneh, PERS.
Mastic, FR.	Almacegu, PORT.
Mastix, GER.	Almaciga, SP.
Roomie Mustakie, GUZ. & HIND.	Roomie mustakie, TAM.
	Sakes, TURK.

This resinous substance is the produce of the *Pistacia Lentiscus*, a native of the Levant, and particularly abundant in the island of Chios, whence it is brought to India by way of the Red Sea. The best is in the form of dry, brittle, yellowish, transparent, tears; it is nearly inodorous, and almost insipid to the taste. It forms the basis of several drying varnishes, is one of the ingredients used in fumigations, and is considered to be efficacious in promoting a healthy state of the mouth when chewed.—*Faulkner.*

(5238) MASTODON, the name of an extinct genus of gigantic Pachydermatous Proboscidian Mammals (*Mastotherium*, Fischer), whose remains are found abundantly in the third and fourth, or Pliocene, divisions of the tertiary fresh-water deposits, and also, but less frequently, in the deposits of the second, or Miocene, period. In the greater portion of their organisation the Mastodons must have closely resembled the elephants. [ELEPHANTIDÆ.] The tusks, the proboscis, the general conformation of the body and the limbs were very similar; and the principal distinction between the two genera was formed by the molar teeth. These indeed were gradually pushed forward from behind as they are in the Elephant, and displayed the same relative increase in proportion as the animal was advanced in life; but, unlike those of the Elephant, their crowns exhibited on cutting the gum large conical points of a mammiform structure, whence the animal derives its name. As these conical points were worn down by mastication, the tooth presented discs more or less large, according to the degree of attrition which it had undergone. Remains of the Mastodon were found by Captain Cautley in the Sewalik Mountains; and in assigning an age to the formation, the Captain adopts the views of Dr. Falconer, who considers the deposit to be synchronous with that from which Mr. Crawfurd obtained the remains near Prome, on the banks of the Irawaddi. Captain Cautley having found jaws in which the front teeth are not to be distinguished from the teeth of *M. latidens*, and those in the rear from the teeth of *M. elephantoides*, he conceives that the distinction which was established on detached teeth will be found to be erroneous.—*Eng. Cyc.*

(5239) MATS.

Matten DUT.	Boorya, PERS.
Nattes, FR.	Esteiras, PORT.
Matten, GER.	Progoshki, RUS.
Chuttæ, GUZ. HIND.	Esteras, SP.
Stuoje, Stoje, IT.	

A texture formed of rushes or the bark of trees, and leaves of different species of palm trees interwoven. Mats are made in various countries but chiefly in Russia, where a kind termed *bast mats* are largely manufactured from the inner bark of the lime tree. China mats are in general use in India for covering floors, and lining staircases.

Lime or Linden Tree (*Tilia europæa*), *and Russia Mats.*—The Lime tree abounds in the forests of Europe, but especially in those of Russia; and is esteemed for its sweet-scented flowers. The wood of the tree is white and light, and employed for making furniture, for turning, and for carved works. The bark of these trees when steeped in water soon separates into thin layers, which are employed for making a coarse kind of rope, for making matted shoes much worn by the Russian peasantry, and also for making the mats which are so largely exported from Russia, and which are so extensively used in England for packing furniture, as well as for gardening purposes, and for covering the floor. A Linden shoot growing in moist situations, is stated by Mr. Tooke as not fit for peeling, for the purpose of being platted into shoes, in less time than three years. To every pair of shoes, from two to four young Linden stems are requisite; and though these grow faster as they are cut, yet the consumption is enormous, and the destruction of the Linden tree is in consequence immense. For the better, larger kind of mats, trees of from eight to sixteen years are cut down when full of sap, and the bark is immediately separated both from the tree and the branches. It is first cut longitudinally, then raised with an instrument made of bone, and then torn off with the hand. When the bark has been removed, it is stretched on the ground to dry, two or three strips being laid one over the other, and kept straight by being tied down to long poles. They are employed for making ropes in some parts of England, and for well-ropes in France. When required for use, they are steeped in water, and the cortical layers readily separate from each other. The best of these layers are those which are in the interior, while the coarser layers are on the outside. The manufacture of mats is nearly confined to Russia and to some parts of Sweden. Trees of from six inches to one foot in diameter are selected in the woods, and in the beginning of summer the bark is stripped from the trees in lengths of from six feet to eight feet. These are afterwards steeped in water, till the bark separates freely into layers; it is then taken out and separated into ribands or strands, which are hung up in the shade—generally in the wood where the trees grew from which they were taken; and in the course of the summer they are manufactured into mats. The fishermen of Sweden make fishing nets out of the fibres of the inner bark. The trees from which the bark is taken are cut down in the summer, and, properly cut, are burnt in heaps into charcoal. The sap is drawn off, and, when evaporated, yields sugar. The honey of the flowers is much sought after by bees. The Lime tree is principally produced in the governments of Vialka, Kostroma, and those immediately contiguous; and in the months of May and June—the period when the bark is most easily detached from the stem—the villages in the governments in question are almost deserted, the whole population being then in the woods employed in stripping the trees. The academician Koppen, who has carefully investigated this curious subject, estimates the average annual production of mats in European Russia, as follows:

Government of	Vialka...	6,000,000 pieces
„	Kostroma...	4,000,000 „
„	Kasan...	1,000,000 „
„	Nijni Novgorod ...	1,000,000 „
„	Vologda, Tamboff. Simbrisk, and Penza...	2,000,000 „
Total	... ...	14,000,000 „

Koppen further estimates that about a fourth part of this vast quantity, or 3½ millions, are exported, the rest being consumed at home. Archangel is the principal port for the shipment of mats, and it appears that on an average of the years 1851 and 1852, the export of mats from that port amounted to 615,360 pieces a year. Large quantities are also shipped from Petersburgh, Riga, and other ports. (M'Culloch's 'Com. Dict.') The extent of the Imports of Russia Mats into Great Britain may be judged of by the following statement furnished to Dr. Royle by Messrs. Wrench:

1832	.....	840,000	1847	.....	520,359
1840	.....	817,772	1848	.....	397,553
1841	.....	508,485	1849	.....	576,565
1842	.....	532,401	1850	.....	359,223
1843	.....	861.565	1851	.....	734,659
1844	.....	449,817	1852	.....	333,008
1845	.....	634,041	1853	.....	657,040
1846	.....	898,619			

The price in Jan., 1834, was £4 10*s.* per 100, the duty included; in 1848, 95*s.* to 100*s.*; and in 1849, under 80*s.* In 1850, 90*s.*; 1851, 87*s.* 6*d.*; 1852, 85*s.* to 100*s.*; and in 1853, 120*s.* per 100.—*Royle Fib. Pl. p.* 233. Large quantities of Bast are imported into England, in the form of mats, from Russia, chiefly for the use of gardeners, who use them for covering pits and frames, or protecting plants, and afterwards, when pulled to pieces, for tying up plants and vegetables. The mats are also extensively used for packing cabinet-work and furniture in general. It is calculated that about 3,500,000 mats are exported from Russia, and about 500,000 to 800,000 are annually imported into England. They are made of the bark of the Lime or Linden tree, which, when stripped off, is also made into shoes, cordage, sacks for corn, &c.—*Royle, Fib. Pl. p.* 236. Mats, about 3,500,000 mats are

annually exported from Russia, from 500,000 to 800,000 of which are imported into England. *Mats of Arracan.* There are six kinds of Bast, called in Arracan "Sha" which might successfully be fabricated into similar mats. In 1854, the price of Russian Mats was £ 7-10-0 to £ 8 per 100 wholesale and from 2*s.* to 2*s.* 6*d.* each, retail. Mats of Bengal, called *Sital Patee*, are made from the Phrynium dichotomum. Several species of *Typha*, Juncus and Saccharum, abound in the Madras Presidency, and are applied to useful purposes. Many of the mats exported from Calcutto are made from a species of papyrus, the P. Pangorei. Some of the Burmese mats are made from the split stems of a species, of Maranta, M. dichotoma, Burm: "*Then*," which grows abundantly in the forests of Burmah and the Tenasserim Provinces. The large coarse mats in universal use in Burmah, are made from the leaf of a species of screw pine Pandanus furcatus? Burm: tha-ban: known as the Lowland screw pine, in distinction to "Highland" species of Pandanus, which grows on the highlands above tide waters, from which the smaller and finer mats are fabricated.

China Mats.—Table mats are made by the Chinese very beautifully and the demand for them has increased the importation of rattans within the last few years. They are exported to all parts of the world. Table mats are put up in sets of six each of different sizes, or else are made and put up to order. Floor mats are made of a rush cultivated for the purpose; the best are called Lientan mats. They are either plain white, or plain red and white. The manufacture of matting for sails of boats and junks employs myriads of workmen; and that for floors and envelops of boxes and cases, as many more. Floor matting is put up in rolls containing 50 mats of 6 by 4 feet; such a roll is estimated to weigh a pecul. The annual exportation to the United States is upwards of 10,000 rolls of 40 yards each, at $4 a roll. It is also sent to India and south America, Sydney, &c. When matting is shipped, care should be taken that the rolls are perfectly dry, or they will mildew and become rotten. *Mats* made of rattan for table-furniture, and of grass for floors, are largely exported from China. The latter is manufactured of different widths and patterns, and though the amount annually sent to the United States and elsewhere is calculated to exceed half a million yards, it forms a very small proportion to the home consumption. Floor matting is put up in rolls containing fifty mats, or forty yards,—*Williams.* The manufacture of mats for sails of junks and boats, floors, bedding, &c., employs thousands. A sail containing nearly 400 square feet can be obtained for ten dollars. The rolls are largely exported, and still more extensively used in the country for covering packages for shipment. A stouter kind made of bamboo splinths serves as a material for huts, and many other purposes that are elsewhere attained by boards or canvas. Rattans are also worked into mats, chairs, baskets, and other articles of domestic service. Several branches of manufacture have entirely grown up or been much encouraged by the trade at Canton among which the preparation of vermilion, beating gold leaf, cutting pearl buttons, weaving and painting fancy window blinds, and the preparation of sweetmeats, are the principal.—*Williams' Middle Kingdom, Vol.* II. *page* 142.

Colored Mattings.—The manufacture of mattings from colored grass has long been carried on successfully in the Madras Presidency, and those from Cochin, Paulghat, Tinnevelly, and Wandiwash, have been in considerable demand; the two former on account of their brilliance of colors, and fine quality, and the two latter from their extreme cheapness. Several species of grass appear to be employed for mats, some being broad, flat and soft, while others are round, fine and wiry; the mats of Cochin, Paulghat and the Western Coast are of the latter description, and are more durable in consequence. The chief defect in this manufacture was that the mats have hitherto been made in long strips which required to be sewed together when a large surface of floor is to be covered. This defect was pointed out to the Local Committee of Cochin, who have contributed two large mats 12 feet × 12 (CCV 115 and 116) each woven in a single piece of good pattern and harmonious colors. The Jury considered this an important improvement in the manufacture, and recommended a 2d Class Medal to the exhibitor; and that the two large mats be purchased for addition to the collection intended for the India house. The mats from Tanjore, Tinnevelly and in the Tariff, were creditable.

Coir Matting.—Some good specimens of plain coir matting are exhibited from Malabar, and of colored red and black matting from Canara, the Jury recommended a prize of 20 Rs. to the maker of the former, Mr. Haller, and a prize of 30 Rs. to the manufacturer of the latter. A thick door mat made of Aloe fibres exhibited by the Coimbatore Local Committee, was deserving of attention, as a novel and useful manufacture, the Jury would point out that this substance is well suited to the manufacture of rugs and carpets, as it is cheap, strong and nearly white; it is exhibited in another class dyed of the most brilliant colors and manufactured into cloth, damask, and imitation horse hair cloth.

Mats made in	Palghaut	called	Manha Poo Paya.
,,	,, Needoongund	,,	Cooroo Nare Virallee.
,,	,, Palghaut	,,	Anjee Pooketty Mookeya Valle
,,	,, ,,	,,	Shooyakunden, Virallee.
,,	,, Palghaut	,,	Kella Mooka Virallee.
,,	,, ,,	,,	Ketta Mookya Virella.

Mats are made, in the Laccadive Islands, from the coaconut leaf cut out of the heart of the tree just before it unfolds. The mats are employed in the islands as sails of ships: they are of fine quality and much esteemed when exported.

The most common and most generally useful are formed of the bamboo, those made with the shining outside strips are used for matting of rooms where the rattan is not procurable. Common bamboo mats are used for lining vessels previous to receiving cargo for covering bullock carts. Rattan mats are generally preferred for rooms, Tonga mats similar to the Bengal is prepared in many parts of Southern India, the date, and palmyra leaf mats are generally used by natives for sleeping on and are very useful; the kildara (Mogali) leaf furnishes a good material for matting for packing, the Mauritius sugar bags are made from it; different grasses and rushes furnish material for common mats, the mat-makers stain the mats with red and black.—*Rohde, M.S.S.* Paulghaut mats and those from Cochin are considered the finest in Southern India. Mats of Travancore are made from the grass *Cyperus Textilis*, and another grass called Cooray.

(5240) MAT BAGS.

Cuppas, Guz. Hind.

Are formed of the leaves of the date and other palm trees, and are extensively used in Bombay and many parts of India for packing goods. They are imported into Bombay from Sonmeeanee and the Persian Gulf.

(5241) MAUT KE BAUJEE. Amarantus tristis. Lin.

Aray keeray, Tam.	Tontakoora, Tel.
Maut ke baujee, Duk.	Jillika, Sans.

Agri. Nom. Vol. II. *p.* 252.

(5242) MAUT KE BAUJEE. Amarantus Oleraceus.—Greens. There are two sorts of these common greens, cultivated in all native gardens; the leaves are eaten as spinach or put into curries.

(5243) MATE, YERBA, Paraguay Tea. The leaves of an evergreen shrubby plant (*Ilex Paraguayensis*), largely consumed, in the manner of tea, in many parts of South America, where they are the subject of extensive commerce. The manner of using it is as follows; a pinch of the leaves is put into a small cup of warm water, and the infusion is imbibed through a little tube pierced with small holes; in the lower part, which only allows the passage of the water, and keeps back the leaves. The same leaves serve for three infusions. It is drank by some with sugar or lemon-juice, and is used at all times.

(5244) MATICO, the Peruvian styptic, a powerful vegetable astringent, was first made known to the medical profession of England by Dr. Jeffreys, of Liverpool, in the *Lancet*, as far back as January 5th, 1839. A paper on its history and power was published in May, 1843, in the "Transactions of the Provincial Medical and Surgical Association," vol. 10. It is stated to be the *Piper angustifolium* of Ruiz and Parsons. Dr. Martin believes it to be a species of *Phlomis*. The leaves are covered with a fine hair.

(5245) MAUND, a measure of weight, which varies from 25 lbs. to 84, according to the substance weighed.

(5246) MAURANDIA BARCLAYANA, &c. Very pretty creepers, with pink, white and blue flowers, require a rich soil, well adapted for mixing amongst other creepers on arbors or trellises. —*Jaffrey.*

(5247) MAURANDIA. Scrophulariaceæ. Maurandia Semperflorens. These are very elegant climbing plants with dark blue and white, also purple coloured flowers, well adapted for trellis work, and are easily grown from seed, the plants thrive well in a good soil, either in pots or on the ground.—*Riddell.*

(5248) MAYBYOUNG. This is a hard, tough, knotty wood, which the Tavoyers select for anchors to their large boats, wooden anchors laden with stones constituting the greater part in use. I have never seen the tree.—*Mason.*

(5249) MEADOW GRASS. Poa. In Tenasserim, Meadow grass has one or two representatives among the most conspicuous grasses.—*Mason.*

(5250) MEADOW SAFFRON, Colchicum.

Sorinjan, Arab.

Is a bulbous plant (*Colchicum autuminale*), the roots and seeds of which are employed in medicine.—*Faulkner.*

(5251) MEAL.

Meel, Dut.	Farine, It.
Farine, Fr.	Farina, Lat.
Mehl, Ger.	Muka, Rus.
Atta, Guz. & Hind.	Farina, Sp.

The edible parts of wheat, oats, rye, barley, and pulse of different kinds, ground into a coarse flour.—*Faulkner.*

(5252) MECONOPSIS, (from μήκων, a poppy, and ὄψις, a resemblance), a genus of Plants belonging to the natural order *Papaveraceæ*, and formerly referred to *Ppaver*. This genus stands between *Papaver* and *Argemone*. It has 4 petals, numerous stamens, a short style, 5-6-radiating free stigmas, the capsule obovate, opening by pores beneath the apex.—*Eng. Cyc.*

(5253) MECONOPSIS ACULEATA. A native of Nepal, Choor, Kedarkanta, Peer Punjal. The roots are reputed to be exceedingly narcotic. A fine drawing of this plant is published in Royle's Illustrations of the Botany of the Himalayas. An alcoholic extract of one drachm of the root given to a small dog produced no perceptible effect.—*O'Shaughnessy, page* 184.

(5254) MECONOPSIS NEPALENSIS, a Nepaul plant, is described as being extremely poisonous, especially its roots.—*Eng. Cyc.*

(5255) MEDICINAL SUBSTANCES. The medicinal substances employed by the people of Eastern and Southern Asia, are very numerous.

Dr. Impey mentions that drugs to the number of ninety are found perfect substitutes for those employed in Europe. The following are the better known.

Catechu,	Acacia catechu.
Aconite,	Aconitum ferox.
Sweet flag,	Acorus calamus.
Bael fruit,	Aegle marmelos.
Mutty pal,	Ailanthus malabaricus.
Aloes,	Aloes indica.
Galanga root,	Alpinia galanga.
Lemon Grass, or Citronelle,	Andropogon citratum.
Roosa Grass,	„ calamus aromaticus.
Prickly poppy,	Argemone Mexicana.
Indian Birthwort,	Aristolochia indica.
Dhak kino,	Butea frondosa.
Indian hemp,	Cannabis sativa.
Senna leaves,	Cassia senna.
Purging Cassia,	Cathartocarpus fistula.
	Chiretta.
Clitorea,	Clitorea ternatea.
	Cocculus Indicus.
	Colchicum.
Croton seed,	Croton tiglium.
Colocynth,	Cucumis colocynthis.
Thorn apple,	Datura stramonium.
Foxglove,	Digitalis purpurea.
Borneo Camphor,	Dryobalanops camphora.
Gamboge,	Garcinia pictoria.
Dikkamully gum,	Gardenia lucida.
Bonduc nut,	Guilandina bonduc.
Chaulmoogra,	Gynocardia odorata.
Country Sarsaparilla,	Hemidesmus indicus.
Hydrocotyle,	Hydrocotyle asiatica.
Henbane,	Hyoscyamus niger.
	Juniper Berries.
	Kreyat.
Linseed,	Linum usitatissimum.
Chiretta, variety of,	Ophelia elegans.
Assafœtida,	Narthex assafœtida.
Opium,	Papaver somniferum.
Cubebs,	Piper cubeba.
Black pepper,	Piper nigrum.
Indian Leadwort,	Plumbago zeylanica.
True kino,	Pterocarpus marsupium.
Pomegranate Rind,	
Rhubarb,	Himalayas and Tibet.
Castor Oil,	Ricinus Communis.
Different sorts of Galls,	Terminalia catappa, and other species.
Country Ipecacuanha,	Tylophora asthmatica.
Sarsaparilla,	Smilax.
Nux vomica,	Strychnos nux vomica.
Clearing nut	Strychnos potatorum.
Connessee bark,	Wrightia antidysenterica.

M. E of 1857.

The Tenasserim Provinces are rich in medicinal plants, both in number and quality. Lindley's Flora Medica contains descriptions of all the known medicinal plants in the world, and more than a tithe of the whole number may be seen growing on the Tenasserim coast. Were we deprived of European drugs, and left to our own resources; we could find good substitutes for almost every article in the Medical Flora. Besides those to which separate paragraphs have been allotted, the bark root of the red cotton tree, and the roots of the clitoria are emetic; and the root of *Tylophora vomitoria* has been pronounced by Indian practitioners not inferior to ipecacuanha for any of the purposes to which that medicine is applied. *Cassia fistula* pods, the chebula fruit, the root of the heart seed, the seeds of the Sapodilla, Otaheite gooseberry, and physic nut are aperient or purgative. The gum of the white cotton tree, the bark of *Wrightia antidysenterica*, and the peel of the mangosteen are prescribed in bowel complaints. The green fruit of the papaya, the root of the Persian lilac, and the fruit of the Rangoon creeper are vermifuges. The bitter roots of *Sida acuta*, and *Tephrosia purpurea*, and the seeds of the musk-mallow or musk plant, are deemed cordial and stomachic, and the bark of *Guilandina Bonduc*, is considered a good substitute for cinchona where that cannot be had. The decocted leaves of the goat-footed ipomœa are used as an external application in cholic. The leaves of *Vitex trifolia* are applied in diseases of the spleen. The bark of the white plumbago root will raise a blister, it is said, almost as quickly as cantharides. The oil of the cashew nut "has been used successfully in ring-worms, cancerous ulcers and corns." The mango tree exudes a large quantity of gum-resin resembling bdellium, and an indigenous pine can furnish any quantity of turpentine. The bark of the root, the leaves, and the fruit of the Bengal quince, are as popular with the natives, as the root, bark, flower, and fruit of the pomegranate, which have been famous for their medicinal properties ever since the days of Celsus—*Mason*.

(5255) MEDICAGO (from Μηδική, the Greek name of one of the species), a genus of Plants belonging to the natural order *Leguminosæ*, to the tribe *Loteæ*, and the sub-tribe *Trifolieæ*. It has the calyx somewhat cylindrical, 5-cleft, the keel rather removed from the vexillum; the stamens diadelphous; the legume many-seeded, of various forms, reniform, falcate, or cochleate, but usually twisted in a spiral manner. The species are herbs or shrubs, with the stipules usually cut; the leaves trifoliate, the leaflet usually toothed, and the peduncles 1-2-many flowered. They are exceedingly numerous, upwards of 80 species having been described.—*Eng. Cyc.*

(5256) MEDICAGO SATIVA, Lucerne has many flowered racemes; the pods compressed, spiral, with two or three turns, downy, unarmed; the pedicels shorter than the calyx or bract; the leaflets obovate, oblong, dentate above, emarginate. This plant is a native of Europe, and is found wild in England and Scotland. It has an erect stem, with yellow or violet flowers. It is commonly cultivated in the fields of Europe, and Babington says that "the wild specimens found are scarcely naturalised." This is the Μηδική of Theophrastus, 'Plant. de Caus.,' lib. 2, cap. 20; and the *Medica* of Pliny, lib. 2, cap. 20; and the *Medica* of Pliny, lib. 18, Cap. 20.—*Eng. Cyc.* Lucerne is cultivated in the Deccan for feeding horses, also in Goozerat, where it is coming fast into use among the na-

tives as green food for cattle. Propagated by seed; may be sown at any season, in beds or rows. It requires much water, and each plant should have five or six inches of space allowed to it. Cultivators generally cut it, as it begins to blossom, when fresh shoots spring up, and a succession of crops is continued in this way for several months, by manuring it occasionally.—*Riddell.*

(5257) MEEAN MILILE. A very hard, fine, close grained, heavy Ceylon wood.

(5258) MEERSCHAUM, a Mineral belonging to the series of Silicates of Magnesia. It is dull-white, opaque, and earthy, nearly like clay. Its hardness is 2·0, and specific gravity 2·6 to 3·4. A variety from Anatolia, analysed by Thomson, gave—

Silica,...	42 0
Magnesia, ...	30·5
Water, ...	23·0
Lime, ...	2·3
Alumina, ..., ...	2 0
	99·8

When heated it gives out water and a fetid smell, and becomes hard and perfectly white. When first dug up it has a greasy feel, like soap, and on this account is used by the Tartars in washing their linen. It is known in Europe from its being made use of in Turkey to make the bowls of tobacco-pipes, which are hence called meerschaums. These pipes are first imported into Germany, where they are softened in tallow and wax, and then polished. *Aphrodite* and *Quincite* appear to be varieties. (Dana, *Mineralogy.*)—*Eng. Cyc.*

(5259) MEETHEE. TRIGONELLA FŒNUM-GRŒCUM. Fœnugreek. This is a small annual, commonly cultivated during the cold season. The greens are used by the natives and the seed in curries. It is sown like all other common greens. —*Riddell.*

(5260) MEETHEE KUDHOO. CUCURBITA PEPO. Sweet Pumpkin. This is grown at the same time as all the other species, and if hung up in a dry place is an excellent store vegetable, keeping for several months.—*Riddell.*

(5261) MEGACHILE. The nest of the leaf-cutter bee is to be found in thousands in the cliffs of the hills of the Soane valley with May-flies, Caddis-worms, spiders, and many predaceous beetles.—*Hooker Him. Jour. Vol.* 1. *p.* 52.

(5262) MELALEUCA (from μέλας, black, and λευκός,, white), a genus of Plants belonging to the natural order *Myrtaceæ*. It has the calyx-tube nearly hemispherical, the limb 5-partite; the petals 5; the stamens numerous, combined into 5 elongated bundles, which alternate with the petals; the anthers incumbent; the style filiform, the stigma obtuse; the capsule cannate with and inclosed in the thickened tube of the calyx, which is sessile on and adnate at its base to the flower-bearing branch, 3-celled, many-seeded; the seeds angular. The species are trees or shrubs with alternate or opposite entire leaves, equal at the base, with flowers perfectly sessile, or somewhat combined with the branch, arranged in spikes or heads, and of a white, yellowish, or purplish colour.—*Eng. Cyc.*

(5263) MELALEUCA CAJUPUTI. (Roxburgh), *M. minor* (Smith), *Melaleuca Cajuputi*, Roxb. (fig. 64), forms a small tree with an erect but crooked stem covered with thick, rather soft, light-coloured bark; branches scattered, with slender twigs which droop like those of the Weeping Willow. Leaves alternate lanceolate, acute, slightly falcate, 3 to 5 nerved, while young silky, and diffusing a powerful odour when bruised. Spikes terminal and from the extreme axils, downy as well as the calyx and branchlets, while in flower there is only a scaly conic bud at the apex, which soon advances into a leafy branchlet. Bracts solitary, 3 flowered. Calyx urceolate, (fig. 64, 3,) limb 5 parted. Petals 5, white, scentless. Stamens from 30 to 40, in five bundles; filaments 3 or 4 times longer than petals. Anthers incumbent with a yellow gland at the apex. Style long. Stigma obscurely 3-lobed. Ovary ovate, and like the capsule 3-celled, (f. 64. 2 and 1,) many seeded, lower half united with, but the capsule is enclosed within the thickened tube of the calyx. Seeds angularly wedge shaped. A native of the Molucca Islands, especially of Bocrou, Manipe and of the S. of Borneo. It is called *Daun kilsjil*, but also Cajuputi. The leaves are collected on a warm dry day in autumn, and placed in dry sacks, in which they neverthless become heated and moist. They are then cut in pieces, macerated in water for a night, and then distilled. Two sackfuls of the leaves yield only about 3 drachms of the oil. This is clear and limpid, of a light green colour, very volatile, diffusing a powerful odour, having a warm aromatic taste, something resembling that of Camphor, followed by a sense of coolness. Sp. Gr. 0·914 to 0·927; soluble in Alcohol. It boils at 343°. When distilled with water, a light and colourless oil first comes over, and then a green-coloured and denser oil, which with less odour, is more acrid. Comp. C_{10} H_9 O=77. Some adulterations are occasionally practised with this oil, especially at the time when it reached a high price, chiefly with the Oils of Rosemary and of Camphor; but it is now commonly met with in a pure state, and without any admixture of Copper. In its *Action* and *Uses*, it is Diffusible Stimulant, Antispasmodic; externally in Rheumatism. Surprise was excited in India when Cayaputi Oil was stated to be a cure for Cholera, as Oil of Peppermint is as useful. Dose ℥ iij.—℥v. given on a lump of Sugar—*Royle.*

(5264) MELALEUCA LEUCODENDRON, White-Tree, or Cajeput-Tree, has alternate long lanceolate acuminated falcate 3-5-nerved leaves; the flower-bearing branches pendulous; the flowers in spikes rather distant, which, as well as the rachis, are quite glabrous. It is a native of the East India Islands, and was at one time supposed to yield the oil of commerce. Roxburgh asserts that it possesses little or no fragrance in its leaves, and that it is seldom or never used for the distillation of the oil which is used in the European markets. Upwards of 30 species of *Melaleuca* have been described, the majority of which are natives of Australia. Many of them are fine plants with beautiful blossoms, and very desirable for the conservatory or greenhouse. They grow well in a mixture of peat, loam, and sand, and may be propagated by cuttings, which will readily take root if planted in a pot of sand and placed under a hand or bell-glass. (Lindley, *Flora Medica*; Don, *Dichlamydeous Plants.*—*Eng. Cyc.*

(5265) MELANORRHÆA, a genus of Plants belonging to the natural order *Anacardiaceæ*, so called from the brown fluid with which every part of the principal species abounds turning black upon exposure to the air.—*Eng. Cyc.* In the Tenasserim Provinces, there are two indigenous species Melanorrhæa glabra and M. Usitata, of the same genus that produces the common black varnish; but Mr. Mason, is not aware that the exudation which they yield is applied to any economical purpose.—*Mason.*

(5266) MELANORRHÆA USITATA.

Theet-see, Burm.

This is the *Theet-see* or *Lignum vitæ* of Pegu. It is plentiful in the Tounghoo and Prome Forests, especially in the former. It is of dark red colour, of extreme closeness of grain and density of structure, with a specific gravity so great, that it serves in place of iron as anchors for native boats. Its great hardness and weight prevent its being employed in house-building. It would answer for sheaths or block-pulleys and other purposes connected with machinery, where great strength and density are required. The tree is very common above the parallel of Tounghoo and grows to a girth of six feet Dark-brown wood. —*McClelland. M. usitata*, which is familiarly known as the Birmese Varnish-Tree, or Theetsee, was not described by botanists until discovered by Dr. Wallich, and figured in his splendid work 'Plantæ Asiaticæ Rariores,' t. 11 and 12. The tribe to which it belongs abounds in plants yielding a blackish, acrid, and resinous juice used for varnishing and other such purposes, as the Marking Nut and the Japan Varnish-Tree. This tree was first seen near Prome, and is found in different parts of Birma and along the coast from Tenasserim to Tavoy, extending from the latter in 14° to 25° N. lat., as Dr. Wallich has identified it with the Kheu or Varnish-Tree of Munipoor, a principality in Hindustan, bordering o the north-east frontier districts of Silhet an Tippera. It grows especially at Kubbu, an e tensive valley elevated about 500 feet above th plains of Bengal, and 200 miles from the neare sea-shore. There it attains its greatest size; som and those not the largest, having clear stems 4 42 feet to the first branch, with a circumferen near the ground of 13 feet. It forms extensiv forests, and is associated with the two stap timber-trees of continental India, Teak and Sa (*Tectona grandis* and *Shorea robusta*), especiall the latter, and also with the gigantic Wood Oil Tree, a species of *Dipterocarpus*. Th Theetsee forms a large tree, with the hab of *Semicarpus*, and abounds in every part wit a viscid ferruginous juice, which quickly become black by the contact of the atmosphere. It leaves are large, coriaceous, simple, very entire and deciduous. The panicles of flowers ar axillary, oblong; those of the fruit simple an lax, with very large rufous and finally ferrug nous involucres. It sheds its leaves in Novem ber, and continues naked until the month of May during which period it produces its flowers an fruit. During the rainy season, which lasts fo five months, from the middle of May until th end of October, it is in full foliage. At Prom a considerable quantity of varnish is extracte from this tree, but very little at Martaban. I is collected by inserting a pointed joint of a bam boo, which is closed at the other end, int wounds made in the trunk and principal bough which are removed after 24 or 48 hours, an their contents, which rarely exceed a quarter o an ounce, emptied into a basket made of bambo and rattan previously varnished over. The co lecting season lasts from January to April. I its pure state it is sold at Prome at about 2*s.* 6 for about 3½ lbs. avoirdupois. (Wallich.) M Smith, who was long resident at Silhet, and wa acquainted with this substance in 1812, state that it is procurable in great quantities fro Munipoor, where it is used for paying river craft and for varnishing vessels designed t contain liquids. The drug, he says, is conveye to Silhet for sale by the merchants who com down annually with horses and other objects o trade. In Birma, Dr. Wallich states that almos every article of household furniture intended t contain either solid or liquid food is lacquere by means of it. The process consists in firs coating the article with a layer of pounded calcin ed bones, after which the varnish is laid o thinly, either in its pure state or variously co loured. The most difficult part consists in th drying. It is also much employed in the pro cess of gilding; the surface, being first beamea ed with this varnish, has then the gold leaf im mediately applied to it. Finally, the beautifu Pali writing of the Birmese on ivory, palm-leave or metal, is entirely done with this varnish in it

native and pure state. Some difference of opinion exists as to the effects of this juice on the human frame. Dr. Wallich states that it possesses very little pungency, and is entirely without smell, and that both Mr. Swinton and himself have frequently exposed their hands to it without any serious injury, and that the natives never experience any injurious consequences from handling its juice; but he has known instances where it has produced extensive erysipelatous swellings attended with pain and fever. Sir D. Brewster, on the contrary, considers it a very dangerous drug to handle, one of his servants having been twice nearly killed by it. A second species of the genus, *M. glabra*, was obtained by Dr. Wallich from Tavoy. (Wallich, 'Pl. As. Rar.,' i., p. 9, t. 11 and 12; and 'Edinb. Journ. of Science,' viii., p. 96 and 100.)—*Eng. Cyc.*

(5267) MELASTOMA (from μέλας, black, and στόμα, a mouth, because the berries when eaten stain the mouth black), a genus of Plants, the type of the natural order *Melastomaceæ*. It has the tube of the calyx ovate, half-adhering to the ovary, densely covered with scales or bristles; the limb 5- rarely 6-cleft, the segments alternating with the appendages, both deciduous; the petals 5-6; the stamens twice the number of the petals; the anthers oblong linear, a little arched, opening by a pore at the apex, each furnished with a stipe-formed connective, which is in some species elongated and in others short, but always biauriculate or emarginate in front; the free part of the ovarium conical and bristly: the style filiform, somewhat thickened at the apex; the stigma a pruinose dot; the capsule baccate, 5-6-celled, opening irregularly; the seeds cochleate. The species of this genus are shrubs, which are usually covered with strigæ. The leaves are petiolate, and either quite entire or serrulated. The flowers are large, white, rose-coloured, or purple. Between 30 and 40 species of *Melastoma* have been described. They grow in the warmer districts of the Old and New World, and are found in South America, Asia, and Africa. Their flowers are very handsome, and all the species may be cultivated for ornament. They grow well in a mixture of loam, peat, and sand, and young cuttings root freely in sand in heat under a hand-glass. (Lindley, *Vegetable Kingdom*; Don, *Dichlamydeous Plants.*)—*Eng. Cyc.*

(5268) MELASTOMACEÆ, *Melastomads*, an extensive natural order of Polypetalous Exogenous Plants nearly related to *Myrtaceæ*.—*Eng. Cyc.*

(5269) MELASTOMA MALABATHRICUM, Malabar Melastoma, is a shrubby plant with tetragonal branches rough from strigæ; the leaves elliptic-oblong, obtuse at the base, acute at the apex, quite entire, green on both surfaces, and scabrous from strigæ; the corymbs 1-5-flowered; the calyx clothed with adpressed strigose scales, with ovate acute lobes; the connectives of the anthers short, or very long. It is a native of the East Indies, and frequent in the Indian Archipelago. The leaves of this plant are employed by the natives where it grows as a remedy in diarrhœa, dysentery, and mucous discharges.—*Eng. Cyc.* In the Tenasserim Provinces, this species of melastoma with large gaudy purple petals, and long yellow stamens, is a common weed. Its calyx opens like a lid, and bears a fruit which in taste and flavour strongly resembles the blackberry of temperate regions. In Bengal the same plant is cultivated as a garden flower, but it does not compare with the wild plant of Tenasserim.—*Mason.* This is one of the Black-Dye Plant of Asia. The blossoms of the shoe-flower plant are used by the Chinese to dye leather black, the juice of the cashew-tree gives a black to linen, and the fruit of this melastoma affords a black dye—*Mason.*

(5270) MELANIA. Lamarck gives the rivers of the East Indies, Madagascar, the Mauritius, &c., as the locality of *M. amarula*, the animal of which, he says, is very bitter, and passes for an excellent remedy for the dropsy. The apex of all the species is generally eroded as the animal advances in age. Woodward, in his 'Manual,' says, there are 160 recent species. The following are sub-genera:—*Melanatria*, Bowdich; *Vibex*, Oken; *Ceriphasia*, Sw.; *Hemisinus*, Sw.; *Melafusus*, Sw.; *Melatoma*, Anthony; *Anculotus*, Say; *Amnicola*, Anthony; and *Pachystoma* Gray—*Eng. Cyc.*

(5271) MELIA (so called from Μελία, the Greek name of the Common Ash, which one species of the genus is thought to resemble in foliage), a genus of Plants belonging to the natural order *Meliaceæ*, to which it has given its name, and which is, like *Melia*, characterised by having the filaments of the anthers combined into a tube, with the anthers sessile within it, and opening inwards; the seeds without wings. The species are few in number, and chiefly Indian; one is naturalised in the south of Europe, and one is found in North America.—*Eng. Cyc.*

(5272) MELIA AZADIRACHTA. Lin.

Vaypum marum. TAM.

Flowers of the Indian azadirachta.

Vaypum poo, TAM. | Vaympa poo, TEL.
Neem ka pool, DUK. |

M. Azadirachta, the Neem-Tree or Margosa-Tree of the peninsula of India, has been separated into a distinct genus on account chiefly of its ternary, not quinary, structure of the parts of the pistil, and its single-seeded fruit. This has been named *Azadirachta* from the Persian (Azad-i-Du rukht, 'the excellent tree'). Its bark is bitter, and considered a valuable tonic. The fleshy part of the fruit (like that of the olive) yields a fixed oil, which is bitter, and considered anthelmintic and stimulant. The leaves are universally used in India for poultices, and both the flowers and seeds are irritating and stimulant. According to

Dr. Ainslie, a kind of toddy is procured by fermenting the sap of healthy young margosa-trees. The wood is serviceable, that of old trees is very beautiful and well adapted for furniture, the bark is astringent as well as the leaves, a decoction of which is used as a remedy for itch with effect, the seeds yield a bitter oil which is useful as an external application; the flowers are collected for making a kind of chatun.—*Rohde M.S.S.* In general it is a soft reddish coloured, rather loose textured wood, which however takes a pretty good polish, and is much used for cabinet-making purposes, under the name of bastard cedar.—*Wight.*

(5273) MELIA AZEDARAK, sometimes called Persian Lilac, Pride of India, and Common Bead-Tree (Hill Margosa by Dr. Ainslie), is said by Dr. Roxburgh to be a native of China; it is also a native of the north of India. It is much cultivated in the southern part of the United States of America. It is called Dek in the northern provinces of India, and may be confounded with another species under the name *Azedarach* by Avicenna. When in flower it has some resemblance to the Lilac, and its flowers are very fragrant. The berries are sweetish, and, though said to be poisonous, are eaten by children in the United States without inconvenience, but are reputed to be a powerful vermifuge. The bark of the root in its recent state has a bitter nauseous taste, yielding its virtues to boiling water, and is cathartic and emetic, and considered in the United States an efficient anthelmintic, and also useful in infantile remittents.—*Eng. Cyc.* The Melia Azedarak or Persian Lilac or Hill margosa, *Dek*, flowers in the Botanical Garden of Calcutta during the hot season; it thrives luxuriantly, and becomes a large useful timber tree, of very great beauty. Its flowers are like those of the lilac, and sweetly fragrant. (Roxb. ii p. 395.)—*O'Shaughnessy.*

(5274) MELIA BUKAYUN is distinguished by Dr. Royle from the West Indian *M. sempervirens* of Schwarz, with which it was united by Dr. Roxburgh. This tree appears to be a native of Persia, though common throughout India. It is called by the Arabs Ban, and by the Persians Azad-i-Durukht. It is probable therefore that this may be one of the trees included under the *Azedarach* of Avicenna. The seeds are bitter, and considered laxative and anthelmintic, as is also the bark. *M. tomentosa* is a species found in the Island of Penang; and *M. composita*, in which are included both *M. superba* and *M. robusta*, is a species found in Malabar and Mysore.—*Eng. Cyc.*

(5275) MELIA ROBUSTA. A large tree a Native of Malabar: in seven years the trunk of one raised in the Calcutta gardens attained a circumference of forty-four inches and a height of forty-six feet.—*Rohde M.S.S.*

(5276) MELIACEÆ, *Meliads*, a natural order of Polypetalous Exogenous Plants, distinguished from all others by their stamens being united into a complete cup, within and often below the rim of which the anthers are inserted. It consists of trees or shrubs with alternate often compound leaves, inhabiting all countries within the tropics, but very rare in colder climates; *Melia Azedarach*, or Bead-Tree, a Syrian plant, now naturalised in the south of Europe, forming the principal exception. In general the species are bitter and astringent, but they are sometimes dangerously poisonous, acting violently as emetics and purgatives. Notwithstanding this, the pulpy fruit of the *Lanseh* is esteemed in the Indian Archipelago; and that of *Milnea edulis* is eaten in Silhet where it seems to resemble the Litchi and Longan of China. There are 33 genera and 150 species.—*Eng. Cyc.*

(5277) MELIA SEMPERVIRENS or BUKAYUN. Ever-green Bread Tree.

Bukayun, Bukain, PERS. | Maha nimba, BENG.
Ban, ARAB. |

A smaller tree than the M. Azedarach—the flowers bluish.—*O'Shaughnessy, page* 243-244. It is common at Ajmeer; as is also the large deciduous variety. This is the chief tree in compounds, being very ornamental when in blossom, and odoriferous.—*Genl. Med. Top., p.* 193.

(5278) MELICOCCA TRIJUGA.

Kobin or Jobin, BURM.

A most valuable timber, called by the Burmese Kobin, and employed by the natives of the country for cart-wheels, oil-mills, and other purposes requiring great strength and solidity. It is found in greatest perfection on the banks of the Sitang in the Kareen Forests above Tounghoo; but it is also found throughout the Pegu and Tounghoo Forests in abundance, more particularly the latter. It is also found along with Teak in Tharawaddy and Prome Forests. Light-brown wood.—*McClelland.*

(5279) MELILOTUS. MELILOT. Griffith saw large fields of melilot in the neighborhood of Ava, but Mr. Mason has not seen it in these Provinces.—*Mason.*

(5280) MELILOTUS ARBOREA. BOKHARA CLOVER. A plant under this name has attracted some notice in Ireland, on account of its fibre. It is the *Melilotus arborea* and is nearly allied to *M. leucantha*, and therefore not a true Clover. It grows so freely as to yield five or six cuttings in the season of green herbage, from which, it is said, a considerable proportion of strong fibre may be obtained; but the Committee of the Irish Flax Society state, that the trials made in steeping this plant were unsuccessful with them.—*Royle, Fib. Pl. p.* 198.

(5281) MELOE. The Linnæan genus *Meloe* included the several genera of Heteromerous *Coleptera* now forming the family *Cantharidæ*, interesting on account of its including those beetles known under the name of 'blistering flies,' and employed in medicine. [CANTHARIDÆ.] The term *Meloe* is now restricted to the Apterous *Cantharidæ*, and the species are all beetles with large and swollen bodies, and short oval elytra, lapping over each other at the base of the suture. They are sluggish creatures and feed on various plants, especially the species of *Ranunculus*. When alarmed they emit from the articulations of their legs an oily, yellow, or reddish liquid. Latreille maintained that this insect was the *Buprestis* of the ancients, to which noxious qualities were attributed. (See his paper on the subject in the 12th volume of the 'Memoires du Museum d'Hist. Naturelle.') The nature of the larva of the *Meloe* has been a subject of considerable discussion among entomologists, having been supposed to be a minute, active, parasitic animal found on bees and flies. Most entomologists have held this view since the time of Linnæus, but the observations of Geoffroy, Newport, and Westwood, go far to prove that it is a mistake, and that there is no anomaly in the case.—*Eng. Cyc.*

(5282) MELOE TELINI. MYLABRIS CHICOREI. The blistering-beetle, or native blister-fly of East India, abounds at Lahore.—*Dr. Honigberger, p.* 307. Telini is the Hindoostanee name given in the higher provinces of India to an excellent substitute for the Spanish fly. It abounds in Bengal, Behar and Oude; particularly in the rainy season, during which period, Dr. Fleming tells us, it is seen feeding on the flowers of Cucurbitaceos plants. Ainslie had not met with it in lower Hindoostan.—*Ains. Mat. Med. p.* 118.

(5283) MELOE TRIANTHEMA. While the fly called Telini in higher Hindoostan is often used as a substitute for the Spanish fly, Dr. Fleming informs us that another species of Meloe, which has got the scientific appellation of Meloe Trianthema from being frequently found in fields over-run with the common plant Trianthema Decandia (Willd.) is now much used, as a safe and efficacious epispastic in the Medical Hospitals of the upper provinces. Its peculiar qualities were discovered by Dr. Adam Burt, Superintending Surgeon of the Bengal Establishment, in 1809, who first noticed the insect in fields around Muttra; it has since, however, been ascertained that it abounds in every part of the Doab, and in the districts on the right banks of the Jumna. Dr. Ainslie learned that this valuable fly had never been met with in lower India.—*Ainslie's Mat. Med. p.* 297.

(5284) MELOCHIA CORCHORIFOLIA, Lin. Hort. Mal.

Poonnacoo keera, TAM. | Ganuka peindie koora, TEL. Tjeroo, URIA.

The whole of this plant, with the exception of the root boiled in oil, is supposed, on the Malabar coast, to be an efficacious remedy for preventing bad consequences from the bite of a water snake. See Hortus Malabaricus, part 9th page 143.—*Ains. Mat. Med. p.* 134.

(5285) MELON.

Khurbooza, HIND.

Rock, green, and musk melons are all sown in the Deccan at the same time,—generally in beds of rivers where the soil is light and sandy. They are very seldom sown in gardens. The seed is put down in November, three or four together, with as rich manure as can be procured. The plants must not be close together—a distance of from six to eight feet is generally allowed. They come in about March, and continue until the rains. In Bombay they are in season at the same time, and a second crop is grown during the rains: this is not the case in the Deccan. The water melon (*Hind.* Turbooza) is also to be had at the same time, and grown in a similar manner. The seed should always be preserved from the finest and richest-flavored fruit, and is better for being three or four years old. The green melon is the finest flavored, although many of the others are very good, the melons growing finer in the sandy beds of rivers is attributed to the temperature being more equal about the roots than it is in beds in the garden—especially during the night.—*Riddell.*

(5286) MELON, MUSK. CUCUMIS MELO. A very indifferent musk melon is cultivated by the natives generally.—*Mason.*

(5287) MELON SEED OIL, CUCUMIS MELO. Pitcha Pusjhum—harbooza, Khurbooza.

(5288) MELON, WATER. CITRULLUS CUCURBITA. Both Burmese and Karens raise water melons, but they are neither so large nor so sweet as those of America.—*Mason.*

(5289) MEMECYLACEÆ, are a very small natural order of Polypetalous Exogenous Plants, consisting of a few tropical species of little interest. Most of them inhabit the East Indies, the Mauritius, and Madagascar. They are in habit and foliage like *Myrtaceæ*, with which order they agree in most respects; but they have anthers which in form resemble those of many *Melastomaceæ*, and the leaves have no transparent dots. From the latter order they are distinguished by their leaves not being ribbed, and by their cotyledons being convolute. In the opinion of Brown and Chamisso, it is rather as a section of *Melastomaceæ* than as a peculiar order, that *Memecylaceæ* are to be accounted. No useful properties have been assigned to any of the species, except to *Memecylon edule*, an East Indian plant, whose leaves, according to Rox-

burgh, are an ingredient in the dyes of Coromandel, and whose ripe astringent pulpy black berries are eaten by the natives.

(5290) MEMECYLON EDULE, Roxb. 82.

Aalee pundoo, TEL.

Aalee pundoo is the Teloogoo name of a berry which grows upon a small bush, common in most jungles on the Coromandal coast, it has much pulp of a bluish color, and is of an astringent quality.—*Ainslie, p.* 221.

(5291) MEMECYLON TINCTORIUM. Aliakoo or Casau elay.

Kasha marum, TAM. | Alaika chettoo, TEL.

This tree is said by Rheede to abound in the woods about Cochin. Its leaves are known to be used as a dye stuff.—*M. O. C.* It is a small tree common in jungles in the Carnatic. The wood is brought into Madras for firewood and a large quantity of the leaves are imported daily for dyeing purposes. Cold infusion of the leaves imparts a yellow dye.—*M. E. J. R.* In Tenasserim, this small blue flowered species of memecylon bears its flowers in compound corymbs, which contrast favourably with its shining green leaves,and is interesting to the florist in that country, where blue flowers are so rare.—*Mason.*

(5292) MENISPERMACEÆ, *Menispermads*, an important and extensive natural order of Exogenous Plants, considered by some to be Polypetalous, and referred to De Candolle's Thalamifloral sub-class ; by others placed among the *Monochlamydeæ* of that author. The order consists of twining or scrambling shrubby plants with alternate leaves without stipule, and small greenish or white unisexual flowers, often collected in large loose panicles or racemes. The floral envelopes are arranged in a power of three or four, and usually in more rows than one ; whence arises the opinion that these plants belong to Polypetalous Exogens, the inner series being regarded as a corolla. The stamens are either distinct or monadelphous, either equal in number to the inner series of the calyx, and of the same number or much more numerous. The carpels are in most cases three, or some multiple of that number, either distinct from each other or consolidated. The fruit consists of succulent one-celled drupes, with a solitary seed and a horse shoe shaped embryo with thin flat cotyledons. The wood of the stem is arranged essentially upon the Exogenous plan, but has some striking peculiarties. According to M. Decaisne, it has no annual concentrical layers. The woody plates are always simple and do not divide longitudinally, as in other Dicotyledons, but increase each year by the formation of a new woody layer outside the former and inside the liber. The latter ceases to grow after the first year. In *Cissampelos Pereira* and some others, new woody plates, like the first in appearance, but having no spiral vessels or liber, show themselves, at the end of several years, on the outside of the first, and produce around them a concentric circle, a formation which may be repeated a great many times. ('Comptes Rendus,' v. 393.) The order is common in the tropics of Asia and America, but uncommon out of these latitudes. All Africa contains but five, North America six, and Siberia one. The species are universally found in woods twining round other plants. *Cocculi* are most common in the Old World, and *Cissampeli* in the New World. *Menispermaceæ* are usually bitter and tonic plants ; the species of *Cocculus* called *Batis Fibraurea, cinerascens*, and others, are used in their native countries as a remedy for intermittent fevers. *Cocculus palmatus* furnishes the Calumba Root of the shops, a valuable bitter. *Pereiria medica* is used for the same reason in Ceylon as is *Clypea Burmanni* in Malabar, and various sorts of *Cissampelos* in Brazil. But the bitter principle, which in its diluted state is thus valuable, becomes a dangerous poison if concentrated, as in the seeds of *Anamirta cocculus*, the Cocculus Indicus of the shops. There are 11 genera and 175 species of this order.—*Eng. Cyc.*

(5293) MENISPERMINA, a vegetable alkali extracted by Pelletier and Courbe from the *Menispermum cocculus*, or *Cocculus Indicus*, in the shells of the fruit of which it occurs.—*Eng. Cyc.*

(5294) MENISPERMUM (so called from μήνη, the moon, and σπέρμα, seed, from the crescent-like form of its fruit), a genus of the natural family of *Menispermaceæ*, which formerly contained numerous species, many of them valuable for their medicinal and other qualities, such as the Calumba Root, and the berries called *Cocculus Indicus*, which are now referred to the genus *Cocculus*. *Menispermum*, as at present constituted, contains but few species ; and these are climbing shrubs, which have their sepals and petals in quaternary order, arranged in two or three whorls. Male, stamens 16 to 20 ; Female, ovaries 2 to 4 ; drupes baccate, round, kidney-shaped, single-seeded. *M. Canadensis* and *M. Smilacinum* are found in the United States of America, and *M. Dauricum* in the wooded hills of Dauria.—*Eng. Cyc.*

(5295) MENTHA, a genus of Plants belonging to the natural order *Lamiaceæ*, or *Labiatæ*. It has a campanulate or tubular calyx, 5-toothed equal, or somewhat 2-lipped, with the throat naked inside or villous ; corolla with the tube inclosed, the limb campanulate, nearly equal, 4-cleft, the upper segment broader, nearly entire, or emarginate : stamens 4, equal, erect, distant ; filaments smooth, naked ; anthers with two parallel cells ; style shortly bifid, with the lobes bearing stigmas at the points ; fruit dry and smooth.—*Eng. Cyc.* Several of the Mints, remakable for their odour and taste, have long been used in medicine *inter-*

Ἥδυοσμος and Καλὰ μινθα of the Greeks, *nana* of the Arabs), and some as sweet herbs; but it is difficult to distinguish one species from another by the short descriptions given.—*Royle.*

(5296) MENTHA CRISPA. Lin.

Widdalilam, Tam. | Poodina, Duk.

Ainslie's Mat. Med. p. 258.

(5297) MENTHA PIPERITA, Peppermint, is found by the sides of ditches and rivers in Britain, all over Europe, in Egypt, the middle of Asia, India, and North and South America. It has a procumbent ascending branched stem, reddish, quite smooth, or fringed with a very few spreading hairs; petioles generally ciliated; leaves ovate-oblong, or somewhat lanceolate, rounded at the base, deep green, smooth, or hairy on the under side; the upper floral leaves small, lanceolate, subulate, shorter than the flowers; whorls few, lax, the uppermost collected into a short oblong obtuse reddish spike, the lowermost remote, with the cymes shortly stalked; bracts subulate, the outer ones as long as the calyx: pedicels quite smooth; teeth of the calyx hispid, subulate, erect. Peppermint is an aromatic stimulant, and the most pleasant of all the mints. It is employed in medicine for several purposes; the volatile oil is an antispasmodic.—*Eng. Cyc.*

(5298) MENTHA PULEGIUM, Pennyroyal also a British plant, is found in wet ditches in most parts of Europe, also the Caucasus, Chili, and Teneriffe.

(5299) MENTHA ROYLEANA, is much used by the Hill people of the Himalayas.—*O'Shaughnessy, p.* 489.

(5300) MENTHA SATIVA.

Widdatilam. Tam. | Nana, Arab.
Poodina, Duk. | Hibbuk, Arak.

Is prescribed by the Mahomedans in dyspeptic complaints and to stop vomiting —*O'Shaughnessy, p.* 489.

(5301) MENTHA VIRIDIS, Spearmint, is a native of Britain, and is also found in the milder parts of Europe, the Canaries, Cape of Good Hope, and America, both North and South. It is a creeping rooted herbaceous plant, with an erect smooth stem; leaves subsessile, ovate-lanceolate, unequally serrated, smooth, those under the flowers all bract-like, rather longer than the whorls, these and the calyxes hairy or smooth; spikes cylindrical, loose: whorls approximated, or the lowest or all of them distant. This plant greatly resembles *M. piperita*. The colour however is of a deep green. It is also frequently confounded with *M. crispa*, than which it has a stronger and more agreeable odour, but weaker than peppermint. It has not the aromatic odour of that plant, nor does it leave the sense of coolness in the mouth. From it are prepared a distilled water, a spirit, and a volatile oil, which are used as the former.—*Eng. Cyc.*

(5302) MENTHA VIRIDIS. Spearmint. Pahari Poodena. A native of Cashmere but cultivated in the plains for its essential oil and distilled water.—*O'Shaughnessy, p.* 489.

(5303) MENISPERMUM CORDIFOLIUM. Heart Leaved Moon Seed, *Russel.*

Sheendie codie, Tam. | Tippatingay, Tel.
Goolbayl, Duk. | Guduchi, also Amoorta,
Gurcha, Hind. | Sans.
Cita-merdoo, Mal.

Very common in the Ajmeer hills; M. Cordifolium &M. Glabrum are called Gullanchi by the natives indifferently.—*Genl. Med. Top. p.* 211. The powder of the dried tender shoots of this creeper which is bitter, and a little nauseous to the taste, the Tamool Practitioners prescribe as an alterative in cases of depraved habit of body proceeding from visceral obstruction and Jaundice. Dr. Fleming informs us that the Hindoo Physicians consider a decoction of the leaves as a febrifuge and as a tonic in gout. And this plant (which in some parts is called Somalatay) is bruised and put into water and taken by the Brahmins at some of their religious ceremonies.—*Ains. Mat. Med. p.* 112.

(5304) MENISPERMUM CORDIFOLIUM, INFUSION. An infusion of Gulancha is an excellent alterative tonic and diuretic. It is especially valuable in convalescence from fevers, and in secondary venereal affections. Dose, two to four ounces thrice daily.—*Beng. Phar. page* 300.

(5305) MENISPERMUM CORDIFOLIUM, TINCTURE. A tincture of Gulancha, is Tonic and febrifuge. Dose, two to four fluid drachms repeated as required.—*Beng. Phar. p.* 427.

(5306) MENISPERMUM GLABRUM. Nim-gilo Gulancha. A climber found often on Neem trees: the whole plant is very bitter, the stem is chiefly used: six masses are given as a dose, with other ingredients in fevers. An extract called "giloysut," is prepared and much used.—*Genl. Med. Top. p.* 148. Common in Ajmeer. The whole plant is used in fevers as elsewhere in India, every part is very bitter; an extract is prepared called Giloysut, from the stems and leaves.—*Genl. Med. Top. p.* 210.

(5307) MENISPERMUM VERRUCOSUM. Warty-stemmed Moonseed. Found in the Ajmeer hills.—*Genl. Med. Top. p.* 211.

(5308) MENISPERMUM VILLOSUM. Woolly Moon-seed. Found in the Ajmeer hills.—*Genl. Med. Top. p.* 211. I only obtained one specimen of a plant which I am almost sure was the Cocculus Indicus or Plutakenetu, but I could not again obtain portions of the plant, the person who first brought it having forgotten where he first found it.—*Genl. Med. Top. p.* 211.

(5309) **MENYANTHES INDICA**, INDIAN BUCKBEAN.

Bara-phooli, HIND.

In standing water at Ajmeer and Pushkur.—*Genl. Med. Top. p.* 190,

(5310) **MERCURY, QUICKSILVER.**

Abuk, Zibakh, ARAB.	Rassa, MAL.
Shwuyyin, CHIN.	Seemab PERS.
Mercure, Vif-argent, FR.	Rtut, RUS.
Quecksilber. GER.	Rasa, Sutum, Parada, SANS.
Para. GUZ. & HIND.	Azogue, SP.
Argento Vivo, IT.	Rasam. TAM.
Hydrargyrum, LAT.	Rasam, TEL.

Mercury (Hg=202), or Quicksilver, was known to the ancients. The Romans seem to have employed it as a medicine externally (p. 133), as did the Arabs; but the Hindoos were probably the first to prescribe it internally. (v. p. 191.) It is found in China, at Almaden in Spain, and Idria in Carniola, and likewise in South America. It occurs occasionally in metallic globules; usually as the native Bisulphuret or *Cinnabar*; combined with Silver, forming a *Native Amalgam*; or with Chlorine, as in *Horn Mercury*. It is chiefly obtained from the Sulphuret by distillation with lime or with Iron, which combining with the Sulphur, the metal distils over and is condensed.—*Royle*. Quicksilver, or native mercury, is imported from Burmah into Tenasserim, and it is said to be brought to Ava from China.—*Mason*.

(5311) MERCURY, BICHLORIDE OF: CORROSIVE SUBLIMATE. This is much used as a preservative of timber, canvas, &c. from the ravages of mildew, the dry rot and of white ants. A solution is made in the proportion of one pound to four gallons of water, and in this the article to be protected is steeped a variable time according to its nature —*Beng. Phar. p*, 340,

(5312) MERCURIAL PREPARATIONS OF INDIA. *Russa Karpoor*. Several preparations of mercury have been described by the Sanskrit and Tamul writers, especially in the "Purana Sastram," a work on Materia Medica and religious observances. The processes Dr. O'Shaughnessy examined generally led to the production of a mixture of calomel and corrosive sublimate, and the analysis of all the bazar preparations he collected, shews their composition to be a mixture of varying proportions of these substances. The Raskarpur is generally considered to be corrosive sublimate, but on analysis he found that it is usually calomel. Once, however, he met a specimen which was corrosive sublimate of the finest kind. The cause of the uncertainty is to be traced in the different portions of the ingredients recommended by different native writers, and which of course must lead to the results described.—*Beng. Phar. p.* 342.

Rustapushpum.—This is a sort of muriate of mercury, in great repute amongst the Tamuls, and which appears to be administered by them in larger doses than any other preparations of this metal. But it generally happens that through defective manipulation a mixture of calomel and the bi-chloride is formed.—*Beng. Phar. p.* 342.

Shasirum.—This strange compound is administered by the Tamuls in very small quantities; and it ought to be so, as it is evidently a harsh, uncertain, and dangerous preparation. In the mode of preparing it, the vapours of calomel simultaneously rising and meeting the chlorine are converted into the bi-chloride of mercury, the preparation now described.—*Beng. Phar p.* 342.

(5313) MERIANDRA BENGALENSIS; a plant of the family of Labiatæ.

Kafoor ka putta, HIND.

Is in use amongst the people of India.—*O'Shaughnessy, p.* 492.

(5314) MERIANDRA STROBILIFERA. (MURTOO) of the family of Labiatæ has a strong fragrance, and is considered by Royle as very promising.—*O'Shaughnessy, p.* 492.

(5315) MERINO. The term applied to a fine kind of woollen fabric, of various colours. —*Faulk.*

(5316) MEASKHEE FIBRE, BOEHMERIÆ SPECIES (Urticeæ). A fibre is enumerated by Major Hannay ('Journ. Agri-Hortic. Soc.,' vii, p. 217), which he says is called *Mesakhee*, and is an *Urtica*, but not a stinging one. It is a shrubby tree, probably a species of *Boehmeria*, and is very abundant. Its young branches, which are tender and red-coloured, as well as its leaves, are edible. Capt. Thompson had a log-line made of the fibre and found the strength of it quite equal to Russia Hemp, but for want of being properly harvested, the fibres cling so close together that great loss of material takes place in heckling it. He thinks it well adapted for cordage, and if brought into general use ought to bring as much as Petersburgh Hemp." ('Journ. Agri-Hortic Soc.,' viii, p. 60.) Major Hannay says: "The Murrees and others might be induced to bring the fibre for sale; but as the value of this Nettle in the market has not been ascertained, I have only offered at the rate of Rs. 5 per maund which, however, on account of the slow method of manipulation, has not been considered remunerative." (*l. c., p.* 86,) Of Major Hannay's Nos. 9, 7, and 5, the first, which is the foregoing, he says is called *Mesakhee* or *Mejingah*, the other *Mesakhees*. No. 9 has but little fibre and a very rough stem. No. 7 has much the same habits as Bon Rheea., and can be cultivated like it. Its fibre is also of the same character, but white, strong, and durable. It is used for the same purposes. Capt. Dalton, in a letter, dated 20th July, 1854, referring to what Dr. Royle had said

respecting the Wild or Bor. Rheea, writes:—"As he alludes to the batch sent through this office by Major Hannay in 1853, he must refer to the 'Mesakhee,' of which large quantities are procurable, growing wild in Upper Muttock and elsewhere in the district. The instructions regarding the specimen of Petersburg Hemp sent out as a sample are more applicable to this fibre than to the Dom Rheea. I propose to take measures for collecting as much of it as I can get prepared. The cost will be from three to four annas a seer. This might be accompanied by samples of the *Bon Rheea*, *Bon Surat* and other fibres, all prepared to resemble the Petersburgh Hemp. If for these wild fibres we had a good market, the frontier tribes, Singphoos &c., who understand how to prepare them, might be induced to assist in supplying them." The specimens which Dr. Royle had referred to in the above communication were sent under the name of Bon Rheea from India. The two plants, *Bon Rheea* and *Mesakhee*, may be identical or nearly allied species, but this cannot be ascertained without authentic Botanical specimens. Major Hannay distinguishes the two kinds—the *Bon Rheea* being his No. 2 and *Mesakhee* No. 9—in his paper in the 'Journ. Agri-Hortic. Soc.,' vii, *p.* 215.—*Royle. Fib. P. p.* 365.

(5317) MESONA WALLICHIANA. A Labiate plant that grows on the Jyntea Hills, on the ascent, whose bruised leaves smell as strongly of patchouli, as do those of the plant producing that perfume, to which it is closely allied.—*Hooker, Vol.* II. *p.* 314. *Pogostemon Patchouli* has been said to occur in the Khassia Hills of India, but Dr. Hooker never met with it, and doubts the accuracy of the statement. It is a native of the Malay peninsula, whence the leaves are imported into Bengal, and so to Europe.—*Hooker, Him. Jour. Vol.* II, *p.* 314.

(5318) MESPILODAPHNE PRETIOSA. Woods near Para. Inner bark and rind of the calyx very fragrant, resembling cinnamon and bergamot.—*O'Shaughnessy, p.* 547.

(5319) MESUA. The mesua, which in Ceylon is called "iron wood tree," though not large, has an erect symmetrical figure, whose deep evergreen foliage, flowing downward from its cone shaped crest, quite conceals its bowering branches, so that when covered with its rich blossoms, with ivory white petals and deep yellow stamens, it looks like the royal umbrella bespangled with gold; and the Burmese say that their next Budha, *Aree-ma-tuya*, will enter the divine life while musing beneath its hallowed shades, hence it is a favorite tree with the priests who plant it around their monasteries. In Sanscrit it is called nagakeshura, and Sir William Jones remarks of it:—"This tree is one of the most delightful on earth; and the delicious odor of its blossoms justly gives them a place in the quiver of Camadeva, the Hindoo god of love."

To this Moore alludes in the following stanza.

"Then rapidly with foot as light
As the young musk deer's, off she flew
To cull each shining leaf that grew,
Beneath the moonlight's hallowing beams
For this enchanted wreath of dreams;
Anemones, and seas of gold,
And new-blown lilies of the river,
And those sweet flowerets that unfold
Their buds on Camadeva's quiver."

There are at least two different species in the Tenasserim Provinces, *M. pedunculata* and *M. ferrea*. Much confusion exists in our standard works on botany in relation to this last species. The *Mesua ferrea* of Roxburgh is the *M. Roxburghii* of Wight's illustrations; the Mesua tree of Calcutta, Serampore, and neighbourhood.—The *M. ferrea* of Wight's Prodromus is the *M. Coromandelina* of Wight's Icones, and Illustrations.—The *M. ferrea*, of Wight's Illustrations, is the *M. nagaha* of Gardener, the mesua tree of Ceylon; while the *M. ferrea* originally described by Linnæus is *probably* the species found on this coast; but for the lack of books which contain the description of Linnæus, it cannot be affirmed with certainty.—*Mason.*

(5320) MESUA FERREA, Nagsara or Nagkesur. As. Researches, iv. 295. Lin.

Irool Marum, Tam.	Nagacessra, Sans.
Nagasar, Hind.	

The blossoms of this tree, which Sir W. Jones says, is one of the most beautiful on earth, are extremely fragrant, and with them one of the five arrows of Kama the god of love, is tipped.—*Ains. Mat. Med. p.* 163. Under the Tamool name of Irool maram this or another species of Mesua is common in the Nelambore jungles and much used by the natives for building purposes: being durable and not liable to be attacked by insects.—*McIvor. M. E. of* 1857. Mesua Ferrea is cultivated in gardens at Jaepoor, is very ornamental and the flowers are fragrant.—*Genl. Med. Top. p.* 199. This tree is found chiefly in gardens in Bengal, where it flowers in the beginning of the warm season. The dried anthers are fragrant; the flowers and leaves are used in Bengal as antidotes to snake poison.—*O'Shaughnessy, p.* 230.

(5321) MESUA——Irool Marum Mesua sp.: Nelambore Jungles common: much used by the Natives for building purposes: durable and not liable to be attacked by insects.—*McIvor.*

(5322) METALLIC MIRRORS are still in use in Southern Asia.

(5323) METROSIDEROS (from μητρα, the heart of a tree, and σιδηρος, iron), a genus of Plants belonging to the natural order *Myrtaceæ*. It is distinguished from allied genera by the tube of the calyx not being angular, adhering to the ovarium, the limp 6-cleft; the stamens 20-30, free, very long, and exserted; the style filiform, and stigma simple; the capsule 2- or 3-celled,

the cells many-seeded; the seeds wingless. The species are trees or shrubs, with opposite or alternate leaves, with the flowers pedicellate, not adnate to the branches, as they are in the genera *Melaleuca* and *Callistemon*. The last genus with *Angophora*, has been recently separated from *Metrosideros*.—*Eng. Cyc.*

(5324) METROSIDEROS VERA, true Iron-Wood, has opposite ovate-lanceolate acuminated quite glabrous leaves, seated on short petioles; the cymes axillary, pedunculate, many flowered. It is a native of Java and Amboyna, among rocks. The Chinese and Japanese value the wood of this tree, which they apply to many purposes, as the making of rudders, anchors, &c., for their ships and boats. The bark is used in Japan as a remedy in mucous discharges, diarrhœa, and dysentery. It is usually mixed with some aromatic, as Penang cloves, or nutmeg.—*Eng. Cyc.*

(5325) METROSIDEROS POLYMORPHA, has opposite coriaceous leaves, of various forms, glabrous on both surfaces, but covered with a little silky tomentum beneath; the peduncles 3- or many-flowered, terminal and axillary, corymbose; the calyxes and branchlets glabrous or clothed with silky tomentum. The species is a tree, and grows in the Sandwich Islands, and is said to be the plant from which are made the clubs and other weapons employed in warfare by the South Sea Islanders. "The Aki, or Lignum Vitæ of New Zealand, the Rata and the Pohutu Kawa of the same country, are all hard-wooded trees belonging to the genus *Metrosideros*." (Lindley.) Several other species of *Metrosideros* have been described, natives of Australia and the South Sea Islands. *M. lucida*, a beautiful tree, occurs as far south as Lord Auckland's Islands, in lat. 50½ S. The *M. buxifolia* of Allan Cunningham is the New Zealand plant called Aki, and is a rambling shrub, adhering to trees, and climbing by means of its lateral roots to the summits of the loftiest trees in the forests of Wangaroa and the Bay of Islands. In cultivation these plants may be grown in a mixture of loam, peat, and sand. They may be propagated by seeds or cuttings. Ripe cuttings will root in sand under a hand-glass. (Don, *Dichlamydeous Plants*; Lindley, *Vegetable Kingdom*; Burnett, *Outlines of Botany*.)—*Eng. Cyc.*

(5326) METROXYLON SAGO, *Syn* SAGUS KONIGII.

Rambaya, MALAY.

Is cultivated in the Eastern Archipelago, to obtain sago from its wood.—*Seeman.*

(5327) MEZEREUM BARK, MAZRIOON, Rei; Root of Daphne mezereon. Linn.—*Ben. Ph.* 214.

(5328) MEZEREON, OCTANDRIA TRIGYNIA, Linn. This plant is supposed to be included with *Daphne oleoides* under the χαμελαια of Dioscorides. It is called *Mazrioon* in Persian works on Materia Medica, and *Khamela* assigned as its Greek name. Mezereon is a small shrub. Leaves lanceolate, tapering below, smooth, evergreen. Flowers subternate, lateral arranged in a spike-like manner, appearing before the leaves, rose-coloured. Perianth 4-fid, segments ovate acute, tube hairy, Stamens 8, short inserted (1) in the tube of the perianth in two rows. Ovary (2) oval, oblong, with a short style and peltate and stigma. Berry bright red, fleshy, 1-seeded (v. 3), where some of the sarcocarp has been removed, to show the seed.—Woods of central Europe, less common in Great Britain; cultivated in gardens as an ornamental shrub.—Nees von E. 125. St. and Ch. 65. *D. Guidium* (Fr. *Garou*), *D. Laureola*, Spurge Laurel, and other species, are also employed on the continent. The bark of the latter forms much of what is used, even in England, for Mezeroon—Squire, P. J. i. 395. The bark of the root is officinal in the L. and E. P. and is the most efficacious; that of the stem and branches in the Dublin Pharmacopœia; but all these parts as well as the berries, are acrid. The bark is tough and fibrous, as in all Daphnes; it is met with in strips which are of a light greyish colour externally, whitish and shining within; when fresh dried, it has a slight but peculiar odour. The taste, especially of the inner part of the bark, is hot, acrid and durable, though at first a little sweetish.—*Royle, page* 528.

(5329) MICA.

Abraka, SANS. | Ubruck, HINDU.
Tulk, PERS. and DUK.

Several varieties of this beautiful and useful mineral are found in India, especially in Behar, and in the Northern Circars. It readily splits into transparent, elastic flakes. It consists of nearly equal parts of silica and magnesia, and about 6 per 100 of lime. Slips of Mica afford the young chemist a very convenient substitute for platinum foil, in several experiments especially on the effect of heat on organic bodies. —*O'Shaughnessy, page* 694. Mica, is a Mineral belonging to the extensive series of Silicates of Alumina. It occurs in oblique rhombic prisms of about 120° and 60°. The crystals usually with the acute edge replaced. The cleavage is very decided, yielding easily thin elastic laminæ of extreme tenuity. It is found usually in thinly foliated masses, plates, or scales: sometimes in radiated groups of aggregated scales or small folia. The colour is from white through green, yellowish, and brownish shades, to black. The lustre is more or less pearly. Transparent or translucent. Tough and elastic. Hardness 2·0 to 2·5. Specific gravity 2·8 to 3·0. Mica resembles externally talc, and some forms of gypsum. From talc it differs in affording thinner laminæ, and being elastic. It also has

not the greasy feel of talc. The same characters, except the last distinguish it from gypsum, besides it does not crumble so readily on heating. Mica is one of the constituents of granite, gneiss, and mica-slate, and gives to the latter its laminated structure. It also occurs in granular limestone. It is found abundantly in India in the United States, in Russia, in Great Britain, and other parts of the world. It is not often found in large isolated masses, but filling up the veins and fissures of rocks, into the composition of which it enters. It occurs in the oldest rock, as well as in those which are new and possess a crystalline character. In Russia it is used extensively as a substitute for glass, and hence it is called Muscovy Glass. The very thin laminæ are employed for examining objects under the microscope. Hauy states that these laminæ are sometimes not more than the 1-300,000th part of an inch in thickness — *Eng. Cyc.*

(5330) MICHELIA CHAMPACA.

Shemboogha poo. TAM.	Bongas jampacca, MALAY
Champeka pooi, DUK.	Shumpenghie poo, TEL.
Schampakam, HORT. MAL.	Champac SANS.

This beautiful golden coloured flower is held in high estimation by the Hindoos, by whom it is dedicated to Krishna and is one of those with which the five Arrows of Kama the god of love are said to be tipped. Sir William Jones tells us, that its aromatic scent is so strong as to be offensive to Bees, who never alight upon it. Itheede informs us that the powder of the bark of the root of this tree is given to excite the flow of the menses. The wood itself is employed in making drums.—*Ains. Mat. Med. p.* 157. In Pegu *Michelia Champaca* is a large tree, cultivated greatly by the Burmese for the fragrance of its yellow flowers. It is from this that the aromatic *Sumpunghee oil* of the Madras list is obtained —*McClelland* In Tenasserim the streets of the towns and villages are often shaded with the lofty distinguished champac, one of the few trees embalmed in English song of which the poet sings:

> "The maid of India blest again to hold
> In her full lap the Champac's leaves of gold.
> Thinks of the time when by the Ganges' flood
> Her little playmates scattered many a bud
> Upon her long dark hair."

The tree is in flower or fruit a great part of the year, and its rich orange blossoms, which are exquisitely fragrant, are also used by Burmese maidens to adorn their "long black hair." It is the only representative on that Coast of the "Glory of America" — the Magnolia tribe.—*Mason.* The bark of this well known tree is bitter, and aromatic, and on several trials appeared to Dr. O'Shaughnessy to possess the properties attributed to the Magnolia glauca. It may be given in powder in intermittent fevers in doses of from 10 to 30 grains. Its aromatic properties are dissipated by boiling either in water or spirit, and on evaporation a bitter extract remains, which contains tannic and gallic acid.—*O'Shaughnessy, page* 193. The roots of the Uvaria narum are employed in the Mauritius in decoction as tonic and stimulant, and are externally applied for destroying vermin. The powdered seeds of the custard apple are used in Bengal for the same purpose.—*O'Shaughnessy, page* 193.

(5331) MICHELIA NILAGIRICA. MAGNOLIACEÆ, Ill. 5, Icon. 938.

Shemboogha marum, TAM.

This tree is rare in the Walliar forests, being alpine in its tendencies. It is common on the Neilgherries, wood said to be good as regards strength, but too highly hygrometrical to be useful in other form than rafters or beams, though close and fine grained. —*Wight.*

(5332) MICHELIA RHEEDII. PEELA CHUMPA OR GOLDEN FLOWERED CHUMPA.

Sampaughy Marum, TAM.

This is a handsome tree with beautiful golden coloured flowers, held in high estimation by the Hindoos, the bark of the root of the tree is used medicinally in some female complaints.—*Riddell.* The Michelia Rheedii, (*Wight*) Sumpaghymaram, yields a pretty olive colored mottled wood, close grained, without being heavy, and well suited for cabinet making. It is, being tried in Bombay for ship building purposes. At the Madras Exhibition of 1855, a very large plank was contributed by Capt. Cunningham of the Mysore Commission, obtained from *Michelia Rheedii* (Sumpaghy). The extraordinary dimensions, (length 11½ feet, breadth 4½ feet, thickness 3 inches.) which the tree assumes, though rarely, and the ornamental character of the wood, were well shown in that specimen, which may with justice be declared *unique*. This remarkably large specimen was apparently derived from a tree of very great age.—*M. E. J. R.*

(5333) MICO. A sort of butter prepared in Japan from the Dolichos bean.—*Simmonds.*

(5334) MICROLÆNA SPECTABILIS is a tree found at the foot of the Himalayas, which yields fibres for rope-making.—*Royle.* It is one of the most numerous timber trees of Pegu, and yields, it is said, a fibre fit for making rope, but the Burmese do not make use of it.—*McClelland.*

(5335) MICROPUS (Swainson), a genus of Birds belonging to the family *Brachypodinæ*, the first sub-family of the *Merulidæ*, according to his arrangement. [MERULIDÆ.]

(5336) MICROPUS CHALCOCEPHALUS. IXOS CHALCOCEPHALUS, Temm. The male has the whole head covered with a sort of hood of metallic black with violet reflection; the neck,

the shoulder, the back, and wings, dull gray or lead colour; breast deep gray, which becomes brighter on the other lower parts of the body; wings black, but the secondaries gray, bordered with whitish on the exterior barbs; tail gray with a transverse black band, and terminated with a broad white border. Length 9 inches 4 lines. Female: less lively in colour. It inhabits Java, where Van Hasselt found it in the wild and woody district of Bantam.—*Eng. Cyc.*

(5337) MIGNONETTE. RESEDA ODORATA.—A general favorite in all countries, may be had in great luxuriance on the plains during the cold months, does not like to be transplanted, and ought invariably, whether in pots or flower beds, to be sown where intended to flower: requires an open soil and free drainage, sometimes lives through the hot season, if sheltered by a high building.—*Jaffrey.*

(5338) MIGRATION.—The reader, curious on the subject of the migration of Indian birds, should consult a paper by H. M. Hodgson, Esq., in the 18th volume of the Asiatic 'Researches,' Part II., 122.—*Cal. Rev.*

(5339) MILDEW, PUCCINIA GRAMINIS, a fungus attacking corn, in England, the spores of which appear to enter the grass, not by the roots, but by the stomata.—*Hassall.*

(5340) MILK.

Laban, ARAB.	Lac, LAT.
Ellakerrie, CYNG.	Soosoo, MAL.
Lait, FR.	Sheer PERS.
Milch, GUZ.	Gokshira, SANS.
Dood, HIND.	Pashuin Paal, TAM.
Latte, IT.	Aoopaloo, TEL.

The following analysis of several kinds of milk is by MM. O. Henry and Chevallier.

Constituents.	Cow.	Ass	Woman.	Goat.	Ewe.
Caseum,...	4.41	1.82	1.52	4.02	4.50
Butter,..... ...	3.13	0.11	3.52	3.32	4.20
Sugar of milk,...	4.77	6.08	6.50	5.28	6.00
Various salts....	0.60	0.34	0.45	0.50	0.68
Water,..... ...	87.02	91.65	87.98	86.80	85.62
Total	100.00	100.00	100.00	100.00	100.00
Solid matter.....	12.98	8.34	13.00	13.20	14.38

—O'Shaughnessy, page 690.

(5341) MILK HEDGE.—Euphorbia Tirucalli.

(5342) MILK OF PALM NUTS. This popular term, is the albumen of the seed when in a liquid state; and which, when the fruit is quite ripe, appears as a solid, white or yellowish mass, and is then termed the kernel. This albuminous fluid or water, when the nut is taken from the tree early in the morning and whilst the dew is still upon it, is a cool and delicious draft. It is slightly effervescent and gently aperient.—*Seeman.*

(5343) MILLET.

Dukhn, ARAB.	Milium, Panicum Miliaceum, LAT.
Kungoo, BENG.	Kuma[illegible], MAL.
Tana-hul, CYNG.	Arzun[illegible], PERS.
Navonay, CAN.	Milho Mindoo, PORT.
Cay Khe, COCH-CHIN.	Kangu, Priyangu, SANS.
Bal, Rawla, DUK.	Mija, SP.
Mil. Millet, FR.	Tenny, TAM.
Hirse, GER.	Coraloo, TEL.
Kang, GUZ. HIND.	
Miglio, IT.	

Millet of various kinds is met with in the hottest parts of Africa, in the South of Europe, in Asia Minor and in the East Indies. In India they hold a rank second to rice alone, and those chiefly cultivated are as follows,

Botanical Names.	English.	Hindoostanee.	Tamil.
Setaria italica.	Italian millet.	Kala kangnee.	Tenny.
Setaria germanica.....	German millet.....	Kora kang..... ...	....
Panicum miliaceum... ...	Common or little millet...	Sawee; cheena; Warree... ...	Varagoo.
Pencillaria spicata.....	Spiked millet.	Bajree.....	Cumboo.
Sorghum vulgare..... ..	Great millet...	Jowaree.....	Cholum.
Eleusine coracana.....	Raggy.....	Natchnee Ragee...	Kavaroo.

The native West Indian species are P. fasciculatum and oryzoides. Setaria Germanica is the most common in America, where millet is chiefly grown for making hay, half a bushel of seed to the acre is the usual quantity, sown broad-cast and harrowed in, but to procure the finest quantity of hay, an additional three or four quarts of seed is sown. The ordinary yield of crops is about a ton to a ton and half of hay to the acre, but it should be cut as soon as it is out of blossom, for if it stands later, the stems are liable to become too hard to make good hay. In Southern India, there are three kinds of Jowaree, white, green and red, the straw is of great bulk and goodness, and furnishes good provender for cattle being preferable to that of rice. It is however given dried, as the green plant is injurious. Among culmiferous plants and legumes used in the East, are the Panicum italicum, Eleusine coracana (the meal of which is baked and eaten in Ceylon under the name of Corakan flour), and Paspalum of several varieties. The pigeon pea (Cytisus Cajan;) and a very valuable and prolific species of bean called the Mauritius black bean (Mucuna utilis), growing even in the poorest soil, is cultivated in India and Ceylon. Sorghum vulgare is the principal grain of Southern Arabia and the stems are also used extensively for feeding cattle. The plant bears its

Indian name of joar, or jwari, and is cultivated throughout Western Hindostan. Mr. Simonds says Job's tears (Coix lachryma) is another cereal grass, native of the East Indies. Millet of different kinds is met with in the hottest parts of Africa, in the South of Europe, in Asia Minor, and in the East Indies. One is a small yellowish seed growing in dense panicles or clusters, the produce of a grassy plant with large and compact seeds growing to the height in India of seven or eight feet. The millets are known to Europeans as petit mais, tropical crops. In India they hold a second rank to rice alone, and in Egypt perhaps surpass all other crops in importance. In Western Africa they are the staff of life. The red and white millets shown by Austria, Russia and the United states, at the Great Exhibition, were beautiful, and Ceylon exhibited fair samples. Turkey abounds in small grains. Panicum miliaceum and P. frumentaceum are the species grown in the East Indies. Loudon says there are three distinct species of millet, the Polish, the common or German, and the Indian. Setaria Germanica yields German millet. The plants are readily increased by division of the roots or by seed, and will grow in any common soil. The native West Indian species are *P. fusciculatum* and *oryzoides*. Millet receives some attention in New South Wales. In 1844, there were 100 acres of land under cultivation with it, and the amount grown in some years in this colony has been about 3,500 bushels. In the United States millet is chiefly grown for making hay, being found a good substitute for clover and the ordinary grasses. It is a plant which will flourish well on rather thin soils, and it grows so fast that when it is up and well set it is seldom much affected by drought. It is commonly sown there in June, but the time of sowing will vary with the latitude. Half a bushel of seed to the acre is the usual quantity, sown broadcast and harrowed in. For the finest quantity of hay, it is thought advisable to sow an additional quantity of three or four quarts of seed. The ordinary yield of crops may be put at from a ton to a ton and a half of hay to the acre. It should be cut as soon as it is out of blossom; if it stands later, the stems are liable to become too hard to make good hay. The variety known as German millet is that most common in North America. It grows ordinarily to the height of about three feet, with compact heads from six to nine inches in length, bearing yellow seed. There are some sub-varieties of this, as the white and purple-seeded. The Italian millet, *Setaria italica*, is larger than the preceding, reaching the height of four feet in tolerable soil, and its leaves are correspondingly larger and thicker. The heads are sometimes a foot or more in length, and are less compact than the German, being composed of several spikes slightly branching from the main stem. It is said to derive its specific name from being cultivated in Italy, though its native habitat is India. It is claimed by some that this variety will yield more seed than any other, and the seed is rather larger, but the stalk is coarser, and would probably be less relished by stock. If the greatest amount of seed is desired from the crop, it is best to sow it in drills, two to two-and-a-half feet apart, using a seed drill for the purpose. This admits of the use of a small harrow or cultivator between the rows, while the plants are small, which keeps out the weeds. The crop will ripen more uniformly in this way than broadcast, and enables the cultivator to cut it when there will be the least waste. The seed shatters out very easily when it is ripe, and when the crop ripens unequally, it cannot be cut without loss, because either a portion of it will be immature, or, if left till it is all ripe, the seed of the earliest falls out. It should be closely watched, and cut in just about the same stage that it is proper to cut wheat, while the grain may be crushed between the fingers. It may be cut with a grain cradle, and, when dry, bound and shocked like grain; but it should be threshed out as soon as practicable, on account of its being usually much attacked by birds, many kinds of which are very fond of the seed. The seed is used in various European countries as a substitute for sago, for which it is considered excellent. It is likewise a valuable food for poultry, particularly for young chickens, which from the smallness of the grain can eat it readily, and it appears to be wholesome for them. In some countries millet seed is ground into flour and converted into bread; but this is brown and heavy. It is, however, useful in other respects, as a substitute for rice. A good vinegar has been made from it by fermentation, and, on distillation, it yields a strong spirit. Millet seed—the produce of *H. saccharatum*—is imported into this country from the East Indies for the purpose chiefly of puddings; by many persons it is preferred to rice. It is cultivated largely in China and Cochin-China. The stalks, if subjected to the same process that is adopted with the sugar-cane, yield a sweet juice, from which an excellent kind of sugar may be made. Millet will grow best on light, dry soils. The ground being first well prepared, half a bushel of seed to the acre is ploughed in at the commencement of the rains in India. The crop ripens within three months from the time of sowing. The usual produce is about 16 bushels to the acre. The Canary Islands export annually about 212,400 bushels of millet.

Great Indian Millet, or Guinea Corn.—This is a native of India (the *Sorghum vulgare*, the *Andropogon Sorghum* of Roxburgh), which produces a grain a little larger than mustard or millet seed. It is grown in most tropical countries, and has peculiar local names. In the West

Indies, where it is chiefly raised for feeding poultry, it is called Guinea corn. In Egypt it is known as Dhurra, in Hindostan and Bengal as Joar and in some districts as Cush. In Lower Scinde joar is very extensively cultivated, as well as bajree (*H. spicatus*). It is harvested in December and January, requires a light soil, and is usually grown in the east, after *Cynosurus coracanus*. The natives of Mysore reckon three kinds known as white, green, and red. The red ripens a month earlier than the rest, or about four months from the time of sowing. Near Bengal, Bombay, and elsewhere, in Eastern India, sowing is performed at the close of May or early in June. A gallon and a third of seed is sown per acre, and the produce averages 16 bushels. This grain, though small, and the size of its head diminutive, compensates for this deficiency by the great bulk and goodness of its straw, which grows usually to the height of 8 or 10 feet. It is sometimes sown for fodder in the beginning of April, and is ready to cut in July. It is said to be injurious to cattle, if eaten as green provender, the straw is therefore first dried, and is then preferable to that of rice. This grain is frequently fermented to form the basis, in combination with goor or half made sugar, of the common arrack of the natives, and in the hills is fermented into a kind of beer or sweet wort, drank warm.

Holcus spicatus, the *Panicum spicatum* of Roxburgh, is cultivated in Mysore, Behar, and the provinces more to the north. From one to four seers are sown on a biggah of land, and the yield is about four maunds per acre. It is sown after the heavy rains commence, and the plough scres to cover the seed. The crop is ripe in three months, and the ears only are taken off at first. Afterwards the straw is cut down close to the surface of the soil, to be used for thatching, for it is not much in request as fodder. Being a grain of small price, it is a common food of the poorer class of natives, and really yields a sweet palatable flour. It is also excellent as a fattening grain for poultry. The *Poa Abyssinica* is one of the bread corns of Abyssinia. The bread made from it is called *teff*, and is the ordinary food of the country, that made from wheat being only used by the higher classes. The way of manufacturing it is by allowing the dough to become sour, when, generating carbonic acid gas, it serves instead of yeast. It is then baked in circular cakes, which are white, spongy, and of a hot acid taste, but easy of digestion. This bread, carefully toasted, and left in water for three or four days, furnishes the *boza*, or common beer of the country, similar to the *quas* of Russia.—*Simmonds.*

(5344) MILLELE. A wood of Ceylon probably specifically identical with sapoomilile, with which it coincides in very respect.

(5345) MILLINGTONIA HORTENSIS. Bignoniaceæ. An elegant tree growing to the height of fifty feet, is in blossom towards the close of the rains, and the seeds ripen in March. The bark is of a soft spongy nature, the wood is white, firm, and close grained.—*Riddell.*

(5346) MILLINGTONIA SIMPLICIFOLIA, is also scarce, but found in the Forests of the Pegu Valley. Its properties as a timber are valuable from its weight and strength. Wood, white-colored, adapted to every purpose, house-building.—*McClelland.*

(5347) MILL STONES.

Pierres meulieres, Fr.	Schernowoi kamen, Rus.
Muhlsteine, Ger.	Muelas de molino. Sp.
Mole macine, It.	

Are large circular stones, which, when put in motion by machinery, grind corn and other articles.—*Faulkner.*

(5348) MIMOSA, a genus of Plants belonging to the natural order *Leguminosæ*. It has polygamous flowers; petals 4 or 5, connected together into a 4 or 5 cleft funnel shaped corolla; stamens inserted in the base of the corolla, or in the stipe of the ovary, equal in number to the lobes of the corolla, or double or triple that number; legume compressed, flat, 1- or many-jointed; joints 1-seeded; ribs permanent; stipules petiolar; leaves bipinnate, with one or more pairs of pinnæ, each pinna bearing 2 or many pairs of leaflets; flowers rose-coloured or white, disposed in heads. The leaves are frequently sensible to touch, as in the Sensitive Plant. The species are very numerous.—*Eng. Cyc.* Of this genus of plants, many are to be found all over the country, the leaves of some of the species are remarkable for being sensitive to the touch. The pink and yellow flowers of one of the small shrubby kinds are particularly beautiful in the rains, readily grown from seed in any soil.—*Riddell.*

(5349) MIMOSA, or WATTLE-BARK, is procured from different species of mimosa, which grow in Australia and New Zealand. It is sometimes imported in the form of fluid extract, as well as bark. The leather produced by its means is of good quality, but of bad colour. The bark must be finely ground, or it does not give up the whole of its tannin to warm water.—*Simmonds.*

(5350) MIMOSA ABSTERGENS, Soap nut. Roxb.

The fruit.

Seekayah, Tel.	Seeyakkoy, Tam.
Secka kai, Hind.	

The leaves.

Shee a kai elley, Tam.	Sheeka-kayo, Duk.
Sik kai ka paat, Duk.	Ghodasala, Sans.

This is a long, flat pod or legume, containing separate, small, oval, dark coloured seeds, and is

considered by the Native Practitioners as a most valuable medicine. In taste it somewhat resembles the soap nut, but is more acid, less bitter, and has a singular pungency. Its qualities are said to be deobstruent and detergent; and I am inclined to believe that it is also an expectorant. It is commonly prescribed by them in cases of Jaundice and other biliary derangements, and is, besides, used by them like the soap nut, for washing the head. The small leaves of this prickly shrub have a pleasant acidity, and are frequently put into pepper water, when it is found necessary to keep the bowels open or work off bile. The pod is usually prescribed in electuary, in doses of about the size of a small walnut, every morning for three days.—*Ainslie's Mat. Med. pages* 111 *and* 260.

(5351) MIMOSA ADENANTHERA.—The UNARMED MIMOSA. Nat. Lajwanta species.

(5352) MIMOSA ALBA.—The WHITE MIMOSA.

(5353) MIMOSA PUDICA.—The Sensitive Plant.

Lajuk Hind. | Total vadic. Tam.

Common in gardens, and grows readily from seed, color of the flowers pale pink.—*Jaffrey. M. pudica* has a prickly herbaceous stem, with the petioles and peduncles more or less beset with stiff hairs or bristles; leaves somewhat digitately pinnate, with 4 pinnæ, each pinna bearing many pairs of linear leaflets. It is a native of Brazil, and is commonly grown in gardens under the name of Sensitive Plant, the leaves falling on the slightest touch. The roots of this plant and its allies emit a most offensive smell, resembling the odour of a sewer at the time of impending rain.—*Eng. Cyc.*

(5354) MIMOSA SAPONARIA. The legumes of *M. saponaria*, according to Royle, form considerable article of commerce in India on account of their saponaceous qualities. [SENSITIVE PLANTS.] (Lindley *Vegetable Kingdom*; Don, *Dichlamydeous Plants.*)—*Eng. Cyc.*

(5355) MIMOSA PROCERA.

Padda Patscroo, Tel.

A Native of Coromandel where it grows to be one of their largest trees. *Roxb.*—*Rhode M.S.S.*

(5356) MIMOSA SCANDENS.—The climbing Mimosa.—*Riddell.*

Gela, Hind. | Gilla liga, Tam.

(5357) MIMOSA SENSITIVA, the Sensitive Plant, has prickly stems and petioles; leaflets ovate-acute, dotted with adpressed pili beneath, but glabrous above. It is a native of Brazil. The flowers are rose-colored and tetrandrous. The leaflets are sensitive to touch, but not so much so as the following species.—*Eng. Cyc.* This vegetable wonder will grow in almost any situation and soil, raised easily from seeds.—*Jaffrey.* In Tenasserim, where "garden flowers grow wild," near deserted habitations the pink globular heads of the sensitive plant may be often seen peeping through the grass. It is cultivated by the Burmese, and is quite naturalized.—*Mason.*

(5358) MIMOSA XYLOCARPA.

Conda Tungedoo, Tel. | Betada swamuniki Vriksha, Can.
Maici Avarei, Tam.

It is called Pingadoo in Pegu where it is used for knees, crooked timbers &c. in ship building. A large stately timber tree; a native of various parts of India. It blossoms during the hot season, at which period it is nearly destitute of foliage. The timber is remarkably strong and durable—*Roxb.* In the Vizagapatam district this wood is used for common purposes, it generally is faulty in the centre, it is not a bad wood for furniture, is well adopted for handles of tools &c. the average size at Vizagapatam is 12 inches in diameter and fifteen feet long; on the Godavery it is seldom obtained exceeding 8 inches in diameter and generally is faulty in the centre; it is used for posts.—*Rhode M. S. S.*

(5359) MIMOSEÆ, a sub-order of Plants belonging to the natural order *Leguminosæ*, whose flowers are regular, the stamens long, usually indefinite in number, and hypogynous, and the flowers valvate in æstivation. They are in many cases polygamous, and their leaves are always more or less compound. The principal genus of the division is the *Acacia. Mimosa* itself consists of a considerable number of species many of which are remarkable for the irritability of their leaves, a curious property which has always rendered them objects of interest. [SENSITIVE PLANTS.] The species commonly cultivated for the exhibition of this phenomenon is the *Mimosa pudica*, a South American annual. Among the useful plants belonging to *Mimoseæ*, and not included in the genus *Acacia*, are the *Inga saipida*, *I. dulcis*, *I. biglobosa*, and some others, whose pods contain a sweet nutritious fæcula, which renders them fit for food: and several kinds of *Prosopis*, the astringency of whose pods and bark renders them valuable for tanning purposes. In general, in the northern hemisphere, *Mimoseæ* are confined to tropical countries, or to those which have a high summer heat: but in the southern hemisphere they extend beyond such limits as in Van Diemen's Land, where Acacias, called Wattles, are the commonest wood. [LEGUMINOSÆ.]

(5360) MIMULUS. SCROPHULARINÆ. Monkey flower.—*Riddell.*

(5361) MIMULUS CARDINALIS. These plants are well suited for flower borders, the colours are chiefly blue, red and yellow, easily grown from seed in any garden soil, it takes its name from *Mimo*, an ape, the seed bearing some resemblance to the face of a monkey.—*Riddell.*

(5362) MIMUSOPS ELENGI. SAPOTACEÆ.

The Tree.

Maghidam maram, TAM.	Pogada mannoo, TEL.
Taindoo or Bacul, Mulsari, DUK.	Moogali mara, CAN.

An ornamental tree with dark green oblong alternate leaves, and white fragrant flowers; common.—*Wight.* A tree of moderate size, cultivated for the oil obtained from its fragrant flowers. The wood is little known. Wight No. 40, Mysore 23,33, Nellore 87, Travancore 209, Rajahmundry 54, Hort. Gard. 54.—*M. E. J. R.* The quality of the wood, says Mr. Rohde, is unknown to me, and, being so much a cultivated plant, it is not probable that it is much used and is therefore little known.—*Rohde.* This species of mimusops, a rare ornamental tree, is much valued by Burmese ladies for its small delicate sweet-scented blossoms, which they string in chaplets for the head.—*Mason.* It thrives well at Ajmeer, growing to a large size, the flowers are delightfully fragrant, and the wood is very hard and durable, the foliage is beautiful and evergreen. The berries are eaten sometimes by the poor. This tree would be very ornamental in compounds.—*Gen. Med. Top. p.* 190.

(5363) MIMUSOPS ELENGI. Lin. Colebr. 92.

The Flower.

Maghadam poo, TAM.	Mulsari ka pool, HIND.
Poghada, TEL.	Bacula, SANS.
Bolsarika pool, DUK.	

The small pale brown sweet smelling flowers of this most beautiful and ornamental tree are celebrated in the puranas and even placed amongst the flowers of the Hindoo paradise.—*Ains. Mat. Med. p.* 158.

(5364) MIMUSOPS OIL. MIMUSOPS ELENGI. A medicinal oil, obtainable in tolerably large quantities in some parts of the country. At the Madras Exhibition of 1855, it was exhibited by W. E. Underwood, Esq. as a new oil, but is known in England.—*M. E. J. R.*

(5365) MIMUSOPS HEXANDRA.

The Tree.

Pala marum, also patta, TAM.	Rajun, HIND.

This is a tree common in the Deccan, and is generally planted by the Mussulmans with the Elengi; the wood is much used where strength and toughness are required; the fruit is eaten by the natives —*M. E. J. R. Riddell.*

(5366) MIMUSOPS HEXANDRA. ROXB.

The Fruit.

Palay pullum, TAM.	Pala pundoo, TEL.
Keernie ka pull, DUK.	Cheerie, SANS.

This is the olive shaped reddish colored fruit of a very large tree. It is eaten (but not much sought after) by the poor, and grows in the woods of the Northern Circars.—*Ainslie, p.* 229.

(5367) MIMUSOPS KAUKI, OBTUSE-LEAVED MIMUSOPS.

Kirnee, HIND.

Cultivated at Ajmeer and Kotah, the tree becomes very large and is very handsome, the small fruit is eatable, the wood is fine-grained and hard.—*Irvine, page* 190. In the Deckhan, this tree grows to a large size, and is generally planted in groves: the fruit, which is about the size of a small olive, is of a yellow color when ripe, after the rains, and contains a sweet clammy juice, eaten chiefly by the Natives.—*Riddell.* This dried fruit is occasionally seen among the Chinese, brought from Singapore, and some of the seeds produce trees, which, judging from their leaves, can be no other than that now under notice.—*Mason.*

(5368) MINERAL SPRINGS.

1. SULPHURETTED.

Malacca, thermal (Ward).

Spring, 27 miles N. from Hazareebagh, thermal, (H. H. Wilson).

Bum Buklesir, thermal, 16 miles, W. and S. of Sooree in Bheerbhoom, (Sherwill).

Jorya Booree, not far from Chaunch, near meeting of Barakur and Damooda rivers, thermal (Oldham).

Tantloie near it, on other side Damooda, thermal.

Tata Pani, Sirgoojah, Chota Nagpore, thermal (Breton).

2 springs at N. base of Maha Deo Mountains, Nerbudda, thermal, (Spilsbury).

Well at Gwalior, (Col. Todd).

Below Landour, (Murray).

At Sonah, 30 miles from Delhi, thermal, (Ludlow).

At Lousah, in Noorpore, (Marcadieu).

At Bishisht in Kulloo, thermal, (Gerard).

In the Bukh Ravine Salt Range, thermal, (Fleming).

At Jubba in Salt Range, 10 miles E. of Indus (do.)

Chihalee Pass W. of Indus below Kalibag, (do).

Mittah near Esau Khail W. Bank of Indus (do.)

Peer Mungal and Gazee Peer in Scinde, thermal, (Major Baker and Lt. McLagan.)

At Lukkee Pass, near Schewan, thermal, (Gibson).

Within high water mark in Kuttywar, (Sandwith),

Temple of Somnath in Guzerat, (Col. Todd.)

Arowlee in the Concan, thermal, (Duncan).

At Bhadrachellum on the Godavery, thermal, (Heyne, Malcomson).

At Chittoor, slightly thermal, (Hardy).

2. SALINE.

Several springs at Sooroojkoond near Belcuppee and Burkutta, Grand Trunk Road, (Sherwill and Hooker), thermal.

Tevah in Kangra district, (Marcadieu).

Mukhdoor Rusheed in Moultan, (Edgeworth).

Shahpore near Jhung, (Neelmadub Mookerjee).

Lahard Khad on Sutledge above Roopur, (Wade).

Universal throughout Salt Range, (Fleming).

Sumoondur and Kullur kuhar lakes in Salt Range? (Fleming).

Doozeekoostuck Scinde, thermal (Viccar).

Ooch Scinde, (Viccary).

Lukkee Pass, (Gibson).

Well at Banda? (Prinsep).

Near Hyderabad Deccan, (Voysey).

a. brine.

Sambher lake?

Many springs in Salt Range, (Fleming).

Old spring near Jeypore in Assam?

Brine springs in Becaneer and Jessulmeer, (Irvine).

Cachar Hills.

Peer Mungul Scinde, (Baker and McLagan).

b. alkaline.

Loonar lake, 50 miles from Jaulnah, (Malcomson)?

At Mean Meer, and others in Punjab, (Baddely).

Kairi water, or Soda water wells in Ajmeer, (Irvine),

Well at Jowali Mookhi? (Marcadieu).

c. aluminous.

Well below Landour, (Murray).

d. iodine.

Traces of iodine in well at Jowali Mookhi and Arlun in Kangra, (Marcadieu).

Ditto Thunga Bara near Hurripore, (ditto).

Strong iodide of potass well at Jowali, [Mr. Marcadieu states, that though bronchocele is very common in the district—the inhabitants of Jowali are exempt from it.] (do.)

e. lime.

Many in Murree Hills above Rawul Pinddee, (Fleming).

Peeth in Halla mountains thermal, (Viccary).

Kye in ditto, thermal, (A. Young).

Near Sunjabundia, Kurnool, thermal, (Newbold) temperature decreasing.

f. silicious.

Burrare and Bheem Bhand, Kurruckpore Hills thermal, (Sherwill and McClelland).

3. CHALYBEATE.

At Dallhousie, Chumba, (Clemenger).

Rhotas near Jhelum, (Fleming).

Bakh ravine in Salt Range, (ditto).

Chibalee, W. Bank of Indus, (ditto).

At Munnee Karn, (Edgeworth).

At Nagconda, Simla hills, (ditto).

Below Landour, (Murray).

On Rungeet river, Darjeeling (Liston).

Rungnoo river, 4 miles E. by N. of Darjeeling, (Withecombe).

Bangalore, (Garrard).

Ramandroog hills near Bellary, (Mayer).

Near old town of Attaran, Moulmein thermal?

4. THERMAL SPRINGS WITH NO IMPORTANT INGREDIENTS, OR IMPERFECTLY KNOWN, SOME OF THEM PROBABLY CARBONATED.

Hot springs at Cannea in Ceylon. Temp. variable?

Hot water fountain at Tavoy,
Ditto at Lunkyen in ditto,
Ditto at Sienlee in Martaban. } Prinsep.

Near Kaline Aurig Martaban, (Low.)

Hot spring on Attaran river Tenasserim, (Piddington).

Hot springs on the Palouk river and at Pee, between Mergui and Tavoy, some sulphuretted, (Major W. McLeod).

Springs at Numyan near Prome.

Between Mecaday and the Arracan hills, (Phayre).

Seetacoond, near Chittagong.

Utteer, 30 miles from Poorie, (Brander).

Kaljhurnee, Maharoo, Hathulleah, Nonbhil, between Rajamahal and Sooree (Sherwill).

Lacarakoonda 21 miles S. W. of Sooree in Beerbhoom, (Sherwill).

Tantlooee 16 miles N. W. of Sooree, on Sidh Nulla, (Sherwill).

Springs at Katkamsandi, old Benares Road, (Everest).

Pinarkoon, Ramgur, (Breton).

Seetacoond, Monghyr.

Paharpoor, Kurruckpore hills, (Sherwill).

Rajgeer and Guriuk, N. by E. of Gyah, (Sherwill).

On Rungeet river, (Darjeeling Guide).

Near Bagin river in Pana district Bundlecund, (Franklin)

Two hot springs in Alwar country, one 15 miles W. by S. from Alwar, one 20 miles N. E. of Jeypore, (Capt. Bellew's survey.)

Mineral springs at Machery? (Col. Todd.)

At Seetabaree, in Harowtee, also cold springs, (Col. Todd).

At Jumnootrie, Gungootrie, Kedernath, and at Badrinath, in Ghurwal.

Hot springs near Nutpa, Booktee and Jauree, valley of Sutledge, (Gerard).

Opposite Sonee banks of ditto, (Prinsep).

Hot spring at Silol, Kangra, (G. T. Survey).

Munneekarn in Kulloo and hot spring further up the Parbutti. (Mr. Edgeworth informs me that the water where it issues from its source, is of the temperature of 207° Fahrt. It is therefore one of the hottest known springs

Some of the hottest of these are the Geysers 180°, Sooroojkoond 190°, the Petersquelle in the Caucasus 195°, spring on Palook river 196°, and what Humboldt discovered and describes as the hottest spring in the world, Guanaxuata in Mexico 207°. The boiling point of water at the elevation of Munneekaru is much below that point. Rice is cooked in the spring at Jumnootrie 194°, at about 11,000 feet above the sea, and in many others of inferior temperature.)

Kulat in Kulloo, (Gerard).

Lower range of Sooliman mountains, (Fleming).

Peer Muggen Alligator Tank, 13 miles from Kurachee, (Carless).

Juggun and Deyrah, N. Scinde, (Kirk).

Springs at the base of the Halla mountains, Scinde, (A. Young).

Oonee, Central range of Kuttywar, variable temp. (Gibson).

Oonopdeen and Soonoopdeen in Satpoora Range, (Briggs).

From near Surat to Rajapore many hot springs, at Mahar, Rutnaghery Mat, &c. more than 12 in number (Duncan.)

At Kair and Urjunnah, Deccan, (Malcomson).

At Byorah (Malcomson).

5. PETROLEUM.

Pegu?

Arracan, Paidong 5 miles from Ramree (Bogle).

Island of Cheduba.

Assam, at Jeypore and five other places, (Hannay).

Sylhet, (Inglis)

Kaffir Kote, Algud ravine W. bank of Indus, (Fleming).

Jubba, N. side of Salt Range, 10 miles E. of the Indus, (do.)

Jowali Mookhi, (Gerard).

Three springs in Dooloo, eastward of Gogra, (do.)

Principal Authorities.

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Ainslie's Materia Medica.
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Kirk's Topography of Scinde.
Irvine's ditto of Ajmeer.
Oldham's Report.
Darjeeling Guide.
Todd's Rajpootana.
Phillip's Geology.

Proceedings of Geological Society.
Madras Road Book.
Hooker's Travels.
Gerard's Kunawur.

The preceding list, which, though a rude general classification has been attempted, has no pretension to being any thing more than a catalogue, includes, it is hoped, most of the mineral sources in India and its dependencies, of which accounts have been published. The names attached to the notices have been added; generally they are those of the discoverers, or rather describers; but in some instances of the analysers of the waters. Some springs, such as the Monghyr Seetacoond, have been so long known, that it is uncertain who the original describers were. A few have been communicated to me by friends. I have to acknowledge my particular obligations, to Capt. Sherwill for information about the Rajmahal and Bheerbhoom springs, to Mr. Edgeworth about those in Kulloo, Dr. Fleming the ones in the Salt Range, and Mr. A. Young those in Scinde. About 30 springs are believed to be here noticed for the first time. Major Sanders gave me some valuable information from the Maps in the Quarter Master General's Office: and I also was kindly allowed access to the Surveyor General's Office. I have thus, although I cannot hope to have escaped mistakes, been able to verify most of the localities, which in many instances, owing to strange transmutations of names, has been no easy matter. Three or four are from the records of the Foreign Office and Medical Board. It seemed useless, with reference to the generally imperfect nature of most of the observations, to attempt to include an abstract of such analysis as have been made, or even a record of the temperature of the thermal springs, or of the nature of the rocks or soil from which they issue. This was the less necessary, as it is understood that these points will be fully investigated in the course of a general inquiry about to be made by order of the Government of India. Petroleum wells have been included in the list, as they are of some commercial value, although they perhaps cannot properly be called *mineral* springs. Their medicinal use, which is known to the Natives of India, is also now almost abandoned except in some cutaneous affections. Even in the present imperfect state of our knowledge of the mineral waters of India, a few points of interest are suggested by the table, which I shall now consider. What districts are richest in mineral waters? These appear to be, the Tenasserim Provinces, a district round Hazareebaugh stretching in almost every direction for about 130 miles, in many places literally teeming with hot springs, the upper part of the Jullunder Doab, or rather the hills beyond its Northern boundary, the salt Range, and Northern and

Western Scinde; next is the Concan, and, though not to be compared with any of the foregoing, the peninsula of Guzerat. The deficiency of mineral sources in the Southern portion of the peninsula of India, and throughout the great central trap formation, is remarkable. They are found at every elevevation, from within high water mark to a height of 12,000 feet. What kinds of mineral waters are most common? More than half of those in the Table are thermal. The most frequent of all appear to be the Hot springs without any very strong mineral impregnation, which are so abundant in the Tenasserim Provinces, and in the Hazareebaugh districts, in some parts of the Himalaya, in the Concan, also in Scinde, where, as in many other places, an impregnation with carbonate of lime is common. One or two such have been found in Rajpootana and the Deccan. The Sulphurous Springs, appear to be pretty equally diffused; several in Hazareebaugh, some in the Nerbudda, some in the Concan and Guzerat, some in Scinde and the Salt Range, many at the base of the Himalayas, and in the upper part of the Jullunder Doab. Only one has been noticed in the Madras Presidency, (Chittoor is scarcely an exception to this,) and no true one in Tenasserim. The great majority of them are thermal. The Saline springs are chiefly found in Scinde and in the higher portion of the Punjab; they usually contain common salt with some sulphate of soda and small quantities of other salts, when they are not simply brine. Traces of iodine are found near Kangra. Throughout Rajpootana and in some parts of the Punjab, the wells are abundantly impregnated with soda. Some of the springs in Kemaon contain mineral impregnations, but scarcely to an extent to be considered saline. Scarcely any strong saline ones are thermal. The few thermal salines are chiefly calcareous, and one or two silicious. There appears to be a general deficiency of Chalybeates, and there is no one district in which they have been found more frequently than another, unless the outer ranges of the Himalayas; the wells in the Neilgherries are said often to have a trace of iron. None of the Indian chalybeates are thermal, and none of those known, except that at the beautiful spot Nagconda, appear to be strong ones; but it is difficult to suppose, especially with reference to there being no want of iron in India, that other sources of this description and of more powerful virtues will not be discovered. I am told there are many undescribed chalybeates in the Himalayas. The Murree hills contain scarcely any, and it is to be hoped that the one at Chumba, may prove of value. It is much to be regretted, that none of the agreeable Acidulous carbonated waters, such as the Selters, commonly called Seltzer water, which are abundant in some parts of Germany, have been found in India, where they would be so grateful. Some of the thermal springs, as the Seetacoond, at Monghyr, the water of which is highly prized and often carried on long voyages, are probably slightly carbonated, and observers talk of Indian springs effervescing, for instance the so-called chalybeate at Bangalore. When, however, it is considered, that almost all the strongly carbonated Springs in other parts of the world are found in the neighbourhood of extinct volcanoes, as in Auvergne, the Rhine Provinces, the Caucasus, or near active ones, as at Ischia, they are scarcely to be looked for in India. [Hot springs are not necessarily indices of volcanic action; they are most common at points of great displacement of strata, or at the junction of stratified and unstratified rocks. There seemed to be no sufficient grounds for considering the Loonar lake volcanic. Former observers could not discover scorix or lava, but it appears that Dr. Bradley in 1851 found both, See a paper by Dr. Buist in Trans. Bombay Geogr. Society, from which I have got much useful information. He has collected a large list of thermal springs, and connects them with volcanic agency.] By analogy, some might be expected to be found in Arracan, or in the Pegu and Tenasserim Provinces, the first being, and the other two being nearly included in the belt of volcanic action that runs up the eastern side of the Bay of Bengal, terminating in Barren Island and the mud volcanoes; but I never heard of any when I was stationed in Arracan, although I visited some of its volcanoes. I may now inquire how far these waters have been had recourse to, by the natives of the country, and to what extent they are likely to be of use to Europeans? In the great majority of instances, they have only been regarded by the natives of the country as emanations of the deity, and as objects of poojah or worship. Wherever there is a hot spring, there is pretty sure to be a temple, visited by pilgrims. Many have, however, been used medicinally. Some of those, which appear to be most resorted to, for their healing virtues, are the springs at Malacca, those at Sonah near Delhi, where considerable buildings have been erected for the convenience of bathers, at Munnee Karn, and at the Lukkee Pass. All of them are thermal, and except Munnee Karn, are sulphuretted, and natives have undoubtedly faith in them in certain cases. Such springs might easily at a small expense be made more extensively useful to natives. Europeans can scarcely be said to have ever made a fair trial of any of the mineral springs of India. Mr. Ludlow in 1826, suggested that the wells at Sonah should be made use of for European soldiers. Dr. Murray's spirited attempt in 1843-44, to employ the sulphuretted and chalybeate springs in the

valley below Landour for the benefit of the Invalids at that sanatarium, never, I think, met with the support it deserved, and the situation of the springs at the bottom of a hot and confined though picturesque valley, was a very important obstacle to success. In 1846 I found them all but abandoned. That more attempts of the kind have not been made, that springs of as high virtues as those so prized in Europe, should have been neglected, must no doubt be a matter of surprise to people who have not visited India, to foreigners, to whom of all but the poorer classes a visit to a bath is a yearly necessity, and to Germans, who publish annually some 30 new works on their watering-places, but not to those who are aware of the many practical difficulties to be contended with in this country. It is not, however, generally known in Europe, nor indeed in this country, that mineral springs are so abundant in the East. Above 100 separate localities have been included in the Table, and it would be easy to extend the list, if I were to insert waters beyond the bounds of British India. There are hot springs in Ladak, Nepal, and Sikkim; at Uchebul in Cashmeer, and hot sulphur springs near Rajourie, in Goolab Sing's territory. See Cunningham's Ladak. Hooker's Travels, Mrs. Hervey's Travels &c. In what direction are we to look as the most favorable one for the establishment of a spa in India? The mere absence of strong ingredients in the water, as in the Tenasserim and many of the Hazareebaugh hot springs, would be no essential obstacle to success in their use, for some of the popular European baths, as Matlock, Wildbad, Pfeffers, and Bad Gastein, are very deficient in salts, yet are found efficacious in many affections, being chiefly used for bathing. But the absence, at most seasons of the year, of a bracing climate, at the generality of the thermal springs in India, diminishes the chance of their ever proving of utility to Europeans. Unless the climate of Hazareebaugh, w[illegible] European visitors, there is not the sea, alone[illegible]s of interest in the neighbourhood to this remar[illegible] *Macpherson M. in No. iii, India* have been for the [illegible] *Science, page* 205, *Oct.* 185[illegible]ountain of Parisnath, [illegible]INT. [illegible] miles off, were adapte[illegible] [illegible]me of the mineral springs which a[illegible] Frauen murze, [illegible]nt in the adjacent country, had been discovered in its clefts. But all evidence goes to show, that the space on the ridge at its summit, is far too limited for more than two or three bungalows, and there would be much difficulty in procuring a proper supply of drinking water for any number of people. Besides, it is very doubtful whether in the plains of Bengal, its height, although equal to Mahableshwar, about 4,500 feet, is a sufficient elevation for a sanatarium. The opening of the Railway to Raneegunge will bring two or three sulphuretted springs within reach of Calcutta.

That at Chaunch is only twenty miles from the terminus, and about three miles off the Grand Trunk Road. It is prettily situated, not far from the Pachete hills, and there is a colliery near. But there is a much more abundant and hotter one called Tanloie, on the banks of the Damooda, two or three miles off. Those at Bum Buklesir are about 15 miles from Mungulpore, and the same distance from Sooree: they are further off the high road, but are more powerful and abundant. The hot spring at Lakarakoonda is not far off, and there is said to be another near at Kisshun. The elevation of all them may be about 300 feet above the sea level. The Europeans resident at the Collieries count the district healthy, except during the rains. Of these places, Bum Buklesir, is particularly deserving of an early investigation, for no analysis of its waters has yet been made. There are four or five springs: the temperature at least of the hottest, which is 162°, exceeds that of the most popular springs of the kind, Aix-la-Chapelle, or Bareges and Cauterets in the Pyrenees. During the four cold weather months the climate is probably not inferior to that of any of those places in their short bath season. Indeed, but for the peculiar arrangements of society in India, depending on Europeans being birds of passage, and not colonists, but for the absence here of any season of general relaxation from business, these wells might, for all I can see to the contrary, that is, if there be no local objection to them, have long ago been found of much utility to the inhabitants of Calcutta. The truth is, the facility of communication with England and of going to sea, enjoyed by Calcutta people, has led to indifference about the sanitary resources of the country, and to the neglect of Cherra Poonjee and Darjeeling, or rather to their never being fully appreciated, and to the abandonment of the only sanatarium they had on the sea-coast, Poorie; not that it was ever in very high favor. A few of the residents of Cuttack still go there, during the hot months, but I never hear of any one visiting it from Calcutta. In fact, sea bathing, or any other kind of bathing, except for purposes of ablution, is scarcely known in Bengal, and probably not much practised in any part of India. Swimming baths are scarcely an exception to this statement. Yet how refreshing is the following description, extracted from the dry Madras Road Book—"Cootallum (not very far from Cape Comorin) is a large place with several bungalows close into the hills. The well known cataracts are close at hand. The lower cataract falls from a height of 200 feet. The average temperature of the water is 72° to 75°, and invalids derive great benefit from bathing in it. The bathing-place is under a shelving rock, affording the most delightful shower-bath possible. The

climate is particularly enjoyable to Europeans in June, July and August. The scenery is splendid; there are in all three falls, the highest being 2,000 feet above the sea." Amherst, too, or Negrais, should either be hereafter employed as a sanatorium, may indeed be useful to the occupants of our new provinces, but will never be any great resource to the inhabitants of Bengal. Of Negrais in particular a very favourable account appeared in an interesting article in the *Calcutta Review*, five years ago. Negrais has since then been reoccupied, but not exactly in the way anticipated by Mr. J. R. Martin, when he wrote on the subject. But, to return from what would have been a digression, if sanatoria and watering-places were not so intimately connected with each other, if we look next to Scinde, which abounds in mineral waters, the situation of the province and its climate alike preclude the hope of their ever being extensively useful to Europeans, though they might be more employed for sepoys, and the people of the country. There is also no great prospect of any of the other wells in Bombay becoming available. The thermal springs of the southern Concan do not appear to be powerful, and they have no advantage as to climate. For Madras there seems to be no hope, but in making the most of the chalybeates at Ramandroog. The European Regiment and Artillery might well be moved there from Bellary—so far, at least, as one without local knowledge can judge. There is table land 3,198 feet above the sea; climate cool, invigorating and healthful, 13° to 14° cooler than Bellary; the table land is 2,735 yards long by extreme breadth 996 yards. The climate must make the sulphur springs of Bhadrachellum useless for Europeans, even if in other respects they were promising. What then is the Land of promise? The higher portion of the Jullundur, a tract abounding in mineral wells of all descriptions, where the icy stream of the Parbuttie, close to the boiling fountain of Munneekarn, which rises in a jet at an elevation of 5,587 feet, could furnish Russian baths, if they were desired, and where the immediate vicinity of a chalybeate is not to be forgotten: where some are reported to contain Iodine or Bromine (the asserted presence of less than $\frac{1}{3}$ of a grain of bromide of potass, with the merest trace of iodine, in 16 ounces of the water, was the making of the Saline of Kreutznach), and where some must possess the advantage of an almost European climate. In this district also and on the Banks of the Beas, is Bishihi, at an elevation of 6,681 feet, with an ample thermal sulphuretted source. After touching on the subject of the use of grapes, Dr. McPherson continues; but to get grapes in abundance, (and the vine blight has not yet reached Asia,) they would have to proceed further into the Himalayas than any of the springs I have enumerated, beyond the influence of the periodical rains, to the beautiful valley of Chinee, of which Mr. Grant has furnished so pleasing an account, and where he describes the grapes as being plentiful, excellent, and exceedingly cheap. There too may yet be found sources of value, for Gerard says, there are a few mineral springs impregnated with salt, iron and alum, that may possess medicinal virtues, and the famous wells of Zungsum, at the meeting of the Speetee and Parati rivers, 4 miles North of Shealkhur, where inscriptions in the Tartar language on tablets of stone describe the particular virtues of each spring, are scarcely beyond the limits of Kunawur.

Bum Buklesir.—So interesting does this locality appear to me, with reference to its vicinity to Calcutta, that I do not hesitate to add to this paper some detailed information respecting it, which I owe to the kindness of Capt. Sherwill. Dr. Sheridan of Bheerbhoom has had the kindness to write me an account of a recent visit to the springs. It tallies with Capt. Sherwill's; only one went in the rains, when the country was under water, the other in the cold weather. Bum Buklesir is a pretty and curious spot, easily accessible. It is healthy and not jungly, being situated in a well-cultivated country, with a little jungle to its South. It is one mile from the large town of Tantipara, on the banks of a small nullah, called the Buklesir. There are five or six hot springs, the whole group called Bum Buklesir. The hot wells that have been surrounded with masonry walls are immediately on the North or right bank of the nullah. There are numerous hot springs in the bed of the nullah only to be seen in the dry season, giving out the well-known smell of sulphuretted hydrogen, with which the air is tainted. Near the hot springs there are several cold ones, all flowing from a tough gneiss rock. The hot and cold springs are only separated by a few feet from each other. The body of water ejected from the hottest well is very considerable, being about 120 cubic feet per minute; the[n] runs from innumerable [illegible] mud and [illegible] In the mas[s] [illegible] 162°, a g[reater] [illegible] spring is [illegible] 3 or 400 feet from [illegible] of bathers is a large pucka tank which is supplied by two springs, one hot and the other cold; so that at one end the water is warm, at the other cold, and in the centre tepid. The stream of the nullah is about 50 yards across, with a brisk current, and it retains its heat below the springs for a considerable distance; its temperature was 83° in the month of December, when the temperature of the air was in the shade 77°. The sand of the stream some little way from the spring, and at the depth of six inches, is intolerably hot to the hand. Extending for about 200 yards along the right bank of

the stream, are 320 small brick and mortar Viharahs or temples, built by various pilgrims, each containing a Priapus or emblem of Maha Deo. Only one temple has any pretension to architectural elegance. Numerous attendant Brahmins, who are most importunate beggars, loiter about the temples, engaged in bathing in the hot stream, or watching the cremation of dead bodies, which operation is constantly being carried on. Tantipara is a fine substantial village, with most of its inhabitants engaged in preparing silk for the Calcutta market; there is an indigo factory besides a police chokee and abkaree station; a short way off is the large town of Dobrajpore, offering a good market for English piece goods, and producing a large supply of fish from its numerous tanks. Between it and Bum Bucklers, and in the town of Dobrajpore, large naked and picturesque masses of granite and gneiss protrude through the soil, occupying altogether about a mile square. The scene is a very curious one, and there is a good view of the surrounding country from the top of one of the rocks, on which is a Grand Trigonometrical Station about 60 feet high. In the opposite direction, but further away, is Nagore or Jy Nuggur, a large town; the greater part of it has gone to decay, as is shown by its falling mosques, half-filled and weed-choked masonry tanks, and ruined buildings which almost approach to palaces in extent. The famous Nagore wall or entrenchment, extends in an irregular and broken figure round the town of Nagore, at a distance of about 4 miles; its length is about 32 miles. At Lakarakoonda, about 5 miles off, is a warm spring, temp. 85°. Near the feeble stream which carries away its waters is a curious Hindu cut stone temple, which is fast falling into ruin. I trust that I have quoted at sufficient length from Capt. Sherwill's interesting notes and reports to show, that if Bum Buklesir were fitted for the reception of European visitors, there is no lack of objects of interest in the neighbourhood.—*Dr. John Macpherson M. in No. iii, Indian Annals of Medical Science, page* 205, *Oct.* 1854.

(5369) MINT.

Hibbuk, Nana, Arab.	Frauen murze, Ger.
Baume Verte, Fr.	Menta romanna, It.
Pudeena, Nana, Guz. Hind.	Nana, Pers.
	Widdatilum, Tam.

A well-known leaf, chiefly used for culinary purposes in England, as well as in India, where it is easily grown. Mint is occasionally prescribed by Mahomedan practitioners in dyspeptic complaints, and to stop vomiting. Several kinds are distinguished, all remarkable for their peculiar odour and taste.—*Faulkner.* The common sorts are three, Spear-mint, Pepper-mint and Penny Royal. The first is generally used for culinary purposes: it may be propagated by layers, or cuttings, or parting of the roots; it requires a moderate proportion of water. In the rains a small black caterpillar attacks the leaves, and will destroy the whole bed if not removed by hand, or flooding the beds, when the insect becomes detached from the leaves, and is easily destroyed.—*Riddell.*

(5370) MIRABILIS JALAPA, Marvel of Peru. Belle de nuit.

Patrash, Tam.	Gool bajee, or Gulabbas, Hind and Duk.
Reso, Japan.	Krishna keli, Beng.

Cultivated as an ornament in all the gardens of Bengal. Considered an aperient by the native doctors. Drs. Hunter and Shoolbred tried it without satisfactory results, and Dr. O'Shaughnessy's experiments lead him to believe it destitute of any efficacy. It is at best an uncertain cathartic. The roots of this plant were long regarded as the source of the true Jalap. They are considered purgative, their taste is acrid and nauseous, and they abound in starch; the seeds also contain this principle in such abundance that they have been proposed as an alimentary article. The Mirabilis dichotoma and longiflora are reputed to possess similar properties.—*O'Shaughnessy, p.* 511. This plant is very beautiful though very common, and known as the Marvel of Peru. The flowers are of various colours, red, white and yellow, also variegated red and white, yellow and white. The root when dried is prepared for medicinal use. It becomes in a short time quite a weed in a garden. Is propagated by seed, and in any soil.—*Riddell.*

(5371) MIRCHEE. Capsicum Frutescens. Capsicum.

(5372) MISHME TEETA. Golden thread-root of Assam. Roots of Coptis teeta.—*Beng. Ph.*

(5373) MISSEE, a powder made from gall-nuts: sulphate of copper; steel filings: myrobalans, and the pods or gum of the keekur tree: the Hindoo and Mahomedan women use it in staining the teeth black.—*Herklots.*

(5374) MISWAK, a substitute in India for a tooth brush, made from a twig of the Margosa: the rough acharantes: careya arborea, Phyllanthus multiflorus; and Palmyra.—*Herklots.*

(5375) MOCHA STONES AND MOSS AGATES are semitransparent calcedony, including various ramified forms, produced by iron, manganese, bitumen and chlorite or green earth, but sometimes also, as has been proved by Daubenton and MacCulloch, produced by the presence of real vegetable bodies, such as Confervæ and Mosses. The finest are found in Guzerat, but received their name from having been brought from Mocha, in Arabia.—*Eng. Cyc.*

(5376) MOCHEAL, the Tamil name of a Ceylon tree which is about twenty inches in diameter,

and eight or ten feet high. It is used in native boats &c. It produces a fruit from which oil is extracted.—*Edye. Ceylon.*

(5377) MODEL OR PUTCHA OOTOO WOOD.

(5378) MOHAIR.

Moire, FR.	Moerro, IT.
Mohr, GER.	Mue, Muer. SP.

The hair of the Angora goat, famous for being soft, fine as silk, and of a silvery whiteness. It is made into camlets, &c.—*Faulkner.*

(5379) MOHUL WOOD.

Mohul, HIND.

(5380) MOHUNNANEE WOOD OIL.

(5381) MOHUR OR ASHRUFFE. A gold coin, of India, now rarely seen, of fifteen rupees value.

(5382) MOLASSES, TREACLE.

Melasses, FR.	Melasso, PORT.
Syrup, GER.	Patoka sacharnaja, RUS.
Kakwee, GUZ HIND.	Meil de azucar, SP.
Meilazzodi zucchero, IT.	

The uncrystallisable part of the juice of the sugar-cane, separated from the sugar during its manufacture. It is of a brown or black colour, and a sweet taste. Molasses is used in preparing the coarser sorts of preserves, and on the Continent and in India, in the preparation of tobacco.—*Faulkner.*

(5383) MOLINDA CANESCENS.

Korive : Sapindus tetraphyllus, TEL.

A native of the Circar mountains ; flowers about the time the sapindus does. The wood of this tree is white and not so serviceable as that of the *Sapindus* rubiginosus. Roxb.—*Rohde, M.S.S.*

(5384) MOMORDICA, a genus of Plants belonging to the natural order *Cucurbitaceæ*. The flowers are monœcious, yellow or white ; the staminiferous flowers have a 6-cleft calyx, with very short tube, a 5-parted corolla, tridelphous stamens, with connate anthers ; the protilliferous flowers have three sterile filaments, the styles bifid, the ovary 3-celled ; the fruit opens with elasticity when ripe ; the seeds compressed, reticulated.—*Eng. Cyc.*

(5385) MOMORDICA CHARANTIA, CUCURBITACEÆ.

Kurilla, DUK.

(5386) MOMORDICA CHARANTIA.

Punney Fodaylang-kai, TAM.

This vegetable is very commonly cultivated by the natives at the commencement of the rains, the fruit is from ten to fourteen inches long, and from two to four in diameter; the edges are curiously notched and ridged, the flavour is bitter, and it requires to be soaked before being cooked. —*Riddell.* The green fruit used in curries, &c., it grows about 1 foot or 15 inches length, commonly cultivated, known by the name of small snake gourd ; before cooking it is generally steeped in salt water.—*Jaffrey.* In Tenasserim, two or three varieties of momordica, a fruit the size of a cucumber covered with tubercles, are used in curries.—*Mason.* In Ajmeer, cultivated in the rains.—*Gen. Med. Top. p.* 209. This is a creeper, sown at the commencement of the rains, and may be continued during the cold season ; it is a bitter fruit, very rough skinned, and from four to five inches long ; the edges have a very wrinkled appearance ; when ripe it is of a beautiful deep red and yellow. The natives fry and eat them, but they are principally used in curries ; they require to be soaked in salt and water before dressing. They sell from one to two pice a seer.—*Riddell.*

(5387) MOMORDICA CHARANTIA, VAR. FRUCTIBUS OBLONGIS.

Comboo pagulkai, TAM.	Pandy pavel, HORT. MAL.
Lumba carala, DUK.	Deerga Karavullie, SANS.
Commoo Kakakaia, TEL.	

This is a very valuable pleasant tasted and wholesome hot vegetable though perhaps a little too bitter. It is about four or five inches long and of a wrinkled and scabrous appearance outside. The natives sometimes make curry of it, but prefer it fried. In some parts of the country the Tamool name of this article is pronounced Comboo pawakia.—*Ainslie, p.* 238.

(5388) MOMORDICA CHARANTIA, *Var.* MURICATA.

Pavay-kai, TAM.

The bitter gourd. Commonly cultivated and used in curries, said to be very wholesome ; another fruit called Nerree pavay-kai, is sold in the bazaars, I have seen nothing but the fruit, and take it to belong to Curcurbitaceæ.—*Jaffrey.*

(5389) MOMORDICA DIOICA.

Angakara Gudda, TEL.

This is a smaller species and round-fruited, but differs little from the former : both are much cultivated by the natives for their curries.

(5390) MOMORDICA DIŒCA. DIŒCIOUS MOMORDICA. A species of momordica with small muricated fruit, is occasionally eaten by the natives.—*Mason.*

(5391) MOMORDICA MIXTA.

Gol-Kakra, BENG.

This is erroneously named *Makal* by Ainslie, and as he also by mistake applies the same term to the colocynth plant, many errors have originated in attempts to introduce the Indian colocynth into medical practice in India. The fruit of the Gol-Kakra is large, red, and thorny, contains a yellow insipid pulp, is totally inert as a medicine, and is indeed occasionally used for

food in Bengal. *Makal* is the correct name of Trichosanthes palmata.—*O'Shaughnessy, p.* 349.

(5392) MOMORDICA MURICATA. Bura Hurela. HIND. cultivated.—*Gen. Med. Top* p. 209.

(5393) MONEY. The current and convenient principal coin of the Malay and Philippine Archipelagos is at present, and has long been, the hard Spanish dollar, the peso duro of the Spaniards; and that with globes and pillars, containing 3709 grains of pure silver, and worth in sterling money 5179 pence, has an universal preference. The English rupee and Dutch guilder are but of local currency and always, more or less, at a discount. The dollar, in the native languages, is known by various names; the Malays usually call it real, which is, no doubt, an "abreviation of the Spanish real de a ocho, or a piece-of-eight." The common name with the Javanese is ring git, which literally means "scenic figure."—*Crawfurd Dict. page* 285. A great variety of small coins of brass, copper, tin and zinc are in circulation throughout all the islands. The most frequent of these is the Dutch doit, of which about 300 ought to go to a Spanish dollar. The intrinsic value of all such coins, however, having no relation to their assumed one, and being usually over issued, they are generally at a heavy discount. The small coins of Palembang, Achin, Bantam, and Queda are of tin. Those of the latter place go under the name of tra, which is, however, only the word "stamp" or "impression." Of these 160 are filed on a filament of ratan, of which 8 strings or 1280 coins are considered equivalent to a hard dollar. In Bali and Lomboc the currency consists of Chinese Zinc coins with a hole in the middle for filing them on a string, each string having 200, and five of these called a siah, that is, "one thousand," being the highest denomination of money in the reckoning of the inhabitants of these islands. Their value rises, and falls in the market according to the supply, like any ordinary article of merchandise; so that a Spanish dollar will sometimes buy 800 of them, but often as few as 500 only. All these small coins are generally known by the Javanese name of pichis, corrupted pitis by the Malays, a name which had extended to the Philippines.—*Crawfurd Dict. p* 285. The only native country of the Archipelago in which a coin of the precious metals seems ever to have been coined, is Achin. This is of gold of the weight of nine grains, and of about the value of 14d. sterling: to which European traders have given the name of a mace, a corruption of the Malay mas, itself a corruption of the Sanscrit, masha, the name of an Indian weight. All the coins of this description that have been seen are inscribed with Arabic characters, and bear the names of the sovereigns under whom they were struck, so that they are comparatively modern.—*Crawfurd Dict. p.* 286. Previous to the arrival of Europeans, the natives of the Archipelago generally, had no other coin than the small bits of copper, brass, tin, or zinc, already named. The Javanese appear to have coined some of their own money, as we find from many examples excavated from old temples, and other places.—*Crawfurd's Dictionary, page* 286.

(5394) MONGHYR, is celebrated for its iron manufactures, especially of muskets, in which respect it is the Birmingham of Bengal. Generally speaking, these weapons are poor, though stamped with the first English names. A native workman will, however, if time and sufficient reward be given, turn out a first rate fowling-piece. The inhabitants are reported to be sad drunkards, and the abundance of toddy-palms was quite remarkable.—*Hooker Him. Jour. Vol.* 1 *Page* 87.

(5395) MONITORIDÆ, or MONITORS, a family of Lacertian Reptiles: the name Monitor has been given to the typical genus of this family in consequence of the supposed warning given by them of the vicinity of crocodiles. The warning of these Monitory Lizards was said to be a hissing or whistling; but the better opinion is, that they obtained credit for this monition solely from the accident of their haunts, which are for the most part in the neighbourhood of the waters, and consequently bring them sometimes into company with the destructive and gigantic reptiles above mentioned. The Monitors have teeth in both jaws, but none on the palate. Cuvier divides them into two groups, and Fitzinger into three, under the names of *Tapinambis*, *Varanus*, and *Psammosaurus*. Dr. J. E. Gray makes the *Monitoridæ* the first family of his *Leptoglossæ*, or Slender-Tongued Lizards. Character of the Family.—Head with minute polygonal shields; teeth adnate to the inner side of the jaws; tongue elongate, slender, retractile into a sheath at its base; scales small, roundish, placed in cross rings, those of the sides like those of the back; legs 4, strong; toes 3-5, compressed, unequal; thighs porcless; supraorbital plate bony. The species are inhabitants of the Old World, and frequent the banks of rivers. The Asiatic genera and species of the 'British Museum Catalogue' are as follows:—

Odatria Gray.—Nostrils ovate, longitudinal, sub-anterior; teeth compressed, acute. Tail elongate, round, not keeled above; scales large, sharply keeled, sub-spinose. Back with elongate narrow keeled scales. Ventral shield elongate. Toes rather unequal, elongate.

O. Timorensis (*Monitor Timorensis* Gray; *Tapinambis viridimaculatus* Daud.), the Timor Odatria. Black, yellow-dotted, dots forming rings and spots; head yellow and black-dotted. Scales over the orbits small, granular; of forehead larger. Ventral shields nearly as broad as long. Tail slightly compressed above, sub-triangular; base of tail unarmed. Is a native of Timor.

Empagusia, Gray. Nostrils large, oblong, oblique, in front of the muzzle. Tail as long as the body head, tapering, roundish, with a double-edged keel above; scales sharply keeled. Toes rather short, sub-equal. Teeth acute. Scales ovate, keeled. Head short.

E. flavescens, Gray (*Monitor flavescens*, Gray; *Varanus Russelii* Schlegel; *U. Piquotii*, Dum. et Bib.; *M. exanthematicus*, var. *Indica*, Schlegel), the Indian Empagusia. Olive, with yellowish cross-bands. Head-shields sub-equal; eye-brows with a central series of larger plates. It is found in Nepaul.

Varanus, Merrem.—Nostrils oblong, rather oblique in the centre, between the apex of the muzzle and the orbits. Tail elongate, compressed, with a double-edged keel above. Toes elongate, unequal, strong. Head elongate.

a. Shields over the orbits small, sub-equal.

U. heraldicus: *Monitor heraldicus*, Gray, the Heraldic Varan. Black, with cross rows of pale-eyed spots; pale beneath; black-banded. Shields over the orbits small, sub-equal. It is a native of India.

U. lunatus, the Lunated Varan. Nostrils large, nearly central; shields over the orbit small, sub-equal. Dark brown, with lunate bands directed backward on the neck and forwards on the body, and with cross-bands on the tail; belly and under side of tail whitish. It is found in India.

U. ornatus, the Philippine Varan. Nostrils large, central; shields over orbit small sub-equal. Olive; neck and front of the body with pale-spotted broad black cross-bands; the hinder part of the body and tail with pale spots. It is a native of the Philippine Islands.

U. Dumerilii; *Monitor Dumerilii*, Muller; Dumeril's Varan. Brown, with obscure cross-bands, with a black spot on side of neck. Shields of the head and over the orbit nearly equal, moderate. Scales large, convex. It is a native of Borneo.

U. rudicollis, the Rough-Necked Varan. Nostrils large, nearer the orbit than the end of the muzzle; shields over the orbits nearly square, the hinder central ones rather larger. Scales of the back triangular, keeled; of the neck large, prominent. Muzzle elongate. Black, with white streaks on back of neck, and bands across the back. It is found in the Philippine Islands.

b. Scales over the orbit small, with a central longitudinal series of larger plates.

U. nebulosus (*Monitor nebulosus*, Gray; *M. nebulatus*, Schlegel), the Coloured Varan. Nostrils large, rather nearer the orbit than the end of the muzzle orbital shield with a large series; back of neck with converging dark streaks. It is a native of India.

c. Tail triangular, compressed, and with a doubly-toothed crest above. Nostrils small, round. Aquatic.

Monitor, Gray (*Polydædalus*, Wagler; *Varanus*, Fitz.)—Nostrils small, round, in the middle, between the apex of the muzzle and the front angle of the eye. Tail elongate, compressed, with a double edged keel above. Toes elongate, unequal, strong. Teeth rounded.

M. Dracœna, Gray (*Lacerta Dracœna*, Linn. *Stellio Salveguardia*, Laur.; *Tupinambis Benga*; *lensis*, Daud.; *T. Indicus*, Daud.; *T. Cepedianus* Daud.; *Varanus guttatus*, *U. punctatus*, and *U. Argus*, Merrem; *M. gemmatus*, Guerin) the Indian Monitor. Brown; black-spotted or yellow-eyed when young. Nostrils central; scales over the eyes flat, small, sub-equal; of the head rather larger. It is a native of India.

M. Gouldi Schlegel (*Hydrosaurus Gouldii* Gray), Gould's Monitor. Neck with two yellow streaks on the side; scales over the eyes small, granular; of forehead larger. Ventral shields small, longer than broad. It is found in north-western Australia.—*Eng. Cyc.*

(5396) MONKEYS. The Chinese are skilful in teaching the smaller kinds of monkeys various tricks and persons carrying them around the country to entertain the populace with their antics are often met. Mr. Breton gives one picture of their adroitness and usefulness in picking tea in Shantung from plants growing on otherwise inaccessible acclivities which if not misrepresented rests on doubtful authority. One of the most remarkable animals of this tribe is the "donc" or Cochin-chinese monkey (Simia nemæus) which is said to occur also in Kwangsi. It is a large species of great rarity, and remarkable for the variety of colors, with which it is adorned. Its body is about two feet long and when standing in an upright position its height is considerably greater. The face is of an orange color and flattened in its form. A dark band runs across the front of the forehead aud the sides of the countenance are bounded by long spreading yellowish tufts of hair. The body and upper parts of the forearms are brownish grey, the lower portions of the arms from the elbows to the wrists being white, its hands and thighs are black and the legs of a bright red colour, while the tail and a large triangular spot above it are pure white. Such a creature matches well for its grotesque and variegated appearance with the mandarin duck and gold fish also peculiar to China.—*Williams' Middle Kingdom, p.* 247.

(5397) MONKEY BREAD TREE.—ADANSONIA.

(5398) MONKEY FLOWER.—DIPLICUS AND MIMULUS.

(5399) MONKSHOOD.—ACONITE.

(5400) MONOCERA GRIFFITHII.—MONOCERA. In the southern provinces of Tenasserim, there is a species of monocera which bears flowers similar to the Elæocarpus.—*Mason.*

(5401) MOODOOGA OIL, BUTEA FRONDOSA. The seeds of this tree yield a small quan-

city of a bright clear oil, which is sometimes used medicinally —*M. E. J. R.*

(5402) MOOCHEE, Hindoo castes, in Bengal, shoemakers, or saddlers, in the Dekhan, painters, book binders, saddlers, &c.

(5403) MOOCHERUS. A gum resin yielded by the *Bombax Heptaphyllum*. It occurs in knotty, opaque, dark-brown pieces, often with internal cavities. The roots of this plant constitute the *Suffeid mooslie* of the Indian bazars. Vide article Mooslie White, is a laxative and as such given to children.—*Faulkner.*

(5404) MOONJA, SACCHARUM MOONJA, a grass indigenous to India, it is collected after the rainy season, it is possessed of great tenacity and is employed for tying up cattle at night, for ropes for the Persian wheels : and the Benares and Indus boat-men make tow ropes of it, and it is used as rigging, in all the vessels above Sikkim. It would form an ample supply of half stuff for paper makers.—*Royle.*

(5405) MOOLAY KEERAY, AMARANTUS POLYGAMUS, Lin.

Molay kceray, TAM.	Molakoora, TEL.
Cholai baji, GUZ.	Chuolaee, HIND.
Rujgheere, ke baujee DUK.	Shakinee, SANS.

(5406) MOOLOKARANG VARAY PUTTAY; TODDALIA ACULEATA : AMARANTUS SPINOSUS. LIN.

Moolloo keeray, TAM.	Mooloo Duntoo koora, TEL.
Cateahrajaheera ke baujee, DUK.	Cuntaka, Shakenie, SANS.

(5407) MOONG AROOD. PHASEOLUS MONGO. Green Gram. This is chiefly grown in the upper parts of Hindoostan ; it is eaten by the natives dressed in various ways.—*Jaffrey.*

(5408) MOONG PHULEE. ARACHIS HYPOGÆA. Earth-nut. Ground nut ; Manilla nut : the legumes contain the nuts ; they are small and white, and require to be roasted before eaten ; they are not in much esteem.—*Riddell.*

(5409) MOON STONE. Some of the "cat's eyes" that are brought for sale by the Ceylonese, are made of adularia or moon-stone, a variety of felspar found in Ceylon resembling opal. In Europe it is often sold for opal.—*Mason.*

(5410) MOORCH'HUL. A club-like fan, made of peacocks feathers, used by the great.—*Herklots.*

(5411) MOORDAR SUNG. Litharge is not made at Ajmeer, though there are lead mines : it is brought from Delhie : used in ointments and in oil paintings : two seers for one rupee.—*Genl. Med. Top. page* 146.

(5412) MOORIES, BLUE. These cloths are principally manufactured in the Districts of Nellore and at Coonatoor in the Chingleput Collectorate of Madras. They are 2 cubits in breadth, and 28 long and sold at from 2 to 7 Rs. each according to their sizes. They are largely exported to the Straits of Malacca.

(5413) MOORVA, MAROOL. BOW-STRING-HEMP SANSEVIERA ZEYLANICA. Dr. Gibson states grows freely on the Bombay side of India.—*Royle Fib. Plant, p.* 337.

(5414) MOOSLIE. Authors describe the source of this Indian drug, differently.

(5415) MOOSLIE, WHITE. SUFED MOOSLIE. Root of Bombax Malabaricum.—*Beng. Pharm.*

(5416) MOOSLI-SUFAID. ASPARAGUS SARMENTOSUS. The root of the plant is brought from Kotah, and via Pali : considered of a warm nature and given in purges and mesalihs.—*Gen. Med. Top. page* 145.

(5417) MOOSLI-SIYAH, Black root of similar shape and size comes from Kotah ; used in the same way, and considered stimnlant and used as an aphordisiac.—*Genl. Med. Top. p.* 145.

(5418) MOOSLIE, WHITE.

Suffeid Mooslie, DUK. GUZ. & HIND.	Tanneer-Vittang, Kalung, TAM.
	Tsulla Ghedaloo, TEL.

The root of the *Bombax Heptapyllum*. It is long, fleshy, and whitish, and is used as food by the inhabitants of Ceylon, where the plant grows. In Southern, and some parts of Western India, the powdered root is used in the form of a thick mucilage with water, and answers admirably as a nutritious demulcent for convalescent persons. It is also supposed, when taken in this form, to have the effect of filling the small pox, and preventing the confluent disease.—*Faulkner.*

(5419) MOOSLIE, BLACK, NELEPANNY ROOT.

Tal moolie, BENG.	Warahi, Moosalie, SANS.
Kalee Mooslie, DUK. HIND. & GUZ.	Nelepanny kalung, TAM.
Secah Mooslie, PERS.	Nalla tady gudda. TEL.

A tuberous and wrinkled root about four inches long ; it is slightly bitter and mucilaginous to the taste, and is reckoned among those medicines which purify the blood ; it also possesses tonic properties. It is procurable in most bazars throughout India.—*Faulkner.*

(5420) MOOTE KEERAY, TAM. This green Ainslie had never seen, nor did he believe that the Botanical name of the plant had been ascertained. It grows in the Southern parts of the Peninsula, and is eaten by the poor.—*Ainslie, p.* 255.

(5421) MORACEÆ, *Morads*, a natural order of Exogenous Plants which were formerly placed as a sub-order of *Urticaceæ*. The species are trees or shrubs, with a milky juice, sometimes climbing. The leaves are commonly lobed and rough. The flowers are small, monœcious, and collected in heads, spikes, or catkins. The ovules are solitary and suspended. The embryo lies in the midst of fleshy albumen, hooked, with the radicle long, superior, folded down towards the cotyledons. Although the Mulberry and Fig

grow in Europe, all the *Moraceæ* are extra European. The species inhabit the temperate and tropical latitudes of both hemispheres, often forming vast forests. The genus *Ficus* is the most distinguishing feature of this order. Most of the plants of this order furnish caoutchouc. The fruit of the Mulberry is edible, and the leaves of the genus *Morus* are the food of the Silk-Worm. Several species of *Dorstenia* are used in medicine. Other genera of this order yielding useful products are *Broussonetia* and *Maclura*. This order embraces 8 genera and 184 species. —*Eng. Cyc.*

(5422) MOREA CHINENSIS: Thunb.

Belameanda scholarmani. TAM. HORT, MAL.

The root of this plant ground and applied to any part bitten by a Cobra is said by the people of Southern India, to prevent fatal consequences. The leaves are given by the Natives of the Malabar Coast to cattle that have eaten poisonous vegetables, to prevent their dying. See *Hortus Malabaricus*, Part 11th, page 74.—*Ains. Mat. Med. page* 130.

(5423) MOREL.—This species of Fungus is found at the latter end of the rains, and generally dug out of white ants' nests. The wholesome sorts of mushroom are readily distinguished by being of a pink or flesh color in the gills, changing to a darker color as they get older; they have also a peculiar sweet smell: and another criterion of their being edible is the outer skin pealing off easily.—*Jaffrey.*

(5424) MORINA ELEGANS. DIPSACEÆ.—This species is a native of Persia, the colours red, and white, grown from seed as most other annuals.

(5425) MORINDA.

Morinda Citrifolia.

Ali ka Jhar, HIND. | Moagha, TEL.
Aach or Atchy, TAM. | Nyagyee, BURM.

Morinda Umbellata.

Noona marm, TAM.

Morinda Exserta.

Nya, BURM.

Morinda: this name is given to the bark and root of several species of Morinda, the *M. Tinctoria*; *M. Citrifolia*, *M. Umbellata*, in India, and *M. Exserta*, in Burmah, and are employed to form a very valuable red dye, which is fixed with alum; but Buchanan mentions another species the M. ternifolia in Mysore, the root of which is used for similar purposes. Most of the red turbans of Madras are dyed with the root of the Noona tree. The Karens prepare their red dyes most usually from the roots of the morinda tree, and at least two or three species are used for this purpose. The *M. citrifolia*, is cultivated by the Burmese for a dye, but the Karens more commonly use *Morinda exserta* the indigenous species.

(5426) MORINDA BARK. From Morinda tinctoria, citrifolia and umbellatta. Specimens of the bark and root of various species of Morinda were exhibited at the Madras Exhibition of 1855, from different parts of Southern India and the Northern Circars. These form a very valuable red dye which is fixed with alum: colour, though not brilliant, is far more permanent than many other red colours—the most of the Madras red Turbans are dyed with the root bark of the *Noona* tree, which is pretty common, and is in flower great part of the year. The large Triplicane burying ground is thickly studded with the tree. The quantity procurable is very large, and the dye appears worthy of the attention of practical dyers. —*M. E. J. R.*

(5427) MORINDA, MORINDA FRUIT. A species of morinda is often seen growing near Burman houses, which produces a fruit as large as a pullet's egg. It is a great favorite with the Burmese, and is served up in their curries.—*Mason.*

(5428) MORINDA, FRAGRANT MORINDA. The most agreeably fragrant, flowering shrub in the Karen forests, is a species of morinda, that has not yet found its way into cultivation. The flowers are small, in dense heads, like other members of the genus, azure purple externally, but white within; and has only four anthers, like a species described by Jack which he found on the Malay Islands.—*Mason.*

(5429) MORINDA BRACTEATA.

Yaiyoe, BURM.

This wood, of bright yellow colour, is found in the Bengal bazars under the name of *Rouch*, and is valuable as affording a bright yellow dye. The tree is common throughout the province of Pegu. It is also cultivated about Phoungyee houses.—*McClelland.*

(5430) MORINDA, BRACTEATA, YAIYOE: AND M. EXSERTA.

Mhan bin, BURM.

Both are small trees, only found about Phoungyee houses, in a cultivated state: yellow-wood, fit for fancy work.—*McClelland.*

(5431) MORINDA CITRIFOLIA: AAL, ACH, MORINDA CITRIFOLIA. *Rubiaceæ.*

Munja pavuttay marum, TAM. | Togaru kurra, TEL.
Togaree wood, ENG. | Bura-al, HIND.

This tree is common in Kotah and Boondee. The flowers have a very sweet scent and the tree would be ornamental and thrive well in compounds.—*Genl. Med. Top. p.* 182. The wood of this tree is a deep brownish yellow and the roots are used in dyeing. The quality of the wood, judging simply from the appearance, is little if at all inferior to the preceding; but the tree is much smaller.—*Wight.* Mr. Rohde has seen trees of this wood nearly 2 feet in diameter: the roots are used

to assist more expensive dyes in giving a red colour to yarn and cloth—the red thread used in carpet making is entirely dyed with it. The process of dyeing red yarns in the Circars is well described by Heyne.—*Rohde.* The roots of the awal tree of Malabar and other parts of India, *Morinda citrifolia*, and of *M. tinctoria*, found abundant in all the Asiatic islands, are extensively used as a dye stuff for giving a red color. It is usually grown as a prop and shade for the pepper vine and coffee tree. The coloring matter resides principally in the bark of the roots, which are long and slender, and the small pieces are the best, fetching 8s. to 10s. a maund. It is exported in large quantities from Malabar to Guzerat, and the northern parts of Hindostan, but seldom finds its way to Europe.—*Simmonds.*

(5432) MORINDA MULTIFLORA: AAL, VERNACULAR AT NAGAPORE. Achu Al. A native of Berar much cultivated about Nagapore for its dye.—*Rox. Rohde M.S.S.* Cultivated through Rajpootanah principally near Kotah, and all over Harowtee. The plant is allowed to remain three years in the ground, and then the roots are taken up and dried. The dye is a fine turkey red and is very plentiful. One maund costs sixteen rupees. Is not used medicinally.—*Gen. Med. Top p.* 125.

(5433) MORINDA TINCTORIA.

Uchyoota, SANS.	Tagaroo, TEL.
Al or Aach, HIND. BENG.	

This small tree is pretty common in every part of India. It is in flower and fruit the greater part, if not the whole of the year. It is largely cultivated at Boondee, Kotah and Mewar. —*Genl. Med. Top. p.* 182. The bark of the roots is used to dye red, the colour is fixed with alum, but it is neither bright nor durable. In some parts of India, it is cultivated for the sake of the roots. In the Circars the dyers use the bark of the fresh roots bruised and gently boiled in water for a short time. The cloth or yarn is prepared in a cold infusion of the powdered gall of Terminalia chebula, in milk and water; it is then dried and moistened with alum water, and again dried, and receives from the above decoction, a pretty bright, but fugitive red. The green fruits are pickled by the Hindoos and eaten with their curries. The wood is hard and very durable, variegated with red and white, it is employed for gunstocks in preference to all other kinds.—*Roxb. Rohde M.S.S.* Dr. Irvine says the root is extensively exported as a red dye, the colour is fixed with alum. The plant is not allowed to shoot up into the bush, but is dug up the third year after planting. The flowers are very fragrant; of the large plant, the berry is eaten. The wood of all the species is beautiful, hard and durable; and excellent for gun stocks.—*Med. Top. p.* 182.

(5434) MORINDA UMBELLATA. LEAF OF THE UMBELLATED MORINDA. Lin.

Noona marum elley TAM.	Kleeba, SANS.
Chota Al ka paat, DUK.	Mang-kudu, MALAY.

There are two species of this tree common in India, both of which are called Noona Marum by the Tamools, the one however is smaller and more erect than the other, and is distinguished by the botanical appellation of Morinda Umbellata. The roots of either sort are used as a red dye.—*Ains. Mat. Med.* The wood and roots of *M. umbellata*, known in the eastern islands as "Mangkudu," are used extensively for their red dye, in Celebes and Java. Specimens of all these, and of the Lopisip bark, bunchong bulu wood, and the gaju gum (from undescribed plants), have been introduced into England. They are said to furnish excellent dyes in the Asiatic islands. Native dyes from Arracan have also been imported, viz., thit-tel and the-dan yielding red dyes, ting-nget and reros, affording dark purple dyes; and thit-nan-weng, a chocolate dye. These would be worth enquiry, and particulars of the plants yielding them, the quantities available, and the prices might be procured. *Simmonds. Noona-kai*, Tam., the fruit of this tree, when green, is used as pickles.—*Jaffrey.*

(5435) MORINGACEÆ, *Moringads*, a small natural order of Exogenous Plants, embracing the species of the genus *Moringa*. They are characterised by the possession of a many-leaved calyx, perigynous petals and stamens, 1-celled anthers, stipitate and consolidated siliquose fruit, and seeds without albumen. This order is referred by most botanists to a position near *Leguminosæ*, but Lindley places them in his *Violales*. They are natives of the East Indies and Arabia. The root of *Moringa peterygosperma* has a pungent odour with a warm biting and somewhat aromatic taste. The seeds of this plant are called by the French Pois Queinques and Chicot They are the Ben-Nuts of old writers, from which the Oil of Ben was extracted. It is chiefly used by perfumers as the basis of various scents. It does not readily freeze and on this account is used by watchmakers. The flowers, leaves, and other parts of this plant are added to curries in India. —*Eng. Cyc.*

(5436) MORINGA.

Sohunjuna, Moongay kajhar, DUK.	Moriaben, ARAB.
Sujna, HIND.	Seeds Hubool ban, ARAB.
Sigroomala, and Sohanjana, BENG.	Da-tha-lwon, BURM.
Sajna, PERS.	Mooringa marum, TAM.
	Mooraga chettoo, TEL.

Moringa, leaves, root, flowers, seed vessels or fruit, gum, wood, bark, and oil, for all these parts and products of the Moringa pterygosperma are used by the people of India and by Europeans. The tree is very abundant all over India, Burmah and Malay peninsula. The leaves, flowers and seed vessels are used in cur-

ries. The roots have precisely the flavour of horse-radish, and seem identical in chemical composition, and in India are substituted for the true horse-radish by Europeans. The Gum and bark are used in native medicine. Royle mentions that the oil is aperient, and much used by the natives in gout and rheumatism. Ainslie mentions that the native doctors prescribe the green root as a stimulant in paralysis and in intermittents, in scruple doses, and use it also in epilepsy and hysteria. The seeds are also used internally by the native practitioners, for their pungent and stimulating virtues. In Jamaica the wood is used for dyeing a blue colour. An oil is obtained from the seeds possessed of the same qualities as the *oil* of *ben* the product of the *M. aptera*, a native of Sennaar, Cairo and Palestine, much used by perfumers and by watch makers, as it neither grows rancid nor freezes readily. The delicate perfume of flowers are often retained by the ben oil, by pouring it over the flowers, or strewing layers of the flower for about four hours over cotton soaked in the oil. In the West Indies the oil is used as a salad oil. According to Mr Faulkner ben oil is also prepared from the Guilandia Moringa, a tree which he says grows in Ceylon, Arabia, Egypt and Ethiopia.

(5437) MORINGA GUM FROM MORINGA PTERYGOSPERMA, obtained in a large quantity, does not dissolve in water, resembles in some respects Gum Tragacanth, for which it may probably be substituted.—*M. E. J. R.*

(5438) MORINGA APTERA. A native of Sennaar, Cairo, and Palestine. The seed yields the *oil* of *ben*, much used by perfumers and by watch-makers, as it neither grows rancid nor freezes readily; seeds acrid, and used as a rubefacient. They are also said to be purgative and emetic in small quantities.—*O'Shaughnessy, p.* 289.

(5439) MORINGA CONCANENSIS. A new species discovered in the Southern Concan. —*Riddell.*

(5440) MORINGA PTERYGOSPERMA, *Syn.* HYPERANTHERA MORINGA.

Sohunjuna, Moongay ke jar ke-jur, DUK.	Moriaben, PERS.
Sujna, HIND.	Seeds, Hub-ool-ban, ARABIC.
Sigroomala and Sobhanjuna, SANS.	Mooroongay-kai-keeray and poo, TAM.
Sajna, BENG.	Moosing, DUK.

Indian Horse Radish tree.—This tree grows readily from seed, and attains a height of from fifteen to twenty feet, in its second year; the root when young and fresh scraped, has the flavour of English Horse radish; the pods when young and green are used as a vegetable both boiled and in curries; the seed when ripe yields a fine clear oil; the wood of the tree is soft and of little use.—*Riddell.* It is commonly cultivated in India for leaves, flowers, and seed vessels, which are used in curries. The roots have precisely the flavour of horse-radish, and seem identical in chemical composition. Reduced to a pulp they afford an excellent external irritant. An oil is obtained from the seeds, possessed of the same qualities as that of the M. aptera. It is said by Royle to be aperient, and much nsed by the natives as an unguent in gout and rheumatism. The seeds are also used internally by the native practitioners for their pungent and stimulating virtues.—*O'Shaughnessy.* This is a very useful tree. The leaves and flowers are much eaten by the natives, and make an excellent vegetable. The pods are freely eaten by Europeans as asparagus, either boiled separately or in curries—the roots as a substitute for horse radish—the natives have recourse to this root in adulterating the country mustard, prepared here for sale, and very often pass it off for genuine English; cultivated every where, in gardens and about villages. The large branches planted in the ground root freely and soon become small trees, giving a continued supply of wholesome vegetables; produce from seedling plants is the best.—*Jaffrey.* The delicate perfumes of flowers are often retained by the ben oil, by pouring it over the flowers, or strewing layers of the flowers for about four hours over cotton soaked in the oil. It is thus that the jessamine, and several other very volatile odours are obtained by the perfumers. Ainslie mentions that the native doctors prescribe the green root as a stimulant in paralysis, and in intermittents, in scruple doses, and use it also in epilepsy and hysteria. In Jamaica the wood is used for dyeing a blue colour, (Ainslie i. 176). —*O'Shaughnessy, page* 289. The horse-raddish-tree is propagated by the Burmese for its pods, which are eaten in curries; but it is chiefly valued by Europeans for its roots which cannot be distinguished when eaten with roast beef, from the common horse-raddish, *Cochlearia Armoracia.*—*Mason.*

(5441) MORINGA PTERYGOSPERMA, COMPOUND INFUSION OF SOHUNJUNA. This preparation represents the compound infusion of Horse Radish of the London Pharmacopia. The root of the Moringa pterygosperma, Sohunjuna of Bengal, is a perfect substitute in flavour and properties for the European Article.—*Beng. Phar. p.* 304.

(5442) MORINGA PTERYGOSPERMA, COMPOUND SPIRIT OF SOHUNJUNA. Stimulant in a dose of from two to four fluid drachms in water.—*Beng. Phar. p.* 414.

(5443) MORINGA ROOT. SOHUNJUNA. Root of Moringa pterygosperma.—*Beng. Phar.*

(5444) MORINGA SEEDS. HUB-OOL-BAN. Moringæ semina. An excellent substitute for the horse-radish, Cochlearea armoracia.—*Ben. Phar.*

(5445) MOROCCO LEATHER, MAROQUIN.

Maroquin, Fr.	Saffian, Rus.
Saffiam, Ger.	Marroqui, Sp.
Marrocchino, It.	

A fine kind of leather prepared of skins of goats in the Levant, Barbary, Spain, &c. It is of various colours, and is used for lining carriages, chairs, in the binding of books, &c.—*Faulkner.*

(5446) MORUS, a genus of Plants belonging to the natural order *Moraceæ*. The flowers are monœcious; the staminiferous flowers spiked; calyx 4-parted, spreading, membranous; the stamens 4, larger than the calyx, with the rudiments of an ovary between their bases: the pistiliferous flowers clustered; sepals 4, scale-like, imbricating each other, 2 being opposite and external to the other 2; stigmas 2, linear, glandular; ovule solitary, suspended. Fruit consisting of the latter flowers become fleshy and grown together, each inclosing a dry membranous pericarp. Seed pendulous; embryo curved like a horse-shoe, amongst fleshy albumen, with the radicle directed to the hilum. The species are trees.—*Eng. Cyc.* The genus *Morus* is numerous in species and abounding in individuals, many of which are cultivated on account of their fruit, but still more for their leaves as food for the silkworm. It is probable that most of the species of the genus Morus have bark of a sufficiently fibrous nature. But few, if any, seem to be turned to this useful account. Yet the bark of the White Mulberry seems from very early times to have been made into paper in China; for Marco Polo informs us that "the Grand Khan causes the bark to be stripped from those Mulberry trees, the leaves of which are used for feeding silkworms, and takes from it that thin rind which lies between the coarse bark and the wood of the tree. This being steeped, and afterwards pounded in a mortar until reduced to a pulp, is made into paper, resembling that which is made from cotton." This fact directs attention to the bush cultivation of the Mulberry in Bengal, for feeding silk-worms. This culture consists in planting cuttings of the Mulberry, which as they grow, are cut down about four times in the year, in order to produce young leaves for the successive broods of silk-worms. The countless number of shoots which are thus thrown away, or used as fuel, would probably, under the agency of the dhenkee, yield good half-stuff for the paper-maker. Mr. Henley, indeed, informs us that, before leaving India, he had produced very satisfactory specimens of half-stuff from the bark of these rejected stems. The bark separates when the cut stems are steeped in water, and when pounded up, the greater part of the mucilaginous matter passes off, leaving a mass, having much of the good qualities of linen rag half-stuff. —*Royle Fib. Pl. p.* 341. In China, the leaf of the common mulberry is the principal object of its culture, but the fruit is eaten, and the wood burned for lampblack used in making ink—*Williams' Middle Kingdom, p.* 281. Two species, Morus alba, the White, and Morus Nigra, Black, grow equally well in the Dekhan; the white, growing to a very large tree, shedding its leaves before the hot season. The red mulberry bears fruit in the rains, as well as the black. Silk worms may be fed on the young fresh leaves, although the leaves of the white are preferred. Grows from seed or cuttings.—*Riddell.*

(5447) MORUS ALBA, the white Mulberry is a native of China where it forms a small tree, and whence it has been gradually carried westward till it has become a common plant in most of the temperate parts of the Old World, forming in the south of Europe a pollard-tree by road-sides. Its leaves are smooth and shining, usually heart-shaped at the base, and on old trees ovate or oblong, but on young vigorous shoots as frequently divided into deep lobes. The fruit is white, insipid, and of little value except for feeding poultry; in England it is seldom formed. It is on this species that the silk-worm is chiefly fed; and in silk countries many varieties are cultivated for the purpose, some of which are said to be much better than others. The common wild kind is said to suit the silkworm as well as, or even better than, any other kind; but as it yields only a small quantity of foliage, compared with other sorts, it is principally employed as the source of seeds from which stocks are raised for grafting more productive varieties. Of the latter each silk country has its own fancy kinds, which there would be little advantage in noticing here; but there is among them an exception of importance, the value of which has been recognised wherever it has been cultivated. Some years since a mulberry was introduced into France from Manilla, whence it has gained the name of the Philippine Mulberry, the great excellence of which seems universally acknowledged. It has straight smooth branches, oval, heart-shaped leaves, tapering to a point, thin, rather soft, a little blistered and puckered in the middle, often drooping, and sometimes more than six or even nine inches broad in the dry climate of the south of France. It grows much faster than the White Mulberry, and strikes from cuttings as freely as a willow, which is not the case with the latter. The abundance of its leaves is much greater than any other known variety, and, what is most important, it is not only freely eaten by the silkworms, but perfectly agrees with them. Its culture is now superseding that of all others in the south of Europe, and it is even taken as a stock on which to graft the common white Mulberry, when the latter is wished for. According to M. Bonafous this may be done either upon layers of the Philippine Mulberry, headed down to one or two eyes above the ground, or upon cuttings seven or eight inches long, which may be planted immedi-

ately after having been grafted: the young plants will be five or six feet long the first year, and three or four inches in circumference. This mulberry is sometimes called *Morus multicaulis*. In England the White Mulberry and all its varieties suffer a good deal from the winters, but not so much as to prevent its cultivation. Some years ago an attempt was made to introduce it and the rearing of silkworms into Great Britain; but the attempt failed, owing partly to unskilful management, but more to the soft juicy condition of the leaves in that damp climate, which rendered them unfit for the food of the worm. Loudon, *Arboretum Britannicum*).—*Eng. Cyc.*

(5448) MORUS ATROPURPUREA.

Shatoot, Duk.

Cultivated as the former.

This species of mulberry from China scarcely diffused throughout the Tenasserim Provinces, which produces a very agreeable black berry in great quantities and is a valuable fruit.—*Mason.*

(5449) MORUS INDICA, Mulberry. Willd.

Cumble pullum, Tam.	Babisarn, Malay.
Toot, Duk.	Toota, Sans.

A small tree with long tapering leaves sometimes lobed, fruit dark red, used for making tarts.—*Riddell.* This small Indian Mulberry which is found in Southern India, is a delightful fruit and is considered by the natives as cooling and aperient.—*Ainslie, p.* 223,

(5450) MORUS NIGRA. The black or Common Mulberry, is a small tree with very rugged bark. The young shoots are downy; the leaves roundish, cordate, pubescent, coarsely serrated, rough to the touch, slightly acuminate; stipules oblong, membranous, downy, the length of the petiole or longer, deciduous. The Black Mulberry is the only species of *Morus* worthy of being cultivated as a fruit-tree. It is a native of Persia, and its indigenous range appears to be extensive. Its introduction to England dates about the middle of the sixteenth century. Under great vicissitudes it proves very tenacious of life; and under ordinary circumstances it attains, even in that climate, a considerable age, for some trees planted in 1548 are still alive. The fruit is used at the dessert, fresh gathered, and at the same time it ought to be so ripe as to be just ready to drop from the tree; indeed the fruit may be said to be in the highest perfection with regard to ripeness when it actually drops, and hence a grass plot surrounding the trunk is desirable; but the trees are found to thrive better when the soil is kept stirred; however, as grass will be generally preferred, all strong-growing sorts of grasses should be avoided; and it should also be kept very closely mowed till at least immediately before the fruit ripens. By this means the sun's rays will be permitted to penetrate the soil to a greater depth than when obstructed by a covering of long grass. Mulberries are also preserved in the form of a syrup; and their juice, mixed with that of apples, forms a beverage of a deep port-wine colour, called Mulberry-Cider. The soil for mulberrry trees should be of a light, rich, and moderately dry nature. If the subsoil be not naturally pervious, it should be rendered as much so as is possible. A good bottoming of brick rubbish will prove beneficial with regard both to the growth of the tree and the flavour of the fruit. Propagation of the Mulberry may be effected either by seeds, cuttings, or layering. The last is the preferable mode; where it can be conveniently adopted; and the shoots or branches used for this purpose, as also those intended for cuttings, should be selected from those trees, or parts of a tree, that have been observed to be most fruitful; for although the plant is generally monœcious, yet some trees occasionally assume a dicœcious character. Hence, likewise, seedling plants are not so desirable as those propagated from trees previously ascertained to be prolific: and moreover seedling plants are a greater number of years in attaining to a bearing state. As the acquisition of a good mulberry-tree is very desirable, the following directions for obtaining a bearing tree readily and quickly will be useful. If a tolerably large branch of a vigorous tree is ringed and the annulation is inclosed in a box filled with rich soil, sufficiently large to hold as much as will preserve a somewhat uniform temperature, or at least an approximation to that which the roots of a tree naturally experience in the ground, roots will be readily emitted into the earth, and in due time the branch may be cut off and planted. A covering of moss is useful, partly for maintaining an equable temperature, and partly for preserving moisture. The Mulberry-Tree requires very little pruning beyond that of regulating the head. The season for this operation should be always mid-winter; for if in a growing state, this plant bears amputation very ill, especially as regards large limbs. Mulberries have been trained against south walls, over which a single plant has been known to extend upwards of ninety feet horizontally; additional size and flavour are said to have been gained, but certainly not so much over a standard on a proper bottom as to compensate for the great extent of wall-room occupied.—*Eng. Cyc.*

(5451) MORUS PAPYRIFERA, now, BROUSSONETIA PAPYRIFERA. The Japanese make abundance of paper as well for writing and printing, as for tapestry, handkerchiefs, packing cloths for goods, &c. It is of different qualities, and some of it is as soft and flexible as our cotton cloth. Indeed, that used for handkerchiefs might be mistaken for cloth, so far as toughness and flexibility are concerned. The materials, of which it is made is the bark of the mulberry, (morus papyrifera,) and the process is described

as follows: In December; after the tree has shed its leaves; they cut off the branches about three feet in length and tie them up in bundles. They are then boiled in a ley of ashes in a covered kettle, till the bark is so shrunk that half an inch of the wood may be seen projecting at either end of the branch. When they have become cool, the bark is stripped off and soaked in water three or four hours until it becomes soft when the fine black skin is scraped off with a knife. The coarse bark is then separated from the fine; the new branches make the finest paper. The bark is then boiled again in fresh ley, continually stirred with a stick, and fresh water from time to time is added. It is then put in a sieve and taken to a brook, and here the bark is incessantly stirred until it becomes a fine pulp. It is then thrown into water and separates in the form of meal. This is put into a small vessel with a decoction of rice and a species of Hibiscus, and stirred until it has attained a tolerable consistence. It is then poured into a large vessel, from whence it is taken out and put in the form of sheets on mats or layers of grass straw, these sheets are laid one upon another with straw between, and pressed to force the water out. After this they are spread upon boards in the sun, dried, cut, and gathered into bundles for sale. This paper will better endure folding, and last longer than that of Europe.—*American Expedition to Japan page* 64.

(5452) MOSCHIDÆ, a family of Ruminant Quadrupeds familiarly known as Musk-Deer. Linnæus defines the genus *Moschus*, which he places between *Camelus* and *Cervus*, under his order *Pecora*, as having no horns, and the upper canine teeth solitary and exserted—"Cornua nulla Dentes Laniarii Superiores solitarii, exserti." Dr. J. E. Gray, in his 'Disposition of the Mammalia' ('Annals of Phil,' 1825), divides the family *Bovidæ* into two sections, the first with persistent horns, and the second with either no horns or deciduous horns. He makes *Moschina* the fourth sub-family, and arranges it between *Camelina* and *Cervina*, in the second section. The genera of *Moschina*, in this arrangement, are *Moschus* and *Memina*. The same author, in June, 1836, read to the Zoological Society of London some observations 'On the genus *Moschus* of Linnæus, with descriptions of two new species.' He remarked that the only character by which this genus, as established by Linnæus and others, differs from the genus *Cervus*, consists in the absence of horns; for the elongated canines are common to it and most of the Indian species of *Cervus*, especially the *C. Muntjac*. The character of the fur, the degree of hairiness or nakedness of the metatarsus and the presence or absence of the musk-bag of the male, offer however, he observed, good characters for the sub-division of the group into three very distinct sections or sub-genera. The

first of these divisions, for which Dr. Gray would retain the name of *Moschus*, comprehends only the Tibet Musk, *M. Moschiferus*, Linn. In common with the Deer and Antelopes, it has, he pointed out, the hinder and outer side of the metatarsus covered with close erect hair, and, like many of the deer also, its fur is quill-like and brittle; the throat moreover is entirely clothed with hair, and the males are provided on the middle of the abdomen with a large pouch secreting musk. Its young, like those of most of the Deer, are spotted, whilst the adult animal is plain-coloured. Dr. Gray further stated that the division to which, in the year 1821, in a paper in the 'Medical Repository,' he gave the name of *Memina*, also consists of but a single species, the *Moschus Memina*, Linn. In this group the hinder edge of the metatarsus is, he observed, covered with hair; and there is no musk-bag in either sex. The false hoofs, he remarked, are distinct, although Linnæus and Buffon denied their presence. The third and last sub-division is characterised by Dr. Gray, under the name of *Tragulus*, as having the hinder edge of the metatarsus nearly bald and slightly callous, a character which distinguishes them at once from all other Ruminants; the fur is soft, and adpressed like that of *Memina*, but not spotted even when young: the throat is provided with a somewhat naked, concave, sub-glandular, callous disc, placed between the rami of the lower jaw, from which a band extends to the fore part of the chin; and they have no musk-bag. Like all the other species of the Linnæan genus *Moschus*, they have false hoofs; and most of them have the edges of the lower jaw, three diverging bands on the chest, and the under surface of the body, more or less purely white. The species of this division scarcely differ in colour in the various stages of their growth, the young fawn resembling the adult in every particular except in size. In this division, the synonymy of which is stated to be extremely confused, Dr. Gray reckons four species, two of which he describes as new. Dr. Gray stated that he was unable to identify with any of the four species mentioned by him on this occasion, or to separate from them as distinct, the Palendoc, figured in Marsden's 'Sumatra,' or Pygmy Musk of Sumatra, figured in Mr. Griffith's edition of Cuvier's 'Animal Kingdom,' on which Fischer has established his *Moschus Griffithii*. The *M. pygmæus* of Linnæus, in Dr. Gray's opinion, belongs to the genus *Antelope*; the hinder part of the tarsus being covered with hair, and the false hoofs very small and rudimentary, and entirely hidden under the hair of the feet. He thinks that the *M. Americanus* appears by its spotted livery to belong to a species of Deer; and that the *M. delicatulus*, or Leverian Musk of Shaw, is undoubtedly the fawn of a deer. Dr. Gray further observed that it is curious that Dr. Shaw quotes as

a synonym of the last-named species the figure of Seba, on which alone the *M. Americanus* is founded, while at the same time he enumerates the *M. Americanus* as a distinct species ('Zool. Proc.,' 1836.) In the same year Mr. Ogilby, in his paper on the 'Ruminantia,' read before the Zoological Society, makes the *Moschidæ* the third family of that order, with the following character :—Feet bisulcate; horns; incisor teeth (primores), above none, beneath eight. Two genera,

1. *Moschus*.—Rhinaria large. Lachrymal sinuses none; interdigital fossæ none; inguinal follicles none: teats four. Type *M. Moschiferus*.

2. *Ixalus* (?).—Rhinaria none. Lachrymal sinuses small and distinct; interdigital fossæ none; inguinal follicles small; teats two. Type, *I. Probaton*. ('Zool. Proc.,' part iv. p. 119.) Mr. Ogilby goes on to state that the genus *Ixalus*, founded upon the observation of a single specimen, may eventually prove to belong to a different family: and indeed he observes that it differs little from the true antelopes; but even supposing it to be correctly placed among the *Moschidæ*, other forms, Mr. Ogilby remarks, are still wanting to fill up the chasms which evidently exist among the character of that group. "Two," continues Mr. Ogilby, "are more especially indicated, and our knowledge of the laws of organic combination, and of the constituent parts of other groups, gives us every reason to believe in their actual existence, and to anticipate their discovery." He then proceeds to characterise the genera *Hinnulus* and *Capreolus*, observing that they will probably be found, one in the tropical forests of the Indian Archipelago, and the other on the elevated table-lands of Mexico or South America. "It may appear a bold, perhaps a presumptuous undertaking," says Mr. Ogilby, "thus to predict the discovery of species and define the characters of genera, of whose actual existence we have no positive knowledge; but, as already remarked, all the analogies of nature, whether derived from organic combination, or from the constituent members of similar groups, are in favour of the supposition; and I may observe further, that the recent discovery of the genus *Ixalus*, if indeed it eventually prove to be a genus, of which I had long previously defined the characters, as I have here done for the presumed genera *Hinnulus* and *Capreolus*, strengthens my belief in the actual existence of these forms, and increases the probability of their future discovery." The family is placed by Mr. Ogilby between the *Cervidæ* and *Capridæ*. The same author makes *Tragulus* (type *Antilope pygmæa*) the first genus of his family *Bovidæ*. The *Moschidæ* do not differ much from the other Ruminants: the leading differences are given above, and the general osseous structure of the form may be collected from the following.

Dental Formula:—Incisors, $\frac{0}{8}$; Canines, $\frac{1-1}{0-0}$; Molars, $\frac{6-6}{6-6}$ = 34.

The canine teeth go far back into the upper jaw. It is not impossible that the so called canine teeth of *Ursus cultridens* may be the canine teeth of an extinct ruminant allied to this family, or that of the *Cervidæ*.

Moschus Moschiferus, the Musk, or Tibet Musk. It has somewhat of the form of a Roebuck; but higher behind than it is at the shoulder, from the upper part of which to the sole of the foot it measures about 2 feet 3 inches; whilst from the top of the haunches to the soles of the hind feet the measurement is about 2 feet 9 inches. Ears long and rather narrow, in the inside pale-yellow and dark-brown outside. Hair on the body suberect, long, each hair marked with short waves from top to bottom, ash-coloured near the base, black or blackish near the end, and rusty at the tips. Chin yellow. The colours vary. Most of the adults are plain-coloured. In some, and such is the individual figured by Pennant, the fore part of the neck is marked on each side with long white stripes from the head to the chest, the back striped transversely with pale-brown reaching to the sides, which are also dappled with a lighter colour. Hoofs very long and deeply divided, spurious hoofs very long. Tail about an inch long, concealed in the hair. Scrotum rutilum. Penis vix percipiendus. (Pennant.) Female less than the male, and wants the two tusks. Young, spotted. The Musk is a mountain animal, timid, and shy, and lover of solitude. Precipices covered with pines and almost inaccessible crags are its favourite haunts; and the musk-hunter often perils his life in the dangerous chase; for when hotly pursued the animal takes refuge frequently in the highest fastnesses, leaving men and dogs with scarcely the possibility of access to the precipitous summits to which it flies. And yet the slaughter made among them must at one time have been great, and the animals abundant; for Tavernier bought in one journey 7673 musk-bags. The bag, or tumor, containing this well-known drug is peculiar to the male: it is kidney-shaped, pendulous, of the size of a hen's egg, and situated beneath the abdomen. There are said to be two apertures, the larger oblong, the smaller round, and covered with hair: and on the application of pressure the musk may be forced through the apertures. It is brown and unctuous. This bag the hunters cut off, and tie it up for sale, but, like everything that is calculated for the use of man and is the object of commerce, it is said to be adulterated by the admixture of foreign matter, and pieces of lead are stated to have been found enveloped in it, for the purposes of increasing the weight. The musk which comes from Tibet is considered the best, and used to bear the highest price; the bag is more or less full, and the quality more or less good, according to the age and health of the animal. When dry, musk is dark-brown, inclining

to red, or rusty-black, and appears more or less granulated. To the taste it is rather bitter and somewhat acrid. It is perhaps the strongest and most pungent of perfumes, and so subtle that every thing near it becomes infected, and for a long time retains the odour; vessels of silver even, a metal which, as much as, if not more than others, readily becomes purified from odorous substances, do not part with the scent of musk, which may have been placed in them, for a long time. When fresh, or exposed in large quantities, its effects upon the nervous system are said to be absolutely violent; and it is stated that blood has been forced from the nose, eyes, and ears, of those who have imprudently inhaled the vapour of a considerable quantity. When Chardin made his purchases, he secured himself from the sudden effects of the smell by covering his face with a handkerchief several times folded. The mere skin of the animal fills the place where it is kept with the perfume for a long period. In medicine it is used for nervous and convulsive cases in considerable doses. The flesh of the animals, though that of the males is rather highly flavoured with musk, is eaten by the Russians and Tartars. In rutting-time this flavour is most predominant. It is a native of Tibet; the province of Mohang Meng in China; Tonquin, and Hootan; about the lake Baikal; and near the rivers Yenesei and Argun. Found from lat. 60° to 44° or 45°; but never wanders so far south, except when forced through hunger, by great falls of snow, when it migrates to feed on corn and new grown rice. (Pennant.) The description given by Linnæus of this species is an example of his great neatness. He describes the Tibet Musk as *Moschus folliculo-umbilicali;* and this is the distinction of the species, as far as we yet know. It does not appear to have been known to the ancients, but seems to have been first mentioned by the Arabians. Serapion described it in the 8th century. There are three other species of *Moschus—M. Sibiricus*, the Kubaya, a native of Siberia; *M. leucogaster*, the White-Bellied Musk, a native of Nepaul; *M. chrysogaster*, the Golden-Eyed Musk, also from Nepaul. The *Moschus aquaticus*, Ogilby, the Boomorah of West Africa, is the *Hyemoschus aquaticus* of Gray.

Meminna Indica (*Moschus Meminna*, Linn.) It is the only species known. Length about 17 inches. Ashy-olive; throat, breast, and belly white, sides and haunches spotted and barred transversely with white: ears large and open, tail very short. Weight about 5½ lbs. It is a native of Ceylon and Java. (Pennant.) Colonel Sykes informs us that it is the Peesoreh of the Mahrattas, and that it is found in considerable numbers in the dense woods of the Western Ghauts, but never on the plains. ('Zool. Proc,' 1831.) Pennant described it from a drawing communicated by Governor Loten, of Ceylon.

Tragulus Javanicus, Pallas (*Moschus Javanicus*, Gmelin and Raffles; *M. Napu*, F. Cuvier), is the size of a large hare. Body heavy. Limbs very delicate. Head arched and long. Eyes large but not expressive. General colour brown mixed with blackish-gray or yellow reflections; yellow predominating along the back and tail, on the legs, the neck, and head; the gray and black prevail on the lower part of the shoulders, on the sides, and thighs. These different tints are the result of the colouring of the hairs, which on those parts which are yellow are of that colour for the greatest part of their length and black at the point, and where the hairs lie very thick and one on the other, some of the parts appear black. Lower jaw white; two white lines which spring from it extend thence beyond the cheeks; two other white bands spring from the same point as the first, and terminate at the shoulders; a middle band descends on the breast, widening in its descent, and is lost in the white of that part. The upper edge of the first two white bands is bordered with black, and the other bands are all separated from each other by hairs of a brownish-black colour. Belly, anterior and upper part of the hind legs, posterior and upper part of the fore legs, and the under part of the tail, white. End of the muzzle naked. Eyes surrounded with a naked part, from which springs a band without hairs which goes to the muzzle. These naked parts are black with a slight tint inclining to violet. The toes are united, by a rather loose membrane, nearly to the origin of the hoofs, which are very long and pointed; the spurious hoofs are also long, cylindrical, and pointed. Length about 24 inches. Height to the shoulder rather more than 9 inches, to the top of the haunches rather more than a foot. Mr. Bennett observes that M. F. Cuvier regards five radiating bands as the distinctive character of the Napu, and three as that of the Kanchil; whereas, in truth, the number is the same in both, and the difference is only in their disposition. The Napu comes from Java and Sumatra. Sir Stamford Raffles states that this species frequents thickets near the sea-shore and feeds principally upon the berries of a species of *Ardisia*. He adds that it can be easily trained, when taken young, and will become quite familiar. Dr. Gray refers also to this genus *Moschus Kanchil* (Javan Musk of Shaw, Le Chevrotain de Java of Buffon); *M. fulviventer* (Le jeune Chevratain of Buffon); and *M. Stanleyanus*, of which last, in 1836, there were four living specimens in the magnificent collection of the Earl of Derby at Knowsley; and two others consisting of a specimen of each of the varieties, in that of the Zoological Society of London, the gift of her present Majesty. With the exception of the last, whose locality is not known, these

are Oriental, the Kanchil being an inhabitant of Java, and the *Tragulus fulviventer* a native of the Malacca Islands and the East Indian Peninsula, but the habitat of *T. fulviventer* is given by Dr. Gray with a query.

(5453) MOSQUITO, a term applied to certain stinging Flies belonging in all probability to several distinct genera. The mosquitoes are either gnats or gnat-like insects, which are furnished with a proboscis adapted for piercing the flesh, and at the same time forming a kind of siphon through which the blood flows; this instrument moreover injects into the wound which it makes a poison which causes inflammation. Many insects called Mosquitoes probably belong to the same tribe as the Common Gnat (*Culex*, Linn.); Humboldt however asserts that the insects known by that name in America belong to the genus *Simulium*, and that the *Culices*, which are equally numerous and annoying, are called Zancudoes, which means long legs. The former are what the French call Moustiques, and the latter Cousins.—*Eng. Cyc.*

On the Metamorphoses of the Musquito—*By* W. GILCHRIST Esq., *of the Madras Medical Establishment.*—The Musquito has three stages of existence, in two of which it is a water insect, in the third the well known winged one—6th May, 6 A. M. I observed several Musquitos on the surface of some stagnant water, each in close proximity to a yellowish substance, which, when viewed through a microscope, proved to be a collection of eggs that the musquitos were depositing; each collection, though consisting of not fewer than one hundred eggs, did not exceed three twentieths of an inch in length, and about one twentieth of an inch in breadth. These eggs were arranged in lines, standing on end, and were each about 1-40th of an inch long; the lower end being larger than the upper, so that the upper surface of the collection was somewhat concave. A few of these collections of ova were carefully introduced, with some of the water on which they floated, into a tumbler, and placed under a glass shade. Excepting a change of colour, from a yellow to a dark brownish grey, which occurred within six hours after being put into the tumbler, no visible alteration took place, till two days and a half, when the water was found to swarm with animalculæ. The shells of the ova were still adherent, as when first observed. On examining one minutely, the larger, or under, end was found to have opened, like a lid, to allow the insect to escape into the water. A lady's thimble, furnished with a lid, would resemble exactly the appearance of what is being described. The design of having the lids placed at the bottom, is, evidently, to allow the newly hatched animalculæ immediate exit from the shell into the water; and the concavity of the whole collection, above alluded to, effectually tends to retain the large ends undermost. Had the ova been arranged promiscuously, as to the large and small ends being upwards and downwards, it is evident that the newly hatched insect, under the former arrangement, would have some difficulty in reaching the water, a difficulty that, most probably, would amount to an impossibility; one which, at all events, is effectually prevented by the concave form of the collection. A sketch of the newly hatched insect, about 2,500 times the natural size, was given in figure 1. In the chest, or thorax (*a*), the heart is seen (obscurely however, the body being only semi-transparent), furnished with four projections; from this organ two blood-vessels proceed down the centre of the body, to the end of the elongation (*b*), the extreme termination of which is to be seen just above the surface of the water, where the insect lives, for the most part; the body being suspended, as it were, from this, head lowermost. Between the heart, in the thorax, and the extremity of this singular elongation, an active sanguiferous circulation is to be observed; in all probability, therefore, it is the seat of the lungs or gills, and it would appear, that a comparatively large supply of air, is essential to the existence of the insect, as it lives, as much as possible, in this pendulous position at the surface, with the extremity of the elongation rising just above. Its motion, which is quick, is effected by a rapid bending of its whole body, so that head and tail (the latter represented at (*c*), and consisting of a bundle of delicate filaments, approximate, alternately, on either side of the body; it always goes tail foremost, so that the head is dragged along behind. When in search of food, it throws out, in advance of its mouth, a couple of delicate brushes, the individual filaments of which, though seen magnified to the extent above stated, were still of microscopic size. The oval shaped figures in the head (*d*. fig. 1.) represents these brushes when not in use (though obscurely, as the semi transparent body intervenes) Each of these is put in rapid circular motion, w[illegible] double kind of whirlpool is occasione[illegible]omen. The[illegible]od comes within the sphere of the[illegible] larger obl[illegible]eedily devoured. The food appear[illegible]ed with hair: ly, decomposing vegetable matte[illegible]sure the musk I put into the tumbler, as the[illegible]rtures. It is br[illegible]e ova were discovered contain[illegible]g the hunters cu[illegible]y fed voraciously. They did[illegible]ut, like everyth[illegible] entirely confine themselves to[illegible]e use of ma[illegible]iet. I was much amused with o[illegible]ce, it is said, in a drop of water under the microscope of for[illegible] these confined limits its appetite did not f[illegible]sfie it, and the only article of food it found, was the head of one of its own species. So soon as this came within the vortex, it was ravenously seized, but, being apparently, too large a *morceau*, it was let go, after sundry futile attempts at swallowing. It frequently came within the whirlpool again, and was as

often seized, but with no better success. They, however, eat the shells they had recently quitted. Some that were kept in clean water, without food, died on the third day. In this stage of their existence, the insects were lively and grew apace. At the termination of 21 days, during which the water was thrice changed, they had attained three or four twentieths of an inch in length. On attaining this size, or age, they underwent a second metamorphosis. The shape they assumed is represented in fignre 2, magnified, like the former, 2,500 times. Most likely they cast their former envelope, for the hairs, so conspicuous on the former insect, were not to be seen on the present. The shape, it will be remarked, has materially altered, but the most remarkable change is that which occurs with respect to the seat of the lungs, or gills. These organs are now situate in the thorax, their former seat (the elongation b. fig. 1) has disappeared, and the channel of communication, now, between them and the air, are two small tubes (b. fig. 2) on the top of the chest. In this stage of their existence, the insects are much less active than during the former one. A still greater contrast, however, is that, now, they do not require food, and have no mouth; in this respect resembling the charysalis stage of the butterfly tribe. But the demand for air appears increased; they rarely leave the surface of the water, and, when they do descend, they take down a supply of air, small globules of which are distinctly to be observed, at the end of the tube (b. fig. 2). Their descent is accomplished by striking the water with their body, but, being specifically lighter than that fluid, they rise without any effort to the surface, though, in case of *despatch*, can impel themselves upwards by the same means as they descended. However, as has been remarked, they seldom leave the surface, and, having done so, speedily return to it. The insects remain about 48 hours in this stage; towards the termination of which the legs and proboscis of the winged musquito can be distinctly seen through the thin membrane that surrounds it. This, in due course, bursts, when the winged musquito draws itselt out, stands on the surface of the water a few minutes, to dry and expand its wings, on which it presently proceeds to a dry situation. I observed several undergoing this change. If the musquito, when in either of the first two stages, be taken out of the water, it speedily dies, and it is as speedily deprived of life, if immersed in that fluid immediately after becoming the winged insect. We learn, from the above, that the musquito is a most prolific insect and that, as stagnant water such as that of tanks, &c. is necessary to its propagation, all such ought to be kept as distant as possible from our dwellings; thereby we are more likely to enjoy an immunity from their annoyance, than by practising the mode so facetiously described, or rather suggested, by Captain Basil Hall in his voyages.—*Gilchrist M. L. S. J. July* 1836.

(5454) MOTACILLINÆ, OR MOTACILLIDÆ, a sub-family of Birds belonging to the family *Sylviadæ*. [SYLVIADÆ.] They are an active graceful race, tripping it along the smooth shaven grassplots, edges of ponds, and sandy river-shores in unwearied search for their insect-food, and with tails which never cease to vibrate as long as their restless bodies are in action. The species are natives of the old World only—Europe; Asia, and Africa. At least the form does not appear to have been hitherto detected in America, and that continent has now been much searched by zoologists.—*Eng. Cyc.*

(5455) MOTHER OF PEARL SHELL, OYSTER SHELL.

Cheep, GUZ. HIND. & PERS.

Is extensively used for inlaid work, toys, snuff-boxes, buttons, &c. Mother of pearl Shells are imported in Bombay from the Persain Gulf, and are re-exported to England and France.—*Faulkner.* Mother-o-pearl shells are brought to the Chinese market from the islands of the Pacific and Sulu sea, in the same vessels which bring bicho-de-mar; it also comes from California. It is a small trade, and not likely to increase much. A large proportion of that which is brought to China is re-exported in the shape of fans, paper-knives, card-cases, fish counter, and a great variety of fancy articles, the structure of the nacre of the shell rendering it easy to carve and emboss. Large shells are the best, and these should be chosen of which the nacre or inner surface is not decayed or fractured.—*Morrison.*

(5456) MOTHER-OF-PEARL, or NACRE, is the hard, silvery, internal layer of several kinds of shells, especially oysters, the large varieties of which in the Indian seas secrete this coat of sufficient thickness to render the shell an object of manufacture. The genus of shell-fish, *Pentadinæ*, furnishes the finest pearls as well as mother-of-pearl: it is found round the coasts of Ceylon, near Ormus in the Persian Gulf, at Cape Comorin, and in some of the Australian seas. The dealers in pearl-shells consider the Chinese from Manilla to be the best: they are fine, large, and very brilliant, with yellow edges. Fine large shells of a dead white are supplied by Singapore. Common varieties come from Bombay and Valparaiso, from the latter place with jet black edges. South Sea pearl-shells are common, with white edges. The beautiful dark green pearl-shells called *ear-shells* or *sea-ears* are more concave than the others, and have small holes round the margin; they are the coverings of the *Haliotis*, which occurs in the Californian, South African, and East Indian Seas. In the Indian collection of the Great Exhibition, specimens of the finest pearl-

shells were shown, such as the *Meleagrina margaritifera*, *Haliotis gigas*, *Haliotis iris*, and a large species of *Turbo*, which shells are known in commerce as *flat-shells*, *ear shells*, *green snail-shells*, *buffalo-shells*, *Bombay shells*. Messrs. Fauntleroy and Mr. Banks had also some fine collections. The latter gentleman states that the shores of the Sooloo Islands afford the finest shells. The beautiful tints of mother-of-pearl depend upon its structure; the surface being covered with a multitude of minute grooves, which decompose the reflected light. Sir David Brewster, who was the first to explain these chromatic effects, discovered, on examining the surface of mother-of-pearl with a microscope, "a grooved structure, like the delicate texture of the skin at the top of an infant's finger, or like the section of the annual growths of wood as seen upon a dressed plank of fir. These may sometimes be seen by the naked eye; but they are often so minute that 3,000 of them are contained in an inch." It is remarkable that these iridescent hues can be communicated to other surface as a seal imparts its impress to wax. The colours may be best seen by taking an impression of the mother-of-pearl in black wax; but "a solution of gum arabic or of isinglass, when allowed to indurate upon a surface of mother-of pearl, takes a most perfect impression from it, and exhibits all the communicable colours in the finest manner, when seen either by reflection or transmission. By placing the isinglass between two finely-polished surfaces of good specimens of mother of-pearl, we obtain a film of artificial mother-of-pearl, which, when seen by single lights, such as that of a candle, or by an aperture in the window, will shine with the brightest hues." [Brewster's Optics, Chapter XIV., one of the volumes of the Cabinet Cyclopœdia.] It is in consequence of this lammellar structure that pearl-shells admit of being split into laminæ for the handles of knives, for counters, and for inlaying. Splitting, however, is liable to spoil the shell, and is therefore avoided as much as possible. The different parts of the shell are selected as nearly as possible to suit the required purposes, and the excess of thickness is got rid of at the grindstone. In preparing the rough pearl-shell, the square and angular pieces are cut out with the ordinary brass-back saw, and the circular pieces, such as those for buttons, with the annular or crown-saw, fixed upon a lathe-mandrel. The pieces are next ground flat upon a wet grindstone, the edge of which is turned with a number of grooves, the ridges of which are less liable to be clogged than the entire surface, and hence grind more quickly. If the stone be wetted with soap and water it is less liable to be clogged. The pieces are finished on the flat side of the stone, and are then ready for inlaying, engraving, polishing, &c. Cylindrical pieces are cut out of the thick part of the shell, near the hinge, and are rounded on the grindstone preparatory to being turned in the lathe. The finishing and polishing are described in the third volume of Mr. Holtzapffel's excellent work on Mechanical Manipulation." Counters, silk-winders &c., are smoothed with Trent sand or pumice-stone and water on a buff-wheel or hand-polisher, and are finished with rotten stone moistened with sulphuric acid, which develops finely the striated structure of the shell. For inlaid works the surface is made flat by filing and scraping; then pumice-stone is used, and after this putty-powder, both on buff-sticks with water; and the fine polish is given with rotten stone and sulphuric acid, unless tortoise-shell or some other substance liable to be injuriously affected by the acid be present in the inlay. In turned works fine emery-paper, rotten-stone and acid or oil are used. The pearl handles for razors are slightly riveted together in pairs, then *scraped*, *sand buffed* on the wheel with Trent sand and water; thirdly, *gloss-buffed* on the wheel with rotten stone and oil, or sometimes with dry chalk rubbed on the same wheel; and fourthly, they are *handed up*, or polished with dry rotten-stone and the naked hand.—*Tomlinson.*

(5457) MOTHER-WATER, the liquor left after a saline solution has been evaporated so as to deposit crystals on cooling.—*Faulkner.*

(5458) MOTHRUS. Gums and Gum Resins. Let-pau, Bur.

Bombax pentandra, and *Bombax heterophylla*, are two common trees found in every part of the Pegu Forests which yield an astringent gum resin, called in the bazars of Bengal *Mothrus*. I have not been able to learn whether the Burmese extract this gum, but from the abundance of trees affording it, it might become an article of some importance.—*McClelland.*

(5459) MOTHS. At Lemu Samdong in the Lachen valley *Noctuæ* and *Geometræ* abounded, with many flies and Tipulæ. *Hymenoptera* were scarce, except a yellow *Ophion*, which lays its eggs in the caterpillars above-mentioned.—*Hooker, Vol.* II. *p.* 65.

(5460) MOW CHOK. Bambusa, species. The most beautiful bamboo in the world—was growing about in wild profusion. This bamboo I have never met in any other part of the world. In the central and eastern provinces [redacted] China it is largely cultivated, [redacted] sides of mountains where [redacted] and in the vicinity of [redacted] monastic buildings. Its stems [redacted] n, and clean, the joints are [redacted] small, [redacted] the height of from sixty to eighty [redacted] or thirty feet of the lower part of its stem are generally free from branches. These are produced on the upper portion of the tree, and then they are so light and feathery

that they do not affect the cleanness of the main stem. In addition, therefore, to the highly picturesque effect it produces upon the landscape, it is of great value in the arts, owing to the smoothness and fineness of its structure. It is used in the making of sieves for the manipulation of tea, rolling tables for the same purpose, baskets of all kinds, ornamental inland works, and for hundreds of other purposes, for which the bamboo found in India is wholly unsuitable. Like all other species of the same tribe, it grows with great rapidity and perfects its growth in a few months. To use a common expression, "one could almost see it growing." I was in the habit of measuring the daily growth in the Chinese woods, and found that a healthy plant generally grows about two feet or two feet and a half in the twenty-four hours, and the greatest rate of growth was during the night. The young shoots just as they peep out of the ground are highly esteemed as food, and are taken to the markets in large quantities. I was in the habit of using them as a vegetable every day during the season, and latterly was as fond of them as the Chinese are themselves. Sometimes I had them split up, boiled, and dished by themselves, at other times they were used in soup, like cabbage; and in one occasion Mr. Forbes the American Consul in China, to whom I recommended them, taught me to make an excellent omelette, in which they form one of the ingredients. In the South of China, that is about Hong-Kong and Canton, several kinds of the bamboo are very common. There is a yellow variety with beautiful green stripes, painted on its stems as if done by the hand of a most delicate artist. But all these kinds resemble the Indian varieties,—that is, they grow in dense bushes, their stems are not remarkable for their straightness, and the large joints and branches which are produced on all parts of the stem, give it a rough surface, and consequently render it unsuitable for fine work. These tropical, jungly-looking bamboos disappear as we go to the more northern latitudes and in their places we have the mow-chok, already mentioned, the long-sin-chok, the hoo-chok and one or two others, all with clean stems and feather-branches, suited for the most delicate kinds of work, and all "good for food." These trees are well worth the attention of people who inhabit temperate climates, such as the south of France Italy, and other parts of the south of Europe. No doubt they would be well [illegible] to some parts of Australia, [illegible] southern portions of the Un[illegible]rica. In the province of Ch[illegible] summer heat is from 90° to [illegible] but only a few days in the [illegible] August so high; in winte[illegible] (Fahr.) is rarely so low as 20. Those interested in this matter may consult my 'Wanderings in China,' and 'Journey to the Tea Countries,' for fuller accounts of the climate of this part of the China. With regard to soil and situation, it should be remarked that these trees invariably grow in a rich yellow loam on the slopes of the hills. I have succeeded in introducing the mow-chok to India, and at no very distant day it may be seen flourishing on the slopes of the Himalaya in the north-western provinces, where the bamboos are very inferior. Several plants were also sent to the Agricultural and Horticultural Society of India, and reached Calcutta in good condition—*Fortunes' Residence in China, page* 189.

(5461) MOWTAN OR TREE PŒONY, is abundant in China, fruits large and variegated flowers, it bears the name of hwawang, or king of flowers to indicate the estimation in which it is held. The skill of the native gardeners has made many varieties, but the difficulty of perpetuating them may be one reason for their high price.—*Williams' Middle Kingdom, p.* 285. Tree pœonies are not natives of the South of China, but are brought down in large quantities every year, about the month of January, from the northern provinces. They flower soon after they arrive, and are rapidly bought up by the Chinese to ornament their houses, after which they are thrown away, as they do not thrive well so far south as Canton or Macao, and will not flower a second season. They are sold according to the number of flower-buds they may have upon them and many of them fetching rather high prices.--*Fortunes' Wandering, p.*154. A flower painter inChusan had informed me that several very valuable varieties of the Moutan, or tree Pœony, were to be found in Gardens near Shanghae. Those varieties of this flower, which are yearly brought from the northern provinces to Canton, and which are now common in Europe, have blossoms, which are either rose-colored or white: but it was always asserted, although not believed, that in some part of China purple, blue, and yellow varieties were produced, although these were never brought to Canton for sale. It was for these that I made the most particular inquiries, and this painter not only affirmed he had seen them, but also offered, for a small sum, to make me drawings from memory of all the different kinds. I employed him at once, and when he had finished the drawings, I took them with me to Shanghae. A nursery-man, who had a flower-shop in the town, to whom I showed these drawings, promised at once to procure living plants for me, but said they would [illegible] very expensive, as he would have [illegible] send to [illegible]o-chow, a distance of nearly one hundred [illegible]s, for they were not to be procured in the [illegible]cinity of Shanghae and a man would be about at least eight days. I was, of course, glad to get them upon any terms, and gave the man the price he asked which, after all, was not much out of the way, if they were to be brought a hundred miles. At the specified time the Mou-

tans arrived and proved most valuable kinds, which, in England would have brought a very high sum. Amongst them there were lilacs and purples; some nearly black; and one which the Chinese called, "the yellow" which, however, was only white with a slight tinge of yellow near the centre of the petals.—*Fortunes' Wanderings, page* 135.

(5462) MOWA OIL.—Bassiæ Oleum.—Oil of Bassia latifolia.

(5463) MOZAIC GOLD. Bronze Powder.

A bisulphuret of tin, formed by heating the peroxide with its weight in sulphur. It is produced in small, soft, shining flakes, of a golden yellow colour. It is chiefly imported into England from Germany, and is much used for ornamental work, particularly paper hangings.—*Waterston. Faulkner.*

(5464) MUCIC ACID, See Gum.

(5465) MUCILAGINOUS SEEDS &c. OF INDIA.

Linseed, (Ulsee,) Linum Usitatissimum,
Quince, (Beh Dana,) Cydonia vulgaris,
Tookhm,(Bulungo,) D. racocephalum Royleanum.
Isufghol, Isufghola, Plantago, Dr. Taylor.

(5466) MUCUNA, a genus of Plants belonging to the natural order *Leguminosæ*. The calyx is campanulate bilabiate with two very caducous bracteoles as long as the tube; the upper lip broad, entire, and obtuse; the lower lip trifid, with acute segments. The corolla is papilionaceous, with a cordate vexillum incumbent on the wings, much shorter than the wings and the keel, and without callosites. The stamens are diadelphous, with five of the anthers oblong, linear, and the other five ovate and hairy. The seeds oval, roundish, or reniform, with a narrow, oblong, or linear hilum. The species are climbing herbs or shrubs, with pinnately-trifoliate leaves and axillary racemes, which hang down when bearing fruit.—*Eng. Cyc.*

(5467) MUCUNA PRURIENS. *Syn.* Dolichos pruriens. Lin.

Poonaykali, Tam.	Nai Carana, (Hort Mal), Cowitch.
Kanchkoori ke beenge, Duk.	Copikachu, Atmagupta Sans.
Peelia dooghookaia, Tel.	
Kiwach, Hind.	

This when cleared of the small hairs which cover it is eaten by the Natives like other beans. Rheede says that on the Malabar coast it is supposed to have the effect of exciting venery.—*O'Shaughnessy, Ainslie, p.* 244. *M. pruriens*, Common or Stinging Cowitch, has entire ovate-acute leaflets, smooth above, hairy beneath, the lateral ones oblique at the base, the middle one slightly rhomboidal. The racemes are from 12 to 18 inches long, lax, and many-flowered. The calyx is hairy, pink, with narrow lanceolate segments. The flowers have a disagreeable alliaceous smell; the vexillum is flesh-coloured, the wings purple or violet, and the keel greenish-white. The legumes about 3 inches long, the thickness of the finger, closely covered with strong brown stinging hairs. The seeds oblong, variegated with a white hilum. A mixture of the hairs of this and the next species form the Cowitch of commerce. The ripe pods are dipped in syrup, which is scraped off with a knife, and when the syrup has attained the thickness of honey, by means of the hairs becoming mixed with it, it is used as a medicine, and is considered a good anthelmintic, as it occasions no uneasiness. It is given from a tea-spoonful to a table-spoonful in the morning, fasting. The hairs, when applied to the skin, produce an intolerable and painful itching. A vinous infusion of the pods, 12 to a quart, is said to be a certain remedy for dropsy. A strong infusion of the roots, sweetened with honey, is used by the native practitioners in India in cases of cholera. It is likewise considered a powerful diuretic.—*Eng. Cyc.* The strigose hairs of the plant called *kiwach* in India, as well as those of *Rottlera tinctoria*, are used in India as an Anthelmintic, whence the practice was probably introduced as well as its corrupted name. Sir. W. Hooker has distinguished the East India plant, *M. prurita* from M. *pruriens*, which is indigenous in the West Indies. The pods of the Kiwach, when young and tender, form articles of diet in India. When ripe, they are of a brownish colour, and covered with innumerable sharp prickle-like hairs, which penetrate into and irritate the skin. *Action. Uses.* Mechanical, Anthelmintic. Useful in expelling lumbrici and ascarides, by sticking into their bodies, when pressed against the intestinal, and thus irritating and dislodging them. *D.* The pod being dipped into treacle or honey, have the hairs scraped off until they have the consistency of an electuary when a table-spoonful may be given to adults, and a tea-spoonful to children, followed by a purgative of Castor Oil, &c.—*Royle.* The cowhage, or cow-itch, with its stinging pods is very common in the Karen jungles. Mr. Mason thinks it is the common species, but he never met with the plant in flower. —*Mason.*

(5468) MUCUNA PRURITA, Cowitch, has purple flowers in compact ovate racemes; leaflets hairy beneath, the middle one rhomboidal and obtuse, the lateral ones dilated on the outer edge; the legumes are oblong, curved, compressed, not keeled, and covered all over with a thick coating of short stinging hairs, which turn black in drying and brown when ripe. It is a native of the hedges and banks of the East Indies.—*Eng. Cyc.*

(5469) MUDAR. Yercum nar, or Mudar or Ak, are names applied to the fibres of the *Calotropis gigantea*, the gigantic swallow, wort, also to the C. Hamiltonii, a plant which is widely diffused throughout the southern provinces of the penin-

sula of India where it grows wild, preferring poor soil near the sea. It is replaced in the Bellary district, C. by procera, which is equally common and in Northern India by C. Hamiltonii.

(5470) MUDAR BARK. Arund. Bark of root of Calotropis gigantea.—*Beng. Phar.*

(5471) MUDUD, pills of the size of a pepper corn, made of chopped betel leaf and opium: and smoked in a small chillum.—*Herklots.*

(5472) MUEDA LUKREE. Wood of Tetranthera Roxburghii.—*Beng. Phar.*

(5473) MUGILIDÆ, the Mullet Tribe, a family of Fishes of the order *Acanthopterygii.* This family may be distinguished by the following characters:—Body nearly cylindrical, covered with large scales: dorsal fins two in number separated, the first with only four spinous rays; the ventral fins have their origin a little behind the line of the pectorals; branchiostegous rays, six. The head is somewhat depressed, and, like the body, is covered with large scales or polygonal plates; the muzzle is very short; the mouth is transverse, and when closed forms an angle, the lower jaw having an eminence in the middle, which fits into a corresponding hollow in the upper; teeth very minute; pharyngeal bones much developed. There are three genera belonging to this family—*Atherina, Mugil,* and *Tetragonurus.*

Atherina has the body rather elongated; two dorsal fins widely separated; ventral fins placed far behind the pectorals; sides with a broad longitudinal silver band; teeth minute; branchiostegous rays 6.

Mugil has the body nearly cylindrical, covered with large scales; two dorsal fins widely separated, the rays of the first fin spinous, those of the second flexible; ventral fins behind the pectorals; middle of the under jaw with an elevated angular point, and a corresponding groove in the upper; teeth small; branchiostegous rays 6.

Tetragonurus, so named from the projecting keels or riges on each side, near the base of the caudal. There is only one species, an inhabitant of the Mediterranean, about a foot long, and black, and reputed to be poisonous.—*Eng. Cyc.*

(5474) MUGIL, Mullet Large. A species of mullet is very common in Tenasserim and is often seen on the tables of Europeans, by whom it is highly esteemed. Mr. Blyth, to whom I sent a specimen for the determination of the species, wrote that it was abundant in Calcutta, but "is of a species I could never determine from descriptions."—*Mason.*

(5475) MUKHUM SEEM. Dolichos Gladiatus. Sabre Bean. This is a large kind of bean, grown at the same time as others; it requires strong support to run over. The beans are dressed as French beans but are not so tender.—*Riddell.*

(5476) MULBERRY. Morus Indica.

(5477) MULLET FISH. Mugil cephalus.

Maddava meen, Tam. | Bonta, Tel.
Arabie mutchie, Duk. | Purhid, Hin

Ain's Mat. Med. p. 155.

(5478) MULLET, Mugil cepsalotus, *Vallenciennes,* large eyed. The Tenasserim seas have another mullet, equally valuable for the table with the last, and equally common in Calcutta, but distinguished among other things by its small head, smaller scales, and goggle eyes which appear to be starting out of its head.—*Mason.*

(5479) MULLET. Mugil subviridis, *Vallenciennes,* small. A small mullet is often found in great numbers in the river near Maulmain, which many of the Burmese regard as the young of the preceding, but it is a distinct species, of which Mr. Blyth wrote that he had never seen it before, but had "made it out to be as above."—*Mason.*

(5480) MULLET. [Mugilidæ; Multus.]

(5481) MULLUS, a genus of Fishes belonging to the group *Acanthopterygii* and the family *Percidæ.* The species have the body thick oblong; profile of the head approaching to a vertical line; scales large, deciduous; two dorsal fins widely separated, the rays of the first spinous, those of the second flexible; teeth on the lower jaw and palate only; two cirri at the symphysis of the lower jaw; branchiostegous rays 4. There are two species of this genus found in Europe, and both are inhabitants of the seas of Great Britain.

(5482) MULMURACA, the Tamil name of a tree which grows to about twenty-four inches in diameter, and twenty feet in height. It is used by the natives for canoes, catamarans, and many other purposes. It produces a fruit which, with the leaves of the tree, is used medicinally.—*Edye. Ceylon.*

(5483) MUM. A fermented liquor, brewed principally from the malt of wheat.—*Faulkner.*

(5484) MUNDAREKAI, Tam. This article Ainslie had never seen. It grows in the extreme Southern parts of the Peninsula, and is eaten by the common people.—*Ainslie, p.* 241.

(5485) MUNGEVENAH, the Tamil name of a Ceylon tree which grows to thirty inches in diameter, and eight feet long. It is close in its grain and light. It is used for gun-stocks, poles of palanquins, sandals, &c. It produces a fruit which is of little use. It is on the fruit of this tree that the monkeys, pea-fowl, &c. feed.—*Edye. Ceylon.*

(5486) MUNJEET, Indian Madder.

Munjeet, Guz. & Hind.

Rubia Munjistha, or Indian madder root,

growing in various parts of India, Persia, &c. It is used in dyeing, and is applied to the same purposes as Europe madder. The roots are long, about the thickness of a quill, with a smell somewhat resembling liquorice-root. Munjeet is largely imported into Bombay from the Persian Gulf and Kurrachee, and is chiefly re-exported to England.—*Faulkner.* See MADDER,

(5487) MUNJUN. A tooth powder, made of burnt almond shells; or common charcoal: or charcoal made from myrobalans or betel nuts.—*Herklots.*

(5488) MUNSOOR ALI KHAN. An almost direct road from Hoomayoon's tomb near Delhi, leads to a mausoleum of some celebrity, viz. that of (Nawab Munsoor Allee Khan,) Sufdur Jung, one of the Omrahs of Delhi. Before the accession of the British dominion, he and his ancestors, it is said, held the Soobahdaree of Oude. This native nobleman's remains were either interred here or the building answers the purpose of a cenotaph. It is a substantial work of red stone so common in many of the edifices of Delhi. It is in many parts relieved with marble, is surmounted by a large white marble dome, forms a structure of some magnitude and is said to be about 150 years old. The tomb stone on the upper floor and on a line with the sarcophagus is a chaste piece of sculpture of white marble, and the leaves which surround its base form an excellent and neat specimen of the power of the chisel in the hands of art. The mausoleum is situated in the centre of a large area of enclosed ground laid out into a fine garden and occupies an isolated position on the main road which connects Delhi with the Kootub.—*Tour in India by French, p.* 13.

(5489) MURÆNIDÆ, or ANGUILLIDÆ, a family of Fishes belonging to the Apodal section of the *Malacopterygii.* These fishes have an elongated and often cylindrical body, covered by a thick and soft skin in which the scales are deeply imbedded and scarcely apparent. They have no cæca, but nearly all are furnished with a natatory bladder. In the first group, which constitutes the great genus *Muræna* of Linnæus, the opercula are small, and enveloped in the skin; the gill-opening is small, and is situated far back, an arrangement which, by more completely protecting the branchiæ, permits these fishes to live a long time out of water. They have no ventral fins. The species of the genus *Anguilla* are distinguished by the possession of pectoral fins; the dorsal, anal, and caudal fins are united, the dorsal commences at a considerable distance behind the pectorals; the upper jaw is shorter than the lower; the gills opening by a small aperture on each side, situated beneath the pectoral fin. Three if not four species of *Anguilla,* or Eel, are found in Britain—the Sharp-Nosed Eel, the Broad-Nosed Eel, and the Snig.—*Eng. Cyc.*

(5490) MURIATIC ACID, MARINE ACID, SPIRIT OF SALT, HYDROCHLORIC ACID, CHLOROHYDRIC ACID.

Loona rasa, CYNG.	Nemuk ka Teezab, HIND.
Acide Hydrochlorique, FR.	Acidum Muriaticum, Spiritus Salis, LAT.
Salzsaure, Chlorwasserstoffsaure, GER.	Ooppoo travagum, TAM. Lawana travagum, TEL.

This acid is a solution of the gas in water. Geber and the Arabs were probably acquainted with it, and the Hindoos knew it by a name equivalent to *Spirit* or *sharp water of Salt.* This is the Commercial acid, and is always of a yellow colour. It commonly contains as impurities a little Sulphuric Acid, Nitrous Acid, Perchloride of Iron, Chlorine, and Bromine. It is prepared by pouring the Oil of Vitriol of commerce on Common Salt in earthen or iron vessels, especially since the extensive manufacture of Carbonate of Soda from Sulphate of Soda. Its Density,= 1180.—*Royle, p.* 46.

(5491) MURICIA COCHINCHINENSIS. A native of China, Cochin China, a large shrub, berry large, reddish purple, scentless, insipid; seeds and leaves aperient, and used by the Chinese in obstructions of the liver, "tumors, malignant ulcerations, &c." externally employed in fractures, and in dislocations. (Lindley).—*OSh. p.* 351.

(5492) MURIDÆ, the name of an extensive family of Rodents, comprising, when taken in its largest sense, a great number of genera and species, which, though none of them attain to any considerable size, become worthy of serious notice from their prodigious multiplication and the destructive influence which they exert over vegetation and the fruits of the labour of the agriculturist. The type of this family is found in the genus *Mus,* to which our Common Rats and Mice belong. The Linnean genus *Mus* is thus characterised in the last edition of the 'Systema Naturæ:'—'Dentes primores inferiores subulati;' and, as might be expected from such a definition, it is made the receptacle not only for such Rodents as are vernacularly known as Rats and Mice, but for the Guinea Pig, the Agoutis, the Paca; in short, for all the *Glires* then known, not arranged under the genera *Hystrix, Lipus, Castor* and *Sciurus.* The remaining genus (*Noctilio*), placed by Linnæus among his *Glires,* belongs to the Bats. [CHEIROPTERA.] Pallas concurred with Linnæus in uniting under one great genus (*Mus*) all the Rodents provided with clavicles which had no striking external distinction, such as the tail of the Squirrel or the Beaver. Mr. Swainson in his 'Classification of Quadrupeds' (1835) also separates the *Glires* into two divisions: the first, or *Glires* proper, with clavicles; and the second with rudimentary clavicles, or none. In the first division, after the genera *Castor, Fiber* and *Mybpotomus,* and an observation in a note

to the first section, that these divisions are purely artificial, and nearly formed to facilitate the search among so many unarranged groups, we find the following sections :—

1. Rats and Mice, under which are arranged the following :—*Arvicola*, Lacép. (*Hypudæus*, Ill.) Example, *Mus amphibius*, Linn., Water-Rat, Penn. ; *Georychus*, Ill. (Lemmings). Example, *Mus Norvegicus*, Linn., the Lemming. *Echimys*, Geoff. (Spined Rats). Ex. *Echimys cristatus*, Desm., Gilt-Tailed Dormouse, Penn. *Myoxes*, Gm. (Dormouse). Ex. *Mus avellanarius*, Linn, the Common Dormouse. *Hydromys* Geoff. (Water-Rat). Ex. *H. leucogastor*, Australia. *Mus*, Auct. Ex. *M. Rattus*, Linn., Common Rat. *Capromys*, Desm. Ex. *C. prehensilis* South America. *Cricetus*, (Hamster). Ex. *C. vulgaris*, the Hamster.

2. Fore legs very short, hind legs long. Jumping Mice, under which come the following genera and subgenera :—*Dipus* (Jerboa). Ex. *Mus Jaculus*, Linn. (*D. Sagitta*, Dum.) Sub-genus *Gerbillus*, Desm. Ex. *M. Tamariscinus*, Tamarisk Jerboa, Sh. *Meriones*, L. Cuv. Ex. *Meriones Labradorius*, Sub-genus *Pedetes*, Ill. Ex. *M. Caffer*, Pall., Cape Jerboa, Penn. Then follows *Lagostomus*, *Brookes*, with its sub-genera *Chinchilla* and *Logotis*. [CHINCHILLIDÆ.]

3. Tail very short. Mole and Sand-Rats, including *Geomys*, Schmaltz (Saud-Rat). Ex. *Geomys Douglasii*, America. *Diplostoma*, Schmaltz, America ; *Aplodontia*, Richardson. Ex. *A. leporina*, America. *Aspalax*, Guld. Ex. *Mus Typhlus*, Pall., Asia ; *Bathyergus*, Ill. Ex. *M. maritimus*. Gm., Africa.

4. Tail long, bushy. Squirrels, under which are arranged *Arctomys*, Gm. Ex. *Mus Marmotta*, Linn., the Marmot. *Spermophilus*, F. Cuv. Ex. *M. citellus*, Pall., chiefly America. *Sciurus* Auct. Ex. *S. vulgaris*, Linn., the Common Squirrel ; together with the sub-genus *Pteromys*, Geoff. and the genus *Cheriomys*. The numerous forms which press upon the attention in considering this large section of *Mammala* are enough to convince any one who has bestowed any thought on the subject that authors have not spoken of the difficulties surrounding it without reason. General Hardwicke gives the following interesting account of his *Dipus Indicus* :—"These animals are very numerous about cultivated lands and particularly destructive to wheat and barley crops, of which they lay up considerable hoards in spacious burrows near the scenes of their plunder. They cut the culms of the ripening corn just beneath the ears, and convey them thus entire to one common subterraneous repository, which when filled they carefully close, and do not open for use till supplies abroad become distant and scarce. Grain of all kinds is their favourite food ; but in default of this they have recourse to the roots of grass and other vegetables. About the close of day they issue from their burrows, and traverse the plains in all directions to a considerable distance ; they run fast, but oftener leap, making bounds of four or five yards at a time, carrying the tail extended in a horizontal direction. When eating they sit on their hind legs like a squirrel, holding the food between their fore feet. They never appear by day, neither do they commit depredations within doors. I have observed their manners by night, in moonlight nights, taking my station on a plain, and remaining for some time with as little motion as possible. I was soon surrounded by hundreds at the distance of a few yards ; but on rising from my seat the whole disappeared in an instant, nor did they venture forth again for ten minutes after, and then with much caution and circumspection. "A tribe of low Hindus, called Kunjers, whose occupation is hunting, go in quest of these animals at proper seasons, to plunder their hoards of grains ; and often, within the space of twenty yards square, find as much corn in the ear as could be crammed into a common bushel. They inhabit dry situations, and are often found at the distance of some miles out of the reach of water to drink. In confinement this animal soon becomes reconciled to its situation, and docile ; sleeps much in the day, but when awake feeds as freely as by night. The Hindus above mentioned esteem them good and nutritious food." ('Linn. Trans.,' vol. viii.). In the collection of the British Museum the student will find specimens of nearly all the Asiatic *Murida* at present known. The following is a list of the species found in that collection, with the Asiatic countries in which the specimens were found :—

Family *Muridæ*.

a. Murina.

Acanthomys Cahirinus, the Cairo Rat. Egypt.

A. affinis, the Allied Acanthomys.

Mus Bandicota (Bechstein), the Bandicoot, or Pig-Rat. Nepaul.

M. nitidus (Hodgson), the Shining Rat. Nepaul.

M. gigas, the Egyptian Bandicoot. Egypt.

M. decumanus (Pallas), the Norway Rat. Great Britain and India.

M. Decumanoides (Hodgson), the Indian Rat. Nepaul.

M. Asiaticus (Gray), the Asiatic Rat. Mexico and India.

M. niviventer (Hodgson), the White-Bellied Rat. Nepaul.

M. Kok (Gray), the Kok. India.

M. Abyssinicus (Ruppell), the Abyssinian Rat. Abyssinia.

M. Ellioti, Elliot's Rat. Madras.

M. rufescens (Gray), the Red House-Rat. India.

M. albipes (Ruppell), the White-Footed Rat. Abyssinia.

M. leucosterum (Ruppell), the White-Crested Rat. Abyssinia.

M. variegatus (Brants), the Variegated Rat. Egypt.

M. Mauci, the Mauci. Madras.

Vandeleuria oleracia (Gray), the Meinalka. Madras.

V. dumeticola, Hodgson's Free Mouse. Nepaul.

Nesokia Hardwickii (Gray), the Nesoki. India.

Golunda Ellioti (Gray), the Galandi. Madras.

G. Meltada (Gray), the Meltada. Madras.

Leggada Booduga (Gray), the Buduga. Madras.

L. platythrix (Gray), the Leggade. Madras.

Phlæomys Cumingii (Waterhouse), the Phlæomys. Manilla.

b. Arvicolina.

Arvicola Roylei (Gray), the Indian Vole. India.

A. (?) *hydrophilus* (Hodgson), the Nepaul. Vole. India.—*Eng. Cyc.*

(5493) MURRAYA. BURMAN BOX-WOOD. The Karens sometimes furnished specimens of a wood that can scarcely be distinguished from the box-wood of Europe, but he had never seen the tree though Mr. Mason has named it a Murraya. Wallich found *Nauclea cordifolia* on the banks of the Irrawaddy, which has "wood coloured like that of the box tree, but much lighter, and at the same time very close grained." It may possibly be the same tree, although the Tenasserim wood is not light; or it may be a Tavoy tree, which he says has "a strong tough wood, in grain like box."—*Mason.*

(5494) MURRAYA EXOTICA. Lin. *Aurantiaceæ.* NAT. BIBZAR OR KOONTIE. This most beautiful shrub is not a native of India so has no Tamool or Teloogoo name. The fragrance of its delicate white flowers is delightful and has procured for it the name of the Honey bush.—*Ainslie's Mat. Med. p.* 162. Dr. Riddell describes it as an ornamental shrub, with beautiful dark green leaves; flowers white, and fragrant in the evening, and commonly known by the name of China-box; it is to be found in most gardens, and is easily grown by layers or cuttings. —*Riddell.* MURRAYA EXOTICA, and PANICULATA and the Aglaia odorata, are cultivated in China as very fragrant shrubs.—*Williams.* Dr. Hooker says that he found the woods of the Rajabat in the Soane valley full of monkeys, and amongst other plants, observed *Murraya exotica*, but it was scarce.—*Hooker Him. Jour. Vol.* I. *p.* 44.

(5495) MURRAYA PANICULATA. COSMETIC BARK. A small tree, with pinnate leaves; flowers white and fragrant, appear in Dec. and Jan.; fruit reddish.—*Riddell.* The fragrant bark of this tree which is indigenous in Burmah above Rangoon, is more universally used for a cosmetic than sandal wood. A single specimen has been shown Mr. Mason in Maulmain, which is this very ornamental fragrant flowering shrub of the citron tribe.—*Mason.*

(5496) MURTHY WOOD.

(5497) MURVILINGA, or Marvilingum Maram, the Tamil name of a Ceylon tree which grows to about sixteen inches in diameter, and eight feet high. It is prized by the natives for sandals and toys, &c. It produces a kind of pod, which, with the bark and leaves, is used with much success in cases of intermittent fevers.—*Edye. Ceylon.*

(5498) MUSA, a genus of Endogenous Plants the type of the natural order *Musaceæ.* The species consist of herbaceous plants, having a gigantic simple stem, thickly clothed with the sheathing petioles of long, broad, horizontal leaves, which form a tuft, like that of some palm on the apex of the stem. These leaves are of a firm but thin texture, and are undivided; but having simple veins running directly from the margin towards the midrib, and presenting a broad surface to the wind, they are always torn into broad strap-like divisions, which give them a compound appearance. From the midst of these leaves proceeds the inflorescence, consisting of a compound spike of great size, each of whose divisions is inclosed in a large bract or spathe loaded with male flowers at its base, but bearing females or hermaphrodites at the upper end. The perianth consists of 6 superior divisions, five of which are grown together into a tube, slit at the back, while the sixth is small and concave. There are 6 stamens, one or more of which are imperfect. The ovary is inferior, 3-celled, with the double row of numerous ovules in each cell; the style is short; the stigma is funnel-shaped, and obscurely 6-lobed. The fruit is an oblong fleshy body, obscurely 3-5-cornered, containing numerous seeds buried in pulp. The latter are roundish, the size of a pea, flattened, with a hard brittle shell, which is indented at the hilum. This genus is one of the most important of those found in tropical countries, to which the species are confined in a wild state. The *M. Sapientum*, or Plaintain, of which the Banana, or *M. paradisiaca*, is a slight variety, has fruit used to a prodigious extent by the inhabitants of the torrid zone; and, from its nutritious qualities and general use, it may, whether used in a raw or dressed form, be regarded rather as a necessary article of food than as an occasional luxury. In equinoctial Asia and America, in tropical Africa, in the islands of the Atlantic and Pacific ocean, wherever the mean heat of

the year exceeds 24 centigrade degree (75° Fahrenheit), the plantain is one of the most interesting objects of cultivation for the subsistance of man. Three dozen fruits will maintain a person, instead of bread, for a week, and even appears a better diet in warm countries. Indeed the plantain is often the whole support of an Indian family. The fruit is produced from among the immense leaves, in bunches weighing from 30 to 80 lbs., of various colours, and of great diversity of form. It usually is long and narrow, of a pale-yellow or dark-red colour, with a yellow farinaceous flesh. But in form it varies to oblong and nearly spherical; and in colour it offers all the shades and variations of tints that the combination of yellow and red, in different proportions, can produce. Some sorts are said always to be of a bright-green colour. In general, the character of the fruit to an European palate is that of mild inspidity; some sorts are even so coarse as not to be edible without preparation. The greater number however are eaten in their raw state, and some varieties acquire by cultivation a very exquisite flavour, even surpassing the finest pear. In the better sorts the flesh has a fine butter-yellow colour, is of a delicate taste, and melts in the mouth like marmalade. To point out all the kinds that are cultivated in the East Indies alone would be as difficult as to describe the varieties of apples and pears in Europe, for the names vary according to the form, size, taste, and colour of the fruits. Sixteen principal kinds are described at length by Rumphius, from which all the others seem to have diverged. Of these the worst are, Pisang Swangi, Pisang Tando, and Pisang Gabba-Gabb; and the best are the round soft, yellowish sorts, called Pisang Medji and Pisang Radja. Some cultivators at Batavia boast of having 80 sorts. Rheede distinguishes 14 varieties by name, as natives of Malabar. In Sumatra alone 20 varieties are cultivated, among which the Pisang Amas, or Small Yellow Plantain, is esteemed the most delicate, and next to that the Pisang Raja, Pisang Dingen, and Pisang Kalleé. In the West Indies, plantains appear to be even more extensively employed than in the eastern world. The modes of eating them are various. The best sorts are served up raw at table, as in the East Indies, and have been compared for flavour to an excellent reinette apple after its sweetness has been condensed by keeping through the winter. Sometimes they are baked in their skins, and then they taste like the best stewed pears of Europe. They are also the principal ingredient in a variety of dishes, particularly in one called mantague, which is made of slices of them fried in butter and powdered over with fine sugar. Of the many cultivated sorts, that called by the French La Banane Musquee is considered the best; it is less than the others, but has a more delicate flavour. There are uncoloured figures of the plantain fruit in Rheede's 'Hortus Malabaricus,' vol. i., plates 12,-13, and 14; and coloured ones in Tussac's 'Flore des Antilles,' plates 1, 2. All hot climates seem equally congenial to the growth of this plant; in Cuba it is even cultivated in situations where the thermometer descends to 7 centesimal degrees (45° Fahrenheit), and sometimes nearly to freezing point. There is a hardy variety called Camburi, which is grown with success at Malaga. The Plantain prefers a rich fat soil; for in sandy places, where it flowers abundantly, it produces no fruit. In the climates that suit it, there is no plant more extensively useful, independently of its being an indispensable article of food. A tough fibre, capable of being made into thread of great fineness, is obtained from its stem; and the leaves, from their breadth and hardness, form an excellent material for the thatch of cottages. An intoxicating liquor is also made from the fruits when fermented, and the young shoots are eaten as a delicate vegetable. The Banana of hot countries is a mere variety of the Plantain, distinguished by being dwarf, with a spotted stem and a more delicate fruit. Botanists call it *Musa paradisiaca*, in allusion to an old notion that it was the Forbidden Fruit of Scripture; it has also been supposed to be what was intended by the grapes, one bunch of which was borne upon a pole between two men, that the spies of Moses brought out of the Promised Land. The only argument of any importance in support of the latter opinion is, there is no other fruit to which the weight of the fruit of Scripture will apply. All the genus is Asiatic; the wild plantain is found in the forests of Chittagong. where it blossoms during the rains; *M. coccinea*, a dwarf sort, with a stem not more than 3 or 4 feet high, is found in China; *M. ornata* and *M. superba* inhabit the forests of Bengal: *M. glauca* is from Pegu; *M. textilis* is from the Philippines, where it furnishes the valuable thread called Manilla Hemp. There is also in the gardens of England a plant called *M. Cavendishii*, not above 3 feet high, and fruiting abundantly at that size, the origin of which is said to be Mauritius.—*Eng. Cyc.* The name of this family of plants, derived from *Musa*, is, so classically sounding, that we are apt to forget its probably oriental origin. For being natives of tropical countries, though often extending beyond such limits, and having the name of *mauz* or *moz* applied to one of the species by old Arabic writers, there is very little doubt of this being the source of the name *Musa*. This is now applied to the genus which produces the fruits commonly known as Plantains and Bananas; as also the fibre so well known under the name of Manilla Hemp. The Plantain was undoubtedly known by description both to the Greeks and Romans, for Theophrastus, among the plants of India, describes one as having fruit which serves

as food for the wise men of India: and which was remarkable both for its sweetness and for its size, as one would suffice for four men—referring most propably to a bunch of plantains. Pliny, evidently describing the same plant, informs us that its name was *Pala*. Garcias, in comparatively modern times, describing the plantain, states that its name on the Malabar coast was *Palan*. The plants of Musa are conspicuous for their size among herbaceous plants. They are devoid of true stems, but form a spurious stem, often of considerable thickness, from the leaves, as they rise from the root-stock, being sheathing at their base, encircling each other, and enveloping, layer within layer, the slender flower and fruit-stalk. This, rising through the centre, projects and hangs down from the top of the sheathing part of the leaves. These, at this point, expand into broad, and at the same time long laminæ or blades, in which numerous parallel veins proceed at right angles from the thick midrib to the margin of each leaf. As these veins do not anastomose and form a network as in ordinary leaves, the leaves are apt, when blown about by the wind, to be divided into innumerable narrow shreds, which are still attached to the midrib. This appearance, no doubt, suggested and justifies the leaves being said to be like ostrich feathers. Every part, both of the sheathing and the exposed parts of these leaves, abounds in fibre. The species of Musa are found in hot and tropical parts of the world, as in the Philippine Isles, where *Musa textilis* is indigenous, as well as in those of the Indian Archipelago, where the edible species are common. From thence they extend northwards as far as Japan; while in China are found *Musa coccinea* and *Cavendishii*; also along the Malayan Peninsula to Chittagong—*M. glauca* being indigenous in the former, and *M. ornata* in the latter locality. In the valleys of the south of the Peninsula of India and of the Dindygul Mountains, *M. superba* is found. The common edible varieties of *M. paradisica* flourish even in the poorest soils, and also near brackish water. They are extensively cultivated at stations in the interior. On the Malabar coast, the Plantain is everywhere at home. The fruit of those at Bassein is especially well-flavoured, and the plant is particularly abundant in the district of Broach. If from the west we return to the east of India, we find the Plantain and Banana most extensively cultivated. The Plantain, according to Dr. Helfer, is to be found in the highest perfection in Tenasserim, especially in province Amherst. More than twenty varieties are known, of which several are peculiar to the country, and the greatest part of them are superior to any to be got in Bengal. They thrive well everywhere without the slightest care. No Burmah or Karen house is to be found without a plantation of Plantains. As the latter leave their abodes, at least every three years, in order to migrate to fresh localities, they are, of course, obliged to leave their Plantain gardens behind them, and therefore these may be found growing luxuriantly in many uninhabited places, until they become choked up by the growth of the more vigorous jungle trees. With the Plantain, as with other long cultivated plants, many distinct varieties are recognised and named, but which it is extremely difficult to arrange in suitable order. But the natives of Bengal generally prefer the large and coarse-fruited kinds, called Plantain; while the smaller and more delicately tasted fruit, known as the Banana is alone esteemed by Europeans. These are cultivated in the most northern, as well as in the southern parts of India; while along the jungly base of the Himalayas there is a suitable climate as far as 30° of north latitude, for plants of this genus growing in a wild state. That growing in Nepal has been called *M. nepalensis*. A similar species may be seen growing below the Mussoore range, as well as near Nahn. The fruit, however, in all these situations, consists of litttle else than the hard dry seeds. [A similar variety of *Musa sapientum*, having seeds surrounded with a gummy substance, instead of fruit-like pulp, was found by Dr. Finlayson, on Pulo Ubi, near the southern extremity of Cambodia. In Batavia also, there is stated to be a variety full of seeds, which is called *Pisang batu*, or *Pisang bidju*—that is, Seed Plantain. In Kemaon and Gurhwal it is cultivated at as great an elevation as 4000 and 5000 feet above the sea, and has been seen as far north as the Chumba range at an equal elevation. Major Munro has seen the wild Plantain at 7000 feet above the sea, in the Khondah slopes of the Neilgherries. Though many of the above have been mentioned as distinct species, it is probable that some, at least, are only varieties. "Baron Humboldt has suggested, that several species of Musa may possibly be confounded under the names of Plantain and Banana, and that some of these may be indigenous to America; but as stated by Mr. Brown, nothing has been advanced to prevent all the cultivated varieties being derived from one species, *Musa Sapientum* (also called *M. paradisiaca*), of which the original is the wild Musa, described by Dr. Roxburgh as grown from seed received from Chittagong. Mr. Brown further adds, that it is not even asserted that the type of any of those supposed species of American Banana, growing without cultivation and producing perfect seed, have anywhere been found." ('Illust. of Himal. Bot.,' p. 355.) If the Plantain and Banana are therefore natives of Asia, which have been introduced, probably, by the Spaniards into America, no plants can more strikingly display the benefits derivable to one country from introducing the useful plants of another which is similar in climate. For Plan-

tains and Bananas are now extensively cultivated in various parts of South America, and at an elevation of 3000 feet in the Caraccas. They are abundant in the West India Islands, as well as at considerable elevations in Mexico. To the negroes in the West Indies, the plantain is invaluable, and like bread to the European, is with them denominated the staff of life. In Guiana, Demerara, Jamaica, Trinidad, and other principal colonies, many thousand acres are planted with the Plaintain. But, before proceeding to treat of the Plaintain and Banana, it is desirable to notice the species which yields Manilla Hemp, showing how valuable some of these plants are, on account of their fibres — *Royle Fib. Plants.*

(5499) MUSACEÆ, *Musads*, a natural order of Endogens, of which the genus *Musa* is the representative. They are stemless or nearly stemless plants, with leaves sheathing at the base and forming a kind of spurious stem, often very large; their limb separated from the taper petiole by a round tumour, and having five parallel veins diverging regularly from the midrib towards the margin. Flowers spathaceous: perianth 6-parted, adherent, petaloid, in two distinct rows, more or less irregular; stamens 6, inserted upon the middle of the divisions, some always becoming abortive; anthers linear, turned inwards, 2-celled, often having a membranous petaloid crest; ovary inferior, 3-celled, many-seeded, rarely 3-seeded; ovulus anatropal; style simple; stigma usually 3-lobed. Fruit either a 3-celled capsule, with a coculicidal dehiscence or succulent and indehiscent. Seeds continuous, surrounded by hairs, with an integument which is usually crustaceous; embryo orthotropal, oblong-linear, or mushroom-shaped, with the radicular end touching the hilum, having pierced through the mealy albumen. The species are stately and always beautiful herbaceous plants with the aspect of a plantain, and with large bracts and spathes, which are usually coloured of some gay tint. The characteristic marks of the order are to have an inferior ovary, with very irregular and unsymmetrical flowers, whose sexual apparatus is not consolidated. It is chiefly by these distinctions that it is known from *Amaryllidaceæ*. In some the fruit is fleshy, as in the Plantain; in others it is dry and capsular. Only 4 genera are known of this order, consisting of about 20 species, all of striking beauty. *Heliconia* is the principal American form nearly all the others being found in the Old World; of these the species are conspicuous for their brilliantly-coloured rigid boat-shaped bracts, sometimes yellow, sometimes scarlet and even a mixture of both. The species of *Strelitzia* are Cape plants with rigid glaucous leaves, and singularly irregular flowers of considerable size, coloured yellow and blue or pure white. Finally, the Ravenula of Madagascar (*Urania speciosa*), a noble palm-like plant, is remarkable for the brilliant blue colour of the lacerated pulpy aril which envelopes the seeds; the latter are used for dyeing in Madagascar, but none of the order are of any important use to man, with the exception of the Musas themselves. [MUSA.]

(5500) MUSA PARADISIACA. Lin.

Valie pullum, TAM.	Pesang, MALAY,
Maoz, DUK.	Vallacoy, MAL,
Arittie pundoo, TEL.	Cadali, SANS.

The flower.

Valei poo, TAM.	Plantain flower. ENG.
Arittie poo, TEL,	Cadali, SANS

Ainslie's Mat. Med. p. 261.

Of this delicious fruit there is a great variety in lower India, three of the most esteemed sorts are the Rajah plantain, the red and the yellow. Plantains in their green state are sliced and made into curry, when they eat not unlike potatoes. The natives particularly the Mahometans consider plantains as highly nutritious and eat them with cows milk and sugar as we do strawberries. — *Ainslie, p.* 234. The plantain and Banana, though probably only varieties of one species, are yet sufficiently distinguished by the size and flavour of their fruit, to be considered familiarly as distinct. They are, from their luxuriant-growing and large overhanging leaves, considered among the most characteristic forms of tropical vegetation. They are also among the most valuable of plants, inasmuch as in some countries they supply the place of bread, and form the chief nutriment of the people. But not only does the Plantain supply the place of bread and serve as fruit, but also in a preserved state as desert. The farinaceous parts may, moreover, be separated in the form of flour, and are probably as nutritious as rice. The shoots or tops of the young plants, both in the East and the West, are occasionally given as fodder to sheep and cattle, and are described by some as a delicate edible. The leaves, in a dried state, are used for thatching and bedding. Both the stem and leaves abound in fibre, useful for textile or cordage purposes, while the tow which is separated in preparing the fibres, forms an excellent material for the finest or the toughest kinds of paper. The illustrious Humboldt has long since remarked, that the Banana is for the torrid zone what the Cerealia are for Europe and Western Asia, or rice for Bengal and China, forming a valuable cultivation wherever the mean temperature of the year is about 75°. He has also calculated that the same extent of ground, when planted with the Banana, will support a far greater number of people than when planted with wheat. As this is a point of great economical interest, it has been a subject of subsequent investigation. The productiveness has been found to differ with the mean temperature of the place. Boussingault has

given the following as the produce, per imperial acre, of the raw fruit in three places, according to Humboldt's (1), Gondot's (2), and his own observations (3):

	Temperature.	Produce, per imperial acre.	Or of dry food, per acre.
(1) In warm regions	81½ Fah.	72 tons.	19½ tons.
(2) At Cauca	78⅘ ,,	59 ,,	16 ,,
(3) At Hague	71⅚ ,,	25 ,,	6¾ ,,

Professor Johnston is the authority for the last column, or that of dry food per acre, as he had, from his analysis, obtained 27 per cent. of nutritive matter from the Banana. He justly observes, that all these quantities are very large, and show how easily life may be supported in tropical countries. And further, that as potatoes contain about one fourth their weight of dry nutritive matter, it would require a crop of twenty-seven tons of potatoes per imperial acre, to yield the smallest of the quantities above mentioned as the yield of an acre of Plantains; while only twenty to twenty-four tons of potatoes are obtained in favourable seasons and localities. Though it is not probable that the Plantain is cultivated in India, with the care to enable the largest possible quantity of produce to be obtained, yet there is no doubt that the produce is large and the culture most simple. It would be an interesting subject of experiment for the Agricultural Societies of India, to ascertain which are the most productive varieties; whether the modes of cultivation adopted in that country have attained the highest limits of productiveness; and also to determine the best methods for preserving the fruit in different places; and also, when superabundant, whether its meal might not be preserved for periods of scarcity, or for the season of pthe year when the fresh fruit is not rocurable. In South America the fruit is not only used as an article of diet in its fresh state, but, when dried, forms an article of internal trade, besides having its flour separated, and cooked or made into biscuits. It is also preserved in the Society Islands. The preservation of the fruit and the preparation of the meal has already been introduced into India. Some Plantain meal was sent to the Exhibition of 1851, from Madras, as well as baked Plantains from Jessore, by the Rev. J. Parry. These, after some years, are still in good preservation and well tasted. The late Dr. Stocks, and the loss is great which Science and the East India Service have sustained, in the death of this accomplished naturalist, who was as remarkable for the variety of his attainments, as for his zeal for botanical science and its application to practical purposes, informed Dr. Royle that the Plantains at Bassein, where the cultivation is most extensive, are delicious in flavour, and that there the people had acquired the art of preserving them. But this was practised many years ago in Central India, and in Ceylon in 1840, the late Sir John Robison, Secretary of the Royal

Society of Edinburgh, wrote to Dr. Royle some years since: "Among the products of India, which, I think, might be easily brought into general sale in England, are some of the fruits which, if cut in slices and dried in the sun, would become as susceptible of transport, as those of the Levant and the South of France. Above all, the Banana, of which the varieties, which are rich in saccharine matter, make an admirable preserve, on being skinned and split longitudinally and dried in the sun, by which process they immediately acquire a consistence like Turkey figs, and become capable of being packed and preserved in the same way." He concludes by stating: "I was in the habit of having large quantities preserved every year in this way at Hyderabad, and of using them as an article of dessert at table." In treating of the culivation of species of Musa or Plantain in India for fibre, it is desirable to advert to the cultivation of the edible species, or the numerous varieties included under the names of Banana and of Plantain, and suggesting them as above as subjects of experiment to members of the Agricultural Societies in India, to ascertain whether the modes of cultivation adopted in India have attained the highest limits of productiveness; and also whether the fruit might not be preserved in different forms. Dr. Royle has already observed that a remarkable instance of the great length of time for which these Plantains may be preserved in an eatable state, occurred at the Exhibition of 1851. There were some preserved Plantains, "Plantano pasado," which had been brought home by Lieut.-Col. Colquhoun, R.A., from the province of Jatisco (Guadalaxara), Mexico, in the year 1835, and which since then had remained neglected in a baggage warehouse. The specimen exhibited was the remainder of a package of 75 lb weight, made up, as customary, in the leaves and fibre of the plant, after having been subjected to considerable pressure. The state of preservation, after sixteen years, was favorably reported on by Dr. Lindley, and no signs of decomposition were then perceptible in the specimens given to Dr. Royle by Colonel, now Sir W. Reid; the sugar of the fruit having been sufficient to preserve them. They are prepared in considerable quantities in the hot region (tierra caliente) of the western coast of Mexico, for consumption in the elevated districts of the interior. The Silver Medal of the Society of Arts was awarded for the first samples brought to England. *See* the 'Transactions,' vol. I, p. 43, for the method of preparation, reprinted in 'Trans. Agric. Soc. of India,' viii, p. 60. Before, however, proceeding to detail the methods of preservation of the fruit, or the preparation of the meal, it is desirable to notice the relative values of these as compared with other kinds of fruit. This we are enabled to do from an excellent

Report 'On the composition and nutritive value of Plantain Meal,' by Professor Johnston, published in the 'Journal of the Highland and Agricultural Society of Scotland,' in 1848, and to which attention called by Professor Key, of Madras. By this we shall see that, in extending the culture of the Plantain, there is no probability of this ever becoming so extensive as for its fruit to become valueless.

Chemical Analysis of Plantain Fruit and Meal.

Extracts from a Report upon the 'Properties of the Plantain Meal.'—This meal is of a slightly brownish colour, and has an agreeable odour, which becomes more perceptible when warm water is poured upon it, and it has a considerable resemblance to that of Orris root. When mixed with cold water, it forms a feebly tenacious dough, more adhesive than that of oatmeal, but much less so than that of wheaten flour. When baked on a plate, this dough forms a cake which is agreeable to the sense of smell, and is by no means unpleasant to the taste. By washing with water this dough leaves a residue of insoluble tenacious gluten, as that of wheaten flour does. When filtered from the starch, the wash water gives no cloudiness when rendered slightly sour by Acetic Acid, when boiled yields a little coagulated albumen. Whether this is the case in the fresh fruit, or only in the dried meal prepared from it, I have had no opportunity of determining. The addition of Alcohol to the same watery solution renders it more or less distinctly gelatinous, as it does similar solutions obtained from other fruits, and form the turnip, parsnip, &c. This shows the presence of pectin, or pectic acid, the substance which in fruits, in the turnip, and in many other bulbous roots, takes the place of the starch found in grain, and in the tubers of the potato. When boiling water is poured over the meal, it is changed into a transparent jelly having an agreeable taste and smell. If it be boiled with water, it forms a thick gelatinous mass, very much like boiled sago in colour, but possessing a peculiar, pleasant odour.

Composition of the Plantain Meal.—By a careful analysis, the composition of the plantain meal was found to be nearly as follows:

a. The water.—Mr. Law states that 59 parts of the fruit yielded only 30·85 of eatable parts, which, on drying in the air, were reduced to 12·32 parts. The fruit, therefore, consisted in 100 parts of—

	Per cent.
Husks, &c.	47.71
Water evaporated by the sun	20·88
Meal dried in the sun	31.41
	100.00

MUSA PARADISIACA.

The meal thus dried in the open air, when dried again in the laboratory at 212° Fahr., lost 4·07 per cent. of water in addition; or one hundred parts of the recent fruit contain 27 of dry nutritive matter.

b. The albumen, &c.—By combustion the proportion of nitrogen in this meal, in its ordinary state, was found by Dr. Fromberg, in two experiments, to be 0·88 and 0·97 respectively, equal as a mean to 5·82 per cent. of protein compounds. These, as we have already seen, are most probably in the state of soluble albumen taken up by cold water, and of coagulated albumen attached to, or mixed with, the starch, cellular fibre, &c. In the perfectly dry meal the proportion is 6·75 per cent.

c. The ash.—When burned in the air, the proportion of ash left behind amounts to 2·32 per cent., or in the dried meal to 2·71 per cent. The entire composition of the plantain meal is represented in the following table:

	Dried in the air.	Dried at 212. Fah.
Water, ...	14·07	
Starch, ...	67·42	78·43
Gum and Pectin, ...	4·47	5 21
Cellular fibre, ...	4·84	5·62
Sugar, ...	2·03	2·40
Oil, ...	0·41	0·48
Albumen (soluble), ...	1·21	1·41
Albumen (coagulated gluten, &c.),	3·23	3·74
Ash, ...	2·32	2·71
	100·00	100·00

On comparing the above composition with that of other kinds of food commonly eaten by man, we find the plaintain *fruit* to approach most nearly in composition and nutritive value to the potato, and the plantain *meal* to those of rice. Thus the fruit of the plantain gives 27 per cent., and the raw potato 25 per cent. of dry matter. Again, the dry mealy matter of the plantain, of the potato, and of rice consists respectively of—

	Rice.	Potato.	Plantain.
Starch, ...	86·9	65·0	78·4
Sugar, Gum, &c.	0·5	15·0	7·6
Fat, ...	0·8	1·0	0·5
Cellular, ...	3·4	8·0	5 6
Protein compounds ...	7·5	8·0	5·2
Ash, ...	0·9	3·0	2·7
	100·0	100·0	100·0

or, comparing only the Starch, Sugar, &c., and the protein compounds, on which the nutritive

quality of these different vegetable productions principally depends, we have the following numbers :

	Rice.	Potato.	Plantain.
Starch, Sugar, &c. ...	67·4	79 0	86 0
Protein compounds, ...	7 5	8·0	5·2

These numbers show that it approaches, as I have said, nearest in its composition to rice, containing nearly as much starch, but a sensibly smaller proportion of the protein compounds, on which the sustenance of the muscles is supposed chiefly to depend. In regard to its value as a food for man in northern climates, there is no reason to believe that it is unfit to sustain life and health ; and as to warmer or tropical climates, this conclusion is of more weight. The only chemical writer who has previously made personal observations upon this point (M. Boussingault) says : " I have not sufficient data to determine the nutritive value of the banana, but I have reason to believe that it is superior to that of potato. I have given as rations to men employed at hard labour about 3 kilogrammes (6½ lb.) of half-ripe bananas, and 60 grammes (2 ounces) of salt meat." Of these green bananas he elsewhere states that 38 per cent. consisted of husk, and the internal eatable part lost 56 per cent. of water by drying in the sun. The 6·6 pounds, therefore, were composed of—

Husk, ...	2·5 lb.
Water, ...	2·3 ,,
Heart dried in the sun, ...	1·8 ,,
	6·6 lb.

so that less than two pounds a day of this dried banana fruit, which we may suppose to be equal in quality and composition to the sun-dried plantain meal, above described, with two ounces of salt meat per day, were found sufficient to maintain men, *not slaves*, at moderately hard labour. This was equal to 12½ lb. dried eatable banana, and 1 pound of salt meat (query fish) per week. * * * The composition of the ash of the Plantain also bears a close resemblance to that of the potato. Both contain much alkaline matter, potash and soda salts, and in both there is nearly the same per centage of phosphoric acid and magnesia. In so far, therefore, as the supply of those mineral ingredients is concerned, by which the body is supported as necessarily as by the organic food, there is no reason to doubt that the banana, equally with the potato, is fitted to sustain the strength of the animal body. It must not be denied that our present knowledge indicates the advantage of a mixture of food, as the most conducive to health and strength, but experience shows that however desirable, this is not absolutely necessary. The oat alone in Scotland raises and supports strong men ; rye alone does so in the north of Europe ; and the potato alone does so in Ireland. This result of experience in the case of the potato justifies us, were there no experience on the subject in tropical countries, in believing that the banana, which resembles it, will do the same. Whatever other reasons may lead us to recommend a mixture of other food with it, especially where *hard* labour, perhaps not a natural condition of things, is required of him, we ought not to base this recommendation upon any belief that the banana, when eaten alone, will not fully supply all the ordinary wants of the living animal.

Cultivation.—The plantain has thus been proved to be valuable on account of its fruit, both in its unripe and ripe state, the latter both when fresh and when preserved, and for yielding nutritious meal. The plant is also to be esteemed on account of the fibre with which every part of it abounds. Though both the Plantain and the Banana are to be found near the huts of the poor and in the gardens of the rich, the most profitable mode of culture has, probably, in few places been as yet ascertained. In the first place, of the great varieties to be found in cultivation, it would be necessary to select those which abound most in the products we chiefly require. The small Banana is most esteemed as a fruit by Europeans, and the people of Southern Asia, but the large-fruited and, in comparison with the other, coarse tasted Plantain is preferred by the natives of Northern India, as is the long yellow Plantain in Jamaica. Both of the latter abound in fibre, and are therefore to be preferred when both this and the fruit are objects of desire. The culture of the Plantain is, upon the whole, very simple, as it will succeed in almost any soil where the climate is warm and moist. The vicinity of water, for cleansing and washing the fibre, will, of course, be an essential. Professor Key, of Madras, has stated that in India the Plantain will flourish in the poorest soil and near brackish water, and that its culture might be extended with very little trouble and expense. A sucker being planted, rapidly attains maturity; some varieties in eight months, others within the year. Each producing a bunch of fruit which may weigh from twenty-five to forty, and even ninety pounds ; and each throwing out from its roots and around its stem, from six and seven to eight and ten fresh suckers. These will each form a distinct plant, producing its own bunch of fruit ; all requiring to be cut down annually in order to make room for the fresh suckers which spring up. This may go on for fifteen or twenty years, though some think that is better to renew the plantation entirely or partially at shorter periods. A chief consideration is the distance at which the original plants should be placed, in order to give room for the secondary suckers, as well as to allow of free ventilation. Some place them at distances of six feet, but it is bet-

ter to have them ten feet apart, either around the boundaries of fields or of gardens, or in rows as a separate plantation. In the latter case, it is recommended that there should be space enough between the rows to allow of the culture of other crops. In some parts of India, the Plantain is employed as a nurse, or to afford shade, to the Betel Vine (itself one of the most valuable of crops), or to young Areca-nut and to Cocoa-nut Palms. By cutting away some of the suckers as they arise at different periods, and allowing others to remain, a supply of fruit, and also of stems for fibre, may be obtained for a great part of the year. In Demerara and Guiana, the Plantains have been injured by some disease, which has impaired their fruitfulness, and consequently, the profits of their culture. It has been recommended to plant them at sufficient distances (as eight feet) to allow of free ventilation, accompanied with good tillage in the intervals and the cultivation of annual crops of Maize, Yams, Sugar-cane, or Eddoes. (Arum.) According to the distances, there may be from 360 to upwards of 400 plants in an acre, each producing, say, on an average, seven suckers; making in all from 3100 to 3200 plants in an acre.

Preservation of the Fruit.—The fruit of the Plantain, when ripe, containing a sufficient proportion of nutritive matter may well serve as a portion of the food of the natives of warm countries. But it is probably as much employed by them before being perfectly ripe, as it is sometimes stewed, and at other times fried; and, by the natives of India, dressed in various ways to eat with rice. In the West Indies, the fresh Plantain, when boiled whole, forms a mass of considerable toughness, and which, when beaten in a mortar, constitutes the *foo-foo* of the negroes. (Simmonds.) When nearly or perfectly ripe, it is pleasantly, or even lusciously sweet, and it is in the former state that it is preserved. Col. Colquhoun describes the mode of preparation as very simple: "The fruit is gathered when fully ripe, and is laid on light cane frames, exposed to the sun. When it begins to shrivel, the outer skin is stripped off. This is stated to be a very essential part of the process, as without it the fruit acquires an unpleasant flavour. After this, the drying is completed. During this process it becomes covered with a white, mealy efflorescence of sugar, as the fig does under similar circumstances. For convenience of transport it is pressed into masses of about 75 lb. each, and is wrapped in plantain leaves. The masses are twenty-four inches long by fourteen wide, and four inches thick. The samples presented to the Society of Arts were about two years old, sufficiently moist, of a consistence and flavour between the date and the fig, very sweet, and without any acidity. It is evident that this process of preservation will be found to be of considerable value in other parts of the world, and especially in situations where it is cultivated in larger quantities than the fruit can be consumed. The drying in the sun would be sufficient in dry climates, but baking in ovens seems to be necessary in moist climates, such as Dacca and Jessore. The process seems to be sufficiently well understood in several parts of India. When the fruit is of a good kind, no addition of sugar can be necessary. This subject seemed so worthy of a fair trial in the British West Indies to the Society of Arts, that they offered, in the year 1834, a premium for its encouragement. It seems no less important for the East Indies, especially if any planters should be induced to cultivate the Plantain in large quantities, on account of its fibre, or for the preparation of half-stuff for paper-makers.

Plantain Meal.—Mr. Simmonds describes this meal as prepared by stripping off the husk of the fruit, slicing the core, and drying it in the sun. When thoroughly dry it is powdered and sifted. It is known among the creoles of the West Indies under the name of *Conquin tay*. It has a fragrant odour, which it acquires when drying, and which somewhat resembles that of fresh hay or tea. The flavour of the meal is, moreover, said to depend a good deal on the rapidity with which the slices are dried. Hence, the operation is only fitted for dry weather, unless where a kiln or stove is had recourse to. Above all, the Plantain must not be allowed to approach too closely to yellowness or ripeness, otherwise it becomes impossible to dry it. The colour of the meal is, moreover, injured, when steel knives are used in husking or slicing; but nickel blades or Bamboo slicers would not injure the colour. On a large scale, some single machine might be adapted to the husking and slicing processes, and the mode tried by which arrow-root is obtained, by scraping and suspension in cold water. It is calculated that the fresh core will yield forty per cent. of dry meal, and that 5 lb. may be obtained from an average bunch of 25 lb. weight; and an acre of Plantain walk of average quality, producing even during the year 450 such bunches, would yield upwards of a ton of meal, the value of which must of course vary in different countries according to the price of other articles of food. In the West Indies it is largely employed as the food of infants, children, and convalescents. In point of nutritious value, we have seen that the fruit approaches the potato, and the meal to that of rice. There can be no doubt, therefore, of the value of this meal, and of the benefit of preparing it, wherever the fruit is produced in larger quantities than it can be consumed.

Preparation of the Fibre.—The Plantain has been stated to abound in fibre—indeed, almost, every part of the plant may be said to be availa-

ble for this product. It is related, that from the upper part of the spurious stems, spiral vessels may be pulled out in handfulls, and are used as tinder in the West Indies. De Candolle has described them as consisting, in Musa, of seven distinct fibres lying parallel, formed into bands; and La Chesnaye of upwards of twenty, arranged in a spiral manner. M. Mohl describes the secondary cell-membrane as divided into as many as twenty parallel spiral fibres. But these are not the fibres which are separated for economic purposes, nor are they situated on the same side of the vegetable structure. For instance, if we take any separate layer of the Plantain stem—that is, a part of the sheathing footstalk of a leaf—we may observe on its outer side a layer of strong longitudinal fibres, which form a kind of framework or ribs for the support of the structure, which is cellular on its inside. It is on this side that spiral vessels are placed, and next the pith in exogenous plants. They are abundant in the peduncle, or core, as it is often called, of the Musa. As in the Manilla, so in the common Plantain, the fibre is found to be coarse and strong in the outer layers of the sheathing footstalks, fine and silky in the interior, and of a middling quality in the intermediate layers. This fibre is separated by the natives of Dacca, for instance, and is used by them for making the string of the bow with which cotton is teazed (bowed). Much of it is well adapted for cordage. Mr. Leycester (*v. supra*), when calling attention to the fibre of the *Musa textilis* grown in Calcutta, directed attention to the fibres of *M. sapientum* and of *M. ornata*, as fitted to answer as string for all gardening purposes. Mr. Crawfurd is of opinion that the common Plantain most probably afforded the Indian Islands the principal material for their clothing, in the same way that the indegenous species does in the Philippine Islands. The art of making cloth from these fibres seems also to have been known in Madagascar. There is no doubt that the large cultivated Plantain of India contains a considerable quantity of strong fibre, in the same way that the common yellow Plantain does in Jamaica. But it seems well worthy of inquiry, whether the wild, and at present useless Plantains, growing along the foot of the Himalayas and on the Neilgherries, may not yield a stronger fibre than any of the cultivated kinds. The fibre may be easily separated from many parts, by simply scraping it on a stone or flat-board, with a piece of hard, wood; iron, though frequently used, no doubt injures the colour. In the following directions given by Dr. Hunter ('Art Journal,' Madras, i. pp. 108 and 376) the essentials are attended to, and the fibre is separated in an uninjured state, but the process is probably not the most economical. To prepare the fibres of the Plantain, he rejects the outer, withered layer of leaves, and then strips off the different layers, and proceeds to clean them in the shade, if possible soon after the plant has been cut down. Lay a leaf-stalk on a long flat board, with the inner surface uppermost, scrape the pulp off with a blunt piece of hoop-iron fixed in a groove in a long piece of wood. When the inner side, which has the thickest layer of pulp, has been cleaned, turn over the leaf and scrape the back of it. When a good bundle of fibres has been thus partially cleaned, it ought to be washed briskly in a large quantity of water, so as to get rid, as quickly as possible, of all the pulpy matter which may still adhere to the fibres. It may be readily separated by boiling the fibres in an alkaline ley or in alkaline soaps, but not in the Indian soaps made with quicklime, as these are too corrosive. When the fibres have been thoroughly washed, they should be spread out in thin layers or hung up in the wind to dry. If exposed to the sun when in a damp state, a brownish-yellow tinge is communicated, which cannot be easily removed by bleaching. Exposure during the night to the dew bleaches them, but it is at the expense of part of their strength. If we attend only to what is essential in the above process, we find that all that is required is scraping or pressure to separate the cellular and watery from the fibrous parts. This is followed by careful washing, and sometimes by boiling in an alkaline ley, but the latter part of the process does not appear to be essentially necessary. In the West Indies, according to the complete account of a practical correspondent in Jamaica, as given in Simmonds' 'Commercial Products of the Vegetable Kingdom,' the fibre is separated, either by crushing under rollers in a mill, or by fermentation. If by the latter process, there is considerable saving in carriage, as the stems, when cut down, are heaped together near where they have grown, and are shaded from the sun by laying the leaves over them. A drainage of the sap takes place, which is described as having a tanning property, and as discolouring the pieces which lie at the bottom. But several weeks elapse before decomposition is complete, when the fibres can be easily separated from the rest of the vegetable mass. There is little doubt, that besides discoloration, there must be some weakening of the fibre by this process, as we know takes place in India when the stems are steeped in water until some decomposition takes place. It is usual not to cut the stem until fruit has been produced; "for two reasons—first, that the fruit be not lost, and secondly, that the tree will not have arrived at its full growth and ordinary size, and the fibres will be too tender." This is the reverse of the practice in the Philippines, where the stem is cut before the fruit appears, in order to ensure a better quality of fibre. It would be an interesting experiment for those, favourably situated, to ascertain the mode by which the

best kind of fibre is produced, and what would be the loss of profit, supposing that the fruit is sacrificed for the sake of the fibre. The stem is described as being cut off about six inches above the ground, and being tender, it may, on being bent down, be cut asunder with a single stroke of a hatchet or cutlass. It is then divided, longitudinally, into four parts, the centre taken out and left to serve as manure, and the pieces conveyed at once to the mill to be crushed. It is said that "one man can cut down 800 trees, and split them in a day." A very convenient size for the rollers of the mill, will be found to be about three feet in length and one foot in diameter. In the process of crushing, care should be taken to separate the tender from the harder layers of fibre. This may be attained by having the rollers of the mill placed horizontally; and if the pieces of Plantain are passed lengthways through the mill the pressure will be uniform, and the fibre uninjured. "In this manner, pass the different sorts of layers separately, and the produce will be about four pounds of fibre from each tree. The stalks of the branches of the Plantain (no doubt the midrib of the leaf is meant) give the best fibre, and a large quantity as compared with the body of the trees; 100 lbs. of the stalk will give 15lb. nett of fibre. In general, if a tree will give 4lb. nett of fibre, the stalks will give 1lb. out of the 4lb. The stalks ought also to be crushed separately, because they are harder than the exterior layers of the tree. About 3000 trees may be passed through the mill in a day. Whilst the experiments were in progress, it was ascertained that, with a single horse, 100 Plantain trees, on an average, were crushed in twenty minutes—giving five minutes' rest for the horse." The quantity of produce from each plant, is the point of greatest discrepancy between the West Indian practice and Dr. Hunter's experiments, as he mentions only a few ounces of fibre as procurable from each plant. But as he rejected the outer parts, and did not include the midrib of the leaves, the discrepancy may be partly accounted for. The combings or tow, separated from the fibres during their preparation, are also of value as a substitute for horse-hair, for stuffing mattresses, &c.; and also the peduncle or core, if pounded into half-stuff for paper-makers. Some of the cellular tissue containing much fibrous matter, might, probably, be converted to the same purposes. In addition to the above processes of crushing and washing, the West Indian account also gives the details of the process of boiling the fibre with carbonate of soda and quick-lime, in order, it is said, to get rid of the remaining vegetable matter, and to bleach the fibre. The different qualities of which, having been crushed separately, are of course to be kept so, and boiled separately. The proportions given in the above account are for making three tons of fibre per day. For this, four large (300-gallon) boilers are required, and about 360 lb. of soda would be consumed, with a proportionate quantity of lime; or the soda, that is its carbonate, may be first deprived of its carbonic acid. This may be done by preparing, in a small separate boiler, the quantity of liquid necessary for a day's consumption, which may be done in about an hour, by taking, by weight, ten parts of soda, six parts of quick-lime, and not less than seventy parts of water. The operation of boiling in the soda ley is said to be important in separating the gluten and colouring matter from the fibres, and also to facilitate their bleaching. The lightest coloured fibres do not require more than six hours to bleach, whilst the darkest will probably take from twelve to eighteen hours. It is advisable to place over each boiler the means of lifting the mass of fibre when boiled, and suffering it to drain into the boiler before it is carried away to be washed. The machinery necessary for cleansing and washing may be of various descriptions—as that used by paper-makers in England, or by coffee-planters and arrow-root growers in the West Indies. The fibre may be dried, by being hung over lines made of the same material. These, when dry, may be pressed and packed. For carrying on the culture of the Plantain on an extensive scale, in the West Indies, it is stated that the materials will cost £2000, buildings £500, purchase of land £1500, working capital £1000 to £5000. The estimated expense in cultivating one quarree or 5⅕ English acres, in Plantains, will be £30, as the work can be easily performed by one labourer in 300 days, at 2*s.* sterling per day. A quarree will produce 18 tons of mill-fibre, the cost of the preparation of which is as follows:

For workmen's wages, soda, lime, and fuel, at £3 per ton	£54
Freight to Europe, at £4 per ton	72
Manager	30
Duty, insurance, office fees, &c., at £1 per ton	18
	£174

Thus making the total expense of producing 18 tons of fibre £174, or £9 13*s.* 4*d.* per ton. By another statement, derived from different data, but somewhat similar sources, it has been calculated that Plantain fibre, in a coarse state, might be laid down in England, at £10 6*s.* 8*d.* But some expense would be incurred in cleansing the fibre for finer purposes. In another account, also taken from West Indian information, it is stated that the cost of well cleaned fibre would amount to £7 1*s.* 3*d.*, to which, of course, freight would have to be added, while half-stuff for paper-makers might, at the same time, be produced from the refuse at about half that sum. As Plantain fibre has not yet, as far as we have heard, been systematically prepared as an article of commerce, these calculations of cost are somewhat conjectural. But they are interesting, as showing, from the experiments which had been made, that large quantities of a valuable product

may be obtained at a comparatively cheap rate; and this, from what is now a complete refuse—that is, the stem and leaves; while the expenses of culture are paid for by the fruit. And the more so, as the data are West Indian, where the prices of material and the wages of labour are much higher than in India. Specimens of Plantain fibre, and a barrel of it for experimental purposes, were sent by two Exhibitors from Demerara, also some from Porto Rico (*v.* 'Illust. Cat., p. 982); and it was stated that the fibre might be obtained in very large quantities from the Plantain cultivation of the former colony. It is calculated that upwards of 600lb. weight of fibre might be produced annually from each acre of Plantains, after reaping the fruit crops. It is further stated, that "at present, the stems of the Plantain trees, when cut down, are allowed to rot on the ground. If a remunerative price could be realised for this fibre, a new branch of industry would be opened up to the colonists." India, unfortunately, furnishes no statements showing the rates at which Plantain fibre, tow, and pulp, might be obtained as articles of commerce. Dr. Hunter, of Madras, has done much in showing the various purposes to which this valuable product might be applied; as he sent to the Exhibition of 1851 both the fibre and the tow in a well-cleaned state. The former about four feet in length, and also dyed of several colours, as well as twisted into fine cord and into rope. Some Plantain rope was, moreover, sent in a tarred state. A portion of the tow sent in a state fit for packing and stuffing, and some converted into paper; of the latter, some was almost as thin as silver paper, and some of it seemingly as tough and tenacious as parchment, well fitted for packing paper, as apparently little affected by water. But in England some excellent letter paper has been made from the Plantain fibre. Besides the above, Plantain meal was sent by Professor Key from Madras, and preserved Plantains from Jessore. But dried Plantains seem already established as an article of commerce at Bombay, as we observe them among the exports for the year 1850-51, from thence to Cutch and Guzerat, to the extent of 267 cwt., valued at 1456 rupees. So that the various applications of which Plantain fruit and fibre are susceptible have been already made in India. It remains only to produce them as cheaply as the other products of the country. Dr. Hunter, in his experiments, found that the fibre cost about three annas, or about sixpence, a pound—which is prohibitive as an article of export. But he states that if regular supplies of the fibre were required, the price might be reduced to two annas. He also mentions that, at Madras, the rate at which the stems were at first supplied was ten annas for one hundred trees: but this was raised to four rupees for the same number, when he began to make use of them. This is sufficient proof that they are not very abundant there. But "in the vicinity of some of the Zillah (that is, of District) Jails, the Plantain is cultivated very extensively, but no use is made of the stems, which are allowed to rot on the surface of the ground." This is also the case in most parts of India. On the opposite coast of Arracan, the Plantain is abundant. What seem to be the layers forming the stem of such a plant, and about seven feet in length, are sold there in a dried state, and called *Pa-tha-you Shaw*; some of it even twisted into a bast-rope, is sold for the same sum, that is, for one rupee the maund or for about three shillings per cwt. As the above Shaw or *bast* of an unknown plant is sold at so cheap a rate, as well as the other basts sent from Arracan to the Exhibition of 1851, even after some preparation, there is no reason why Plantain fibre might not be sent cheaply into market; and no doubt that it would very soon command a price equal to its real value, as a material for paper-making, for cordage, or for textile fabrics. The fibre might be collected in situations where the plant is already cultivated, in gardens, or where it grows wild, and its stems not turned to any account. Or it might be cultivated in fields on its own account, either with or without other crops, such as Pan or *Piper Betle*, or Ginger, Turmeric, &c. The fruit in its fresh state, near towns, or in a preserved state, or converted into meal, ought to pay all the expenses of, and afford some profit on the culture. The stems and leaves would thus be obtained at a minimum of cost—that is, simply of carriage. Indeed, if the crushing mill were not of too cumbrous a nature, it might be brought into the vicinity of the field, in the same way that the natives of India construct a sugar-mill and boiler in the immediate vicinity of where the Date tree is grown or the Sugar-cane cultivated. A mill, consisting of the rollers of a sugar-mill or an enlarged churka, with an Archimedean screw, or with cog-wheels, or with bands, to which motion is given by bullocks, as practised in various parts of India, would probably be sufficiently effective, and certainly economical. The separation of the different qualities of fibre, with the washing, combing or heckling, and drying, might at first all be performed by hand, where labour is so cheap. If all the fibrous matter, or the combings or tow only, should be required for conversion into half-stuff for paper-makers, nothing is more effective, and at the same time so economical, as the Dhenkee of India. To this attention has been recently called by Mr. Henley ('Journ. of Soc. of Arts,' vol. ii, p. 486), and which, as he describes, "resembles in principle our European tilt hammer." "Its cost would be—erected in place—engineers, foundations, and all charges included—three shillings; and this charge supposes the more

than usually heavy machine employed for paper-making"! "The total wages for the preparation of 20 to 30 lb." of suitable material, "would amount to sevenpence-halfpenny." Mr. Henley adds, that "in the event of employing such fibres as the Plantain leaf stalk, a small pair of hard wood grooved rollers, such as they employ for squeezing sugar-cane, would be very useful. Their cost is two shillings." Dr. Royle having, in a Lecture before the Society of Arts, recommended the Plantain as likely to yield an abundant supply of material for paper-making, Mr. Henley observes: "From extensive cultivation of the Banana or Plantain, which surrounds almost every house, it is probable this material would form one of the first objects of attention by paper-material collectors; but from its coarse, stringy nature, it would be cheaper in the state of fibre than as half-stuff. This plant offers great advantages for our views generally, for it is truly in the position of refuse, inasmuch as it has already paid the charges of its cultivation by its products in fruit. The interior of the plant, or true flower-stem, is eaten as a vegetable by the natives; the lower part being perfectly mild, whilst the upper extremity, near the bunch of fruit, pours out, on cutting it across, a limpid fluid, which is very acrid and deleterious, and is a true substantive olive dye on cotton cloth, as indelible as marking ink, for which it may be substituted." With regard to the price at which such materials could be obtained, Mr. Henley says; "I am of opinion that contracts could be made, according to the ordinary usages of the country, at the rate of from one rupee eight annas, or three shillings, to two rupees eight annas, or five shillings, per maund of 82 lbs., deliverable at any central depot within a radius of twenty miles. These prices are equal to from about £4 4*s*. to £7 a ton; and that of these too, a lowest-priced material could be landed in London, paying all charges, for £13 4*s*., and the more expensive, which would include articles equal to linen rags, at £16 5*s*." Having already noticed the facility with which the species of Plantain may be cultivated in suitable climates, Dr. Royle mentions that he lately tasted some excellent fruit of *Musa Cavendishii*, grown in a Fernery on Putney Heath. He warns cultivators against planting the Plantain too close together; for though this may produce fineness of fibre, it will also diminish strength, and want of free ventilation may produce disease. For separating the fibre, it may be a question whether smooth or grooved cylinders will be best for so fleshy and moist a substance, but it is very necessary to remember that the pulp or the fibre must be thoroughly dried, in order that it may not undergo decomposition when in transit in the hold of a ship. Of the value of the Plantain fibre for paper-making, there can, he conceives, be no doubt. Some paper, though unbleached, but excellent as far as substance and tenacity are concerned, was sent from India by Dr. Hunter, in 1851. In the year 1846, Mr. May showed Dr. Royle some beautiful specimens of note and letter paper made from Plantain fibre. He was at that time anxious to establish a manufactory for Plantain paper in Calcutta, but subsequently went to one of the British colonies in South America; and a gentleman showed specimens of paper made from Plantain fibre in Demerara. Mr. Routledge subsequently made some excellent paper, both of a tough and of a fine quality, from the fibres of species of Musa—sheets of which he presented to Dr. Royle, who has lately seen specimens of similar paper in the hands of Mr. Sharp. Besides which, excellent paper has for some time been made from the refuse of or from worn-out Manilla rope. All which facts prove that an excellent material for paper-making may be had in inexhaustible supplies, whenever those chiefly interested choose to take the necessary measures for securing such a supply. As to the other uses to which Plantain fibre can be applied, Lieut. Col. Whinyates, Principal Commissary of Ordnance, in a letter to the Secretary to the Military Board at Madras, states that the Plantain oakum or tow sent by Dr. Hunter is "undoubtedly of a very superior description, and admirably adapted for packing. From the soft, elastic character of the fibre, he also conceives that it would be a desirable substitute for coir in stuffing hospital beddings, &c. But he fears that the supply is too limited, and the cost all too high, being at that time (October 29th, 1850) about three annas the pound." With respect to the strength of Plantain fibre, Dr. Royle states that in some experiments which he had made on Plantain fibre, some from Madras bore a weight of 190 lb., but the specimen from Singapore bore not less than 390 lb., while a salvage of Petersburgh Hemp, of the same length and weight, broke with 160 lb. A twelve-thread rope of Plantain fibre made in India broke with 864 lb., when a similar rope made of Pine apple fibre broke with 924 lb. Even from these experiments, it is evident that Plantain fibre possesses sufficient tenacity to be applicable to many, at least, of the ordinary purposes of cordage, as is very clearly shown by the experiments detailed in the following tabular statement. But it is probable that the plants grown in a moister climate than that of Madras will posess a greater degree of strength. The outer fibres may also be converted into a useful kind of coarse canvass, as has been done by Dr. Hunter; and the more delicate inner fibres most probably into finer fabrics, as is the case with those of the Abaca or *Musa textilis*; when equal care has been taken in the preparation and separation of the fibres, and there is some experience in weaving them.—*Royle, Fib. Plants.*

STATEMENT showing the comparative Strengths of the undermentioned Specimens of Rope, Cord, String, &c., made from the fibres of the Plantain, with Manilla Rope, as exemplified in a set of Experiments carried on at the Arsenal, Fort St. George, in July, 1850.

Number marked on label.	[illegible] ELLED.	Arsenal Numbers.	Description.	Circumference.	Length of Rope, &c., used	Weight required to break the Rope, &c.	Weight required to break: After immersion in water 24 hours, dried in the shade, and tested 7 days after.	Weight required to break: After being immersed in water 10 days, and dried in the sun.	Weight required to break: Manilla Rope of same circumference.	Weight required to break: English Hemp Rope, of same circumference.	Weight of one Fathom of each description: Plantain.	Weight of one Fathom of each description: Manillae	Weight of one Fathom of each description: Europe.
				In	Fams.	lb.	lb.	lb.	lb.	lb.	oz.	oz.	oz.
1	Rope and String made from the fibres of the Plantain. Mr. Lima. Porto Novo.	1	Line	0 3/4	2	248	—	—	—	—	2 1-16	—	—
		2	String	1/4	1	54 1/2	—	—	—	—	0 4-16	—	—
2	Rope and Line made from the fibres of the Plantain, by the prisoners of the House of Correction.	3	Line	1	2	288	—	—	—	—	2 7-16	—	—
		4	ditto	0 3/4	2	190	—	—	—	—	1 12-16	—	—
		5	String	0 1/2	1	114	—	—	Bengal log line 137	—	0 9-16	—	—
3	Rope made from the fibres of the Plantain, in the House of Industry. Fibres prepared in the House of Corr., Madras.	6	Rope	3 1/4	2	2330	2387	2050	4669	3885	19 9-16	28 11-16	39
		7	ditto	1 1/2	2	638	—	—	869	—	6	5	—
		8	ditto	1 1/2	2	694	—	—	869	—	5 13-16	5	—
		9	ditto	1 3/8	2	624	—	—	—	Ratli 8	4 5-16	—	5 1-16
4	Rope made from the fibres of the Plantain, by a pauper in the Monegar Choultry, Madras.	10	Line	1	1 3/4	323	—	—	—	—	2 10-16	—	—
		11	ditto	1	1	330	—	—	—	—	3	—	—
		12	ditto	0 3/4	2	183	—	—	—	—	1 8-16	—	—
		13	ditto	0 3/4	0 3/4	362	—	—	—	—	1 9-16	—	—
5	Rope and String made from the fibres of the Plantain, by five Europeans, in her Majesty's Jail.	14	Rope	1 3/4	2	1240	1266	762	1490	1184	7 9-16	9 8-16	13
		15	ditto	1 3/8	2	974	—	—	Bengal logline 137	—	5 8-16	—	—
		16	String	0 1/2	1	185	—	—		—	1 4-16	—	—
		17	ditto	0 1/4	1	38	—	—	—	—	0 5-32	—	—
6	Ditto, ditto, by the same prisoners, from fibres of the Plantain prepared in the House of Correction.	18	Rope	2	2	1490	—	—	—	—	11	—	—
		19	ditto	1 3/4	2	1322	—	—	1490	1184	8 6-16	9 1/2	13
		20	ditto	1 1/4	2	806	—	—	757	at 638	5	3 1/4	5 1-16
		21	String	0 1/4	1	43 1/2	—	—	—	—	0 3-16	—	—

1256

MUSA PARADISIACA.

(5501) MUSA SAPIENTUM. MUSACEÆ.

The Plantain.

Kilah, DUK. | Vallee-kai, TAL.

There are several varieties of the Banana cultivated in the Deccan,—the large red, the green, and the yellow. A small sort, which is supposed to be the real Banana of the West Indies, is perhaps the most luxuriant of the whole. The plants blossom at all seasons, and as soon as the drupe of fruit begins to ripen, which is known by some turning color, it is cut and hung up to ripen in the house. The plant will not bear again, and may be cut down (otherwise it will perish of itself,) when the surrounding shoots grow up and blossom as the former. The plants are generally grown in beds or clusters in a good rich soil, when fine fruit is almost the sure return. In transplanting the shoots, if two or three feet high, about one half is generally cut off ofthe common plantain the green fruit is used in curries; the natives use the extremities of the flower shoots, the heart of the stem, and that portion of it from which the roots proceed in their curries. This and the variety Musa Paradisiaca Banana, Valey is cultivated everywhere in Southern India. It yields a fine white silky fibre of considerable length, specifically lighter than Hemp, Flax and Aloe fibre by 1-4th or 1-5th and possessing considerable strength. There are numerous varieties of the Plantain, which yield fibres of different qualities, viz:

Rustaley, superior table plantain.
Poovaley, or small Guindy variety.
Payvaley, a pale ash colored sweet fruit.
Monden, 3 sided coarse fruit.
Shevaley, large red fruit.
Putchay Laden or long curved green fruit.

These varieties, as might be expected, yield fibres of very different quality. The only samples in which the different plants are noted, were those contributed by the South Arcot Local Committee, but they are not well cleaned. Very fine specimens of this fibre were contributed by the Local Committees of Masulipatam, Tanjore, Malabar, Canara, Nellore and Travancore. Very carefully prepared Plantain fibre, Hackled Do yarn, string, rope, tow and half stuff for paper were exhibited by the Madras School of Industrial Arts. The same fibre was exhibited from almost every district in the Presidency, and varies in shade and quality according to the method of cleaning that has been adopted. This plant has a particular tendency to rot and to become stiff, brittle and discoloured by steeping in the green state, and it has been ascertained by trial that the strength is in proportions to the cleanness of the fibre. If it has been well cleaned, and all the sap quickly removed, it bears immersion in water as well as most other fibres, and is about the same strength as Russian Hemp. The coarse large fruited plantains yield the strongest and thickest fibres, the smaller kinds yield fine fibres, suited for weaving, and if carefully prepared, these have a glossy appearance like silk. This gloss however can only be got by cleaning rapidly, and before the sap has time to stain the fibre, it is soon lost if the plant be steeped in water. By far thel greater number of specimens of Plantain fibre exhibited were discolored from steeping, and they had acquired a dull ash grey or brown color, which in this plant is always accompanied by stiffness and brittleness; one or two of the specimens are so brittle as to break when gently rubbed; others are harsh and stiff. Some well made rope, line, and string were exhibited by several of the Local Committees. A 2d Class Medal was awarded for the ropes from Mayaveram in Tanjore, these were clean, strong, silky and well laid up. A 2nd Class Medal was awarded to Mr. Thorpe for the cleanest and largest bundles of Plantain fibre, prepared in the Monegar Choultry. The Madura Local Committee exhibited fine specimens of fibre cleaned both by the quick process and by soaking, the latter have lost their gloss and are stiff and not so strong as the others. The Travancore Local Committee exhibits some excellent fibre and rope, the latter very carefully laid up but stiff from over twisting. This kind of rope ought not to be hard spun, as it becomes stiffer when wet and is liable to snap if it gets into a twist or knot, The Plantain fibre being one of the most abundant in India, has received this lengthened notice.—*M. E. J. R.*

(5502) MUSA TEXTILIS. MANILLA HEMP.

Among the various substitutes for hemp, few have hitherto attracted more attention than Manilla Hemp, and this as well from the elegance of its appearance, combined with the power of bearing great strains, as from being very durable, lighter, and also cheaper than Russian hemp. It has of late years been much employed for cordage of various kinds, especially where considerable strain is required, as in ropes for raising goods into warehouses or out of mines. Some yachts, as well as many American vessels, have the whole of their rigging composed of Manilla Hemp, and this cordage, when worn out, can be converted into an excellent quality of paper. The plant yielding this fibre in Eastern Asia, is extremely interesting, not only because it may easily be cultivated but because there are other species of the same genus which may be turned to the same useful account. The plant which yields Manilla Hemp is called *Abaca*. The natives distinguish several varieties of the Abaca.

1. *Abaca btava* (the wild Abaca), called *Agotai* by the Bicoles.

2. Mountain Abaca, the fibres of which only serve for making ropes, that are called *Agotog* and *Amoquid* in the Bicol language.

3. The *Sagig* of the Bisayas.

4. The *Laquis* of the Bisayas, by whom the fibres of the original Abaca are called Lamot.

Rumphius states that the Malay name is *Pissang utan*; that it is called in Amboyna, *Kula abbal*; in Ternate, *Fana*; and in Mindanao, *Coffo*, as also the cloth made from it. He distinguishes the Mindanao kind from that of Amboyna. by the natives of the Philippine Islands, who are said to apply the same name to its fibre. The plant is sometimes called a tree, but it is, in fact, only a large herbaceous plant, which belongs to the same genus, and is, in fact, a kind of plantain or banana, which is named *Musa textilis* by botanists. It was first called *Musa sylvestris* by Rumphius in his 'Herbarium Amboinense.' It was thought to be a variety of *M. troglodilarum* by Blanco, but called *Musa textilis* by Don Luis Nee, in a memoir which has been translated into English, and published in the 'Annals of Botany,' vol. i; where there may also be seen another memoir, which was sent in French to Sir Joseph Banks. These have been republished in the 'Transactions of the Agric. Soc. of India,' vol. viii, p. 7, together with a translation by Mr. Piddington, of Calcutta, of a notice by Father Blanco, in his 'Flora de las Filipinas.' In addition to these we have a notice in the first volume of the Trans. of the above Society, 1828, by Mr. Piddington himself, one of the gentlemen who escaped the massacre of the English at Amboyna. From these authors we learn that the Abaca is abundant in the volcanic region of the Philippine Islands, from Luzon, in the northern province of Camarines especially, to Mindanao; also in the neighbouring islands, even as far south as the Moluccа Islands, that is, in Gilolo. Hence this species may be stated to extend from the Equator to nearly 20° of north latitude. It may, therefore, very probably be easily cultivated in other countries, where there is some similarity of soil, and warmth with moisture of climate; as in India in the province of Travancore, and on the Malabar coast, also in that of Arracan, in Chittagong. Assam, in parts of Bengal, and in the northern Circars. This was one of the plants subjected to experiment by Dr. Roxburgh, in the beginning of the century. His specimens are still in the East India House. Mr. Leycester, one of the founders of the Agricultural Society of India, called the attention of its members to its fibres as early as the year 1822, when he presented the fibres of three species of Musa. These were *Musa sapientum*, *M. ornata*, and the present species, *M. textilis*. That of the latter he describes as having been formed from a coat stripped off about sunrise on that day, and having been brought into the house about ten o'clock, had received no further bleaching from the sun or in any other way; and that he had had some of it made into a neat cord, which was in no way inferior to English whipcord. He concludes his letter by congratulating the members on the fibre of their common overgrown plantains being sufficient for all the purposes of twine requires in their gardens. Some time after this was written we find it stated in the 'Proceedings of the Agricultural Committee of the Society,' 1st October, 1836, that "a row of the Musa plant, from which the China grass cloth is made, is in a flourishing condition." But, on 12th August, 1840, the Committee notice the favourable appearance of some plants of the Manilla hemp-tree (the abaca or *Musa textilis*.) *Musa textilis* is the *Abaca* of the natives of the Philippine Islands. It is found both in a wild and cultivated state, but the natural groves are considered as property. The fruit is green and hard, and of a disagreeable taste. Several villages formerly furnished yearly 1500 arobas each of the fibre, and others exported nearly as much cordage. With the produce of this plant, the natives of these villages pay their tribute, parish dues, purchase the necessaries of life, and clothe themselves. The Abaca is cut when about one year and a half old, just before its flowering or fructification is likely to appear, as afterwards the fibres are said to be weaker. If cut earlier, the fibres are said to be shorter and finer. It is cut near its roots and the leaves cut off just below their expansion. It is then slit open longitudinally, and the central peduncle separated from the sheathing layers of fibres, which are in fact the petioles of the leaves. Of these layers the outer are harder and stronger, and form the kind of fibre called *bandala*, which is employed in the fabrication of cordage. The inner layers consist of finer fibres, and yield what is called *lupis*, and used for weaving the *nipis* and other more delicate fabrics; while the intermediate layers are converted into what is called *tupoz*, of which are made webcloths and gauzes, four yards long, of different degrees of fineness. These are universally used as clothing. Some being so fine, that a garment may be enclosed in the hollow of the hand. Besides Pina fibre, fibres of "Jussi" and striped Jussi dresses were sent from Manilla to the Exhibition of 1851, and "Bijuco" fibre is mentioned. The plants yielding these fibres are not known. Mr. Bennett says, at Manilla there is an extensive manufacture of muslin and sinamaya or grass-cloth; as if, like in the notice at Calcutta, the Abaca was supposed to yield China grass. The stem-like mass consists of cellular tissue and fibres, with much thickish, watery fluid, which requires to be pressed out. The fibrous coats when stripped off, are left for a day in the shade to dry, and are then divided lengthwise into strips, three inches wide. Blanco says the petioles are stripped off one by one, and an incision is made across inside with a knife, to take off the bark which covers them. They are then scraped with an instrument made of bamboo, until only the fibres remain. Sometimes they require much pressing while be-

ing scraped. Blanco says the strips are placed beneath the cutting edge of a knife fixed in a long bamboo, which acts as a spring; and the Abaca being placed beneath the knife, is drawn through strongly by one end This must act as a scraper, but much of the Abaca is said to be spoiled. When sufficiently scraped, the bundle of fibres may be shaken into separate threads; sometimes they are washed, and then dried and picked—the finest being separated by the women with great dexterity. Those for cordage require no further preparation. Those for fine weaving are rendered soft and pliable by beating them with a wooden mallet, after having been made up into a bundle. They are then fastened to each other by "almost invisible knots"—but rather, have their ends gummed together, as in the case of the Pine-apple fibre—then wound into balls, and afterwards committed to the loom. Don Luis Nee describes the Abaca as being dressed like flax on a kind of heckle—a sort of saw which operates like the heckle (Blanco). Mr. Piddington describes it as a bamboo scraper, into the slit of which the Abaca is introduced, and which being dragged downwards, acts as a scraper on both sides. The stuffs, when woven, are soaked in warm water (lime-water, Blanco) for twenty-four hours, after which they are soaked in cold water, then put into rice water, and, lastly, washed as before—by which means they acquire lustre, softness, and a white colour. Some are also dyed, and take different colours (as blue and red). Others are embroidered. Few are imported into Europe, but seem often to be confounded with grass-cloth. These details have been given in order that the proper treatment may be followed if the plant is cultivated in India; or some of them may be applied to the other kinds of Musa cultivated in India - the fibres of some of which may have a portion of the properties of the Manilla Hemp as cordage. Mr. Piddington had no doubt that when the Manilla Hemp was better known, it would be more appreciated, especially if properly manufactured: the great defect of Manilla-made rope being its stiffness in rainy weather, arising from the coarseness of the yarns—not more than three being to a strand, which should have nine or twelve. This, Mr. Piddington had ascertained in a vessel commanded by himself, in which both kinds were used: and the latter (made by himself) was at all times as pliant as hemp. It bears tarring well, and he had known it used for lower rigging with success. In a subsequent volume of the 'Transactions,' in the year 1840, Mr. Stewart Mackenzie, then Governor of Ceylon, forwarded to the Agricultural Society of India. a specimen of Manilla rope, with a note from Mr. Higgs, Master-Attendant at Trincomalee. In this the latter observes, "that shortly after the arrival of the Melville in this country, in 1832, Sir John Gore procured rather a large supply of the different sizes (of Manilla rope) for the squadron, from seven inches to one inch. 'In that ship we made extensive use of it, reeving it on one side of the ship against Europe rope on the opposite side, and it is from a close observation of its merits, that I have formed the opinion of its being very superior to Europe rope in this country, particularly if this has been long in store here." Mr. Higgs regrets that the Manilla rope is not better laid; and observes that Capt. Naish, one of the oldest captains in the China trade, was in the habit of bringing the large rope from Manilla, and laying it up afresh at Bombay, and tarring the yarns; when it became excellent rope for shrouds. The price of Europe rope at the Naval Yard at Trincomalee, was then £2 7s. 3d. per cwt, while the price of the Manilla rope (without freight) was £1 12s., and it was one fifth lighter than Europe rope.—*Royle, p.* 69. Having seen the rate at which such materials may be imported, both from the East and the West Indies, it is desirable to have some idea of the prices which are likely to be realised for Plantain fibre or pulp, when introduced into the markets of Europe. Manilla Hemp, which has long been in demand both in America and in Europe, had a nett average price, for the ten years previous to 1852, £32 per ton. In part of the years 1844 and 1845, it sank as low as £22 to £25; and the consumption increased so much, that the price rose, in 1852, to £44 and £50 for the average kinds; but, independently of what was used for cordage and coarse purposes, there was a considerable consumption of the fine, white qualities, for which horse-hair had originally been used. In the rise which took place in April, 1854, Manilla Hemp was quoted at from 70s. to 76s. per cwt. Though common Plantain fibre is not possessed of the strength of Manilla Hemp, yet it is fitted for many of the ordinary purposes of cordage and canvass, and some of the fine kinds for textile fabrics of fine quality and lustre. In the communication from Demerara, already quoted, it is stated that "in 1846, a gentleman (probably Mr. May) visited this colony, and exhibited several specimens of cloth of a beautiful silky texture, and specimens of paper of superior quality, manufactured from the fibre of Plantains grown in the Jardin des Plantes." There is no doubt that some of the more delicate fibres of the interior might be used for such purposes; and for these, a high price would no doubt, be realised; and for the coarser, outer fibres, which are fit for cordage, at least £30, some say £35, a ton; while some of the superior tow would be a good substitute for horse-hair, for stuffing beds, &c.; and the different qualities of half-stuff producible from the combings, &c., of different parts of the plant, would produce half-stuff, at least equal in value to the rags which sell in ordinary times from 16s. to 20s. a cwt. But when its qualities

are better known, it probably would sell at still higher rates, as there would be no labour in sorting, and no loss of material in cleaning. Mr. Betts was induced in India, to attempt the preparation of the fibre, from seeing a remark in the 'London Price Current,' of Dec., 1839, that considerable supplies of a new sort of Hemp from the stalk of the Plantain tree had realised from 6*d.* to 8*d.* per lb.; and the Society of Arts were induced, as long since as the year 1762, from the apparent importance of the subject, to offer a premium for the production of this fibre (*v.* 'Jury Report,' p. 102). Therefore, even with the least sanguine expectations, and on the most moderate computations, there is every prospect of a certainty of demand, accompanied by remunerative prices. With this in view, we may conclude our observations on this subject, which may appear to occupy too much space, and to have been treated of too much in detail. But if properly considered, it cannot but appear of vast importance to the natives of tropical countries, and to planters and colonists abroad, to utilise so valuable and abundant a product, which is now allowed to run to waste, and of which, if they increase the cultivation, they will at once attain the two-fold object of multiplying the supply of food for the body, at the same time that they are increasing materials for diffusing information for the mind.—*Royle, Fib. Plants.* Musa textilis grows freely in Singapore.—*Royle Fib. p.* 377. This species of banana, is a native of the Philippine and of some of the more northerly of the Molucca Islands. On account of its filaments it is extensively cultivated in the first of these, particularly in the provinces of Camarines, and Albay in the great island of Luzon, and in several of the Bisaya Islands, a range lying south and east of it. The name abaca belongs to the Tagala and Bisaya tongues, but is not the generic name of the banana in either of them. By the Spaniards of the Philippines the plant is known under the name of arbol de canamo, or the hemp tree, from which no doubt, is derived our own commercial one for the filament "Manilla hemp." The abaca, like other bananas, is propagated easily by the suckers which spring up at the roots of the old plant when it dies. A measure of 5000 square yards of land will grow 1000 abaca plants. It grows to the height of 13 or 14 feet exclusive of the leaves. The fruit is small, of a disagreeable taste, and not edible. When it is about to form, the plant is cut down, and the stem being cut open longitudinally, is found to contain a great quantity of filaments of various thickness, and usually a couple of yards in length. These are extracted, hackled after the manner of flax, and then sorted. Some of the finest are as slender as a hair of the head, and these are reserved for the manufacture of cloth, while the coarser are appropiated for cordage from the smallest rope to a ship's cable. In the husbandry of the Philippines, the abaca is of more importance than cotton. When or how its culture came to be first introduced is not known. In his enumeration of the plants of the Philippines on their first discovery in 1521, Pigafetta does not include the abaca, although he mentions cotton and the esculent banana; but it is possible enough that so peculiar a production may have escaped his notice. Dampier, in his account of Mindano, where he resided for six months in 1686, not only mentions the textile banana, but gives an ample and accurate description of the mode of extracting the thread from the trunk. "As the fruit of this tree," says he, "is of great use for food, so is the body no less serviceable to make cloths, but this I never knew till I came to this island. The ordinary people of Mindano do wear no other cloth." After this follows the account of the process of extracting the fibres, which is well worth perusal. The Dutch have of late years introduced the culture of the abaca into the northern or volcanic peninsula of Celebes, where it seems to be indigenous, and with a fair prospect of success. There is a large exportation of abaca in the forms of raw hemp and cloth, but especially of cordage, from Manilla.—*Crawfurd, Dit. p.* 1.

(5503) MUSCARDINE, the name given to a disease to which silk-worms are subject, and which often causes great injury to those who cultivate these animals for the sake of their silk. This disease is attended with the development of a fungus belonging to the genus *Botrytis*, and has been named by Balsamo and Montagne *B. Bassiana*. This plant, which is characteristic of the disease, can be propagated by the introduction of spores into a healthy caterpillar. The result of the changes produced upon the blood and tissues of the animal is its death. This disease is much more common some years than others. It frequently spreads to other insects; and the caterpillars of other *Lepidotera* can be inoculated by the spores of the *Botrytis*. When once the disease has appeared there seems to be no means of checking it. The best mode of prevention is to take care that the caterpilllars are not over-crowded, and that they have a sufficient supply of fresh food. The predisposition to this disease amongst silk-worms seems to be brought on by the same causes as those which act upon the human system, and render it favourable to the attacks of epidemic diseases. (Robin, *Hist. des Vegetaux Parasites.*)

(5504) MUSCICAPIDÆ, *Flycatchers*, a family of insectivorous Birds, so named from their mode of taking their prey. Thus, M. Temminck states that the Flycatchers (Gobe-Mouches) feed entirely on flies and other winged insects, which they catch as they fly ('Manuel d'Ornithologie') and our countryman White says:—"There is one circumstance characteristic of this bird (the

Spotted Flycatcher, *Muscicapa grisola*) which seems to have escaped observation, and that is it takes its stand on the top of some stake or post whence it springs forth on its prey, catching a fly in the air, and hardly ever touching the ground, but returning still on the same stand for many times together." ('Nat. Hist. of Selborne.')

Eurylaimus.—Bill broader than the head; under mandible very thin, particularly at the base. Nostrils basal, transverse, oval; the aperture naked. First quill slihgtly second almost imperceptibly graduated. Tail short, rounded. *E. Javanicus* (*E. Horsfieldii*, Temm). Entire length eight inches. Head, sides of the neck, and the whole of the neck and body underneath violet, or rather vinous, varying in intensity. The part of the forehead around the bill nearly black. Upper part of the neck brown, darker towards the back, where the tint is sooty. Wings very deep blackish-brown above, more intense near the shoulder, and lighter towards the extremity. A yellow streak between the coverts and secondary quills. Wings beneath from the axillæ to the shoulder yellow, which borders the wing externally. Tail-coverts black at the base and yellow at the tips, so that the rump appears yellow, which is the colour at the vent. Two intermediate tail-feathers black, four next on each side black, with a white transverse band near the extremity. On the two external feathers the band is near the middle, and rather broader. Bill reddish-brown at the base, with both mandibles irregularly variegated, and striped towards the extremity; culmen yellowish; cutting-edges intensely black and shining. Tarsi and toes dusk-yellowish; claws brown, inclining to black. Dr. Horsfield is of opinion that from the observations of Sir Stamford Raffles, in the catalogue of a zoological collection made in the island of Sumatra under his direction, and communicated to the Linnæan Society, we can also in some measure determine the range of this genus: "It extends," continues the Doctor, "from Sumatra eastward to Singapura, and thence south to the eastern extremity of Java near the Straits of Baly, where I discovered it in the year 1806; since that period I have not met with it again. We are indebted to Sir Stamford Raffles for the following remarks on the first species:—'It frequents the banks of rivers and lakes, feeding on insects and worms. It builds its nest pendent from the branch of a tree or bush which overhangs the water.' I found it in Java, in one of the most distant and inaccessible parts covered with extensive forests and abounding with rivers and marshes." Dr. Horsfield placed the genus among the *Meropidæ* or *Syndyctylæ*.—*Eng. Cyc.*

(5504) MUSHROOM. [AGARIDUS; FUNGI.]

(5505) MUSHROOM.

Koodruttee, HIND.

Commonly found all over the country during and after the rains.—*Riddell.* A tribe of fungus plants (*Agaricus*), some species of which are used for pickling, in making catsup, and for using fresh. Many kinds are poisonous, and it is only by experience that the edible varieties can be distinguished.—*Faulkner.* Mushrooms are often seen in the Tenasserim bazar, and the Karens have names for sixty-four different species of mushrooms and the allied fungi. They distinguish the edible from the poisonous kinds, they say, by touching them with the lime that they eat with the betel. If the fungus turn red when touched, it is regarded as poisonous. But they are so careless or ignorant, that sickness and death often ensue after eating them.—*Mason.*

(5506) MUSICAL INSTRUMENTS, *both European and Native, form an article of import and of internal traffic.* The principal instruments of the Mahomedans are the Sectar: Moorchung; Duff; Thekree: Poonggee; Meerdung Munjeera: Ghuggree; Ghoongroo; Sarung D'hol; Soor; Shuhnall; Banka; Qurna; Tooree or Toortooree: Sunkh; Nugara; Dunka; D'hubboos: Tukkoray or Zer Bum: Khunjooree Dacera; Dubla Puk' hawuj; Tasa; Murfa, Been or Vina, Keenggree; Doroo; Munjeera Ghoongroo. The Hindoos, in addition to the above, have the Tumboorah: Kinnarah: Juck-kee, Ghatum, Khunjeree Senkum Gyrekaulah, Pillungovee Theeroo-chenum; ulgojah, Pawmoolah naga-sarum Bhooree Naga-saurum Dhamawyee Muddal Sooreyah Vawyedium Tittee Doloo Commoo Tuppettah Toodoomoo Bhairie; Toora-ka-naga saramooloo, Aurabee Toorak Dunmawyee, Brumah Taulum, Dhasaree Tapettah Undhaoodooca Chetecaloo, Booragah Talm.

(5507) MUSK.

Miskh, Muskh, ARAB.	Moschus, LAT.
Rutta, Ooroola, CYNG.	Jebat, MAL.
Desmer, DAN.	Miskh, Muskh, PERS.
Muskus, DUT.	Almiscar, PORT.
Musc, FR.	Kabarga, Muscus. RUS.
Bisam, GER.	Mooshka, Castoorie, SANS.
Kustooree, GUZ. HIND.	Almizele, SP.
Muschio, IT.	Custoori, SANS. TAM, TEL.
Dedes, JAV.	

Humor in folliculo præputii secretus, *London* Concretum Moschus dictum, *Dublin.* Inspissated secretion in the follicles of the prepuce, *Edinburgh*, of MOSCHUS MOSCHIFERUS, Linn. Musk. The Musk animal differs from common Ruminants in the absence of horns, and in having long canine teeth on each side of the upper jaw. It inhabits the mountainous regions of central Asia, extending from the Himalayas to the Altai mountains, and from these to China. Hence, as in the case of Rhubarb from the same regions, we have Russian, China, and Indian Musk. It is singular that the common Hindoo name of the Musk, and in the Himalayas that of the Musk animal, is *kustooree*, a name similar to Castoreum a substance which Musk so closely resembles in

nature. The name *musk* is no doubt derived from the Arabic *mishk* or *mooshk*, which is evidently the same word as the Sanscrit *mooshk*. This has been used as a perfume and as a medicine by Hindoos from very early times. It seems to have been adopted from Serapion, but it was previously mentioned by Ætius. The animal bears a close resemblance to the Deer tribe in shape and size. It is usually less than three feet in length, with the haunches somewhat more elevated than the shoulders. The want of horns and the projecting canines have already been mentioned. There are altogether 32 teeth : namely, 8 incisors in the lower jaw, 2 canines in the upper, and 24 molars. The canines are not met with in the female. The ears are long and narrow, and the tail very short. The fleece, which consists of strong, elastic, undulated hairs, varies in colour with the season, the age of the animal, and perhaps the place which it inhabits. The general colour is a deep iron-grey. The individual hairs are whitish near the root, and fawn-coloured or blackish towards the tip. The gestation of the female was quite unknown until Mr. Hodgson in Nepal ascertained that it was about 170 days. They are extremely timid, mild, and gentle in their nature. Found on the tops of difficultly-accessible and generally open mountains, usually in the neighbourhood of the snow, but coming nearer to the plains according to the inclemency of the seasons, springing from rock to rock with great agility. The Musk animal is particularly distinguished by the males secreting the remarkably strong smelling secretion called Musk, in a planoconvex oval, hairy bag, of which the orifice is situated just before the præputial orifice. The sac is flat, smooth, and naked above where it is applied, against the abdomen, convex, below, and hairy, composed of several coats. The musk is secreted by small gland-like bodies situated in little pits on the most internal of these coats. The quantity in each sac varies from 1½ to 3 drachms It is most abundant in the rutting season and when fresh is soft, and of a reddish brown colour When dried, and contained in its native sacs, i forms the Musk of commerce. The kinds known are the Chinese and Siberian ; the last is inferior in its fragrance to the other. The Chinese is probably from the same kind of cold and lofty region as the Himalayan. Some of this is imported into and apparently consumed in *India Rogle* Musk is in grains or lumps, soft and unctuous to the touch, of a reddish-brown colour, with a powerful, penetrating, and diffusive smell. It is usually adduced as an instance of the subtlety of the particles of matter. The taste is bitter, disagreeable, and somewhat acrid; readily inflammable. Rectified Spirit and ether are the best solvents of Musk. Analysed by different chemists, it has been found to contain a variety of principles, as Stearine, Elaine, Cholesterine, an Oily Acid combined with Ammonia, free Ammonia, various salts, and animal principles, as Albumen, &c., an odoriferous principle which seems particularly attached to the Ammonia. But the quantity and proportion of the constituents vary considerably, perhaps from the difficulty of obtaining specimens which have not been subjected either to abstractions or to additions. The hunters even are said to adulterate it, and if they do not the Chinese merchants do so. —*Royle.* Musk, then, is the unctuous secretion of a glandular pouch or sac,, situated in the skin of the abdomen of the musk-deer (*Moschus moschiferus*), an inhabitant of the great mountain range which belts the north of India and branches out into Sibeiria, Thibet and China. It is also found in the Altaic range near Lake Baikal, and in some other mountain ranges, but always on the borders of the line of perpetual snow. It is from the male only musk is produced and the secretion when dry is of a dark brown or black colour, and somewhat granular. Its taste is bitter, and its peculiar and penetrating odour is well known. It was formerly held in high repute as a medicine, and it is still so among eastern nations. The musk-deer is eagerly hunted for the sake of its costly perfume, which, however, is always much adulterated. Tavernier says that the odour of musk, when recent, is so powerful as to cause the blood to gush from the nose, and in this way he would account for the supposed adulteration of the article with dried blood. Chardin also says, "It is commonly believed that when the musk-sac is cut from the animal, so powerful is the odour it exhales, that the hunter is obliged to have his mouth and nose stopped with folds of linen, and that often in spite of this precaution the pungency of the odour is such as to produce so violent an hæmorrhage as to end in death. I have heard the same thing talked of by some Armenians who had been to Bootan, and I think it is true. The odour is so powerful in the East Indies that I could never support it ; and when I trafficked for musk, I always kept in the open air, with a handkerchief over my face, and at a distance from those who handled the sacs, referring them to my broker : and hence I knew by experience that this musk is very apt to give headaches, and is altogether insupportable when quite recent. I may add that no drug is so easily adulterated or more apt to be so." Tavernier states that at Patna he once bought 1,673 musk-bags weighing 2,557½ ounces, containing 452 ounces of pure musk.—*Tomlinson.* Two musk-deer, called "kosturah" by the mountaineers were seen by Dr. Hooker in East-Nepaul. The musk, which hangs in a pouch near the navel of the male, is a well-known object of traffic in Bengal. This creature ranges between 8000 and 13,000 feet, on the Himalaya, often scenting the air for many hundred yards. It is a pretty

grey animal, the size of a roebuck, and something resembling it, with coarse fur, short horns, and two projecting teeth from the upper jaw, said to be used in rooting up the aromatic herbs from which the Bhoteeas believe that it derives the odour of musk. This he much doubted because the animal never frequents those very lofty regions where the herbs supposed to provide the scent are found, nor had he ever seen signs of any having been so rooted up. The *Delphinium glaciale* smells strongly and disagreeably of musk, but it is one of the most alpine plants in the world, growing at an elevation of 17,000 feet far above the limits of the kosturah. The female and young male are very good eating, much better than any Indian venison he ever tasted, being sweet and tender. Mr. Hodgson once kept a female alive, but it was very wild, and continued so as long as Dr Hooker knew it. Two of his Lepchas gave chase to these animals, and fired many arrows in vain after them: these people are fond of carrying a bow, but are very poor shots.—*Hooker Him. Jour.* vol. 1. p. 269. This substance is an extremely odorous secretion, lodged in a bag which is attached and peculiar to the abdomen of the male Musk-Deer (*Moschus Moschiferus.*) The elevated regions frequented by the creature, its timidity, and speed in flight, render it very difficult to obtain the substance, while the high price borne by it offers great inducements to substitute other articles for that which is genuine. The musk-bag varies much in form, colour, size, and quality, circumstances which suggest the belief that it is procured either from two or more species of musk-animals, or that it has been obtained at different periods of the year, or from very differently-aged animals. In the very young animal the bag is quite empty, while in the old and feeble the musk is in small quantity and of inferior strength. It is said to be secreted in greatest abundance during the rutting season, and to have then its sensible qualities most developed. The secretion has a much stronger odour in the animal which inhabits Tibet and China than in that which frequents the more northern districts of Siberia. In the fresh state the musk has an extract like consistence and a reddish brown colour, with are odour so powerful that the huntsmen can scarcely endure it. This odour diminishes by drying, and the musk acquires a friable granular state, and a dark brownish colour. In Siberia the chase occurs in spring and summer. In Tibet the pursuit is restricted by the government to certain periods, and the bags which are obtained are stamped with the royal signet. In commerce two and occasionally three varieties of Musk are met with. The Tonquin, or Tibet Musk, occurs in small oblong rectangular boxes, lined with lead, and covered with paper or silk. Each bag, or pod, as it is termed, is wrapped in thin lube or red paper on which are marked some Chinese characters. Sometimes the bags are enveloped in a deep yellow brownish nearly transparent paper, which becomes brittle by time. The most distinctive mark of this sort of musk is, that it is slightly flattened, nearly round, and very rarely pear-shaped. The yellow or yellowish-brown hairs chiefly at the sides, are often cut, while those which remain in the centre are darker coloured, finer, and less bristly. Generally the hairs converge or point towards a small natural opening. The pods are mostly about two inches and a half long and one inch and three-quarters broad. The weight of different specimens varies considerably, some being merely 3 drachms 30 grains, others 9 drachms 47½ grains; the average is 6 drachms 12 grains. The average quantity of musk contained in the sacks is about 2½ drachms. By careful removal of the bag there remains the musk, which is solid, in grains of different sizes, adhering to each other, soft and unctuous to the feel, of a reddish-brown colour, like a clot of blood dried, having frequently a number of hairs intermixed, derived from the inner side of the orifice already described. The taste is bitterish, acrid, disagreeable, and somewhat astringent. The odour is strong, peculiar (musky), penetrating, very lasting, and extraordinarily diffusible. It is stated that a single grain can constantly fill the air of a larger apartment with a sensible impregnation for many years, without its weight being perceptibly diminished; and one part can communicate its odour to 3000 parts of an inodorous powder. It should be kept in glass-bottles, very closely stopped, and preserved in a place neither very dry nor too damp. By the analysis of Geizar and Reiman it appears to consist of—1, a peculiar volatile principle (which can exist in a free state); 2, ammonia; 3, a peculiar fixed uncrystallisable acid (these three are in undeterminable quantity); 4, stearine and oleine; 5, cholesterine; 6, a peculiar bitter resin; 7, osmazome, with several salts; 8, a mouldy like substance, in part combined wih ammonia, and numerous salts; 9, sand; 10, water, acid, &c., with some volatile odorous matter. It has not been ascertained upon what musk depends for its peculiar properties. It has been conjectured that a kind of putrefaction goes on which evolves the peculiar odour. Moisture seems to favour this, and musk which when dry yields little scent, becomes powerful when moistened. The odour is augmented by adding a few drops of the solution of subcarbonate of potass.

2. Kabardin, Russian or Siberian Musk, is either received through St. Petersburg, or, it is said, sent to China, and laid, for some time among the bags of genuine Tonquin Musk, to acquire the odour of the latter and then shipped to Europe. The pods of this sort are in general larger, more oval, more compressed, and the

margins often have large portions of the skin of the abdomen attached to them. The colour of the hairs is a dirty milk-white. The musk exhibits a more homogeneous and less granular appearance, having a much fainter odour and taste than the preceding kind. The odour is augmented by moisture, but is somewhat nauseous and disagreeable. The wood cuts show the difference of aspect of the two kinds. Musk is more soluble in water than in alcohol. Of 100 parts of genuine Tonquin Musk, boiling-water dissolves 90 parts, alcohol only 50. Of Kabardin Musk water dissolves only 50 per cent. It is likewise soluble in ether, acetic acid, and yolk of egg.

3. A very small kind of pod is sometimes met with, which is not flattened, but perfectly round: the hairs of a yellowish-brown colour. This is probably the musk-bag of the *Moschus Altaicus*. It is safest to purchase the musk out of the pod, as there is then less opportunity of adulteration. Infusion of genuine musk is not precipitated by a solution of bichloride of mercury (corrosive sublimate); but genuine musk is precipitated by nitric and other strong acids, by acetate of lead (sugar-of-lead), and infusion of galls. The musk-bags are used by perfumers to prepare Essence of Musk. An artificial musk is sometimes made with nitric acid and oil of amber.—*Eng. Cyc.*

(5508) MUSK OKRO, Musk Hibiscus Musk Plant Abelmoschus Moschatus.

Hubb-ul musk, Arab. | Kala-Kustoorie, Guz, Hind.
Kapu Kinaissa, Cyng. | Cattu Gasturi, Mal.

The seeds of the (*Hibiscus Abelmoschus*), a native of the East Indies and South America. They are brown, kidney-shaped, the size of hemp seed, slightly compressed, striated, with parallel streaks, and covered with points slightly hollowed. In smell and taste, these seeds resemble a mixture of musk and amber. They are much esteemed in India for their cordial, stomachic, and antispasmodic virtues. In a powdered state, they are used as an adjunct to coffee by the Arabs. *Faulkner*. One of the most gaudy flowering shrubs in the Tenasserim country is the musk plant, whose large yellow blossoms with blood colored eyes are sometimes seen bedecking European grounds, and whose seeds have been said to be an antidote to snake bites.—*Mason*.

(5509) MUSK-RATS TAILS, are the tails of the *Ondatra*, (Lacepede) the Musquash of North America, of which there are three varieties, the black, the pied and the white. The animals are hunted for their furs and upwards of one million of skins are imported into England annually for hat making: their tails are covered with a thin sleek coat of short hairs, have a pleasing odour of musk and are greatly prized in Russia and the Maldive Islands. Their abundance in the northern parts of Russia impress use with the belief that the animal also inhabited Siberia, The Musquash is easily tamed, soon becomes attached and is cleanly and playful.—*Nobis, Eng. Cyc.*

(5510) MUSK-ROOT, the root of a plan brought to England from Russia and Persia and known also by the name of Sumbul. This root exhales a powerful smell of musk, and has been used in medicine as a substitute for that substance. The plant yielding it is not known, but the root has the appearance of belonging to the natural order *Umbelliferæ*. Its tissues are full of starch.—*Eng. Cyc.*

(5511) MUSKA KA JHAR. Hind

(5512) MUSKITO, Mosquito.

Muchr, Hind. Tam. | Tel.

In a former work on China, 'A journey to the Tea Countries, Mr. Fortune noticed a curious subtance called "mosquito tobacco," or "mosquito physic," for it is known by both of these names, which he had met with for the first time when travelling in the western parts of the province of Chekiang on his way to the Bohea mountains and the great black-tea country of Woo-e-shan. He says, The day before the discovery was made had been very hot, and during the night such swarms of mosquitoes came that neither my servant nor myself had been allowed to close our eyes. I had no curtains with me, and looked forward with dread to many such sleepless nights during the journey. "Why don't you procure some mun-jung-ean?" said the boatmen to my servant Delighted to find there was some simple remedy, I sent on shore to the first village we passed, and procured some sticks of this invaluable substance. I found it answer the purpose admirably, and used it every night during the remainder of that journey whenever I happened to sleep, whether in boats, in temples, or in the common inns of the country.—*A Res. among the Chi. p.* 108. Years after, during this Traveller's residence in China, on inquiring as to its composition from a person, at first he was very communicative. He informed him the following articles were used: namely, the sawings of juniper or pine trees (pih heang fun, or sung shoo), artemisia-leaves reduced to powder (nai-hai) tobacco-leaves (ean fun), a small portion of arsenic (pe-za), and a mineral called nu-wang. With regard to the proportions of each, it appeared that, to thirty pounds of the pine or juniper sawings, about twenty of artemisia, five of tobacco, and a small quantity of arsenic were added. But ere we had come to this point my informant's jealousy had been aroused, and his statements were evidently not much to be depended upon. He now began to question me in return for the answers he had given. "What did I want this information for? if I wanted to buy the article he had it for sale, and it was cheap enough."—*A Res. among the Chi. p.* 111. From subsequent inquiries, he ascertained the composition to be Pine and juniper sawings, wormwood leaves, and tobacco-leaves, reduced to powder, a

small portion of nuwang and arsenic. Each article was well beaten up with water, then the whole mixed together, and in the form of a thick paste rolled on a slip of bamboo. On exposure to the air the substance dried quickly, and was then put away for sale. When finished the sticks are somewhat like the common joss-sticks of the country, or about the thickness and length of a light walking cane. Another substance, much cheaper than the last, is found in every town and village in the central and eastern provinces of the empire where I have been, and no doubt it is in use over the greater part of China. Long, narrow bags of paper—say half an inch in diameter and two feet long—are filled with the following substances, namely, the sawings of pine or juniper mixed with a small portion of nuwang and arsenic. The proportions are thirty pounds of sawings, two ounces of nu-wang, and one ounce of arsenic. This mixture is not made up in the form of a paste like the latter but simply well mixed, and then run into the bags in a dry state. Each bag being filled is closed at the mouth, and then coiled up like a rope and fastened in this position with a bit of thread. Many hundreds of these coils neatly done up and placed one above another, may be seen exposed for sale in shops during the hot season, when mosquitos are numerous. When about to be used, the thread which keeps the coil together is cut, then the coil is slightly loosened, so that its sides do not touch each other, for if this happened it would ignite at various parts and soon be consumed. The outer end is then lighted, and the whole is laid carefully down upon a bit of a board, when it goes on burning for the greater part of the night. One hundred of these little coils may be bought for a sum equivalent to three pence of our money, and two of them will suffice for a night in an ordinary sized room. A third substance cheaper than either of the above, is made of species of artemisia or wormwood (A. indica) which grows wild on every hill in this part of China. It is the same kind I have already noticed as forming one of the ingredients in the genuine mosquito tobacco, and is that which was used in taking the honey from the bees in the temple of Teinting. It is gathered and thoroughly dried, then twisted or plaited into ropes, in which condition it is fit for use. Although cheaper and consequently more in use amongst the poorer classes, than the other kinds, it is not so efficient and it gives out more smoke than is agreeable to a European.—*Ref. among the Chi.* p. 113.—See BANE, Mac Mosquito.

(5514) MUSLIN.

Neteldoek, DUT.	Mousseline, IT.
Mousseline, FR.	Kisiea, RUS.
Musselin, GER. GUZ.	Muselina, SP.
Muslin, ENG.	Sana Sella PEL.
Saila HIND.	

A fine cotton fabric, extensively manufactured at Manchester, Glasgow, in France, &c. There are a great variety of kinds and qualities, as, book-muslin, cambric-muslin, mull-muslins, &c. Formerly all muslins were made in the East, and Dacca in Bengal was formerly celebrated for "its webs of woven wind." The Dacca muslin manufacture, which once employed thousands of hands, is quite at an end, so that it was with great difficulty that the specimens of these fabrics sent to the Great Exhibition of 1851, were procured. The kind of cotton (which is very short in the staple) employed, is now hardly grown, and scarcely a loom exists which is fit for the finest fabrics. The jewellers still excel in gold and silver filagree.—*Hooker. Him. Jour. Vol.* II. *p.* 254. At the Madras Exhibition of 1855, the Cambric Muslin bleached and the Isree exhibited by Veeraboruna Kristnama Chetty were of a very superior quality and the Jury considered the Manufacturer entitled to a reward of a 2d Class Medal.—*M. E. J. R.* The most celebrated of Indian muslins was that of Dacca Cotton grown in the vicinity, the thread from which does not swell. Chicacole, Upada a few miles north of Cocanada formerly produced fine muslins and at present a strong muslin, generally checked, is procurable at Chicacole at 3 to 6 Rupees per piece of 8 yards, I have had it made to order of very good quality at 11 Rupees the piece. The famous Arnee Muslins, of which *Book* Muslins are an imitation, are prepared near and at Arnee in the Chingleput district: they sell according to quality from ? to ? the piece of ? yards ? inches broad.—*Rhode, M. S. S.*

(5515) MUSQUASH. Is the skin of the musk-rat, a diminutive species of beaver, which is largely used as a hatting fur.—*Waterston.*

(5516) MUSSÆNDA WALLICHII. A species of mussænda with corymbs of orange-colored flowers, and a single sepal expanded into a large white leaf, is not the least interesting shrub to the eye of the curious. In Calcutta an allied species is cultivated in the gardens, but its abundance in Tenasserim forests prevents its introduction into European gardens on this Coast.—*Mason.*

(5517) MUSTARD, BLACK. TETRADYNAMIA SILIQUOSA, Linn. Sinapis, L. Semina, L. Sinapi, E. D. Pulvis Seminum, D. Flour of the Seeds, E. Sinapis Nigra, *Linn.* Common Mustard consists of the flour of the seeds of the Black Mustard, though generally mixed with that procured from the seeds of the White Mustard, or Sinapis alba, and deprived of fixed oil by expression. Both species have been long used in medicine, being the *napu* of Hippocrates, and the Sinapi of the Romans. The Black Mustard is indigenous in almost every part of Europe. *Bot. Ch.* The root is thick and fleshy, the stem about 2 to 3 or 4 feet high, hispid below, with smooth round branches above. Lower leaves large, rough, lyrate, variously lobed and toothed; upper

ones narrow, lanceolate, smooth, dependent. Calyx yellowish, equal at base, spreading. Petals obovate, yellow, spreading. Silique small erect, or placed close to the stem, obtusely quadrangular, nearly even and smooth, tipped by a short quadrangular style, but without the proper, often seed bearing beak of the genus; the valves convex, with one straight dorsal nerve, and a few lateral anastomosing veins. Seeds numerous in a single row, small, round, blackish brown.—*Royle.* Fig. 41.—E. B. t. 96.

Sinapis arvensis, Charlock, or Wild Mustard, E. B. t. 1748, has its seeds sometimes substituted for the Black Mustard. It may be distinguished by the long sword-like beak of the pods, and by the valves being three nerved. The Black Mustard wanting these, has been removed to the genus Brassica by Koch and other botanists. The Mustard plant is officinal on account of its seeds, or rather of the flour of these seeds, so well known as a condiment by the name of Mustard. But Dr. Pereira learnt that the best flour of Mustard is prepared by crushing the seeds of both Black and white Mustard between rollers, and then pounding them in mortars, when they are twice sifted to yield *pure flour of mustard*. Dr. Christison's information confirms that of Dr. Pereira, that common flour of mustard is adulterated, partly on account of the pungency of Black Mustard seed. "Two bushels of black, and three of white seed yield, when ground, give 145 pounds of flour; which, to diminish the pungency and improve the colour, is mixed with 56 pounds of wheat flour and two pounds of turmeric; and the acrimony is restored without the pungency, by the addition of a pound of (capsicum) chilly pods, and half a pound of ginger." (c.) Dr. Thomson says he could detect no turmeric, nor cayenne pepper in the specimen which he examined. The *pure flour* of Mustard ought alone to be used officinally. Though Black and White Mustard have both been minutely examined by several chemists, they still require further investigation. The former contains a Fixed Oil, Gummy matter, Sugar, a colouring and a peculiar green matter, a Fatty pearly matter; *Myronic acid* in combination with Potash, or Myronate of Potash (the Sulpho-Sinapisin of Henry and Garot) *Myrosyne*, *Sinapisin*, and some salts.

Sinapis alba, Linn. E. White Mustard. The white Mustard is mentioned in the Edinburgh Pharmacopœia as well as the black (v. supra). It is, like the former species, indigenous in most parts of Europe, and may like it have been employed by the Greeks, as it possesses nearly the same properties. *Bot. Cl.* Root tapering, small. The stem 1—2 feet or more high, round, smooth, or slightly hairy. Leaves lyrate, irregularly lobed or pinnatifid, roughish, Sepals linear, green, horizontal. Flowers large, yellow. Silique hispid, spreading on nearly horizontal stalks, short, tumid or knotty from the prominent seeds, shorter than the sword shaped beak; valves with 5 straight strong nerves. Seeds few on each side, large and roundish, pale yellow coloured, having in the interior a yellow mass, which is covered by a thin pellicle of what must be composed of condensed mucilage. Fig. 42.—E. B. t. 1677. White Mustard seeds yield about 36 per cent. of fixed oil, and when macerated in water, a thick mucilaginous, almost insipid liquor, while Black Mustard seeds give little mucilage, but a pungent taste to the water. According to the analysis of John, these seeds contain.—1. An acrid volatile oil. 2. A yellow fixed oil. 3. Brown resin. 4. A very little extractive. 5. A little gum. 6. Lignin. 7. Albumen. 8. Phosphoric acid, and salts. White Mustard does not furnish volatile oil; but, in certain circumstances similar to those with Black Mustard seed, a fixed acrid principle is produced, which, like the volatile oil of Black Mustard, did not previously exist. The *fixed acrid principle* is an unctuous liquid of a reddish colour, without odour, but having a biting acrid taste, analogous to that of Horseradish root. It contains Sulphur. M. Faure states that this same principle is formed in small quantity when Black Mustard is treated with water. *Erucin* which does not redden the salts of Iron, and contains no Sulphur, is another principle found by Simon. *Tests.* As the common flour of Mustard is that usually employed, instead of the powder of Black, or the mixed powders of the Black and White Mustard, as in the E. P., so it often contains adulterations along with the true flour. But as Mustard flour is sometimes exhibited internally, it is desirable to have it in a pure form. The adulteration of wheat flour can be easily detected, by the test of the Edinburgh Pharmacopœia. "A decoction allowed to cool is not turned blue by tincture of Iodine." Mustard flour is weakened by the addition of wheat flour. A sinipism of mustard may be made with bread-crumb, or the Mustard flour may be spread on a poultice; vinegar is worse than useless, as like other acids, it prevents the formation of the acrid principle. Messrs. Trousseau and Pidoux found boiling water unnecessary, as a cold poultice produces the same effect as a hot one, but takes a little longer time to produce its effects. The volatile oil is a powerful rubefacient and vesicatory, in the proportion of 1 part to 20 of proof spirit.—*Royle.* Dr. Hassall tells us that the plants from which mustard is obtained are, Sinapis nigra or black, and Sinapis alba, or white mustard, they belong to the natural family Cruciferæ. The black mustard plant is distinguished by its seed vessels, which are smooth, and the colour of the seeds themselves, which are reddish or blackish brown. In the white mustard plant the vessels or pods are clothed with hairs which render them rough

and the seeds are yellow. The two species of mustard differ in properties as well as in botanical characters. The seeds of S. nigra are more pungent, than those of S. alba, but there are other differences. Analyses has detected in black mustard seed several distinct chemical compounds. Mirouic acid, Mirocyne, a volatile oil, and a fixed oil of mustard. Of the composition of white mustard we find the following account in Pereira's "Materia Medica." "Robiquet and Boutron (Journ. de Pharm, xvii. p., 179) however have proved, that white mustard contains neither volatile oil, nor any substance capable of producing it, but owes its activity to a non-volatile acrid substance, which does not pre exist in the seeds, but is readily formed in them under certain conditions. Another chemical peculiarity of white mustard is, that it contains sulpho-sinapisin. The young or seed leaves of white mustard are used for salad. In Britain, both species are indigenous and may commonly be seen in flower in the month of June in waste places and fields, in the brick fields in the neighbourhood of Nottinghill they grow in great quantities. McCulloch's Commercial Dictionary contains the following interesting particulars in relation to the growth &c., of mustard. It was formerly extensively cultivated in Durham, but it is now seldom seen in that county. At present it is principally raised in the neighbourhood of York and throughout other parts of the North Riding, and being manufactured in the city of York is afterwards sold under the name of Durham mustard. Two quarters an acre are reckoned a good crop. Mustard is of considerable importance in the materia medica, and is extensively used as a condiment. It was not however known in its present form at our tables till 1720. The seed had previously been merely pounded in a mortar and in that rude state separated from the integuments and prepared for use. But at the period referred to, it occurred to a woman of the name of Clements residing in Durham to grind the seed in a mill and to treat the meal in the same way that flour is treated. Her mustard was in consequence very superior and being approved by George I speedily came into general use. Mrs. Clements kept her secret for a considerable time and acquired a competent fortune. In Bengal and other eastern countries mustard is extensively cultivated as rape is in Europe for the purpose of yielding Oil."—*Barley survey of Durham, page* 147; *London's Encyclopeædia of Agriculture.* The subjoined particulars, in reference to the manufacture of mustard, as furnished by a manufacturer, are given by Pereira:—"The seeds of both black and white mustard are first crushed between rollers, and then pounded in mortars. The pounded seeds are then sifted. The residue in the sieve is called dressings, or siftings; what passes through is impure flour of mustard. The latter by a second sifting, yields pure flour of mustard, and a second quantity of dressings: by pressure, the dressings yield a fixed oil which is used for mixing with rape and other oils." Immense quantities of wheaten flour are employed in the adulteration of mustard, and many samples almost entirely consist of it. It has been stated that pea-flour is sometimes used: out of fifty samples of mustard which Hassall submitted to examination he had not met with a single instance of adulteration with any other farina than wheaten flour. *Adulteration with Turmeric powder.* Turmeric powder is the ground tuber of Curcuma longa one of the Zingiberaceæ, it is of a dark yellow colour and consists of large cells, some of these are loosely imbedded in a reticular tissue, but others, and these the majority, are quite free: they may be recognised with facility under the microscope by their size and bright yellow colour. When crushed, each cell is found to contain coloring matter as well as a number of starch granules resembling closely those of Curcuma arrow-root, already described and figured. On the application of iodine the cells become of a deep-blue, and with potash of a reddish colour. Although we have examined a large number of samples of mustard in no instance have we found turmeric powder to be absent. By some means or other probably by moisture and heat the turmeric powder is made to part with a portion of its colouring-matter to the flour which enters so largely into the composition of the mustard of the shops. Four qualities of mustard are supplied by the manufacturer. The first is called "second" it is usually of a bright yellow colour, but is thickly studded over with numerous black or reddish-black points: these are fragments of the husks of black mustard seed. The next quality is termed "fine," it also presents a considerable number of black specks, but fewer than in the former case. The third quality is called "superfine," it is spotted to a much less extent, although minute specks are still visible. The fourth, or best quality, is the "double-superfine," in this the eye can scarcely detect husk at all, although with the microscope, a little may still be discovered. These several qualities are vended to the public by a wholesale and retail establishment in the city of London at the following rates: "seconds," 5d.; "fine," 8d.; "superfine," 11d.; "double superfine," 1s. 2d., per lb. The qualities of the following samples varied much—from "second" to "double-superfine." The price also varied greatly—from 1s. to 2s. the pound, the ordinary charge made being 1s. and 1s. 4d. the pound. Dr. Hassall's inquiries showed,

1st. That genuine mustard, whatever be the price paid for it, is scarcely ever to be obtained.

2nd. That the whole of forty-two samples submitted to examination were adulterated.

3rd. That the adulteration practised, in every case, was the same in kind, varying only in de-

gree, and consisted in the admixture of genuine mustard with immense quantities of wheaten flour, highly coloured with turmeric.—*Food and its adulteration, p.* 123.

(5518) MUSTARD OIL. SINAPIS SPECIES.

Rai ka teil, GUZ. HIND.	Avaloe and Sarsava Noona, TEL.
Sarshapatailum, SANS.	
Kadaghoo yunney, TAM.	

An expressed oil, prepared from the seeds of different species of Sinapis, is used in the Northern parts of Hindostan, and in many parts of Malabar, for culinary purposes, in the same way that butter and ghee is on the Coromandel Coast.—*Ainslie.* Mustard oil has of late been exported from Bombay to England and France.—*Faulkner.* Five or six species of Sinapis are cultivated in all parts of India, for the sake of the valuable oil they yield: those most frequently seen are *S. glauca, toria* and *racemosa*. The seeds of the "sinapis alba" yields by expression 36 per cent of a bright yellow, pleasant tasted, edible oil, having a strong smell, and slight taste of mustard. The seeds of "sinapis nigra," yield only 28 per cent of an oil in all respects similar to the above. The average price of mustard seed in eighteen large stations, in all parts of the Madras Presidency, for the Quarter ending 31st October 1854 was Rs, 1 2 8 per maund of 25lbs., the maximum being Rs. 1 14 6 at Cannanore, and the minimum As. 10 5 at Nagpore. In Vizagapatam it costs Rs. 208 per Sicca garee. The oil is not exported, from Madras but the seeds have been shipped as follows:—

In the years	1847-48	.....Cwt.	5,828
,,	1848-49.	..... ,,	6,767
,,	1849-50.	..... ,,	9,435
,,	1850-51.	..... ,,	9,909
,,	1851-52.	..... ,,	3,636
,,	1852-53.	..... ,,	16,075

Uses.—This valuable oil, although seldom sold in the market, being made when required, is used in most parts of India in cookery, and is considered superior to all other oils for anointing the body, which it is supposed to invigorate. In medicine, it is sometimes given internally, but is more frequently applied as a rubefacient. At the Madras Exhibition of 1855, the following exhibitors contributed very good specimens, Mr. Kohlhoff of Tanjore, Madras Tariff, Trichinopoly Local Committee, and Rajahmundry Local Committee. Lieut. Hawkes, exhibited a complete and interesting series of oils and oil cake of common mustard, obtained from four different sorts of sinapis.—*M. E. J. R.*

(5519) MUSTARD SEED, BLACK.

Khirdal. ARAB.	Susavic, MAL.
Kidi-tsai, CHIN.	Sirshuff, PERS.
Gau-aba, CYNG.	Mostarda, PORT.
Mosterd, DUT.	Gortschiza, RUS.
Moutarde, FR.	Sirsoon, Rajika, SANS.
Muslert, GER.	Mostaza, SP.
Kalee Rai, GUZ. HIND.	Kadaghoo, TAM.
Mostarda, Senapa, IT.	Avaloo, TEL.
Sinapis nigra, LAT.	

Black mustard seeds are small and roundish. Externally they are beautifully veined, and of a reddish or blackish brown colour, though sometimes whitish. Internally they are yellow. They are inodorous, but have an acrid phagidenic taste. The black mustard is indigenous in almost every part of Europe.—*Pereira.* It is also grown in some parts of India, and has of late years been exported from Bombay to England and France.—*Faulkner.*

(5520) MUSTARD SEED, WHITE.

Safeid Rai GUZ. HIND.	Kalococo, TAM.
Sinap-Alba, LAT.	

This species differs only in the colour and size of the seeds, which are yellowish, and much larger than the black seed. The properties of the white are less energetic than those of the black. In other respects they agree altogether.—*O'Shaughnessy.*

(5521) MUSTARD-TREE. The plant referred to by this name in Scripture is, according to Dr. Royle, the *Salvadora Persica* of botanists. It is a native of the East Indies. [SALVADORA.]

(5522) MUSTELIDÆ, the Weasel Tribe, a family of Digitigrade Carnivorous Animals, of which the Common Weasel is the type. Among the Polecats of warm climates, Cuvier notices the Javanese Polecat (*Putorius nudipes*, F. Cuv.), the African Polecat *P. Africanus*. Desm.), the Striped Polecat of Madagascar (*P. striatus*, Cuv.), and the Cape Polecat (the Zorille of Buffon; *Viverra Zorilla* of Gmn.). The following is a list of the species of Asiatic *Mustelidæ* in the British Museum:—

Martes melanopus, the Japanese Sable. Japan.

M. flaviyula (Hodgson), the White-Cheeked Weasel. India.

Mustela Hodgsonii (Gray,) Hodgson's Weasel. India.

M. Cathia (Hodgson), the Cathia. Nepaul.

M. Horsfieldii (Gray), Horsfield's Weasel. India.

M. Subhemachalana, the Nepaul Weasel. Nepal.

Helictis moschata (Gray), the Helictis. China.

H. Nipalensis, the Nepaul Helictis. Nepaul.

Mydaus meliceps (F. Cuvier), the Stinkard, or Teledu. Java.

Arctonyx collaris (F. Cuvier), the Balisaur, or Sand-Bear. India.

Lutra Chinensis (Gray), the Chinese Otter. China and India.

L. aurobrunnea (Hodgson), the Golden-Brown Otter. Nepaul.

Aonyx leptonyx, the Wargul. India.—*Eng. Cyc.*

(5523) MUTILLA ANTIGUENSIS, Linn. Mutilla occidentalis seems to be a different kind of the former. Beer botie is a most beautiful scarlet velvet colored insect, about the size of a large pea, but flattish, it is commonly found in rainy weather, in Hindostan and at Lahore. These insects are officinal, and are kept by the druggists. The native doctors use them against

snake bites, and in colic of horses.—*Honigberger, p.* 444.

(5524) MUTHERIE, the Tamil name of a Ceylon-wood known in England by the name of satin-wood; by the Portuguese it is called Burutu. It is a handsome and valuable wood, and may be considered the most durable of any in Ceylon for general uses, provided it is seasoned in the shade: it may be converted into handsome furniture, &c. In consequence of its weight all trees are cut in lengths of from ten to twelve feet, for the purpose of getting it floated down the rivers from the forests, which is done in canoes. I am of opinion that it may be obtained from twenty-five to forty feet long, and the largest diameter thirty-six to forty inches. That which is in general brought to the dockyard is about fifteen feet long, and from eighteen to twenty-four inches in diameter, being cut to that size for the ease of conveyance.—*Edye. Ceylon.*

(5525) MUTKE KE PULLIE. Dolichos Fabæformis. Small Sabre Bean. This is grown the same as the larger sort.—*Riddell.*

(5526) MUTTI, ALSO MUDDI.

Chuncoa CAN. | Muttia, BUCK.

Mutti (or Muddie) is the Canarese name of a good timber tree, common in some of the woods of the Malabar coast, the ashes of the bark of which the Natives use to chew with betel like Chunam.—*Ainslie's Mat. Med. p.* 266.

(5227) MUTTY PAL, the resinoid exudation of "*Ailanthus malabaricus*" D. C., is a peculiar substance, first mentioned by Buchanan, who observed it in the Animalay Forests. It is exhibited from Cochin and Travancore, and is said to be used as incense.—*M. E. J. R.*

(5528) MYLABRIS. The ancients chiefly employed two species of *Mylabris*, one of which, the *Mylabris cichorii* (vern. *telini* HIND.) has been used for ages, and is so at present by the European and native physicians of India and China. The blistering flies of India are chiefly the Mylabris or Meloe cichorii, the Cantharis gigas, and the Cantharis violocea. The *Meloe* or *Mylabris cichorii* (Telini, *Hind.*) is common in the neighbourhood of Dacca, in the Hydrabad country, in Kurnool, and numerous other localities. Dr. Hunter published a good account of this article in the 5th vol. of the *Transactions of the Asiatic Society*, p. 216. The insect is about an inch long, and ⅓ broad; the elytre or wing coverts are marked with six cross stripes of deep blue and russet brown. The *Buprestis* of ancient writers is met with in the bazars under the name of the golden fly (*sonamukhi.*) The *Cantharis violacea* is often mixed with specimens of *Meloe* in the bazars. The Telini fly, if procured before the mites have commenced its destruction, yields on an average one-third more of cantharidin than the *Spanish fly* of the European shops. The blue fly is of uncertain strength; the Buprestis in all the specimens obtained, was quite inert.—A species of Meloe called the *M. trianthema*, from its being usually found on the plant named *Trianthema decandra* (biscopra, *Hind.*) was described by Dr. Fleming. A tincture, acetous tincture, plaster, and ointment of the Meloe cichorii are described in the Bengal Pharmacopeia. Some prejudice exists against the article on account of its alleged excessive severity of action. This is solely owing to the presence of a greater quantity of *Cantharidin* than that contained in the common fly. Diluting the tincture, and adding to the proportion of lard and wax in the plaster and ointment, perfectly assimilate the action of the indigenous and the imported insects.—*O'Shaughnessy, page* 684. At the Madras Exhibition of 1855, specimens of the Indian Blistering beetles, *Mylabris pustulata*, and *punctum* were exhibited by Monsieur Le Docteur Collas of Pondicherry. These were accompanied with a full and interesting report on their blistering properties printed in the "*Moniteur Officiel*" of 2d March 1855. The larger species is *Mylabris pustulata*, and the smaller is *Mylabris punctum*—Both insects are found in large quantities at certain seasons all over Southern India. On account of Dr. Collas' careful researches into the natural history of these beetles, as well as his interesting report, and successful experiments with this therapeutic agent, the Jury awarded him a 2d Class Medal. —*Royle, O'Shaughnessy*; *M. E. J. R.*

(5529) MYMENSING. *The District of Mymansing* can furnish specimens of the best *sunn* (Crotolaria Juncea) and the best *pât* or *jute* (Corchorus Olitorius) and *maestee pât*, (Hibiscus Cannabinus) grown in Bengal. The fibres of these plants which are so commonly used in that country for making twine, ropes, sails, screens, bags, and paper, are dressed and exported, in large quantities, from Serajegunge and other parts of this district of Bengal, to Calcutta for shipment to England. From this district there might also be obtained samples of oil seeds, as mustard, sesamum, rape and linseed. The two latter are of a superior quality and are now valuable exports to England.—*Taylor.*

(5530) MYOSOTIS (from μυς, a mouse, and ωτ, the crude form of οὖς, an ear), a genus of Plants belonging to the natural order *Boraginaceæ*. It has a 5-parted calyx; the corolla salver-shaped contorted in æstivation; the throat closed with scales, the limb 5-fid, obtuse; the stamens included, with filaments very short; the style simple; the nuts smooth, externally convex, keeled within attached by a minute lateral spot near their base. This genus is distinguished from all the other Boragineous genera by the possession of a contorted æstivation of the corolla. The species are annual or perennial, rough or smoothish plants, with blue flowers in terminal racemes, which are revolute before expansion. About 50 species have been described, which in-

habit the more temperate parts of Asia, Africa, and America, and are abundant in Europe. Eight species are found in Great Britain.—*Eng. Cyc.*

(5531) MYOSOTIS PALUSTRIS. Great Water Scorpion-Grass, or Forget-Me-Not, has the calyx open when in fruit, and shorter than the pedicel, with straight adpressed bristles; the teeth short, triangular; the limb of the corolla flat, longer than the tube; the lobes slightly emarginate; the pubescence of the stem spreading. It is a native throughout Europe, and also of Asia and North America. In Great Britain it is found in humid meadows, bogs, banks of rivers, rivulets, and ditches. This plant has a large bright blue corolla with a yellow eye. It is a beautiful plant, and when once seen will be seldom forgotten. It is probably on this account that it has obtained its common name Forget-Me-Not. Amongst the young it is regarded as emblematical of true affection. A variety is described with white flowers.—*Eng. Cyc.*

(5532) MYRICA. Fortune notices one repeatedly: It is (the Greek Μυρίκη), a genus of Plants the type of the natural order *Myricaceæ*. It has its flowers in catkins, which are composed of concave scales; 4 to 8 stamens. The fruit a 1-celled 1-seeded drupe, and no perianth. There are several species of this genus, which are shrubs or small trees --*Eng. Cyc.* Wight gives Myrica integrifolia, 766; and Nilagirica, 938. Fortune says, in China the *Yang mae*, appears to be a species of *Myrica*, allied to the Himalayan *M. sapida*, noticed by Frazer, Royle, and other writers. The Chinese variety is, however, much superior to the Indian. Indeed I believe the Chinese have both, but use the Indian one as a stock for grafting upon—*Fortune, page* 344. There is a very large plantation of this tree in Chusan, and the fruit was beginning to be brought to the market during my stay there. It was sold at a very cheap rate, and was considered a great luxury by the native.—*page* 345. I had frequently seen the trees of the *Yang-mae*, but never when in fruit, so I determined to visit one of the plantations. *page*—345. On the sides of these inland hills there were large quantities of the *Yang-mae*. The trees were bushy, round-headed, and from fifteen to twenty feet in height. They were at this time loaded with dark-red fruit, not unlike, at first sight, the fruit of England's Arbutus, although very differently formed and much larger. I observed two kinds, one with red fruit, and the other with fruit of a yellowish colour. The trees formed most striking objects on the hill side. —*Ibid. p.* 345. The "Yang-mae," a species of Myrica, was also met with on these hill-sides, and some grafted plants secured for India. These are now luxuriating in the north-west provinces. This fine fruit will no doubt succeed admirably in the Himalaya, for already there is a variety—far inferior indeed to the Chinese kind, but yet a plant requiring the same soil and temperature—common on these hills. It is the Kaiphul of the hill-tribes of India.—*Fortune' Residence.* Having been engaged in procuring some Yang-mae trees, which the Government of India was anxious to introduce to the Himalaya, I was somewhat better informed upon this subject than the learned Chinaman. I told him the fine variety of Yang-mae was grafted upon the wild kind, which the Chinese call the san or hill variety (Myrica sapida); and further I showed him some plants which I had just purchased: but all was of no use; he was "convinced against his will," and still firmly believes the Yang-mae is usually grafted on the pine.—*A Res. among the Chi. p.* 64.

(5533) MYRICA CERIFERA. Wax-Myrtle or Bay-Tree, has cuneate lanceolate leaves, sometimes entire, but more frequently toothed, particularly towards the end, somewhat pubescent, a little paler beneath, and generally twisted or revolute in their mode of growth; has a branching half-evergreen stem, from 1 to 12 feet high. The small flower is formed by a concave, rhomboidal scale, containing three or four pairs of roundish anthers, on a branched footstalk. The pistiliferous catkins which grow on a different shrub are less than half the size of the staminiferous ones, and consist of narrower scales, with each an ovate ovary, and two filiform styles. To these catkins succeed clusters or aggregations of small globular fruits, which are at first green, but finally become nearly white. They consist of a hard stony covering, which incloses a dicotyledonous seed. The hard covering is studded on its outside with small black grains, and over these is a coating of hard white wax, fitted to the grains and giving to the surface of the fruit a granulated appearance. This plant is a native of woods in the United States of America. The bark of the root of this plant is acid and astringent; in large doses it produces vomiting, accompanied by a burning sensation in the throat. It is used as a stimulant and astringent. The wax of the fruit is collected and purified, and used for many of the purposes for which bees'-wax and candles are employed. The wax has been occasionally used in pharmacy in the same way as common bees'-wax.—*Eng. Cyc.* The Candleberry Mystle abounds in the Bahama Islands. The shrub produces a small green berry, which, like the hog plum, puts out from the trunk and larger limbs. Much patient labor is required in gathering these berries, and from them is obtained a beautiful green wax, which burns very nearly, if not fully, as well as the spermaceti, or composition candles imported from abroad. Not long since Mr. Thos. B. Musgrove, of St. Salvador (or Cat Island), obtained about 80 lbs. of this wax, and made some excellent candles of it. The method of procuring this wax is by boiling the berries in a copper or brass vessel for some time. Iron pots

are found to darken and cloud the wax. The vessel after a sufficient time is taken from the fire, and when cool the hardened wax, floating on the top of the water, is skimmed off.

(5534) MYRICA CORDIFOLIA.—According to the experiments of M. Cadet and Dr. Bostock, myrtle wax differs in many respects from bees' wax. Specimens of it assume shades of a yellowish green color. Its smell is also different; myrtle wax, when fresh, emitting a fragrant balsamic odor. It has in part the unctuosity of bees'-wax, and somewhat of the brittleness of resin. Its specific gravity is greater, insomuch that it sinks in water, whereas bees'-wax floats upon it; and it is not so easily bleached to form white wax. The wax tree of Louisiana contains immense quantities of wax. Mr. Moodie ("Ten Years in South Africa") says,—"I occasionally employed my people, at spare times, in gathering wax berries that grow in great abundance upon small bushes in the sand hills, near the sea, and yield a substance partaking of the nature of wax and tallow, which is mixed with common tallow, and used by the colonists for making candles. The berry is about the size of a pea, and covered with a bluish powder. They are gathered by spreading a skin on the sand, and beating the bush with a stick. When a sufficient quantity of the berries are collected, they are boiled in a great quantity of water, and the wax is skimmed off as fast as it rises; the wax is then poured into flat vessels and allowed to cool, when it becomes hard and brittle, and has a metallic sound when struck. The cakes thus formed are of a deep green colour and are sold at the same price as tallow. The wild pigs devour these berries when they come in their way, and seem very fond of them." A good specimen of myrtle, or candleberry wax, accompanied by candles made from it in the crude unbleached state in New Brunswick, was shown at the Great Exhibition. At a meeting of the Central Board, at Cape Town, in March, 1853, the members voted about £300, to employ some 20 or 30 men, in gathering berries from the Downs, and making wax during the winter months, that is, from the beginning of May to the end of September. The wax fetches a good price in the Cape market. In the annual report of the Cape of Good Hope Agricultural Society, in May, 1853, a very fine sample of myrtle, or berry wax, grown on the Cape Flats, was exhibited by Mr. Feeny, Superintendent of the Road Plantation, by direction of the Commissioners of the Central Road Board, in different stages of purification, from green to white, as also some candles; and it being conceived by the meeting that this article might ultimately become one of considerable importance for purpose of export, a letter of thanks was addressed to Mr. Feeny; and Nathaniel Day, the constable who assisted him, was presented with the sum of £5, as a remuneration for his trouble in assisting to purify and prepare the wax. On reference to the juror's report on the Great Exhibition, it will be gratifying to find that the berry wax, forwarded by this Society, had attracted peculiar notice, and a prize medal been awarded for it; the following reference is therein made to it: "some fine specimens of myrtle or berry wax, from the Cape of Good Hope, are exhibited by J. Lindenberg, of Worcester. This is an excellent material for the manufacture of candles, when employed in conjunction with other solid fats. The jury awarded a prize medal for these specimens." The Committee suggested every possible attention being drawn to this subject, in which they are gratified to state, the Commissioners of the Central Road Board have evinced a readiness to co-operate, by offering to place at the Society's disposal the sum of £ 10 10s., "to be given as a premium for the best information respecting the wax berry plant, the soils and situations in which it is found to grow most luxuriantly: the best mode of propagating and cultivating it, of collecting the berries, and extracting and preparing the wax, &c." And from a letter received from the Secretary to the Central Road Board, it appears that the Board had authorised the shipment to England of 2,561 lbs. of the wax, by the *Queen of the South* in November last, which, from the account sales lately received from Messrs. J. R. Thomson and Co., realised as follows, viz.: —

4 cases weighing nett 856 lbs. a	8d.	£28	10	8
4 „ 1040 lbs. a	9d.	39	0	0
3 „ 745 lbs. a	11d.	34	2	11
3 „ 6 lbs. a	11d.	0	5	6
		£101	19	1
Discount 2½ per cent.		2	11	0
		£99	8	1

CHARGES.

Warehouse Entry 3s. 6d. Fire Insurance 2s., Port 2s. 6d.	£0	8	0
Freight	7	3	3
Primage	0	14	4
Dock Charges	3	9	6
Sale Expenses	0	9	0
Brokerage	1	0	6
	£13	4	7
Commission at 2½ per cent	2	11	0
	£15	15	7

Simmonds.—Of the Myrica Cordifolia of the Cape, so long since as 1840, it was mentioned that the wax was used for candles.—*Loudon's Arboretum, page 612.*

(5535) MYRICA INTEGRIFOLIA. Roxburgh Fl. Ind. iii. p. 765, from the N. E. frontier, seems to be different from M. sapida, its

fruit is acid and used for pickling—*O'Shaughnessy, page* 611.

(5536) MYRICA NILAGIRICA. Wight. Icon, 938.

(5537) MYRICA SAPIDA. Wall. Tentam. Nipal. t. 45

Kuephul, HIND.

Himalayas from the Sutlege to Nipal, fruit agreeably flavoured. The same, or a nearly allied species, is found in China and Japan. The bark (Kuephul) is aromatic and stimulant, and a favourite native medicine.—*O'Shaughnessy.*

(5538) MYRICACE'Æ, *Gallworts*, are plants constituting a very small natural order of apetalous Exogens, with separate sexes. The most essential part of their character is expressed by Endlicher in the following terms:—"Flowers unisexual. Males—Bractlets, 2; calyx, 0. Females—Hypogynous scales from 2 to 6; ovary 1-celled, with 2 styles; ovule 1, erect, orthotropous; drupe 1-seeded; seed erect; embryo without albumen; radicle superior." In general, their flowers are arranged in a manner similar to those of *Betulaceæ* and *Salicaceæ*, with which latter however they seem to have no real affinity. From *Casuaraceæ* curious Australian trees, with jointed leafless stems, like those of *Equisetum*, they are only distinguished by their erect ovule and orthotropous seeds. They are common in the temperate parts of the world, especially in North America, and the Cape of Good Hope. The order embraces 3 genera and about 20 species. —*Eng. Cyc.*

(5539) MYRISTICA. a genus of Plants, the type of the order *Myristicaceæ*. The flowers are diœcious; calyx urceolate, 3-toothed; filaments of stamens monadelphous: anthers 6 to 10, connate; ovary simple; style, none; stigma 2-lobed; pericarp fleshy, 2-valved, 1-seeded, seed enveloped in a fleshy aril.—*Eng. Cyc.*

(5540) MYRISTICA CINEREA. MYRISTICACEÆ.

Sandikai marum, TAM.

A tall straight growing tree, usually with fine clean bole. Wood light coloured, close, even grained, apparently of fine quality.—*Wight.*

(5541) MYRISTICA MOSCHATA,

Jadikai, TAM.	Jowzulteib, ARAB.
Jawpull, DUK.	Booapala, MALAY.
Jaephall, HIND	Jatafala, SANS.
Jowzbewa, PERS.	Nutmeg tree,, ENG.

Myristica, L. E. Nux Moschata, D. Nuclei, L. D, Kernel of the Fruit, E. of Myristica officinalis, *Linn.* E. (*M. Moschata*, Thunb. L. D. Nutmegs, Macis Involucrum, D. (arillus) of the Nut. Mace. Adeps et Oleum, *Diœcia Monadelph. Linn.*

A diœcious tree, 20 to 25 feet high, a native of the Moluccas, especially of Banda.—*Ainslie's Mat. Med. p.* 264.—*O'Shaughnessy.* The Nutmeg-tree is about 25 to 30 feet high, with some resemblance to a Pear-tree. Leaves faintly aromatic, alternate, sub-bifarious with short petioles, oblong, somewhat obtuse at the base, acuminate, glabrous, above dark green paler beneath. *Male.*—Racemes axillary. Flowers small, yellowish, the pedicels of each supported by a minute bract. Calyx urceolate, 3-toothed, thick and fleshy, with short reddish pubescence. Filaments united into thick oblong and obtuse column. Anthers about 9, (5 pairs, *Roxb.*), linear-oblong, attached round the upper part of the filamentous column, 2-celled, free at their base, opening longitudinally. *Female.*—Peduncles usually solitary, axillary. Perianth much as in the male. Ovary ovate. Style short. Stigma 2-lobed, persistent. Fruit pyriform or nearly spherical, about the size of a peach. Pericarp fleshy, splitting from the apex into two equal, thick, fleshy, astringent valves and displaying the deep-orange or scarlet coloured *arillus* or *Mace*, which cut into many irregular denticulate stripes embraces the nut so tightly as to impress it with superficial furrows. Nut ovoid, attached by a large umbilicus to the bottom of the cell; its shell is hard, of a dark brownish black colour, and glossy, with its inner coat of light-brown colour, thin, but spongy closely investing the seed. *Seeds* or *Nutmeg* conform to the shell, and consisting chiefly of albumen, into with the inner coat of the shell dips deeply, giving it a variegated, brownish veined, or *ruminated* appearance; while fresh rather soft, juicy, and more fragrant than after being dried. Embryo at base of albumen erect, patelliform. Cotyledons 2. thick, fine shaped, margins irregularly cut, Plumule of 2 unequal lobes. Radicle inferior, hemi-spherical.—Roxburgh chiefly. Fl. Ind. iii. p. 844. Coram, Plant iii. t. 267. Nees von. E. 133. St. and Ch. 104.—*Royle. M. officinalis*, Linnæus (*M. Moschata*, Thunberg; *M. aromatica*, Roxburgh), is the Nutmeg Tree. This tree is a native of the Moluccas Islands, especially of Banda, but cultivated in Java, Sumatra, and elsewhere in the East, and lately in Cayenne and several of the West India Islands. It yields nutmegs and mace, the best of which are produced in the first-mentioned islands. The fruit is of the size and form of a peach, and, when ripe, the fleshy part separates into two nearly equal halves, exposing the kernel surrounded by an arillus, the former being the nutmeg, the latter the mace. The arillus is red when gathered; but being sprinkled with sea-water and dried it assumes an orange-yellow colour. It has a fatty shining appearance, yet is horny and brittle. The odour is strongly aromatic; the taste aromatic, but sharp and acrid. It contains both a fixed oil (in small quantity) and a volatile oil. One pound of mace yields by distillation one ounce of the latter. The former is not an article of European commerce, and what is termed the expressed oil of mace, is obtained from the nutmeg, and should bear

its name. An inferior mace is obtained from various species of *Myristica*, specially the *M. tomentosa* and *M. officinalis* (Martius), which is a Brazilian tree. The properties of mace are similar to those of the nutmeg. On the removal of the mace is seen the shell, of an oval or ovate shape, and of a dark-brown colour, in which is contained the seed or nut. This is closely invested by an inner shell or coat, which dips down into the substance of the albumen of the seed, and gives it the character which is termed ruminated. Two or three gatherings of the nutmegs are made in the year, generally in July and August, in December, and in April. The third period yields the best nutmegs. The collected nuts are dried in the sun, or by the heat of a moderate fire, till the shells split: they are then sorted and dipped in lime-water, to preserve them from the attacks of insects. The nuts are about an inch long, of the size of a hazel nut, but with a furrowed or sculptured surface. Those of good quality should be heavy each weighing, on an average, 90 grains. The internal aspect is marbled and of a fatty appearance. The substance is gray; but the veins, which are of a reddish-brown, consist of cellular tissue abounding in oil, and are the processes of the internal coat already mentioned. Odour agreeable, strongly aromatic. Taste warm, aromatic, oily. Besides the fixed oil, it contains a volatile oil, lighter than water, being of the specific gravity of 0·931-47, while a spurious, oil of nutmeg is only 0·871. By keeping, it deposits a stearopten, or muscat-camphor, called Myristicine. The solid or fixed oil consists of stearine and elaine, with a light portion of volatile oil intermixed. Both the fixed and volatile oils are used for medical purposes. Of the fixed, there are two varieties, the English and Dutch, of which the former is the better. It occurs in pieces, wrapped in leaves of the banana, weighing about three-quarters of a pound. When cut into it has a uniformly reddish yellow colour. The Dutch sort is in large pieces, wrapped sometimes in leaves, sometimes in paper, and of a lighter yellow colour. Both are frequently adulterated. The volatile oil is also mixed with purified oil of turpentine. Nutmegs are frequently either digested in alcohol or distilled to abstract the volatile oil, and then passed off as fresh. Such nutmegs are lighter, and when a hot needle is inserted do not give an oily coating to it. Old, worm-eaten, or wild nutmegs should be rejected. Genuine or cultivated nutmegs are called female, to distinguish them from the male or wild nutmegs, which are the produce either of the *M. Maschata*, var. *sphenocarpa*, or of *M. tomentosa* (Thunb.). These are longer, heavier (weighing generally 110 grains), and of inferior quality. They are more apt to cause narcotic symptoms, giddiness, &c., than the true sort. The coarse strong-smelling nutmegs from Santa Fe are from the *M. otoba*. Other species also yield nutmegs —as *M. spuria*, in the Philippines: *M. Madagascariensis* and *M. acuminata*, in Madagascar, and *M. Bicuiba*, in Brazil. Some nutmegs have little or no odour, as the *M. fatua*, but they nevertheless act powerfully on the system. *M. spuria* yields a crimson juice, which is employed in the Philippines as a substitute for dragon's blood. Nutmegs and mace, from the large quantity of volatile oil, are decidedly stimulant, and when used in abundance produce, by exciting the circulation, narcotic effects. In moderation they promote the appetite and assist digestion.—*Eng. Cyc.* This tree has been introduced into India from the Eastward. The fruit ripens in the rains: it is the size of a large plum, with a green covering, and upon being opened, discovers a net-work of a dark red color surrounding the nut, which has a most beautiful appearance: this is the spice known as mace. The first care of the cultivator is to select ripe nuts and to set them at the distance of a foot apart in a rich soil, merely covering them very lightly with mould. They are to be protected from the heat of the sun, occasionally weeded, and watered in dry weather every other day. The seedlings may be expected to appear in from thirty to sixty days, and when four feet high, the healthiest and most luxuriant, consisting of three or four varieties, are to be removed in the commencement of the rains to the plantation, previously cleared of trees and underwood by grubbing and burning their roots, and these placed in the holes dug for their reception at the distance of eighty feet from each other,—screening from the heat of the sun, and violence of the winds. They must be watered every other day in sultry weather; manured once a year during the rains, and protected from the sun until they obtain the age of five years. The nutmeg tree is monœcious as well as diœcious, but no means of discovering the sexes, before the period of inflorescence, is known. Upon an average, the nutmeg tree fruits at the age of seven years, and increases in produce till the fifteenth year, and is said to continue prolific for sixty or eighty years. Seven months in general elapse between the appearance of the blossom and the ripening of the fruit: and the produce of one bearing tree with another, under good cultivation, in the fifteenth year may be calculated at five pounds of nutmegs, and a pound and a quarter of mace. It bears all the year round, but more plentifully in some months than others, and generally yields more abundantly every other year. It is necessary that the roots of the trees during their growth should be kept well covered with mould, for they have a tendency to seek the surface. The growth of the lateral branches is to be alone encouraged, and all suckers, or dead and unproductive branches, are to be removed with the pruning knife, and the lower shoots lopped off, with the view of es-

tablishing an unimpeded circulation of air."—*Penang Gazette. Riddell.* MACE. The arillus or (Jawatri, *Hind.*) is thick, between horny and fleshy, much lacerated, folded and anastomosing towards the extremity, almost enveloping the nut; when fresh, brilliant scarlet, when dry, more horny, yellowish brown and brittle. The smell and taste of the arillus are peculiarly fragrant and agreeable. It softens, but does not dissolve in the mouth. Beneath the arillus is found a bony shell, which covers the almond or kernel; this shell is thin, hard, brittle, brown and shining above, pale grey within, insipid and inodorous and encloses the nutmeg of commerce. NUTMEG. The kernel, Jaephul, *Hind.* Jatiphali, *Sans.* (*nutmeg muscade*) is large, rounded, obtuse at both ends, the size of a small Myrobalan nut, smooth, marked with reticulated chinks, those transversely placed being less evident than the longitudinal; grey externally. In the chinks occurs a whitish powder, apparently chalk; internally the almond is traversed by branching, reddish, irregular greasy veins, giving it a marble appearance. The nut is hard, and easily cut, scraped, or grated, very inflammable, but the smoke is devoid of the fragrance of the acid. The odour of the nutmeg is most agreeably aromatic: its taste hot, and analogous to the smell. The nut readily divides under the teeth, and is partially soluble in the saliva. Nutmegs are much injured by time, becoming the prey of insects, which perforate them in every direction; sometimes good nutmegs are adulterated with others from which the valuable principles have been extracted by alcohol. Worm-eaten nuts are also fradulently repaired by the introduction of a paste of flour and nutmeg oil into the holes.—*O'Shaughnessy, p.* 535.

Essential Oil of Nutmegs.—White, lighter than water, acrid, pungent taste and very powerful nutmeg odour,—*O'Shaughnessy, p.* 535.

Fixed Oil, or Butter of Nutmegs.—This occurs in commerce (in Europe) in flattened masses, of square form, yellowish, solid, internally marbled, 50 parts containing about 50 of essential oil. This substance is much adulterated, particularly with suet, spermaceti, marrow, wax, the oil of the Moringa pterygosperma coloured with alkanet or *rocou*, &c. &c. The fixed oil is obtained by bruising the nutmegs into a paste, which is compressed in bags between hot metallic plates. Two kinds are found in commerce—one in small earthen pots, of mace colour, and very agreeable smell, is exported from the Moluccas to Holland chiefly; the second kind is obtained from Holland, occurs in flat cakes, is far inferior to the first, and is usually adulterated with spermaceti.—*O'Shaughnessy, p.* 535. The chief use of nutmegs is as a spice, and for the preparation of perfumes and scented soaps. The tree, according to Mr. Fee, was altogether unknown to the ancients, and Κωμακον of Theophrastus and the *Cinnamomum* of Pliny have been erroneously regarded as identical with this. Avicenna seems to have been the first who described it under the same "*Jauzboa.*" The tree itself however has only been identified clearly within the last few years. The nutmeg tree is chiefly cultivated in the Banda islands, but plantations are now numerous at the Mauritius, Bourbon, Cayenne, Martinique, and in the English possessions to the Eastward, especially in Province Wellesley of Penang—also in the Tinnevelly district of Southern India. The natives of the Moluccas gather the nutmeg fruit by the hand, strip off and reject the pulpy pericarp, detach the mace carefully, and expose it to the sun, which soon changes its blood-red colour to a light brown, it is then sprinkled with sea-water to render it flexible, and to preserve it. The nuts are first sun-dried, and then smoked, until the kernel rattles against the shell. This envelope is then broken, and the kernels dipped twice or thrice in lime water. They are then heaped together for two or three days, wiped, and packed in bales or barrels. The nutmegs thus prepared have been long termed, "female," or "cultivated," in commerce, to distinguish them from a kind named the "wild" or male, which is less esteemed, and seldom found in European trade.—*O'Shaughnessy, p.* 536.

(5542) MYRISTICA TOMENTOSA. "Male nutmeg tree" Also a native of the Moluccas. The fruit is larger than in the preceding species, downy, its substance fleshy, more solid, and firm. The kernels is covered by a hard shell provided with a pale arillus, the kernel is 1½ to 2 inches long, elliptical, the parenchyme devoid of marbling. Its odour is weak, flavour disagreeable. The mace of this nutmeg is distinguished from the true mace by being formed of three or four regular bands united at the summit. The chemical composition of the article is analogous to that of the true nutmeg, but the oils are so inferior in proportion, that the "male" nutmeg is but of little commercial value.—*O'Shaughnessy, p.* 537.

(5543) MYRISTIC OTOBA. *Syn.* VIROLA SEBIFERA, Lamarck. *Myristica sebifera.* In Santa Fe, also yields aromatic nuts. A large tree of Cayenne and Guiana, the seeds of which when boiled with water give out a large quantity of a fixed oil, used for making candles. An acrid juice also excudes from incisions in the bark, and is employed as a popular medicine.—*O'Shaughnessy, p.* 537.

(5544) MYRISTICACEÆ. NUTMEGS, a family of Plants belonging to the division of Diclinous Exogens. The species are tropical, fragrant, aromatic trees, with an astringent juice, alternate coriaceous simple leaves, without stipules, and dicecious flowers. Of the flowers, the males have monadelphous stamens; the females have a single 1-celled ovary, containing an erect seed; and both have for calyx a tubular coria-

ceans envelope, with from 2 to 4, usually 3, valvate teeth. Their fruit is a 2-valved succulent capsule, containing a single seed enveloped in an aril, and consisting of ruminated albumen, abounding in a powerful and agreeable aromatic secretion; the embryo is very small, and placed in a cavity at the base of the albumen. The order is nearly allied to *Anonaceæ*, from which however it differs very remarkably in the total want of a corolla, and in the reduction of the number of carples to one. To section it in the artificial division of Apetalous Exogens, as is usually done, is to violate every principle of natural cla-sification. The Nutmeg of the shops, which is the seed of *M. officinalis*, is the only product of the order employed officinally. Other species bear fruit that may be employed as a substitute, but they are all inferior to the real Oriental *Myristica*. This order embraces 5 genera and about 35 species. The genera are, *Myristica*, *Virola*, *Knema*, *Pyrrhosa*, and *Hyalostemma*: *Virola sebifera* yields a fatty oil on being heated. *Pyrrhosa tingens* yields a crimson dye, with which the natives of Amboyna stain their teeth.—*Eng. Cyc.*

(5545) MYRRH. Myrrha, Gummi Resina, Balsamodendron (Protium) Myrrha, *Nees.* L. E. Myrrh. Octand. Monog. Linn.

Murr, Arab.	Myrrha, Lat.
Madu, Bali.	Manisan lebah, Mal.
Mirrhe, Dut.	Mirra, Port.
Myrrhe, Fr.	Vola, Sans.
Myrrhen, Ger.	Valatipolum. Palendra-bolum, Villeybolum, Tam.
Herabole, Guz. & Hind.	Bolinturaboluin, Tel.
Mirra, It.	
Madu, Jav.	

Myrrh is first mentioned in Exod. xxx. 23, by the name of *Mor* or *Mur*. The Arabic name also is *Mur*. The Greeks called it μυρρα, and also Σμυρνα. Herodotus mentions it as produced in the South with Frankincense, &c. Dioscorides states the variety called *Trogodytica* to be the best. In the Periplus of the Red Sea, Arrian mentions Myrrh with Olibanum as exported from the coast of Barbaria, that is, the modern Berbera. Bruce learnt that it was produced, as well as Frankincense, in the country behind Azab, or in that of the Dankali. The embassy to Abyssinia under Major Harris met with it on the hills in the comparatively flat country which extends from Abyssinia to the Red Sea near the Straits of Bab-el-Mandeb, or from the Doomi Valley to the banks of the Hawash. Mr. Johnston (Trav. i. p. 249) met with it in nearly the same locality. Both authors describe the Myrrh as exuding from wounds made in the bark, and that it is collected in January and March (H.), but chiefly in July and August, and in small quantities at other times of the year (J.); and exchanged for Tobacco with the merchants who proceed to Berbera, &c., whence it is exported to the coast of Arabia. Dr. Malcolmson wrote to Dr. Royle from Aden, that it is exported in native boats from different ports in the Red Sea, but chiefly from Berbera, Zela, and Massowah, and adds "there is no Myrrh produced in Arabia." Myrrh, it is well known, now reaches Europe chiefly from Bombay, having been imported from the Arabian and Persian Gulfs. It used formerly to be obtained also from Turkey. Some Myrrh, however, appears to be produced in Arabia, as Ehrenberg and Hemrich found a small tree in Arabia near Gison, on the borders of Arabia Felix, from off which they collected some very fine Myrrh. There is still considerable uncertainty respecting the plant or plants which yield Myrrh, though it is probable they all belong to the genus Balsamodendron.

Balsamodendron Kunth.—Amyris. Protium. *Wight and Arnott.* Flowers often unisexual. Calyx 4-toothed, persistent. Petals 4, linear, oblong, induplicately valvate in æstivation. Stamens 8, inserted like the petals under the margin of the annular disk or torus, which is cup-shaped, fleshy, deeply cernated. Ovary 2-celled. Style short, obtuse, 4-lobed. Drupe globose or ovate, nut thick and very hard, bony, 2-celled, (one of the cells by abortion, often obliterated,) cells one-seeded Balsum producing trees. Leaves with 3 to 5 sessile leaflets, which are without dots.

Balsamondendron Gileadense, K. Unarmed. Leaves palmately 3-foliolate, petiolate, smooth; leaflets obovate, oblong, very entire, glabrous; pedicels short, single-flowered, with the calyx broad, shallow, and campanulate.—This includes the *Amyris Opobalsamum* of Forskal; but fresh specimens and recent observations are required to distinguish whether this is different from the *Balessan* of Bruce. Other species which are found in the Peninsula of India and are *spinescent*, used to be included under it, but are considered distinct by Dr. Arnott, who does not now unite them with *Protium* (as in the Prod. Fl. Ind. Penins.) from which indeed they differ much in habit.

The *Balessan* of Bruce was found by him at Azab, and said to extend to the straits of Bab-el-Mandeb. Gerloch found it at Bederhunin, a village between Mecca and Medina. Forskal found his Opobalsamum at Haes in Arabia Felix. At Aden it is called Beshan. Dr. Roth, in the Appendix to Harris' Abyssinia (ii. p. 144) mentions B. Opobalsamum as occuring in the Adel country and the jungles of the Hawash, along with the Myrrh tree. The bark when wounded exudes the fragrant and far-famed Balsam which has been called Balm of Gilead, but which seems to have been only cultivated in Palestine near the town of Jericho. It is now never obtainable in Europe in a pure state, and therefore seldom if ever employed medicinally, though it is no doubt possessed of stimulant properties.

Balsamodendron Myrrha (fig. 56.) Stem shrubby, arborescent; branches squarrose, spinescent Leaves ternate; leaflets obovate obtuse, obtusely tooth-letted at the apex, the lateral smooth. Fruit acuminate (Nees). Bark pale ash-gray, approaching white. Wood yellowish-white; both it and the bark have a peculiar odour. Leaves on short stalks Flowers unknown. Fruit ovate, smooth, brown somewhat larger than a pea; surmonnted at the base by a four-toothed calyx, and supported on a very short stalk.

Dr. Royle has adopted the above description, as translated by his friend, Dr. Pereira, who has closely followed the account given by Nees von Esenbeck in the folio work *Beschreib Officin* : *Planzen*, where he says that his friend Dr. Ehrenberg collected from off this tree "*sehr schone Myrrhe*," and that the description is taken from the specimens of the plant collected by Ehrenberg at Gison, on the borders of Arabia Felix. Though it is not very probable, from modern information, that any large quantity of Myrrh is produced in Arabia, yet it is possible that some may be produced there, and from the same species of plant as that which yields the large quantities of Myrrh in Africa. Indeed, it is stated in the Appendix to Harris' Abyssinia (ii. 414), probably on the authority of Dr. Roth, that the "*Balsamodendron Myrrha* (*Karbeta* of the natives) grows on the borders of Efat and in the jungle of the Hawash, and in the Adel desert. The resinous gum called *Hofali* is collected for exportation. *B. Opobalsamum* (Besham) grows commonly with the former, and grows even at Cape Aden." Unfortunately there are no specimens of either plant in the Herbarium collected by the embassy and sent to the India House. On examining the specimens in the British Museum of *B. Opobalsamum* or *B. Gileadense*, now united into one species, it appears to Dr. Royle that the specimens vary sufficiently to require careful examination and detailed description of good and complete specimens, before we can distinguish them as varieties, or determine them to belong to separate species; also whether the above *B. Myrrha* itself differs sufficiently to constitute a distinct species. The drawing of Nees, appears to Dr. Royle to resemble some of the Arabian specimens of *B. Opobalsamum* very closely. All are very distinct, both in foliage and inflorescence, from *B. Kataf* (v. 56, 1, 2, 3), of which a specimen collected by Forskal is in the British Museum. The species referred to by Dr. Roth are probably the same as the following.

Mr. Johnston, also, in his Travels through Adel to Abyssinia (i. p. 249), in treating "of the tree that yields this useful drug, Myrrh," says "there are in the country of Adel two varieties, one a low, thorny, ragged-looking tree, with bright green leaves, trifoliate, and an undulating edge, is that which has been described by Ehrenberg." (v. the annexed figure, 56.) "This produces the finest kind of Myrrh in our shops." This may be either the above *B. Myrrha* or one of the forms of *B. Opobalsamum*. "The other is a more leafy tree, if we may use the expression, and its appearance reminded me exceedingly of the common hawthorn of home, having the same largely serrated, dark-green leaves, growing in bunches of four or five, springing by several leaf-stalks from a common centre. The flowers are small, of a light-green colour, hanging in pairs beneath the leaves, and in size and shape resemble very much the flowers of our gooseberry-tree. It belongs to the Octandria Monogynia, the eight stamens being alternately long and short, the former corresponding to the four partial clefts in the edge of the one-leafed calyx. The fruit is a kind of berry, that when ripe easily throws off the dry shell in two pieces, and the two seeds it contains escape. The outer bark is thin, transparent, and easily detached; the inner, thick, woody. When wounded, a yellow turbid fluid (the gum-myrrh) immediately makes its appearance. Naturally, the gum exudes from cracks in the bark of the trunk near the root, and flows freely upon the stones immediately underneath. Artificially, it is obtained by bruises made with stones." This plant, judging from the specimens deposited by Mr. Johnston in the British Museum, corresponds exactly with one, also in the same collection, obtained by Mr. Salt in Abyssinia, *Balsamodendron Kua* of Mr. Brown's MSS. and of which Mr. Salt says, he obtained from it a gum much resembling the Myrrh.

Balsamodendron Africum, Arnott.—Heudelotia africana. Guill. et Per. This species, first found on the west of Africa, occurs also in the Abyssinian collection, having been found in the flat country of the Adel. Mr. Johnston immediately recognized it as one of the trees yielding gum-resin. The leaflets are like those of *B. Kua*, Br. It yields African Bdellium, or that imported into France from Guinea and the Senegal, according to M. Porrottet. M. Adanson, likewise, in his Travels in the Senegal, mentions it by the name of Niotout as producing Bdellium. It may also yield the Bdellium which is exported from the west coast of Africa. Dr. Malcolmson wrote to Dr. Royle that "Bdellium (of which he sends a specimen) is produced in Africa by a tree similar to the Myrtle. None is obtained in Arabia. It is very similar to Myrrh, and sometimes sold for it."

One kind of Bdellium is produced in India, which Dr. Royle was informed was yielded by a tree called *googul* by the natives (v. Himal. Bot. 177), and which is the *Amyris Commiphora* of Roxb. referred by Messrs. Wight and Arnott to Balsamodendron. Dr. Walker, in his account of the drugs produced near Aurungabad, states "a gum-resin, called by the natives *googool*, is produced by a tree (Dr. W. calls it Amyris Bdellium? Roxb.) which grows in the neighbourhood of

Umber, a town twenty miles to the westward of Aurungabad. Roxburgh imagined that Googool was identical with Myrrh." But the whole of the species of this genus require to be carefully examined from good and authentic specimens accompanied by their respective products, before the several doubts can be resolved. *Prop.* Myrrh is imported from Bombay. It is generally in pieces of irregular form and size, formed apparently by agglutinated tears, dry, and covered with a fine dust, commonly of a reddish-brown colour; brittle, fracture irregular, conchoidal, shining, with the surface apparently dotted with volatile oil, often varied, with opaque, whitish, semicircular marks; the smaller pieces angular shining, semi-transparent; taste bitter and aromatic, the smell peculiar and balsamic. Other kinds are also met with, probably derived from the same source, as it sometimes reaches this country with the different qualities intermixed (*Myrrh* in sorts) or when the finer pieces are picked out (Turkey or picked Myrrh). But when the process is adopted abroad, the inferior qualities may come separately or remain intermixed with other gums or resins, especially Bdellium, from the careless manner in which all are collected by the natives. The specimens brought by the Abyssinian embassy have *granular* fragments mixed with roundish tears; and some of a pale, even whitish, colour may be seen on the same piece of bark with ordinary coloured Myrrh. The specimens which have not been exposed to the air, are darker coloured, moister, and of a more powerful and agreeable smell.

Indian Bdellium is sometimes sold for and considered as an inferior kind of Myrrh. It is in roundish pieces of a dull dark-red colour, more moist than Myrrh, and not brittle like it, softening even with the heat of the hand; bitter and a little acrid in taste, with a less agreeable odour. It often has portions of the birch-like bark adhering to it. Myrrh, when heated, softens, then burns partially, leaving a black spongy ash. Triturated with water, it forms an emulsion: the Alcoholic tincture is rendered opaque on the addition of water. It is a Gum-resin with volatile Oil, and salts of several acids combined with Potash and Lime. The Gum, about 63 per cent., consists of two kinds, one-half being *Bassorin* or insoluble, and the remainder *Arabin*, or soluble Gum. This being dissolved in water, readily suspends the Resin and Oil. The Resin, about 28 per cent., is also of two kinds, one soft, odorous, and soluble in ether, while the other is hard, without odour, soluble in alkalis. The volatile Oil, about 2·5 per cent., passes over if distilled with water; it is at first without colour, but becomes yellowish, has the odour and taste of Myrrh, is soluble in Alcohol, Ether, and the fixed Oils. Upon it and the Resin the properties of Myrrh chiefly depend. *Action. Uses.* Stomachic, Excitant, Stimulant Expectorant, Emmenagogue, *D.* gr. x to xxx. but usually united with tonics or with purgatives, as Aloes.—*Royle.* The sort met with in India, and brought from the Arabian and African Coasts, is in large opaque pieces, generally covered with a brownish white powder. An interior kind of Myrrh is also imported from the above places, and termed in India Bysabole. It has a great resemblance to Bdellium, for which it is not unfrequently mistaken. Myrrh is largely imported into Bombay, and is chiefly re-exported to England.—*Faulkner.*

(5546) MYROBALANS. This is a name applied to the almond-like kernels of a nut or dried fruit looking like a plum, of which there are several sorts known in the East. They are the produce of various species of *Terminalia*; as *T. Bellerica*, *T. Chebula*, *T. citrina*, and *T. angustifolia*. They vary from the size of olives to that of gall nuts, and have a rough, bitter, and unpleasant taste. Many of the trees of this tribe, which are all natives of the tropical regions of Asia, Africa, and America, are used for tanning, and some for dyeing. They are highly valued by dyers, creating, when mixed with alum a durable dark-brown yellow. Myrobalans fetch in the Bombay market 8*s.* to 26*s.* the Surat candy of 821 lbs. The bark and leaves of *T. Catappa* yield a black pigment, with which Indian ink is made; the seeds are eaten like almonds. A milky juice is said to flow from *T. angustifolia*, which when dried, is fragrant, and, resembling Benzoin, is used as a kind of incense in the Catholic churches in the Mauritius. The fruit of *T. Bellerica*, and of *T. Chebula*, both useful timber-trees, indigenous to the East Indies, are used medicinally as a tonic and astringent. One hundred and seventeen cwts. of Myrobalans were shipped from Ceylon in 1845. The annual imports of Myrobalans into Hull, amount to about 1600 cwts. The quantity which arrived at Liverpool was 185 tons in 1846, and 851 tons in 1850; 27,212 bags in 1851, and 19,946 bags in 1852; they came from Calcutta and Bombay, and are used for dyeing yellow and black. The price in January 1853 was 6*s.* to 12*s.* per cwt. The average annual imports into the United Kingdom may be taken at 1200 tons. Myrobalana is also the English name given by Lindley to the natural order *Combretaceæ*, which yields these fruits. [COMBRETACEÆ; EMBLICA.] (Simmonds, *Commercial Products of the Vegetable Kingdom.*) —*Eng. Cyc.* This fruit of several East Indian trees, is used in India as a substitute for galls. When ripe, the fruit is pear-shaped, deeply wrinkled, and of a brownish yellow colour: it weighs from 70 to 100 grains. The husk contains the whole of the astringent matter, some mucilage, and a brownish yellow colouring substance, which is used in India for dyeing yellow. The husk is easily separated by bruising the nut, which it encloses. The tannin

of myrobalans differs slightly from that of gall. Gallic acid is also present in rather large proportion. The price of myrobalans in June 1852 was quoted at from 6*l.* to 10*l.* per ton. The *Myrobalans* of commerce yielded by *Terminalia chebula*, *belerica* and *citrina* (called also Gallnuts) are oval fruits of a dingy yellow colour, containing much tannin; hence, they are useful to the tanner as well as the dyer. With alum, this dye yields a good durable yellow, and with salts of iron, a black colour, little inferior to that produced by Oak Galls. The Myrobolans although a very common dyeing and tanning material of this country from time immemorial, have not been many years introduced into English commerce, but so useful have they been found, that they have become a very important article of trade, and the consumption is now fully 2000 tons annually (Archer).—*Tomlinson*. On this subject, the Canara Local Committee observes as follows:—"During the last season a sudden demand "arose for the Gallnut, and large profits were "made by the persons who collected it from the "jungles. The exports for five years have been "as follows:"—

Fuslies.	Quantity.		Value.		
	Candies.	Mds.	Rs.	As.	P.
Fusly 1256.....	207	3	918	,,	,,
1260.....	380	16	1877	,,	,,
1261.....	537	19	2860	,,	,,
1262.....	520	17	2614	,,	,,
1263.....	2154	4	3029	,,	,,

All the three Myrobolans are to be met with in many parts of lower India. In Bengal they grow in abundance. In Java we are told by Buntins, (1) that the Dutch were in the habit of employing the Embic and Beleric sorts daily in their hospitals, in dysenteric, and bilious affections.—*M. E. J. R. Ainslie.*

Har, Harra, from Terminalia chebula, and other species, three in number, comprise all the discarded myrobalans of our old pharmacopœas. The myrobalans as brought into Cashmere from Delhee and Harowtee, Hindusthan and the Dukhan, are of four kinds namely:

Gural harra.—Astringent and purgative: used in mesalibs: given in medicine to children: four seers for one rupee.

Juwal harra.—Used in the same way; eight seers for one rupee.

Chaipel harra, used only in dyeing, ten seers for one rupee. The whole are much used in dyeing. According to the size of the myrobalan its value augments, so that a very large one may be worth one hundred rupees or more, the natives believing that the very large ones have the virtue of causing purging by being merely retained in the hands—*Gen. Med. Top. p.* 136. The Har or Harra, is, says Dr. Irvine, one among the articles of the native materia medica than which no one is more vaunted. It is considered to possess wonderful general deobstruent and purgative qualities &c. &c., while those who thus belaud it, are apparently not aware that this is the chebulic myrobalan (Terminalia chebula) of English pharmacopœias of the sixteenth century and long since deservedly neglected.—*Gen. Med. Top. p.* 153.

(5547) MYROBALAN, BELLERIC. TERMINALIA BELLERICA. Roxb.

Beleyluj, ARAB.	Belelah. Belegleh, PERS.
Booloo, CYNG'	Behira, Veebitaka, SANS.
Bella, DUK.	Tanikai, TAM,
Behevra, Beeda, HIND. GUZ.	

The fruit of the Bellerie Myrobalan, in its dried state, is little larger than a gall-nut, but not so regular in shape, of a dirty brown colour, and astringent taste. It is supposed to be similar in its properties to the Chebulic Myrobalan, but in a much weaker degree. It is much used in India as the basis of several colours, and also in medicine. Small quantities have of late years been exported from Bombay to England.—*Faulkner.* This article is sometimes used by the natives in its dried state in cases requiring slight astringents. The large tree which produces it, is common in Mysore, where it is called Tari; and hence the botanical name (Myrobolanus Taria) given to it by Dr. Buchanan. It would appear to be the Tani of Rheede.—*Ainslie's Mat. Med. p.* 28. Bellerie Myrobalan fruit is esteemed medicinal by the Burmese, and is dried and sold among the drugs. The tree is indigenous, but not very abundant.—*Mason.*

(5548) MYROBALAN, BLACK, OR INDIAN.

Heleelaj Aswad, ARAB.	Helcelah Seeah, PERS.
Zengi har, BENG.	Kurkadaga, SANS.
Hemuz, Hemuj, GUZ. H.	Sinhgi, TAM.

Is the unripe dried fruit of the *Terminalia chebula*. It is about the size of a pistachio nut and of a deep black colour, oblong, pointed at both ends, slender, and has scarcely the rudiment of the nut. It is used by the natives of India as a brisk purge; and also as a dye. In Bengal and in most parts of the Western Presidency, they are grown in abundance. They are largely exported from Bombay to the Arabian and Persian Gulfs.—*Faulkner.*

(5549) MYROBALAN, CHEBULIC. COUNTRY GALLS. Terminalia Chebula, Willd.

Heleeluj Kabulee, ARAB.	Humbether GUZ. HIND.
Araloo, CYNG.	Helcelah—kilan, PERS.
Huldah, DUK.	Haritaka, SANS.
Hurda, HAR. HAR,	Kadukai, TAM.
	Carakaia, TEL.

In its dried state, it is about the size of a large Spanish olive, of an oblong ovate shape, yellow brown colour, and is marked with edges and furrows alternately. The tree (*Terminalia chebula*),

which yields this fruit, is common in the Mysore country, Bengal, and in some parts of the Western Presidency. This fruit is infinitely more astringent than the preceding, and is on that account, much more extensively used by the natives in their arts and manufactures. They are exported from Bombay to London and Liverpool in large quantities.—*Faulkner.* This species is infinitely more astringent than the preceding, and it would appear by some experiments made by Dr. Roxburgh, that it is even more so than the Aleppo Galls. Kadukai well rubbed in conjunction with Galls and Cuttacamboo (of each equal parts) is considered by the Vyteans as an excellent external application in the apthous affections of children, and adults, the last of which is a most dangerous disease amongst the Native Indians. The tree which produces the Kadukai is common in Mysore, where it is called Arulay, and hence the Botanical name (Myrobolanus) given to it by Dr. Buchanan.—*Ainslie's Mat. Med.*

(5550) MYROBALAN, CITRINE. MYROBOLANUS CITRINA.

Alay-gara, TAM.	Liba, SANS.
Harra, Harva, GUZ. H.	

The Citrine Myrobalan (*Terminalia citrina*), is ranked among the fruits; it is about the size of a French plum, and is often made into pickle, and when green, is used as a gentle purgative. It is frequently met with in most parts of Lower India. This fruit grows in Canara, it is not much prized and is generally made into pickle.—*Ainslie.*

(5551) MYROBALAN EMBLIC. EMBLICA (OR PHYLLANTHUS) OFFICINALIS. Phyllanthus Emblica, *Linn.*

Amla Anola, BENG.	Aoonla, Amlej, DUK.
Cayboung Ngot, Hac-min-sau, COCH-CHIN.	Amleh, PERS.
	Amalaka, Amrita, SANS.
Amla, Anvelcutty, Aoonla Aunwera, GUZ. HIND.	Nelliekai, TAM.
	Woosheerikaia, TEL.
Awusadanelli, CYNG.	

The Emblic Myrobalan in its dried state, is about the size of a small marble, of a dirty, dark-brown colour, and irregular surface, possessing a considerable degree of astringency. It is to be met with in most parts of lower India. In Bengal they are grown in abundance. It is reckoned among the Indian fruits, and in its green state, is frequently made into preserve and pickle; it is also used in medicine.—*Faulkner.* In its dried state it is with other articles of similar qualities, made into a cooling and opening Ptisan. The tree which produces this article is the Nilicamarum of the Hort. Mal. and the Boa Malacca of the Malays.—*Ains. Mat. Med. p.* 29.

(5552) MYROSPERMUM, a genus of plants belonging to the natural order *Amyridaceæ*. It has a 5-toothed campanulate calyx; 5 petals, the upper one largest; stamens 10, distinct; ovary stipitate, oblong, membranous, with 2-6-ovules; legume with a winged stalk, terminating in an oblique indehiscent 1-celled 1-2-seeded samara. The species are trees with dotted leaves.—*Eng. Cyc.*

(5553) MYROSPERMUM. PERUIFERUM. (Myroxylon Peruiferum Linnæus), Balsam of Peru Tree. The stem of this plant yields the Balsam of Peru. It has a thick smooth straight trunk with a gray coarse bark, which is filled with resin. By distillation with water it yields a volatile oil. By exposure to the air it hardens, and is then termed Opobalsamum Siccum, which must not be confounded with the true Opobalsamum. Balsam of Tolu is also sometimes called Opobalsamum.—*Eng. Cyc.*

(5554) MYRTACEÆ, *Myrtle Blooms*, Polypetalous Exogens, forming a very extensive and important natural order of Plants, exclusively inhabiting warm countries, and in all cases either shrubs or trees, an herbaceous form of the order being unknown. The most northern station of the species is the south of Europe, where the common Myrtle grows apparently wild. If this plant is taken as the type of the order, it might be said to consist of aromatic plants with opposite leaves, dotted with transparent oil-cysts, bearing icosandrous monogynous polypetalous flowers, succeeded by an inferior succulent fruit; but this is the character rather of a section of the order than of *Myrtaceæ* considered as a whole. In this division are however included nearly all the species employed for the use of man. Among the table-fruits of the tropics are—the Guava, yielded by different species of *Psidium*; the Rose-Apple and Jamrosade, produced by *Eugenia Malaccensis* and *E. Jambos*: of spices, Cloves are the flower-buds of *Caryophyllus aromaticus*; and Allspice is the dried berries of *Eugenia Pimenta*; all which are obtained from the plants belonging to the same section as the Common Myrtle; the aromatic fruits of that plant were indeed used as a spice before Cloves and Allspice became common.

The deviations that take place from the typical structure of the order consist partly in the fruit being dry and capsular instead of fleshy and indehiscent, and partly in the organisation of the interior of the fruit being educed to a state of great simplicity; besides which the leaves are often alternate instead of opposite. Some of the species have no corolla, and there is in many cases a very singular tendency to consolidate the floral organs of all kinds.

The species with capsular fruit are principally found in Australia, where, in the form of *Eucalyptus* and *Leptospermum*, they constitute one of the most striking features of the vegetation. These plants abound in a powerful astringent secretion, chiefly found in their bark, on which account they are found valuable for

the tanner's purposes; while the aromatic principles is also abundantly secreted in other cases, as, for example, in *Melaleuca Cajeput*, from which the green stimulating oil of the Cajeput is procured. It is more particularly among these species that anomalous conditions of the floral organ occur. In *Eucalyptus* there is no corolla, and the segments of the calyx are so completely united to each other as to form a fleshy cap, thrown off by the flowers when the time arrives for extricating the stamens. In *Melaleuca*, *Calothamnus*, and several others, the stamens are united to each other by their filaments, so as to form showy, petal-like, fringed expansions; and in *Eudesmia* the petals themselves are united into a cap, thrown off upon the expansion of the flower.

The most singular form of *Myrtaceæ* is that which derives its name from an Australian plant, called *Chamælaucium*, in which the interior of the ovary contains but one cell, with from two to five ovules rising up obliquely from its base. These plants are all small heath-like shrubs, having in the majority of cases the edge of the petals prolonged into long and delicate fringes. Such plants are extremely abundant on the west coast of Australia, where they form one of the most striking characters of the Flora. *Punica Granatum*, the Pomegranate-Tree, is a most anomalous form of *Myrtaceæ*, remarkable for an almost total absence of transparent dotting, and consequently of aromatic qualities; and having a fruit consisting of two whorls of carpeds compacted together into an inferior ovary, the interior of which becomes altered and distended so much after the flower has fallen off, that the fruit is nothing but a collection of cavities filled with seeds, and having no apparent relation to each other.

The genus *Caryophyllus* has the following characters:—Tube of the calyx cylindrical; limb 4-parted; petals 4, adhering by their ends in a sort of calypra; stamens distinct, arranged in 4 parcels in a quadrangular fleshy hollow near the teeth of the calyx; ovary 2-celled; ovules about 20 in each cell: berry 1-2-celled, 1-2-seeded; seeds cylindrical or half-ovate; cotyledons thick, fleshy convex externally, sinuous in various ways internally.

C. aromaticus, the Clove-Tree, is a native of the Moluccа Islands. It is a moderately-sized tree, with leaves opposite and decussate, persistent, somewhat coriaceous and shining, minutely punctuated, about 4 inches long, ovate-lanceolate, more or less acute, quite entire, pale beneath, tapering gradually at the base into a slender footstalk which is almost 3 inches long. The cloves of the shops are the dried compressed flower-buds of this tree.—*Eng. Cyc.*

(5555) MYRTUS (*Μύρτος*), a genus of Plants, the type of the natural order *Myrtaceæ*. It has the calyx-tube somewhat globose, with the limb 5- or very rarely 4-partite; the petals 5, or very rarely 4; the stamens distinct; the berry 2- or 3-celled, somewhat globose, crowned with the segments of the calyx; several seeds in each cell, or very rarely solitary; uniform, with a bony testa; the embryo curved; cotyledons semi-cylindrical, very short, the radicle twice the length of the cotyledons. The species are shrubs with opposite quite entire pellucid dotted leaves; peduncles axillary, 1- or rarely 3-flowered.—*Eng. Cyc.*

(5556) MYRTUS COMMUNIS, Common Myrtle, has solitary 1-flowered pedicels about the length of the leaves, bearing 2 linear bracteoles under the flowers; the calyx 5-cleft; the leaves ovate, lanceolate, or acute. This beautiful plant is a native of the south of Europe; it is found wild in France, about Marseilles, and extends from that city along the sea-coast to Genoa, and throughout Italy. In these districts it forms thickets which sometimes grow within reach of the spray of the sea. This plant has been in all ages a great favourite in Europe. It was called by the Greeks *Μύρτος*. *Μυρσίνη* is the name under which Hippocrates refers to this plant. ('Morb. Mul.,' i. 599.) Theophrastus also uses this word, and *Μυρτίνη* and *Μυρτίς*, in speaking of the Myrtle. The Romans knew this plant by the name of Myrtus. (Pliny, 12-13.) This name has been adopted in most European languages. It is Mirto in Italian and Spanish; Myrte in German; Myrter in Danish; Myrten in Swedish; Mirte in French; Mirta in Portuguese. The leaves of the Myrtle, like the whole order, contain a volatile oil which possesses medicinal properties, and they were used as stimulants by the ancients. The buds and berries of this plant also contain volatile oil, and were used by the Romans as a spice, and are at this day in Tuscany employed as a substitute for pepper. The Tuscans also prepare a kind of wine from the Myrtle called Myrtidanum. The berries are used at the present day in Greece as a remedy in the diarrhœa of little children. The mode of administering them is to soak them in red wine. The flowers of the Myrtle have an agreeable scent, and when distilled they form the perfume sold in France under the name of Eau d'Ange. In addition to the volatile oil the Myrtle contains tannin, so that in medicine its various parts have an astringent action, and have been used for this purpose. In Greece, Italy, and the south of France, the bark is used for tanning. The varieties are the Gold-Striped Broad-Leaved Myrtle, Broad-Leaved Jew's Myrtle, Gold-Striped-Leaved Orange-Myrtle, Silver-Striped Italian Myrtle, Striped Box-Leaved Myrtle, Silver-Striped Rosemary-Leaved Myrtle, Silver-Striped Nutmeg Myrtle, Cockscomb or Bird's-Nest Myrtle, Spotted-Leaved Myrtle. About 40 other species

of Myrtle besides those of the old genus *Myrtus*, now referred to the genera *Myrica*, *Eugenia*, &c., have been described. None of them yield products used in arts or medicine, and only a few of them have been cultivated.—*Eng. Cyc.*

(5557) MYRTUS NUMMULARIA is a creeping species found at the Straits of Magalhæns; and *M. myrsinoides*, a native of the colder parts of Peru, would probably be found to be half-hardy in England (Loudon, *Arboretum Britannicum*; Fraas, *Synopsis Floræ Classicæ*; Burnett, *Outlines of Botany*; Lindley, *Flora Medica*. —*Eng. Cyc.*

(5558) MYRTUS SPECTABILIS, M. TOMENTOSA.

(5559) MYRTUS TOMENTOSA, is a native of Cochin China. It is a handsome shrub, and has been found to grow well against walls in the south of England.—*Eng. Cyc.*

(5560) MYTILIDÆ, a family of Lamellibranchiate *Mollusca*. It includes the species referred by Linnæus to the genus *Mytilus*. Mr. G. B. Sowerby ('Genera'), after remarking that the Linnæan genus *Mytilus*, on account of its principal character being its want of hinge teeth, consists of several forms that are widely distinct from each other, and which have well served as the types of several Lamarckian genera, such as *Avicula*, *Modiola*, *Anodon*, and others, in connection with the present genus, which deservedly retains the name of *Mytilus*, both on account of its form and the priority of its claim, proceeds to observe that the other genera which have been united with it but from which it appears necessary to distinguish it because of a certain degree of general resemblance, are *Modiola* and *Lithodamus*: from *Anodon* and *Avicula*, together with Lamarck's *Meleagrina*, it is, he adds, obviously distinct: whilst one character—namely, the pointed terminal umbones—serves to distinguish it from *Modiola* and *Lithodomus*.—*Eng. Cyc.*

(5561) MYTILUS. This genus is abundant on most rocky coasts, where the species are to be found moored by their coarse filamentous byssus, generally to such rocks or other submarine bodies as are exposed at some periods of the tide where tides exist, and covered by the sea at high water. Mr. G. B. Sowerby does not think that, after being once attached, they habitually disengage themselves, though it appears to him probable that, when disengaged by the force of the sea, they may live for some time without being in any manner, affixed. The species are numerous, and most of them are used as food; but they should be eaten with caution, for serious illness and even death have insued from a meal made on some of them. The byssus, or beard, as it is popularly called, should be carefully cleared away, and they should be particularly avoided when cholera is about, or even when diarrhœa is prevalent.—*Eng. Cyc.*

(5562) MYTILUS. EDULIS, the Common Salt-Water Muscle. This species is too well known to require description: the shell, is strong. When freed from the epidermis and polished, the under surface of the external parts of the shell is exposed, and is of a deep blue. In this state it is often offered for sale at watering places. The inside of the valves is white with a dark rim. The Common Edible Muscle is found in extensive beds below low-water mark, and also at a greater depth. Rocks and stones between high-water marks are also covered with them.

N.

(5563) NAA. A very hard, fine, close-grained, and very ponderous Ceylon wood.

(5564) NADULEE. A stone engraved with a verse of the koran, and suspended as a charm round the necks of children.—*Herklots.*

(5565) NAGEESA HIND. There is much dispute amongst oriental scholars about the wood Nageesa; the Bombay philologists refer it to a species of *Garcinia*, whilst the pundits on the Calcutta side of India consider it to be *Mesua ferrea*. Throughout his travels in India, Dr. Hooker was struck with the undue reliance placed on native names of plants, and information of kinds: and the pertinacity with which each guist adhered to his own crotchet as to the application of terms to natural objects, and their pronunciation. It is a very prevalent, erroneous impression, that savage and half-civilised people have an accurate knowledge of objects of natural history, and a uniform nomenclature for them. —*Hooker Him. Jour. Vol.* II. *p.* 328.

(5566) NAGEIA PATRANJEVA: POOTRA JEEVI, TELING Pongalam: Rheed Pootrungeiva Pitanjia. A native of various mountainous countries of Coramandel and Hindoostan, where it grows to be a large timber tree with an erect straight trunk and a large spreading shady head composed of innumerable expanding branches, with bifarious branchlets. Flowering time March and April and the fruit ripening in January.

The wood is white, close grained, and very hard. —*Rhode M.S.S.*

(5567) NAGKESUR, Mesua ferrea. The root of the tree is used: considered astringent and refrigerant: one tola is taken internally: is applied externally in cynanche.—*Ainsl. Mat. Med. Top. p.* 147.

(5568) NAIGRE SEED, is not known at Madras, it is an article of export from Malabar: it is probably the name of the seed of Pongamia glabra.

(5569) NAIA, Laurenti's name for a genus of highly venomous Serpents, to which the species of *Uræus* and *Aspis* of Wagler belong. This form appears to be confined to the Old World. The Asiatic species *Coluber Naja* of Linnæus; *C. cæcus* of Gmelin (?); *Vipera Naja* of Daudin; *Naja tripudians* of Merrem; *N. lutescens* of Laurenti; Cobra de Capello (adder with a hood) of the Asiatic Portuguese; Serpent a Lunettes of the French; Nag and Chinta Nagoo of the natives; and Spectacles-Snake of the English, may be considered as the type of the genus. It has the following characters:—Head with nine plates behind, broad; neck very expansile, covering the head like a hood: tail round. (Gray.) The expansion of the neck and upper part of the body is effected by the anterior ribs, which the animal has the power of raising and bringing forward so as to dilate that portion into a disc more or less large. When this disc is thus dilated in the *Naia tripudians*, it presents on the back part of it no bad representation of a pair of spectacles, or rather barnacles, reversed, for there is no trace of the lateral pieces by which spectacles are attached to the head of the wearer. The animal is brown above, and bluish-white beneath. The following cuts will convey some idea of the form of this snake, with the hood or disc expanded. Colonel Briggs informs us that this active and deadly serpent is sometimes worshipped in temples in India, where it is pampered with milk and sugar by the priests, and he notices it as a surprising instance of the effect of kind treatment in subduing the most irritable spirits. "The Hindus," says the Colonel, in continuation, "have a notion that the sagacity and the long-cherished malice of this worm are equal to that of man. I have seen them come out from their holes in the temples, when a pipe has been played to them, and feed out of the hand as tamely as any domestic animal; and it is when in this state of docility, so opposite to their shy but impetuous nature, the common people believe that the Deity has condescended to adopt that form. It seems probably that this hooded snake was the dragon of the heathen worship; and the shape of its head and its activity when in a state of excitement probably gave rise to the fable of its being winged." It is pretended that the root of the *Ophiorrhiza mungos* is a specific against the bite of this serpent. The priests and jugglers however, who make them dance to astonish or amuse the people, make all sure, there is little doubt, by extracting the poison-fangs. This formidable species, or at least some species of hooded snake, according to the records of travellers, grows to a considerable length. Captain Percival gives the following account of its size and habits, in his 'Account of the Island of Ceylon,' 5to, 18 5:—"The Cobra Capello, or Hooded Snake, is found here from six to fifteen feet long. Its bite is mortal. The natives find the herb pointed out by the ichneumon a remedy, if timely applied. When enraged and preparing to attack, it raises its head and body to the height of three or four feet in a spiral manner, while at the same time the remaining part of the body is coiled up to accelerate and give force to the spring. At this instant it distends from its head a membrane in the form of a hood, from which it receives its name. This membrane lies along the forehead and the sides of the neck, and is almost imperceptible till the animal gets into a state of irritation and is about to attack his foe. When the hood is erected it completely alters the appearance of the head, and discloses a curious streak in the shape of a pair of spectacles, and sometimes of a horse shoe. The extension of this membrane seems intended by Providence to give warning to all those within this animal's reach that he is preparing to attack them. Without this signal he would be very dangerous indeed, as his motions afterwards are too rapid to be avoided. I have more than once been an eye-witness to instances where the fatal bite of this snake was escaped from merely by the object of his vengeance timely observing his preparations. One remarkable characteristic of these dangerous serpents is their fondness for music. Even when newly caught they seem to listen with pleasure to the notes, and even to writhe themselves into attitudes. The Indian jugglers improve greatly on this instinct, and, after taming them by degrees, instruct them even to keep time to their flageolet." The largest Cobra de Capello seen by Dr. Davy in Ceylon was nearly six feet long; and he adds that the general length is between two and four feet. The colour varied: those of a light colour were called high-caste snakes by the natives, and those of a dark colour low-caste. "The natives," says Dr. Davy, "in general rather venerate this snake than dread it. They conceive that it belongs to another world, and that when it appears in this it is merely as a visitor; they imagine that it possesses great power, that it is somewhat akin to the gods, and greatly superior to man. In consequence they superstitiously refrain from killing it, and always avoid it, if possible. Even when they find one in their house, they will not kill it, but, putting it into a bag, throw it into water. They believe that this snake has a good and

generous disposition, and that it will do no harm to man, unless provoked." Dr. Davy gives a pleasing picture of the irritations and soothings with which the snake-charmers excite and allay the temper of this serpent. He records several instances of the operation of the poison, the first arising from a serpent found in a bag floating down the Kalang-ganga. It was about five feet long, and about six inches in circumference in the broadest part. This snake bit a hen, fixing its fangs in the skin covering the lower part of the left pectoral muscle, and keeping its hold about two or three seconds, when Dr. Davy succeeded in shaking it off. The hen, which at first seemed to be little affected, died eight hours after she was bitten. ('An Account of the Interior of Ceylon,' &c., by John Davy, M.D., F.R.S., 4to, London, 1821.) Several Cobras have been kept alive in the Zoological Gardens, Regent's Park. One of these creatures bit one of the keepers on the nose whilst he was playing with it. The man died in a few hours after. The Arabs who accompanied the Hippopotamus had the power of snake-charming; and on several occasions these fearful reptiles were made to go through a variety of performances by a lad not more than 10 or 12 years old. There are several other species of *Naia*. Schlegel, in his essay on the 'Physiognomy of Serpents,' gives the following:—

"*Naia Haje*.—The Aspis of antiquity. This is the snake which is most frequently operated on by the snake-charmers of Egypt, where it is found. [ASP.] It is worthy of observation with reference to the contest in the presence of Pharaoh between Moses and Aaron and the magicians of Egypt (Exodus, vii. 9,12), that it is stated, on good authority, that the modern Egyptian jugglers possess the power of throwing the *N. Haje* into a state of catalepsy, and rendering it stiff and immoveable, in other words, changing it into a rod, by pressing the nap with the fingers.

Nabalus Bungarus.—Is a rare species, inhabiting the islands of Java and Sumatra. It is the *Bungarus* of Daudin.

Nabalus Curta.—A native of Australia. We owe to Dr. Cantor, who has added so much to our knowledge of the natural history of Asiatic serpents, the introduction of a new genus of hooded snakes, *Hamadryas*, which will probably find its proper place in the series as a sub-genus of *Naia*.

Hamadryas (Cantor). Head broad, subovate, deplanate, with a short obtuse rostrum, covered above with 15 scuta; cheeks tumid; eyes large, prominent, pupil round; nostrils widely opened, within the confine of two scuta; gape very ample, subundulated. Poison-fangs anterior, behind which are the maxillary teeth. Neck dilatable. Body thick, smooth, imbricated with smooth scales disposed in oblique rows. Tail short, covered with scuta and scutella, its apex acute.—*Cantor*.

H. ophiophagus (Cantor). Above olive-green, girt with black sagittal striæ; abdomen glaucous, marbled with black. The Hindustanee name is Sunkr Choar. It is a native of Bengal. Dr. Cantor thus describes the habits, the effect of the poison, and the history of this serpent:—"The *Hamadryas*, like the *Bungarus*, *Hydrus*, and *Hydrophis*, has a few maxillary teeth behind the poison-fangs, and thus, like the latter, connects the venomous serpents with isolated poison-fangs to the harmless, which possess a complete row of maxillary teeth. "Of the terrestrial venomous serpents, the *Bungarus* is chiefly characterised by a distribution of the teeth similar to that of the *Hamadryas*, which also partaking of the chief characteristic of the genus *Naja*, namely, that of forming a hood or disc, constitutes an immediate link between the genera *Bungarus* and *Naja*. "In consequence of the strong resemblance in the general appearance between the *Naja* and the *Hamadryas*, when first my attention became attracted to the latter, I thought I could refer this serpent to that genus; and it was not until I was able to examine a specimen whose poison-fangs were untouched (those of the first specimens I saw having been drawn by the natives, who are greatly afraid of this serpent), that I discovered the maxillary teeth behind the poison fangs.

"*H. ophiophagus* differs from the Naja *tripudians*:—1, By its maxillary teeth; 2, by the strongly-developed spines on the os occipitale inferius; 3, by the covering on the head; 4, by the integuments covering the abdominal surface of the tail; 5, by its colour; 6, by its size. According to the natives, the *Hamadryas* feeds chiefly upon other serpents: in one I dissected I found remains of a good-sized monitor, which fact may account for its arboreal habits, as I have in Bengal, along the banks of the rivers, observed numbers of those large lizards among the branches of trees watching for birds. "The power of abstaining from food, generally speaking, so characteristic of the Serpents, is but in a comparatively small degree possessed by this species; the most protracted starvation amounts to a period of about one month; while the *Vipera elegans*, the *Naia tripudians*, and the *Bungarus annularis*, have, without inconvenience, been confined in cages without any food for more than ten months. Two specimens of the *Hamadryas*, in my possession, were regularly fed by giving them a serpent, no matter whether venomous or not, every fortnight. As soon as this food is brought near the serpent begins to hiss loudly, and, expanding the hood, rises two or three feet; and retaining this attitude, as if to take a sure aim, watching the movements of the prey, darts upon it in the same manner as the *Naia tripudians* does. When

the victim is killed by poison, and by degrees swallowed, the act is followed by a lethargic state, lasting for about twelve hours. Such of the other India venomous serpents, the habits of which I have had opportunity to study from life, show themselves much inclined to avoid other serpents, however ready they are to attack men or animals when provoked or driven by hunger; and I am not aware of any other of those serpents being recorded as preying upon its own kind. A short time ago however, during my sojourn at the Cape of Good Hope, I received from high authority the following fact, which throws a light upon the habits of the *Naja* of Southern Africa, one of which, when being captured, threw up the body of a *Vipera arietans* (*V. brachyurus*, Cuvier), which bore marks of having been submitted to the process of digestion. "The *Hamadryas*, like the greater number of Indian serpents, evinces a great partiality to water. With the exception of the Tree-Serpents (*Leptophina*, Bell), they all not only drink, but also moisten the tongue, which, as this organ is not situated immediately in the cavity of the mouth, become in the serpents two different acts. Specimens of this serpent in my possession changed the skin every third or fourth month, a process which takes place in all the Indian serpents several times during the year. The *Hamadryas* is very fierce, and is always ready not only to attack but to pursue when opposed; while the *Cophias*, the *Vipera*, the *Naja*, and the *Bungarus* merely defend themselves, which done, they always retreat, provided no further provocation is offered. The natives of India assert that individuals are found upwards of 12 feet in length —a statement probably not exaggerated, as I have myself seen specimens from 8 to 10 feet in length, and from 6 to 8 inches in circumference, I have often heard it asserted that 'Cobras' (which name is naturally enough given to every hooded serpent) have been met of an enormous size, but I strongly doubt their belonging to the genus Naia, among a considerable number which have come under my observation, I never saw any exceeding 5 to 6 feet in length, while the common size is about 4 feet. Some time before I discovered the *Hamadryas*, I was favoured by J. W. Grant Esq., of the Hon. Company's Civil Service, with an interesting description of a gigantic hooded serpent he had observed in the upper provinces, and which, he remarked, was not a *Naja*. By inspection this gentleman denied the *Hamadryas* to be indentical with the above-mentioned. "The natives describe another hooded serpent, which is said to attain a much larger size than the *Hamadryas*, and which, to conclude from the vernacular name, Mony Choar,' is perhaps another nearly allied species.

"The fresh poison of the *Hamadryas* is a pellucid tasteless fluid, in consistence like a thin solution of gum arabic in water; it reddens slightly litmus paper, which is also the case with the fresh poison of the *Cophias viridis*, *Vipera elegans*, *Naja tripudians*, *Bungarus annularis* and *Bungarus caeruleus*. When kept for some time it acts much stronger upon litmus; but after being kept it loses considerably, if not entirely, its delcterious effects.

"From a series, of experiments upon living animals, the effects of this poison come nearest to those produced by that of the *Naja tripudians*, although it appears to act less quickly. The shortest period within which this poison proved fatal to a fowl was fourteen minutes, whilst a dog expired in two hours eighteen minutes after being bitten. It should however be observed that the experiments were made during the cold season of the year."—*Eng. Cyc.*

Nabalus Elaps.—Is a very large snake, but its country is unknown.

(5570) NAILS.

Spykers, Dut.	Chiodi, Chiovi, Aguti,
Clous, Fr.	It.
Nagel, Spiker, Ger.	Pregos, Port.
Keela, Meikh, Guz. Hind.	Gwosdi, Rus.
	Clavos, Sp.

Are small spikes of iron, copper, brass, &c. which, on being driven into wood, serve to bind or keep together several parts or pieces. The principal seats in England of this useful branch of the iron manufacture are at Birmingham, Bilstone, and Wolverhampton. Iron nails are largely made in Bombay, and are chiefly used in the construction of houses, sailing vessels, &c.—*Faulkner.*

(5571) NAK-CHIKARA. The leaves of a small plant found about Ajmeer, also imported from Delhi: are very hot, and a good sternutatory: three massee are given in pills, as a dose in colic, which is said to be thus speedily relieved.—*Gen. Med. Top. p.* 147.

(5572) NALAPANA KULINGOO, Cæsalpigo orchioides.

(5573) NIMA QUASSIOIDES, (Hamilton.) *Syn.* Simaruba Quassioides, Don. This is a native of the Himalayas. It was discovered in Nipal by Dr. Hamilton, and is stated by Dr. Royle to exist in Turanda, on the banks of the Sutledge, in more than 31° of N. latitude. Dr. Royle has also met with it in valleys in Gurhwahl. In general appearance and intense bitterness this tree is too closely allied to the Simarubeæ to permit their separation. The wood of this tree is light coloured and very bitter, and although it has not as yet been subjected to experiment, we are led from analogy to entertain the most confident opinion of its proving a perfect substitute for the West Indian article.—*O'Shaughnessy, page* 569.

(5574) NAMEDE. A rather hard, very fine, close-grained, heavy Ceylon wood.

(5575) NAMELUDDOOOOO.

Neemee ladooo, Tel. | Junglee shumbaloo, Hind.

(5576) NANDINA DOMESTICA. There is a plant, with red berries, which takes the place of our English holly. It is the *Nandina domestica*, and is called by the Chinese the "Teinchok," or sacred Bamboo. Large quantities of its branches are brought in from the country and hawked about the streets. Each of these branches is crowned with a large bunch of red berries, not very unlike those of the common holly, and, when contrasted with the dark, shining leaves, are singularly ornamental. It is used chiefly in the decoration of altars, not only in the temple, but also in private dwellings and in boats, for here every house and boat has its altar—and hence the name of "sacred Bamboo" which it bears.—*Fortune, page* 122.

(5577) NANKEEN, or NANKIN.

Nankings linnen, Dut.	Nankeen, Guz. Hind.
Toile de Nankin, Fr.	Nanquino, It.
Nanking, Ger.	Nanquina, Sp.

A Chinese cotton cloth of either white, blue, or brownish-yellow colour. In point of strength and durability, it is unrivalled by any of the cotton fabrics of Europe. In some of the southern parts of Europe, the warmer parts of America, and the British settlements in Africa, Nankeen is worn by both sexes all the year round, and constitutes the principal article of attire. In England and India it is now almost disused. —*Faulkner*. This kind of cotton cloth is so named from Nanking, where the reddish threads were originally made. They are divided into company's of which there are three qualities, and narrow nankeens; the former are the finest and most esteemed. Nankeens are also manufactured in Canton and other parts of the empire, but the fabric is of an inferior quality. Those made in Canton still maintain their superiority in color and texture over the imitations of other countries. The price varies from $ 45 to $ 90 per hundred pieces. This cloth is extensively worn by the Chinese themselves, who usually dye it with indigo. The exportation is now trifling, and almost wholly to England, although small quantities find their way elsewhere. The duty, which was formerly a discriminating one, has been equalized under the new tariff, and includes nankeens and all other kind of native cotton cloths. —*Morrison*. The durable cotton cloth made in the central provinces, called Nan-keen by foreigners, is the chief produce of Chinese looms from Cotton, the aerial muslins so highly admired by the Hindus not being woven. The nankeen is generally exported without dyeing, but the people usually color it blue before making it into garments. The import of raw and manufactured cotton constitutes a large item in the foreign trade, but forms a small part of the native consumption. In preparing the cotton for spinning, it is cleaned and freed from knots by placing the string of a bow under the heap, and striking it with a beater; the recoil separates it into flocks without injuring the staple. *Williams' Middle Kingdom, Vol.* II, *page* 124. *Nankeens* were formerly sent abroad in considerable quantities, but instead of exporting their own fabrics, the Chinese now purchase cottons from their former customers to a large amount. There are few fabrics more durable than the nankeen, and it forms the principal material for cheap garments among the people and is more or less exported every year to England, Sydney and South America.—*Williams*.

(5578) NAPHTHA, Rock Oil.

Neft, Arab.	Kesoso no abra, Jav.
Bitume de Judee, Fr.	Minuia tauna, Mal.
Nuckteil Mittie-ke-teil, Guz. & Hind.	Bhumi, tailuni, Sans.
	Mun tylum, Tam.
	Boomie tylum, Tel.

An inflammable mineral substance, which is both a natural and artificial product. It is a fine, thin, volatile, colourless fluid which issues out of white, yellow, or black clays in Persia, Media, and other places; a similar liquid is obtained by the distillation of petroleum, caoutchouc, and pit coal in gasworks: the latter kinds have a penetrating and unpleasant odour. Naphtha dissolves the greater number of the essential oils, and the resins; and is extensively used for dissolving caoutchouc to render cloth water proof; with certain vegetable oils, it forms a good varnish, and for this purpose is sometimes substituted for turpentine. In Genoa it is used in the street lamps.—*Faulkner*. Naphtha is a compound of Carbon and Hydrogen, frequently found in the neighbourhood of coal-deposits, and in other parts of the earth. It contains 82.2 of carbon and 14.8 of hydrogen. It is a limpid or yellowish fluid, lighter than water, and hence called Mineral Oil. Its specific gravity is 0.7 to 0.84. It hardens and changes to the substance called Petroleum on exposure to air. It may be obtained from Petroleum by heat, which causes it to pass off in vapour. Naphtha issues in large quantities from the earth in Persia and the Birman Empire. At Rangoon, on one of the branches of the river Irawaddy, there are upwards of 500 naphtha and petroleum wells, which afford annually 12,000 hogsheads. In the peninsula of Abcheron, on the western shore of the Caspian, naphtha rises through a marly soil in vapour, and is collected by sinking pits several yards in depth, into which the naphtha flows. There is an abundant spring near Amiano, in the Duchy of Parma. Mr. Dana says that in the United States it was formerly collected for sale by the Senecas and other Indians; the petroleum is therefore commonly called Genesee

belief, that the species is a perfect representative of the valerian of the English Pharmacopœia.—*O'Shaughnessy*, pages 403, 404. *N. Latamani* is a dwarf herbaceous plant with a long hairy taproot. The stems are perennial, very short, and simply divided into a number of shaggy scaly crowns, from which the leaves are produced; the branches erect, downy, and a few inches high; leaves obovate, lanceolate, 5 ribbed downy, those at the base acute, the upper ones obtuse; the flowers are of a pale pink colour, clustered in the axils of the upper leaves, which form a kind of involucre for them. It is a native of Nepaul, on the Himalaya Mountains, and in Delhi, Bengal, and the Dekan. This species is the true Spikenard of the ancients, and is esteemed not only as a perfume but as a stimulant medicine. Oriental writers give it as a remedy for a multitude of diseases, and it seems to be really valuable in cases of epilepsy and hysteria.—*Eng. Cyc.*

(5585) NARDUS, a genus of Grasses belonging to the tribe *Rothellieæ*. It has the spikelets in two rows on one side of the rachis of one flower; glumes absent; outer pale keeled, tapering into a subulate point; stigmas elongate, filiform, protruded at the apex of the flower.—*Eng. Cyc.*

(5586) NAR-PUTTE, the Tamil name of a Ceylon tree which is used for canoes, planks of vessels, &c. It grows to about thirty feet in height, and twenty inches in diameter. It is not durable, and is of little use.—*Edye Ceylon.*

(5587) NARWALI OR NARVALI FIBRE, CORDIA ANGUSTIFOLIA, is found common near Severndroog where ropes are made of the fibres.—*M. E.*

(5588) NARUVEALY, the Tamil name of a Ceylon tree which grows to about twenty inches in diameter, and fifteen feet in height, not of much use. It produces a small red fruit which is of a very glutinous nature, and much esteemed by the natives of Malabar. From the bark of this tree a kind of cordage is made, which is used for the purposes required in the hills, and in the conveyance of timber, &c.—*Edye Ceylon.*

(5589) NARVELL, a Ceylon wood, sometimes called Jambu, in Tamil and Portuguese. It grows to about eighteen inches in diameter, and from ten to fourteen feet in height. It is used for the frames of native vessels and boats, and is not considered as a very durable wood. After it has attained its full growth it produces a berry which the natives use as food.—*Edye, Ceylon.*

(5590) NASTOE EDULIS, used as food in China, is a cryptogamic plant.

(5591) NASTURTIUM, an old word applied to some kind of pungent herb, such as Cress. By the English of the present day it is given to the *Tropæolum majus* [TROPÆOLUM], an American annual with pungent fruit; by botanists, to the Water-Cress and plants allied to it; by the Romans it was applied to a plant resembling Mustard in its qualities. The species now referred to the genus *Nasturtium* were formerly included under *Sisymbrium*. *Nasturtium* was separated by Brown, and is principally distinguished by the position of the cotyledons, a point of primary importance in the whole order of *Brassicaceæ*. In *Sisymbrium* the cotyledons are folded with their back upon the radicle, while in *Nasturtium* their edges are presented to it; in the former the cotyledons are said to be incumbent, in the latter accumbent. This is either grown from cuttings or seeds, and merely requires to be protected from the hot winds to be in flower all the year round; it grows much better in beds than pots. The flower and leaf are eaten mixed with other salads, and the seeds when green are pickled.—*Jaffrey.*

(5592) NASTURTIUM, INDIAN CRESS, *Tropæolum majus* and *minus*, raised from seeds sown at the commencement of the rains, succeeds well if not too much exposed to the sun, of easy cultivation, seldom produces seed on the plains, the introduction of the other species and varieties cannot be recommended. Natives of Peru.—*Jaffrey.*

(5593) NASTURTIUM. WATER, CRESS. Griffith says he found an indigenous species of nasturtium in the Provinces, but he does not appear to have described it.—*Mason.*

(5594) NASTURTIUM. OFFICINALE: SISYMBRIUM NASTURTIUM, the Common Water-Cress. In addition to the characters of the genus, this plant is known principally by the form of its leaves. The upper leaves do not separate into distinct leaflets, being pinnatifid with narrow segments. The petiole of the leaf does not in any manner embrace the stem. The flowers are white, and the pods, when ripe, are about an inch long. It is a native of rivulets throughout the world, and is very plentiful in Great Britain. It has a warm agreeable flavour, and has long been one of the most popular plants as a salad. It was formerly much used in medicine as a diuretic and anti-scorbutic, but its great consumption now is as an article of diet. As it frequently grows amongst plants that are not wholesome, and that bear to it a general resemblance, it would be well for every one to be acquainted with its characters. The plant most frequently mistaken for it, especially when out of flowers, is the fool's water-cress. [SIUM.] From this it may be always distinguished, and in fact from all other *Umbelliferæ*, by the petioles of the leaves not forming a sheath round the stem. The water-Cress is cultivated to a very great extent in the neighbourhood of London. The plants are placed out in rows in the bed of a clear stream in the direction of the current, and all that is required for their successful growth is replanting occasionally and keeping the plants clear of mud and weeds;

sandy and gravelly bottoms are best. "Some market-gardeners who can command only a small stream of water, grow the water-cress in beds sunk about two feet in a retentive soil, with a very gentle slope from one end to the other. Then, according to the slope and length of the bed, dams are made six inches high across it, at intervals, so that when these dams are full, the water may rise not less than three inches on all the plants included in each. The water, being turned on, will circulate from dam to dam, and the plants, if not allowed to run to flower, will afford abundance of young tops in all but the winter months." (G. Don.) Water-Cresses grown in this way have not so fine a flavour as those from natural streams.—*Eng. Cyc.*

(5595) NASTURTIUM. PALUSTRE is also a native of wet places. It has a fibrous root and small flowers, with the petals only as long as the calyx. The two last are also natives of Great Britain. Other European species are *N. lippizense N. pyrenaicum, N. anceps, N. amphibium, N. fluviatile, N. armoracioides, N. terrestre*, and *N. austriacum.*—*Eng. Cyc*

(5596) NASTURTIUM SYLVESTRE, is a less common species. It is found on river banks and in wet places. It is distinguished from the last by having yellow flowers, and by its petals being twice as long as the calyx.—*Eng. Cyc.*

(5597) NATCHENNY.

Moopoon, Beng.	Mootanny, Maleal.
Ragie, Duk.	Rajika, Tsjettipullu, Sans.
Natchenny, Ragie, Guz, Hind.	Kalwaragoo, Tam.
	Punassa, Tamidaloo, Tel.

The name of a useful and most valuable grain, which is eaten and prized by all classes of the natives of India. It is about the size of mustard seed, and darkish coloured. It is made chiefly into cakes, and is also prepared in several other ways; it has a sweetish taste. It is grown on the Coromandel Coast, and in many parts of the Western presidency.—*Faulkner.* It is the Eleusine corocana of botanists.

(5598) NATRON Carbonate of soda Natron is abundant in the vicinity of Ava, where it is used by the Burmese instead of soap, and they call it "earth soap."—*Mason.*

(5599) NAUCLEA, a genus of Plants belonging to the natural order *Rubiaceæ*. It has a calyx with an oblong tube and a short truncate or 5-toothed limb; the corolla is funnel-shaped, with a slender tube, a naked throat, and 5 spreading oval oblong lobes; the anthers are inclosed, and always shorter than the lobes of the corolla; the capsules are 2-celled, sessile upon the receptacle, but gradually attenuated to the base. The seeds numerous, imbricate, winged, fixed to oblong placentæ, which are adnate to the dissepiment; the embryo is invested in a fleshy albumen. The leaves are opposite, or 3-4 in a whorl, petiolate, or sessile. The bracts wanting at the base of the head of flowers, but with linear paleæ among the flowers, which are crowded and sessile. The species are unarmed trees, rarely shrubs, are natives of India and Africa. There are 37 species of this genus enumerated, all of which are natives of the East, but do not possess any peculiar qualities which entitle them to particular notice.—*Eng. Cyc.*

(5600) NAUCLEA CADAMBA.

Cuddum, Hind.	Rudrakshakamba, Tel.
Vella Cadamba, Tam.	

A noble tree, wood yellow, used for furniture. Travancore 292, Bengal 16, *N. Cadamba*, has bracliate branches; petiolate coriaceous ovate leaves; triangular stipules; terminal solitary peduncles, usually shorter than the heads, which are globose. The flowers are orange coloured, collected into heads about the size of a small apple; the style is white and exserted. The seeds not winged; the leaves from 6 to 10 inches long. Kadumba is the native name of this tree; it flourishes about Calcutta and Malabar, where it grows to be a very large tree, and is ornamental and very useful from the extensive shade it affords.—*Eng. Cyc.* It is plentiful in Kotah Boondee and Mewar, rare in Ajmeer. The wood is soft and fine grained like satin-wood. The flowers are fragrant and are called Kurun-phool "This tree would be highly ornamental in compounds," along with the bukain and neem.—*Genl. Med. Top. p.* 182. This tree grows to a very large size, in the Dekhan where it is common about villages; the fruit is eaten by the natives, who esteem the tree as "holy."—*Riddell.* In Tenasserim this fragrant orange-flowered species of nauclea is sometimes cultivated by the natives. Its large glossy leaves afford a thick and beautiful shade; and, in Indian Mythology, it is one of the four shadow giving trees that grow on mount Meru—viz. the eugenia, the nauclea cadamba, the banyan, and the peepul.—*Mason.*

(5601) NAUCLEA CORDIFOLIA.

Daduga, Tel.	Munja cadamba, Tel.
Keli kadam, Beng.	

A large tree growing abundantly in the mountainous districts of the Peninsula of India, wood yellow, rather close grained. It is used for common purposes, and easily worked, but is best suited for work which is sheltered, bedsteads, &c., being much affected by alternation of dry and wet weather. *N. parviflora*, (neer cadamba) is also frequent in the Western Coast, and is valued for yielding flooring planks, packing boxes, &c. Wight No. 49, Travancore 66-223-288, Palamcottah 242, Bangalore 364.—*M. E. J. B.* This like the foregoing species, grows to be a large tree, it is a native of the mountains of Coromandel, the wood is exceedingly beautiful, its colour is like that of the box tree but much lighter, and at the

same time very close grained, it is to be had of a very large size from one to two feet or more in diameter and is used for almost every purpose where it can be dry; for furniture it answers exceedingly well being light and durable. In timber yards the cumboo which if not the same as the above described, is confounded with this and with Bundaroo at Rajahmundry I found Patseroo, Bundaroo and Cumboo indiscriminately applied. The Bundaroo I suppose is the Boti kadami.—*Rhode. M.S.S.*

(5602) NAUCLEA GAMBIER, of Hunter ('Linnæan Transactions,' vol. ix.) is now *Uncaria Gambier* [UNCARIA.]

(5603) NAUCLEA PARVIFOLIA, has petiolate obovate obtuse leaves, oval stipules, and terminal solitary peduncles; sometimes the peduncles are in triplets, when the middle one is the shortest. It is a native of the East Indies and all the coast of Coromandel, but chiefly in the mountains of the Philippines. The flowers are light yellow and globular, about the size of a plum. The wood is of a pale chestnut-colour, firm, and close-grained: it is useful for purposes where it can be kept dry, but when exposed to wet it soon decays.—*Eng. Cyc.*

(5604) NAUCLEA PARVIFLORA. *Rubiaceæ* Ill. 123.

Neer codumbay, ENG.	Bota Kadami, TEL.
Neer codumbai, TAM.	

Grows to be a large tree: is a native of almost every part of the coast of Coromandel but chiefly up amongst the mountains. The wood is of a light chesnut color firm and close-grained, is applied to various purposes where it can be kept dry, but exposed to wet it soon rots.—*Rohde M.S.S.* This is a strong fine grained timber, sustaining a weight of 400 lbs. Beams of considerable size are procurable. The wood is dark colored and close-grained, but according to Roxburgh, soon rots if exposed to wet. From the fineness of its grain it seems well fitted for cabinet purposes, and has the advantage of being easily worked. —*Wight.*

(5605) NAUTILIDÆ, OR NAUTILACEA, a family of Cephalopodous *Mollusca*. According to Lamarck, they constitute the sixth family of his Polythalamous *Cephalopoda*, consisting of the genera *Discorbites*, *Siderolites*, *Polystomella*, *Vorticialis*, *Nummulites*, and *Nautilus*. To these Mr. G. B. Sowerby, Jun., adds *Simplegas* and *Endosiphonites*. In the system of M. De Blainville it is the fifth family of his *Polythalamacea*, and comprises the genera *Orbulites*, *Nautilus*, *Polystomella*, and *Lenticulina*. The genus *Nautilus* is the type of this family. The species inhabit the seas of warm climates, especially those of Asia and Africa, and their islands, Amboyna, Zanzibar, and New Guinea; and the Pacific and Australian Oceans.—*Eng. Cyc.*

(5606) NAVANE (Can.) is grown in very few places in Mysore, and serves as food for poor people.—*M. E. Cat.*

(5607) NAVILE. Oil seeds of Bassia latifolia.

(5608) NEATS FOOT OIL. At the Madras Exhibition of 1855, this was exhibited by the Madras Tariff—Tanjore Local Committee and Lieut. Hawkes. Its uses as a softener of leather, &c. &c. are well known.

(5609) NEEDLES.

Sooee, GUZ. HIND.

Are well-known useful articles, made from the best steel, and reduced by a wire-drawing machine to a suitable diameter. Dr. Ure states that, "the construction of a needle requires "about 120 operations; but they are rapidly, "and uninterruptedly successive."

(5610) NEEL. INDIGOFERA TINCTORIA.

Neelum, TAM.

(5611) NEEMOOKA. Root of several species of Cissampelos.—*Ben. Phar.*

(5612) NEERADI MOOTOO. Species of JATROPHA.

(5613) NEERADI MOOTOO OIL.

Neerada Mootoo Yennai, TAM.	Junglie Badam ka Tel, HIND.

This valuable oil was sent to the Madras Exhibition under the various names of Neeradee-mootoo, jungle Almond, Maroty, Tamana, Maravettie, Neervettie and Soorty. It is said to be in great repute, as a medicine amongst native practitioners and the kernel enters largely into their prescriptions. It might probably be found of use in the arts, it much resembles almond oil but is rather thicker. The seeds cost in Madras As. 2-6 per seer—excellent specimens were contributed by the Madras Tariff, Travancore and Cochin Local Committees and Lieutenant Hawkes.

(5614) NEERIJA BARK. Bark of Elæodendron Roxburghii—*Ben. Ph.*

(5615) NEEROODEE.

Chinna neeroodee, TEL.	Neeroodee, HIND.

(5616) NEILGHERRY GRASS. This is a species of lobelia, which is unknown on the Neilgherries, its name notwithstanding, and probably came from Java. Wight, writing on the lobelias says: "There is a small cespitose species much cultivated in pots, by amateurs, under the strange name of Neilgherry grass. I suspect the *Lobelia succulenta* of Blume, a Java plant."—*Mason.*

(5617) NEILGHERRY NETTLE; HOROO SURAT OF ASSAM. Urtica heterophylla.

Herpah or Serpah, BHOOTEA.	Theng Mah, CHINESE.

Is the most widely diffused of the large Indian Nettles, being found in South Concan, along the Malabar coast; the Mysore, the Neil-

gherries, the valleys of the Himalayas in Assam & Burmah. It is an annual plant, the sting of which produces intense pain, the bark abounds in fine, white, glossy silk like fibres, but these probably differ with the locality in which the plant is grown. Dr. Wight describes those of the Neilgherries, as a fine soft flax like fibre, and fitted to compete with flax in the manufacture of even very fine textile fabrics. The Todawars extract it by boiling the plant, and use it as a material for making thread. Mr. Dickson passed it through his machine and liquid, which rendered it like a beautiful, soft, silky kind of flax. He calls it a wonderful fibre, of which the tow would be useful for mixing with wool, as has been done with the China grass.—*Royle.*

(5618) NELUMBIACEÆ, a natural order of Exogenous Plants, by some writers associated with *Nymphæaceæ*, or Water-Lilies, which they resemble in appearance and manner of life, inhabiting the fresh waters of the temperate parts of the world, and producing large polypetalous flowers with numerous stamens. But these orders differ in such important circumstances that they can hardly be regarded as plants of very close alliance, much less as members of the same order for *Nelumbiaceæ* have no albumen, and their system of female organs is broken up into its original elements, while in *Nymphæaceæ* there is an abundance of albumen, and the female system is completely consolidated. *Nelumbiaceæ* are readily known by their carpels being distinct, 1-seeded, and buried in the cavities of a large truncated fleshy receptacle, which eventually forms a broad hard bed, filled with holes, in each of which there is a single ripe nut. Notwithstanding their large flowers, these plants must be regarded as among the lowest forms of the exogenous type. The best known species is *Nelumbium speciosum*, a magnificent water-plant floating in the rivers and ditches of all the warmer parts of Asia, and also found in the Nile: its nuts are supposed to have been the sacred bean of Pythagoras; its fleshy stems are used as food by the poorer inhabitants of China. The nuts of all the species are eatable and wholesome. *Nelumbium* is the only genus. —*Eng. Cyc.*

(5619) NELUMBIUM, a genus of Plants belonging to the natural order *Nymphæaceæ*, but sometimes regarded as the type of an order called *Nelumbiaceæ*. It has many distinct carpels, half-immersed in the profoundly honey-combed obconical elevated torus, each bearing a style with a solitary seed in each carpel, which is exarillate, and destitute of albumen. The flowers are large and showy, white, red, or yellow. Both leaves and flowers rise from the surface of the water.—*Eng. Cyc.* Writing regarding the Nelumbium, Mr. Fortune says I now walked down to the lake accompanied by the priests. No flower could be more beautiful or more majestic than the Nelumbium was at this season. As I stood on the little romantic bridge I looked to the right and left; my eye rested on thousands of these flowers, some of which were white, others red, and all were rising out of the water and standing above the beautiful clear green foliage. The leaves themselves, as they lay upon the smooth surface of the lake, or stood erect upon long footstalks, were scarcely less beautiful than the flowers, and both harmonized well together. Gold, silver, and other kinds of fishes were seen swimming swiftly to and fro, and apparently enjoying themselves under the shade of the broad leaves, in happy ignorance of the encounter between their protectors and their piratical enemy.—page 350. At another place he says, in the garden of a mandarin at Ning-po. I once observed a very beautiful variety of the Nelumbium, different from the red and white kinds already noticed, and which I may distinguish by the name of *N. vittatum*, its flowers being finely striped. It was evidently extremely rare in that part of China, so rare indeed that I could not succeed in procuring a plant to send to England.—page 351. Although these plants are generally grown in the stove when their cultivation is attempted in England, they are fitted by nature to endure a very low degree of temperature in winter. They are abundant in all parts of the province of Kiang-nan, at Shanghae, Soochow, and Nanking, where the winters are very severe. The ponds and lakes are often frozen up and the thermometer frequently sinks to within a few degrees of zero. During the spring and summer months the plants form and perfect their leaves, flowers, and fruit; in autumn, all the parts which are visible above water gradually decay and nothing is left in a living state except the large roots, which remain buried deep in the mud, and they continue in a dormant state until the warmth of spring again calls vegetable life into action. p. 351. The Nelumbium, or *Lien-wha*, is cultivated very extensively in China for the sake of its roots, which are esteemed an excellent vegetable, and are much used by all classes of the community. The roots attain their largest size at the period when the leaves die off; and are dug up and brought to market during the winter months in the north of China. The stalls of the green grocers are always loaded with them at that season of the year. Although in high repute amongst the natives, being served up with many of their dishes and forming part of others, I must say that I never liked them, nor are they generally liked by foreigners. An excellent description of arrowroot is made from them, which is considered equal in quality to that which England imports from the West Indies. The seeds are also held in high estimation; they are commonly roasted before being served up to table.—*Fortune, pag* 352.

(5620) NELUMBIUM SPECIOSUM. Juss. EGYPTIAN LOTUS. The Plant.

Tawmaray, TAM. | Kumala also Padma, Kungwel, DUK. | SANS.

(5621) NELUMBIUM SPECIOSUM, PYTHAGOREAN BEAN, has a polypetalous corolla, and anthers drawn out beyond the cells into a club-shaped appendage. It is a native in slow running streams and tranquil waters, in the warmer parts of Asia. The flowers are very beautiful, smelling of anise, and generally of a rose colour, seldom white. A variety of this species, Tamara, has its outer stamens sterile, dilated at the top, winged, obcordate, the appendage rising from a notch at the apex. It is a native of Malabar. The fruit resembles an instrument once used in play by the French, called Lotos, and is one of of the plants supposed to be the celebrated Lotos of antiquity, formerly found in Egypt. It was known to the Greeks, and is mentioned as growing in Egypt by Herodotus (ii. 92), Theophrastus, and others. Although not now to be met with in that country, there can be no doubt as to its having actually existed there, either naturally or in a cultivated state, for these authors speak of it in clear and decisive terms, and their accounts are confirmed by the sculptures still preserved, which testify that this species, as the proper Lotos, has obtained religious reverence. It is spoken of as having been used as food by the Egyptians. Both roots and seeds are esculent, and are accounted cooling and strengthening, and to be of service in extreme thirst, diarrhœa, vomiting, &c. In China it is called Lien-wha, and the seeds and slices of the hairy root, with the kernels of apricots and walnuts, and alternate layers of ice, were frequently presented to the British ambassador and his suite, at breakfasts given by the principal mandarins. The roots are laid up by the Chinese in salt and vinegar for winter use. Thunberg says this plant is held sacred in Japan, and is considered pleasing to the deities, the images of which are frequently made sitting on its large leaves. The seeds are somewhat of the size and form of an acorn, and of a state more delicate than that of almonds.—*Eng. Cyc.* This beautiful plant, which floats on the surface of the water, is well known to be highly venerated by the Hindoos " but it is the more immediate attribute of vishnoo, " from being the prime of aquatic vegetables, and he a personification of water." It is also peculiarly sacred to Lakshmi, the wife of Vishnoo who is sometimes called Kamala, or Lotus-like: it is moreover, an emblem of female beauty. This plant is the true Lotus of the Egyptians, and the Nymphœa Nilufer of Sir William Jones, Nilufer being its Arabic name. The new blown flowers of the rose coloured Tamaray have an agreeable fragrance; those of the white and yellow have less odour.

There is a variety which is blue, a native of Cashmere and Persia.—*Ains. Mat. Med. p.* 162. This grows at Lahore and in Cashmere. Its flowers, which are abundant on the lakes, are used by the Hindoos in their religious ceremonies called Pooja. Every morning I saw, at Cashmere, vast numbers of these flowers, which had served in the rites of the Pooja, flowing down the river. Its boiled roots are eaten as a pot-herb by the natives; in Lahore they are called Pe, in Cashmere Nadroo. Nelumbium seeds are also employed as articles of diet amongst the natives of India; I believe they are the same kind of seeds as those from which the ancient Egyptians made a sort of bread.—*Honigberger, p.* 315. Several aquatic plants increase the list of Chinese plants among which the nelumbium covers extensive marshes in the eastern and northern provinces, otherwise unsightly and barren. The root is two or three feet long, and pierced longitudinally with several holes; when boiled it is of a yellowish color and sweetish taste not unlike a turnip. Taro is used less than the Nelumbium, and so are the watercaltrops and water-chestnuts. The taste of watercaltrops when boiled resembles that of new cheese, water-chesnuts are the round roots of a kind of sedge and resemble that fruit in color more than in taste, which is mealy and crisp. The sweet potatoe is the most common tuber for although the Irish potatoe has been cultivated about Canton and Whampoa for scores of years, it has not become a common vegetable among the people.—*Williams' Middle Kingdom, Vol.* II. *page* 44.

(5622) NELUMBIUM SPECIOSUM: Juss. ROOT OF THE PELTATED WATER LILY. Wild.

The Root.

Tawmaray Kalung, TAM. | Bekhiniloofur, PERS.
Kungwelka gudda, HIND AND DUK. | Sahastraputra, SANS.

This is an esculent root and is also prescribed medicinally as cooling and demulcent. See Hort. Mal. Part xi. page 60.—*Ains. Mat. Med. p.* 117. The roots of the sacred bean of India after being cut into slices, dried and fried in oil, are eaten by the natives and considered a delicacy.—*Jaffrey.*—This is the root of a plant highly venerated amongst the Hindoos. It is dressed in different ways by the natives but like the Allie Kalung, it is only to be obtained during very dry weather as it grows in the beds of tanks. 1st Section 4th.—*Ainslie, p.* 251. Nelumbium Speciosum, the Large water lily, grows wild in tanks, in all parts of India.

(6623) NELUMBIUM SPECIOSUM. SACRED BEAN PLANT. The Flower. The flower of this plant being much like a white lily, it is usually regarded as one, but the fruits are so different that botanists have placed them in different natural families.—*Mason.*

(5624) NELUMBIUM SPECIOSUM. THREAD of the EGYPTIAN LOTUS.

Tawmaray noole, TAM. | Padma, SANS.
Tawmaray darum, TEL.

Tawmary noole is the name given by the Tamools to the long, fine filaments which are found within the cells of the stalks of the sacred Tamaray plant. With them are prepared those wicks which on great and solemn religious occasions are burnt in the lamps of the Hindoos placed before the shrines of their deities. Other wicks of a similar nature but less venerated are made with the filaments of the Allie (Nymphæa Lotus) and also from those of the Shengalaneer, (Nymphæa odorata); the delightfully smelling flowers of which are held in high estimation by the Indians.—*Ains. Mat. Med. p.* 202.

(5625) NEMESIA FLORIBUNDA, SCROPHULARIACEÆ. These plants may be cultivated from seed in any rich light soil, the colour of the flowers is purple.—*Riddell.*

(5626) NEMOOKA ROOT, the root of several species of Cissampelos, and is an efficient substitute for Pareira.—*O'Shaughnessy.*

(5627) NEMOPHILA AURITA, HYDROPHYLLACEÆ. These plants are all annuals, and require a great deal of moisture, growing and flowering in shady situations, the colors are white and purple, blue and dark purple, they are natives of California, and North America.—*Riddell. Nemophila Insignis,* and *maculata* are too tender to succeed well on the plains. N. maculata the spotted variety succeeds to a certain extent if sown after the heavy rains are past.—*Jaffrey.*

(5628) NENDOON. Hard, though coarse, open-grained, heavy Ceylon wood.

(5629) NEOPHRON PERCNOPTERUS. Mr. C. J. Anderson, in his interesting work entitled 'Lake Ngami,' notices the curious fact of this Vulturine bird resorting to vegetable food. In the desert sandy region extending southward from Walfisch (*i. e.* 'Whale-fish') Bay, along the eastern coast of South Africa, "a kind of prickly gourd (called, by the natives, *naras*) of the most delicious flavour" occurs in great abundance; the creeping plant that bears it covering almost every little sand-hillock; and moreover fixing, "with wonderful tenacity, by means of its extensive ramifications, the constantly shifting sands:, it is, indeed," remarks Mr. Anderson, "to those parts what the sand-reed (*Ammophila arundinacea*) is to the sandy shores and downs of England. In this barren and poverty-stricken country, food is so scarce, that without the 'naras' the land would be all but uninhabitable. It is not man alone, that derives benefit from this remarkable plant; for every quadruped from the Field Mouse to the Ox, and even the feline and canine races, devour it with great avidity. Birds are, also, very partial to it, more especially Ostriches, who during the 'naras' season are found in great abundance in these parts. *I have seen the White Egyptian Vulture feed upon it.*" Captain Watkins, in a paper on the Ornithology of Andalusia ('Zoologist,' November, 1856), states that he possesses, alive, a common Kite (*Milvus regalis*) and also a Black Kite (*M. ater*). "These birds, in their present domestic state, have a great *penchant* for vegetables and fruits. I have watched them often in my kitchen-garden plucking the pods of peas, and eating the contents; a bed of radishes, also, (which I was at a loss to conceive what had demolished,) I one morning found occupied by my two pets, eagerly devouring them: they could not have been driven to it by hunger, as they were well supplied with birds and young Rabbits. Since the figs and peaches have been ripe, they have indulged most freely in their taste for fruit, nothing pleasing them better than a fig." In the *Annals and Magazine of Natural History*, xii (1843), p. 269, the curious fact is recorded of the Jaguar (FELIS ONCA) striking down and devouring the nests of a honey-producing Wasp of S. America! In a recent notice of the devastations of Locusts in South Africa, we observed the NEOPHRON PERCNOPTERUS designated as the 'Locust-bird'; making its appearance in vast numbers to prey on the destructive insects: but it is not what is ordinarily known as the 'Locust-bird' in that part of the world, which is a much smaller bird, appertaining to the Starling or Maina group. According to Sir James Alexander, as quoted by Mr. Anderson, (and given on the authority of the natives about the Orange river,) when the Ostriches have left their nest in the middle of the day in search of food," "a white Egyptian Vulture may be seen soaring in mid-air, with a stone between his talons. Having carefully surveyed the ground below him, he suddenly lets fall the stone and then follows it in rapid descent. Let the hunter run to the spot, and he will find a nest of probably a score of eggs, some of them broken by the Vulture." We have all heard of the story of an Eagle, or a Gull, or a Crow, (for the anecdote is current of all of them,) dropping the 'shell-fish' upon a stone; and of the bird's mistaking the philosopher's bald pate for one: but here the case is reversed; for the stone is taken up and dropped on the eggs of the Ostrich. In his account of the British Carrion Crow, Mr. Mudie remarks—"There are modern instances of the story of the ancient philosopher who was killed by a Crow mistaking his head for a stone, and dropping an Oyster on it in order to break the shell. One of these was seen by the celebrated Watt. A Crow caught up a crab, rose with it to a considerable height, and dropped it—not on the head of a modern philosopher, or he might have come off more safely than the ancient one,—but on a stone, and descended to her feast." Again, Mr. Selby remarks, of the Hooded Crow, "I have repeatedly observed one

of these birds to soar up to a considerable height in the air, with a cockle or mussel in its bill, and then drop it upon the rock, in order to obtain the contents." Anecdotes of Gulls performing the same feat are recorded in Cabanis' 'Journal fuer Ornitholigie,' Vol. III. (1844-5): so that there is no particular reason to disbelieve the assertion of the NAORHROH dropping a stone on the eggs of the Ostrich.—*Mr. Bligh in Calcutta Review.*

(5630) NEPAL PAPER PLANT. DAPHNE CANNABINA (THYMELÆÆ). At the Great Exhibition of 1851, many were much interested about a huge sheet of Nepal paper exhibited by Colonel Sykes. This was curious, not only on account of its size, but also on account of the plant from which it was made. This belongs to a genus and family containing plants remarkable for their fibrous bark. Thus the Lace-bark tree (*Daphne Lagetta*, now *Lagetta lintearia*) of the West Indies is "remarkable for the beautiful net-like appearance of its several easily separable layers of bark, whence it has received its English name. As the fibres of other species possess considerable tenacity, they have been employed in making cordage; and the toughness, as well as fineness of the inner bark of these plants, may be seen in a plant common in English gardens, and used in medicine on account of its acridity, that is, the Mezereon, *Daphne Mezereum* of botanists. It is from the inner bark of one of these plants, the *D. Bholua* (*D. cannabina* of Loureiro, and which is supposed to be identical with the *D. odora* of Thunburg), which is extremely abundant in the Himalayas, that this Nepal paper is made, as from other species in other countries. Another plant of the same, or of an allied genus, as it is called both *Daphne* and *Gnidia eriocephala*, is very common on the ghauts of the West of India, and in the hilly parts of the Sothern Mahratta country and of the Dukhun. Several specimens, from various localities, are in Col. Sykes's collection. It is probable that it might be turned to the same use as the Nepal plant. Of the uses of this plant good accounts have been given by Mr. Hodgson ('Journ. As. Soc.,' i, p. 8, 1832) and Dr. Campbell. The former describes the process as consisting, first, in boiling slips of the inner bark of the paper plant in a ley of wood-ashes for about half an hour, by which time the slips will be quite soft. These are then beaten in a stone mortar with a wooden mallet till they are reduced to a homogeneous pulp. This is then diffused through water, and taken up in sieves and paper frames, as in the ordinary process for making paper by hand. When dry, the sheet of paper is folded up; sometimes it is smoothed and polished by being rubbed on wood with the convex side of a conch shell: but Mr. Hodgson does not explain how the very large sheets of several yards square are made. Though called Nepalese, the paper is not manufactured in Nepal, but in Cis-Himalayan Bhote, in the mid-t of its immense forests, where there is an abundant supply of the plant, of wood for ashes and for firewood, as well as a constant supply of clean water. This paper is remarkable for its toughness, as well as its smoothness. Some of it, in the form of bricks of half-stuff, was sent to England previous to the year 1829. As the quantity sent was not sufficient for a complete experiment, a small portion of it was made into paper by hand. An engraver, to whom it was given for trial, stated that "it affords finer impressions than any English-made paper, and nearly as good as the fine Chinese paper which is employed for what are called India paper proofs." ('Gleanings in Science,' i, p. 210.) Dr. Campbell decribes the paper, as made by the Bhoteahs, "as strong, and durable as leather almost, and quite smooth enough to write on; and for office records, incomparably better than any India paper. It is occasionally poisoned by being washed with preparations of arsenic, in order to prevent the destruction caused by insects. Many of the books in Nepal, written on this paper, are said to be of considerable age, and that the art of making paper seems to have been introduced about 500 years ago from China, and not from India." He states that this paper may easily be procured at Patna, Purneah and other places in the plains of both Southern and North-Western India.—*Royle fibr. pl. page* 311. The dried bark, of the Nepaul paper plant, may be substituted for the Mezereon (D. Mezereum) of the London Pharmacopœia, the Bazar Mezereon, is almost always inert from age.—*Beng. Phar. page* 279.

(5631) NEPENTHACEÆ, *Nepenths* a natural order of Exogenous Plants inhabiting the damper and warmer parts of Asia, and having in the place of leaves, large hollow bodies furnished with a lid, and containing water secreted from a peculiar glandular apparatus with which they are lined. These bodies, or pitchers, as they are called, appear at the end of a leafy tendril-like expansion of the bark, and are considered to be a hollow state of the apex of the petiole of a leaf, while the lid that closes them is regarded as the blade. Their flowers are dioecious, green or brown, apetalous, arranged in cylindrical racemes, and are succeeded by a capsular fruit filled with fine fusiform seeds, which look liked very small sawdust. They are considered to be closely akin to *Aristolochiaceæ*, and also related to *Sarraceniaceæ* and *Euphorbiaceæ*. Adolph Brongniart has pointed out a resemblance between *Nepenthaceæ* and *Cytinaceæ*; but Lindley remarks that it is impossible to agree in this conclusion:—"To say nothing of the extreme dissimilarity in habit between these plants, the structure of their fruits appears to be essentially different; and the seeds of *Cytinus* being unknown, the resemblance between it and *Nepenthes* is reduced to a similarity in the arrangement of the anther swhich cannot

in the present case be considered of much importance, as it in some degree depends upon the unisexuality of the flowers of both genera. A better approximation of the order has been made by Brown, who points out a relation to Birthworts (*Aristolochiaceæ*); as to which, the structure of the wood in some respects confirms his views. Like many in that order it is zoneless, although plainly exogenous; but it has this in particular to characterise it, that the system of spiral vessels is developed in a degree unknown in any other plants. Endlicher adopts the same view as does A. Bronginart, and I have formerly coincided with these botanists; but the adherent ovary of Birthworts, their highly-developed calyx, axile placentation, and hermaphrodite flowers, are serious difficulties in the way of a close contact between them and Nepenths, unless the peculiar structure of the wood, the consideration of which I for the present abandon should lead to the final establishment of the class of Homogens, in which case Nepenths and Birthworts will be brought into contact or at least, near neighbourhood. For the present the true position of this order must be regarded as an undetermined point." Lindley places them in the Euphorbial alliance, observing that "its points of agreements are its unisexual flowers, albuminous seeds, incomplete floral envelope, and climbing habit. Its great disagreement consists in its indefinite seeds and peculiar woody structure, which is however in some respects without example." ('Vegetable Kingdom.') The water found in an unopened pitcher was found to emit while boiling an odour like baked apples, and to yield minute crystals of superoxalate of potash. There are about six species of *Nepenthes*.

(5632) NEPENTHES. The pitcher-plant grows on strong and grassy hills about Amwee, near the Jyntea Hills and crawls along the ground; its pitchers seldom contain insects in the wild state, nor can we suggest any special function for the wonderful organ it possesses.—*Hooker, Him. Jour. Vol.* 11. *page* 315. There are about six species of Nepenthes, the best known of which, the Pitcher plant, is the N. Distillatoria. The Nepenths, *Nepenthaceæ*, is a natural order of exogenous plants, inhabiting the damper and warmer parts of Asia, and have in the place of leaves, large hollow bodies furnished with a lid and containing water secreted from a peculiar glandular apparatus with which they are lined. These bodies, or pitchers as they are called appear at the end of a leafy tendril-like expansion of the bark and are considered to be a hollow state of the apex of the petiole of a leaf, while the lid that closes them is regarded as the blade.—*Eng. Cyc.*

(5633) NEPHELIUM LITCHI, Sapindaceæ. This tree, orginally from China, is an ever-green, and grows to a large size. The fruit is of a dark brown color, and contains a glutinous yellow sweet sort of pulp; it is not much prized—perhaps from its inferior quality to the Chinese fruit, which is much esteemed. The fruit ripens in March and April.—*Biddell.*

(5634) NEPHELIUM. Red Nephelium. This is a small inferior Tenasserim fruit, eaten by the natives only, though belonging the same genus which produces the famous lichi, and bearing its fruit in bunches like that.—*Mason.*

(5635) NEPHELIUM. Wild Ramboutan. One of the indigenous trees of Tenasserim bears a fruit whose subacid is very agreeable to the palate, and much resembles that of the ramboutan so famous at Malacca. Malays, to whom I have shown the fruit, say it is the wild ramboutan, and the tree certainly belongs to the same genus; but never having met with it in flower, I cannot determine the species.—*Mason.*

(5636) NEPHRITE.—*Jade* or *Axe-Stone*—a mineral which occurs in masses. The structure is compact. Its fracture is coarse, splintery. Hardness 7·0. It is very tough. Colour dark-green and green of other shades. Translucent on the edges. Specific gravity 2·9 to 3. Before the blow-pipe it whitens, but does not fuse, but with borax it forms a transparent glass. The following is an analysis by Kastner:—

Silica	50·50
Alumina	10·00
Magnesia	31·00
Oxide of Iron	5·50
Oxide of Chromium	0·05
Water	2·75
	——99·80

It is carved into images and worn as a charm. It was supposed to be good in diseases of the kidney—hence its name. It is found in New Zealand, China, and Western America.—*Eng. Cyc.*

(5637) NEPHRODIUM FILIX, Mas. A Filix Mas.—*Honigberger.*

(5638) NERITA, a genus of Gasteropodous *Mollusca*, the type of the family *Neritidæ*. The genus *Nerita* has the following characters:—Shell thick, smooth, or spirally grooved; epidermis horney; outer lip thickened, and sometimes denticulated within; columella broad and flat, with its inner edge straight and toothed; operculum shelly. Dr. J. E. Gray makes the *Naticidæ* the first family of his second section, *Eriophthalma* (*Edriopthalma?*), of his second order *Phytophaga*. Under the *Naticidæ* he comprises the following genera:—*Natica, Neverita, Nacca, Cepatia, Polinices, Mammilla, Cernina, Globulus, Naticina, Cryptostoma, Stylina*, (?), *Radula* (?), and *Neritopsis*. In Woodward's 'Manual of the Mollusca' the *Naticidæ* inclued the genera *Natica, Sigaretus, Lunellaria, Narica*, and *Velutina*. Ninety recent species of *Natica* have been recorded. They are inhabitants of the Arctic

Seas, Great Britain, the Mediterranean and Caspian Seas, India, Australia, China, Panama, and the West Indies. The fossil species amount to 260.—*Eng. Cyc.*

Sigaretus has 26 recent and 10 fossil species.
Lamellaria has 3 recent and 2 fossil species.
Narica has 6 recent and 4 fossil species.
Velutina has 4 recent and 3 fossil species.

In Forbes and Hanley's 'British Mollusca' the following species of *Neritidæ* and *Naticidæ* are enumerated as British:—*Neritina fluviatilis*, *Natica monilifera*, *N. nitida*. *N. sordida*, *N. Montagui*, *N. Helicoides*, *N. pusilla*, and *N. Kingii*.

(5639) NERITIDÆ, a family of Holostomatous *Gasteropoda*, having the following characters:—Shell thick, semi-globose; spire very small; cavity simple from the absorption of the internal portion of the whorls; aperture semi-lunate; columellar side expanded and flattened; outer lip acute; operculum shelly, sub-spiral, articulated. At the end of the columella there is an oblong muscular impression, connected on the outer side by a ridge on which the operculum rests; within this ridge the inner layers of the shell are absorbed. Animal with a broad short muzzle, and long slender tentacles; food oblong, triangular; teeth 7, uncini very numerous. This family includes the genera *Nerita*, *Pileolus*, *Neritina*, and *Navicella*. Mr. Swainson places the family *Naticidæ* between his *Turbidæ* and *Trochidæ*, making it consist of the following sub-families and genera. His arrangement is, he says, founded on the shells only, from ignorance of the animals of the major part:—

Sub-Family 1. *Naticinæ* Sea-Snails.

Genera: *Natica*, Lam. (with the sub-genera *Naticella*, *Globularia*, *Mamillaria*, *Sigaretus*, *Naticaria*, *Lacuna*, *Leuctis*).

Sub-Family (?) *Neritinæ*. Nerits.

Genera: *Nerita*, Linn. (with the sub-genus *Neritopsis*, Gray); *Neritina*, Lam. (with the sub-genera *Clithon*, *Velotes* (*Velates*), *Pileolus*, and *Navicella*). ('Malacology.') Dr. J. E. Gray makes the *Neritidæ* the sixth family of his *Podophthalma*, and places it between the *Fissurellidæ* and the *Ampullariadæ*. Dr. Gray's *Neritidæ* comprise the following genera:—*Nerita*, *Pileolus*, *Culana*, *Neritina*, *Clithon*, *Dostia*, *Velates*, and *Navicella*. The genus *Nerita* is described separately. [NERITA.]

Neritina has the shell rather thick at the aperture, but extensively absorbed inside; outer lip acute, inner straight, denticulated; operculum shelly, with a flexible border; slightly toothed on its straight edge.

Pileolus has the shell limped-like above, with a subcentral apex; concave beneath, with small semilunar aperture, and a columellar disc, surrounded by a broad continuous peristome. The species are only known as fossil. Upwards of 100 recent species of *Nerita* and 70 species of *Neritina* have been described. The fossil species of *Nerita* amount to 60, and of *Neritina* to 20. *Nerita* is found in the Lias, and *Neritina* in the Eocene Formation.

Navicella.—With the exception of the disposition of its operculum and of the muscles of attachment to the shell, the animal may be said to be nearly similar to that of *Nerita*.

The genus *Natica*, sometimes made the type of a family (*Naticidæ*), has been included with the *Neritidæ*. Messrs. Quoy and Gaimard remark, that the *Naticæ* are animals to which their foot gives a remarkable aspect. It is a long oval lamella, ordinarily squared in front, oval behind and doubled; anteriorly, where it is widest, it is a thick escutcheon, a little auriculated, which ascends on the front of the shell, which it covers, at the same time that it hides all the head of the animal, of which ordinarily nothing but the tentacles appear; a groove on each side indicates the two parts of the foot.

Natica Melanostoma has the shell oval, ventricose, convex-depressed thin, white, zoned with yellow; spire somewhat prominent; lip blackish-brown, umbilicus semi-closed. (Lam.) Length 15 lines; breadth 11½ lines. Operculum membranous; paucispiral on the left border; the rest of its lamellæ obliquely transverse. Colour deep chestnut-brown lighter on the edge. It has been found at Tonga, the Moluccas, and many other places. Found by Messrs. Quoy and Gaimard some fathoms deep. Species of the genus have been captured creeping on the shore like the Nerits on rocks and sea weed, and from the surface to the depth of 40 fathoms on mud and sandy mud, in æstuaries and in tidal rivers.—*Eng. Cyc.*

(5640) NERIUM (from *νηρός*, humid, the habitat of the species), a genus of Plants belonging to the natural order *Apocynaceæ*. It has a hyprocrateriform corolla, the orifice surmounted by lacerated multifid processes; segments of the limb contorted; the filaments are inserted into the middle of the tube; the anthers sagittate, adhering by the middle to the stigma; it has two ovaries, a filiform style dilated at the apex, and an obtuse stigma.—*Eng. Cyc.*

(5641) NERIUM ANTIDYSENTERICUM. (OVAL LEAVED) ROSEBAY TREE. *Apocynaceæ*. Linn. *Wrightia Antidysenterica*.

Veppalei maram, TAM. | Indurjan, HIND.

This common shrub flowers in April and May in terminal corymbs. The bark is used as an astringent.—*Riddell.* The wood of this tree is white beautiful, and fine grained; and is made into cabinets and elegant furniture.—*Ains. Mat. Med. p.* 209. Wight speaking of the Tamul-

name says I take this name from Ainslie, but suspect it is another name for Kooda pallie, (which see) the Linnæan name belonging to a Ceylon plant, which I have not seen on the continent. The wood is said to be excellent for cabinet making purposes.—*Wight.* A shrub common in many parts of Hindostan. Its seeds bear some resemblance to oats, and are officinal at Lahore. They certainly merit the attention of European physicians, as they possess many medical properties.—*Honigberger, p.* 316.

(5642) NERIUM COCCINEUM, Scarlet Oleander. *Wrightia coccinea. Nerium coccinea.*

Scarlet Oleander, Soorookhkanel, Hind.

Common in gardens at Ajmeer and it is highly ornamental.—*Gent. Med. Top. p.* 186. In Tenasserim European compounds are occasionally scented with this useful shrub, whose orange-red flowers have the grateful fragrance of the pine apple.—*Mason.*

(5643) NERIUM GRANDIFLORUM.

Mendasinghi, Hind.

Double species cultivated by seed or cuttings.—*Riddell.*

(5644) NERIUM ODORATUM. Oleander.

Aralivayr, Tamil.	Ghennera vayroo, Tel.
Cauner kajurr, Duk.	Karrabeera, Sans. *Ainslie.*

This species has linear lanceolate leaves, three in a whorl; the segments of the calyx erect; appendages of the corolla filamentous; the anthers bearded at the point. The flowers red or white, with an agreeable musky scent. The bark of the root and the sweet-smelling leaves are supposed by native Indian doctors to act as powerful repellants applied externally. The root, taken internally, acts as a poison. (*Eng. Cyc.*), and is frequently resorted to, for the purpose of self destruction by the women of India when tormented with jealousy, the plant is the Beluttry-areli of the Hortus Malabaricus.—*Ainslie's Mat. Med. p.* 70. The root of the hill-plant is much more violent than that of the garden, and in the hills is considered poisonous. Jealous women so frequently have recourse to it that it is proverbial among the females of the hills, when quarrelling, to bid each other go and eat of the root of Kaneer.—*Honig, p.* 316. It is plentiful and very beautiful at Ajmeer. The single white is called sufaid-kurpud, the single rose-colored, lal-kurpud and the beautiful large double rose variety is called pudma-kurpud.—*Irvine, p.* 186.

(5645) NERIUM ODORUM. This well known fragrant flower adorns a few of the gardens in Maulmain, but it has not yet come into general cultivation.—*Mason.* It is cultivated in the gardens at Lahore, merely for its beauty. Its flowers, leaves, and roots, are officinal.—*Honigberger, p.* 326.

(5646) NERIUM OLEANDER.

Kar-Zubra, Hind.

Common Oleander, has lanceolate leaves, three in a whorl being beneath, the segments of the corona trifid. It is a native of the Indies, in humid places, but has now become wild in the south of Europe, by the side of streams and the sea-coast. The flowers are rather large and of a bright-red colour. This species contains a great quantity of gallic acid, and a decoction of the leaves or bark forms an acrid stimulating wash, much employed by the poor people in the south of France to cure cutaneous disorders. The peasants in the neighbourhood of Nice use the powdered bark and wood of the Oleander to poison rats. Several cases are also recorded of death from having eaten meat roasted on a spit of Oleander wood. All the species of Oleander are very showy when in blossom. They thrive well in a light rich soil; and cuttings strike root freely in a moist situation. All of them require a good deal of heat to flower well in this country. (Don, *Dichlamydeous Plants*; Lindley, *Flora Medica*; Burnett, *Outlines of Botany.*)—*Eng. Cyc.* In the Dekhan, the Double Red and White grow wild on the banks of rivers, bearing both white and red flowers: the root is poisonous. There are two other varieties very commonly met with bearing double flowers both red and white, and by budding the red color on the opposite one in several parts of the same stalk, a very pretty appearance may be given to the shrub. The yellow congener is called the Exile—introduced I believe from America. Grows easily from cuttings.—*Riddell.*

(5647) NERIUM PISCIDIUM. Among the division of plants to which the Apocynaceæ belongs there are some which are most conspicuous for the strength of their fibres. These belong to two families of plants which are so nearly allied to each other, that they were united together by the celebrated Jussieu. Both are remarkable for abounding in milk juice; and some of them in caoutchouc, or some analogous products. Of these, the Apocynaceæ or Dogbanes are composed chiefly of trees and shrubs, of which the Oleander is a conspicuous example. But some are herbaceous, as in the case of the Vinca, or Periwinkle as it is called, which shows another characteristic, that is, the climbing habit of many of these plants, as well as the toughness of their fibre, as may easily be ascertained by trying to break any of the long, trailing twigs of this plant, so common in gardens and shrubberies. Among these, is a plant called *Nerium piscidium*, by Dr. Roxburgh, 'Fl Ind.,' ii, p. 7, common in the Khasya or Silhet Mountains, and

there called *Echalat*. It there forms an extensive perennial climber. Its bark contains a large quantity of fibre, which the natives use for the same purposes as Hemp. Dr. Roxburgh, in steeping some of the young shoots in a fish-pond, in order to facilitate the removal of the bark and to clean the fibres, found that many, if not all the fishes, were killed. Hence the specific name which he applied. Dr. Wight has formed the plant into a new genus, Echaltum. It is probable that there are many other fibre-yielding plants in this family.—*Royle Fib. Pl. p.* 302.

(5648) NERIUM TINCTORIUM, WRIGHTIA TINCTORIA. ROSEBAY, BLUE DYEING ROSEBAY Roxb.

Pala mom also Palak, and Palavayraynoo, TAM.	Tshil aukaloo, TEL. Ulayamaraka, SANS.

This species of Nerium which has been so accurately described by Dr. Roxburgh in the 1st Volume of the Oriental Repertory differs but in a very slight degree from the Nerium Antidysentericum already mentioned and chiefly, by the latter wanting a nectarium. I find that the Indigo (0) yielding property of its leaves is well known to the Natives in many parts of lower India, and that particularly in Coimbatore, near Palachy much blue-dye is actually made from them. Sir William Jones informs us, in the 4th Volume of the Asiatic Researches, that the Hindoo peasants of Bengal call this plant Nil (or Blue); a proof that they are perfectly acquainted with its peculiar qualities.—*Ains. Mat. Med. page* 195.

(5649) NETS.

Jhall, GUZ. & HIND.

Are rarely a subject of commerce, being almost all manufactured by the fishermen and their families. This seems to be the universal practice. —*Faulkner*. Net making or the art in which the fabric is required to be transparent, but in which the fibres are decussated and retained in their places by knots, that the interstices may retain their form and size, and prevent objects from escaping, seems to have been known in the earliest ages in Egypt, and is practised with the greatest skill on the coasts of Bombay and of Scinde, as well as on the rivers of India. A great variety of nets, from a few to fifty fathoms in length, are fully described in the "Illustrated Catalogue." Those from Singapore are interesting, as some are made with cotton, and others with the fibre which is very similar to, if not identical with, that forming the so called China grass.—*Royle Arts &c. of India, page* 505.

(5650) NETTLE, a name applied to various plants. The true Nettles are various species of the genus *Urtica*, well known for their stinging properties, which are owing to the presence of an acrid poisonous secretion that in some Indian species is so dangerous as to cause excruciating pain and even death. Dead Nettles are species of *Lamium*, monopetalous plants belonging to *Labiatæ*, and wholly inert. The Nettle-Trees belong to the genus *Celtis*, also destitute of stinging properties, but having leaves resembling those of some kinds of *Urtica*. [URTICA; LAMIUM.] —*Eng. Cyc.* The great shrubby nettle (*Urtica crenulata*) is common at Chakoong, in Sikkim: this plant, called "Mealum-ma," attains fifteen feet in height; it has broad glossy leaves, and though apparently without stings, is held in so great dread, that Dr. Hooker had difficulty in getting help to cut it down. He gathered many specimens without allowing any part to touch his skin; still the scentless effluvium was so powerful, that mucous matter poured from his eyes and nose all the rest of the afternoon, in such abundance, that he had to hold his head over a basin for an hour. The sting is very virulent, producing inflammation; and to punish a child with "Mealum-ma" is the severest Lepcha threat. Violent fevers and death have been said to ensue from its sting; but this he very much doubts. The stinging hairs are miscroscopic, and confined to the young shoots, leaf and flower-stalks. Leschenault de la Tour describes being stung by this nettle on three fingers of his hand only at the Calcutta Botanical Gardens, and the subsequent sneezing and running at the nose followed by tetanic symptoms and two days' suffering, nor did the effects disappear for nine days. It is, says Dr. Hooker, a remarkable fact that the plant stinks violently only at this season, I frequently gathered it with impunity on subsequent occasions, and suspected some inaccuracy in my observations; but in Silhet both Dr. Thomson and I experienced the same effects in autumn. Endlicher ("Lindley's vegetable kingdom") attributes the causticity of nettle-juice to bicarbonates of ammonia, which Dr. Thomson and I ascertained was certainly not present in this species.—*Hooker, Him. Jour.* Vol. II. p. 188. It will be remembered that in treating of Hemp, it was stated that it belonged to the natural family of the Nettles, or *Urticeæ*. These are widely diffused throughout both tropical and temperate climates, though they generally occur where there is considerable moisture either of soil or of climate. Though small and herbaceous in Europe, they grow to a gigantic size in the hot moist parts of Asia, and extend from its warm tropical islands, all along the Malayan Peninsula, to the foot of the Himalayas, and along which, and in its valleys, they flourish even near to the banks of the Sutlej. Species are also found around the Neilgherries, and along the Malabar coast to the Concan. Though the flowers of all are inconspicuous, some of the species (as *Urtica pulcherrima*) are remarkable for the beauty of their foliage; one of them (*U. tuberosa*) is distinguished by its tuberous rootstock, which is eaten by some of the natives of India, either in its raw or cooked state Every one, however, knows that the great cha-

racteristic of the Nettles is their sting. Some of the Indian species are remarkable, even among Nettles, for this quality; as, for instance *U. crenulata* and *U. heterophylla*, the latter "a most ferocious-looking plant." Many of the Nettles formerly placed in the genus *Urtica* have been removed to the genus *Boehmeria*, which includes what are sometimes called stingless Nettles. But many of each have long been famous for the tenacity of their fibre. Thus, of the European species, thread and cloth, as also paper, have been made from the fibre of the common Nettle (*Urtica dioica*). So, of the Siberian species, *U. cannabina*, thread and cord is made for the use especially of fishermen. In the Society Islands, also, cord is made with the fibres of *U. argentea*; and in Japan, the bark of the species called *U. Japonica*, is employed in making lines, cordage, and cloth. *Himalayan Nettles.*—Major Swetenham, when writing respecting the Maloo Creeper (*v.* p 296), thus mentions the large Nettle of Gurhwal —which he says is considered by the natives as superior to Bhang, or the true Hemp—"There is another plant that grows in the interior of the Hills from which stronger ropes even than the Hemp are said to be made—I allude to the large Nettle plant. I have seen this growing to the height of fourteen or fifteen feet; the Hill people in preparing ropes from this plant, steep it for *three* days *only* and then strip off the fibre; this is done in a contrary method to the Hemp stripping, *i. e.*, the top of the Nettle is broken off, and the fibre pulled down from the thin end." Capt. Huddlestone in his paper on the Hemp of the Himilayas, mentions also other fibres Among these—"The larger Nettle called *Jurkundaloo, Kundaloo* and *Kubra*, grows chiefly in the northern parts of the district, in great quantities; it also grows in the middle ones; and from its fibre the natives make rope for tying up their cattle and snow-sandals. One bundle will produce about a seer of fibre, but it is not collected for sale. The plant grows about eight or nine feet high, and the stalks are about the size of a finger in thickness. It is cut in the cold season, and the stalks are soaked a few days in water before the fibre is stripped off from the thick end like Hemp."—(' *Trans. Agri-Hortic. Soc.*,' viii. *p.* 275.) Dr. Campbell also mentions the gigantic stinging Nettle of the Nipal and Sikkim Hills, as made into Hemp and used in making the cloth called "Bangra." The preparation is the same as the "Pooah." The Bangra is harder and stiffer than the "Pooah," and not adopted to making cordage and nets.

Mr. C. Gubbins, C. S., when at Simla, forwarded some specimens of fibrous material produced by a species of Urtica growing about and below Simla, used by the natives of those parts for making string. The process, which he describes as employed for separating this fibre, is interesting from its simplicity. The plant is cut in October, and dried in the sun; when brittle it is beaten, and the fibres separate easily. He observes: "Seeing it stated that there was considerable labour required in cleaning the fibre, I made particular inquiries on this head; and as far as I can learn, there is no greater trouble in cleaning the fibre of the Urtica when merely dried, than is experienced with the Hemp of the Hills which is not rotted in water." Hence the separation would seem to be effected entirely by the dry process and mechanical means. Capt. Rainey, when Assist. Pol. Agent at Subathoo, sent a net formed from the fibre of Stinging Nettle, which grows in the same locality as that described by Mr. Gubbins, and he says; "1*st*. The Nettles from which this sample was wove, grew in the low valleys adjacent to the Hill station of Simla in the Himalaya Mountains. "2*d*. The vegetable abounds in all the ravines and valleys of those mountains, and forms one of the most rank weeds of these places, during the rainy months. "3*d*. In August and September, when it is in perfection, it can be obtained in any quantity, running from five to six and seven feet in height. "4*th*. As far as I have been able to ascertain, it is chiefly in demand, if not at present wholly so, for fishing nets; in consequence of the virtue ascribed to the cord wove from it, of gaining increased strength by constant immersion in water, and resisting decay from that element longer than any other description of cords. "5*th*. The weed is known throughout the lower and centre ranges of the Himalayas by the names Babar, or Allow, or Bichoo; the last evidently consequent on its stinging property being the common designation of the scorpion. "6*th*. The following is the preparation to which the article is subjected by the natives of the place; but I doubt not, much of the process might be omitted or simplified—"1*st*. Being cut in August or September, the weed is exposed for *one* night in the open air. "2*d*. The stalk is then stripped of leaves and dried in the sun. "3*d*. When well dried it is deposited in an earthen pot which contains water mixed with ashes (the refuse remains of any wood fire), and boiled four and twenty hours. "4*th*. The stalk thus boiled is then taken to a stream and well washed. "5*th*. The Hemp is then brought home, and being sprinkled with flour (otta) (of the grain called Koda), it is again dried in the sun, and afterwards spun at any time into cord for nets of every description." As no distinctive characters are given of these Nettles, it is impossible to determine the respective species. In Gurhwal and near Simla, *Urtica virulenta* and *U. heterophylla* are common as stinging Nettles, as well as some others, while of species of Boehmeria, the *B. frutescens*, *macrostachya*, *Goylodo*, *salicifolia*, are found, and all probably abound in fibre, though a few only

have been as yet ascertained to do so, as has been mentioned in the preceding pages.—*Royle Fib Plants.*

Nettle of Gurwal, grows there to the height of 14 or 15 feet and is used by the Hill people in making ropes.

Neilgherry Nettles.—The *Girardinia Leschenaultiana*, is frequent all over the higher range of the Neilgherries: the bark yields a fine, strong, white flax-like fibre, which the hill people obtain by plunging the plant in hot water, to deprive it of its virulently stinging properties, and then peeling the stalks. The textile material so prepared is of great strength, and the Todawars use it as thread.

Nettle Fibre of the Neilgherry.—From Urtica Heterophylla, is supposed, to be still unknown in commerce. As yet it is only obtainable in small quantity but if called for, the supply might be largely increased as the plant is abundant and widely distributed over the Indian Peninsula. Is is separated by boiling the stalks. —*M.C.C.*

Nettle of the Boehmeria. See Boehmeria.

Strength of the Rheea and nettle Fibres. With regard to the strength of Nettle fibres, it has already been stated that Dr. Roxburgh found the Rami or Caloee bore 240 lb., when Hemp bore 158 lb. and Sunn 150 lb., Messrs. Sharp, in 1815, found a cord bore 252 lb, when Russian Hemp was only required to bear 82 lb. So in Dr. Royle's experiments with these fibres in an untwisted state, Petersburgh Hemp bore only 160 lb, when China-grass bore 250 lb., the Rheea 320 lb., and the Wild Rheea 343 lb. Mr. Henley had previously found the Kunkhoora or Rheea to bear about three times the weight of Russian Hemp. Capt. Thompson also thought it about three times as strong; and though rather too wiry, he considered it would make excellent cordage, as well as canvas. But though this is too valuable to be applied to such purposes, we have in the Wild Rheea equal strength with greater flexibility, and all that is required, as is apparent from the following abstract of the experiments made at Messrs. Huddarts's.

Experiments on Strength of Rope made from samples of Fibre of growth of India, received from Dr. Royle, at Messrs. Huddart's Rope manufactory, Limehouse, Feb. 13, 1854.

Description of Hemp.	Size of Rope.	Number of Yarns per strand.	Total number of Yarns in Rope.	Strength of Rope in pounds.	Strength of Rope per inch, circumf. squared.	Size of Rope at breaking.	Tar absorbed.	Amount of stretching.
	Inc.							
Wild Rheea, 1st expt.	4¼	44	132	19,062	·844	4¼	1-7th	1 in 16
Ditto, 2d expt.	4¼	44	132	21,025	·894	4¼	1 7th	1 in 16
Rheea Fibre.	4¼	44	132	20,488	·910	4¼	1 9th	1 in 16

So Messrs. Morgan, having made some rope for Mr. Saugester with the Rheea sent him by Major Hannay from Assam, found it to be at least 50 per cent. better than similar rope made of Russian Hemp. This is conspicuous also in the following experiments. The excellence of the fibre for lines and fine cordage is particularly observable in the fine thread called *Talli Rami* from Singapore, as likewise in the delicate nets, some of which seem fine enough for lace instead of for catching fish. The fitness of the Wild Rheea, from its strength, flexibility, and durability, is seen in the various kinds of line and cord which Dr. Royle, has had made of it in this country, as well for fishing lines, as bowstrings, clew lines for hammocks, &c., in order to show its fitness for all and every purpose to which fibrous substances require to be applied. A subsequent report was made on the strength of these fibres, when twisted into cords and rope of different sizes. "In continuation of the experiments which I made on the strength of some Indian fibres in their untwisted state, I beg leave to subjoin an account of some others that I thought it desirable to have made on some of these fibres after they had been twisted into twine, cord, and rope, of different kinds, by a regular rope-maker. This I have had done in order to obviate the objections which are made against new articles by ignorance or prejudice, or from the opposition of interested parties. "These cords and ropes having been subjected to a fresh set of experiments and compared with others made of Russian Hemp and of as nearly as possible the same size, I am happy to report that in every instance the Wild Rheea has proved stronger than Russian Hemp, and in the case of the two-inch rope the Indian fibre bore 1000 lb. more than the Russian. The cultivated Rheea, which is equally strong, will, I hope, be applied to better purposes than rope-making; but it is important that the Wild Rheea is proved by these experiments to be fit for every purpose for which strong fibre is required, either in Europe or in India." A few experiments were also made with rope made of other Indian fibres. "Plantain and Pine apple fibres, though less strong, are capable of bearing considerable weights, and might be used for many ordinary purposes. But the fibre of the Agave, commonly called American Aloe, is capable of bearing a great strain, and the plants have the peculiarity of being able to flourish in a dry soil and climate, such as that of the Deccan and of Mysore. The Dhunchee fibre of Bengal, which is hardly known in England, appears to be as strong as Russian Hemp, and is, I understand, as easily cultivated and as cheap as Jute. The results which have been obtained are as follows:—

	lb.
Wuckoo Fibre small Cord ... broke at	86
Petersburgh Hemp Cord	170

Wild Rheea Cord, same size as Russian	190
Rheea Fibre Cord, one thread larger	230
Pound line of Wild Rheea	510
Six-thread Cord of *Petersburgh Hemp* ...	505
Six-thread Ratline of Rheea, tarred ...	525
Six-thread do. of Wild Rheea, do.	530
Nine-thread do. of Wild Rheea, do. .	860
Twelve-thread do. of Wild Rheea do. ...	1120
One-inch Rope of Wild Rheea ...	1350
One-and-half-inch Rope of Wild Rheea, tarred	1900
One-and-half-inch Rope of Wild Rheea do.	1900
Two-inch Cord of *Russia Hemp*	1800
Two-inch Rope of Rheea Fibre tarred	2800
Twelve-thread Rope of Plantain made in India	864
Twelve-thread do. of Pine-apple do. ...	924
Two inch Cord of *Russian Hemp* ...	1800
Two-inch Rope of Dhunchee fibre, made in India	1850
Two-inch Rope of Agave, usually called Aloe do.	1900

For the sake of comparison we reprint the experiments made with the untwisted selvages of some of the same fibres, and of which the specimens were very carefully prepared by George Aston, and their strength tried in the office of the Military Stores.

Petersburgh Clean Hemp	broke with	160 lb.
A fibre from Travancore, called Wukka	,,	175
Yercum fibre	,,	190
Jubbulpore Hemp	,,	190
China grass, from China	,,	250
Rheea fibre or China grass, from Assam	,,	320
Wild Rheea, also from Assam	,,	343
Hemp from Kote Kangra in the Himalayas, bore without breaking.		400 lb

The other tables, in which the strength of various Indian fibres is given, as tested by different experimentalists, are to be seen, of Pine-apple fibre of Agave. &c., of Moorva, of Plantain, of different fibres, of Sunn, Jubbulpore Hemp and Dhunchee fibre, of Himalayan Hemp, and other fibres, Mudar, of Rheea and other Nettles, under the head of Fibres. The Nettles species are conspicuous for Fibrous properties, each consisting of numerous individuals widely distributed, and easily cultivated. They appear useless only because so few take the trouble, or, we should rather say, enjoy the pleasure of reading the wide-spread book of Nature. When some of the improved methods of separating fibre are successfully applied to such plants as the Rheea and Wild Rheea, the benefits to India and the world will be incalculable. For they are exceeded by none in fineness, excel all others in strength, and may be fitly compared to the trunk of the elephant, which can pick up a needle or root up a tree.—*Royle, Fib. Pl. p.* 876.

(5651) NEUROPTERA (from νεῦρον, a nerve, and πτερόν, a wing), one of the orders into which the class *Insecta* is divided.—*Eng. Cyc.*

(5652) NICANDRA PHYSALODES, Gaertn. (Atropa physalodes, Linn.) is said to be diuretic.—*O'Shaughnessy, page* 466.

(5653) NICKEL, A brilliant white metal resembling silver; ductile and malleable, and capable of receiving a high polish. It is usually procured from speise, a compound of the metal with arsenic, found associated with cobalt in Germany. Alloyed with copper, it forms argentane or german-silver; and is besides used in making mariner's compasses, and for other purposes.—*Waterston. Faulkner.*

(5654) NICOTIANA, a genus of Plants belonging to the natural order *Solanaceæ*. The species of this genus are called Tobacco. Tobacco was the name used by the Caribbees for the pipe in which they smoked it, but this word was transferred by the Spaniards to the herb itself. The genus *Nicotiana* contains about 40 species, most of them yielding tobacco for smoking, and many of them cultivated in the gardens of Europe. The name *Nicotiana* was given these plants after Jean Nicot, of Nimes, in Languedoc, who was an agent of the king of the France at Portugal, and there procured the seeds of the tobacco from a Dutchman who had procured them in Florida. Nicot sent them to France in 1560. The species of *Nicotiana* are most of them herbs, rarely under shrubs, and generally clothed with clammy hairs or down. The flowers are terminal, racemose, or panicled, and of a white, green, or purplish colour. The Calyx is 5-cleft, permanent; corolla funnel- or salver-shaped, divisions 5, plicate and spreading; stamens 5, as long as the tube of the corolla; anthers dehising lengthwise; stigma capitate; capsule 2-celled, 2-valved, valves bipartite; seeds minute, numerous. In addition to those below there are several other species of tobacco which are used for smoking in the places where they naturally grow. *N. quadrivalvis* has capsules with four valves; it grows near the Missouri River, and is there smoked by the natives. *N. multivalvis* has capsules with many valves; it is cultivated by the Indians on the Columbia River for smoking. It is a fetid plant, and the calyx, the most fetid part, is selected by the Indians for smoking. *N. nana*, a small species of tobacco, is a native among the Rocky Mountains of North America, and is smoked by the Indians. *N. repanda* is a native of Cuba, and is said to furnish the tobacco for making the small cigars known as Queen's.—*Eng. Cyc.* Tobacco leaves when properly dried have a greenish yellow colour, a strong pleasant smell, and acrid taste; taken into the stomach by persons not habituated to its effects violent vomiting, diarrhœa, and collapse are occasioned. The effects of smoking the leaf are too well known to require notice in our pages.—*O'Shaughnessy, page.* 471.

(5655) NICOTIANA. MACROPHYLLA, Orinoco Tobacco, is an herbaceous plant, with ovate-acute leaves clasping the stem; throat of corolla inflated, segments short pointed. It is a larger plant than the last, the stem rising from 5 to 7 feet high. It is a native of America, and is frequently used for smoking, under the name of Orinoco Tobacco; it is however inferior to the

last; the milder Havannah cigars are said to be made from it.—*Eng. Cyc.*

(5656) NICOTIANA PERSICA, Shiraz Tobacco, is an herbaceous plant, clothed with clammy down, with the leaves of the root oblong, those of the stem acuminate and sessile; corolla salver-shaped, with a long tube, and rather unequal segments. This plant is a native of Persia, and furnishes the famous Shiraz Tobacco. This tobacco is milder than that produced by the N. *Tabacum*, and but a small quantity is consumed in England. The English smoke more of the strongest tobacco than any nation in the world.—*Eng. Cyc.*

(5657) NICOTIANA RUSTICA. English Tobacco, has an herbaceous square stem, with petiolate ovate quite entire leaves; tube of corolla cylindrical, longer than the calyx; segments of the limbs roundish, obtuse. This plant is a native of Europe, Asia, Africa, and America. It is called English Tobacco because it was the first species that was introduced into that country for growth; it was then brought from America. It grows very well in that climate, and in some places is almost naturalised. It is known in France as Tabac Pausse, in Germany as Bauern-Tabak, and in Spain as Tabac Cimaroso. This plant grows on the coast of the Mediterranean, and thence finds its way into India, where it is highly valued. The tobaccos of Salonica and Latakkia, which are much esteemed, appear to be the produce of *N. rustica*. From the extensive range of climate and difference of situation which this plant occupies, its characters suffer considerable change; hence a number of varieties have been described. In the shops this tobacco is known as Turkish.—*Eng. Cyc.* Dr. Hooker writing of this species, says, To wind up the feast, we had pipes of excellent mild yellow Chinese tobacco called "Tseang," made from *Nicotiana rustica*, which is cultivated in East Tibet, and in West China according to M.M. Huc and Gabet. It resembles in flavour the finest Syrian tobacco, and is most agreeable when the smoke is passed through the nose. The common tobacco of India (*Nicotiana Tabacum*) is much imported into Tibet, where it is called "Tumma," (probably a corruption of the Persian "Toomback,") and is said to fetch the enormous price of 30s. per lb. at Lhassa, which is sixty times its value in India. Rice at Lhassa, when cheap, sells at 2s. for 5 lbs.; it is, as I have elsewhere said, all bought up for rations for the Chinese soldiery.—*Hooker, Him. Jour. Vol. 4, page 232.*

(5658) NICOTIANA TABACUM. Common Virginian or Sweet-Scented Tobacco, is an herbaceous plant, with acuminated oblong-lanceolate sessile leaves, lower ones decurrent; throat of corolla inflated, segments of the limb pointed. This plant is a native of the West Indies, where it first became known to the Spaniards, and of Virginia, where the English first became acquainted with its properties. Of the various species it is that which is most commonly cultivated in gardens as an ornament. It is also largely cultivated in Europe for the purpose of smoking. The other species are however in some cases preferred. Schrank has described a large number of varieties of the common tobacco, varying in the size and form of their leaves, as well as the colour and form of their corollas. This species is the one most commonly employed for making tobacco and cigars. [TOBACCO, in ARTS AND SC. DIA.]—*Eng. Cyc.* This remarkable plant we are informed by Mr. Royle, on the authority of the Persian works on Materia Medica, was introduced into India in A. H. 1014 (A. D. 1605) towards the end of the reign of Jelalooden Akbar Padshah. From India tobacco probably found its way to the Malayan Peninsula and China, though Royle quotes the authority of Pallas, Loureiro and Rumphius, who think tobacco was used in China at a period anterior to the discovery of the new world. —*Mason.*

(5659) NGAN-TSOING-SHA, a bast of Arracan.

(5660) NIGELLA (from *niger*, black, because of the colour of the seeds), a genus of Plants belonging to the natural order *Ranunculaceæ*. It has 5 coloured petal-like spreading sepals. The petals small, from 5 to 10, bilabiate, with a hollow nectariferous claw. The capsules more or less connected together, terminated by the elongated styles opening in the inside, many-seeded. The leaves are capillary, multifid, often surrounding the flowers like an involucre, and finely cut like fennel. The flowers are solitary on the tops of the stems or branches The species are erect annual smoothish herbs. The species are vulgarly known by the names Devil in a Bush and Devil in a Mist.—*Eng. Cyc.*

(5661) NIGELLA ARVENSIS, has pointed anthers; from 5 to 7 styles circinately revolute, outwardly smooth; capsules connected below the middle into an obconical fruit, which is narrowest at the base. It has a smooth stem, with diverging branches. It is a native of middle and southern Europe in corn fields, also in the north of Africa. The seeds are sometimes used instead of those of *N. sativa*, but they are not so aromatic, neither have they so pleasant a smell. Both species are employed in the adulteration of pepper. (Lindley, *Flora Medica*; Fraas, *Synopsis Plantarum Floræ Classicæ.*)—*Eng. Cyc.*

(5662) NIGELLA HISPANICA. Some of the flowers are pretty, and only require to be sown in open ground, at the commencement of the rains, the colours are chiefly pale blue and yellow.—*Riddell.*

(5663) NIGELLA SATIVA, FENNEL FLOWER. Lin.

Carin siragum, TAM.	Nulla Gilakara, TEL.
Kalunjen, DUK. & HIND.	Musavi, SANS.

See article fennel flower seed, in Catalogue 1st section 1st.—*Ainslie's Mat. Med. p. 262. N. sativa* has ovate-obtuse anthers; capsules muricated, united up to the very point into an ovate fruit, terminated by 5 erect styles; the stem erect and rather hairy; flowers naked. The seeds are angular, aromatic, subacid, and were formerly used instead of pepper: and have also been employed as carminatives. It is the Μελάνθιον of Hippocrates, 'Steril,' 675, and of Dioscorides, 3, 93; the Githex of Pliny, 20, 17.—*Eng. Cyc.* This plant is a native of the south of Europe, Egypt, Barbary, and the Caucasus, and is extensively cultivated in India. The *Seeds*, resembling coarse gunpowder, are triangular, slightly compressed, obtuse above with oblique bases, rugose, black externally, internally of a greenish white hue. The capsules are polyspermous, oblong, and pointed at the side. The seeds are of strong aromatic odour, and flavour resembling sassafras or cubebs. These properties are due to an essential oil, of which the seeds yield from 5 to 10 per cent. The nigella seeds have been long used in medicine, and are praised by Hippocrates as a tonic condiment. At present they are chiefly employed by the native Hakims as Baidas aromatic adjuncts to purgative or bitter remedies. In Bengal they are given to nurses, in the belief that they increase the secretion of milk, and facts have been laid before us which tend to corroborate that opinion. In eruptions of the skin, Dr. Ainslie informs us, the seeds reduced to powder and mixed with sesamum oil, are much used as an external application. The seed will seldom be prescribed in substance. The tincture is a useful, warm stimulant, and may be added conveniently to numerous draughts and mixtures intended for other purposes. The popular mode of giving the nigella to nurses is by mixing the powdered seed with curry, to which however it communicates a very heavy and disagreeable flavour. The price of the seed in the bazars is from one to two annas the seer,=2lbs., avoirdupois.—*O'Shaughnessy, page* 164. The tincture of it is stimulant and diaphoretic, and is recommended by native practitioners to promote the secretion of milk. Dose, half a fluid drachm to two drachms.—*Beng. Phar. page* 430.

(5664) NIGELLA SEED, KOLANJEE SEED. NIGELLA SATIVA, SMALL FENNEL FLOWER SEED. Syn.

Siah dana, PERS.	Hab Saude, EGYPT.
Kala-jira, HIND.	Gemein Nigelle. GER.
Μελάνθιον of Dioscorides.	Krishna jiraka, SANS.
Shoonez, ARAB.	Carin Sirraguin, TAM.
Mugrela, BENG.	Nulla gilakara, TEL.
Kaloodooroo, CYNG.	Kolinjee, Kalee jeera, GUZ. HIND.
Kolunjun, DUK.	

These seeds have a great resemblance to coarse gunpowder, are triangular, slightly compressed, obtuse above with oblique bases, rugose, black externally, internally of a greenish white hue. They have a strong aromatic odour, and flavour resembling sassafras or cubebs. They are used in medicine by the natives, as an aromatic adjunct to purgative or bitter remedies; and also in curries and pickles. The plant (*Nigella Sativa*), is a native of the South of Europe, Egypt, Barbary, and the Caucasus, and is extensively cultivated in India.—Produced in various parts of the Western Presidency; and exported from Bombay to London and France. —*Faulkner.*

(5665) NIGHT BLOWING CEREUS. Cereus.

(5666) NIGHTINGALE. Dr. J. D. Hooker, in this most interesting work on the Sikhim Himalaya, twice notices "the Nightingale," as having been heard by him; but at a time of the year at which no real Nightingale ever sings. Every one familiar with the true Nightingale knows that it regularly ceases to sing, somewhat abruptly, about the beginning of the month of June, and this alike whether it has young to tend in the wild state, or when confined in a cage; and captive Nightingales recommence their song, if in health and vigour, about January, and continue in full song for two months or more before their wild brethren arrive from their southern haunts. This bird never sings out of season. Accordingly we have no hesitaiton in declaring that Dr. Hooker's "Nightingale" refers to some other bird, and most probably to the Shama. "On the 4th October," he remarks, "I heard the Nightingale for the first time in the season;" and when at Pemiongchi (a former capital of Sikhim), in January, he notices that "Nightingales warble deliciously night and morning, which rather surprised us, as the minimum thermometer fell to 28°, and the ground next day was covered with hoar frost. These birds migrate hither in October and November, lingering in the Himalayan valleys till the cold of early spring drives them further south, to the plains of India, whence they return north in March and April." Among the numerous collections of Sikhim birds which we have examined, no specimen of a Nightingale has ever occurred: nor is the bird enumerated in Mr. Hodgson's lists of the species inhabiting that region.—*Bligh.*

(5667) NILGHIAU OR NYL-GHAW, PORTAX TRAGO-CAMELUS, one of the largest and most magnificent of known antelopes being upwards of 4 feet high at the shoulder; resides in the dense forests of India, is a vicious animal of very uncertain temper, and even when domesticated from both, is violent and changeable.

(5668) NIMA, a genus of Plants, belonging to the natural order *Cinarocaceæ*. It has her-

maphrodite flowers, a 5-parted permanent calyx, 5 oblong petals, 5 stamens with filaments dilated at the base; the 5 ovaries are connected together, pilose, and seated on the thick disc beneath the petals. The embryo is large, without albumen. The species are trees, with alternate imparipinnate leaves, having four parts of serrated leaflets. The flowers are disposed in panicle corymbs.—*Eng. Cyc.*

(5669) NIMA QUASSIOIDES, is a native of Nepaul, in a valley near the town called Thankot. It has elliptical oblong leaflets, which are acuminated and serrated. The corymbs are trichotomous. It is as bitter as the quassia of South America. (Don, *Dechlamdeous Plants*; Lindley, *Flora Medica.*)—*Eng. Cyc.* It grows at foot of the Himalaya mountains of which it rises to near the snow line: The wood has long been used for killing insects, and latterly recommended in fever by M. Macardieu.—*Ind. An.* 106.

(5670) NIPA FRUTICANS. This a low stemless palm that grows in the tidal waters of the Indian ocean, and bears a large head of nuts. It is a plant of no interest to the common observer, but of much to the geologist, from the nuts of a similar plant abounding in the tertiary formations at the mouth of the Thames, and having floated about there in as great profusion as here, till buried deep in the salt and mud that now forms the island of Sheppy.—*Hooker, Him. Jour. Vol.* I. *page* 1. The "Nipa" and "Sasa" of the Philippine islands possesses various useful purposes. It is the *Nipa fruticans* of botanists, and has affinities with the screwpines. The leaves are used for thatch baskets or when burnt, they yield salt: and toddy a palm wine is extracted from the spathe, convertible into syrup, sugar, vinegar, yeast and a strong spirit.—*Seeman.* The Nipah Palm from the appearance of its foliage, is generally supposed to be a Palm, though stemless, but in the nature of its flowers, it approaches the Screw Pines and is a plant of which the leaves are applied to mat making and thatching. It is a native of the Indian Archipelago, which extends northwards to the Mergui River, where it is found in perfection, but only a few specimens as far north as Moulmain. It flourishes in brackish water, along with the Mangrove, and its lower parts are inundated when the tide rises. It abounds in saccharine sap, which may be evaporated into an excellent sugar, or fermented into a kind of "Palm wine." Its leaves are those chiefly employed in the Tenasserim Provinces for covering the roofs of houses, and large quantities are sent northwards from Mergui for this purpose. They are also made into mats, and no doubt abound in fibre, though this is not separated for economic purposes.—*Royle Ill. Plants, p.* 35. The nipa is very extensively cultivated in the province of Tavoy. From incisions in the stem of the fruit, toddy is extracted, which has very much the flavour of mead, and this extract when boiled down becomes sugar. In Burmah, where the palmyra abounds, an extract from that tree is made to supply its place.—*Mason.* Writing of this plant Dr. Hooker says "Receding from the Megna, the water became saltish, and *Nipa fruticans* appeared, throwing up pale yellow-green tufts of feathery leaves, from a short thick creeping stem, and bearing at the base of the leaves its great head of nuts, of which millions were floating on the waters, and vegetating in the mud. Marks of tigers were very frequent." *Hooker, Him. Jour. Vol.* II. *page* 355.

(5671) NITRE. NITRAS POTASSÆ, NITRATE OF POTASH. *Nitrum. Salpetræ. Salpetre F.* Nitrate de Potase. Nitre. *G* Salpeter Salpetersaures Kali. Nitrate of Potash (K O, N = 102), Nitre, or Saltpetre, being a production of nature, must early have been known, especially as both the Indians and Chinese have long been acquainted with the making of fireworks, and the former have an easy process for making Nitric acid, in which they have been followed by Geber and other Arabian authors. The names *neter* in the Old Testament, and *nitrum* in ancient authors, were applied to Carbonate of Soda, but they were also used in a generic sense. Nitre is found effloresced on the soil in many parts of India, where there is no animal matter, and being washed out, a fresh crop is formed after a few years. The soil is sandy, with mica interspersed, which will continue to yield a supply of Potash, while the Nitric acid must be furnished by the combination of the Oxygen of the atmosphere with its Nitrogen, probably, as suggested by Liebig, by the oxidation of the Ammonia which he has proved is always present in the atmosphere. Mr. Stevenson (Prinsep's Journ. ii. p. 23) has detailed the process, and shown that the saline earth contains of salts soluble in water, Sulphate of Soda, Muriate of Soda, Nitrates of Lime and of Potash. The Nitrate of Lime is easily converted into that of Potash by lixiviating the saline soil over a filter of woodashes, which contains Carbonate of Potash (the Carbonic acid combines with the Lime, and the Nitric acid with the Potash), a Carbonate of Lime is precipitated, and the Nitrate Potash in solution is evaporated and put aside to crystallize. The salt obtained contains from 45 to 70 per cent. of pure Nitrate of Potash. It is redissolved and crystallised, but still contains impurities, which are termed so much per cent. of *refraction*. The ordinary kinds are called *rough* or *crude* Saltpetre, and the purer *East India refined*. In Europe Nitre is prepared artificially in Nitre-beds or Nitre-walls, and in ditches covered by sheds, where urine is added to different mixtures of earth with refuse vegetables, various animal substances, and calcareous matter, &c. The whole is exposed to the action

of the air. The Nitrogen, combining with the Oxygen, forms Nitrates, and the foregoing processes being adopted, similar results are obtained *Prop.* Nitrate of Potash in its purified state is colourless and semi-transparent, without odour, of a sharp and cooling, disagreeable, saline taste; crystallized usually in long, striated six-sided prisms, terminated at each extremity with dihedral summits, or in two or six converging planes, sometimes in a dodecahedron formed of two six-sided pyramids joined base to base. The crystals are anhydrous and unalterable in the air. Sp. Gr. 1.62. Soluble in 4 parts of water at 60° producing cold, and in an equal weight of boiling water. Insoluble in Alcohol, and sparingly so in diluted Alcohol. Heated to about 660°, it melts into a transparent fluid; in cooling, it forms a white semi transparent mass, which used to be called *Sal Prunellæ* when run into small balls. By a high degree of heat, Nitre is decomposed, Oxygen gas being first given off, and afterwards mixed with Nitrogen, while Hyponitrite of Potash is left behind. Water is apt to be lodged between the plates of the crystals, particularly when these are large; hence in gunpowder manufactories, small crystals, if equally pure, are preferred. With inflammable substances the decomposition of Nitre, when heated, is rapid, light and heat being disengaged, constituting what is called the deflagration of Nitre. This takes place also with some of the compound acids, into which Carbon enters as a constituent. Nitre being required of the best quality for the manufacture of gunpowder, that of commerce is usually sufficiently pure for medical purposes. But it sometimes requires purification to the extent of a single solution, and re-crystallization, as in the D. formula.—*Royle.*

(5672) NITRAS POTASSÆ PURIFICATUM, D. PURIFIED NITRE. *Prep.* Take *Nitr. Potash* one part, *boiling water* two parts, dissolve, remove the scum, filter, set aside for crystals to form. *Tests.* The presence of Nitric acid and of Potash may be detected by their respective tests. Nitre should be entirely soluble in distilled water. The solution should not be affected by Chloride of Barum (no Sulphates), nor by Nitrate of Silver (no Chlorides). Calcareous salts which occur only in rough Nitre, may be detected by the Oxalate of Ammonia, throwing down a white precipitate of Oxalate of Lime. Sulphate of Potash is now seldom found in the best Nitre, and only a small proportion of Chloride of Potassium or of Sodium.—*Royle.*

(5673) NITRATE OF SODA, CUBIC NITRE.

Nitrate de Soud, FR. | Wurfelsalpetre, GER.

Consists of nitric acid and soda. It is similar in its properties to saltpetre, differing chiefly in being more pungent in taste, more soluble in cold water, more inclined to attract moisture from the atmosphere, and in crystallizing in a rhomboid form. It is highly esteemed as a manure for pastures, and for all other sorts of agricultural produce, except that grown in heavy wet soils. It is also applied to many of the purposes for which saltpetre is used, though being more deliquescent than that salt, it is not adapted for the manufacture of gunpowder. This salt is found in immense quantities in deposits in South America, particularly in the districts of Atacama and Tarapaca in Peru.—*Waterton. Faulkner.*

(5674) NITRIC ACID, AQUA FORTIS. Acidum Nitricum, L. D. Acidum Nitricum purum, E. Nitric Acid, *Aqua Fortis. Spiritus Nitri Glauberi.*

Maulabker, ARAB.
Vediloonoorasa, CYNG.
Sterk water, DUT.
Acide nitrique, FR.
Salpeter saure, GER.
Sooriakhar-ka teil, HIND.
Shore ka tezab, HIND.
Uruk-i-shora, PERS
Aqua forte, PORT.
Acidum Nitricum, Aqua fortis, LAT.
Pottle Ooppoo travagum, TAM.

Nitric Acid (N or NO_5=54) is a compound of Nitrogen acidified by Oxygen. It was known to Geber, and probably also to the Hindoos. Cavendish first clearly ascertained its composition by forming the acid by passing electric sparks through atmospheric air over a solution of Potash. Phil. Trans. vol. 75, p. 572, and vol. 78, p. 261. (1785.) It may frequently be detected in the atmosphere after thunder-storms, in consequence of the Oxygen and Nitrogen combining together with the aid of electricity. In combination with Potash, Soda, and Lime or Ammonia, it is found, effloresced on the soil in some countries; also in some minerals; likewise in some vegetables, as in the officinal Pareira root, in the state of Nitrate of Potash. *Prop.* Nitric is unknown anhydrous, being always seen as a liquid in combination with water. When pure, it is colourless, transparent, of a very sour corrosive taste, destroying vegetable and animal matter. It tinges the skin yellow, and causes it to peel off; gives acid properties to a large quantity of water, vividly reddening Litmus and vegetable blues. It has a strong, almost suffocating odour, fumes in the air, from condensing its moisture; fumes still more if Ammonia be present. Its affinity for water is great, absorbing it from the air, and having its Sp. Gr. and strength diminished; when mixed with it, heat is evolved. Its strength necessarily depends on the quantity of water mixed with it; the density of the L. P. acid is 1·5082 to 1·504; Mr. Phillips considers this to be the strongest procurable; but it has been brought, by distilling with a gentle heat, by Kirwan to 1·55, and by Proust to 1·62. The E. P. also employs the Nitric acid of commerce, commonly called Aqua Fortis, of Sp. Gr. 1380 to 1500. Dr. Christison considers 1500 as the densest acid which can be obtained free of Nitrous Acid, but, im-

pregnated with this, it may be got so heavy as 1540 and upwards. The purest Nitric Acid, if long exposed to light, becomes yellowish from decomposition, Oxygen being given out, and Nitrous Acid formed. This may be got rid of by the action of heat, as it escapes in the form of Nitrous acid fumes, leaving the Nitric nearly colourless. Nitric Acid, of Sp. Gr. 1·50 will freeze at −40° and will boil at 247°, but these points vary of course with the density; if the heat be continued, the acid volatilizes, and at a red heat is decomposed. At the density of 1.5 it consists of 1 Eq. of Nitric and 1½ Eq. of Water, or 54 + 13·5 = 67·5, and it then contains about 80 per cent. of acid. Many vegetable substances, as Charcoal, Sugar, Alcohol, deprive Nitric Acid of its Oxygen, also Phosphorus, and hence it is one of the most powerful oxidizing agents. The Metals do not in general decompose it when concentrated, but if diluted with water, this becomes decomposed as well as the acid, both yielding Oxygen to oxidize the Metal; the oxide is insoluble, or, being acted on by some of the undecomposed acid, a Nitrate is formed. The other part of the decomposed acid escapes in the form of Nitric oxide gas, which, uniting with Oxygen of the atmosphere, ruddy fumes of Nitrous acid gas are observed. If Copper filings be used, then the solution will be of a greenish-blue colour. If Hydrochloric Acid be mixed with the Nitric, both become decomposed, and the mixture, called Nitro-Muriatic acid or *Aqua Regia*, is capable of dissolving gold. The presence of Nitric Acid may be ascertained by the bright red colour produced when it touches Morphia or Brucia; saturated with Carb. of Potash, it forms Nitrate of Potash, which deflagrates. *Prep.* Nitric Acid may be formed by passing electric sparks through a mixture of 1 part of Nitrogen and 5 of Oxygen. The L. and E. P. direct *Nitrate of Potash* and *Sulphuric Acid* in equal quantities by weight to be mixed together in a glass retort, and the resulting Nitric Acid to be distilled in a sand-bath (or by a naked gas flame, E). The D. P. employs 100 parts of salt to 97 of common Sulphuric Acid. To obtain a pure acid, the E. P. directs the Nitrate of Potash to be purified by two or three crystallizations, till Nitrate of Silver does not act on its solution in distilled water. When manufacturers make Nitric Acid they employ only half the quantity of Sulphuric Acid and use Nitrate of Soda instead of Nitrate of Potash, because it is cheaper. The acid obtained is of a brownish colour, fumes, and is called Nitric acid of Commerce.—*Royle.* When pure, it is colourless, but as met with in commerce, it is yellowish, owing to its containing nitrous acid in solution; besides which it is often highly diluted, and mixed with sulphuric and muriatic acids. It is exceedingly corrosive, and its taste is sour and acid. Nitric acid is employed in a great variety of chemical processes; in metallurgy and assaying, for etching on iron and copper, in dyeing and in medicine.—*Faulkner.*

(5675) NITRO-MURIATIC ACID, ACIDUM NITROMURIATICUM, D. Acidum Nitrohydrochloricum. Aqua Regia.

Eau regale, Fr. | Konigswasser, Ger.

This acid is made by mixing Nitric Acid with Muriatic, and has probably been known since the discovery of these acids. The Arabs must have been acquainted with it, as they had a solvent for Gold. *Prop.* Nitrohydrochloric Acid is of a golden yellow colour with the suffocating odour of Chlorine, and the irritant corrosive properties of the strong acids. *Prep.* Mix gradually in a cooled vessel, and where the fumes can easily escape. *Nitric Acid* 1 part, *Muriatic Acid* 2 parts (both by measure). Keep the mixture in a well-closed bottle in a cool, dark place. The resulting acid is not a mere mixture of the two acids, for both become decomposed. It is distinguished by the property of disolving gold.—*Royle.*

(5676) NIZAM-OOD-DEEN AOLEEA, is a spot near Delhi where visitors used to witness some excellent feats performed by a number of swimmers, who jump into a large reservoir from a dome about fifty or sixty feet above the surface of the water.—*Tour in India by French. p.* 11.

(5677) NOLANA (so named by Linnæus, from 'nola,' a little bell, on account of the bell-shaped form of the corolla), a genus of Plants belonging to the natural order *Nolanaceæ*. It has a 5-cleft calyx; a campanulate 5-lobed 5-plicate corolla; 5 stamens adhering to the tube of the corolla, nearly equal; the anthers are 2-celled, dehiscing lengthwise. The seeds are roundish, with a membranous testa, and fleshy copious albumen. The species are herbs; natives of Peru and Chili; usually annual. Leaves alternate, quite entire. The flowers are solitary, peduncular, and of a showy blue colour. The species of *Nolana* are only valuable as ornamental plants, they are showy when in blossom, and are much like some of the trailing species of *Convolvulus*. The seeds should be sown in a gentle hot-bed in the spring, and the plants when of sufficient size, or about the middle of May, should be finally transplanted to the open ground, where they will flower and ripen seed; or the seeds may be sown at once in the open border in a warm sheltered situation.—*Eng. Cyc.*

5678) NOLANA GRANDIFLORA. Trailing annual plants with white, yellow and blue flowers, easily raised from seed, in any garden soil.—*Riddell.*

(5679) NOLE-COLE, must be sown exactly in the same manner as that recommended for cabbage, broccoli, &c. It comes in early, and remains in season until April. If watered during the hot weather and taken care of, it will, when

the rains commence, throw out sprouts, and form other knole-cole on the old stalk, which may either be used, or slipped off and planted: they will not be so fine as those raised from seed, yet are fit for use.—*Jaffrey.*

(5680) NONEA ROSEA. BORAGINEÆ. These are plants of no great beauty and may be raised in common grden soil.—*Riddell.*

(5681) NOOCHIE OIL, VITEX NEGUNDO.

(5682) NOONA BARK: MORINDA UMBELLATA. The *Noona Dye* is famous in Tanjore and the plant is grown in large quantities, the colour red but not so bright as that extracted from the Imboora, which is exported to Madura and with it the famous Madura turbands are dyed.—*M. C. C.*

(5683) NORFOLK ISLAND PINE. Araucaria excelsa, grows also in New Caledonia, Botany Island, Isle of Pines; a majestic tree growing to the height of from 60 to 228 feet, with a circumference of 30 feet. Its wood is useful for carpenters in-door-work but is too heavy for naval purposes as spars.

(5684) NUCIFRAGA, a genus of Birds known by the name of Nutcracker. One species is a native of Britain. This genus is generally considered to comprehend only two known species: *N. Caryocatactes* and *N. hemispila*, which bears a considerable resemblance to it, though it is clearly a distinct species, described and figured in Mr. Gould's 'Century of Birds from the Himalayan Mountains.' Prince C. L. Bonaparte and Mr. Audubon, include the *Corvus Columbianus* of Wilson in the genus *Nucifraga*.—*Eng. Cyc.*

(5685) NUGAR-MOTHA, Cyperus pertenuis. Very common at Ajmeer: the root has a pleasant smell: used in hair mesalihs: also considered astringent and to check diarrhœa: one tola is given.—*Gen. Med. Top. p.* 147.

(5686) NUL OR NAR. Native name of a Bengal grass of which the mats known as "Durma," are made.

(5687) NUMMULITE.

Shudnaj udsee, ARAB.

Officinal with the natives. They are lentil-shaped greyish pebbles, of various sizes, consisting of carbonate of lime and iron (with a nucleus of calcareous crystals, Royle). The Hakims administer them in eye-diseases, and ulcers.—*Honigberger.*

(5688) NURTIUNG IN THE JYNTEA HILLS. The Nurtiung Stonehenge is no doubt in part religious, as the grove suggests, and also designed for cremation, the bodies being burnt on the altars. In the Khasia these upright stones are generally raised simply as memorials of great events, or of men whose ashes are not necessarily though frequently, buried or deposited in hollow stone sarcophagi near them, and sometimes in an urn placed inside a sarcophagus, or under horizontal slabs.—*Hooker Him. Jour. Vol.* II. *page* 320. The usual arrangement is a row of five, seven, or more erect oblong blocks with round heads (the highest being placed in the middle), on which are often wooden discs and cones: more rarely pyramids are built. Broad slabs for seats are also common by the wayside. Mr. Yule, who first drew attention to these monuments, mentions one thirty-two feet by fifteen, and two in thickness; and states that the sarcophagi (which, however, are rare) formed of four slabs, resemble a drawing in Bell's Circassia and descriptions in Irby and Mangles' Travels in Syria. He adds that many villages derive their names from these stones, "mau" signifying "stone:" thus "Mausmai" is "the stone of oath," because, as his native informant said, "there was war between Churra and Mausmai, and when they made peace, they swore to it, and placed a stone as a witness;" forcibly recalling the stone Jacob set up for a pillar, and other passages in the old Testament. "Maulow" is "the stone of salt," eating salt from a sword's point being the Khasia form of oath; "Matflong" is "the grassy stone," &c. Returning from this grove, we crossed a stream by a single squared block, twenty-eight feet long, five broad, and two thick, of gray syenitic granite with large crystals of felspar.—*Hooker Him. Jour. Vol.* II. *page* 320. Notes on the Khasia mountains and people; by Lieutenant H. Yule, Bengal Engineers. Analogous combinations occur in the south of England and in Brittany, &c., where similar structures are found. Thus *maen, man,* or *men* is the so-called Druidical name for a stone, whence *Pen-maen-mawr,* for "the hill of the big stone, Maen-hayr, for the standing stones of Brittany and Dalmen, the table stone of a cromlech."—*Hooker Him. Jour. Vol.* II. *p.* 321.

(5689) NUTMEGS.

Jowzaltelb, ARAB.	Jaiphul, GUZ. HIND.
Bu-wah-pa, BALI.	Noce moscada, IT.
Jayaphala, BENG.	Woh-pala, JAV.
Jatipullum, Sadikka, CYNG.	Buah-pala, MAL.
Jaiphul, DUK.	Jowz bewa, PERS.
Muskaatnoten, DUT.	Noz moscada, PORT.
Muscades Noix muscades, FR.	Jati-phala, SANS.
Muskatennusse, GER.	Jadjeni, TAM.
	Jajikaia, TEL.

Faulkner.

The importance of this spice, requires that the opinions of various writers should be recorded. Dr. Hassall says there are three species of Myristica, which furnish nutmegs. That which yields the best description, Myristica fragrans, forms a tree from twenty to twenty-five feet high, somewhat similar in appearance to a pear tree. The fruit is smooth externally pear shaped, and about the size of an ordinary peach. It consists, first of an outer

fleshy covering, called the pericarp, which when mature separates into nearly equal longitudinal parts, or valves, secondly, of the aril, or mace, which, when recent, is of a bright scarlet colour; and thirdly, of the seed proper, or nutmeg. This is enclosed in a shell, which is made up of two coats, the outer is hard and smooth, the inner, thin, closely invests the seed sending off prolongations which enter the substance of the seed and which being coloured, impart the marbled or mottled appearance characteristic of nutmeg. Nutmegs are cultivated in the Molucca Islands, and espcially in those called the Banda, or Nutmeg Islands. It is also grown in Java, Sumatra, Penang, Singapore, Southern India, Bengal, Bourbon, Island of Madagascar, and certain of the West India Islands. There are two kinds of nutmegs met with in commerce. The first, called the true, round, cultivated, or female nutmeg, is the product of Myristica fragrans. These nutmegs are characterised by their full and rounded form and delicate and aromatic flavour; they are occasionally imported in the shell. There is also a small variety, not larger than a pea, which has been described under the name of the royal nutmeg. Three varieties of true nutmeg are distinguished by dealers, which are thus described in Pereira's Materia Medica:"—

1. "*Penang nutmegs.*—These are unlimed or brown nutmegs, and fetch the highest price. They are sometimes limed in Britain for exportation, as on the Continent the limed sort is preferred. According to Newbold, the average amount annually raised at Penang is 400 piculs (of 133⅓ lbs. each).

2. "*Dutch or Batavian nutmegs.*—These are limed nutmegs. In London they scarcely fetch so high a price as the Penang Sort.

3. "*Singapore nutmegs.*—These are a rougher, unlimed, narrow sort, of somewhat less value than the Dutch kind. According to Mr. Oxley, 4,085,361 nutmegs were produced at Singapore in 1848, or about 252 piculs (of 133⅓ lbs. each); but the greater number of the trees had not come into full bearing, and it was estimated that the amount would in 1849, be 500 piculs. The second kind of nutmeg is called the false, long, wild, or male nutmeg, and is the produce chiefly of Myristica fatua; but a kind of nutmeg which is also called wild, is obtained from Myristica Malabarica. The seeds of Myristica fatua, are about half as long again as the true or round nutmeg; they are paler, and less aromatic. The wild nutmeg obtained from the Myristica Malabarica, has scarcely any flavour or odour, and, according to Rheede is of the size and figure of a date "The Turkish and Jewish merchants," writes Rheede "mix these nutmegs with the true long ones, and the mace with good mace, selling them together. They also extract, from these inferior articles an oil, with which they adulterate that of a more genuine quality." In the Banda Islands, three crops or harvests of nutmegs are obtained in the year, the principal gathering is in July or August; the second in November; and the third in March or April. The fruit is gathered by means of a barb attached to a long stick; the mace is separated from the nut and separately cured. On account of their liability to the attacks of an insect known as the nutmeg insect, considerable care is required in drying them. They should be dried in their shells, as they are then secure from the insect. They are placed on hurdles, and smoke-dried over a slow wood fire for about two months. In the Banda Islands, they are first dried in the sun for a few days. When the operation of drying is complete, the nuts rattle in their shells; these are cracked with mallets, and the damaged, shrivelled, or worm-eaten nuts removed. To prevent the attacks of the insect, the nuts are frequently limed. For the English market, however, the brown or unlimed nutmegs are prepared. The Dutch lime them by dipping them into a thick mixture of lime and water, but this process is considered to injure their flavour. Others lime them by rubbing them with recently-prepared, well-sifted lime. This process is sometimes practised in London. The following account is extracted from McCulloch's Dictionary of Commerce, *of the Quantities of Nutmegs entered for Home Consumption in the United Kingdom, in* 1840, 1841, 1842, *and the amount of Duty received thereon.*

Quantities.		Duties.	
	lbs.	£.	s.
1840.....	118,664	1840... 15,041	9
1841.....	113,441	1841... 14,851	10
1842.....	170,064	1842... 22,018	12

In 1842, the duties were fixed at 3*s.* 6d. per lb. on those from a foreign, and at 2*s.* 6*d.* per lb. on those from a British possession. The duty on wild nutmegs in the shell was then also fixed at 3*d*, without regard to origin. The duty now is 1*s.* per lb; on wild nutmegs in the shell, 3*d.* per lb., not in the shell, 5*d.* per lb. Wholesale price, 1*s.* 9*d.* to 4*s.* Were entered for home consumption in 1852, 239, 200 lbs.; in 1853, 208, 198 lbs. It appears from Dr. Hassall's inquiries, 1st. That nutmegs, as they reach the consumer are not in general deprived of their essential oil; a result contrary to the opinion commonly entertained on this point. 2nd. That, as met with in the English markets, they are seldom limed.—*Food and its adulteration, p.* 408. Crawfurd says the species of the genus Myristica are numerous and wide-spread, for some are found in all the islands of the Archipelago, in several parts of Hindustan, in the Hindu-Chinese countries, in the Philippines, in Australia, and in tropical America. As a spice, however, the moschata or aromatic, is the only one of which the nut or mace is of any value, and of this the geographical

limits are comparatively narrow, being comprehended between the 126th and 135th degrees of east longitude, and the 3rd degree of north, and the 7th of south latitude. It is, or has been, found wild in the proper Moluccas, in Gilolo, Ceram, Amboyna, Boeroe, Dammma, the North and south sides of the western peninsula of New Guinea, and in all its adjacent islands. It certainly does not exist in its wild state in any of the islands west of these, nor in any of the Philippines. Wherever the soil and climate are suitable for its growth the aromatic nutmeg is raised with great facility. It is even transported to remote parts, and the seed is disseminated by birds that feed on the mace dropping the nut. These birds consist of two species of pigeon, Colomba perspicillata and ænea, which prey on the nutmeg as our own wood-pigeons on the acorn.

In its native country the nutmeg tree comes into full bearing in its ninth year, and lives to seventy-five. In shape and size, the ripe fruit resembles a peach, or rather a nectarine. When ripe, the fleshy outer substance bursts, the nutmeg in its black shining shell is seen through the interstices of its reticulated crimson envelope, the mace, which last amounts to about one-fifth part of the weight of the whole dried fruit. These two articles, the nut and mace, constitute the spices which for so many ages have been in request among the nations of Europe and Asia, although never used as a condiment by the inhabitants of the countries that produce it. The English, after the unsuccessful efforts of two centuries, succeeded at length in participating in the nutmeg trade, in consequence of having occupied the Spice Islands in 1796. In 1798 the nutmeg was introduced into Bencoolen and Penang, and in 1819 into Singapore, and at these places it is now largely cultivated, but certainly under the disadvantage of growing as a not readily acclimated exotic. In countries native and congenial to it, the nutmeg is reared with great ease, requiring little care beyond shelter from the sun and weeding.—*Crawfurd Dict. p.* 305. At the Madras Exhibition of 1855, fine samples of nutmegs were sent by General Cullen from his gardens, Velley Malay near Oodlagherry south of Travancore, 1800 feet above the sea. Two sorts of nutmegs were exhibited by C. S. Vernede Esq. Commercial Agent to the Cochin government; first sort, averaging 70 to the pound, and the second sort, 100 to the pound; the former are particularly fine. In some instances the nutmegs had been coated with chunam to preserve them. Wild or spurious nutmeg, was also forwarded from the Bababoodeen Hills, Mysore, and from Canara; it is much used as a substitute for the true spice, but is almost wholly devoid of aroma and of no interest.—*M. E.* The nutmeg tree has been found growing wild in Assam, lat. 27° 30" and probably it would succeed in higher latitudes in America.—*Bonynge, America, p.* 155. Both Nutmegs and Mace, according to Tomlinson, are the produce of the same tree (*Myristica moschata*), a native of the Moluccas Islands, but cultivated in Sumatra, Java, and elsewhere in the East. It is likewise cultivated in several of the West India Islands, but with less success. The fruit of the nutmeg-tree is as large as that of our peach; but when ripe the fleshy part bursts asunder into halves, showing the stone (as we should call it in the peach) which contains within it the valuable kernel or nutmeg. But this stone is itself covered with a membranous kind of network, of a bright red colour, which is the mace: in drying, this afterwards becomes orange yellow. The appearance of the rich brown shell of the nutmeg covered with the red fibres of the mace is very beautiful in the fresh fruit. These fibres being removed, the shells are dried in the sun or by a moderate fire until they split, revealing the aromatic kernel or nutmeg. Nutmeg plantations are formed in alluvial ground, or in virgin forest land in level situations. Declivities are unfavourable on account of the slight hold these trees take on the soil, and the consequent danger of their being uprooted during the heavy rains which occur in tropical countries. Their culture in Bencoolen, which represents the ordinary mode of treatment has been minutely described by Dr. Lumsdaine, in a paper originally communicated to the Agricultural Society of Sumatra, in 1820, and recently republished in Silliman's American Journal of Science and Arts. From this account we learn that in originating a nutmeg plantation it is necessary to select ripe and sound nuts, and set them at the distance of a foot apart in a rich soil, covering them lightly with mould. They must then be watered every other day, weeded occasionally, and shielded from a scorching sun. In from one to two months the young seedlings may be expected to appear; and when about 4 feet high, the healthiest and most luxuriant are to be removed at the commencement of the rainy season to the plantation previously cleared and prepared for that purpose, and set at the distance of 30 feet from each other, care being taken to protect them from the heat and from violent winds. The plants are set in rows, and between these the plough is employed to clear the intermediate spaces of weeds and grasses, which in warm climates spring up in great luxuriance and choke the soil. The plants continue to require watering every other day in sultry weather; and in nearly all cases the soil requires to be enriched with annual supplies of manure, which are laid on during the rains, and which are made more stimulating as the tree approaches in age. After the fifth year the trees no longer require to be shielded from the sun; in the seventh year they begin to bear fruit; and from that time to

the fifteenth year they generally increase in fruitfulness, being then in their highest perfection. During the progressive growth of the plantation, the beds of the trees are regularly weeded, and the roots kept covered with the mould, for these have a constant tendency to seek the surface: the growth of lateral branches is alone encouraged, and all suckers or dead and unproductive branches are removed by the pruning-knife, so as to thin the trees considerably, and admit of the descent of the night-dews, which contribute much to their well-being, especially during dry and sultry weather. The conclusion of the principal harvest is the time chosen for these prunings. As the trees advance in age, the coarser vegetation and creepers are alone removed from the intervals between the trees, and the more harmless grasses are allowed to remain, giving the plantation a park-like appearance. The use of the plough is then discontinued. Nutmeg-trees are of two kinds in the same plantation, flower-bearing, and fruit-bearing. The productive plants are in the proportion of about two-thirds to the whole plantation. It is impossible to discover the difference in the sexes of the plants until the period of flowering. Between the appearance of the blossom and the ripening of the fruit, a period of 7 months generally elapses; but when once a tree has begun bearing, it continues to produce fruit all the year round, but more plentifully in some months than in others. The months of September, October, November and December, are the period of the great harvest; those of April, May, and June of the smaller harvest. In the Moluccas these trees continue prolific for 70 or 80 years; and the annual produce, taking one tree with another, amounts to about five pounds of nutmegs and a pound and a quarter of mace of each tree. When the fruit is ripe, which is indicated by the bursting open of the fleshy portion, and the appearance of the kernel, it is gathered in by means of long hooked sticks. The first step, after removing the outer integument, is cautiously to strip off the mace, and flatten it by hand in single layers placed on mats and dried for 3 or 4 days in the sun. In damp and rainy weather the heat of a charcoal fire is employed, but with care that no smoke or heat blacken the surface of the mace. In drying, the red tint of the mace changes to orange, its substance becomes horny and brittle, and its strongly aromatic odour and taste are preserved. When well cured, it is made up in tight packages in a dry situation; but is exposed to the sun about once a fortnight to preserve its dryness, and thus to keep it from insects which attack it if it becomes damp. The nuts being liberated from their mucy envelope, are conveyed to the drying house and placed on a raised stage or framework, which admits the heat from a smouldering fire beneath it, to pass freely among them. The heat is kept below 140° Fahr., because too great a heat dries up the kernels, while too long continued heat produces fermentation, which increases their volume so greatly as to fill up the whole cavity of the shell, and thus prevent them from rattling, which is the criterion of due preparation. The drying-house is a brick building of suitable size, and the stage is placed at an elevation of 10 feet having 3 divisions in it for the produce of different months. The nuts are turned every second or third day, that they may all partake equally of the heat, and such as have undergone the smoking process for the period of two complete months, and rattle freely in the shell, are cracked with wooden mallets, and the worm-eaten and shrivelled ones thrown out. The sound nutmegs are rubbed over with recently prepared well sifted dry lime, and packed tightly in chests, the seams of which have been made impervious to air and water. Another and a more common method is to dip them in a mixture of salt-water and lime, and then to spread them out for 4 or 5 days in the shade to dry. But the quantity of moisture imbibed during this process, appears to increase the liability to early decay and to the attacks of insects. The surest way of preserving the kernel would be to export it in the shell; this is done in sending nutmegs to China; but it does not answer in Europe, on account of the heavy allowance for shells, which is one third of the weight. The general qualities of the nutmeg and mace are the same: their agreeable aromatic odour and pungent taste are well known, the peculiar flavour of the mace, however, being quite distinct from that of the nut. They contain, according to Bonastre, fat oil 31-6 per cent., volatile oil 6-0, starch 24, gum 1·2, free acid 0·8, ligniue 54. Not more than 4-5 per cent. of volatile oil is usually obtained in the distillations at Apothecaries' Hall. The fixed oil, called *nutmeg butter* or *expressed oil of nutmeg*, is prepared in Holland: the nutmegs are beaten into a paste, which is enclosed in a bag, steamed and pressed between hot plates. It is imported in oblong cakes, wrapped in flag-leaves or leaves of the banana, and weighing about three quarters of a pound. It is of an orange or reddish brown colour, and of a fragrant odour. It is liable to much adulteration, and so also is the volatile oil, with which turpentine is frequently mixed. The article called *expressed oil of mace* is obtained from the nutmeg, and should bear its name. Nutmeg butter, according to Playfair, consists of three fatty substances, two of which are soluble in alcohol, and the third almost insoluble in that fluid; the third substance has been termed *Myristine* and from this *myristic acid* is prepared. Nutmegs are sometimes passed off as "fresh," after the volatile oil has been abstracted from them. Such nutmegs are very

light, and when pierced with a hot needle, do not give an oily coating to it. The best nutmegs are small, but heavy, weighing on an average 90 grains each. There is a large and inferior kind of nutmeg imported, longer and heavier than the above, weighing as much as 110 grains. This is the produce of another variety, and sometimes of a distinct species of nutmeg, and is said to be more liable to produce narcotic symptoms than the true nutmeg. Nutmegs and mace are decidedly stimulant, and in small quantities wholesome. When used in abundance they produce, by increasing the circulation, narcotic effects.—*Tomlinson.* According to *Mr. Simmonds*, the Nutmeg tree *Myristica moschata, M. officinalis*, or *aromatica*, is of a larger growth than the clove, attaining a height of thirty feet, and has its leaves broader in proportion to their length; the upper surface of these is of a bright green, the under of a greyish color. It is a dioecious plant, having male or barren pale yellow flowers upon one tree, and female or fertile flowers upon another. The fruit is drupaceous, and opens by two valves when ripe, displaying the beautiful reticulated scarlet arillus, which constitutes mace. Within this is a hard, dark brown, and glossy shell, covering the kernel, which is the nutmeg of the shops. The kernels of *M. tomentosa* are also used as aromatics, under the name of wild or male nutmegs. Lindley describes two other species, *M. fatua*, a native of Surinam, with greenish white flowers, and *M. sebifera* or *Virola sebifera*, a native of Guiana, with yellowish green flowers. By expression, nutmegs are made to yield a concrete oil, called *Adeps Myristicæ*, or sometimes erroneously oil of mace. A volatile oil is also procured by distillation. Nutmegs and mace are used medicinally as aromatic stimulants and condiments. In large doses they have narcotic effects. The fleshy part of the fruit is used as a preserve. Dr. Oxley has given such an admirable account of the nutmeg and its cultivation, as the result of 20 years experience in Singapore, that Simmonds draws largely from his valuable paper, which is contained in the second volume of "The Journal of the Indian Archipelago," page 641. The nutmeg tree, like many of its class, has a strong tendency to become monoecious, and planters in general are well pleased at this habit, thinking they secure a double advantage by having the male and female flowers on the same plant. This is, however, delusive, and being against the order of nature, the produce of such trees is invariably inferior, showing itself in the production of double nuts and other deformities. It is best, therefore, to have only female trees, with a due proportion of males. The female flowers, which are merely composed of a tripid calyx and no corolla, when produced by a tree in full vigor are perfectly urceolate, slightly tinged with green at the base, and well filled by the ovary, whereas the female flowers of weakly trees are entirely yellow, imperfectly urceolate, and approach more to the staminiferous flowers of the male. The shape of the fruit varies considerably, being spherical, oblong, and egg-shaped, but the nearer they approach sphericity of figure, the more highly are they prized. There is also a great variety in the foliage of different trees, from elliptic, oblong and ovate, to almost purely lanceolate-shaped leaves. This difference seems to indicate in some measure the character of the produce; trees with large oblong leaves appearing to have the largest and most spherical fruit, and those with small lanceolate leaves being in general more prolific bearers, but of inferior quality. Whilst its congener the clove has been spread over Asia, Africa, and the West Indies, the nutmeg refuses to flourish out of the Malayan Archipelago, except as an exotic, all attempts to introduce it largely into other tropical countries having decidedly failed. The island of Ternate, which is in about the same latitude as Singapore, is said to have been the spot where it was truly indigenous, but no doubt the tree is to be found on most of the Moluccas. At present the place of its origin is unproductive of the spice, having been robbed of its rich heritage by the policy of the Dutch, who at an early period removed the plantations to the Banda isles for better surveillance, where they still remain and flourish. But although care was formerly taken to extirpate the tree on the Moluccas, the mace-feeding pigions have frustrated the machinations of man, and spread it widely through the Archipelago of islands extending from the Moluccas to New Guinea. Its circle of growth extends westward as far as Pinang, or Prince of Wales Island, where, although an exotic, it has been cultivated as a mercantile speculation with success for many years. Westward of Pinang there are no plantations, looking at the subject in a mercantile point of view. The tree is to be found, indeed, in Ceylon, and the West Coast of India, but to grow it as a speculation out of its indigenous limits, is as likely to prove successful as the cultivation of apples and pears in Bengal. In the Banda Isles, where the tree may be considered as indigenous, no further attention is paid to its cultivation than setting out the plants in parks, under the shade of large forest trees, with long horizontal branches, called "Canari" by the natives. There it attains a height of 50 feet and upwards, whereas from 20 to 30 feet may be taken as a fair average of the trees in the Straits' Settlements, but notwithstanding our pigmy proportions (adds Dr. Oxley), it does not appear, from all I could ever learn, that we are relatively behind the Banda trees, either in quantity or quality of produce, and I am strongly impressed with the idea that the island of Singapore can compete with the Banda group on perfectly even terms. Our cli-

mate is quite unexceptionable for the growth of the nutmeg, being neither exposed to droughts or high winds; and although we may lose by comparison of soils, we again gain by greater facilities of sending our products to market, by the facility of obtaining abundant supplies of manure, and any amount of free and cheap labor. A nutmeg plantation, well laid out and brought up to perfection, is one of the most pleasing and agreeable properties that can be possessed. Yielding returns, more or less daily, throughout the year, there is increasing interest, besides the usual stimulus to all agriculturists of a crop time, when his produce increases to double and quadruple the ordinary routine. Trees having arrived at fifteen years growth, there is no incertitude or fear of total failure of crop, only in relative amount of produce, and this, as will be seen, is greatly in the planter's own power to command. It is against reason to suppose that a tree in flower and fruit will not expend itself if left to unaided nature: it must be supplied with suitable stimuli to make good the waste, therefore he who wants nuts must not be sparing of manure. The first requisite for the planter is choice of location. It is true that the nutmeg tree, aided by manure, will grow in almost any soil where water does not lodge, but it makes a vast difference in the degree of success, whether, the soil be originally good, or poor and improved by art. The tree does not thrive in white or sandy soils, but prefers the deep red and friable soils formed by the decomposition of granite rocks and tinged with iron, and the deeper the tinge the better. I am therefore inclined to think, that iron in the soil is almost necessary for the full development of the plant. If under the before-mentioned soil there be a rubble of iron-stone at four or five feet from the surface (a very common formation in Singapore), forming a natural drainage, the planter has obtained all that he can desire in the ground, and needs only patience and perseverance to secure success. The form of the ground ought to be undulating, to permit the running off of all superfluous water, as there is no one thing more injurious to the plant than water lodging around its roots, although, in order to thrive well, it requires an atmosphere of the most humid sort, and rain almost daily. Besides the form of the ground, situation is highly desirable particularly as regards exposure. A spot selected for a nutmeg plantation cannot be too well sheltered, as high winds are most destructive to the tree, independently of the loss occasioned by the blowing off of fruit and flower. At present there is abundant choice of land in Singapore, the greater portion of the island being as yet uncultivated, and much answering to the above description. The land can be purchased from Government at the rate of from 10s. to 30s. per acre in perpetuity. I would advise the man who wishes to establish a plantation, to select the virgin forest, and of all things let him avoid deserted gambier plantations, the soil of which is completely exhausted, the Chinese taking good care never to leave a spot until they have taken all they can out of it. A cleared spot has a great attraction for the inexperienced, and it is not easy to convince a man that it is less expensive to attack the primitive forest, than to attempt to clear an old gambier plantation, overrun with lalang grass; but the cutting down and burning of large forest trees is far less expensive than the extirpation of the lalang, and as the Chinese leave all the stumps of the large trees in the ground, it is almost more difficult to remove them in this state than when you have the powerful leaver of the trunk to aid you in tearing up the roots, setting aside the paramount advantage that, in the one case you possess a fresh and fertile soil, in the other an effete and barren one. Forest land, or "jungle," as it is called in the East, can be cleared for about 25 to 30 dollars (£5 to £6) per acre, by contract, but the planter had better be careful to have every stump and root of tree removed, ere he ventures to commence planting, or the white ants, attracted by the dead wood, will crowd into the land, and having consumed the food thus prepared for them, will not be slow in attacking the young trees. Whilst the planter is thus clearing the ground, he may advantageously at the same time be establishing nurseries; for these the ground ought to be well trenched and mixed with a small quantity of thoroughly decomposed manure and burned earth, making up the earth afterwards into beds of about three feet wide, with paths between them for the convenience of weeding and cleaning the young plants. Of course if the planter can obtain really good plants, the produce of well-selected seed, it will be a great saving of time and expense to him, but unless the seed be carefully chosen, I would prefer beginning my own nurseries, and in the selection of seed would recommend the most perfectly ripe and spherical nuts. Oval long nuts are to be rejected, particularly any of a pale color at one end. The planter having selected his seed, which ought to be put in the ground within twenty-four hours after being gathered, setting it about two inches deep in the beds already prepared, and at the distance of twelve to eighteen inches apart, the whole nursary to be well shaded both on top and sides, the earth kept moist and clear of weeds, and well smoked by burning wet grass or weeds in it once a week, to drive away a very small moth-like insect that is apt to infest young plants, laying its eggs on the leaf, when they become covered with yellow spots, and perish if not attended to speedily. Washing the leaves with a decoction of the Tuba root is the best remedy I know of, but where only a few plants are affected, if the spots

be numerous, I would prefer to pluck up the plant altogether, rather than run the risk of the insect becoming more numerous, to the total destruction of the nursery. The nuts germinate in from a month to six weeks, and even later, and for many months after germination the seed is attached to the young plant, and many be removed apparently as sound as when planted, to the astonishment of the unlearned, who are not aware of the great disproportion in size between the ovule and albumen, the former of which is alone necessary to form the plant. The plant may be kept in nursery with advantage for nearly two years. Should they grow rapidly, and the interspaces become too small for them, every second plant had better be removed to a fresh nursery, and set out at a distance of a couple of feet from each other. When transplanted, either in this way or for their ultimate position in the plantation, care should be taken to remove them with a good ball of earth, secured by the skin of the plantain, which prevents the ball of earth falling to pieces. The nurseries being established, the ground cleared and ready, the next proceeding is to lay out and dig holes about 26 or 30 feet apart, and as the quincunx order has so many advantages, it is the form I would recommend for adoption. The holes should be at least six feet in diameter, and about four feet deep, and when refilled the surface soil is to be used, and not that which is taken out of the hole. Each hole should be filled up about one foot higher than the surrounding ground, to allow for the setting of the soil and the sinking of the tree. which, planted at this height, will in a few years be found below the level. Over each hole thus filled up, a shed, made of Attap leaves or other shelter, closed on two sides, east and west, and proportioned to the size of the plant, is to be erected. It is not a bad plan to leave an open space in the centre of the top of each shed, about twelve inches wide, by which the young plant can obtain the benefit of the dew and gentle rains, which more than compensates for the few rays of sun that can only fall upon it whilst that body is vertical. After the sheds have been completed, each hole should have added to it a couple of baskets of well decomposed manure, and an equal quantity of burned earth, when all is ready for the reception of the plant, which, having been set out, if the weather be dry will require watering for ten days or a fortnight after, in fact until it takes the soil. The planter having set out all his trees must not deem his labors completed, they are only commencing. To arrive thus far is simple and easy, but to patiently watch and tend the trees for ten years after, requires all the enthusiasm already mentioned. About three months after planting out, the young trees will receive great benefit if a small quantity of liquid fish manure be given them. In the first six years they ought to be trenched round three times, enlarging the circle each time, the trenches being dug close to the extremities of the roots, which generally correspond to the ends of the branches, and each new trench commencing where the old one terminated. They must of course greatly increase in size as the circle extends, requiring a proportionate quantity of manure, but the depth ought never to be less than two feet. The object of trenching is to loosen the soil and permit the roots to spread, otherwise the tree spindles instead of becoming broad and umbrageous. Manure is beyond all other considerations the most important to the welfare of the estate; it is that which gives quantity and quality of produce, and without it a plantation cannot be carried on. The want of it must limit the cultivation in the Straits' Settlements, and will arrest many a planter, who, having got his plantation to look well up to the eighth year with very little manure, thinks he can go on in the same manner. The nutmeg tree likes well all sorts of manures, but that which is best suited for it seems to be well-rotted stable and cow-yard manure, mixed with vegetable matter, and when the tree is in bearing the outer covering of the nut itself is about one of the very best things to be thrown into the dung-pit. Dead animals buried not too near the roots, also blood, fish, and oil cakes are beneficial. Guano is of no use. But although manuring is the chief element in successful cultivation, there are many other matters for the planter to attend to during the period that the trees are growing. All obnoxious grasses must be carefully kept out of the plantation, at least from between the trees, and the harmless grasses rather encouraged, as they keep the surface cool. The trunk of the tree ought to be carefully washed with soap and water once a year to keep it clear of moss; this has been ridiculed as a work of supererogation, but let those who think so omit the operation. Parasitical plants of the genus Loranthus are very apt to attach themselves to the branches, and if not removed do great injury The insect enemies of the tree are not very numerous, but it has a few, white ants among the number. They seldom attack a vigorous plant; it is upon the first symptoms of weakness or decay that they commence their operations. Their nests may be dislodged from the roots of the plant by a dose of solution of pig dung, to which they have a great aversion. There are several species of insects which lay their eggs on the leaves, and unless carefully watched and removed, they commit great havoc amongst the trees. For this purpose it is necessary to wash the leaves with a decoction of Tuba root, and syringe them by means of a bamboo with lime and water, of the consistence of whitewash; this adheres to the leaves, and will remain even after several heavy showers. Another nuisance is the nest of the large red

ant; these collect and glue the leaves together, forming a cavity for the deposition of their *larvæ*. The best mode of destroying them is to hang a portion of some animal substance, such as the entrails of a fowl, fish, &c. to the end of a pole thrust through and protruding from the branches; the ants will run along the pole and collect in immense quantities around the bait, when, by a lighted faggot, they can be burned by thousands. This repeated once or twice a day for a week or so, will soon rid the tree of the invaders. The number of men to be kept on an estate to preserve it in first-rate order after it has come into bearing, must depend of course upon the size of the plantation, but in general one man for every one hundred trees will be found sufficient, provided there be some four or five thousand trees. On a small scale the proportion must be greater. The nutmeg planter is under the necessity of keeping up nurseries throughout the whole of his operations for the replacement of bad plants and redundant males. Of the latter ten per cent. seems to be about the best proportion to keep, but I would have completely diœcious trees. No person can boast to get a plantation completely filled up and in perfect order much sooner than fifteen years. Of the first batch planted, not more than one half will turn out perfect females, for I do not take into account monœcious trees, which I have already condemned. The tree shows flower about the seventh year, but the longer it is before doing so, the better and stronger will it be. I cannot refrain from a smile when a sanguine planter informs me with exultation that he has obtained a nut from a tree only three or four years planted out; so much the worse for his chance of success, too great precocity being incompatible with strength and longevity. The best trees do not show flower before the ninth year, and one such is worth a score of the others. This will be evident when it is stated that I have seen several trees yield more than 10,000 nuts each in one year, whereas I do not believe that there is a plantation in the Straits that averages 1,000 from every tree. This very great disparity of bearing shows plainly that the cultivation of the plant is not yet throughly understood, or greater uniformity would prevail, and I think it clearly enough points out that a higher degree of cultivation would meet its reward. The tree has not been introduced into the Straits' sufficiently long to determine its longevity, but those introduced and planted in the beginning of the present century, as yet show no symptoms of decay. *The experiment of grafting the trees*, which at first view presents so many advantages, both in securing the finest quality of nut and the certainty of the sex, has still to be tried in this cultivation. Some three years ago (continues Dr. Oxley), I succeeded in grafting several plants by approach; these are not sufficiently old for me to decide whether it be desirable or not, for although the plants are looking well and growing, they as yet have thrown out their branches in a straggling irregular manner, having no leaders, and consequently they cannot extend their branches in the regular verticles necessary for the perfect formation of the tree without which they must ever be small and stunted, and consequently incapable of yielding any quantity of produce. The grafts have succeeded so far as stock and scion becoming one, and in time a perpendicular shoot from the wood may appear. If after that it should increase in size and strength, so as to form a tree of full dimensions, the advantage gained would be worth any trouble, the quality of some nuts being so far above that of others it would make a difference beyond present calculation; in short 1,000 such picked trees at the present prices would yield something equivalent to £4,000 a year, for £4 per tree would be a low estimate for such plants. If this ever does occur, it will change the aspect of cultivation altogether, and I see no good reason why it should not, except that those possessing trees of the quality alluded to, would not very willingly permit others to graft from them, so it is only the already successful planter who can try the experiment properly. An acre of land contains on an average 92 trees, and it is calculated an outlay of 300 dollars is required upon every acre to bring the tree to maturity; but as not more than one-half of the trees generally turn out females, and as many others are destroyed by accident and diseases to which this plant is very liable, it makes the cost of each tree, by the time it yields fruit, about eight dollars. The nutmeg tree begins to bear when about eight years old, but it gives no return for several years longer; and therefore to the expense of cultivation must be added the interest of the capital sunk. The plant being indigenous in the Moluccas, the expense of cultivation there is greatly less, and this consequently forms a strong ground of claim to the British planter for protective duties to their spices from the British Government. The planter having his tree arrived at the agreeable point of producing, has but slight trouble in preparing his produce for market. As the fruit is brought in by the gatherers, the mace is carefully removed, pressed together and flattened on a board, exposed to the sun for three or four days, it is then dry enough to be put by in the spice-house until required for exportation, when it is to be screwed into boxes, and becomes the mace of commerce. The average proportion of mace yielded in Singapore is one pound for every 433 nuts. The nutmeg itself requires more care in its curing, it being necessary to have it well and carefully dried ere the outer black shell be broken. For this purpose the usual practice is to subject

it for a couple of months to the smoke of slow fires kept up underneath, whilst the nuts are spread on a grating about eight or ten feet above. The model of a perfect drying-house is easily to be obtained. Care should be taken not to dry the nuts by too great a heat, as they shrivel and lose their full and marketable appearance. It is therefore desirable to keep the nuts, when first collected, for eight or ten days out of the drying-house, exposing them at first for an hour or so to the morning sun, and increasing the exposure daily until they shake in the shell. The nuts ought never to be cracked until required for exportation, or they will be attacked and destroyed by a small weasel-like insect, the larvæ of which is deposited in the ovule, and, becoming the perfect insect, eats its way out, leaving the nut bored through and through, and worthless as a marketable commodity. Liming the nuts prevents this to a certain extent, but limed nuts are not those best liked in the English market, whereas they are preferred in that condition in the United States. When the nuts are to be limed, it is simply necessary to have them well rubbed over between the hands with powdered lime. By the Dutch mode of preparation, they are steeped in a mixture of lime and water for several weeks. This no doubt will preserve them, but it must also have a prejudicial effect on the flavor of the spice. After the nuts are thoroughly dried, which requires from six weeks to two months smoking, they cannot be too soon sent to market. But it is otherwise with the mace; that commodity, when fresh, not being in esteem in the London market, seeing that they desire it of a golden color, which it only assumes after a few months, whereas, at first when fresh it is blood red, now red blades are looked upon with suspicion, and are highly injurious to the sale of the article. This is one of those peculiar prejudices of the Englishman which somewhat impugns his wisdom; but it must be attended to, as he is very ready to pay for his caprice; therefore those who provide for him have no right to complain, although they may smile. The nutmeg tree was sent from Bencoolen to Singapore, the latter end of 1819, so that thirty-four years have elapsed since its first introduction. Sir Stamford Raffles shipped to the care of the resident commandant, Major Farquhar, 100 nutmeg plants, 25 larger ditto, and 1,000 nutmeg seeds, which were committed to the charge of Mr. Brooks, a European gardener, who was specially engaged by the East India Company to look after their embryo spice plantations here. Some of these plants were set out in rather a bad soil and locality, but several of them are at present, and have been for the last ten years, fine fruitful trees. 315 of the trees in the Government garden yielded, in 1848, 190,426 nuts, or at the average of 604 for each tree; but of these not over 50 were of the old stock, most having been planted since 1836; so that a planter may safely calculate on having a better average than is here set forth, provided he attends to his cultivation, and his trees are brought up to the age of fifteen years. If a plantation be attended to from the commencement after the manner I have endeavoured to explain, and the trees be in a good locality, the planter will undoubtedly obtain an average of 10 lbs. of spice from each tree from the fifteenth year; this, at an average price of 2s. 6d. per lb., is 25s. per annum. He can have about seventy such trees in an acre, so that there is scarcely any better or more remunerative cultivation when once established. But the race is a long one, the chances of life, and a high rate of interest in the country, make it one of no ordinary risk, and it is one that holds out no prospect of any return in less than ten years. A person commencing and stopping short of the bearing point, either by death or want of funds, will suffer almost total loss, for the value of such a property brought into a market where there are no buyers must be purely nominal. Again, if the property has arrived at the paying point, almost any person of common honesty can take charge of and carry it on, for the trees after twelve years are remarkably hardy, and bear a deal of ill treatment and neglect: not that I would recommend any person to try the experiment. But it is some consolation for the proprietor to know that stupidity will not ruin him, and that even at the distance of thousands of miles he can give such directions, as if attended to, will keep his estate in a flourishing and fruitful state. The total number of nutmeg trees in Singapore in 1848 was 55,925, of which 14,914 only were in bearing. The produce of that year was 1,085,361 nutmegs, or 23,600 lbs. in weight. The greater number of the trees, it will be perceived, have not come into full bearing, but the produce is increasing rapidly, and in 1849 it amounted to fully 66,670 lbs. Among the principal growers in that island are Dr. Oxley, Mr. C. R. Prinsep, and Mr. W. Montgomerie, who have each large plantations, with from 2,000 to 5,000 bearing trees on them. Others, as Sir J. d'Almeida, Mr. Nicol, and one or two more, have planted extensively, but have not yet got their trees to the bearing point. A large supply of nutmeg and clove plants arrived at Pinang in 1802, from the Molucca Islands. There were 71,266 nutmeg and 55,264 clove plants; allowing one half of the former to have been male trees, there would only have been 35,633 useful nutmeg plants. It is believed that a mere fraction of these ever reached maturity, but they served to introduce the cultivation permanently. Plants were likewise sent to Ceylon and Cape Comorin. It does not appear that the climates of these two localities suit the nutmeg tree, as it requires rain, or at least a very damp climate throughout the

year. The East India Company's spice plantations in Pinang were sold in 1824, and the trees were dispersed over the island. The spice cultivators of the Straits' Settlements have for sometime sought a further protective duty on nutmegs, and the extension of a similar protection to mace and cloves, the produce of these settlements; for singularly enough the present tariff affords no protection to mace, the growth of British possessions. From tabular statements, furnished by the Chamber of Commerce of Pinang, drawn up apparently with great care, it appears that in 1843 there were 3,046 acres cultivated with spice trees in Pinang and Province Wellesley, containing 233,995 nutmeg, and 80,418 clove trees, besides 77,671 trees in nurseries ready to be planted out; and by a similar statement from Singapore, which is however not so complete, that 743 acres are cultivated, containing 43,544 nutmeg trees. The island of Pinang is estimated to contain 160 square miles, nearly the whole of which, with the exception perhaps of summits of the hills, is well adapted to spice growing. Province Wellesley is of much greater extent, and the soil of it has already ben proved to be equally well fitted for that kind of cultivation; and the settlements of Malacca and Singapore are said to be admirably suited, in many places, for that species of produce, the latter of which has already several plantations fast approaching to maturity. The cultivation is capable of great extension: encouragement is only required to be held out, and new plantations will be rapidly formed in these settlements. The same tables show that the produce in 1842 was, in Pinang and Province Wellesley, 18,560,281 nutmegs, 42,866 lbs. of mace, and 11,813 lb. cloves; Although this was the amount of produce for 1842, it must be remarked that crop was a complete failure, and the average crop for some years past has been 46,666 pounds, and in Singapore, 812,328 nutmegs, and 1,962 lbs. of mace. Thus making the produce from the two settlements 19,408,608 nutmegs in number (or in weight 147,034 lbs.), 44,822 lbs. of mace, and 11,813 lbs. of cloves. Now the consumption of these spices in Great Britain was, on an average of four years ending 1841, as follows:—Nutmegs, 121,000 lbs.; mace, 18,000 lbs.; cloves, 92,000 lbs. Showing, therefore, that the Straits' Settlements already produce more than sufficient of the two former to supply the home market. In the course of four or five years more, Pinang alone will more than double the present quantity of nutmegs and mace produced in the Straits, and the produce of cloves will be more than tripled. Simmonds has been able, from several elaborate papers in his "Colonial Magazine," to condense details, showing the progress of spice plantations in Prince of Wales Island and Province Wellesley. In the close of 1843 there were 64,902 nutmeg trees in bearing in the Island; 39,209 male trees, 103,982 not bearing; making a total of 208,093 trees planted out, besides 52,510 plants in nursery. The quantity of ground under cultivation was 2,282 orlongs. The produce in 1842 was 15,116,591 good nuts, 1,461,226 inferior nuts, and 38,269 lbs. of mace. The gross value of the produce in 1843, reckoning the good nuts at five dollars per thousand, and the inferior at one dollar, was 76,944 dollars. The estimated number of nuts in 1843 was 12,458,762; in 1844, 25,429,000. In Province Wellesley there were 247 orlongs under cultivation with the nutmeg, on which were 10,500 bearing trees, 8,005 male trees, and 7,307 not yet bearing, making in all 25,902 trees planted out. The produce was in 1842, 1,969,619 good nuts, 18,842 inferior ditto, and 4,500 lbs. of mace. The value of the produce of nutmegs was 9867 dollars. The estimated number of nuts in 1843 was 1,980,000; in 1844, 2,958,000. They were in all 423 nutmeg plantations on the island and main land. There were annually exported in the four years ending 1850, 48,000 lbs. of nutmegs from Pinang, and 57,400 lbs. of mace. The French at an early period cultivated the nutmeg at the Mauritius, and from thence they carried it to Cayenne. In Sumatra it appears to have been grown successfully, and according to Sir S. Raffles, there was in 1819 a plantation at Bencoolen of 100,000 nutmeg trees, one-fourth of which were bearing. Attempts have been made in Trinidad and St. Vincent to carry out the culture, but for want of enterprise very little progress seems to have been made in the matter. Under the duties which came into operation in 1854, nutmegs, instead of standing at 1s. per pound all round, have been classified, and the so called "wild" nutmegs of the Dutch islands are to pay only 5d per pound. This deprives the Straits' produce of its last protection against that of the Banda plantations, where the tree grows spontaneously, while it gives the long Dutch nut a high protection. If an alteration in this suicidal measure is not speedily obtained, the Straits' planters will be ruined. The Dutch have the power of inundating the market with the long aromatic nut. If the original plan of putting all British and all foreign nutmegs on the same footing had been adhered to, the Straits' planters would not have complained, as they would have trusted to their superior skill and care to compensate for the grand advantage the Dutch have in their rich soils. On observing this alteration of duty, Mr. Crawfurd and Mr. Gilman immediately prepared the following memorandum for the Chancellor of the Exchequer, which however failed to influence that minister:—

Memorandum on the Duties of Nutmegs.—"The duty proposed to be levied on nutmegs is 1s. per pound for cultivated, and 5d. per pound

for those commonly called wild. The ground on which this distinction is founded, is said to be that the market value of the one is but half that of the other, and that the Customs can readily distinguish between them. Now it is admitted, on all sides, that there is but one species of culinary nutmeg, the *Myristica Moschata* of botanists, although at least a score of the same genus, all unfit for human food. The parent country of the aromatic nutmegs extends from the Molucca Islands to New Guinea, inclusive. In this they grow with facility, and even in the Banda Islands, where there are parks of them, they hardly undergo any cultivation, and may truly be said, even there to be a wild product. It is only when grown as exotics, as in the British settlements of Pinang and Singapore, that they require cultivation, and that a more careful and expensive one than any other produce of the soil. Aromatic nutmegs are sometimes large and sometimes small—sometimes round, sometimes oblong, and sometimes long, and this will be found the case whether cultivated or uncultivated. How, then, the Customs are able to distinguish them it is difficult to understand. In the ordinary Prices Current no mention whatever is made of the wild and cultivated, the lowest quality being quoted in the most recent at 2*s.* per pound, and the highest at 3s. 10d.,—the best of what are called wild fetching a higher price than the lower qualities of what are called cultivated. But suppose the distinction could be made with the most perfect certainty, to make it would be a palpable departure from the principle adopted with every other commodity, of charging a uniform rate of duty on quality. To give an example, the present price of black pepper is 3¾d. to 4d. per pound, while that of white pepper is 8½d to 1s. 2d. per pound, both paying the same duty of 6d.; yet nothing can be more easily distinguished than these two commodities, which, except as to curing, are the same article. Tea is a still more striking example. The duty is the same on all qualities, though prices range from 11½d. to 3s. 6d. per pound. It was the very circumstance of the difficulty of distinguishing between the different kinds of tea, especially between Bohea and Congou, which, after an eighteen months trial, overthrew the system of rated duties of 1s. 6d., 2s., and 3s., adopted on the abolition of the East India Company's monopoly in 1833. Unless the duty on nutmegs is equalised there will be no end of trouble and disputes, and however expert the Customs may be, they will certainly be outwitted, and long-shaped and small nutmegs, although really cultivated, will be introduced at the lower duty, by unscrupulous traders, as wild ones. It may be added that duties of 12d. and 5d. do not, even if a departure from the principle of charging on quality were justifiable, represent the just proportional rates which ought to be levied upon what are supposed to be, respectively, cultivated and wild, as they are represented in the ordinary Price Current by the highest and lowest prices, which are 3s. 10d. and 2s. The just proportional duty ought to be on the lowest, not 5d., but 7d. The duty, as first proposed by the Chancellor of the Exchequer, of 1s. per pound on nutmegs, without distinction, was perfectly satisfactory to the planters, merchants, and the trade in general. It is a mistake to suppose that a duty of 1s. would exclude the so-called wild nutmegs. They would be imported in large quantities, as the cost is low. In quantity it was 17 Spanish dollars per picul, and there is no reason to suppose it would be more now. The finest picked cost say 34 Spanish dollars. In Pinang and Singapore, for cultivated the price is 65 to 70 dollars. The planters for the most part do not sell on the spot, but consign here for sale on their own account. London, May 23d, 1853.

NUTMEGS IMPORTED AND EXPORTED TO AND FROM SINGAPORE.

	Imported piculs.	Exported piculs.	Growth of Singapore.	Value of the native growth.
				£
1841	227½	412	184½	3,323
1842	258	809	551	9,897
1843	150½	249	98½	1,760
1844	52	282	230	4,131
1845	41	383	342	6,143
1846	79	331	252	4,526
1847	139	416	277	4,275

NUTMEGS EXPORTED FROM JAVA.

	Nutmegs. piculs.		Mace. piculs.
1830	1,304	.. ..	177
1835	5,022	.....	1,606
1839	5,027	.....	1,581
1843	2,133	.....	486

—*Simmonds.* In the Penang papers for 1857, the *Gazttee* gives the following statistics: The subjoined table of the exports of Nutmegs and Mace from Penang during the last ten official years shows a startling rate of increase. The exports in 1855 1856, 4624 piculs of nutmegs and 1340 of mace—exceed the total produce of the Bandas in 1855, which Dr. Oxley states at 4032 piculs of nutmeg and 1008 of mace. When the Singapore produce is brought into the account, it will appear that the British production of this spice now considerably exceeds the Dutch. The consumption in Europe and America has, we believe, more than doubled during the last five years, and if the preposterous duty were reduced to reasonable limits and the protection to the Dutch wild nutmeg withdrawn, we have little doubt the

production and demand would go on improving in a still greater ratio, to the manifest advantage of this Settlement.—*Penang Gazette.*

Exports of Nutmegs and Mace during 10 *years.*

Official Years.	Nutmegs	Mace.	
	Piculs.	Piculs.	Total.
1846—47	1519	477	1996
1847—48	2077	661	2738
1848—49	2178	666	2844
1849—50	2086	656	2742
1850—51	2564	751	3315
1851—52	2625	886	3511
1852—53	3020	781	3801
1853—54	2768	887	3655
1854—55	3294	898	4192
1855—56	4624	1340	5964
Total...	26755	8003	34758

Imports into the United Kingdom.

NUTMEGS, WILD AND CULTIVATED.

	Imports. lbs.		Home consump. lbs.
1847	367,936	.....	150,657
1848	336,420	.....	167,143
1849	224,021	.. ...	178,417
1850	315,126	.. ...	167,683
1851	358,320	.....	194,132
1852	357,940	.....	239,113

MACE.

	Imports. lbs.		Consumption. lbs.
1841	60,265	.....	18,821
1848	47,572	.....	19,712
1849	45,978	.....	20,605
1850	77,337	.....	21,997
1851	77,863	.....	21,695
1852	61,697	.....	21,480

MACE EXPORTED—ACTUAL GROWTH OF SINGAPORE.

	Quantity—piculs.		Value—£
1841	25½	.....	583
1842	72	.....	1,616
1843	40¾	.. ...	943
1844	16½	.....	359
1845	71	.....	1,616
1846	8	.....	179
1847	75	.....	1,661

109 piculs of imported mace were also re-shipped in 1847. 40,000 lbs. of mace were imported into the United Kingdom from India in 1848.—*Simmonds.*

(5690) NUTMEG BUTTER. MYRISTICA MOSCHATA.

Jadipoorie Thuli, TAM. | Jaiphul ka Tael, HIND.
Jajikaya enney, TEL.

Is obtained by expression from the nutmeg, it has an aromatic smell from the volatile oil it contains.—*M. E. J. R.*

(5691) NUTMEG OIL.

Jaiphul-ka-teil, HIND.

The Nutmeg contains a fixed or solid oil, and a volatile oil; both of which are used for medical purposes. Of the former there are two varieties; the English, which is the best, occurs in pieces of about ¼ lb in weight, wrapped in leaves of the banana, it has a uniform reddish colour inside; and the Dutch, imported from the Moluccas chiefly, in larger pieces, wrapped in leaves or paper, and of a lighter colour. *Waterston.—Faulkner.*

(5692) NUTMEGS, MALE.

Kayphul, GUZ. and HIND.

A native of the Moluccas, and frequently to be met with in some of the woods of Southern India. It is covered with a hard shell, provided with a pale arillus. It is one and a half to two inches long, elliptical, the parenchyme devoid of marbling. Its odour is weak, and flavour disagreeable. Its properties are analogous to that of the true Nutmeg, but the oil is so inferior in proportion, that it is but of little commercial value. It is thought that it might, however, be greatly improved by cultivation. They are procurable in most Indian bazars.—*Faulkner.*

(5693) NUTS, ACHEEN, are the betel nut, boiled, of very inferior quality, chiefly used by the lower classes in the South of India and are in no demand at Madras: sold from 35 to 50 Rs. a Candy.

(5694) NUTS, COLUMBO, are raw betel nuts: sold every where and are chiefly used by the Kayala, a class of Mahomedans.

(5695) NUX VOMICA, POISON NUT.

Faloos Mahee, Khanek-ul-kelb, ARAB.
Koochla, BENG.
Matseen, CHIN.
Kodakaddooruatta, CYNG.
Koachla, DUK.
Noix Vomique, ER.
Jeratcheree, Koochla, GUZ. HIND.
Faloos—Mahee, PERS.
Culaka, Kutaka, Veshamostibejum, SANS.
Yettie Cottay, TAM.
Mustig henza, Musadi, TEL.
Nux Vomica, Semina Seeds.
Strychnos Nux Vomica, Lin
Nux Vomica, or Koochla tree.
Pentand. Monog. Linn.

Nux Vomica was early used as a medicine by the Hindoos; it is their *Koochla* tree (Sans. Culaka, and Kataka), and being a produce of India, its properties must have been investigated long before it could be known to foreign nations. It is the *Izarakee* of Persian works on Materia Medica, but there is doubt respecting its name in Avicenna. *Khanuk-al-kulb*, dog-killer, and *Faloos mahee*, fish-scale, are other Arabic names. But under the name of *Jouz-al-Kue* or Emetic Nut, Dr. Royle obtained the fruit of a Rubiaceous shrub. Dr. Pereira thinks that the *Nux Meshil* of Serapion is Nux Vomica; but in Persian works this name is applied to a Datura.

The plant is a moderate sized tree, with a short crooked trunk. Branches irregular, the young

ones long and flexuose, with smooth dark grey bark. Wood white, close-grained, and bitter. Leaves opposite, with short petioles, oval, smooth, and shining, 3 to 5-nerved, differing in size. Flowers small, greenish-white, in terminal corymbs. Calyx 5-toothed. Corol funnel-shaped; limb 5 cleft, valvate. Stamens 5; filaments short, inserted over the bottom of the divisions of the calyx; anthers oblong, half exserted. Ovary 2-celled, with many ovules in each cell, attached to the thickened centre of the partition. Style equal to the corol in length. Stigma capitate. Berry round, smooth, about the size of an orange, covered with a smooth somewhat hard fragile shell, of a rich orange-colour when ripe, filled with a soft white gelatinous pulp, in which are immersed the seeds attached to a central placenta. Seeds peltate or shield-like, slightly hollowed on one side, convex on the other, about ¾ of an inch in diameter, and about 2 lines in thickness, thickly covered with silky ash coloured hairs attached to a fibrous testa, which envelopes the kernel composed of horny bitter albumen, of the form of the seed and of the embryo imbedded in a hollow in its circumference.—Roxb. Corom. i. t. 4.—A native of the Indian Archipelago and of the forests of the Peninsula of India, as well as of the Southern parts of the Bengal Presidency, as near Midnapore.—Esenb. and Eberm. 209. St. and Ch. 11. 52.

Lignum Colubrinum, supposed to be an antidote against the poison of venomous snakes, as well as a cure for intermittent fevers, is produced by other species, as *Strychnos ligustrina* and *S. Colubrina*. *S. Tiente* yields the *Upas tieute* and *Tjettek* of the Javanese, which is an aqueous extract of the bark. *S. toxifera* yields the *Woorali* or *Ourari* poison of Guyana. *S. pseudoquina* is employed in Brazil as a substitute for Cinchona Bark, and the seeds of *S. potatorum*, Roxb., *nirmulee* of the Hindoos, are employed by them to clear muddy water.

Strychnos Ignatia, usually considered as constituting a distinct genus, and called *Ignatia amara*, Linn. is however of most importance, as its seeds called St. Ignatius's beans, are frequently made to yield their Strychnia. They are ovate, triangular, of a reddish-gray colour, and about twenty of them contained in a pear-shaped fruit. They are produced in the Philippine islands, and have long been used in India, where they are called *Papeeta*, and are mentioned in the work called Taleef Shereef. They are intensely bitter, and contain a larger quantity of Strychnia than the Nux Vomica seeds.

The wood of Nux Vomica tree is said by Dr. Christison to be often substituted for the *Lignum Colubrinum*, or Snake-wood. The Bark is unfortunately sold in many shops in Calcutta under the name of *Rohin*, and thus substituted for the febrifuge bark of the *Rohuna tree*, or *Soymida febrifuga* (Beng. Disp. pp. 247 and 437), which was made known by Dr. Roxburgh, written on by Dr. Duncan in 1794, and introduced into the E. P. In this way probably it came to be introduced into England, and not being found saleable, was sent to Holland, and there sold and used as Angustura-bark (v. p. 325), supposed at one time to be the bark of Brucea ferruginea. In 1804, Dr. Ronbach of Hamburgh observed that it acted as a poison, and as several fatal cases occurred, it was in consequence prohibited being used in many Continental states. From its composition, Batka suspected that it was the bark of the Nux Vomica tree, or of some allied species. This Dr. Pereira confirmed by examining the specimens of Strychnos Nux Vomica in the East Indian Herbarium. (Med. Gaz. xix. p. 492.) Dr. Christison, as he informed Dr. Royle, came to the same result by examining specimens of Nux Vomica bark with French specimens of false Angustura Bark.

Dr. O'Shaughnessy in Calcutta, fully established the identity of false Angustura bark, and of the bark of the Nux Vomica tree in Journ. of Med. and Phys. Soc. of Calcutta, Jan. 1837; in consequence of an alkali having been obtained from what was supposed to be the bark of the *Soymida febrifuga*, but which proved to be the bark of Strychnos Nux Vomica. The whole forms a most instructive lesson on the absolute necessity of being thoroughly acquainted with the true nature of the drugs we prescribe.

Nux Vomica Bark is in flattish or slightly curved pieces, thick, hard, and compact; fracture dull and brownish; epidermis sometimes displaying a ferruginous, spongy, and friable efflorescence, at other times a yellowish-grey colour, marked with prominent greyish-white spots. Both appearances are due to alterations in the texture of the epidermis, and not to lichens, which are rare. The bark is smooth internally, its powder of a yellowish-white colour, without smell, but having an intense and permanent bitter taste. A drop of Nitrickacid on the external ferruginous part, turns it of a dark greenish colour; but if applied to a transverse section or internally, a dark-red spot is produced. Analysed by Pelletier and Caventou, it yielded Brucia. Dr. Christison states that it might be employed for obtaining Strychnia. An infusion of the Bark slightly reddens Litmus, Nitric acid produces in it a red, and Sulphate of Iron a green colour, but an infusion of galls a greyish-white precipitate.

Nux Vomica Seeds are round and flat, or rather shield-like, of a light-greyish colour, covered with a thick and tough testa, silky with fine hairs, which assist in detecting it when in powder and magnified. The seeds have little smell, but an intense and tenacious bitter taste; are so tough, that the E. C. give directions for powdering them (v. Extract). The powder, put

to be adulterated with substances employed to assist in pulverization, is of a yellowish-fawn colour. Water takes up some, but Proof and Rectified Spirit nearly all its active properties. Analysed by Pelletier and Caventou, the seeds were found to contain two alkalis, *Strychnia* and *Brucia* united with a pecular acid, the *Igasuric*, called also Strychine acid, a yellow Colouring matter, a Concrete Oil, Gum, Starch, Passorin, and a small quantity of Wax.

Action. Uses. Cerebro-Spinant, Poisonous, producing tetanic convulsions without affecting the brain. Used as a Stimulant of the Nervous System in Paralysis, in doses of the powder gr. v.–gr. xv. or other effective preparations may be employed.—*Royle.*

(5696) NUX VOMICA OIL. STRYCHNOS NUX VOMICA.

Moo yettie cottay yennai, TAM.	Carun jooty, CAN.

(5697) NYCTANTHES ARBOR TRISTIS. SORROWFUL, NYCTANTHES. Lin.

Paghalamallie, TAM.	Hursing, CAN.
Keysur, DUK.	Hursinghar, HIND.
Manjapumarum, HORT. MAL.	Poghadamullay, TEL.
	Sephalica SANS.

This is well known for the delicious though evanescent perfume of its flowers.—*O'Shaughnessy, p.* 436. The delicate sweet smelling flowers of this shrub, or rather the tube of their corollas, called in Hindooie (Dundee), are of a fine rich yellow colour and are employed alone or in conjunction with Parasam flowers (Butea frondosa), in preparing a beautiful bright yellow dye much sought after by the Mahometans for dyeing their turbans.—*Ains. Mat. Med. page* 148. In Ajmeer, cultivated as a rare flower the blossoms are very fragrant and there the tubes of the corolla are used, under the name of "kesru," to dye buff or orange colour. This plant is very abundant, wild at the foot of the Vindhya range, where the green tough stalks are used to make large grain baskets of—*Gen. Med. Top. p.* 172. The tree of mourning, sometimes called night-blooming flower, is as great a favorite in India as in the Southern States of America. Its delicate orange and white blossoms pour the most delicious fragrance on the evening air, and then fall in showers, bedewing the earth's cold bosom with sweetness.—*Mason.*

(5698) NYMPHÆA, a genus of Plants the type of the natural order *Nymphæaceæ*. It has a calyx of 4 sepals girding the base of the torus. The petals, 16 to 28, adnate to the torus, elevated about the ovary and covering the same, and therefore at first sight appearing inserted into it. The stamens are numerous, disposed in many series, and inserted in a similar way above the petals. There are upwards of 20 species of this genus described. They have all large floating leaves, with white, red, or blue flowers, which appear at the surface of the water.—*Eng. Cyc.*

(5699) NYMPHÆA, water lily. Griffith says there are two different species of water lily in the Tenasserim Province.—*Mason.*

(5700) NYMPHÆA ALBA, the common White Water-Lily, has cordate quite entire leaves: the stigmas 16-rayed, the rays ascending. This plant is a native of ditches, ponds, and lakes throughout Europe, and is abundant in Great Britain. The flowers are white, and according to Linnæus, open themselves in the morning at seven o'clock, and close them at four o'clock in the evening. This plant is very deservedly highly esteemed as the most beautiful of European plants. It is frequently accompanied with the yellow water-lily, and the two together give an exceedingly graceful appearance to the waters they occupy. The roots of the White Water-Lily contain an astringent principle, which renders them useful in dyeing. They also contain starch, and on this account swine feed on them, although other animals reject them. The whole plant was at one time regarded as medicinal, but is now seldom employed by medical men, although it has a popular reputation as a remedy in many diseases. There is a variety of this plant occasionally met with called *alba minor*, which has smaller flowers and leaves than the species.—*Eng. Cyc.* Found in tanks in India, and grown as the rest of the species.—*Riddell.*

(5701) NYMPHÆA CERULEA, Blue Water-Lily, has peltate nearly entire leaves without dots, glabrous on both surface, and 2-lobed at the base, the lobes free; the anther with an appendage at the apex; the stigmas 16 rayed. This plant is a native of Lower Egypt in rice-grounds and canals about Rosetta, Damietta, and Cairo. The flowers are very fragrant, and from its frequent representation in the sculptures of Egypt, it appears to have been regarded as a sacred plant by the ancient Egyptians.—*Eng. Cyc.*

(5702) NYMPHÆA CYANEA, BLUE LOTUS.

Neel Padma Lila Phool, HIND.

The plant is common in the Ajmeer and Poshkur lake: the flowers are used medicinally; being considered astringent and refrigerant.—*Genl. Med. Top. p.* 144 and 198.

(5703) NYMPHÆA EDULIS, the Eatable Water Lily, has peltate broad oval entire leaves, with the under surface pubescent. This plant is a native of the East Indies, in wet fenny districts. Its flowers are small, and white or reddish. Like all the species, it has large pear-shaped roots, which contain an abundance of starch, and they are consequently used as articles of diet. The seeds also of a species nearly allied

to this, the *N. rubra*, which has deep-red flowers, are also used as an article of diet. Its flowers also are held in superstitious veneration by the Hindoos in the districts of the East Indies in which it grows.—*Eng. Cyc.* Dr. Riddell says *Nymphæa Esculenta*, has a tuberous root, which is eaten and held in esteem by the Natives. —*Riddell.*

(5704) NYMPHÆA LOTUS. Lin.

Kakikulluvagudda, Tel. | Allie kasung, Tam
Koee, Kumuda, Kumul, Hind. | Cahlara also Caco-utpala, Sans.

At Poshkur, Sambhur, &c.—*Genl. Med. Top. page* 198. *Ainslie p.* 248. *Nymphæa Lotus*, the Egyptian Lotus, has peltate leaves, sharply serrated; the under surface is pilose at the nerves, and pubescent between them. This plant is a native of Egypt, and grows in slow-running streams, especially in the Nile near Rosetta and Damietta and is found in rice-fields during the time they are under water. It has large white flowers, with the sepals red at the margins. The roots are large, tuberous, and eatable. The seeds dried were made into a bread by the ancient Egyptians, and the roots were employed in the same manner. This plant is regarded with superstitious veneration by the Egyptians. It resembles the Nelumbo of the Hindoos, a plant belonging to the same natural order, and called the True or East Indian Lotus. The latter has always been regarded as the emblem of fertility. Lotus is a name applied to various plants by the ancients. The Lotus of the *Lotophagi* was the *Zizyphus Lotus*; that of Homer and Dioscorides, a species of *Lotus*, or *Trifolium*. The Lotus of Hippocrates is the *Celtis Australis*; and the Italian Lotus is the *Diospyrus Lotus.—Eng. Cyc.* Its root, like that of the Tawmaray, (Nelumbium speciosum), can only be found, in dry weather, in the beds of the tanks. It is pleasant to the taste, and is made by the Natives into curries and other dishes.—*Ainslie, p.* 248. Dr. Buist has lately given the scientific world a highly interesting account of the breathing of the Lotus.

(5705) NYMPHÆA ODORATA, Sweet-Scented Water-Lily has cordate quite entire leaves, with the nerves and veins on the under surface very prominent; the stigmas 16-to 20-rayed; the rays erect, inflexed at the top. This plant is a native of North America, from Canada to the Carolinas; it is found in deep ditches and slow-running rivers. This plant is often confounded with the European Lily, but it is quite distinct. Its flowers are white tinged with red, very fragrant; they open in the morning, and close at noon. The root is astringent, and much more powerful than the last species. It contains tannin and gallic acid and a decoction of the root gives a black precipitate, with sulphate of iron. The root is used by medical men in America as an astringent, and is employed by the people for making poultices.—*Eng. Cyc.*

(5706) NYMPHÆA ODORATA.

The flower.

Shengalaneer poo, Tam. | Ructaootepala, Sans.

This beautiful lilac coloured flower ought to have had a place amongst the flowers: it has a most delightful smell, somewhat like the wall flower, and is sacred both to Sheva and to Vishnoo.—*Ainslie's Mat. Med. p.* 301.

(5707) NYMPHÆA PUBESCENS.

Koee Kummell, Hind.

A variety of the last, bears a white flower.—*Riddell. N. pubescens* has peltate, sharply-toothed leaves, orbicularly reniform, with the under surface pubescent and spotted, and the lobes roundish. It is a native of the East Indies, Malabar, Moluccas, Tranquebar, Ceylon, Java, and has been also found at Waree and Acra on the western coast of Africa. This plant is called Lotus throughout India, and is held sacred by the Hindoos. Its flowers are of a beautiful white. They expand during the day and close at night, and exhale a strong vinous odour.—*Eng. Cyc.*

(5708) NYMPHÆA PYGMIA. *Hypericum* and *Parnassia*; also a diminutive water-lily, the flower of which is no larger than a half-crown; grow on the Khasia Hills. The latter is the *Nymphæa pygmæa* of China and Siberia a remarkable fact in the geographical distribution of plants.—*Hooker, Him. Jour. Vol.* II. *p.* 312.

(5709) NYMPHÆA ROSACEA. Pink water lily.

Kumbula Rukla, Hind.

Cultivated in tanks, and also wild at Poshkur &c.—*Gen. Med. Top. p.* 198.

(5710) NYMPHÆA RUBRA.

Kummul, Hind.

Red flowering lotus. In tanks, flowers about the close of the rains—of a dark crimson colour. —*Riddell.*

(5711) NYMPHÆA STELLATA. This plant is common in ponds and tanks. The flowers are blue.—*Riddell.*

(5712) NYMPHÆACEÆ, a natural order of Aquatic Plants, with floating leaves and solitary flowers, found in all the hot and temperate parts of the world. They usually have 4 sepals and many petals, which latter gradually contract into stamens, indefinite in number, and either hypogynous or adherent to the sides of the carpels. The ovary is superior, divided internally into numerous cells, to whose sides adhere many seeds, containing an abundance of albumen and a small embryo external to it: the stigmas radiate from the apex of the ovary. The order dif-

fers from *Ranunculaceæ* in the consolidation of its carpels, from *Papaveraceæ* in the placentation not being parietal, and from *Nelumbiaceæ* in the want of a large truncated disc containing monospermous achenia. The stems of these plants are fleshy rhizomata, rooting in the mud at the bottom of the waters in which they grow; and their woody tissue is so loosely disposed among the cellular, as to have given rise to a controversy concerning the real nature of the plan on which it is arranged, most writers considering that it is exogenous while others refer it to the endogenous type. The species of this order are generally plants of great beauty, either the flowers or the leaves being of unusual size. The White Water-Lily (the *Nymphæa alba*) and the yellow (Nuphar luteum) of English rivers and ponds are among the finest specimens of floral development in northern latitudes. In other countries both their size and colour are augmented, brilliant hues of blue and crimson being added to the pure white of the northern species and the most delicious odour being emitted. In Demerara grows the Victoria regia, whose flowers have a diameter of 15 inches while the leaves are as much as 6½ feet across. In the East Indies, the Euryale ferox emulates the Victoria in the size of its leaves but its flowers are small and inconspicuous. In both these plants the farinaceous seeds are used for food. Barclay is another genus belonging to this order. The genera contain about 50 species.—*Eng. Cyc.*

O.

(5713) OADHAL, Sterculia Villosa, called *Oadal* in Assam, is native of the mountainous countries to the eastward of Bengal. Trunk straight. The bark is smooth, but fibrous bags are made of it. Its fibres are made into cords by the natives of the eastern frontier of Bengal, to bind wild elephants with. Of a coil of *Oadal* rope, Major Jenkins gave the following notice in the year 1847: "The *Oadal tree* is very common, and the rope is made most readily; the bark, or rather all the layers, can be stripped off from the bottom to the top of the tree with the greatest facility, and fine pliable ropes may be made from the inner layers of bark, whilst the outer yield coarse ropes. The rope is very strong and very lasting—wet doing it little injury." *Oadal* is a creeper in Kemaon, with fine, strong fibres.

(5714) OAK.

Baalut, Arab.	Quercus, Lat.
Eeg, Dan.	Dab, Pol.
Eik, Dut.	Roble Carbahlo, Port.
Chene, Fr.	Dub, Rus.
Eiche, Ger.	Roble, Sp.
Quercia, It	Ek, Sw.

A genus of well-known timber trees (*Quercus.*) embracing about 150 species.—*Faulkner.* Several species are indigenous in the Tenasserim provinces—*Mason.*—and on the mountains of Southern India.—*Wight.* Wallich found seven different species of oak Quercus fenestrata, turbinata, velutina, Amherstianus, Tirbhæ, growing in Burmah and on the Tenasserim Coast, and all afford useful timber, though inferior to the English oak.—*Mason.* No oak nor chesnut ascends above 9000 feet in the interior of Sikkim, where they are replaced by a species of hazel (Corylus); in the North Himalaya, on the other hand, an oak (*Quercus semecarpifolia*, see vol. i. p. 187) is amongst the most alpine trees, and the nut is a different species, more resembling the European. On the outer Sikkim ranges oaks (Q. annulata ?) ascend to 10,000 feet, and there is no hazel.—*Hooker, Him. Journal. Vol.* II. *page* 140. It is not generally known that oaks are often very tropical plants; not only abounding at low elevations in the mountains, but descending in abundance to the level of the sea. Though little known in Ceylon, the Peninsula of India, tropical Africa, or South America, they abound in the hot valleys of the Eastern Himalaya, East Bengal, Malay Peninsula, and Indian islands; where perhaps more species grow than in any other part of the world. Such facts as this disturb our preconceived notions of the geographical distribution of the most familiar tribes of plants, and throw great doubt on the conclusions which fossil plants are supposed to indicate.—*Hooker, Him. Jour Vol.* II. *p.* 336.

(5715) OAKUM.

Oakum, Guz. & Hind.

A term applied to old hempen ropes pulled loose, and used in the caulking of sailing vessels. —*Faulkner.*

(5716) OATS, Avena. The Common Oat Tribe, *Aveneæ.*

Havre, Dan.	Owies, Pol.
Haver, Dut.	Aveia, Port.
Avoine, Fr.	Owes. Rus.
Hafer, Ger.	Avena, Sp.
Vena, Avena. It.	
Semina integumentis nudata, L.	Farina ex seminibus, D. Oatmeal.
Seeds, E. of Avena sativa, Linn.	

The Oat (*Βρῶμος* of Dioscorides) was known to the Greeks. The Oat is distinguished among cereal grains by its loose panicle. Spikelets 3-2

flowered. Florets smaller than the glumes, naked at the base, alternately awned. Outer palea with lateral nerves, awned, ending in 2 points. Awn dorsal, kneed and twisted. Stamens 3. Ovary hairy at the top. Stigmas 2. Scales 2. Grain long, crested, and furrowed.—A native probably of the Persian region. Several varieties are cultivated in Europe.—Nees von E. 28. The grains of Oat when deprived of their integuments form *Groats*, when these are crushed, *Embden* and *Prepared Groats*. When the grain is kiln-dried, stripped of its husk and delicate outer skin, and then coarsely ground, it constitutes the *oatmeal* of Scotland. "The husk, with some adhering starch from the seed, is sold under the inconsistent name of *Seeds*." Oats, according to Vogel, consist of 34 of husk and 66 per cent. of meal, and Oatmeal, in 100 parts, of 59 of Starch, 4·3 of Albuminous matter, Bitter Extractive and Sugar 8·25, Gum 2·5, with 23·95 of Lignin and moisture. Dr. Christison finds as much as 72 per cent. of Starch, and that it consists therefore of nearly five-sixths of real nutriment. *Action. Uses.* Groats and Oatmeal are nutrient and demulcent. When boiled with water (3 oz. to Aq.Oj. boiled to Oss.) Gruel is formed, which is so useful as diet for the sick. Oatmeal, when of thicker consistence, forms Porridge, and may be employed for making poultices.—*Royle.* Oats are principally in demand for horses, and the extraordinary increase of the latter has occasioned a proportional increase in the culture of this grain in Britain. They are grown more especially in the north and north-eastern counties; in the midland counties their culture is less extensive, but it is prevalent throughout most parts of Wales. Nearly twice as much oats as wheat is raised in the United Kingdom, but the proportion grown in Scotland is not so large as is supposed. The following is a fair estimate of the comparative production:—

	Acres.	Produce.
England	2,500,000	12,500,000
Ireland	2,300,000	11,500,000
Scotland	1,300,000	6,500,000
Total	6,100,000	30,500,000

England imports annually about 1¼ million quarters from foreign countries and nearly three-fourths of a million quarters from Ireland. The average produce per acre throughout the kingdom is five quarters. The price within the last 10 years has ranged from 28s. 7d. per quarter (the famine year) to 17s. 6d. The oat, when considered in connection with the artificial grasses, and the nourishment and improvement it affords to live stock, may be regarded as one of the most important crops produced. Its history is highly interesting, from the circumstance that in many portions of Europe it is formed into meal, and forms an important aliment for man; one sort, at least, has been cultivated from the days of Pliny, on account of its fitness as an article of diet for the sick. The country of its origin is somewhat uncertain, though the most common variety is said to be indigenous to the Island of Juan Fernandez. Another oat, resembling the cultivated variety, is also found growing wild in California. This plant was introduced into the North American Colonies soon after their settlement by the English. It was sown by Gosnold on the Elizabeth Island in 1602; cultivated in Newfoundland in 1622, and in Virginia, by Berkley, prior to 1648. The oat is a hardy grain, and is suited to climates too hot and too cold either for wheat or rye. Indeed, its flexibility is so great, that it is cultivated with success in Bengal as low as latitude twenty-five degrees North, but refuses to yield profitable crops as we approach the equator. It flourishes remarkably well, when due regard is paid to the selection of varieties, throughout the inhabited parts of Europe, the northern and central portions of Asia, Australia, Southern and Northern Africa, the cultivated regions of nearly all North America, and a large portion of South America. In the United States the growth of the oat is confined principally to the Middle, Western and Northern States. The varieties cultivated are the common white, the black, the grey, the imperial, the Hopetown, the Polish, the Egyptian, and the potato oat. The yield of the common varieties varies from forty to ninety bushels and upwards per acre, and weighing from twenty-five to fifty pounds to the bushel. The Egyptian oat is cultivated south of Tennessee, which after being sown in autumn, and fed off by stock in winter and spring, yields from ten to twenty bushels per acre. In the manufacture of malt and spirituous liquors oats enter but lightly, and their consumption for this purpose does not exceed 60,000 bushels annually in the United States. In 1840, Ireland exported 2,037,835 quarters of oats and oatmeal, but in 1846, on account of the dearth, the grain exports fell off completely. Most of the grain grown in Ireland requires to be kiln-dried, and is, therefore, of lower value. The oat, like rye, never has entered much into the foreign commerce, of Britain as the domestic consumption has always been nearly equal to the quantity produced. The annual average exports from the United States for several years preceding 1817, were 70,000 bushels. By the census returns of 1840, the total produce of the United States was 123,071,341 bushels; of 1850, 146,878,879 bushels. In Prussia 43 million hectolitres of oats are annually raised. The quantity of oats imported into the United Kingdom, has been declining within the last few years. In 1849, imported 1,267,106 quarters; in 1850, 1,154,473; in 1851, 1,2 9,844; in 1852 995,479. In 1844, 221,105 bushels of oats were raised in Van Diemen's Land on 13,864 acres. The flour of oats ground rather coarsely, is

used as an article of food both in Scotland and in the north of England. It is prepared in various ways, chiefly as porridge, and baked into cakes. Although Oat-flour is obtained, in England, from the Avena Sativa, there are several distinct species of Oats. The oat grains or seeds are usually enclosed in their husks; when deprived of these, they are termed "groats; and these crushed constitute Embden groats.—*Hassell.* It is the hardiest of all cereal grains cultivated in Britain, of which there are about 40 species known to botanists.

(5717) OBBAIRIA, Hard, rather fine, generally close-grained, Ceylon wood, presenting, however, many open cells; heavy.

(5718) OCHRE. (YELLOW). SONAGAROO (RED).

Pewdee, HIND. GUZ.

An earthy mixture of alumina, silica, oxide of iron, and other substances, found in beds in various parts of England, India, on the Continent, &c. It is generally of a yellow or brown colour, but is sometimes reddened by calcination. It is prepared for use by grinding and elutriation; and is employed as an ingredient in painter's colours, in the polishing of metals and stones, and for other purposes.—*Faulkner.* Ochre sometimes contains a little calcareous matter and magnesia. The oxide of iron may occur in so large a proportion that the ochre becomes an ore of that metal. Ochre is found in beds some feet thick, generally above the oolite, and covered by sandstone and quartzose sands more or less ferruginous, and accompanied by grey plastic clays of a yellowish or reddish colour. All these substances enter into the composition of the ochres. The ochry earths are ground under edge millstones and elutriated for use: the yellow ochres may be changed into red or reddish brown by calcination, whereby the iron is raised to a higher degree of oxidation. Native red ochre is also called *red chalk* and *reddle or Bole.*

(5719) OCHRA, OR OKRO, ABELMOSCHUS ESQULENTUS. A plant of which the fruit is used as a vegetable in the West Indies, the United States, and in South America, and which is remarkable for the similarity of its name to the vegetable called Ochra by the Greeks, but which has not been ascertained by botanists. The names by which the produce of the New World is distinguished in the works of Marcgrave and Piso are Quingambo and Quigombo, and in the later works by that of Gombo and Gombaut or Gombeau. It is possible, therefore that a classical name which was not otherwise engaged may have been applied to a new vegetable, and, as has been the case in many instances, without any attempt being made to identify the plant named with that which had been described by classical authors. This plant is the Hibiscus esculentus of authors [Hibiscus] —*English Cyclopædia page* 60. The okra plant of the Southern States of America, as universally abounds in the Tenasserim Provinces, and all over the East, as it does in the West Indies.—*Mason.*

(5720) OCOTEA PICHURIM. Species of Ocotea extend from Sylhet to Deyra Dhoon, and ascend to 7000 feet. The fruit, Sassafras nuts or pichurim Beans would be worth examination.—*O'Shaughnessy, p.* 546.

The Massoy Bark,—is a Bark of doubtful origin. It is light, soft to the touch, in long, convex fragments, covered with an epidermis of whitish grey colour, with numerous lichens, internally reddish, tissue rather spongy, brittle, fracture irregular, thickness not surpassing two lines. Taste pungent, bitter, and peppery, odour strongly that of sassafras, with a trace of nutmeg. The Indians attribute tonic properties to this bark; it is rich in essential oil, and proceeds from a lofty and robust tree, very common in New Guinea and in Java. M. Guibourt has detected in this bark the volatile substance previously observed in the Pichurim bean. Fee adds to the preceding articles brief notices of two more species of *Ocotea*, and three of *Litsea*, but their properties are not of material importance.—*O'Shaughnessy, p.* 547.

(5721) OCTOPODA OR OCTOPODIDÆ, a family of Cephalopodous Mollusca to which the genera Octopus, Eledone, Philoxenis and Argonauta belong. It has the following characters: —Animal short, bursiform, ordinarily deprived of fins; head very distinct; 8 sessile arms generally nearly equal, and furnished with simple suckers naked or testaceous, no internal testaceous rudiment, but only two small cartilaginous pieces in some species. Professor Owen, in common with other Zoologists, divides the Octopods into two groups or families, the Testacea and the Nuda. The Testacea consist of the genera Argonauta and Bellerophon.

Argonauta Argo has been from the earliest periods an object of great interest to zoologists, in consequence of the accounts of its sailor-like habits handed down to us from the ancients—we need only refer to the statements of Aristotle, Pliny, Ælian, Oppian, and others—and in consequence of the difference of opinion entertained with regard to the inhabitant of the shell by naturalists; some holding that the Cephalopod found in it was a mere parasite or, even worse, a pirate that had destroyed the legitimate owner and possessed himself of the shell; and others, that the animal was the lawful possessor and original constructor of it. In 1886 Madame Jeannette Power laid before the academy at Catania her 'Osservazione Fisiche sopra il Polpo dell' Argonauta Argo,' in which, after a long and careful course of inquiry, she declared the following results:—1st, that the cephalopodous mollusc usually found therein is the constructor of the shell which it inhabits; 2nd, the clearing

up of the doubts with regard to the first development of its eggs; 3rd, new facts respecting its habits. The following is this lady's description of the cephalopod of the Argonaut:—"It is furnished with eight arms, having on each two rows of suckers; the first two arms are more robust than the others, and should be so, because they serve as masts to support the sails, which, spread out, act before the wind as such. At the base they have on the inferior sides the double row of suckers, like the other six; but from the inferior row, at about an inch from the base in adults, a rather furrowed membrane begins to develop itself, which extends as far as the tip of the arm, and, holding it bent, it can no longer execute the office of a rowing arm, but is employed by the animal as a sail. These sails are so large that, when turned backwards and pressed against the shell, they can entirely cover and protect it. Thus, as far as I can conclude, the true office of these sails is exactly that of keeping themselves applied to the shell at all times, in reserve for the moment when the animal, coming to the surface of the water, removes them, and, spreading them, raises them as sails. In fact, the series of suckers of the sail-arms, when the membrane of the sails is wrapped about the shell, is placed exactly over the keel of it in such a manner that each sucker corresponds to each point in which the ribs of the shell terminate, until they reach the two margins of the spiral." Madame Power compares these sails with the two wing-like lobes of the mantle of *Cypræa* not only from the manner in which they cover the shell, but because she has reason to believe that the formation of the shell is the result of a transudation from the membrane of the sails, the corrugations of which, in secreting the calcareous matter, may be the cause of the ribbed form of the shell. Captain Philip Parker King, R. N., during his well-known voyage, met with some specimens of *Argonauta* in a rather curious way; and though he expresses his opinion with much modesty, it is plain what the inclination of that opinion was. "On our passage from Santos to St. Catherine's, in lat 28° south, we caught," says Captain King, "a Dolphin (*Coryphæna*), the maw of which I found filled with shells of *Argonauta tuberculosa*, [*A. rufa* of Owen] and all containing the *Octopus Ocythoe* that has been always found as its inhabitant. Most of the specimens were crushed by the narrow passage into the stomach, but the smaller ones were quite perfect, and had been so recently swallowed that I was enabled to preserve several of various sizes containing the animal. To some of them was attached tenidus of eggs, which was deposited between the animal and the spire. The shells varied in size from two-thirds of an inch to two and a half inches in length; each contained an *Octopus*, the bulk and shape of which were so completely adapted to that of the shell, that it seemed as if the shell increased with the animal's growth. When so many learned naturalists have differed so materially as to the character of the inhabitants of the *Argonauta*, it would be presumption in me to express an opinion; I therefore merely mention the fact, and state that in no specimen did there appear to be any connection between the animal and the shell." ('Voyages of the Adventure and Beagle,' vol. i. p. 106.) We had an opportunity of examining the specimens above alluded to soon after Captain King's return, and they bore out in every particular the description given by him. Several species are already known; and the specific characters rest in great measure upon the tuberculosities and rib-like elevations on the outside of the shell and on the breadth of the keel. The absence or presence of projecting pointed processes at the sides of the aperture near the spiral part cannot safely be relied on as a specific character: we possessed both broad-keeled and narrow-keeled specimens (now in the British Museum), in which the projecting process was present on one side of the shell and absent on the other. They are inhabitants of the seas of warm latitudes, both littoral and pelagic.

Eledone (Aristotle; Leach).—Arms provided with a single series of sessile acetabula.

E. ventricosa (*Octopus ventricosus*, Grant). Body short, round, the eight arms connected at their base by a membrane.

Octopus Lam., Πολύπους Antiq; and Leach).—Arms provided with a double alternate series of sessile acetabula.

O. vulgaris (*Sepia octopodia* Linn.; *Sepia octopus*, Gmel. Body short and ovoid, the eight arms connected at their base by a wide membrane.—*Eng. Cyc.*

(5722) OCYMUM, a genus of Labiate Plants remarkable for the fragrance of their leaves, which are used as an ingredient in savoury dishes, on which account some of the species have from time immemorial been objects of very general cultivation. In English gardens they are called Basils, a corruption of Basilica, the name given to common Basil by the monkish writers upon plants, in allusion to its regal qualities.—*Eng. Cyc.*

(5723) OCIMUM ALBUM. Linn. White basil; Country tea.

Cunjam koray, Tam. | Kooka tolasie, Tel.
Suffaid Toolsee, Duk. | Viswa tulasi, Sans.
Badrooge abeaz, Arab.

A shrub about a foot high, leaves have a most pleasant aromatic taste and smell. The juice is given to children in colds to the extent of a teaspoonful twice daily. The dried leaves are used as a substitute for tea.—*O'Shaughnessy, p. 593. Ainslie p. 283.* White Basil is chiefly grown in native gardens.—*Riddell.*

(5724) OCYMUM BASILICUM. Linn., Sweet bazil.

Tirnoot patchie veria, Tam. | Dehan siab, Pers. | Kalee tulsee, Hind.
Subze ke beenge Duk. | Manjirika, Sans.
Vepoolpatsa vittiloo Tel.

Common Basil, has many varieties, differing in their size, in the form and colour of their leaves, and in minor particulars: in their qualities they are nearly alike. This species is found wild in the hotter parts of the East Indies, where it is a perennial, with a woody root; but in English Gardens it is treated as a tender annual, being raised in the spring in a hot-bed, and turned into a warm border when the summer is so far advanced that there is no longer any danger from frost, which is instantly fatal to such plants. Besides this Mr Bentham enumerates 43 other species ('Labiatarum Genera et Species'), one of which, the *O. viride*, is used as a febrifuge in Sierra Leone. The genus is readily known by its calyx being bent downwards when the fruit is ripe, and then appearing covered as it were by a very large ovate dorsal lobe, and by the stamens being declinate.—*Eng. Cyc.* The small seeds are deemed cooling and mucilaginous, and consequently given in gonorrhœa, ardor urinæ, and affections of the kidneys.—*O'Shaughnessy, p.* 492. Common sweet basil is not rare, in gardens, but not met with indigenous in Tenasserim.—*Mason.*

(5725) OCYMUM GRATISSIMUM, Strong scented Basil.

Ram Toolsi, Hind.

Cultivated near temples.—*Gen. Med. Top. page* 200.

(5726) OCYMUM HIRSUTUM.

Koolimitan, Tam.

Whole plant slightly aromatic, prescribed by the Hindoos in decoction in the bowel complaints of teething children.—O'*Shaughnessy, p.* 493.

(5727) OCYMUM PILOSUM. Hairy Basil.

Habac, Arabic. | Babai Babooi Toolsee, Hind.
Rihan and Nazboo, Pers.

Common in Upper India. Very common as a weed over all Rajwarra. The green leaves have a delicious smell, exactly like verbena, the seeds are exceedingly mucilagenous and sometimes used as a demulcent. The dried plant prevents bugs approaching beds &c.—*Genl. Med. Top. p.* 200. Seeds aromatic, used by women to relieve after-pains.—O'*Shaughnessy, page* 493.

(5728) OCYMUM SANCTUM, Holy Basil.

Kala Toolsi, Hind.

Cultivated near temples. *Genl. Med. Top. p.* 200.

Tolasee Root.

Tolasee vayer munnie, Tan. | Toolsike munkeh, Duk.
Toolsi ke jur, Duk | Toolasee vayr, tam.

Tolasee is well known to be a plant sacred to Vishnoo and to be held in the highest veneration by all his followers. The root of it is made into beads and worn round the necks and arms of the Vishnoo Brahmins, and Taders. A very handsome bead is sometimes made by polishing the Betel nut called in Tamool Paak munnie.—*Ains. Mat. Med. p.* 443.) The root is given in decoction in fevers, half a tea-cupful twice daily. In Hindoostanee and Bengalee the plant is called kala toolsee, in Sanscrit *Arjaka* and *Paruasa*, (Nalla tirfava, *Rheede.*) The Brahmins regard it as sacred to Vishnu, and use it in their funeral ceremonies. The Malays also strew it over the graves of their dead.—*O'Shaughnessy, page* 493. In the Dekhan Ocymum Sanctum is grown in almost every native garden, and is used for various purposes by Europeans, for flavouring sauces, wine or vinegar.—*Riddell.* Ocymum Sanctum or Holy Basil, is the basil tuft so often seen about the temples of Hindus, where it.

——"waves
Its fragrant blossoms o'er their graves."

It has been so generally introduced in Tenasserim that is not less common in the neighbourhood of Caren houses.—*Mason.*

(5729) OCYMUM VILLOSUM. Woolly Basil.

Sufail, Toolsee, Hind. | Toolasi, Tam.

Cultivated in gardens and near temples.—*Genl. Med. Top. p.* 199. An aromatic herb, leaves used for seasonings, of easy cultivation. In all Courts of Justice, the Hindoos are sworn by these leaves, which are placed on the palm of the hand by a Bramin, who repeats the prescribed oath, and at the termination, they are masticated and swallowed. A good number of the species of this genus are used in cookery.—*Jaffrey.*

(5730) OCYPODIDÆ or OCYPODIANS (Milne-Edwards), a tribe of Brachyurous *Crustacea*, placed by Mr. Milne-Edwards between his Pinnotherians and Gonoplacians. The Ocypodians, as their name implies, are very swift runners, living nearly always on the strand, where they dig holes for themselves. M. Milne-Edwards, who remarks that this small and very natural group is closely allied to the genera *Doto* and *Myctoris* among the Pinnotherians, thus divides the tribe :—

Tribe of Ocypodians.	Cornea transparent, very large, ovail, occupying at least the half of the length of the ocular peduncles, and commencing very near the base of those stems.	Ocypoda.
	Cornea transparent very small, rounded, not occupying the fourth part of the length of the ocular peduncle, and only commencing close to its extremity.	Gelasimus.

Ocypoda (Fabricius). Carapace rhomboidal or even nearly square, as large behind as before. So rapid are the *Ocypodæ* in their motions that those who have observed these animals in their native haunts declare that they run so fast that a man can hardly overtake them. They hollow out holes for themselves in the sand of the sea-bank, and remain shut up in their burrows throughout the winter. They are found in warm climates of both hemispheres. M. Milne-Edwards records seven recent species.

Oils are generally divided into two primary groups, "Fixed" and "Volatile," the former class being again subdivided into drying, greasy, and solid oils. The value of oil as an article of commerce and its numerous uses in candle and soap-making, wool-dressing, food and medicine, as well as its importance as a lubricating agent, are well known. The following table compiled from the official reports of the Madras Custom House will show the quantity and value of all the oils exported from the Presidency.

	1852-53.		1851-52.		1850-51.	
	Quantity.	Value. Rs.	Quantity.	Value. Rs.	Quantity.	Value Rs.
	Cwt. 1,51,528	5,50,928	Cwt. 1,28,619	5,05,316	Cwt. 11,216	4,31,006
	Gl. 14,57,741	3,18,655	Gl. 6,56,037	2,11,669	Gl. 56,119	1,44,939
	Cwt. 2,51,613	5,31,864	Cwt. 1,09,414	3,02,559	Cwt. 7,779	4,37,185
	Gl. 72,967	43,606	Gl. 46,196	26,732	Gl. 262	48,605
	Cwt. 73,215	54,225	Cwt. 6,125	9,993	Cwt. 911	12,347
	Gl. 51,054	20,927	Gl. 24,475	11,979	Gl. 95	13,386
	.....	.....	.....	.....	.....	1,728
	Gl. 57,207	23,605	Gl. 31,027	14,760	Gl. 52,840	.....
	Gl. 2,57,217	71,766	Gl. 77,340	22,157	Gl. 2,717	.....
	Gl. 3,111	1,701	Gl. 1,917	1,048	.....	.....
	.....	.....	.....	.....	.....	.....
	Cwt. 860	1,167	.....	.....	.....	.....
	Cwt. 30	1,701	Cwt. 33	1,57[illegible]	.....	.....
	Cwt. 96	50,057	Cwt. 93	45,75[illegible]	.....	.....
	Cwt. 8,090	7,613	Cwt. 4,498	3,62[illegible]	.....	.....
	Cwt. 1,451	5,322	Cwt. 1,078	3,85[illegible]	.....	.....
	Cwt. 16,075	34,018	Cwt. 3,836	9,31[illegible]	.....	.....
	Gl. 8,059	7,818	Gl. 12,600	15,60	.....	.....
	Cwt. 2,764	4,247	.....	.....	.....	.....
	Cwt. 1,106	3,275	Cwt. 1,067	2,92[illegible]	.....	.....
	.....	.....	.....	.....	.....	.....
	.....	.....	.....	1,71[illegible]	.....	.....

from the Madras Territories to the United Kingdom, 7—46 to 1852—53.

Maldive Islands, Mauritius, New South [illegible] and the Straits, Travancore.

[illegible] acid, [illegible] glycerine pro- [illegible] *acroleine*. These [illegible], with the nature of the oil.

[illegible] passing the vapour of fats or oils slowly through a red-hot tube similar effects are produced together with a considerable quantity of hydrocarbons in a liquid, vaporous and gaseous form. Oil-gas is produced by a similar action. What is called *oil of brick* or *philosopher's oil* is prepared by soaking bricks in oil and distilling the oil from them at a red heat in an iron alembic. The recently expressed fixed oils are not much affected by the oxygen of the air: but by continued exposure to light and air, they absorb oxygen rapidly, and give out carbonic acid and hydrogen;—this action may even be so energetic as to produce ignition, especially when the oil exposes innumerable points to the oxygen: as when it is absorbed by porous substances, cotton, tow and cloths used in lubricating machinery, and then thrown into a corner in a heap. There can be no doubt that steamboats, factories, and other places have been set on fire in this way. What are called *drying oils*, such as nut-oil, poppyseed oil, linseed and some others, seem to undergo this kind of oxidation: when exposed in thin layers to the air they dry into a kind of resinous varnish, a process which is greatly accelerated by the addition of a very small quantity of oxide of lead. The *greasy oils*, on the contrary, do not dry, but become rancid by a similar exposure. The purity of the fixed oils may be determined approximatively, and the admixture of cheaper oils detected, 1, by observing the peculiar odour of the oil when gently heated by a spirit lamp in a small porcelain or platinum capsule. The odour evolved will resemble that of the plant or animal from which it was obtained. In this way linseed oil, whale oil, train oil, or rape oil may be detected

[illegible] the
[illegible] fats
[illegible] rogen
[illegible] aute por-
[illegible] adhering impuri-
[illegible] table shows the relative
[illegible] ons of the three elements in 100 parts
of each of the oils named:—

	Carbon	Hydrogen.	Oxygen.
Olive	77·21	13·36	9·43
Almond	77·40	11·48	10·82
Linseed	76·01	11·35	12·62
Nut	79·77	10·57	9·12
Castor	74·17	11·03	14·78
Whale	76·13	12·40	11·50
[illegible]	78·91	10·97	10·12
[illegible]	79·93	11·14	9·75
[illegible]	[illegible]	11·70	9·30
[illegible]	[illegible]	17·60	16·80

Fats and oil are colourless or of a slight yellow tint: they may be bleached by prolonged exposure to light: they are mostly without smell or taste, but the presence of certain volatile acids imparts peculiar odours to some of them; thus butter contains *butyric* and other *acids*; goat's fat *hircic acid*; whale oil *phocenic acid*, &c. The specific gravity of fats is less than that of water; but it varies greatly with their temperature. Thus common hog's lard at 60°, has a sp. gr. of 0·938: at 122° or in a fluid state, it is 0.892; at 152° it is 0·881, and at 200° it is 0·863.

Gelasimus—Carapace much wider than that of *Ocypoda*, more convex, and much narrower backwards. Stomachal region very small, and genital region generally very large. It inhabits the warm countries in both hemispheres. The *Gelasimi* live in holes near the edge of the sea, in pairs, and the great claw of the males is used to stop the entrance of the hole. The species are numerous.

G. Mariomis. Length about 8 lines; width about an inch, French. It is a native of Manilla.

(5731) ODAY OIL, of Cochin, is extracted from a creeper of that name and given to cattle when much worked. It sells at 8 annas a quart. It was sent to the Exhibition of 1851.

(5732) ODINA PUMATA.

Woodiah wood, ENG.	Æaythya marum, TAM. —*M. C. C.*

(5733) ODINA WOODIAR. Terebinthaceæ, Icon. 60.

Awny curry wood, ENG	Juvula, SANS.
Annai karai marum, Oaddy marum, TAM.	Jawul, BENG.
Goompana kurra, TEL.	Kushmulla kimul, Ajasringha, HIND

A very large tree, a native of most mountainous parts of the coast, it is also frequently found in a cultivated state, it grows readily from cuttings which appears the chief motive for employing it, for it is without leaves from the beginning of the year till May or June, and yields no shade in the months when most required. The wood of old trees is close grained of a deep reddish Mahogany colour towards the centre, the coloured part is useful for many purposes. The wood is difficult to season, but when well seasoned, the central reddish portion is useful for many purposes.—*Rhode, M. S. S.* Wight No. 5. From wounds in the bark there issues a gum which when dry is much like pieces of dry glue, but I know of no use it is put to.—*Roxb.* At Maulmain this species of Odina is quite common, and produces a valuable wood. It is called also ooday and generally supposed a very useless tree. The wood is very difficult to season, requiring to be kept, even in planks 2 or 3 years, but once well seasoned it is a close grained beautiful wood well adapted for cabinet making purposes. The gum resin which exudes from the bark, in upper India is called *Jingum* and *Kineh ke-goond.* Dr. Ainslie gives the latter as the synonyme of galbanum.—*O'Shaughnessy, page* 276. Odina Wodier bark is full of fibrous material.

(5734) ODRE, the Tamil name of a Ceylon tree which grows to fourteen inches in diameter, and ten feet in height. It is used by the native carpenters for palanquins and coach work.

(5735) ŒNOTHERA, a genus of Plants belonging to the natural order *Onagrariæ*, or *Onagraceæ*. It has a 4-cleft calyx; 4 petals; a filiform style, with a clavate or cruciform stigma; linear capsules of 4 cells, with 4 valves; and numerous seeds.—*Eng. Cyc.*

(5736) ŒNOTHERA ACAULIS. Evening Primrose. The yellow and white flowering kinds are easily cultivated by seed, in any good garden soil, and will continue during the hot weather to blossom.—*Riddell.*

(5737) ŒNOTHERA BIENNIS, Evening Primrose, has ovate-lanceolate flat toothed leaves; a rough hairy stem; petals longer than the stamens, and about half as long as the tube of the calyx; the flowers are large, numerous, and of a bright yellow-colour. It abounds on the Lancashire coast, and covers several acres of ground near Woodbridge, Suffolk. The roots are eatable, and were formerly taken after dinner to flavour wine, as olives now are; therefore the generic name was changed from *Onagra*, the Ass-Food, to *Œnothera*, the Wine-Trap. This plant was once cultivated for the sake of its tubers, which might in some measure have stood instead of the potato, had they not been superseded by the introduction of the latter. This is the only British species of the genus. There are 85 species enumerated by Don, growing chiefly in North America. They are handsome border-flowers, and deserve to be cultivated, but are not valuable on account of any properties they possess. —*Eng. Cyc.* There are between 70 and 80 species and varieties of this genus, raised from seeds, cuttings, and layers during the rains, will grow in any good garden soil, succeeds best in flower beds, requires plenty of water during the hot months —*Jaffrey.*

(5738) OETHRA (Leach), a genus of Brachyurous *Crustacea*, placed by M. Milne-Edwards as the representive of his first division (Canceriens Cryptopodes) of his tribe Cancerians; and indeed his Cryptopod Cancerians are composed of this genus solely. It is found in East Indian and African Seas.

Oethra seruposa may be taken as an example. Its length is 2 to 3 inches. Colour grayish. It is found near the Island of Mauritius, and in the Indian Archipelago.—*Eng. Cyc.*

(5739) OGECERAS MAJUS.

Hulsi, BENG.

A small tree, a native of the Delta of the Ganges, and such other places as are overflowed at spring tides. Flowering time the hot season.

(5740) OIL.

Huile, FR.	Roghun, PERS.
Oel, GER.	Maslo, RUS.
Teil, GUZ. HIND.	Aciete, SP.
Olie, IT.	Yennai, TAL.
Oleum, LAT.	Noona. TEL.

This term is applied to designate a number of unctuous liquids, expressed or distilled from certain vegetable and animal matters. The oils which form the chief exports from different parts of India to England, France, the Mauritius, &c., are Cocoanut, Jingelly or Sweet Oil, Ground nut, Mustard, Rape, Sandalwood, Roosa or Grass Oil, and Fish Oil.—*Faulkner.*

Oils are generally divided into two primary groups, "Fixed" and "Volatile," the former class being again subdivided into drying, greasy, and solid oils. The value of oil as an article of commerce and its numerous uses in candle and soap-making, wool-dressing, food and medicine, as well as its importance as a lubricating agent, are well known. The following table compiled from the official reports of the Madras Custom House will show the quantity and value of all the oils exported from the Presidency.

Comparative Statement of the Gross Quantity of Oils and Oilseeds Exported from the Madras Territories to the United Kingdom, Foreign Ports and Home Ports, for the years 1847—48 *to* 1852—53.

NAMES.	1847-48.			1848-49.			1849-50.			1850-51.			1851-52.			1852-53.		
	Quantity.		Value. Rs.	Quantity.		Value Rs	Quantity.		Value. Rs	Quantity.		Value Rs.	Quantity.		Value. Rs.	Quantity.		Value. Rs.
Cocoanuts, dry	Cwt.	74.061	2.90.393	Cwt.	1.52.042	5.60,76	Cwt.	1.32.219	5.45.876	Cwt	1.11.216	4.31 008	Cwt,	1.28.819	5,05,316	Cwt.	1,51.528	5.30.928
Cocoanut oil	Gl.	5.67.801	1.26.476	Gl.	6.26 425	1.64.20	Gl.	10.97.080	2.46.335	Gl.	6.56.118	1.44 952	Gl.	9.56.937	2.11 669	Gl.	14.57.741	3.18.655
Gingeley seed	Qr.	17.518	1.60.134	Qr.	8.594	1 02.72	Cwt.	1.41.125	2 99.41	Cwt.	2.27.779	4.37.185	Cwt.	1.09.414	3.02.559	Cwt.	2.51.613	5.31.864
Gingeley oil	Gl.	19.520	14,766	Gl.	14.686	11 53	Gl.	52.721	36.29	Gl.	77.262	48.605	Gl.	46.196	26,722	Gl.	72.667	43.606
Lamp oil seeds	Qr.	1.876	13.736	Qr.	3.921	27.38	Cwt.	1 10 076	53.87	Cwt.	6.011	12.347	Cwt.	6.125	9.993	Cwt.	73 215	54 228
Lamp oil	Gl.	26.379	12.637	Gl.	17.157	9.48	Gl.	20.181	10.57	Gl.	26 093	13.386	Gl.	24.475	11.979	Gl.	51.084	20.92
Ground nuts	Cwt.	939	6.313							Cwt.	795	1.728						
Ground nut oil				Gl.	37.204	17 43	Gl.	1.07.731	50.499	Gl	1 10.566	52 840	Gl	31.027	14 760	Gl.	57 207	23.603
Fish oil	Gl.	3 512	2.786							Gl.	39.489	12.717	Gl.	77.240	22.157	Gl.	2.57.217	71.769
Margosa oil	Gl.	1.587	1.240										Gl.	1.917	1.048	Gl.	3.111	1.70
Pinnacottay oil	Gl.	3.871	2.116															
Pinnacottay seeds	Cwt.	508	1.353													Cwt	860	1.167
Cassia oil	Gl.	794	2 121	Cwt.	50	2.24	Gl.	718	2.05	Gl.	1 000	3.053	Cwt.	33	1.57	Cwt.	30	1.701
Sandal wood oil	Cwt.	39	25.619	Cwt.	61	38.995	Cwt.	93	45 01	Cwt.	141	38.215	Cwt.	93	45.75	Cwt.	96	50.05
Cotton seed	Cwt.	2,458	2.751	Cwt.	5.141	4.581				Cwt.	4.143	3.540	Cwt,	4 498	3.62	Cwt.	8.090	7.613
Fœnugreek	Cwt.	301	1.079	Cwt.	1.191	3.83	Cwt.	1.567	5.62	Cwt.	591	2.136	Cwt.	1.078	3.85	Cwt.	1.451	5.322
Mustard seed	Cwt.	5.828	11.009	Cwt.	6.767	14,953	Cwt.	9.435	25.559	Cwt.	9.909	22,09	Cwt.	3.636	9.31	Cwt.	16.075	34 048
Castor oil							Gl.	8.670	26.969	Gl.	15.971	25,132	Gl.	12.600	15.69	Gl.	8,059	7.818
Castor seeds				Cwt.	5.168	8.790				Cwt.	14.617	24.09				Cwt.	2.764	4.247
Linseed				Cwt.	1.256	3.897	Cwt.	401	1.539	Cwt.	801	2.271	Cwt.	1 067	2.92	Cwt.	1.106	3.275
Linseed oil																		
Fennel seed										Cwt.	122	1 09	Cwt,	191	1.712			

In addition to the above, about 300,000 lbs. of Wax and Wax Candles, are yearly exported.

These exports are sent to the United Kingdom, America, Arabia, Persian Gulf, Cape of Good Hope, Ceylon, China, France, Maldive Islands, Mauritius, New South Wales, Pegu, West Coast of Sumatra, West Indies, Bengal, Bombay, Concan, Cutch, Goa, Guzerat, French (Indian) Ports, Scinde, Malacca and the Straits, Travancore.

OILS.

Oils are substances of organic origin, and are found in both the animal and vegetable kingdoms. They are divided into Fixed and Volatile. The latter are principally products of the vegetable kingdom. The Fixed Oils are composed of carbon, hydrogen, and oxygen. Their general formula is C_{11}, H_{10}, O. They are liquid or solid according to the manner in which their elements are disposed. Most of them are composed of two compounds, a liquid called Olein, and a solid called Margarin, or another called Stearin. According as these solid substances abound in oils, they are liquid or solid at the ordinary temperatures of our atmosphere. Fixed Oil is found in the fat or adipose tissue of animals. Fixed Oil is found amongst plants principally in their seeds. In some cases as in the Olive [OLEA] it is yielded by the fruit. Some families of plants especially abound in oil. Thus among the *Cruciferæ* we have Mustard, Rape, and Colza seed oil, with other species cultivated in Europe, India, and Japan, of which some have of late years been imported into England. Several of the family of *Compositæ* secrete oil in qantities large enough to render it desirable to cultivate them for this purpose alone, as the sunflower and Jerusalem artichoke, also some species of *Carthamus*, or Bastard Saffron, and also the *Verbesina sativa* of India, now known to be identical with the Abyssinian *Guzotia oleifera*, and of which the oil is known in commerce by the name of hutsyelloo oil. So *Madia sativa* yields madi oil, and its seeds are said to be more abundant in oil than any plant introduced into Europe. Most of the *Cucurbitaceæ* also, as the Melon, Gourd, Cucumber, and the numerous varieties, cultivated especially in India, contain a large proportion of oil, which is expressed in the East, as it formerly was in Europe. The *Rosaceæ* also store up a large proportion of oil in the kernels of their fruit, as in the Almond, which is particularly valued: so also that of the Apricot, as well as that of the Briancon Apricot, and other species of *Prunus*. In the Himalayas, oil is also expressed from the Apricot kernel, and has been sent to this country of a fine quality. Among the *Amentaceæ* we have also several species which yield oil of good quality, and in sufficient quantity, to repay the expense of expression, as Nut oil, obtained from the Hazel; Beech-Nut oil, from *Fagus sylvatica*; with these may be mentioned Walnut oil, from *Juglans regia*. Besides these, Poppy oil, Ben-Nut oil (*Hyperanthera*), Ground-nut oil (*Arachis*), Physic-nut oil (*Jatropha*), are well known. So the cotton-seed yields oil, which is also the case with the seeds of the tea-plants, especially of the species called *Thea oleifera* and some of the Camellias. Two species of *Bassia*, *B. longifolia* and *B. latifolia*, both yield oil; another species, *B. butyracea*, yields a vegetable butter, and is commonly known as the Ghee, or Butter-Tree of Almora. [BASSIA]. The native name of this tree is Choonee, and Mr. Traill describes it as not being found in Kemaon, but in the adjoining Goorkha province of Dotee.—*Eng. Cyc.* Few cultivators says Simmonds are probably aware of the great importance of oil to Britain, and the number of purposes for which it is employed in the arts and manufactures. It is extensively used for candle and soap making, for burning in lamps, for diminishing friction in machinery of all kinds, and especially for locomotives,—in wool-dressing, in the manufacture of paints and varnishes as an article of food, for medicinal purposes, &c. So important are vegetable oils deemed that the Society of Arts, in its prize list for 1851, offered gold medals for the importation or introduction into this country of any new plants or trees from China, India, or elsewhere, producing oils or fatty substances, such as can be used as food, or are applicable to manufacturing purposes; and also to the person who shall manufacture and import the finest specimen of oil, not less than ten gallons, the produce of olives grown in any British colony in Africa or Australasia. The time of burning of equal quantities of the following oils has been found to be—

	Hours.		Hours.
Oil of poppy.	14	Gold of pleasure (*Camelina sativa*)	9½
,, sunflower.	13	,, olives	9
,, rape	11	,, hemp seed	8
,, mustard	11½	,, tallow	10½
,, flax seed	10		

FOREIGN VEGETABLE OILS IMPORTED.

	1821.	1845.	1850.
	tuns.	tuns.	tuns.
Coco-nut oil	- -	2,148	98,040
Olive oil	1900	12315	20,783
Palm oil	3,200	25,285	448,589 cwts
Rape-seed oil	800	3,973	—
Linseed oil	10,500	38 634	- -
	16,400	82,355	
Fish oils	32 356	22,626	21,328

The total quantity of all kinds of wool annually consumed in England and Wales, in 1843, was estimated at 801,566 packs. Now five gallons of olive, rape-seed or other oils, being used in the preparation of every pack of wool for cloth (independent of the quantity used in soap, applicable to the woollen manufactures), it follows that five gallons in 801,566 packs are equal to 4,007,830 gallons, or 15,904 tuns and adding for olive or sperm oil used in machinery, 1-11th of the whole, 1,446 tuns, the total quantity consumed is 17,350 tuns. -(" Enderby on the South Whale Fishery.")—*Simmonds*. Oils and fats may be liquid or solid, but they are easily fusible, and when brought in contact

with paper they make a greasy mark, and render the paper translucent. The fixed oils occur both in vegetables and animals. In the former they occur chiefly in the cellular structure of the seeds, and are supposed by their oxidation or slow combustion to supply the heat necessary to germination. In animals they are deposited chiefly in the cellular membrane. The oils may be of very different consistence even in the same plant or animal: varying from a thin oil, such as almond or spermaceti oil, to solid lard or suet. The vegetable oils are usually obtained from the previously ground or bruised seed by pressure, in some cases assisted by heat. In animals the adipose cells are broken up on the application of heat by the liquefaction and expansion of the fat, which runs out or collects on the surface of the water in which it is. The constitution of fats is stated under CANDLE, to which we must refer. They are compounds of *stearic*, *margaric*, and *oleic* acids, with a base termed *glycerine*, and the *stearate*, the *margarate* and the *oleate* of glycerine are respectively termed *stearine*, *margarine*, and *elaine*. Fat depends for its consistence upon the proportions in which these substances occur: in the solid fats stearine or margarine prevails, and in the liquid oils elain. The ultimate analysis of fats and oils reduces them all to carbon, hydrogen and oxygen. Some of them yield minute portions of nitrogen, the result of adhering impurities. The following table shows the relative proportions of the three elements in 100 parts of each of the oils named:—

	Carbon	Hydrogen.	Oxygen
Olive	77·21	13·36	9·43
Almond	77·40	11·48	10·82
Linseed	76·01	11·35	12·62
Nut	79·77	10·57	9·12
Castor	71·17	11·03	14·78
Whale	76·13	12·49	11·50
Spermaceti	78·91	10·97	10·12
Hog's lard	79·09	11·14	9·75
Suet	78·99	11·70	9·30
Butter	65·60	17·60	16·80

Fats and oil are colourless or of a slight yellow tint: they may be bleached by prolonged exposure to light: they are mostly without smell or taste, but the presence of certain volatile acids imparts peculiar odours to some of them; thus butter contains *butyric* and other *acids*; goat's fat *hircic acid*; whale oil *phocenic acid*, *&c.* The specific gravity of fats is less than that of water; but it varies greatly with their temperature. Thus common hog's lard at 60°, has a sp. gr. of 0·938: at 122° or in a fluid state, it is 0.892; at 152° it is 0 881, and at 200° it is 0·863.

	At 53°.	At 75°.	At 122°.	At 200°.
Nut oil	0 928	0·919		0 871
Almond oil	0 920			0 863
Linseed oil	0 939	0·930	0·921	0·881
Castor oil	0·970	0 957		0 908
Olive oil	0 9 9	0·911	0·893	0 862

The oils may be raised to a high temperature without decomposition; but at certain temperatures they deepen in colour, exhale vapour, and between 500° and 600° undergo decomposition. Hence they cannot be distilled in the ordinary way without being decomposed. The oils cannot properly be said to have any *boiling points*, for when they appear to be in a state of ebullition their glycerine is undergoing decomposition; the fatty acids are either volatilized or form new volatile products; carburetted hydrogen and carbonic acid are evolved, and carbon is left behind. During the distillation the oleic acid is partly converted into sebacic acid, and the stearic into margaric acid, while the decomposition of the glycerine produces an acrid vapour termed *acroleine*. These effects vary, however, with the nature of the oil. On passing the vapour of fats or oils slowly through a red-hot tube similar effects are produced together with a considerable quantity of hydrocarbons in a liquid, vaporous and gaseous form. Oil-gas is produced by a similar action. What is called *oil of brick* or *philosopher's oil* is prepared by soaking bricks in oil and distilling the oil from them at a red heat in an iron alembic. The recently expressed fixed oils are not much affected by the oxygen of the air: but by continued exposure to light and air, they absorb oxygen rapidly, and give out carbonic acid and hydrogen; this action may even be so energetic as to produce ignition, especially where the oil exposes immunerable points to the oxygen: as when it is absorbed by porous substances, cotton, tow and cloths used in lubricating machinery, and then thrown into a corner in a heap. There can be no doubt that steamboats, factories, and other places have been set on fire in this way. What are called *drying oils*, such as nut-oil, poppyseed oil, linseed and some others, seem to undergo this kind of oxidation: when exposed in thin layers to the air they dry into a kind of resinous varnish, a process which is greatly accelerated by the addition of a very small quantity of oxide of lead. The *greasy oils*, on the contrary, do not dry, but become rancid by a similar exposure. The purity of the fixed oils may be determined approximatively, and the admixture of cheaper oils detected, 1, by observing the peculiar odour of the oil when gently heated by a spirit lamp in a small porcelain or platinum capsule. The odour evolved will resemble that of the plant or animal from which it was obtained. In this way linseed oil, whale oil, train oil, or rape oil may be detected

even when used to adulterate another oil. The test, however, is not always a safe one, for the odour of cold drawn oil may differ from the same oil expressed under the influence of heat. Olive oil has a different odour if grown at different places. 2. By mixing concentrated sulphuric acid with oil, (1 or 2 parts acid to 100 oil) the temperature rises and the mixture becomes coloured. If a plate of white glass be placed on a sheet of white paper, and 10 or 15 drops of oil be placed on the glass and a small drop of acid added, a colour will be produced which varies with the oil employed. With *rape oil* a greenish blue ring forms at a certain distance from the acid, while towards the centre light yellow-brown streaks may be observed. In *train oil*, from the whale or stock-fish, a peculiar motion begins at the centre and extends to the outside: a red colour appears and becomes more vivid: in 10 or 15 minutes the margin assumes a violet tinge which in 2 hours is uniform throughout. *Olive oil* instantly becomes pale yellow, and afterwards yellowish green. In *linseed oil* a beautiful dark brownish red web is formed, gradually changing into brownish black. *Tallow oil* or oleic acid becomes brown. "It seldom occurs that a better oil is used to adulterate an inferior one. Oil of almonds, olives, and codfish-oil, will, therefore, never be used for adulterating rape-oil, but probably train or perhaps linsed oil, and sometimes poppy oil. If we are led, therefore, by the odour to infer an adulteration,—for instance by train oil, which occurs the most frequently—it is only necessary to place from 10 to 15 drops of rape oil, the purity of which is undoubted, together with as much train oil, and an equal quantity of the oil whose purity is suspected, and to add to each of them a small drop of sulphuric acid. From the colour produced an inference may be drawn as to the purity of the oil, and by the difference of tinges from the vivid red of the train oil, and the bluish green of rape oil, the extent of adulteration may be detected." This plan is due to Mr. Heidenreich of Strasburg, and is quoted in full in Dr. Normandy's Commercial Hand-Book of Chemical Analysis, 1850, in which will be found a large amount of information respecting the methods of testing the purity of oils. The purity of oils may also be tested by referring to their densities, which are said not to vary in an appreciable manner if the same oil produced in different years. In Saxony an acrometer or *oleometer* is used, it indicates the specific gravity of oils in such a way that pure rape-seed oil is indicated by 17° to 18°, hemp oil by 30° to 31°. There are various other tests: that by the capillarimeter measures the quantity of oil which falls from a certain sized pear under given circumstances. When oil of almonds or pure olive oil is shaken in a phial its surface remains even; but if mixed with oil of poppies it becomes covered with small air bubbles. When olive oil is surrounded with pounded ice it becomes completely solidified, which is not the case if adulterated with oil of poppies. Olive oil is sometimes adulterated with honey, which may be detected by shaking the oil with hot water, which dissolves the honey, and the oil separates when left at rest. The presence of the fish oil in vegetable oils may be detected by passing through them chlorine, which turns them black. The following is a list of the principal unctuous oils of commerce:—

	Sp. Gr.
1. Linseed oil—*Linum usitatissimum et perenne.* Drying.....	0·9347
2. Nut oil—*Corylus avellana*, and *Juglans regia.* D.....	0·9260
3. Poppy oil—*Papaver somniferum.* D	0·9243
4. Hemp-seed oil—*Cannabis sativa.* D.	0·9279
5. Oil of sesamum—*Sesamum Orientale*, Greasy.....	
6. Olive oil—*Olea Europea.* G	0·9176
7. Almond oil—*Amygdalus communis*, G.....	0·9180
8. Oil of ben—*Guilandina moringa.* G.....	
9. Cucumber oil—*Cucurbita pepo et melapepo.* D.....	0·9231
10. Beech oil—*Fagus sylvatica.* G...	0·9225
11. Oil of mustard—*Sinapis nigra et arvensis.* G.....	0·9160
12. Oil of sunflower—*Helianthus annuus et perennis.* D.....	0·9231
13. Rape-seed oil—*Brassica napus et campestris.* G.....	0·9136
14. Castor oil—*Ricinus communis.* D.	0·9611
15. Tobacco-seed oil—*Nicotiana tabacum et rustica.* D.....	0·9232
16. Plum-kernel oil—*Prunus domestica* G.....	0·9127
17. Grape-seed oil—*Vitis vinifera.* D.	0·9262
18. Butter of cacao—*Theobroma cacao.* G.....	0·8920
19. Cocoa-nut oil—*Cocos nucifera.* G...	
20. Palm oil—*Cocos butyracea.* G.....	0·968
21. Laurel oil—*Laurus nobilis.* G.....	

	Sp. Gr.
22. Ground nut oil—*Arachis hypogæa.* G.	
23. Piney tallow—*Valeria Indica.* G..	0·926
24. Oil of Julienne—*Hesperis matronalis.* D....	0·9281
25. Oil of Camelina—*Myagrum sativa.* D.....	0·9252
26. Oil of weld-seed—*Reseda luteola.* D.	0·9328
27. Oil of garden cresses—*Lepidium sativum.* D.....	0·9240
28. Oil of deadly nightshade—*Atropa belladonna.* D.....	0·9250
29. Cotton-seed oil—*Gossypium Barbadense.* D.....	
30. Colza oil—*Brassica campestris; B. Oleifra* G.....	0·9136
31. Summer rapeseed oil—*Brassica præcox.* G.	0·9139
32. Oil of radish-seed—*Raphanus sativus oleifera.* G.	0·9187
33. Cherry-stone oil.—*Prunus cerasus.* G.	0·9239
34. Apple-seed oil.—*Pyrus malus.* G.	
35. Spindle-tree oil.—*Euonymus Europæus.* G.	0·9380
36. Cornel-berry-tree oil—*Cornus sanguinea.* G.	
37. Oil of the roots of cyper-grass—*Cyperus esculenta.* G.	0.0180
38. Henbane-seed oil—*Hyosciamus niger.* G.	0·9130
39. Horse-chestnut oil—*Æsculus hippocastanum.* G.	0·927
40. Pine top oil.—*Pinus abies.* D.....	0·928

The proportion of oil contained in seeds is often very considerable: linseed contains 20 per cent. of oil.; rape-seed from 35 to 40; castor oil seeds as much as 60 per cent. The oil is usually obtained by means of expression. In Europe, an oil-mill is used for the purpose; but it is desirable first to pass such hard seed as lint or rape between iron rollers, in order to crack the shells. These rollers are of cast-iron, turned truly in a lathe, and their spindles run in brass bushes fixed in an iron frame bolted to the frame work of the mill. These frames have mortises, in which the bushes for the rollers are placed and are adjusted by screws passing through the ends of the iron frames: this allows the rollers to be set at any distance apart, according to the size and hardness of the seed to be crushed. The rollers are sometimes of different sizes, so that different velocities may be given to their surfaces: this enables them to draw the seeds in, and to perform their work more quickly. One of the rollers has on its axis a small spur-weel, which engages a cog-wheel on the main shaft of the mill. Its motion by another pinion to the second roller. By giving to the roller pinions a dissimilar number of teeth, they may be made to revolve with different velocities, which answers the same purpose as making them of different sizes. Above the rollers is a hopper containing the seed, which runs out at an opening in the bottom into a trough or shoe, which is agitated by a piece of wood nailed to it resting on the cogwheel: the shoe thus feeds the rollers with a small quantity of seed at a time, and prevents them from being choked up. A plate of iron attached to the frame on each side presses by its edge against the lower part of the rollers, and scrapes off any adhering seed. The crushed seed falls upon an inclined board, and collects in a heap, from which it is removed to feed the running stones. The arrangement of the rollers resembles that of the crushing mill. The seed broken by the rollers is passed under two vertical mill-stones or *runners*, revolving on a horizontal bed, where it is further bruised and prepared for compressiou. In some places the rollers are not used, but the seed is at once subjected to the action of the runners. Hard and smooth grains are, however, liable to slip away from beneath the running stones, and thus require a much longer time to prepare them for the next process, that of compression. Rollers do their work rapidly, but they require great power to work them. When the seed is sufficiently bruised by either or both of these means, it is collected into hair bags and placed in what is called a *wedge-press* In olive-oil mills a screw-press may be used but the hardness and smoothness of the grains of lint and rape, and the cavities formed by the broken shell which retain the oil, require the exertion of a stronger force. The hair bags containing the crushed seeds are placed between wedges of wood contained within a strong framing. The wedges are then driven down by a heavy *ram* or pestle worked by machinery until the pestle rebounds from them 3 times, when they are judged to be sufficiently tight. The oil thus obtained is of the *best quality*, and is kept distinct from that obtained by the after process. The seeds come out of the bags in the form of flat cakes: these are broken up, and pounded in mortars with

heavy stampers, which reduce the parenchyma of the seed to a fine meal, so that the oil can escape more freely when subjected to a second compression, which is now aided by heat. The pounded seed or meal is heated to the temperature of melting bees'-wax in a pan, and is kept in agitation by a spatula worked by machinery The meal is again put into hair bags and compressed, and the resulting oil is considered to be the *best* of the *second* quality. Another compression produces oil of the *ordinary second quality*. During the heating of the meal a little water is sometimes added; but in Holland this practice is considered to be injurious. The cakes are still fat and soft, and are sold as food for cattle; but the Dutch break them down and stamp them again. The result is an impalpable paste, which is head with a very little water, and kept for some time at the temperature of boiling water, with diligent stirring. It is then subjected to the greatest pressure that has yet been applied, and the result is an oil of the *lowest* quality. The cake is dry and hard like a board, and is used for manure. Some of the small millers in Holland purchase oil-cakes from France and Flanders for the purpose of preparing this inferior oil. —*Tomlinson.*

Native Oil Mills.—The principal native oil mill of India, of which, however, there are some varieties, consists of a simple wooden mortar with revolving pestle. It is in common use; two oxen are harnessed to the geering, which depends from the extremity of the pestle,—a man sits on the top of the mortar, and throws in the seeds that may have got displaced. The mill grinds twice a day; a fresh man and team being employed on each occasion. When sesame oil is to be made, about seventy seers measure, or two and a half bushels of seeds are thrown in; to this ten seers, or two quarts and three-quarters of water, are gradually added; this on the continuance of the grinding, which lasts in all six hours, unites with the fibrous portion of the seeds, and forms a cake, which, when removed, leaves the oil clean and pure at the bottom of the mortar. From this it is taken out by a coco-nut shell cup, on the pestle being withdrawn. Other seed oils are described by Dr. Buchanan, as made almost entirely in the same way as from the sesamum. The exceptions are the castor oil, obtained from either the small or large varieties of *Ricinus*. This, at Seringapatam, is first parched in pots, containing something more than a seer each. It is then beaten in a mortar, and formed into balls; of these from four to sixteen seers are put in an earthenware pot and boiled with an equal quantity of water, for the space of five hours; frequent care being taken to stir the mixture to prevent it from burning. The oil now floats on the surface, and is skimmed off pure. The oil mill made use of at Bombay, and to the northward, at Surat, Cambay, Kurrachee, &c., differs a little from that just described, in having a very strong wooden frame round the mouth of the mortar; on this the man who keeps the seeds in order sits. In Scinde a camel is employed to drive the mill instead of bullocks. Castor oil seed is thrown into the mill like other seeds, as already described; when removed it requires to be boiled for an hour, and then strained through a cloth to free it from the fragments of the seed. It is a curious fact, and illustrative of the imperfect manner in which the oil is separated from the seeds, that while the common pressman only obtained some 26½ per cent, Boussingault, in his laboratory, from the same seeds, actually procured 41 per cent. When the oil cakes are meant for feeding stock, this loss is of little consequence, inasmuch as the oil serves a very good purpose, but when the cake is only intended to be used as a manure, it is a great loss, inasmuch as the oil is of little or no use in adding any food for crops to the soil.—*Simmonds.*

The volatile oils are very numerous in the Vegetable kingdom. They are called volatile on account of the ready manner in which they may be volatilised under the influence of heat. The facility with which they are diffused in the atmosphere renders them easy of detection, and it is to this class of substances that plants owe their peculiar odours. Many of them are employed in perfumery, others are used as stimulants in medicine, and some are poisons. Their composition is much more varied than that of the fixed oils, and to the chemist they offer an exceedingly interesting field of research. Many of them have a constitution analogous to the compounds obtained by chemists from the compound radicals. They are divided by chemists into three groups:—1, those containing only carbon and hydrogen, as oil of turpentine; 2, those containing also oxygen, as oil of cloves; 3, those containing sulphur, as oil of garlic. Many natural orders are characterised by yielding volatile oils. Thus the *Lamiaceæ*, *Myrtaceæ*, and others, embrace species all of which contain volatile oil in their leaves. Many of the *Umbelliferæ* yield a volatile oil in their fruits. The petals are often the seat of these secretions, and especially those most prized as the Rose, the Jasmine, the Heliotrope, and many others.—*Eng. Cyc.* Appended is a table of volatile oils employed in medical practice. They are almost all powerful stimulants and carminatives. A drop or two dissolved in a few minims of spirit, and an ounce of water added, gives an extemporaneous substitute for the distilled water of the plant, and a useful vehicle for many draughts or mixtures. These oils are often added in minute quantities to pill-masses, either to give an agreeable flavour, or counteract their tendency to griping.—*Beng. Phar. page* 379.

TABLE OF VOLATILE OILS.

Classical and English Name of Plant.	Native names.	Part used.	Colour of Oil.	Sp. Gr.	Uses and Remarks.
Pimpinella anisum, common anise, ...	.....	Fruits, ...	Yellow, ...	0.985	Carminative congeals at 50°.
Illicium anisatum, star anise, ...	Badian kutai. ...	Do., ...	Do., ...	Do.	Ditto.
Anthemis nobilis, chamomile, ...	Baboone, ...	Flowers, ...	Deep blue, ..	.....	Tonic, authelmintic.
Lavandula vera, lavender, ...	.....	Do , ...	Yellow, ...	0.877 to 0 905	Fragrant, stimulant.
Ruta graveolens, and other species, rue, ...	Sudab, ...	Do. and herb, ..	Do , ...	.....	Stimulant given in amenorrhœa.
Andropogan Iwaranchusa, ...	Roosa, ...	Grass,... ...	Do., ...	.....	Fragrant and stimulant.
Anethum graveolens, dill, ...					
—— Sowa, ...	Souf, ...	Fruits, ...	Do., ...	0.994	Stimulant in flatulence.
—— Panmori, ...					
Carum carui, carraway, ...	Zeera seeah, ...	Do., ...	Do., ...	.....	Ditto.
—— Nigrum, ...					
Eugenia Pimento, (allspice,)	.....	Do., ...	Do., ...	.....	
Amomum Zingeber, (ginger,)	Ada, ...	Root, ...	Do , ...	.....	Ditto.
Fœniculum officinale, (fennel,)	.....	Fruits, ...	.....	0.997	
Melaleuca cajeputi, (cajeput,)	Kyapooti, ...	Leaves, ...	Green, ...	0.927	
Juniperus communis, (juniper,)	Hoober, ...	Fruits, ...	Do., ...	0.878	Stimulant and diuretic.
Piper Cubeba, (Cubebs,)	Kubab chinee, ...	Do., ...	Yellow, ...	.....	Ditto.
Caryophyllus aromaticus, (clove,) ...	Long, ...	Unripe flowers dried.	Do., ...	1.055	Almost caustic.
Laurus cinnamomum, (cinnamon,)	Darchinee, ...	Bark, ...	Reddish yellow, ...	.....	Ditto.
Juniperus sabina, (savine,)	.....	Tops, ...	Yellow, ...	.....	In amenorrhœa.
Ocymum basilicum, (basil,)	Tulsi, ...	Herb,...	Do., ...	.....	
Rosmarinus officinalis, (rosemary,) ...	.....	Tops, ...	Do., ...	0.934	Carminative.
Moringa pterygosperma, (sohunjuna,) ..	Sohunjuna, ...	Roots,...	Do., ...	.....	Vesicatory.
Mentha piperita, (peppermint,)	.....	Herb, ...	Do., ...	0.920	Ditto, much used in cholera.
Mentha pulegium, (pennyroyal,)	.....	Do., ...	Do., ...	.....	Ditto, Stimulant.
Mentha viridis, (spearmint,)	Pudina, ...	Do., ...	Do., ...	.....	Ditto.
Amomum cardamomum, (cardamom,) ...	Elachee, ...	Fruits, ...	Do., ...	.....	
Origanum majorana, (marjoram,) ...	.....	Herb, ...	Do., ...	.....	Ditto.
Sassafras officinale,* (sassafras.)	.....	Bruised root, ...	Do., or colorless, ..	1.094	Fragrant and diuretic.

* A beautiful oil has been obtained from the Nipal sassafras.

Beng. Phar. p. 380.

Fixed oils are found in the cells and intercellular spaces of the fruit, leaves and other parts of plants. Some of these are drying oils, as linseed oil, from *Linum usitatissimum*; some are fat oils, as that from olives (fruit of *Olea sativa* or *Europæa*); whilst others are solid, as palm oil. The solid oils, butters or fats procured from plants have been described under the head. *Butter*, to which we refer, merely mentioning here that the chief are, butter of cacao, from *Theobroma cacao*; of cinnamon, from *Cinnamomum verum*; of nutmeg, from *Myristica moschata*; of cocoanut, from *Cocos nucifera*; of laurel, from *Laurus nobilis*; of palm oil, from *Elais guianiensis*; Shea butter, from *Bassia Parkii*; Galam butter, or Ghee, from *Bassia butyracea*; and vegetable tallow, from *Stillingia sebifera* in China, from *Vateria indica* in Canara and China, and from *Pentadesma butyracea* in Sierra Leone, and from the almond. These oils contain a large amount of stearine, and are used as substitutes for fat. Some of them are imported in large quantities, and enter into the composition of soap, candles, &c.—Castor oil, from the seeds of *Ricinus communis*, differs from other fixed oils in its composition. Decandolle states the following as the quantity of oil obtained from various seeds :—

	Per cent. in weight.
Hazel-nut, ...	60
Garden cress, ...	57
Olive, ...	50
Walnut, ...	50
Poppy (*Papaver somniferum*)	48
Almond, ...	46
Caper-spurge (*Euphorbia Lathyris*) ..	41
Colza (*Brassica oleracea*), ...	39
White mustard (*Sinapis alba*), ...	36
Tobacco, ...	34
Plum, ...	33
Woad	30
Hemp, ...	25
Flax, ...	22
Sunflower, ...	15
Buckwheat, ...	14
Grapes, ...	12

The following table, quoted from Boussingault, shows the results of some experiments made by M. Gauzac, of Dagny :—

	Seed produced per acre.			Oil obtained per acre in lbs.		Oil per cent.	Cake per cent.
	cwts	qrs.	lbs	lbs	ozs.		
Colewort	19	0	15	875	4	40	54
Rocket	15	1	8	320	8	18	73
Winter rape...	16	2	18	611	6	33	62
Swedish turnips	15	1	25	595	8	33	62
Curled colewort	16	2	18	641	6	38	62
Turnip cabbage	13	3	19	565	4	33	61
Gold of pleasure	17	1	16	545	8	27	72
Sunflower	15	3	14	275	0	15	80
Flax	15	1	25	385	0	22	69
White poppy	10	1	18	560	8	46	52
Hemp	7	3	21	229	0	25	70
Summer rape...	11	3	17	412	5	30	65

Simmonds. In estimating the value of an oil producing plant or tree, the other valuable products which it yields should not be lost sight of. The linseed in addition to its oil produces the scarcely less valuable flax, hemp yields a fibre and an intoxicating resin, safflower, a dye—pinnacotay, a soft inferior gum—poonga, a valuable timber—piney, a resin—gamboge tree, a valuable pigment—mahowa, a spirit distilled from the flowers, &c, &c., whilst in the case of the poppy, the oil is second in importance to the more valuable opium. An excellent epitome of the particular qualities, on which the value of an oil as an article of commerce depends will be found in the accompanying extracts of a letter from G. F. Wilson. Esq. to Sir William Hooker, Royal gardens, Kew : "Every oil, or grease, whether solid or liquid, if not poisonous or acrid, like croton oil, viscid and gummy, like castor oil, or drying, like linseed oil, must be worth in London at least £30 a ton. Among greases solid at above 60° Fahrenheit, the higher the melting point (other things equal), the greater the value; for example, the vegetable tallow of Borneo melting at about 90° Fahrenheit is worth at least £5 a ton more than the cocoanut oil of Ceylon melting at 70°. The effect of the soap duty having been taken off, may probably before long, materially change the relative values of greases; but at present, liquid oils, like the ground nut (*Arachis Hypogea*) are worth more than soft solid oils, like the Bassia butter of India, as they require less manufacturing to fit them for use, the liquid oil after a simple treatment in a cheap apparatus, being fit for burning in lamps, while the soft solid oils being neither hard enough for use in candles, or liquid enough for use in lamps, require to go through a press before they are saleable, except for soap-making. Greases may have particular advantages, such as being little acted upon by the air, and therefore not easily becoming rancid, but these good qualities, can only be ascertained by experiments which your correspondents had perhaps better leave to us." "We have been engaged in some experiments upon oils, for use in medicine, in which it seems provable they will take an im-

portant place; already one vegetable oil has been found to be almost as efficacious as cod liver oil, with the advantages of being less unpleasant and cheaper. On account of this new use, it might be well to collect small quantities of oils, even if they did not obey the conditions mentioned above. The value of oil must depend a little (especially when found in out of the way places) upon the way it is held in its matrix; for example. the oil of the Lumbang-nut (*Aleurites triloba*) can be separated with much less labour and simpler machinery than the cocoanut oil, which requires very great pressure to extract it from the copperah, or dried cocoanut kernel." "Waxes are worth more than greases, on account of their very high melting points; their relative values depend upon colour, transparency, and freedom from resinous matter. Resin may be easily detected by lighting a small piece of the wax; the more smoke, the greater proportion of resin, and therefore less value; the paler and more transparent the wax the better. The most valuable tree wax known, is the beautiful insect wax of China." "A simple way to try an oil nut is to crush it with a stone, and then squeeze it between the finger and thumb; if it contains any considerable quantity of greases, enough will be pressed out to judge of colour, hardness and sweetness; if the nut tastes oily, and yet oil does not come out by this treatment, it is well to dry the kernel before squeezing; and, in the case of nuts containing greases, solid at a high temperature, like that of the *Myristica Sebifera*, it is well also to heat the nut. Where a stearic candle can be got, and is burned down a little, until it has formed a cup, and then extinguished, into this a little of the material to be tried may be placed; after a moment's burning, the candle material with which the wick is saturated is burned out, the new material to be tried, in the cup takes its place, and becomes the material supplying the wick until the cup is emptied, and so can be judged of, or a piece of string dipped in the oil or melted grease makes a very tolerable wick; or simpler still, where the nut is very full of oil if lighted at one end, it will at least show what tendency to smoke there is, and the colour of the light." "Some of the resins ought to come in for candle making, though I believe that they have never been extensively used, except for the commonest sorts of candles, on account of their giving off so much smoke; but as some descriptions smoke less than others, there is a hope that new ones may be found smoking still less: these would then be very serviceable in candle making. The points connected with new greases, &c., that we should be most thankful for information upon, are, the manner of growth, probable expense of collecting, means of transport, and quantity likely to be obtained, with small specimens of the grease, if manufactured, and of the fruit, with both its husk and hard shell, where these exist."

Of vegetable substances of Southern Asia, producing "volatile oils" there is an immense variety, but with the exception of the oils of cassia and cinnamon, roosa and the rose utter, few are of any commercial importance, nor are they prepared in any quantity for consumption in India. Scented oils erroneously termed "volatile" obtained by the repeated distillation of fragrant herbs, &c., over into a receiver containing a portion of any fixed oil, to which the aroma is imparted, are prepared to some extent but chiefly for native use. Sandalwood oil and the large variety of utters, &c., which form the principal part of native perfumery are included in this class.—*M. E. J. R.* The subjoined list will serve to exhibit the richness of the produce of different seeds, of Southern Asia, from which varieties of oil are extracted; it gives the proportion of oil per cent. in weight:—

Black til, (*Verbesena sativa*), ...	46·4
Gingely oil (*Sesamum orientale*), ...	46·7
Ground nuts, *Arachis hypogæa*, ..	45·5
Pounded seeds obtained from the Ponnay-tree (*Calophyllum inophyllum*), a bitter lamp oil, ...	63·7
Karunj seeds, from the *Pongamia glabra*	26·7
Ram till, the seeds of *Guizotia oleifera*,	35
Poppy seeds (*Paparer somniferum*), ...	43 to 58
Silaam, an oil seed from Nepaul, ...	41
Rape seed (*Brassica napus*), ...	33

The foregoing are not all the seeds from which oil is extracted by the natives of Southern Asia. —*Simmonds.* The oil seeds most generally cultivated in India are the castor, gingely, rape, mustard, ground nut, ramtill, linseed, and poppy, but the latter is cultivated for its opium the seed forming a secondary consideration. The following plants grow in a wild state, their fruit being collected and the oil expressed as occasion requires; margosa, ben, brumadundoo, pinnacotty, soap-nut, kurunj, cashew-nut, poovana, piney, neradimootoo, physic-nut, cheeronjee, coorookoopilly, &c. &c. &c.—*Madras Exhibition Juries Reports.* Oil is, in Malay, *minah*, and in Javanese, *langa*, both of them words of extensive currency throughout the Malay and Philippine Archipelagos. The plants from which fatty oils are chiefly extracted are the coco-palm, the ground pea, the sesame, and the palma christi; the first for edible use, and the three last for the lamp. In the islands of the Molucca sea, a fine esculent oil is expressed from the nut of the kanari tree (Canarium commune). Crawfurd is not aware that oil is expressed in any of the islands from cruciform plants, nor is flax reared for this purpose. Animal oils are hardly used in any shape: essential oils are obtained from the clove, the nutmeg, the kayu-puti (Melaleuca cajeput) and in great abundance and cheapness from the Malay camphor-tree (Dryobalanops camphora). —*Crawfurd Dict. page* 307. One hundred and twenty fixed oils are known to be produced

hroughout the Madras Presidency and Burmah. These may be arranged as follows :

Fixed Vegetable oils, including drying, greasy and solid oils,	105
Wood oils,	10
Mineral oil,	1
Animal oils,	4
Total...	120

Of the first class, Coconut, Castor, Ground-nut, Gingely and its variety, Rape, Mustard and Linseed form considerable articles of foreign trade. The first three being exported in the shape of oil, the last two as oil seed, and Gingely, both as an oil and oil seed. In addition to these, the following are consumed to a large extent in India :—Lamp, Ramtill, Kurunj, Pinnacotay, Illoopoo, Piney or Doopada, Margosa or Neem, Physic nut, Brumadundoo, Safflower and Poppy. Of the remainder some are medicinal and some are prepared only in those localities, in which the substances producing them happen to abound in a wild state. The prices of these products vary very considerably, not only in different parts of the Presidency, but even in various towns of the same district. It is therefore difficult, if not altogether impracticable, to fix their respective values, with any degree of certainty ; an increased demand or greater facility of transit moreover considerably affect their present value —*M. E. J. R. Eng. Cyc.* The following list contains the names of the better known oils of Southern Asia.

Oil of sweet flag,	Acorus calamus.
Do. belgaum walnut,	Aleurites triloba.
Do. caju,	Anacardium occidentale.
Do khus-khus, or vetiver,	Anatherum muricatum.
Do. grass, or oil of spike-nard (roosa ka tel),	Andropogon calamus aromaticus.
Do of bishops weed seed,	Anethum sowa.
	Apricot Oil, Choohara and Zind Aloo-ke tel.
Do. ground nut,	Arachis hypogœa.
Do prickly poppy,	Argemone mexicana.
Butter of Ghee tree,	Bassia Butyracea
Do. mawa,	Bassia latifolia.
Do. illoopoo,	Bassia longifolia.
Do. kawan,	Bassia species.
Do. Shanghae,	Brassica chinensis.
Rape seed,	Brassica napus.
Do. pulas,	Butea frondosa,
	Cæsalpina oleosperma,
Do. poon seed,	Calophyllum inophyllum.
Oil hemp seed,	Cannabis sativa.
Do. koosum,	Carthamus tinctorius.
Do. of cloves,	Caryophyllus aromaticus.
Do of cummin,	Cuminum cyminum.
Do. malkungance, or staff tree,	Celastrus paniculata.
Do. cheeronjee,	Chirongia sapida.
Do. of cassia	Cinnamomum species.
Do. of cinnamon,	Cinnamomum zeylanicum.
Do. of lemons,	Citrus limonum.
Do cocoanut,	Cocos nucifera.
Do. of coriander,	Coriandrum sativum.
Do. cucumber seed,	Cucurbita pepo.
Do. melon seed,	Cucumis melo.
Do. pumpkin seed,	Cucurbita maxima.
Do. purging,	Curcas purgans.
Do wood	Dipterocarpus several spec
Agait or Napoota	Didynamia gymnosperma
Do. mijo,	Dolichos soja.
	Dolichos biflorus.
Do. of cardamom,	Ellettaria cardamomum.
Do. Japan,	Erysimum perfoliatum.
Do. of sweet fennel,	Fœniculum dulce.
Do. gamboge butter,	Garcinia pictoria.
	Garcinea purpurea.
Do. bondue nut,	Guilandina bonduc.
Do. ramtil,	Guizotia oleifera
Do. of Ben, Sohunjna,	Hyperanthera Moringa.
Sun flower,	Helianthus Annuus.
Do. glaucous leaved physic nut,	Iatropha glauca.
Do. of star anise,	Illicium anisatum
Do. of jessamine,	Jasminum, (var, sp.)
Do. Chinese,	Kin.
Do. linseed	Linum usitatissimum.
Do of cajeput,	Melaleuca cajuputi.
Do. neem,	Melia azaderach.
Do. of mint,	Mentha piperita.
Do. mimusops	Mimusops elengi.
Do. ben,	Moringa pterygosperma.
Do. nutmeg,	Myristica moschata.
Do. of tobacco,	Nicotiana tabacum.
Do. fennel flower,	Nigella sativa.
Do. of keora	Pandanus odoratissimus.
Do. poppy seed,	Papaver somniferum.
Do. anise,	Pimpinella anisum.
Do. of pepper,	Piper nigrum.
Do. putchapat,	Pogostemon patchouli.
Do kurrunj,	Pongamia glabra.
Do. of (Prinsepia Utilis),	Ricinus Communis.
	Salvadara persica.
Do. castor,	Santalum album.
Do. of sandalwood,	Sapindus emarginatus.
Do poonga,	Sarcostigma kleinii.
Do. of sassafras,	Sassafras officinale
Saul,	Shorea robusta.
Do. shaynecotay	Semecarpus anacardium.
Do. gingelly,	Sesamum indicum.
Do mustard	Sinapis alba.
Chinese tallow tree,	Stillingia sebifera.
Oil pea	Suchaw,
Mustard Oil, of kinds.	
Kalee Surson	
Surson.	
Tira,	Species of Sinapis, &c.
Toria and Kurwa,	
Race,	
Do. fetid sterculia,	Sterculis fœtida.
Do. nux vomica,	Strychnos nux vomica.
Do. wild almond	Terminalia catappa.
Do. portia nut,	Thespesia.
	Theobroma cacao.
Do. croton,	Tiglium officinale,
Do. vegetable tallow,	Vateris indica.
Kuttsella, Black till of Deccan, Kala til-ke-tel,	Verbesina Sativa.
	Vernonia anthelmintica.
	Xylocarpus gr natum. Sy
	Carapa moluccensis.

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In addition, there are cotton-seed oil used for their lamps, Castor oil and Argemone seed similarly used. Oil obtained from the fruit of *Melia azadirachta*, &c, for medicine and lamps Apricot oil in the Himalayas, sunflower oil, oi

of cucumber-seed for cooking and lamps, oil of colocynth seed, used as lamp oil. The seeds of bastard saffron (*Carthamus tinctorius*) yield oil. Mustard oil, the produce of various species of *Sinapis*, &c. Shanghae oil, from *Brassica chinensis*; Illiepie oil, from *Bassia longifolia*, which is used for frying cakes, &c., in Madras; and Mahwa oil, from another species of the same genus *Bassia latifolia*. Oil is expressed from the seeds of *Cæsalpina oleosperma*, a native of the East. The neem tree seeds afford a very clear or bitter oil, used for burning. Wood oil is a remarkable substance, obtained from several species of *Dipterocarpus*, by simply tapping the tree. The seeds of the *Argemone mexicana*, also contain a bland, nutritious, colorless, fixed oil. The mass from which the seed is expressed is found to be extremely nutritious to cattle. A solid oil, of a pale greenish color, a good deal resembling the oils of the Bassia in character, though rather harder, and approaching more in properties to myrtle wax, was shown at the Great Exhibition, from Singapore. It is supposed to be the produce of the tallow tree of Java, called locally "kawan," probably a species of Bassia. It is very easily bleached; indeed, by exposure to air and light, it becomes perfectly white; if not too costly, it promises to become a valuable oil. According to Mr. Low, there are several varieties of solid oil commonly used in the Islands of the Eastern Archipelago, and obtained from the seeds of different species of *Dipterocarpus*. Piney tallow is obtained from the fruit of the *Valeria indica*, a large and quick-growing tree, abundant in Malabar and Canara. It is a white solid oil, fusible at a temperature of 97 degrees, and makes excellent candles, especially when saponified and distilled in the manner now adopted with palm oil, &c. It has one great advantage over coco-nut oil that the candles made of it do not give out any suffocating acrid vapors when extinguished, as those made with the latter oil, do. An oil is produced from the inner shell of the cashew-nut *Anacardium occidentale* var. *indicum*, in the East. In Japan a kind of butter called *mijo*, is obtained from species of the Dalichos bean (*Dolichos soja*). The kernel of the seeds of the tallow tree of China, *Stillingia sebifera*, an evergreen shrub, contains an oil, which when expressed, consolidates through the cold to the consistence of tallow, and by boiling becomes as hard as bees' wax. The plant also yields a bland oil. A similar fatty product is obtained from a shrub in British Guiana, the *Myristica* (*Virola*) *sebifera*. Oil is obtained in South America from the sand box tree (*Hura crepitans*), and from the *Carapa guianensis*. The seeds of several plants of the cucumber family frequently supply a bland oil, which is used in the East as a lamp oil and for cooking. Among the vegetable oils imported into Ningpo, and other Chinese ports, from Shantong, Leatong, and Teisin, are oil of teuss, obtained from green and dried peas; black oil of the fruit of the tree *kin* (?) and oil from the pea of suchau. A pale brownish yellow oil is obtained from the seeds of *Carthamus tinctorius*, in Bombay, the seeds of which contain about 28 per cent. of oil. Excellent oil is expressed in various parts of India from the seeds of different species of *Sinapis*, especially from the black mustard seed. *S. glauca*, *S. dichotoma*, and *S. juncea* are extensively cultivated in the East for their oil. The *Erysimum perfoliatum* is cultivated in Japan for its oil seeds. A beautiful pale yellow oil is procured from the seeds of the angular-leaved physic nut. *Jatropha curcas*, a shrub which is often employed in the tropics as a fence for enclosures. It is used by the natives in medicine and as a lamp oil. About 700 tons of this oil was imported into Liverpool in 1850 from Lisbon, for the purpose of dressing cloth, burning, &c. An oil called Carab oil is also obtained in the East, from the almonds of *Xylocarpus granatum*, or *Carapa Moluccensis* of Lamarck, which is used by the natives to dress the hair and anoint the skin, so as to keep off insects. Cacao fat, the butter-like substance obtained from the seeds of *Theobroma cacao*, is esteemed as an emollient. The Agaiti, as it is called by the Portuguese, or napoota by the natives and Arabs (*Didynamia gymnosperma* ?), is much cultivated in all Eastern Africa for its oil, which is considered equal to that of olives, and fetches as high a price in the Indian market. The plant, which is as tall and rank as hemp, and equally productive, having numerous pods throughout the stems, is found everywhere in a wild as well as cultivated state. The "Cape Shipping Gazette," of August, 1850, says:—"The attention of the George Agricultural and Horticultural Society having been drawn to the fact that an excellent oil, equal to the olive oil of Italy, can be extracted from the kernel of the fruit known by the name of "T Kou Pijte" and "Pruim Besjee," they have offered a reward of £10 for the best sample, not less than a half sum of this oil—£15 if it shall be adjudged equal to the best oil of Italy. This fact is deserving of notice, as an instance of the advantages which are likely to result from the attention now being devoted to the natural productions of the colony." Cocum oil, or butter, is obtained from the seeds of a kind of Mangosteen (*Garcinia purpurea*), and used in various parts of India to adulterate ghee or butter. It is said to be exported to England for the purpose of mixing with bears' grease in the manufacture of pomatum. It is a white, or pale greenish yellow, solid oil, brittle, or rather friable, having a faint but not unpleasant smell, melting about 94 degrees, and when cooled after fusion remaining liquid to 75 degrees. An excellent solid oil, of a bright green color, is obtained from Bombay,

having a consistence intermediate between that of tallow and wax, fusible at about 95 degrees, and easily bleached; it has a peculiar and somewhat aromatic odour. There is some uncertainty as to the plant from which it is obtained. It was referred to the *Salvadora persica*, and to the *Vernonia Anthelmintica* a plant common in Guzerat and the Concan Ghats. A pale yellow clear oil is obtained from the seed of *Dolichos bifforus* (?). Oil is also expressed in India from the seed of the *Argemone mexicana*, which is used for lamps and in medicine; and from the seeds of the cashew nut (*Anacardium occidentale*), from *Sapindus emarginatus*, and the country walnut (*Aleurites triloba.*) The fruit of the *Chirongia sapida*, (or *Buchanania latifolia*,) yields oil. From the seeds of the *Pongamia glabra*, or *Galedupa arborea*, a honey brown and almost tasteless oil is procured, which is fluid at common temperatures, but gelatinises at 55 degrees. Other sources of oil are the *Celastrus paniculatus*, *Balanites Egyptiaca* and the saul tree (*Shorea Robusta*).

Cinnamon suet is extracted by boiling the fruit of the cinnamon. An oily fluid floats on the surface, which on cooling subsides to the bottom of the vessel, and hardens into a substance like mutton suet. The Singhalese make a kind of candles with it, and use it for culinary purposes. It emits a very pleasant aroma while burning. According to the analysis of Dr. Christison, it contains eight per cent. of a fluid not unlike olive oil; the remainder is a waxy principle.

Croton oil is obtained by expression from the seeds or nuts of *Croton Tiglium*, tree, 15 to 20 feet in height, belonging to the same order as the castor oil plant, producing whitish green flowers, and seeds resembling a tick in appearance, whence its generic name. It is a native of the East Indies. 160 parts of seeds afford about 64 of kernel. 50 quarters of croton nuts for expressing oil were imported into Liverpool from the Cape Verd Islands, in 1849.

The *Croton Tiglium* grows plentifully in Ceylon, and the oil, if properly expressed, might be made an article of trade. The best mode of preparing it is by grinding the seeds, placing the powder in bags, and pressing between plates of iron; allow the oil to stand for fifteen days, then filter. The residue of the expression is triturated with twice its weight of alcohol, and heated on the sand-bath from 120 to 140 degs. Fahrenheit, and the mixture, pressed again. In this step the utmost caution is necessary in avoiding the acrid fumes. One seer of seed furnishes by this process rather more than eleven fluid ounces of oil, six by the first step, and five by alcohol. The oil acts as an irritant purgative in the dose of one drop. In large doses it is a dangerous poison. When applied externally it produces pustules. In 1845, eight cases of croton oil and six cases of the seed were exported from Ceylon. Other species of Croton as *C. Pavana*, a native of Ava and the north-eastern parts of Bengal, and *C. Roxburghii* yield a purgative oil. The bark of *C. Eleuteria C. Cascarilla*, and other species is aromatic, and acts as a tonic and stimulant. It forms the cascarilla bark of commerce already spoken of. When bruised, it gives out a musky odour and is often used in pastilles. The oil obtained from the seeds of *Jatropha curcas*, a native of South America and Asia, is purgative and emetic, and analagous in its properties to croton oil. It is said to be a valuable external application in itch. In India it is used for lamps. *Oil of Ben*, known as Sohunjuna in Bengal, and Moringa in Malabar is obtained from the seed or nuts of the horse-radish tree, the *Moringa pterygosperma*, Burmann; the *Hyperanthera Moringa*, of Linnæus. This clear limpid oil having no perceptible smell, is much esteemed by watch-makers and perfumers; it is expensive and not often to be procured pure, consequently the oil would be a very profitable export. It grows rapidly and luxuriantly every where in Jamaica, particularly on the north side of the island—as well as in Trinidad and other quarters of the West. It is easily propagated either by cuttings from the tree (the branches) or by seeds, and bears the second year. The produce of each tree may be estimated at from one to two gallons. From the flowers a very pleasant perfume might be easily distilled. The following is the account of Dr. Hamilton. "It is a small tree, of about twenty feet in height, of most rapid growth, coming into flower within a few months after it has been sown, continuing to produce seeds and blossoms afterwards throughout the year. The tree is now naturalised in the West Indies. The timber is said to dye a fine blue, and the gum, which exudes from wounds in the bark, bears a strong resemblance to that obtained from the *Astragalus tragacantha*, for which it might, no doubt, be substituted. The numerous racemes of white blossoms with which the tree is constantly loaded, are succeeded by long triangular pods, somewhat torulose at the ends, and about two feet in length, when arrived at the full growth. These pods, while yet young and tender, are not unfrequently cooked and served up at the planter's tables like asparagus, for which they are not a bad substitute. The pods, when full grown contain about fifteen seeds; each considerably larger than a pea, with a membraneous covering expanding into three wings, whence the specific name of *pterygosperma*. On removing the winged envelope the seeds appear somewhat like pith balls; but upon dividing them with the nail, they are found to abound in a clear, colorless, tasteless, scentless oil, of which the proportion is so large that it may be expressed from good fresh seed by the simple pressure of the nail. Geoffry informs us, that he obtained 30½ ounces of oil from eight pounds of the decorticated seeds

being at the rate of very nearly 24 lbs. of oil from 100 lbs. of seed. Notwithstanding the great value of its oil, and the facility with which it can be obtained in the West Indies, the moringa has been hitherto valued there merely as an ornamental shrub, and cultivated for the sake of its young pods or the horseradish of its roots, as luxuries for the table. The oil is peculiarly valuable for the formation of ointments, from its capability of being kept for almost any length of time without entering into combination with oxygen. This property, together with the total absence of color, smell, and taste, peculiarly adapts it to the purposes of the perfumer, who is able to make it the medium for arresting the flight of those highly volatile particles of essential oil, which constitute the aroma of many of the most odoriferous flowers, and cannot be obtained by any other means, in a concentrated and permanent form. To effect this, the petals of the flowers, whose odor it is desired to obtain, are thinly spread over flakes of cotton wool saturated with this oil, and the whole enclosed in air-tight tin cases, where they are suffered to remain till they begin to wither, when they are replaced by fresh ones, and the process thus continued till the oil has absorbed as much as was desired of the aroma; it is then separated from the wool by pressure, and preserved under the name of *essence*, in well stopped bottles. By digesting the oil thus impregnated in alcohol, which does not take up the fixed oil, a solution of the aroma is effected in the spirit, and many odoriferous tinctures or waters, as they are somewhat inaccurately termed, prepared. By this process most delicious perfumes might be obtained from the flowers of the *Acacia tortuosa*, *Pancratium caribeum*, *Plumeria alba*, *Plumeria rubra*, and innumerable other flowers of the most exquisite fragrance, which abound within the tropics, blooming unregarded, and wasting their odours on the barren air." Three varieties of til are extensively cultivated throughout India, for the sake of the fine oil expressed from their seeds, the white seeded variety, the parti-colored, and the black. It is from the latter that the sesamum or gingelly oil of Commerce is obtained Sesamum seed contains about 45 per cent. of oil. Good samples of the oil were shown at the Great Exhibition from Vizianagram, Ganjam, Hydrabad, Tanjore, the district of Moorshedabad, and Gwalior. The gingelly seed is stated to be worth about £4 per ton in the North Circars. An oil resembling that of sesamum is obtained from the seed of *Guizotea oleifera* or *Abyssinica*, a plant introduced from Abyssinia, and common in Bengal. The ram til, or valisaloo seeds, yield about 44 per cent of oil. The oil is generally used for burning, and is worth locally about 10d. per gallon. BLACK TIL (*Verbesena sativa*) is known as kutsela or kala til, in the Deccan. It is chiefly cultivated in Mysore and the western districts of Peninsular India, as well as in the Bombay presidency. About Seringapatam, as soon as the millet crop has been reaped the field is ploughed four times, and the seed sown, a gallon per acre, during the month of July or August, after the first heavy rain. No manure or weeding is required, for the crop will grow on the worst soils. It is reaped in three months, being cut close to the ground, and stacked for a week. After exposure to the sun for two or three days, the seed is beaten out with a stick. The crop in Mysore rarely yields two bushels per acre, but about Poonah the produce is much larger. The seed is sometimes parched and made into sweetmeats, but is usually grown for its oil. This is used in cooking, but it is not so abundant in the seed, nor so good as that of the sesame. Bullocks will not eat the stems unless pressed by hunger. About 5,000 maunds are exported annually from Calcutta. 3,730 bags were imported into Liverpool in 1851. The price per quarter of eight bushels, in January, 1853, was from 30s. to £2; of teel oil, in tins, weighing 60 to 100 pounds, £2 to £2 4s. Bombay linseed was worth £2 11s. to £2 12s. the quarter of eight bushels, in January, 1853. Bengal ditto 2s. less. The imports into Liverpool were 68,468 bags and 54,834 packets in 1851, and 14,490 bags and 33,700 packets in 1853. About 9,000 bags of mustard seed and from 18,000 to 20,000 bags of rape seed are also imported thence. The price of the latter is about £2 the quarter.

Coco-nut oil.—The chief oil made on the sea board of India, is that yielded by the coco-nut palm. The nut having been stripped of the husk or coir, the shell is broken, and the fatty lining enclosing the milk is taken out. This is called cobri, copra, or copperah in different localities. Three maunds, or ninety pounds of copperah, are thrown into the mill with about three gallons of water and from this is produced three maunds, or seven and three-quarter gallons of oil. The copperah in its unprepared state is sold, slightly dried in the market. It is burned in iron cribs or grates, on the top of poles as torches, in processions, and as means of illumination for work performed in the open air at night. No press or other contrivance is made use of by the natives in India for squeezing out or expressing the oil from the cake, and a large amount of waste, in consequence of this necessarily ensues. *Bombay Times, June* 5, 1850. See COCOS.

Apricot oil.— Oil of the finest kind, is made in India by expression from the kernels of the apricot. It is clear, of a pale yellow color, and smells strongly of hydrocyanic acid, of which it contains, usually, about 4 per cent.

Sun flower oil.—"On inquiring into the use

made of the sunflower, we were given to understand that it is raised in Tartary chiefly for the oil expressed from it. But it is also of use for many other purposes. In the market places of the larger towns we often found the people eating the seeds, which, when boiled in water, taste not unlike the boiled Indian corn eaten by the Turks. In some districts of Russia the seeds are employed with great success in fattening poultry; they are also said to increase the number of eggs more than any other kind of grain. Pheasants and partridges eat them with great avidity, and they cause the same effects on them as other birds. The dried leaves are given to cattle in place of straw; and the withered stalks are said to produce a considerable quantity of alkali."—*Bremner's Interior of Russia.* 658 barrels linseed oil were brought down to New Orleans from the interior in 1849, and 1009 in 1848.

Linseed oil.—During the period of the Great Exhibition special enquiry was made by many manufacturers as to the different oils of Southern India, suitable for supplying the place of animal fat in the manufacture of candles, and generally adapted for various other purposes. Enquiries should be directed to the specific gravity, the boiling point, the per centage of pure oil in the seeds, and the means of obtaining a regular supply. The demand for vegetable oil in European commerce has been steadily on the increase for several years past, and the quantities consumed, are now so large that the oleaginous products of India and the colonies must sooner or later have a considerable commercial importance, from the value which they are likely to acquire.

Margosa, or Neem Oil.—From the pericarp or fleshy part of the fruit of the *Melia azaderachta*, and of the Azaderachta indica the well known Margosa oil is prepared; which is cheap and easily procurable. Dr. Maxwell, when garrison surgeon of Trichinopoly, stated that he has found this oil equally efficacious to cod-liver oil in cases of consumption and scrofula. He began with half-ounce doses, morning and evening, which were gradually reduced.

Bassia oils.—The seeds of three species of Bassia, indigenous to India, yield solid oils, and are remarkable for the fact, that they supply at the same time saccharine matter, spirit, and oil, fit for both food and burning in lamps.

a. The *Illepe* (*B. longifolia*) is a tree abundant in the Madras Presidency, the southern parts of Hindostan generally, and the northern province of Ceylon. In Ceylon the inhabitants use the oil in cooking and for lamps. The oil cake is rubbed on the body as soap, and seems admirably adapted for removing the unctuosity of the skin caused by excessive perspiration, and for rendering it soft pliable, and glossy, which is so conducive to health in a tropical climate. The oil is white and solid at common temperatures, fusing at from 70 to 80 degrees. It may be advantageously employed in the manufacture of both candles and soap; in Ceylon and some parts of India this oil forms the chief ingredient in the manufacture of soap.

b. Mahwa (*B. latifolia*) is common in most parts of the Bengal Presidency. The oil a good deal resembles that last described, obtained from the Illepe seeds; and may be used for similar purposes. It is solid at common temperatures, and begins to melt at about 70 degrees.

c. Vegetable butter is obtained from the Choorie (*B. butyracea*). This Bassia though far less generally abundant than the other two species, is common in certain of the hilly districts, especially in the eastern parts of Kumaon; in the province of Dotee it is so abundant that the oil is cheaper than ghee, or fluid butter, and is used to adulterate. It is likewise commonly burnt in lamps, for which purpose it is preferred to coco-nut oil. It is a white solid fat, fusible at about 120 degrees, and exhibits very little tendency to become rancid when kept.

d. Shea, or galam butter, is obtained in Western Africa from the *Bassia Parkii* or *Pentadisma butyracea*, a tree closely resembling the *B. latifolia* and other species indigenous to Hindostan. According to Park, the tree is abundant in Bambara, the oil is solid, of a greyish white colour, and fuses at 67 degrees. Its product is used for a variety of purposes—for cooking, burning in lamps, &c. This tree has much of the character of the laurel, but grows to the height of eighteen or twenty feet. Its leaf is somewhat longer than the laurel, and is a little broader at the point; the edges of the leaf are gently curved, and are of a dark sap green color. The nut is of the form and size of a pigeon's egg, and the kernel completely fills the shell. When fresh it is of a white drab color, but, if long kept, becomes the color of chocolate. The kernel, when new, is nearly all butter, which is extracted in the following manner:—The shell is removed from the kernel, which is also crushed, and then a quantity is put into an earthen pot or pan, placed over the fire with a portion of water and the nut kernels. After boiling slowly about half an hour the whole is strained through a grass mat into a clean vessel, when it is allowed to cool. Then after removing the fibrous part from it, it is put into a grass bag and pressed so as to obtain all the oil. This is poured into the vessel along with the first-mentioned portion, and when cold is about the consistence of butter. The nuts hang in bunches from the different boughs, but each nut has its own fibre, about seven or eight inches long, and about the

thickness and color of whip-cord. The nut is attached to the fibre in a very singular manner. The end of the fibre is concealed by a thin membrane, about half an inch wide and three-quarters of an inch long. This membrane is attached to the side of the nut, and, when ripe, relinquishes its hold, and the nut falls to the ground, when it is gathered for use. A good-sized healthy tree yields about a bushel of nuts, but the greater number are not so prolific. The trees close to the stream present a more healthy appearance, probably on account of being better watered, and the fire being less powerful close to the stream.—*Simmonds.* The collection of oils exhibited at the Madras Exhibition of 1855, by Lieut. Hawkes, was very extensive, and contained a very large number of highly interesting specimens. The series exhibited the oleaginous products in a state of great purity, accompained by the oil seeds yielding them. No consideration of cost or trouble had been allowed to interfere with providing all that was necessary to render the collection a complete illustration of the oils of Southern India. The value of the collection was greatly enhanced by the care which had been bestowed in the preparation, and the exclusion of all impurities in the process of extraction.—*M. E. R. J.* This officer, as Reporter to the Jury, on the Sub Class "*oils,*" published in the Reports of the Juries of the Exhibition, furnished observations on the extensive collection of oils, himself and others exposed. For the opportunity of having this done however, Southern India is indebted to Lord Harris, to whom this part of the Empire owes more for the practical development of its productive resources, than to any one since the days of James Anderson, Buchanan Hamilton, Heyne, Roxburgh and Ainslie by whom their existence was first made known. From the General and Local Exhibitions which as Governor of Madras he caused to be held in 1855-56 and 1857, the Commercial world and men of Science have been indebted for the learned essays, in the Juries Reports which emanated from Dr. H. F. C. Cleghorn, M. D. Dr. A. Hunter, M. D. Lt. H. P. Hawkes, Dr. A. J. Scott, M.D. Lieutenant Colonel Balfour, C.B. and Colonel G. P. Cameron, C.B.K.T. and K.C.

The *Adul oil* of Travancore was forwarded to the Great Exhibition of 1851, but merits further attention It seems to be medicinal, but the Botanical name of the plant producing it is not given.

(5741) *Aleurites Triloba.* Belgaum Walnut oil.

Hidjlee Badam Ka tael, HIND.

The Molucca tree which produces the "Lumbang nut" grows plentifully near Hydrabad. The nuts yield a very large per centage of Oil, and the tree is found to be very prolific. The nuts are said to be strung upon a thin strip of bamboo, and when lighted will burn like a candle; a notice of this interesting substance may be found in the Transactions of the Agri-Horticultural Society of India. (Vol. 8. p. 220.)—*M. E. J. R.*

(5742) *Allium sativum.* Garlic Oil.

Vellay-Poondoo yennai, TAM.

Good specimens of this medicinal oil were exhibited by Major Miller, the Madras Tariff and Lieut. Hawkes.—*M. E. J. R.*

(5743) *Anacardium occidentale.* Cashew nut oil.

Moondree cottay yennai, TAM. | Kajoo ka tael, HIND

The light yellow, sweet tasted and edible oil obtained from the *nut* of this tree, is in every respect equal, if not indeed superior, to either Olive or Almond oil. It is very seldom prepared, the nuts being used as a table fruit.—*M. E. J. R.*

(5744) *Anacardium occidentale. Cashew Apple Oil.* This powerfully vesicating oil obtained from the pericarp of the Cashew Apple has been long known to the Native Physicians, and much resembles in its properties the acrid oil obtained from the marking nut (Semecarpus Anacardium). —*M. E. J. R.*

(5745) *Andropogon Calamus Aromaticus.*—Roosa Grass Oil. This Oil differs but little either in appearance or quality from the Lemon Grass Oil. It is used for the same purposes.

(5746) *Andropogon Schœnanthus.*—Lemon Grass Oil.

Camachie Pilloo Tylum, TAM.

This well known Oil is obtained by distillation from a grass, which grows plentifully in many parts of the country. It is much used as a rubefacient for Rheumatic affections, as well as in Perfumery, for which purposes it is said to be largely exported from Travancore. When newly made, this Oil is of a light straw color, but age changes it to a deep red. Excellent specimens are exhibited by the Travancore and Tanjore Local Committees and by Lieut. Hawkes. Mrs. Goodsir forwarded an excellent sample obtained from Ceylon.

(5747) *Anethum Sowa.*—Bishops Weed Oil. These well known carminative seeds yield by distillation a very useful Oil which is given medicinally, as a stomachic. Good specimens were shown by Mr. Gay, the Tanjore Local Committee and Lieut. Hawkes.

ANIMAL OILS.

(5748) *Fish Oil.*—The preparation of fish oil is chiefly confined to Malabar and the Western Coast whence it is exported to England in large quantities, the demand is also yearly increasing.

(5749) *Fish Liver Oil.*—Is also prepared chiefly on the Western Coast although some is now made at Madras. The liver of the white shark is that generally used. The mode of pre-

paring the best Cod liver oil which is equally applicable to "Fish liver" is thus described.

"*Cod Liver Oil.*"—The proper season for preparing this oil is early in January when the livers are plump, firm, large, white, and full of oil—the livers are sometimes found diseased, and are specifically lighter than water, these should be rejected. Good livers should cut smooth, and not tear, when cut none of the substance should flow out in a half liquid state. The quantity of oil produced by livers depends much upon the time of the year. In the beginning of January 1000 livers were found by experiment to yield 37 Imperial gallons, and at the end of February an equal number only gave 23 gallons of oil. In the beginning of January 1000 livers of average size weighed 900 lbs. whilst in the last day of March the same number weighed only 575 lbs. The oil at these different seasons was equally pale, and the livers equally white, although much smaller and more flabby in the latter season. To prepare the oil—Wash the liver very carefully, first removing the gall bladders which adhere to them, and infuse them in rain or other water free from salt. Place them over the fire and never allow the heat to exceed 120 or 130°. On this head especial care must be taken, a higher degree of heat although yielding a larger product, communicates a rank fleshy taste and smell and heightens the color of the oil, thereby rendering it disgusting to the patient.

(5750) *Neats foot Oil.*—Its uses as a softener of leather, &c &c. are well known.

(5751) *Oleum Ceræ Oil of Wax.*—Bees wax submitted to destructive distillation with the addition of a little salt yields an empyreumatic oil which is much used in medicine by Native Doctors.

Guana Oil.—A specimen of this oil is exhibited by J. Rohde, Esq. of Guntoor.

(5752) *Arachis hypogea. Ground nut Oil.*

Vayr-cuddala-yenai, TAM.	Willayettie-moong kie-
Manilla noona, TEL.	phullie-ka tel, HIND.

This valuable oil, which of late years has been exported from Madras to a large amount, is obtained by expression from the seeds of the Ground or Manilla nut, which is now cultivated to a considerable extent in most parts of the Peninsula. In the year 1848-49—37,000 gallons were shipped, but in the two following years the Exports exceeded 1,00,000 gallons. It has however fallen to 57,207 gallons in 1852-53. It does not seem to be consumed to any large extent in this country, although the nut itself is much eaten by the poorer classes. It is said to be used for adulterating gingely oil in North Arcot, where it costs from Rs. 1-8-0, to 2-12-0 per maund. In the Nellore District, the seeds are procurable at Rs. 1-8-0 per maund and in Tanjore about 200 acres are cultivated, producing annually 75 candies of oil at Rs. 2-6-9 per maund. The seeds yield about 43 per cent. of a clear straw coloured edible oil, which is an excellent substitute for olive oil, and makes a good soap. Its value in London in January 1855 was £47-10 per ton. Perfect decolorization, far from depreciating, considerably enhances the value of this oil.—*M. E. J. R.* See GROUND NUT.

(5753) *Argemone mexicana.* Brumadundoo or Coorookoo oil. Prickly Poppy; Jamaica yellow thistle.

Brumadundoo yennai, TAM.	Fariugie datura ka tael.
Brumadundie Noona, TEL.	HIND.

This pale yellow limpid oil may be obtained in large quantities from the round corrugated seeds of the prickly poppy, which was originally introduced from Mexico in ballast, but now flourishes luxuriantly in all parts of India It is sometimes expressed by the natives and used in lamps, but is doubtless adapted to other and more important uses. In North Arcot it costs from Rs. 1-14-0 to Rs. 2-1-0 per maund.—*M. E. J. R.*

(5754) *Bassia Longifolia.* Illoopoo Oil.

Illepie Yennai, TAM.	Mohay ka tel, HIND.

This semi-solid oil is expressed from the seeds of a tree which is everywhere common in Southern India. It is seldom sold in the bazar, but the seeds are collected, and the oil manufactured by the Natives for private consumption. The seeds contain about 30 per cent of oil of a bright yellow colour. It is procurable in South Arcot at Rs. 25 per candy, or Rs. 1 4 0 per maund—in Bellary at 3 8 0, in Bhopaul at Rs. 3 12 0. In Tanjore, it may be had to the extent of 2,702 candies at the rate of 2 8 8 per maund.

Uses.—This oil makes excellent candles and soap. Of the latter, several specimens were contributed (Cl. xxix) from Tanjore, Madras, &c. Its chief use is, however, for burning in lamps, and as a substitute for butter in Native cookery. The very great difference in colour, consistence and flavour, which is observable in the many specimens of this oil entirely attributable to the mode of preparation, and to the presence in some cases of a very large proportion of mucilage and other extraneous matter. A bright colored specimen from Tanjore, on being treated with dilute sulphuric acid, proved remarkably pure, samples of the same oil, from Rajhamundry and Tinnevelly and from Lieut. Hawkes were equally good, but those from Nellore and Mysore deposited a large amount of mucilage.—*M. E. J. R.*

(5755) *Bassia Latifolia.* Mahwa Oil. Several specimens of oil under this name were exhibited, at the Madras Exbutition of 1855 but doubt existed as to their being really the produce of the B. latifolia, which has always been described as a solid oil or butter, whereas tho se now shown are quite liquid at ordinary temperature.

The B. latifolia is produced plentifully in Bengal, but it is not yet ascertained that it grows in the Madras Presidency.—*M. E. J. R.*

(5756) *Bombax pentandrum.* Silk Cotton seed Oil. A dark brown though clear oil is obtained by expression from the seed of the silk cotton tree, the fibre of which is largely used as a stuffing for pillows, mattresses, &c. &c.

(5757) *Bryonia Oil.*

Toomuttikai yennai, Tam. | Boddama kaia noona, Tel.

This oil is used for burning in Lamps in some parts of the country, where the fruit abounds. It is extracted by boiling in water, and is procurable only in very small quantities.—*M. E. J. R.*

The *Broonga Malagum Ointment* and the *Vishnamoosty or snake tree ointment* of Masulipatam appear to be new products, but being unaccompanied with any information as to source from which they are derived, this cannot be accurately determined.

(5758) *Butea Frondosa.* Moodooga Oil. The seeds of this tree yield a small quantity of a bright clear oil which is sometimes used medicinally.—*M. E. J. R.*

(5759) *Cabbage seed Oil.* Exhibited in the Madras tariff.—*M. E. J. R.*

(5760) *Calophyllum calaba?* A new oil under the name of *Cherroo Pinnacottay* is sent from Cochin.

Major Miller, Assistant Commissary General, Bangalore, forwards a new oil under the name of "Pootronjie." The same oil was also shown by Mr. Rose of Madras and Lieut. Hawkes.

(5761) *Calophyllum inophyllum.* Pinnacotay or Poon-seed oil.

Pinnay yennai, Tam. | Surpunka tael, Hind.
Pinnay noona, Tel.,

The fresh seeds of the "Alexandrian laurel" when shelled, and subjected to pressure yield a dark green oil of a peculiar odour. Old seeds yield a higher colored and thicker product. In the year 1847-48, Galls 3,871 of the oil, and cwt. 508 of the seeds, were shipped from Madras chiefly to Ceylon and the Straits, it has now ceased to be an article of Export. In Tanjore, 437 acres producing on an average 24⅝ cullums per acre of seed are covered with this tree: this yields 2671¼ maunds of oil at Rs. 20-4 per maund. In Tinnevelly, it costs As. 4-8 and Trichinopoly As. 4 per seer. In Tanjore, it is used for Lamps, and for caulking vessels, but it appears to be chiefly valuable as a medicine. It is seldom procurable in the bazar, but is expressed when required. Samples from Canara, under the name of "Honay," from Goa by the name of "Oleum unda," from Cochin called "Perun Poonaka," and from Masulipatam.—*M. E. J. R.*

(5762) *Cannabis sativa.* Hemp seed oil.

Ganja yenna, Tam.

This oil is obtained by expression from the seeds of the common hemp, which is cultivated in many parts of the country. In Russia, the oil is much used for burning in Lamps, but it is unknown to the natives of India. Three specimens are exhibited, one of a deep green colour from Tanjore, another of an olive green sent by Lieut. Hawkes and the third in the Madras Tariff.—*M. E. J. R.*

(5763) *Cardamom seed Oil.* (Fixed.) This is sent as a "new oil" by Mr. Rose, but is already well known.

(5764) *Carthamus tinctorius.* Safflower oil.

Chendoorookoo yennai, Tam. | Kurrur or Coosum ka tael, Hind.
Koosumba noonay, Tel.

A light yellow clear oil obtained from the seeds of the plant, yielding the well known dye. It grows plentifully in Mysore and Tinnevelly. In Mysore and Bellary, it costs about Rs. 2-8-0 per maund, and is used for lamps, culinary and other purposes.—*M. E. J. R.*

(5765) *Celastrus paniculata.* Malkungunee or staff tree oil.

Valuluvy yennai, Tam. | Malkungunee ka tael,
Bavungie noona, Tel. | Hind.

The deep scarlet colored oil obtained by expression from the seeds of this shrub is used in medicine, the seeds submitted to destructive distillation yield the oleum nigrum.—*M. E. J. R.*

(5766) *Celastrus Paniculata.* Oleum Nigrum.

Vaylarie tylum, Tam.

An empyreumatic oil obtained by the destructive distillation of the seeds of this Celastrus, either alone or in combination with other ingredients. It is much used in the treatment of Beri-beri, Malcolmson's Essay, p. 312.

(5767) *Cheerongie Oil Chirongia sapida or Buchanania Latifolia.*

Saraypuppoo noonay, Tel. | Cheeronjie or Charoolie ka tael, Hind.

The kernels of this tree are eaten by the natives to promote fatness, they abound in a straw colored, sweet tasted and limpid oil which is seldom extracted. The tree grows plentifully in Mysore and Cuddapah.—*M. E. J. R.*

(5768) *Cocos nucifera.* Cocoanut oil.

Taynga yennai, Tam, | Narel-ka-Tel, Hind.
Tencaya Noona, Tel.

The average annual quantity of this oil exported from Madras, from 1847-48 to 1852-53 is about Galls 9,00,000 per annum. Of this by far the largest portion is sent to the United Kingdom and France, the remainder finds its way to Arabia, Mauritius, Bombay and the (Indian) French Ports.

Price.—The prices of this oil vary considerably in different parts of the country. For the quarter ending 31st October 1854, the max: and the min: were Rs. 8-5-4 at Jubbulpore, and Rs. 1-12-9 at Mhow per maund. The average of twenty one large stations in the Madras Presidency giving Rs. 4-9-5 per maund, or about £41-2 per ton. The market-value of "Cochin oil" in London (January 1855) was £46. 10— the average being £46 to 48. The best oil is that exported from Cochin, and the neighbouring ports on the Malabar Coast. It usually fetches 20*s.* per ton more than the Ceylon or Coromandel coast article.

Uses. In Europe, for Candle and soap manufacture, for lubricating machinery, &c. &c. In India, for making soap, anointing the person, for cookery, lamps and in medicine.—*M. E. J. R.* See Cocos. W. E. Underwood, Esq., exhibits an empyreumatic oil and pyroligneous acid obtained by the destructive distillation of cocoanut shells. The latter substance has been used successfully in developing photagraphs by the collodion process. The oil or tar mixed with ordinary "japan varnish" is said to be used with advantage in the "backing up" of positive pictures.

(5769) *Croton tiglium.* Croton or Napaulah oil.

Neervalum yennai, Tam. | Jumal-gotay-ka tael, Hind.
Naypalum vittiloo, Tel. |

This is a well known medicinal oil, the use of which as a drastic purgative, seems to be decreasing.—*M. E. J. R.*

(5770) *Cucumis Colocynthis.* Colocynth seed Oil.

(5771) *Cucumis melo*, Melon seed Oil. Pitcha Pusjhum—Tharbooza, Khurbooza, Pumpkin seed Oil.

(5772) *Cucurbita pepo*, Cucumber seed Oil.

Valerikoi yennai, Tam. | Thosa noona, Tel.

A clear edible oil.—*M. E. J. R.*

(5773) *Garcinia pictoria*, Gamboge Butter. (Rox.)

Mukki-tylum, Tam. | Arasinagoorghy yennai, Can.

The solid butter contained in the seeds of the "Gamboge tree" a species closely allied to the G. purpurea which produces the "cocum butter" has attracted attention. The Gamboge tree grows abundantly in certain parts of the Mysore and Western coast jungles. The oil which is procurable in moderate quantities, is prepared by pounding the seed in a stone mortar and boiling the mass, until the butter, or oil rises to the surface. Two and a half measures of seed should yield one seer and a half of butter. In the Nuggur Division of Mysore, it is sold at the rate of As 1-4 per seer of 24 Rs. weight, or at £36-6 per ton, and is chiefly used as a lamp oil by the better classes of natives, and by the poor as a substitute for ghee. The butter thus prepared does not appear to possess any of the purgative qualities of the Gamboge resin, but is considered an antiscorbutic ingredient in food. The above interesting particulars have been furnished by H. R. Oswald, Esq. M. D. Nuggur Divison, Mysore Commission.—*M. E. J. R.*

(5774) *Ghirgilly Oil.* From Canara obtained from the pulp of the tree; considered an excellent remedy for Rheumatic pains.

(5775) *Guilandina Bonduc.* Bonduc nut Oil.

Calichikai yennai, Tam.

The oil of this common seed is mentioned by Ainslie, as being considered useful in convulsions and palsy. The seeds themselves are believed to possess tonic virtues. Used solely as a medicine.—*M. E. J. R.*

(5776) *Guizotia oleifera*, Ramtill oil—Vebesina sativa.

Valeesaloo Noonay, Tel. | Kala Till ka Tael, Hind.

This sweet tasted edible oil is plentiful in the Mysore, Vizagapatam and Ganjam Districts. It is used for nearly the same purposes as the sesamum. It is procurable in the Nuggur Division of Mysore at Rs. 3 8 0 per maund, but is considered inferior to gingely oil.—*M. E. J. R.*

(5777) *Hura Crepitans.* Sand Box tree oil, The seeds of this tree (which has been introduced from Jamaica) yield by expression an oil, as the whole tree abounds in poisonous matter, this oil probably partakes of its deleterious nature. The tree grows in the Madras Horticultural Gardens.

(5778) *Hydnocarpus inebrians.* Thortay Oil. From Canara a very valuable vegetable tallow, used for sores.

(5779) *Inga dulcis.* Coorookoopilly Oil. The seeds of this common hedge plant yield by expression a light coloured oil, about the consistence of castor oil. Its qualities and uses require to be ascertained.

(5780) *Iatropha (Curcas) Purgans.* Angular-leaved Physic-nut Oil.

Caat-amunak yennai, Tam. | Junglie erundie ka tel, Hind.
Adevee amedapoo noona, Tel. |

This oil, which has of late been imported into England, as a substitute for Linseed oil, is expressed from the fruit of a species of Iatropha, which abounds in all parts of the Madras Presidency. The colour is somewhat paler than the best linseed oil. It can be obtained in some parts of the country where it is plentiful, for little more than the cost of manufacture. It is now chiefly used in lamps. A light straw colored specimen was shown by Lieutenant Hawkes and several good but rather high colored samples from the

Tanjore and Travancore Local Committees and the Madras Tariff.—*M. E. J. R.*

(5781) *Jatropha glauca.* Glaucous leaved Physic nut Oil.

Addale or Authaulay yennai, TAM.

This oil which in appearance approaches castor seems to be but little known. It is fluid and light straw colored, and is procurable in South Arcot, where the plant grows on waste land. It is now chiefly used medicinally as a counter irritant, but if procurable in sufficient quantity seems likely to prove an useful oil. A high colored specimen was sent from Tinnevelly and one of a pale straw colour from Lieutenant Hawkes. —*M. E. J. R.*

(5782) *Lepidium sativum*—Country Cress Oil.

Alie-veric yennai, TAM.

This oil is extracted from the seeds of the "Chinese wall cress." Its qualities and uses have yet to be determined. It must not be confounded with "Linseed oil" the Tamil name of which is the same as that of the present article.

(5783) *Linum usitatissimum.* Linseed oil.

Alliverie yennai, TAM. | Ulsee ka tael, HIND.
Avecsee noona, TEL. |

The seed from which this oil is expressed, has long been cultivated to a limited extent in Nagpore, Bellary and other parts of the Madras Presidency. There is an impression that the oil obtained from the Indian plant is inferior to that imported from England, but it will be found on experiment, that this arises from the former having been imperfectly freed from mucilage, which prevents its drying. The seed is now an article of export from Madras to the amount (1852-53) of cwt. 1,106. In the year 1852-53, English Linseed oil to the amount of galls 4-552 and valued at Rs. 8.763 was imported into Madras, whilst at the same time cwt. 1,045 of the seed were exported from hence mostly to England: it appears that it can be made on the spot for much less than the average value of the English oil. This fact, it is hoped, needs only to be pointed out, to be taken advantage of. It would, however, be necessary to guard against the adulteration of this oil, with any of the other greasy oils which would of course infallibly destroy its drying properties. —*M. E. J. R.* See FLAX.

(5784) *Macassar Oil.* The qualities of this oil which is said to have been obtained from Macassar, the capital of the Celebes Island, require to be determined, it is used by the natives of Singapore as a hair oil.

(5785) *Manaloo Oil.* From Canara used for lamps.

(5786) *Azadirachta Indica; et Melia Azadirach.* Margosa or Neem oil

Vaypum yennai, TAM. | Neem ka Tael, HIND.
Vapa noona, TEL. |

This valuable and much used medicinal oil is obtained by either expression or boiling, from the seeds of the above mentioned trees, which are common throughout Southern Asia. It enters much into the practice of native Physicians, by whom it is administered internally as an anthelmintic, and externally as a liniment in Rheumatism, headache and as an application to ulcers. The oil is of a deep yellow colour, has a strong smell and an unpleasant bitter taste. In the year 1847-48 galls 1,587 were exported from Madras, and in the year 1851-52, galls 1,917, in 1852-53, galls 3,111. The chief market is Ceylon, but the demand is not constant.—*M. E. J. R.*

(5787) *Mesua Ferrea.* Naga-sumpunghee Oil. This valuable oil is procurable in Canara, at the rate of Rs. 4 and the seed at 1-8-0 per maund. It is used both as a lamp oil and as a healing application to sores.

(5788) *Mimusops elengi.* Mimusops Oil. A medicinal oil. Obtainable in tolerably large quantities in some parts of the Country. It is known in England.—*M. E. J. R.*

(5789) *Mooroogana tallow.* This valuable substance which even at high temperatures is perhaps the most solid oil with which we are yet acquainted, was forwarded from Canara by F. N. Maltby, Esq. If procurable in large quantities, and at a moderate cost, it promises to be a valued material for the manufacture of candles, &c. &c. It is used for medicinal purposes, &c. &c. and as a cure for cattle wounded by Tigers.

(5790) *Hyperanthera moringa*: *Moringa Pterygosperma.* Ben or Moringa oil.

Morunghy yennai, TAM. | Sahujna, HIND.
Morunga noona, TEL. |

Ben nut oil has long been considered valuable on account of the lengthened period, which it may be kept without contracting rancidity. The tree from which the "nuts" are obtained, is common in all parts of the country, the flowers, leaves and fruit are eaten by the natives, and the rasped root is used by Europeans as a substitute for horse-radish, to which circumstance it owes its common name of "horse-radish tree." The oil however is seldom made in India, nor does it now form an article of export.—*M. E. J. R.*

(5791) *Myristica Moschata*, Nutmeg butter.

Jadipootrie tylum, TAM. | Japhul ka tael, HIND.
Jajikarra noona, TEL. |

Is obtained by expression from the nutmeg, it has an aromatic smell from the volatile oil it contains.

(5792) *Neeradimootoo oil.* Neerada.

Mootoo yennai, TAM. | Junglie badam ka tael, HIND.

This valuable oil was sent to the Exhibition under the various names of Neeradee-moo-

too, jungle Almond, Maroty, Tamana, Maravettie, Neervettie and Soorty. It is said to be in great repute, as a medicine amongst native practitioners, and the kernel enters largely into their prescriptions. It might probably be found of use in the arts, it much resembles almond oil but is rather thicker. The seeds cost in Madras As. 2–6 per seer.—*M. E. J. R.*

(5793) *Nigella sativa.* Fennel Flower Oil.

Carun Seeragum, TAM. | Kulonjee and Siah Danah,
Nulla Gillikarra, TEL. | HIND.

The black aromatic seeds of the nigella sativa, yield by expression a dark colored fragrant oil. —*M. E. J. R.*

(5794) *Papaver somniferum.* Poppy Oil.

Cas casa yennai, TAM. | Khush-khush ka tael,
Casa-casa noona, TEL. | HIND.

The poppy is largely cultivated throughout Malwa and the Opium districts, where the drying oil obtained from the seed is more extensively used than any other, both in lamps and as food. At Bhopaul the oil is procurable at the rate of Rs. 4-8-0 per maund of 25lbs. or £10-6 per ton By simple exposure to the rays of the sun in shallow vessels, this oil is rendered perfectly colourless. It is much prized by European artists. —*M. E. J. R.*

(5795) *Olive,* Wild, or Pootroojie Oil. Obtained by expression from a handsome tree growing plentifully in Canara and Mysore.

(5796) *Polanisia Viscosa.* Viscid Cleome Oil.

Nahi-cadaghoo, TAM.

This warm and pungent little seed when subjected to very powerful pressure, yields a moderate per. centage of a light olive green colored limpid oil, which promises to be useful for purposes requiring a very liquid oil.

(5797) *Poonga or Kurunj Oil.* Dalbergia arborea or Pongamia Glabra.

Poonga yennai, TAM. | Kurunj ka tael, HIND.
Kanoogoo noona, TEL. |

This oil, which in some parts of the Country is used to a large extent in adulterating lamp oil, is expressed from the seeds of a tree, common in most parts of the Madras Presidency. In North Arcot, Bellary, and the Nuggur Division of Mysore, the oil is procurable at Rs. 2-8-0 per maund. It is chiefly used as a lamp oil by the poorer classes.—*M.E.J.R.*

(5798) *Sahcottay Oil.* From Canara, used for cutaneous diseases.

(5799) *Santalum album.* Sandal seed Oil.

Chundana pusjilum yennai, TAM.

The seeds of the sandal wood tree yield by expression a thick and viscid oil which is burnt by the poorer classes in lamps.

(5800) *Santalum album.* Sandalwood Oil.

Chundana yennai, TAM.

Specimens of this oil are exhibited by the Salem and Canara Local Committees, the Madras Tariff and Lieut. Hawkes. The exports amount annually to about 100 cwt.

(5801) *Raphanus sativus.* Radish seed Oil. Exhibited in the Madras Tariff.—*M.E.J.R.*

(5802) *Ricinus communis, Castor Oil.* Fructibus minoribus.

Sitt-amunakei yennai, TAM. | Bareek erundie ka tel, HIND.
Chitt-amindialoo noona, [TEL. |

Two varieties of the Ricinus communis, one bearing small and the other large seeds, are produced all over India. The small seeded variety yields the best product, and is employed in preparing the oil exported for medicinal purposes.

Mode of Preparation.—The fresh seeds after having been sifted and cleaned from dust, stones, and all extraneous matters, and slightly crushed between two rollers, freed by hand from huskr and coloured grains, are enclosed in clean gunny. They then receive a slight pressure in an oblong mould which gives a uniform shape and density to the packets of seed. The "Bricks" as they are technically called, are then placed alternately with plates of sheet iron in the ordinary screw or hydraulic press. The oil thus procured is received in clean tin pans, and water the proportion of a pint to a gallon of oil being added, the whole is boiled until the water has evaporated, the mucilage will be found to have subsided and encrusted the bottom of the pan, whilst the albumen solidified by the heat, forms a white layer between the oil and the water. Great care must be taken in removing the pan from the fire, the instant the whole of the water has evaporated, which may be known by the bubbles having ceased, for if allowed to remain longer, the oil which has hitherto been of the temperature of boiling water or 212°, *suddenly* rises to that of oil or nearly 600°, thereby heightening the color and communicating an empyreumatic taste and odour. The oil is then filtered through blanket, flannel, or American drill, and put into cans for exportation. It is usually of a light straw colour, sometimes approaching to a greenish tinge. The cleaned seeds yield from 47 to 50 per cent of oil worth in England from 4*d.* to 5*d.* per lb. The following is the result of experiments made at Madras and Calcutta to ascertain the per-centage of oil in the Castor seed (January 27th, 1853.)

Calcutta.—1400 lbs of seed yield kernels and raw oil as follows :—

	Kernels.	Oil.
1st Sort.....	632lbs.....	324lbs.
2nd Sort.....	184lbs.....	87½lbs.
3rd Sort.....	164lbs.....	76½lbs.

Making a total of 980lbs. of kernels and 488lbs. of raw oil from 1,400lbs. of seed.

Madras.—1400 lbs. of seed yield raw oil as follows:

1st Sort	318 lbs. of oil.
2nd Sort	88 lbs. do.
3rd Sort	74 lbs. do.

Making a total of 480 lbs. of oil from 1400 lbs. of seed.

The Cost of the Madras oil is as follows:

1400 lbs. of seed at Rs. 3 3 per bag of 164 lbs.	27	3	4
Husking and selecting kernels and cooly hire	3	11	9
Crushing, moulding, pressing and boiling	2	7	1
Filtering and sundries	2	8	0
Overseer's pay, Godown Rent, &c. &c.	1	6	2
300 empty Quart bottles, corks &c.	34	4	8
Cleaning and Packing charges	4	8	0
Rs.	76	1	0

Or an average of Annas $4\frac{17}{300}$ per quart of First, Second and Third sort oil =4d per. lb.

Uses.—This oil is chiefly used as a mild Purgative. Soap of good quality may be made of it, but the cost and disagreeable smell which it communicates, preclude its general use.

Exports.—Average for the last 4 years 1849-50 to 1852-53 11,325 galls. per annum.

At the Madras Exhibition of 1851, the samples of this oil exhibited by Mr. Gay, Madras, Mr. Kohlhoff, Tanjore, and Monsieur Godefroy of Pondicherry, were particularly fine Mr. Gay's specimen was the clearest, and most limpid, and devoid of any offensive smell. These qualities however do not arise from any superiority of the seed, or care in extraction, but from repeated decolorization with animal charcoal, which in the opinion of many eminent Medical men, considerably detracts from its strength and efficacy. Appavoo Pillay of Tinnevelly, the Nellore Local Committee, and Lieut Hawkes also exhibited excellent specimens. When manufactured in the ordinary Native mill, this oil is sometimes used by the richer classes in Lamps.

Castor oil (extracted hot.) This differs from the preceding only in the mode of preparation—The seeds are boiled for two hours in water, dried for three days in the sun, freed from the shells, pounded and then boiled in fresh water, until the whole of the oil has risen to the surface. Five seers of the seeds or $3\frac{1}{8}$lb. should by this process yield a quart of oil. This is the sort generally used in medicine by native practitioners, it is straw colored, and free from any unpleasant taste or smell.—*M.E.J.R.*

(5803) *Ricinus communis.* Castor or Lamp oil.; fructibus majoribus.

Vullak ennai, TAM.	Chirach-ka-tel, HIND.
Ped-amidum, TEL.	

This oil which is obtained from the large seeded variety of the "Ricinus communis" is sometimes drawn cold, and a straw-colored specimen scarcely distinguishable in quality from the oil of the small seeded variety was shown by Lieut. Hawkes. It is however more usually extracted by heat, and forms the common "Lamp oil" of the Bazar.

Mode of preparation—The seeds having been partially roasted over a charcoal fire, both to coagulate the albumen and to liquify the oil, are then pounded and boiled in water until the oil rises to the surface. The roasting process, however gives it a deeper red colour and an empyreumatic odour.

Price.—The price of this oil varies in different parts of the country from Rs. 1 10 0 to Rs. 3 13 6 per maund of 25lbs. The average of nineteen large stations, in all parts of the Madras Presidency for the Quarter ending 31st October 1854, was Rs. 2 8 6 per maund.

Uses.—Chiefly for lamps.

Exports.—Average of the last six years. Galls. 27,561 per annum.—*M. E. J. R.* See CASTOR OIL.

(5804) *Castor Oil.* Wild. (A new species) from Canara. Is burnt in lamps.

(5805) *Sapindus emarginatus.* Soapnut oil.

Poovandie cottay or Poongum-kai yennai, TAM.	Koocoodie noona, TEL.
	Reethay ka tael, HIND.

This semi-solid oil is used medicinally by the natives, and is extracted from the kernel of the Soap-nut. Its cost prevents its general use.—*M. E. J. R.*

(5806) *Sarcostigma Kleinii.* Poovana Oil. Was exhibited by the Tinnevelly and Travancore Local Committees, and by the Rev. E. Johnston, Cottayam, and is reported to be useful in Rheumatism.—*M. E. J. R.* The Revd. E. Jonstone of Cottayam forwarded a specimen of the oil of *Sarcostigma Kleinii.* This substance has been long known under the name of Poovana and Poovengah, but the exhibitor was the first to ascertain its correct Botanical name. This medicinal oil is used largely on the Western Coast, and seems especially to merit further investigation.—*M. E. J. R.*

(5807) *Semecarpus anacardium.* Marking nut Oil.

Shavng cotty yennai, TAM.	Bhillawan ka tael, HIND.
Nellajie noona, TEL.	

The acrid and vesicating oil which is found between the two laminæ of the pericarp of the marking nut is collected and used as a preventive against the attacks of white ants, and by native practitioners in rheumatic and leprous affections. By boiling the whole nut not divested of its pericarp, an oil is also obtained which acts as a blister. The preparation or collection either of the oil or acrid juice is liable to cause

much irritation and inflammation of the hands, face, &c, of those engaged in the work.—*M. E. J. R.*

(5808) *Sesamum Orientale.* Gingeley or Sesamum Oil (black seeded variety.)

Nool ennai, TAM.	Meetha Till ka tael,
Mundie noonay, TEL.	HIND.

This oil which is perhaps consumed to a greater extent than any other by the Natives of India, is, moreover, second only to cocoanut oil in its importance as an article of commerce. It is extensively cultivated throughout the whole of the Madras Presidency, and has been exported as follows.

Gingeley Seed.

Years 1847-48	Years 1848-49.
Qr. 17,518....Rs. 1,60,134	Qr. 8,594 ... Rs. 1,02,726
Years 1849-50.	Years 1850 51.
Cwt. 1,44,125 Rs. 299,412	Cwt. 2,27,779 Rs. 4,37,185
Years 1851-52.	Years 1852 53
Cwt. 1,09,414 Rs. 302,559	Cwt. 2,51,613 Rs. 5,31,664

Gingeley Oil.

Years 1847-48.	Years 1848 49.
Gl. 19 520.....Rs. 14,766	Gl. 14,686.....Rs. 11 535
Years 1849-50.	Years 1850-51.
Gl. 52,721.....Rs. 36,294	Gl 77,262..... Rs. 48,605
Years 1851-52.	Years 1852-53.
Gl. 46,196.....Rs. 26,722	Gl 72,607.....Rs. 43,608

Of the gingeley seed exported in 1852-53 the United Kingdom received cwt. 12-713—Ceylon, cwt. 590—France, cwt. 2,87,225—Pegue, cwt. 741—Bombay, cwt. 113—Malacca, cwt. 33 and Travancore, cwt. 148. Of the quantity of oil (72,607 gals.) exported in the same year—gals. 42,043 were shipped to the United Kingdom—gals. 2,968 to Ceylon—gals. 4,232 to Mauritius and Bourbon—gals. 19,698 to Pegue—gals. 46 to Bengal—gals. 27 to the French (Indian) ports, and gals. 3,593 to Malacca.

Mode of preparation.—The great disparity of color observed in the specimens of this oil is to be attributed to the mode of preparation. The method sometimes adopted is that of throwing the fresh seeds, without any cleansing process, into the common mill, and expressing in the usual way. The oil thus becomes mixed with a large portion of the coloring matter of the epidermis of the seed, and is neither so pleasant to the eye, nor so agreeable to the taste, as that obtained by first repeatedly washing the seeds in cold water, or by boiling them, for a short time, until the whole of the reddish brown coloring matter is removed, and the seeds have become perfectly white. They are then dried in the sun, and the oil expressed as usual. This process yields 40 to 44 per cent. of a very pale straw colored sweet smelling oil, an excellent substitute for olive oil.

Uses.—In India, it is chiefly used in cookery, in anointing the person, for making soap, and for burning in lamps. In England, it is chiefly used for the manufacture of soap, and for burning in Table-lamps, for which it is better suited than cocoanut oil, owing to the lower temperature at which the latter congeals.

Price.—Value in England (January 1855) £47.10 per ton. In different parts of the Madras Presidency the price of this oil varies from Rs. 1 5 0 to Rs. 6 0 0 per maund of 25lbs. In S. Arcot it is procurable at Rs. 27 12 5 per candy. The prices per maund of this oil, at the undermentioned stations, for the quarter ending 31st October 1854, were as follow.

	RS.	A.	P.		RS.	A.	P.
Arcot, ...	3	8	0	Madura,.....	5	8	3
Bangalore,..	3	7	3	Mangalore,...	4	1	8
Bellary,.....	3	2	0	Nagpore,.....	1	12	0
Berhampore,	2	8	0	Palamcotta,...	4	12	0
Cannanore,...	6	0	0	Paulghaut, ...	3	7	0
Cuddapah, ...	2	13	0	Samulcotta,..	2	10	8
Jaulnah,.....	2	6	0	Secunderabad	2	3	11
Jubbulpore,..	1	5	0	Trichinopoly,	4	1	8
Madras,.....	3	14	0	Vellore,.....	3	14	0
Masulipatam,	3	0	0	Vizagapatam,	3	2	0

Excellent specimens of this oil were exhibited by the Cochin, Tinnevelly, Rajahmundry, Tanjore, Nellore and Canara Local Committees, by Mr. Kohlhoff of Tanjore, and Lieut. Hawkes.—*M. E. J. R.*

Second sort Gingeley Oil, erroneously called "Rape," (Kharasanee yelloo), red seeded variety. This oil is expressed from a variety of sesamum and differs but little from the one abovementioned. In Tanjore, it is procurable at Rupees 3-0-0 per maund.

The following particulars concerning the two varieties of plant, yielding this important oil have been furnished by F. Copleston, Esq., Rajahmundry.

Two varieties of Sesamum are cultivated for the sake of the oil.

The gingeley seed par excellence is the produce of the plant, which is sown in the month of March, after the rice crop, and is irrigated twice, once at sowing, and once afterwards. The seed which is *black*, and is called 1st sort gingeley, from the fact of its yielding the largest per centage of oil, ripens in May, and sells at the rate of Rs. 60 per candy of 500 lbs. The oil obtained from both varieties, sells at the same price, viz. Rs. 2 14 6 to Rs. 3 per maund of 25 lbs. according to quality.

Second sort gingeley is sown in June, and produces a *red* seed. The plant although a little larger resembles in most respects the former, it has, however, a somewhat longer leaf, and the flower differs a shade or two in color. A candy of 500

lbs. of this seed sells at Rs. 57-8 0. The price of the oil is the same as that of gingeley. This seed has of late been exported to France, in consequence of which the present price is double what it was three years ago.—*M. E J. R.*

(5809) *Sinapis species.* Mustard Oil.

Kadaghoo yennai, TAM. | Avaloo and Sursava noona, TEL.
Raye ka tael, HIND. |

Five or six species of Sinapis are cultivated in all parts of India, for the sake of the valuable oil they yield, those most frequently seen are *S. glauca, toria*, and *racemosa*. The seeds of the "sinapis alba" yields by expression 36 per cent of a bright yellow, pleasant tasted, edible oil, having a strong smell, and slight taste of mustard. The seeds of "sinapis nigra," yield only 28 per cent of an oil in all respects similar to the above. The average price of mustard seed in eighteen large stations, in all parts of the Madras Presidency, for the Quarter ending 31st October 1854 was Rs. 1-2-8 per maund of 25 lbs., the maximum being Rs. 1-11-6 at Cannanore and the minimum As. 10-5 at Nagpore. In Vizagapatam it costs Rs. 2-8 per Sicca garee. The oil is not exported, but the seeds have been shipped as follows:

In the years	1847-48.....	Cwt.	5,828
,,	1848-49.....	,,	6,767
,,	1849-50.....	,,	9,435
,,	1850-51.....	,,	9,9[illegible]9
,,	1851-52.....	,,	3,636
,,	1852-53.....	,,	16,075

Uses.—This valuable oil, although seldom sold in the Market, being made when required, is used in most parts of India in cookery, and is considered superior to all other oils for anointing the body, which it is supposed to invigorate. In medicine, it is sometimes given internally, but is more frequently applied as a rubefacient. Lieut. Hawkes, exhibited a complete and interesting series of oils and oil cake (common mustard) obtained from four different sorts of sinapis.—*M. E. J. R.*

(5810) *Sterculia Fœtida.* Fetid Sterculia Oil.

Coodira pusjun-yennai, TAM.

This semi-solid oil obtained by expression from the seeds of a large Jungle tree, appears to contain a large per centage of Stearine, but it is doubtful if it can be obtained in large quantities, it was sent to the Great Exhibition of 1851 from Bombay.—*M. E. J. R.*

(5811) *Strychnos nux vomica.* Nux vomica Oil.

Moo yettie cottay yennai, TAM. | Carun jooty, CAN.

An empyreumatic oil prepared from the fresh nut, is used medicinally by Native Practitioners. It was exhibited by the Travancore Local Committee under the name of Carunjooty oil.—*M. E. J. R.*

(5812) *Terminalia Bellerica.* Belleric Myrobalan Oil.

Tanikai yennai, TAM.

A medicinal oil obtainable in small quantities from the kernel of the Belleric Myrobalan, the use of this drupe as a tanning material is well known.

(5813) *Terminalia Catappa.* Wild Almond Oil. A specimen of oil said to be obtained from the fruit of this tree was exhibited in the "Madras Tariff," and a sample labelled "Almond oil" from Tanjore was the product of this species of Terminalia.—*M. E. J. R.*

(5814) *Terminalia Chebula. Chebulic Myrabolan.* A medicinal oil is procurable in very small quantities from the kernel.

(5815) *Thespesia populnea.* Portia nut oil.

Poorasun yennai, TAM. | Paris pippul, HIND.

This deep red colored and somewhat thick oil is obtained from the seeds of the portia tree, which grows in great abundance in the vicinity of Madras, and other parts of the Presidency. It is extensively planted as an avenue tree, for which its quick-growth and the beauty of its flowers render it a favorite. The wood is capable of being worked when fresh cut and is used for boat building and cabinet work. The juice of the tree is used on the western coast, as a remedy for various cutaneous affections, and the oil which is yet unknown to the natives, might probably be of use in similar cases. Its expense precludes its use otherwise than medicinally.—*M. E. J. R.*

(5816) *Thevetia Neriifolia.* The "Exile" Oil. The kernels of the seeds of this common shrub yield by expression a large per centage of a clear bright yellow colored oil, the qualities of which have not as yet been determined.

(5817) *Thoronogullo Oil.* Pongamia glabra? from Canara used for cutaneous diseases. An empyreumatic medicinal substance called *Tuntapoo oil* (*cassia tora?*) is contributed by the Masulipatam Local Committee.

(5818) *Vateria Indica.* Piney Tallow or Doopada Oil.

Piney Yennai, TAM.

This most valuable tree, which, besides the product under consideration, yields a resin nearly equal to copal, and furnishes an excellent building wood, grows plentifully in the jungles of the Western Coast. The oil which is perfectly solid even in hot climates, is prepared by cleaning the seeds, then roasting and grinding them into a mass. To 5 seers of seed, add 12 seers of water, and boil until the oil rises to the surface. Remove the oil, stir the contents of the vessel, and allow it to stand until the following day, when more oil will be observed on the surface, which may be collected and the process repeated. The oil is principally used for lamps, but is very

suitable for soaps and candle making.—*M. E. J. R.*

(5819) *Wood Oils.* This class of oils is obtained for the most part from the Burmese coast and the Straits. They are usually procured by tapping certain trees of the order Dipterocarpeæ, and applying heat to the cavity. The oil which flows from the wound, is a mixture of a balsam and volatile oil, and when applied as a varnish to wood or other substance the oil evaporating deposits a hard and durable coat of resin. They are chiefly used as natural varnishes, either alone or in combination with colored pigments, also as a substitute for Tar in paying the seams of shipping, and for preserving timber from the attacks of white ants They are said also to be useful as an ingredient in Lithographic inks. Owing to the distance from which they are brought, and the imperfect knowledge we yet possess of the countries whence they are imported, the names of the trees from which these valuable substances are derived, are involved in some degree of obscurity. The oil, therefore generally receives the names of the localities from which they are imported. Some of them differ considerably in colour and consistence, but they all possess the same balsamic odour, and are derived from various trees of the noble family of Dipterocarpeæ. In this section were remarked three good samples of good oil from Canara. Also a very interesting series of ten oils from various parts of the Madras Presidency and Burmah. Lieut Evans 51st Regt. N. I., in addition to other contributions, exhibits a bottle of wood oil from Malacca in its natural state as procured from the tree. The mode of extraction is as follows. " About the end of the dry season, that is in March or April, several deep incisions are made with an axe into the heart of the wood, and a good sized piece scooped out ; into these holes fire is placed, and kept burning until the oil begins to run, when it is received into a bamboo, and allowed to run slowly drop by drop."

(5820) *Teak Wood Oil.* An opaque dull ash colored oil under this name, is procurable in most of the large bazars of India ; when allowed to rest for some time, it separates into two layers, or an uppor dark colored clear stratum and a lower and more solid deposit. Its chief use is for applying to wood work of all sorts, either alone as a natural varnish, or in combination with certain resins.

(5821) *Wood Oil from Pegu.* It is much to be regretted that the Botanical names of the trees, yielding this and the following wood oils cannot with any certainty be ascertained. The oil which is generally known by this name is a very clear and liquid substance forming a natural varnish when applied to wood or other substance.

(5822) *Deodar or Shemanatahu Oil.* Erythroxylon areolatum. An empyreumatic medicinal oil.

(5823) *Wood Oil from Chittagong.* This substance much resembles the " The Teak Wood oil" and the " Wood oil from Pegu," above mentioned. It is less liquid than the latter, but is used for the same purpose; procurable in all large bazars.

(5824) *Wood Oil from Moulmein.*

(5825) *Wood Oil from Rangoon.* This appears to differ very considerably from any other specimen of " wood oil" in the Exhibition, it is quite white and almost solid—but has the usual resinous shell of this class of oils.

(5826) *Wood Oil* from Singapore.

(5827) *Wood Oil* from China.—Although scarcely coming within the limits of this report, this valuable product merits notice as being one of the substances of which the well-known and much prized China lacquer is mode. It is used in Singapore for painting the beams and woodwork of Native houses, and may also be mixed with paint when not exposed to the sun.

(5828) *Sissoo-Wood Oil.*—Dalbergia sissoo. An empyreumatic medicinal product.

(5829) *Wood Oil* from Tinnevelly. An empyreumatic product similar to tar, chiefly used medicinally by Native Practitioners.

(5830) *Camphor Wood Oil. Dryobalanop Camphora.*—The last of this series belongs to the class of " Volatile oils," but may be here noticed. The specimen exhibited by Lieut. Hawkes was forwarded to him from Singapore through Lieut. Heath of the 38th Regiment N. I., and another excellent specimen which is exhibited by Second Dresser Pulneandy was brought by him from Labuan. It is used largely in Singapore as a substitute for turpentine, and sells at from 15 to 20 cent. a bottle. The Jury consider Lieut. Heath and 2d Dresser Pulneandy deserving of Honorable Mention.

(5831) *Wood Oil,* as obtained from the tree without any preparation. This very interesting specimen which was before mentioned as being contributed by Lieutenant E. J. M. Evans, 51st Regt. N. I., by whom it was obtained from Malacca, is obtained from a large tree of the Dipteraceous family which is very common in the dense jungles of the Malayan Peninsula, and grows to a great height. When not topped too soon, the base of the trunk is often of immense girth—the wood is reddish brown and has a smell not unlike that of English fir, the bark is smooth, the leaves alternate, pinnate and exstipulate, fruit a one seeded drupe, seed angular and anatropal. The oil when permitted to remain at rest divides itself into two layers, the upper consisting of a clear chesnut colored liquid balsam and the lower being in appearance like flakes of granulated sugar and consisting probably of the surplus resin deposited by the action of the atmosphere. The Jury considered the Exhibitor deserving of Honorable Mention.

(5832) *Mineral Oils.* Specimens of *Petroleum* are exhibited by the Madras Tariff and Lieut. Hawkes, the produce of our Burmese Possessions. Its uses are well known. The Wound tree oil, or *Gayapanoona* of Rajahmundry although locally known for sometime, is now prominently brought to notice.

(5833) *Wrightia Antidysenterica.* Rosebay Oil.

Vaipallay yennai, TAM.

A medicinal oil—little known. A thick, scarlet colored, medicinal oil partaking doubtless of the properties of the seed.—*M. E. J. R.*

(5834) OLAY.

Olay, TAM. | Puttay, HIND.
Tatakoo, TEL. |

Are the three vernacular names by which the people designate the leaves, when prepared for being written upon, of the Palmyra (Borassus *flabelliformis*), of the cocoanut tree, and those of the Taliput palm (corypha umbraculifera). The oldest Hindoo author who alludes to writing on the Olay is Panniny rishee, who lived above 4160 years ago, and resided at Arittuwarum, near the source of the Ganges. Pliny says expressly (lib: xiii. cap: 2) that the most ancient way of writing was upon the leaves of Palms, from which, it is believed that the leaf (*folium*) of a book came to be synonymous with that of a plant. They are written upon with the style, which is pointed with steel and its handle sometimes highly ornamented. During the operation of writing, the leaf is supported by the left hand, and the letters are cut or scratched upon its surface with the style, which is kept always in the same position and the leaf is moved to the left hand side by means of the thumb. To render the characters more legible, the engraved lines are occasionally filled by smearing the leaves with fresh cow-dung, which is tinged black by rubbing the lines over with cocoanut oil, or a mixture of oil and charcoal powder, and for the same object, in Ceylon, an oil, called Doomale is sometimes rubbed on the letters with a burned rag. All the sacred books of the Hindoos, Burmese, Cingalese &c. are still made of these olay, some of them being highly ornamented. All accounts in the revenue department, all grants of land, leases, and all the accounts in shops are still kept on these leaves, and they are likewise sent as letters. Books are never much beyond two feet in length and two inches in breadth, they are said to last from one to four or five hundred years.—*Seeman.*

(5835) OLDENLANDIA BIFLORA. Two FLOWERED INDIAN MADDER.

Purputee, Papra, HIND.

Appears in moist ground in the rainy season. —*Genl. Med. Top. p.* 180. *Oldenlandia biflora* is very common in Bengal, and called in Bengali *Khet-papura*; other species also occur and are called *Gunda badalee*, and *Poonkhu.*—*O'Shaughnessy, p.* 400.

(5836) OLDENLANDIA UMBELLATA. CHAY ROOT PLANT. Lin.

Emboorel also Ramiseram vayr, TAM.

A native of Java, Coromandel, and Mexico; root long and orange-coloured, employed in Coromandel to dye an excellent red on cotton cloth; considered by the native doctors to be expectorant.—*O'Shaughnessy, p.* 400. The small, white, numerous leaves of this low growing plant, are slightly bitter, and unpleasant to the taste; the Native Doctors consider them as expectorant and prescribe them, accordingly in complaints of the Chest. When dried and pounded, they are also mixed with flour, and made into cakes, which are eaten by such as suffer from consumptive or Asthmatic affections.—*Ains. Mat. Med. page* 79. See CHAY ROOT.

(5837) OLEA a genus of plants the type of the natural order Oleaceæ. It has a 4-cleft corolla a berry with two brittle 1-seeded cells one of them generally abortive. The leaves undivided. Flowers greenish clustered, axillary. Olea Europea has lanceolate quite entire 2-coloured leaves with axillary racemes. It grows wild in rocky places in Italy. It differs from most trees except the sweet Bay (Laurus nobilis) some species of Cornus, and a very few others in yielding a fixed oil from the pericarp; the seed being the source of fixed oil, in most plants. The oil which is expressed from the ripe fruit immediately after being collected is most esteemed, and called Virgin oil Oleum Provinciale. That which is most highly prized comes from Nice and Genoa. When the oil is extracted by a stronger pressure or by the aid of heat or after the olives having been collected into heaps have remained till a kind of fermentation has occurred, it is the common olive oil, the properties of which vary in proportion as the fermentation has been of long or short duration. An oil of still inferior quality is obtained, when the husk of the olive after the former treatment is boiled in water. This kind is employed solely for the preparation of soap. Virgin Oil is of a very pale-yellow or yellowish-green colour more limpid when pure than any other fixed oil, indorous, when fresh; but emitting a very peculiar odour when old, taste purely oily but by age becoming slightly rancid. Common olive oil is of a deep greenish or brownish yellow colour, and an odour and taste more or less subrancid. Its specific gravity is greater than the other. The unripe fruit of the olive is preserved in brine. and eaten frequently at desert. The olive flourishes only in warm and comparatively dry parts of the world, as the south of France and Spain, in Italy, Sicily, Syria, and the north of Africa. Humboldt has stated that "the olive flourishes

between 36° and 44° N. lat ; wherever the mean annual temperature is from 62. 6 to 50°, where the mean temperature of the coldest month is not below from 41° to 42°8, and that of the whole summer from 71-6° to 73°4." Great cold is injurious to it, as that of 1709 was to the olive trees of France ; and as M. Bove states that the olive thrives in Egypt, and Delta that it contributes to the riches of the Fayoum, which is nearly in the latitude of Cairo, it is evident that it is capable of bearing a greater degree of heat, as is probable indeed from its being a native of Asia, having been cultivated in early times in Syria and Palestine by the ancient Hebrews, and known to them by the name of Zait, and to the Arabs by that of Zaitoon. It is said to have been introduced by the Phocæans into Marseille.—*Eng. Cyc.* Dr. Wight gives Olea clavata, 736; glandulifera, 1238 ; linocieroides, 1241 ; *paniculata*, 735 ; polygama, 1239-42 ; robusta, 1242 ; Roxburghii, 735.

(5838) OLEA DIOICA, Oleaceæ.

Koly marum, Tam.

According to Roxburgh the timber of this tree is reckoned excellent and is put to many uses by the inhabitants of Silhet ; a specimen of the wood did not accompany the flowering one, so that he was unable to offer any opinion on it.—*Wight.*

(5839)OLEA FRAGRANS, or KWEI HWA, is largely cultivated *in* China, for scenting tea.—*William's Middle Kingdom, p.* 288. *Olea fragrans*, the Qui Wha of the Chinese is by them planted in different parts of their gardens.—*Fortune's Tea Districts, p.* 17. Along the banks of a ditch, through which the tide ebbs and flows, there is a row of the *olea fragrans* This is the famous kwei-wha of the Chinese, and one of their most favourite flowers. It forms a good-sized bush, about as large as a lilac, and flowers in the autumn. There are three or four varieties, the main difference between them consisting in the colour of their blossoms. Those kinds which produce brownish-yellow flowers are the finest and are most highly esteemed by the natives. The bushes are seen growing near all the villages in the north-eastern provinces of the empire, and are plentiful in gardens and nurseries. When they are in flower in the autumnal months, the air in their vicinity is literally loaded with the most delicious perfume. One tree is enough to scent a whole garden. The flowers of the kwei-wha are a source of great profit to the Chinese cottages, as well as to the nurserymen, who produce them in large quantities for the market. There is a great demand for them in all the large towns. Ladies are fond of wearing wreaths of them in their hair; they are also dried and placed in ornamental jars, in the same way as we do rose-leaves in Europe; and they are used largely for mixing with the finer kind of tea, in order to give it an agreeable perfume. The fragrant olive, moutan, sacred bamboo (*Nandina domestica.*)—*Fortunes' Tea Districts, p.* 79.

(5840) OLEA EUROPEA. Olive Oil. *The Olive-tree.* There are several varieties of this plant, two of which have been long distinguished —the wild and the cultivated. The former is an evergreen shrub or low tree, with spiny branches and round twigs ; the latter is a taller tree, without spines, and with four-angled twigs. The fruit is a drupe about the size and colour of a damson. Its fleshy pericarp yields by expression olive oil, of which the finest comes from Provence and Florence. Spanish or Castile soap is made by mixing olive oil and soda, while soft soap is made by mixing the oil with potash. The wild olive is indigenous to Syria, Greece, and Africa, on the lower slopes of Mount Atlas. The cultivated species grows spontaneously in Syria, and is easily reared in Spain, Italy and the South of France, various parts of Australia and the Ionian Islands. Wherever it has been tried on the sea-coasts of Australia, the success has been most complete. There are several fine trees near Adelaide, some of them fourteen feet high, bearing fruit in abundance. Unfortunately no one has attempted to cultivate the plant on a large scale, but in a few years Australia ought to supply herself with olive oil. The olive tree is also grown in Hong-Kong. There are five or six varieties of *O. Europæa*, or *sativa*, grown in the south of Europe, of which district they are for the most part natives. The entire exports of olive oil from the kingdom of Naples have been estimated at 36,333 tuns a year, which taken at its mean value when exported at £62 per tun, is equivalent to the annual sum of £2,252,646. There are one or two distinct species, natives of the East Indies and the Cape of Good Hope. This genus of plants, besides their valuable products of oil and fruit, are also much admired for the fragrance of their white flowers. There is a yellow-blossomed variety, native of China, *O. fragrans*, the Lanhoa or Kwei Hwa, of the Chinese, which is used to perfume their teas. Olive oil now forms an article of export from Chili, being grown in most parts of that republic, particularly in the vicinity of St. Jago, where trees of three feet in diameter, and of a proportionate height, are common. The olive was first carried from Andalusia to Peru in 1560, by Antonio de Ribera, of Lima. Frezier speaks of the olive being used for oil in Chili, a century and a half ago. The culture of the olive has been recommended for Florida and most of the Southern States of America. Formerly, on account of its slow growth, the olive was not considered very useful ; but some years since a new variety was introduced into France, and into some parts of Spain and Portugal, which yields an abundant crop of fruit the second year after planting. They are

small trees or rather shrubs, about four or five feet high. The fruit is larger than the common olive, is of a fine green color when ripe, and contains a great deal of oil. The advantages accruing from this new mode of cultivating the olive tree, are beyond all calculation. By the old method an olive tree does not attain its full growth, and consequently does not yield any considerable crop under thirty years; whereas the new system of cultivating dwarf trees, especially from cuttings, affords very abundant crops in two or three. An acre of land can easily grow 2,500 trees of the new variety, and the gathering of the fruit is easy, as it can be done by small children. At Beaufort, South Carolina, the olive is cultivated from plants which were obtained in the neighbourhood of Florence, Italy. A gentleman in Mississippi is stated, by an American agricultural journal, to have olive trees growing, which at five years from the cutting bore fruit, and were as large at that age as they usually are in Europe at eight years old. The olive then, it is added, will yield a fair crop for oil at four years from the nursery, and in eight years a full crop, or as much as in Europe at from fifteen to twenty years of age. The lands and climate there are stated to be as well adapted to the successful cultivation of the olive for oil, pickles, &c., as any part of Europe. Some hundreds of the trees are grown in South Carolina, and the owner expressed his conviction that this product would succeed well on the sea-coast of Carolina and Georgia. The frosts, though severe, did not destroy or injure them, and in one case, when the plant was supposed to be dead, and corn was planted in its stead, its roots sent out shoots. It is well known to be a tree of great longevity, even reaching to 1,000 or 1,200 years; so that, when once established it will produce crops for a great while afterwards. The expense of extracting the oil is also stated to be but trifling. The olive is of slow growth; trees 80 years of age measure only from 27 to 30 inches in circumference at the lower part of their trunks. An olive tree is mentioned by M. Decandolle as measuring above 23 feet in circumference, which, judging from the above inferences, may be safely estimated at 700 years old. Two other colossal olives are recorded, one at Hieres, measuring in circumference 36 feet, and one near Genoa, measuring 38 feet 2 inches. The produce in fruit and oil is regulated by the age of the trees, which are frequently little fortunes to their owners. One at Villefranche produces on an average, in good seasons, from 200 to 230 pounds of oil. The tree at Hieres, above mentioned, produces about 55 imperial gallons. The olive is found everywhere along the coast of Morocco, but particularly to the south. The trees are planted in rows, which form alleys, the more agreeable because the trees are large, round, and high in proportion. They take care to water them, the better to preserve the fruit. Oil of olives might be here plentifully extracted were taxation fixed and moderate; but such has been the variation it has undergone, that the culture of olives is so neglected as scarcely to produce oil sufficient for domestic consumption. Olive oil might form one of the most valuable articles of export from Morocco. It is strong, dark, and fit only for manufacturing purposes. This is, perhaps, not so much the fault of the olive as of the methods by which it is prepared. No care is taken in collecting the olives.—*Simmonds.*

Dr. Royle tells us that the Olive tree, ελαια of the Greeks, *Zait* of the Bible, and *Zaitoon* of the Arabs, is one of the most celebrated and useful of trees. The olive tree is usually small, evergreen, but of a dull aspect, wood hard. Leaves with short petioles, ovate-lanceolate or lanceolate, mucronate of a greyish green colour above, hoary beneath. Flowers white, in short axillary clusters. Cal. (2) small 4-toothed. Corol with short tube and 5-cleft limb (1). Stamens 2, a little exserted. Style short. Stigma (2) bifid segments emarginate. Ovary 2 celled, 2-seeded. Drupe (3) about the size of a damson, purple coloured, containing only one sharp-pointed nut.—A native probably of Asia, early cultivated in Syria and Greece. The varieties of the olive are numerous. The var. *longifolia* is chiefly cultivated in the S. of France and Italy, and the var. *latifolia* in Spain. - Esenb. and Eberm. 212. St and Ch. 15. The leaves and bark of the Olive tree have been employed; also a peculiar resinous exudation, called *Olicile* and *Olive gum*. And the bark as a substitute for Cinchona. The fruit of the Olive though esteemed even in its unripe state, as an article of the dessert, having been first steeped in an alkaline ley, and then preserved in salt and water, is chiefly valued on account of the bland fixed oil which is stored up in its outer fleshy part. This is obtained by at once bruising the nearly ripe fruit with moderate pressure in a mill (*Virgin Oil*), or by the aid of boiling water and greater pressure, or when fermentation has taken place in the olives collected in heaps, *ordinary* and inferior oils are thus obtained, the worst being employed only as lamp-oils or in the manufacture of Soap. The finest oils are produced near Aix, Montpellier, Nice, Genoa, Lucca, and Florence. It is also largely produced in the kingdom of Naples, and exported from Gallipoli, on the East coast of the Gulf of Taronta, whence it is commonly called Gallipoli Oil. Olive oil may be taken as the type of the *Fatty* or *Fixed*, called also *Expressed Oils*. It is of a pale yellow, or of a light yellowish-green colour, without smell when fresh, having a bland, somewhat sweetish, fatty taste. It is very limpid. Sp. Gr. 0·910 at 77°, insoluble in water, is readily dissolved by volatile oils, and by twice its bulk of Ether, but requires much more Alcohol. Exposed to the air it absorbs Oxygen and be-

comes rancid, but not drying like Linseed oil, is preferred for machinery. At 38° F. it begins to congeal, and is readily separated at 20° into two distinct bodies, of which one is fluid, called Elaine, or Oleine 72, and the other 28 per cent. solid, named Margarine from its pearly aspect. This is often deposited in jars and casks of the oil. Hyponitrous acid converts Olive Oil into a concrete mass from producing the oleaginous principle Elaidine, mentioned at p. 203. If this like other oils is heated with Alkaline solutions, or with the Oxide of Lead, great changes take place, as exemplified in the making of Soap, and of Lead Plaster, p. 161.

Tests.—Olive Oil is apt to be adulterated with poppy and other oils; these are distinguished by not congealing at the same temperature as olive oil, also by retaining air when shaken up, more readily than pure olive oil. The E. P. directs that "when carefully mixed with a twelfth of its volume of solution of Nitrate of Mercury, prepared as for the Unguentum Citrinum it becomes in three or four hours like a firm fat, without any separation of liquid oil." If 5 per cent. of any other oil be present, the consolidation is slower and less firm, but if there be 12 per cent, the foreign oil floats on the surface for several days. M. Gobley has invented an Elaiometer. (P. J. iii. 293.)

Action. Uses. Nutrient, Emollient, internally in irritant poisoning, externally relaxing, much employed for frictions and for embrocations, and to give consistence to Cerates, Ointments and Plasters: good application to the hair from not drying readily. In doses of ℥j. laxative added to enemata for its emollient effect, or to dislodge ascarides.—*Royle, p.* 476. There are several varieties of this plant, two of which have been long distinguished—the wild and the cultivated. The former is an evergreen shrub or low tree, with spiny branches and round twigs; the latter is a taller tree, without spines, and with four-angled twigs.—*Simmonds' Commercial Product, p.* 527.

(5841) OLEACEÆ, *Olivewarts*, a natural order of monopetalous Exogenous Plants, with a superior 2-celled ovary, a subvalvate corolla, two stamens, and a fruit with pendulous albuminous seeds. In the artificial collocations of natural orders to be found in books, these plants are usually stationed next *Jasminaceæ*, with which they have been even combined. It is however probable that they have really as much affinity with some of the monopetalous dicarpous orders. Lindley, in his 'Vegetable Kingdom,' arranges them in the Solanal Alliance, and gives their further affinities as with *Aceraceæ*, *Jasminaceæ*, and *Solanaceæ*. The species of the order best known in this country are, the Olive, or *Olea Europæa*; the Lilac, or *Syringa vulgaris*; the Evergreen Phillyrea of many forms; the privet, or *Ligustrum*; and the Fringe-Tree, or *Chionanthus*; all corresponding in habit and in sensible properties, which latter are very generally bitter and febrifugal. The bark of the Olive has been extensively used by the French instead of *Cinchona*, and the young fruits of the common Lilac form an infusion scarcely inferior to gentian. The most anomalous genus of the order is the Ash, which, in its most genuine form, has no petals, and in the division called *Ornus* has the petals present, but separate to the base. It is however, in all essential circumstances, the same in structure as the more regular genera, and its relation to the order has been ingeniously proved by the fact that the Olive and the Lilac will both live when grafted upon it. It is from the *Ornus*, or Flowering-Ash, that the bitter-sweet purgative called manna is secreted. The order has 24 genera and 130 species.—*Eng. Cyc.*

(5842) OLEASTER PLUM. Elæagnus conferta. This sour red plum makes very good tarts and jellies, and abounds in some parts of the Tenasserim jungle.—*Mason.*

(5843) OLIBANUM: Olibanum Indicum. —Gunda barosa—oleo-resinous product of Boswellia thurifera.—*Ben Phar.* Incense, Frankincense, Thus.

Looban, Arab.	Incenso Olibano, It.
Gunda barosa, Beng.	Looban Mal.
Avul Coondur, Duk.	Luban, Pers.
Encens, Fr.	Labuniya, Syr.
Incense, Koondur zuchir Guz. Hind.	Paranghi Sambrani, Tam.
	Weirauch, Ger.

Good Olibanum is, as met with in Bombay, in semi-transparent tears, of a light yellow colour, sometimes inclining to white; brittle, and adhesive when warm; when burnt the odour is very agreeable; its taste is bitterish, and somewhat pungent and aromatic. Olibanum has been celebrated from the earliest ages, and used in nearly all the religious ceremonies of antiquity. It is chiefly employed in fumigations, and in the ceremonies of the Greek and Catholic churches. It is imported into Bombay from the Persian Gulf; the superior or garbled qualities are re-exported to England and France, and the inferior or refuse kinds to China.—*Faulkner.* The source of this article is the Boswellia serrata or B. Thurifera.

(5844) *Boswellia*, a genus of balsamic plants belonging to the natural order Amyridaceæ. One of the species is believed by Colebrook to be the Ἄιβανος of Theophrastus, and the *Thurea virga* of the Romans. ('Asiatic Researches,' vol. ix.) *Eng. Cyc. page* 582. It appears that the gum-resin called olibanum is the frankincense that was used by the ancients in their religious ceremonies. Linnæus was of opinion that it was yielded by the Lycian juniper; but that plant is a native of the south of France as well as of the Levant, and the botanists of that country deny that any such substance is produced by their juniper. The Greeks obtained

their frankincense from Arabia. The Arabians call olibanum both Luban and Cunder; but as benzoin is most used at the present day for religious purposes, the Mohammedan writers of India on Materia Medica apply only the term Cundur to olibanum. This Cundur has been ascertained by Messrs. Colebrook, Hunter, and Roxburgh to be yielded by *Boswellia thurifera* or *Boswellia serrata*. It is a large timber-tree found in the mountainous parts of India, yielding a most fragrant resin from wounds made in the bark. Its leaves are pinnate, and consist of about ten pairs of hairy serrated oblong leaflets, each of which is from an inch to an inch and a half in length. The flowers are pale pink, small, and numerous. The calyx is 5-lobed, the corolla of 5-downy petals, the disk a fleshy crenelled cup, and the stamens 10, alternately shorter. The fruit is a 3-sided, 3-valved, 3-celled capsule, containing a single-winged pendulous seed in each cell. From this, Roxburgh distinguishes as a different species *Boswellia glabra*, a plant also yielding a resin which is used for incense and as pitch in some parts of India. It differs from the last in having no hairs on its leaves, in its leaflets being often toothless, and its flowers being panicled. A substance analogous to olibanum, and used in a similar way in various parts of the world, is procured from several different trees, such as, in America, the *Croton niteus* (Schwartz), *C. thurifer* (Kunth), *C. adipatus* (Kunth): in Columbia. *Bailleria nervifolia* (Kunth) yields the American frankincense; the *Amyris (Icica Tacamahaca*, Kunth) *ambrosiaca* (Linn), yields also the resin coumier, likewise called American frankincense. *Lætia apetale* (Jacq.) also yields a substance similar to frankincense. *Olibanum* occurs in commerce of two kinds, the Arabian and East Indian. The former kind is now seldom met with, and its origin is a subject of doubt; the latter is obtained from the tree above described, and to it we limit our remarks. There are two varieties or degrees of fineness of it, the best called 'olibanum electrum,' or 'in grains' sometimes called 'thus mannæ' or 'thus masculum': the other is termed 'olibanum commune,' or 'in sortis,' also fœmineum.' The first occurs in pieces varying from the size of a hazel-nut to that of a walnut, or larger, which are roundish or irregular in shape, of a light yellowish colour, varying to red or brown in some pieces, opaque or semi-transparent, the outside often covered with a white powder, and upon being pounded the whole becomes a white powder. It is very friable, and breaks with a dull, sometimes even, sometimes splintery fracture. The second sort is generally in larger pieces, mostly of a dirty-gray or fawn-colour, and intermingled with pieces of wood and other impurities.—*Engl. Cyc. p.* 583.

(5845) *Boswellia Glabra.*

Salaee, Hind. | Moræda, Tam.

A small tree; leaves pinnate, deciduous; flowers terminal, small, white with a red nectary, anthers yellow; yields the gum salai.

(5846) *Boswellia Serrata*, Stach. (B. thurifera, Colebr.); Roxb. Fl. Ind. 2. p. 383.

(5847) *Boswellia Thurifera*, Colebrooke, *As. Res.* xi. 317 xi. 158. Roxb. *Fl. Ind.* 383. Pereira, *Medical Gazette*, xx. 676.

Gunda barosa, Avul Kundoor, Vern. Looban, Duk. | Koonder Zuchir, Arab. Dup-salaee, Hind.

A tree with leaves pinnate as the last; grows on the hills of the Deccan. It is a native of the mountainous tracts of Central India, and very common in the Shahabad country. Dr. Hooker remarks, when speaking of this plant, we continued to ascend from Beleuppee in Behar to the height of 1360 feet, where I came upon a small forest of the Indian Olibanum (*Boswellia thurifera*), conspicuous from its pale bark, and spreading curved branches, leafy at their tips; its general appearance is a good deal like that of the mountain ash. The gum, celebrated throughout the East, was flowing abundantly from the trunk, very fragrant and transparent.—*Hooker Him. Jour. p.* 29. The *Salai, salaee*, tree, *Boswellia thurifera*, remarks Dr. Irvine, is plentiful in the Ajmeer hills: the gunda birosa is the prepared gum resin of this tree, and is similar in appearance and qualities to Venice turpentine. It is brought from Mewar, Harowtee and the Shekhawatee hills: and is considered stimulating: an oil is distilled from it, said to cure gonorhœa. It is used also in ointments: much used in painting and by the lakheries: one maund cost twelve rupees.—*Med. Top. of Ajmeer*: From the Shahabad country, Dr. O'Shaughnessy obtained fine specimens of the resinous products there called *sale gond or sale lassa*. At Chandalgur it is termed *gunda biroza*, and in the dry state *sukha biroza*. Dr. Hamilton however thought the English Olibanum to be the produce of an Amyris, partly because he could not find that the *sale* resin was used as incense by the Hindoos. The B. glabra and B. thurifera both furnish the Male frankincense of Dioscorides. The resin olibanum occurs in reddish or pale yellow tears, oval, oblong and obtuse, sometimes in dense, opaque, brittle masses. The gunda barosa of the bazars is soft, ductile, opaque, greenish and white. The odour is balsamic and resinous, especially while the resin is burning; the flavour balsamic, and rather bitter. The powder, citron yellow. It is frequently adulterated by dammer, sandarach, and other cheaper resins; when chewed, the hard variety softens, and dissolves partially in the saliva, which it renders white and emulsive. —*O'Shaughnessy.* The ointment from this is the late Mr. Muston's boil ointment, and is a very

useful application. It is an excellent substitute for the Elemi Ointment of the London Pharmacopœia.—*Beng. Phar, p.* 3838. According to Dr. Royle, the Indian is imported in chests chiefly from Bombay, also from Calcutta, but the place producing it is not well ascertained. Mr. Turnbull, of the Medical Service, many years since sent some resin of the *Salai* tree collected in the hills near Mirzapore, which in the London market was recognized as Olibanum. Mr. Colebrooke determined that *luban* or Olibanum is produced by a tree called *salai*. Dr. Royle also collected a very fragrant resin from the *saleh* tree of North-west India, which bears a very close resemblance to common Olibanum. This tree is *Boswellia glabra*, Roxb., the former is *B. thurifera* of Colebrooke, called *B. serrata* in many works; but as Messrs. Wight and Arnott say, "We dare not quote here *B. serrata*, Stack. extr. Bruc. p. 19, t. 3, the leaves being usually described as ovate, oblong, and acuminate." Both species were collected by Col. Sykes in the Deccan as the Olibanum-tree. Dr. O'Shaughnessy states that he has received fine specimens of Olibanum from the Shahabad district, where it is called *sale gond*, and at Chandalgur *gunda barosa*. This tree (Boswellia thurifera, fig. 55) grows to a large size in hilly situations, from the Coromandel coast to the central part of India it is much branched but bare of leaves in its lower parts, but these are crowded and alternate towards the ends of the branches, unequally pinnate. Leaflets oblong, obtuse, serrated, pubescent. Stipules none. Inflorescence in single axillary racemes near the ends of the branches, shorter than the leaves.—Flowers on short pedicels, of a pinkish white colour. Flowers bisexual. (v. 55. 1.) Calyx small, 5-toothed. Petals 5. obovate, tapering to the base, inserted under the margin of the disk; æstivation slightly imbricate. Disk surrounding the base of the ovary, cup-shaped, fleshy, crenulated. Stamens 10, inserted under the disk. Ovary sessile, 3-celled, with 2 ovules in each, attached to the axis. Style terminated by a capitate 3-lobed stigma. Fruit capsular, 3-angled, 3-celled, 3-valved, septicidal (splitting at the angles into valves). Seeds solitary in each cell, girded by a membranous wing. Cotyledons intricately folded, multifid. Indian Olibanum, which is now the most esteemed, is in roundish or oblong tears, of a reddish or a light yellow colour, usually covered with whitish powder from attrition of the pieces against each other, translucent within of a warm bitterish taste, and having a balsamic odour, especially when warmed or burnt. Sp. Gr. 1·22. Analysed by Dr. O'Shaughnessy, a fine specimen gave of Resin 37 parts, Volatile Oil 28 parts, Gum 4, Gluten 11, in 100 parts. But the quantity of Volatile Oil is necessarily much less when it has been exposed and become dry, as seen in commerce. Bracannot obtained only 8 per cent. of Oil, of Resin 56, Gum 30, matter like Gum 5·2, loss 0·8=100.

(5848) OLIBANUM AFRICAN, Africanischen Weihrauch. Ger.

Encens, Fr.

Imported into Vienia and Marseilles from Suez, and obtained from Arabia and the east coast of Africa, is mentioned by Dr. Pereira as African or Arabian Olibanum, and as occurring in smaller tears than the Indian variety, yellowish or reddish and intermixed with crystals of Carbonate of Lime. One kind of African Olibanum is no doubt produced on the hills of the Somali coast westward from Cape Guardafui, and carried to the Arabian coast chiefly by native boats from Maculla. This tree partially described by Capt. Kempthorne of the Indian Navy, has been identified by Mr. Bennett of the British Museum with *Ploslea floribunda* of Endlicher, but which appears to Dr. Royle to be nothing but a species of Boswellia, which he would therefore call *B. floribunda*. The specimens are covered with little resinous exudations, as are the leaves of a plant collected in the island of Socotra by Lt. Wellsted, which also appear to be those of a Boswellia. *Action. Uses.* Stimulant. Sometimes used in chronic affections of mucous membranes, but chiefly in plasters, and as a fumigation.—*Royle, p.* 338.

(5849) OLIVES.

Zeitoon, Arab.	Olivæ, Lat.
Olives, Fr.	Booa-minyak, Mal.
Oliven, Ger.	Zeitoon, Pers.
Zeitoon, Guz. Hind.	Azeitonas, Port.
Ulive, Olive, It.	Aceitunis, Sp.

The fruit of a tree (*Olea Europea*), a native of the South of Europe, Persia, and the North of Africa, and extensively cultivated in France, Spain, Italy, &c. Olives, when fresh, have a harsh, and extremely bitter taste; and they are eaten only after having been steeped for several days in a ley of wood ashes, and then pickled in a strong solution of muriate of soda. They are chiefly valued on account of the oil obtained from them; and are also eaten as an article of dessert. —*Faulkner.* See Olea. The fruit is perfectly oval, rounded at both ends, about one inch long, smooth, shining green, its sarcocarp fleshy, succulent, covering oval, oblong, rugose, pointed nut, marked with longitudinal furrows of ash colour; almond white, and compressed. Inodorous, taste rough, modified by salting.—*O'Sh.*

(5850) OLIVE, Chinese, the tree commonly called the Chinese olive is a species of Canarium, and the fruit gets this name from the resemblance it bears to the olive of Europe; It grows along with the Chinese date, a species of (zizyphus), which produces a fruit not unlike the date imported into England.—*Fortune's Wanderings, p.* 382.

(5851) OLIVE OIL, Lucca Oil, Salad Oil.

Huile de Olives, Fr.	Olio d Uliva. It.
Baumol, Ger.	Oleo-das-Azeitonas, Port
Zeytoon-ka-teil, Guz. Hind.	Aceite de Aceitunas, Sp.

The lightest of the fixed oils, is derived from the olive fruit. Olive oil being high priced, is frequently adulterated with cheaper kinds, sesamum oil (*Vern.* Gingelly oil) chiefly. In the countries of production, this oil is an important article of subsistence to all classes; and is also employed to burn in lamps. In Great Britain it is used in cooking and for salads, and considerable quantities are also employed in the making of fine soap, in the woollen manufactures, and in other arts. In medicine it is used as an emollient, and to form cerates and plasters. It is supposed that a portion of the large quantities of Gingelly oil exported from Bombay to France, after undergoing certain purifying processes are returned to India in the shape of olive oil.—*Faulkner.* See Olea. Olive oil is of pale yellow colour, greenish in one variety: is often adulterated with the oil of poppies. Poutet describes a test by which he states the adulteration may be detected; 8 parts of liquid nitrate of mercury when mixed with 92 parts of *pure* olive oil solidify completely in a few hours; should the oil contain even one-twentieth of the oil of poppies, a soft mass only is obtainable. These experiments are however only available in India during the nights of the cold season. The principal use of olive oil is as an aliment; it is also consumed extensively in soaps, cerates, liniments, plasters, &c. According to the mode of expression, the quality of the oil varies considerably; *virgin oil*, the product of the perfectly recent fruit, is of greenish colour, and highly esteemed; *common olive oil* results from the expression of the fruits after they have undergone a slight fermentation. It is yellow, sweet, and well suited for culinary purposes. The oils inferior to this are consumed almost exclusively in the fabrication of soap, and are obtained by subjecting to the press a second time the crushed fruits which have already yielded the first and second qualities of oil. The finest olives and the worst oil are produced in Spain. The oil of the Sesamum orientale, of the arachis, and of the poppy, are perfect substitutes for the olive oil for medicinal and pharmaceutical uses.—*O'Shaughnessy, p.* 432,433. Vegetable oils are in most cases extracted from the seeds of plants, but in the case of the olive, the best oil is contained in the pulpy part of the fruit, and this is carefully extracted before the seeds are subjected to pressure. The olive is a tree which grows luxuriantly in Italy, whence our chief supply of the oil is obtained; but it is not indigenous to that country, having been transmitted thither from its home in the east. Asia, the birthplace of civilization, was likewise the birthplace of the olive; and in the western world the tree followed the progress of peace, of which it is considered the symbol. The olives in Syria and the Holy Land are very numerous and of great age, springing up without culture in wild luxuriance. The olive-groves of Greece are likewise famed, and some of the Greek islands export large quantities of the oil. Olive oil is also to be obtained on the African coast, and in the south of France and Spain. The olive-tree is not very much unlike the English willow, and is frequently polarded in a similar manner. The scenery in that part of the Italy which may be called "the heel of the boot," is rendered monotonous by the immense olive-groves which cover the country. Throughout the whole of the two provinces Bari and Lecce, or La Terra d' Otranto, scarcely anything else is cultivated. The most celebrated port of these provinces is Gallipoli, which gives its name to the oil brought from an extensive district. Great part of the merit of Gallipoli oil arises from the facilities which that town possesses for keeping it pure and fresh after it is brought in from the country. These will be noticed presently, but we must first describe the very simple means employed to procure the oil. Olive-trees begin to bear at two years old, but are not in full bearing until after five or six years, when they become a sure source of wealth to their owners. They are of extreme longevity, and will bear luxuriant crops when the trunk is quite hollow. A tree of this description, whose empty shell scarcely supported it against the mountain storms, is stated to have produced in one year 240 English quarts of oil. Some years ago there was an olive-tree near Nice in a decaying state, which had been the wonder of that part of the country on account of its enormous size and great age. The lowest extremity of the trunk measured 38 feet, and one of the main branches 6½ feet in circumference. As far back as 1516 this tree was distinctly recorded as the oldest in the neighbourhood. In former years it has borne upwards of three hundred-weight of oil in one season, and so late as 1818 it produced two hundred weight. A celebrated olive-tree at Pescio was said to be 700 years old. These, however, are exceptional cases, and it appears probable that the majority of trees do not continue productive much above a century, unless great attention is bestowed upon them. The ingathering of the olives is performed in different ways. Some cultivators allow the fruit to attain complete ripeness and to drop from the trees. Others consider that the fully ripe fruit produces too fat an oil, and one which is liable to become rancid; they therfore gather it a little before it is ready to drop. Others again prefer gathering the fruit some little time before it is ripe, but the oil thus obtained is liable to be sharp

or bitter. The fruit is sometimes beaten off with poles, a very injurious plan for the trees. The olives likewise are bruised, and unless used directly, the oil obtained from them has a bad flavour. The more tedious process of hand-gathering is therefore to be greatly preferred. In order to obtain the finest description of oil, the ripe fruit is conveyed at once to the mill, or if unripe, it is allowed to lie for 24 or 48 hours in a dry place until it begins to wrinkle. For inferior oil or for soap, the olives are heaped up in storehouses, sometimes for months together, and lose much oil from fermentation, while that which remains is greatly deteriorated in flavour. With proper precautions, however, such as frequent turning of the heaps, leaving spaces for the air to circulate, and keeping the several gatherings distinct, much of this loss may be avoided. The crushing of the olives is effected in a mill of the simplest construction, consisting sometimes of a single mill stone, turning in a circular bed: at others, of two mill-stones, placed far enough apart not to crush the seeds The workmen remove the pulp when sufficiently crushed, and place it in bags or sacks, which are heaped up on the platform of a press. This is also of a very rude description, and gives but a slow and feeble pressure. The oil which first exudes from the olives (supposing them to be of good quality) is a fine pure oil, much sought after for the supply of the table. It is known in commerce as *virgin salad oil*. After this is all extracted, there yet remains a considerable quantity so mixed with vegetable albumen that it cannot flow out. The bags of pulp are therefore lifted up, between each is poured a certain quantity of boiling water. This causes the pulp to swell by the absorption of the water: the albumen coagulates, and the more fluid oil flows freely. Still a certain quantity of oil remains among the refuse, and this is subjected to further treatment in separate workshops, the resulting oil being only fit for soap-making. The imperfection of the former process alone renders these latter ones necessary so that a large amount of time and labour is thus unnecessarily expended. As soon as the first run of fine oil is obtained from the olives, it is conveyed in jars or skins to a reservoir, and on the nature of this reservoir much of its after value depends. The town and report of Gallipoli owe much of their celebrity to the circumstance of the former being built on a rocky island, easily excavated into caverns and cisterns where the oil soon clarifies, and can be long preserved without becoming rancid. A Gallipolitan oil-house is described as being the ground-floor of a dwelling-house, in the stone basement of which 4, 6, or more circular holes are seen, about 2 feet in diameter, resembling the mouth of wells. These are the openings to separate cisterns reserved for different qualities of oil. The oil brought in a turbid state to these excellent reservoirs soon becomes bright and yellow, and in some cases may be kept for a period of 7 years. It is carried thither in sheep or goat-skins, generally on the backs of mules, and when it is to be shipped, it is drawn off from the cisterns into skins, and carried on men's shoulders to a house on the sea-shore, where there is a large open basin capable of containing a given quantity, and of measuring the liquid, and into that the porters empty their skins as they arrive. A tube leads from the basin to a large cock on the outside of the house. Under this cock are placed casks of various sizes, and the oil is thus conveniently drawn off into them. Coopers are at hand to close the casks securely, after which they are rolled down to the beach, and being fastened, several together, by ropes, they are attached to a boat, which tows them through the water to the ship's side. The number of persons employed in all these operations is very great, and their cheerfulness, frequently exhibited by singing in concert, gives a very lively effect to the whole scene. The produce of a full crop of oil, in the province of which Gallipoli forms the chief outlet, was, in 1843, nearly 22,000 tuns. Fine *Spanish soap*, known in England as *Castile soap*, is made of olive oil mixed with alkalies. A similar manufacture is carried on at Marseilles, which has a large export trade in soap. Olive oil is largely used in Greece, Italy, Spain, and France, as an article of food, and in medicine, and the arts. It is extensively used in England, especially in the woollen manufacture. The fine oil, called *Florence oil*, used for culinary purposes, is brought from Leghorn in chests containing 30 bottles, or 4 English gallons. Oil of olives varies in colour from greenish to pale yellow. A little above the freezing point of water it begins to deposit some white grains of stearine. At 22°, it deposits 28 per cent of its weight of stearine.—*Tomlinson.*

(5852) OLIVE, OLEA ATTENUATA. Wallich found a species of olive tree on the banks of the Salwen, but from which no oil is made—*Mason.*

(5853) OLIVE PLANTS, grow well at Dapoorie which is 1900 above the Sea.—*Spry's Suggestions, p.* 38.

(5854) OLIVE TREE OF CHINA; OLEA FRAGRANS. (Thunberg, Fl. Jap. t. 2), is a native of China and Japan; its flowers evolve a most delicious odour, and are sometimes used to perfume teas.—*O'Shaughnessy, p.* 433.

(5855) OLIVE WOOD. The matured wood of the olive is hard, compact, and reddish in colour. It takes a fine gloss, and is made into snuff boxes, and trinkets. *Waterston.* —*Faulkner.*

(5856) OM MANI PADMI OM. A Buddhist prayer, in Sikkim and Thibet. Is an in-

vocation of Sakkya, who is usually represented holding a lotus flower with a jewel in it: Its meaning is, Hail to him of the lotus and jewel. —*Hooker, Vol.* I. *p.* 229. Everywhere at Tumlong, in an oratory, the lotus, the mani, and the chirki (or wheel with three rays, emblematic of the Boodhist Trinity), were introduced; "Om Mani Padmi om" in gilt letters, adorned the projecting end of every beam, and the Chinese "cloud messenger," or winged dragon, floated in azure and gold along the capitals and beams, amongst scrolls and groups of flowers. At one end was a sitting figure of Gorucknath in Lama robes, surrounded by a glory, with mitre and beads.—*Hooker, Him. Jour. Vol.* II. p. 194. A mythical animal with a dog's head and blood-red spot over the forehead was not uncommon in this chapel, and is also seen in the Sikkim temples and throughout Tibet. Ermann, in his Siberian Travels, mentions it as occurring in the Khampa Lama's temple at Maimaochin; he conjectures it to have been the Cyclops of the Greeks, which according to the Homeric myth had a mark on the forehead, instead of an eye. The glory surrounding the heads of Tibetan deities is also alluded to by Ermann, who recognises in it the Nimbus of the ancients, used to protect the heads of statues from the weather, and from being soiled by birds; and adds that the glory of the ancient masters in painting was no doubt introduced into the Byzantine school from the Boodhists.—*Hooker, Him. Jour. Vol* II. p. 195.

(5857) OMMASTREPHES, a genus of Cuttle-Fishes belonging to the family *Teuthidæ*. The Cuttel-Fishes of this genus closely resemble those belonging to *Loligo*. Besides other characters they may generally be distinguished by the short rhomboidal termination of the body, formed by the fins, combined with the hinder extremity.

(5858) OMUM WATER, is the distilled water from Bishop's weed seed. It is a useful carminative and largely used for children in Madras. At the Madras Exhibition of 1855, the late *Mr. Gay's* specimens of various pharmaceutical preparations, including *Omum Water, crystallized sugar of Omum*, &c. were considered creditable, and deserving of notice.—*Madras E. J. R.*

(5859) ONDATRA (Lacepede), a genus of Mammalian animals belonging to the family *Castoridæ*. Ondathra is the native name of the Musquash, or musk-rat, which has been adopted as its generic designation. The only species of this genus is the Musquash of America. Of this animal Sir John Richardson gives the following synonyms:—Rat-Musque of Sagard Theodat; *Castor Zibethicus* of Linnæus; L'Ondatra of Buffon; Musk-Rat of Lawson; Musk-Beaver of Pennant; *Mus Zibethicus* of Linnæus and Gmelin; *Fiber Zibethicus* of Sabine and Harlan; Musk-Rat of Godman; Musquash, Watsuss, or Wachusk, also Peesquaw-Tupeyew (the animal that sits on the ice in a round form), of the Cree Indians. In a tract which has for its title, 'A Perfect Description of Virginia,' 1649, we find among the "Beasts great and small . . . a Muske-Rat, so called for his great sweetnesse and shape."

Dental Formula:—Incisors, $\frac{2}{2}$; Molars, $\frac{3-3}{3-3}$ = 16.

The head is short. Body thick and rather flat; legs very short, hind feet large, not webbed. Dark umber-brown above; sides, anterior part of belly, middle of breast, lateral part of neck and cheeks, shining yellowish-brown; chin, throat, sides of the chest, and posterior part of the abdomen, ash-gray; tail compressed, convex on the sides, with its acute edges in a vertical plane, covered with a thin sleek coat of short hairs, which allow a number of small roundish scales, well separated from each other, and which as well as the hair are dusky-brown, to appear through them; acute margins of the tail (which is rather thicker in the middle than at the root, and tapers gradually from its middle to its extremity, which is not acute) covered with a close line of longer hairs dark-brown on the upper edge and soiled white on the under one. Length of head and body 14 inches; of the tail, 8 inches 6 lines. The fur, which much resembles that of the beaver, but is shorter, resists the water during the life of the animal, but is easily wetted. Charlevoix states that the Musk-Rat takes the field in March, at which time its food consists of bits of wood, which it peels before it eats them. After the dissolving of the snows he says that it lives upon the roots of nettles and afterwards on the stalks and leaves of that plant. In summer it feeds on strawberries, &c. to which succeed the autumnal fruits. During this time he states that the male and female are rarely seen asunder. According to the same author they separate in winter, when each takes up its lodgings apart in some hole or in the hollow of a tree, without any provision; and the Indians declared that not the least morsel of anything is eaten by them whilst the cold continues. "They likewise," adds Charlevoix, "build cabins nearly in the form of those of the beavers, but far from being so well executed. As to their place of abode, it is always by the water side, so that they have no need to build causeways....The flesh is tolerable good eating, except in the time of rut, at which season it is impossible to cure it of a relish of musk, which is far from being as agreeable to the taste as it is to the scent." The habitations of the Musquashes, and the mode of hunting them, are thus described by Sir John Richardson:—"In the autumn, before the shallow lakes and swamps freeze over, the Musquash builds its house of mud, giving it a coni-

cal form, and a sufficient base to raise the chamber above the water. The chosen spot is generally amongst long grass, which is incorporated with the walls of the house, from the mud being deposited amongst it; but the animal does not appear to make any kind of composition or mortar by tempering the mud and grass together There is however a dry bed of grass deposited in the chamber. The entrance is under water. When ice forms over the surface of the swamp the Musquash makes breathing holes through it, and protects them from the frost by a covering of mud. In severe winters however these holes freeze up in spite of their coverings, and many of the animals die. It is to be remarked that the small grassy lakes selected by the Musquash for its residence are never so firmly frozen nor covered with such thick ice as deeper and clearer water. The Indians kill these animals by spearing them through the walls of their houses, making their approach with great caution, for the Musquashes take to the water when alarmed by a sound on the ice. An experienced hunter is so well acquainted with the direction of the chamber and the position in which its inmates lie, that he can transfix four or five at a time. As soon as, from the motion of the spear, it is evident that the animal is struck, the house is broken down, and it is taken out. The principal seasons for taking the Musquash are—the autumn before the snow falls, and the spring after it has disappeared but while the ice is still entire. In the winter time the depth of snow prevents the houses and breathing-holes from being seen. One of the first operations of the hunter is to stop all the holes with the exception of one, at which he stations himself to spear the animals that have escaped being struck in their houses, and come hither to breathe. In the summer the Musquash burrows in the banks of the lakes, making branched canals many yards in extent, and forming its nest in a chamber at the extremity, in which the young are brought forth. When its house is attacked in the autumn it retreats to these passages, but in the spring they are frozen up. The Musquash is a watchful but not a very shy animal. It will come very near to a boat or canoe, but dives instantly on perceiving the flash of a gun. It may be frequently seen sitting on the shores of small muddy islands in a rounded form, and not easily to be distinguished from a piece of earth, until on the approach of danger it suddenly plunges into the water. In the act of diving, when surprised, it gives a smart blow to the water with its tail." Sir John Richardson records three varieties besides that above described:—

1. The Black Musquash, rare.

2. The Pied Musquash, with dark blackish-brown patches on a white ground.

3. The White Musquash (*Fiber Zibethicus albus*, Sabine). This albino is not unfrequent.

According to Hearne, the Musquash is easily tamed, soon becomes attached, and is cleanly and playful. The fur is used in hat making, and upwards of one million of skins are imported into this country.—*Eng. Cyc.*

(5860) ONONIS (from ὄνος, an ass, and ὄνημι, to delight, some of the species being said to be grateful to asses), a genus of Plants belonging to the natural order *Leguminosæ*. It has a 5-cleft campanulate calyx, narrow segments, the lower ones longer. The keel is beaked, the style filiform and ascending, the stigma terminal and subcapitate. There are 107 species of this genus described, but none of them are used in medicine or the arts. They are chiefly natives of Europe; about twelve species are found in Africa, and a few on the coast of Asia. (Babington, *Manual of British Botany.*)—*Eng. Cyc.*

(5861) ONION: Allium Cepa. Lin.; Bulbus, D. The Bulb of the Common Onion.

Bussel, Arab.	Bavangmira, Mal.
Bawung, Bali.	Peeaz, Pers.
Kembally, Can.	Cebola, Port.
Loono, Cyng.	Luk, Rus.
Oignon, Fr.	Palandu, Lafarka, Sukundaka, Sans.
Zwiebel, Ger.	Cebolla, Sp.
Khanda, Peeaz, Guz.	Venggayum, Tam.
Peeaz, Hind.	Woolligudda. Tel.
Cipolla, It.	
Braugbang, Jav.	

The Onion is the κρομμυον of the Greeks, *Busl* of the Arabs, and the *Betzulim* of Numbers, xi. 12. Biennial. Bulb simple, roundish, invested with shining, thin, dry membrane. Stem 1—2 feet high, fistular, leafy, and often ventricose at the base. Leaves glaucous, distichous, fistular, terete-acute, shorter than the stem. Spathe reflexed. Umbels large, regular, globose, many-flowered, not bulbiferous. Flowers whitish or greenish, the segments with a green keel, linear-elliptic, obtuse, shorter than the stamens.—Cultivated in gardens in Europe; flowers in July. Probably a native of the Persian region.—Fl. Græca, t. 326.—*Royle.* These well-known bulbous plants are extensively cultivated for pickling, culinary purposes, &c. They vary in size, flavour, and quality, according to the kind, soil, climate, and manner of cultivation. Those most esteemed in the Bombay Presidency are the Surat onions.—*Faulkner.* This vegetable is common all over India, and is sown broad-cast. When about six inches high it is pricked out into beds six fingers' breadth apart; they are sown at almost all seasons of the year, and go to seed without difficulty.—*Riddell.* This is a favorite pot vegetable of the Natives of India, and is a constant ingredient in all their curries, pollaos, &c. &c. &c.—*Ainslie, p.* 246. The common English onion is sometimes cultivated in Tenasserim, but the principal part of the onions seen in the bazars are brought from Rangoon, and it is believed are of a different species.—*Mason.*

(5862) ONOSMA, (from ὄνος, an ass, and ὀσμη, smell; grateful to the ass), a genus of Plants belonging to the natural order *Boraginaceæ*. It has a 5-parted calyx, a tubularly campanulate corolla, and a naked throat. The anthers are sagittate, and connected together by the bases of the lobes. The nuts are ovate, strong, and fixed to the bottom of the calyx, unperforated at the base. The species are small scabrous canescent plants, with crowded lanceolate or linear leaves, and terminal racemes of large yellow secund and usually drooping flowers. —*Eng. Cyc.*

(5863) ONOSMA EMODI, has lanceolate triple-nerved leaves, less hairy beneath, terminal solitary racemes, linear bracts, not half so long as the flowers: the calyx is 5-cornered with ovate segments a ventricose 5-keeled corolla contracted towards the mouth, and the anthers longer than the filaments. It is a native of Nepaul, in Gosaingsthan, where it is called by the natives Mahairanga. The root is branched, of a dark purple colour, and is used in dyeing. *Eng. Cyc.*

(5864) ONOSMA MACROCEPHALA, Onosma Bracteatum, Royle, is officinal in Cashmere, and grows plentifully on the Himalayas; namely, on the Hindokoosh near the Punjab-road, via Peembur to Cashmere. Flowerstem and root, are both of them efficacious and useful in medicine. —*Honigberger, p.* 316.

(5865) ONYX.

Onix, Onice, Fr.	Onyx, Lat.
Onyx, Ger.	Onique, Sp.

Onyx, one of the inferior gems, the silicious particles are arranged in alternating horizontal layers of opaque white and translucent blue, gray, or brown, and because these have a resemblance to the marks on the human nail, the stone was called from the Greek word for nail, ὄνυξ. It was known to the ancients, and was employed by them, as it is now, for those beautiful gems called Cameos, the figure being cut out of the opaque white, the dark part forming the ground, or the contrary. It is most valuable, when the contrast of colours is strong, and when the layer is thick enough to give a high relief to the object to be engraved. In the royal library at Paris there is an antique cameo cut out of an onyx with four layers, representing the apotheosis of Augustus, eleven inches by nine, which is supposed to be the finest in existence. Agates with an onyx structure are not uncommon, particularly among calcedonies, but the finest are brought from India. Cameos are sold at Rome, which are made from a thick shell, having different coloured layers like an onyx.—*Eng. Cyc.*

(5866) OOD BUTTEE, pastils of Wood Aloes, sandal wood, benjamin: Lichen rotundatus, the Patchouli, foliated gypsum; Talisputree (Flacourtia cataphracta) gum mastich, sugar-candy and gum, pounded fine and formed into pastils: They are made in every large town and burut for the fragrance they give out.

(5867) OOD, IN INDIA. Is the name applied to Benjamin; and in Persia, to Wood Aloes.

(5868) OOLIES. Are bars of steel, fabricated from Vuttoms.

(5869) OONDEY OIL. Its source is not known, at Madras: is supposed to be a Fish oil manufactured at Malabar.

(5870) OOROOPA. Is the Malayalam name of a tree, which the Natives of that country prefer to take for building ships, being more durable and close grained.—*Ainslie. Rohde M. S. S.*

(5871) OOSARA-REWAND. Stalagmitis Gamboogioides. Is real gamboge, and is imported via Pali; considered and used as a violent cathartic, the punsaris suppose it to be the extract of the Mirabilis jalapa root, the dose given is sixteen grains: one seer costs four rupees —*Gen. Med. Top. p.* 118.

(5872) OOTRUM FIBRE. Demia extensa. Is a promising substitute for flax. The plant grows in the Madras Presidency.

(5873) OOTUNGUN. A seed used in medicine procurable in all Indian Bazars, obtained, according to Dr. Royle, from a species of Urtica. *Honigberger.*

(5874) OPAL.

Opale, Fr.	Opalus, Lat.
Opal, Ger.	Opala, Pol.
Opalo, It.	Opalo, Piedrais, Sp.

Of this mineral which is essentially a hydrate of silica, there are mentioned by Mr. Brooke, in the 'Encyclopædia Metropolitana,' eleven varieties, and nearly as many are described by Phillips.

Precious Opal or *Noble Opal.*—This mineral is white, bluish, or yellowish-white, and exhibits a beautiful variety or play of colours, as blue green, yellow, and red, several of which appear together. Fracture conchoidal, with a vitreous or resinous lustre; it is easily broken, but scratches glass. Specific gravity 2·06 to 2·09. Infusible by the blow-pipe, but becomes opaque and loses water. The most beautiful specimens occur in Hungary, but it has also been found in Saxony, South America, &c. Analysis of the Hungarian opal by Klaproth:—

Silica	90
Water	10
	—100

Fire-Opal.—In this the internal reflection is bright red. It occurs with the Precious Opal in Hungary, and has also been found in Cornwall.

Hydrophane.—It is usually opaque, but is rendered transparent, and exhibits the iridescent colours of the Precious Opal by immersion in water. According to klaproth it contains a little alumina in addition to silica and water.

Common Opal.—This is of various shades of colour, as white, green, yellow, and red; but is entirely destitute of the play of colours exhibited by the Noble Opal. In other properties they greatly resemble each other. It is stated to contain a little oxide of iron mixed with the silica and water. It is found chiefly in Hungary and Saxony, but specimens have also been produced in Cornwall and in the Dekhan.

Semi-Opal—This is more opaque than the Common Opal, and is dull. It occurs either white, gray, yellow, brown, or green. It is found in the same places as the foregoing.

Wood-Opal, so called from its showing the woody structure. It occurs of several tints of white, gray, brown, and black. It is generally harder than the Semi Opal, but does not materially differ from it in other properties. It occurs in Hungary, in Transylvania, and in Madura.

Cacholong is white opaque opal; harder than the Common Opal; dull; brittle; fracture flat conchoidal. Specific gravity 2·2. Infusible before the blow-pipe. It is found on the banks of the river Cach in Bucharia, in loose masses. It occurs also in the Faroe Islands, Greenland, and Iceland.

Opal Jasper, Ferruginous Opal.—Opaque, or but feebly transparent on the edges. Colour generally deep shades of red, yellow, and gray. Fracture flat conchoidal. It appears to be a silicate of iron with water. It occurs in Hungary, Siberia, and Madura. Klaproth's analysis of a variety from Telkebanya gave—

Silica	43·5
Oxide of Iron	47·0
Water	7·5
Eng. Cyc.	——98·0

(5875) OPERCULUM (Malacology), the plate or pieces which protect the apertures or exposed parts of certain Molluscs. In many of the Testaceous Gastropods it becomes a cover or door, which fits the aperture of the shell more or less accurately when the animal has retired within it. Opercula of this kind vary much in structure and shape. Thus they are sometimes horny, as in *Trochus* and *Murex*; sometimes shelly, nay almost stony as in *Turbo*; and in construction they are for the most part either spiral, concentric, or unguiculated. In Botany this term is chiefly used for the cap which forms the upper extremity of the theca, or sporangium, of a moss, covering over the peristome, and usually falling off when the spores are ready for dispersion. It has also been applied to the lid which covers in the Pitcher of *Nepenthes*, where it is the lobe of a modified leaf —*Eng. Cyc.*

(5876) OPHELIA. Of this genus Wight gives Ophelia corymbosa, 1329-30; elatior, 1330 elegans, 1331; Grisebachiana, 1330; minor, 1332

(5877) OPHELIA ANGUSTIFOLIA, O. PHELIA ANGUSTIFOLIA, Don, (SWERTIA ROYLE) Nat. Ord. Gentianeæ.

Puharee Cheretta, Hind.

This species has long been used as a bitter tonic. Ind. An. No. 6. It is called Puharee chiretta in the hills, and is substituted for the true kind.—*O'Shaughnessy, p.* 460. *Exacum tetragonum* is similarly named *Ooda chiretta*, or purple chiretta.—*O'Shaughnessy, p.* 460.

(5878) OPHELIA CHIRATA, Grisb. Chiretta Herb and Root. (*Agathotes Chirayta*, Don.) Chiretta, *Tetrand*: *Monog* Linn. The bitter called *Chiretta*, or *Chiracta*, is as universally employed throughout Southern Asia as Gentian is in Europe. It has long been known to the Hindoos, but there is no reason to suppose it to be the *Calamus aromaticus* of the ancients. (*v.* Himal. Bot. p. 277). The first English account is that of Dr. Fleming (in Asiat. Res. xi. p. 167), who referred it to the genus Gentiana, others to Swertia, and the late Prof. Don to Agathotes; Grisebach now refers it to Ophelia. It is often confounded with another powerful Indian bitter, that is, Creyat or Justicia paniculata. But there are several plants closely allied to the Chiretta, which are used for the same purposes, as stated in Him. Bot. p. 277. Thus, *Ophelia* (*Swertia*, Wall.) *angustifolia*, Don, is so in Northern India and called *puharee*, (*i. e.* hill) *chiretta*, to distinguish it from the true or *dukhunee* (southern) *chiretta*. This is obtained from Nepal. *Exacum tetragonum* is called *ooda* (that is, purple) *chiretta*. Ophelia chirata is an annual, of from 2—3 feet high, with a single, straight, round, smooth stem. Branches generally decussated, nearly erect. Leaves opposite, amplexicaul, lanceolate-acute, smooth, 5—7-nerved. Flowers numerous, stalked, upper half of the plant forming elegant decussated umbel-like cymes, with 2 bracts at each division. Calyx 4-cleft, with sublanceolate persistent divisions, shorter than the corolla. Corol yellow, rotate, limb 4-parted, spreading, whithering in æstivation, twisted to the right, with 2 glandular hollows protected by a fringed scale upon each segment. Stamens 4; filaments subulate, shortly connected at the base; anthers clover at the base. Style single. Stigma large, 2-lobed. Capsules conical, rather shorter than the permanent calyx and corol, 1-celled, 2-valved, opening a little at the apex. Seeds numerous, affixed to two receptacles adhering to the sides of the valves. Grows in theHimalaya mountains, o

which Nepal is one of the valleys.—Wall, Pl. As. Rar. 3. p. 33. t. 252.

Chiretta is met with in a dried state, tied up in bundles, with its long slender stems of a brownish colour, having the roots attached, and which have been taken up when the plant was in flower. The whole plant is bitter. Analysed by MM. Bousil and Lassaigne, they yielded a Resin, a yellow Bitter substance, a yellow colouring matter, Gum, Malic acid, Salts of Potash; and of Lime, and traces of Oxide of Iron. Mr. Battley states that it contains—1. A free Acid. 2. A very Bitter Extractive and Resinous matter, and much Gum. 3. Muriate and Sulphate of Lime and of Potash; also, that the Spirituous Extract is more aromatic than that of Gentiana lutea, but that the extractive and the gum are in larger proportion in the latter. Water and Spirit take up its active properties.

Action. Uses. Bitter Tonic; Stomachic in Dyspepsia or as a Tonic in Convalescence; either cold or hot infusion; the former is lighter, and well suited to Dyspeptics, and not so apt to create nausea in a hot climate. Sometimes a little Orange-peel or Cardamom is added. A Tincture made as that of Gentian (or ℥ ij. to Proof Spirit (℥ xvj.), like other bitters, is best taken half an hour before meals.—*Royle.*

(5879) OPHELIA ELEGANS, Wight. Grows plentifully in several parts of the Madras Presidency, is considered febrifuge by the Native physicians who prefer it to the Himalayan Chiretta. It grows plentifully in the Jeypore Zemindary of Vizagapatam, and is annually exported, as *Silaras* or *Selajit*, to the value of about Rupees 2,500. The infusion of O. elegans has a powerful bitterness.—*Cleghorn.* "Ophelia elegans," (vide Wight Icon. t 1031.) is closely allied to, and greatly resembles chiretta—the native name is *Salaras* or *Salajit*: the stalks are sold bound together in bundles about one foot long, and a little thicker than a man's arm. The drug is exceedingly cheap, and the amount exported is considerable: to what extent it is employed, is difficult to ascertain, as it is confounded in the bazar with "chiretta."—*M. E. J. R.* This species of ophelia is common on the Pulney Hills in Southern India, also in Vizagapatam, and the plant has long been used as a bitter tonic.—*Med. An. No.* 6.

(5880) OPHIDIA, an order of Reptiles without feet, and consequently, as Cuvier observes, more deserving the name of Reptiles than any other order. According to Cuvier, the order *Ophidia* consists of the genus *Anguis* [Blindworm], of True Serpents, and Naked Serpents. Cuvier's second family, or that of the True Serpents, comprehends the genera which have no sternum nor any vestige of a shoulder-blade, but whose ribs still embrace a great part of the circumference of the trunk, and the body of whose vertebræ are also articulated by means of a convex surface which is received into a socket or concavity of that vertebra which succeeds it. They want the third eyelid and the tympanum; but the ossiculum auditus exists under the skin, and its shaft or handle (so to speak) passes behind the tympanic bone. Many have vestiges of a posterior member under the skin, and the extremity of this rudiment of a limb shows itself externally in the form of a small hook. [Boidæ.] Those serpents to which the names of Doubles Marcheurs, or *Amphisbænidæ* [Amphisbæna; Typhlops], have been given, have the lower jaw carried, as in the Tortoises [Chelonia] and Lizards [Sauria], by a tympanic bone which is articulated directly with the cranium, the two branches of that jaw soldered anteriorly, and those of the upper jaw fixed to the cranium and the intermaxillary bone, so that their mouth cannot be dilated, as in Cuvier's next tribe (the serpents properly so called), and their head is of uniform size with their body; a form and structure which enable them to make progress equally well in both directions, head or tail foremost. The bony frame of the orbit is incomplete backwards, and their eye is very small. Their body is covered with scales, the anus very near its extremity, the trachea long, and the heart placed very far backwards. Of this tribe no venomous species are known. The Serpents, properly so called, have the tympanic bone, or pedicle of the lower jaw, moveable, and nearly always suspended to another bone analogous to the mastoidian, attached to the cranium by muscles and ligaments which permit its mobility: the branches of this jaw are not united to each other except by ligaments, nor are those of the upper jaw united to the intermaxillary bone in any other manner, so that they can be more or less separated: a conformation which gives these animals the power of dilating their mouth to such an extent as to enable them to swallow bodies larger than themselves. Their palatine arches participate in this mobility, and are armed with pointed teeth curved backwards—the most marked and constant character of this tribe. Their trachea is very long; their heart situated very far backwards; and the greater number have only one very long lung, with the vestige of a second. These serpents, says Cuvier, in continuation, are divided into venomous and non-venomous; and the former are subdivided into venomous with many maxillary teeth, and venomous with isolated fangs. In the non-venomous, the branches of the upper jaws are furnished throughout their length, as well as those of the lower jaw and of the palatine branches, with fixed teeth which are not pierced; there are therefore four nearly equal rows of these teeth in the upper part of the mouth, and two in the lower. [Boidæ.] Those which have the mastoidian bones comprised in

the cranium, the orbit incomplete backwards, and the tongue thick and short, much resemble the *Amphisbænidæ* in the cylindrical form of their head and body, as I have, Cuvier observes, been induced to the Orvets [ORVET], in consequence of the smallness of their scales. The Venomous Serpents with isolated fangs present a very peculiar structure in their organs of manducation. Their superior maxillary bones are very small, carried on a long pedicle analogous to the external pterygoid apophysis of the sphenoid bone, and very moveable: here is fixed a pointed tooth, pierced with a small canal which gives issue to a liquor secreted by a considerable gland situated under the eye. It is this liquor which, when shed into the wound made by the bite of the serpent, carries havock into the body of the wounded animal, and produces effects more or less fatal according to the species which has inflicted the wound. This fang is concealed in a fold of the gum when the serpent does not wish to use it; and there are behind it many germs destined to fix themselves in their turn, in order to replace it if it should be broken in the wound it makes. Naturalists, Cuvier remarks, have named these teeth crochets mobiles, or moveable fangs: but it is, properly speaking, the maxillary bone that moves: that bone carries no other teeth, so that, in the Venomous Serpents, only two rows of palatine teeth are seen in the roof of the mouth. All the venomous species bring forth their young alive, in consequence of the egg being hatched internally before it is laid, whence their general name of Vipers, a contraction of *Vivipares*. These deadly serpents with isolated fangs, though they present external characters of the same nature as the preceding group, have, the greater number of them at least, very dilatable jaws and a very extensible tongue. Their head, wide behind, has generally a ferocious aspect, which announces in some degree their malevolent nature. [VIPERIDÆ.] A third tribe has the jaws organised and armed nearly as in the Non-Venomous Serpents, but the species have the first of their maxillary teeth greater than the others, and pierced so as to conduct the venom in the same manner as is effected in the Venomous Serpents with isolated fangs. Such are the *Bungari* and *Hydri*. [HYDRIDÆ; PELAMYS]. The serpents, with one exception (*Deirodon*, to which we shall presently more particularly call attention), subsist on living prey; and, whether non-venomous or venomous, have their teeth, as might be expected, admirably constructed and arranged for the purpose of securing their prey and assisting in deglutition. Professor Owen, in his valuable and copiously-illustrated 'Odontography,' observes that the order *Ophidia*, as it is characterised in the system of Cuvier, requires to be divided into two sections according to the nature of the food and the consequent modification of the jaws and teeth. Certain species, he observes, which subsist on worms, insects, and other small invertebrate animals, have the tympanic pedicle of the lower jaw immediately and immoveably articulated to the walls of the cranium; the lateral branches of the lower jaw are fixed together at the symphysis, and are opposed by the usual vertical movement to a similarly complete maxillary arch above: these, as we have above seen, belong to the genera *Amphisbæna* and *Anguis*, Linn. The rest of the Ophidians, observes the Professor, which form the typical members, and by far the greatest proportion of the order, prey upon living animals, frequently of much greater diameter than their own, and the maxillary apparatus is, as we have also above seen, conformably and peculiarly modified to permit of the requisite distention of the soft parts surrounding the mouth and the transmission of the prey to the digestive cavity. But the mechanism by means of which this distention is accomplished, and which is in fact a dislocation of adapted parts which return to their original positions when the act of deglutition is accomplished, requires, to be well understood, a more particular description than the general account above given, and we proceed to that presented by Professor Owen, as the best and clearest known to us. The two superior maxillary bones have, he observes, their anterior extremities joined by an elastic and yielding fibrous tissue with the small and single intermaxillary bone: the symphysial extremities of the lower maxillary rami are connected together by a similar tissue, allowing of a still wider lateral separation. The opposite or posterior extremity of each ramus is articulated to a long and moveable vertical pedicle, formed by the tympanic or quadrate bone, which is itself attached to the extremity of a horizontal pedicle formed by the mastoid bone, so connected as also to allow of certain yielding movement upon the cranium. The palatine and pterygoid bones have similarly loose and moveable articulations, and concur with the other dentigerous bones of the mouth in yielding to the pressure of large bodies with which the teeth may have grappled. Professor Owen first describes the dental peculiarities of the true serpents, which, as he remarks, swallow their food whole, whether they prey on living animals, as is the case in almost every species, or feed on the eggs of birds, as does *Deirodon scaber*, Owen (*Coluber scaber* Linn). With the exception of this and some congeneric species, in which the teeth of the ordinary bones of the mouth are so minute as to have been deemed wanting, the maxillary and premandibular bones in all true Ophidians are, he observes, formidably armed with sharp pointed teeth; there is on each side of the palate a row of similar teeth supported by the palatine

and pterygoid bones: in the great Pythons and some species of *Boa*, he adds, the intermaxillary bones also support teeth. But whatever be their position, all the teeth, according to the Professor, present a simple conical form, the cone being long, slender, and terminated by an acute apex, and the tooth is either straight, or more commonly bent a little beyond the base, or simply recurved, or with a slight sigmoid inflection. Thus the teeth are adapted for piercing, tearing, and holding, not for dividing or bruising. Certain teeth in some species are traversed by a longitudinal groove, as above noticed, for conveying an acrid saliva into the wounds which they inflict; in others, two or more teeth are longitudinally perforated for transmitting venom. These poison fangs, he remarks, are always confined to the superior maxillaries, as we have already stated, and are generally placed near the anterior extremity of those bones. Professor Owen notices in the first instance the serpents whose teeth are all simple and solid, where the pulp which occupies the basal cavity is calcified. After this the teeth of the poisonous serpents are described, and Professor Owen calls attention to the fact that in certain genera of non-venomous serpents, as in *Dryophis*, *Dipsas*, and *Bucephalus*, in which the superior maxillary teeth increase in size towards the posterior part of the bone, the large terminal teeth of the series are traversed along their anterior and convex side by a longitudinal groove. In the *Bucephalus Capensis* the two or three posterior maxillary teeth present this structure, and are much larger than the anterior teeth or those of the palatine or premandibular series; they add materially therefore, he observes, to the power of retaining the prey, and may conduct into the wounds which they inflict an acrid saliva, but they are not in connection with the duct of an express poison-gland. The long grooved fangs are either firmly fixed to the maxillary bones, or are slightly moveable, according to their period of growth; they are concealed by a sheath of thick and soft gum, and their points are directed backward. The sheath also contains loose recumbent grooved teeth, ready to succeed those in place. In most of the Colubers each maxillary and premandibular bone includes from 20 to 25 teeth: they are less numerous in the genera *Tortrix* and *Homalopsis*, and are reduced to a still smaller number in the poisonous serpents, in the typical genera of which the short maxillary bone supports only a single perforated fang. The transition to the poisonous serpents, which was begun in the *Bucephali* and allied genera with grooved maxillary teeth, is, according to Professor Owen, completed by the poisonous serpents of the genera *Pelamys*, *Hydrophis*, *Elaps*, *Bungarus*, and *Hamadryas*, which latter genus, as its cervical integument can be expanded into a hood, constitutes an immediate link between the *Bungarus* and *Naja*. The structure of the venom-fangs of serpents, and the machinery by which their deadly agency is brought to bear against those who are so unfortunate as to be the objects of their attacks, are so interesting, that we subjoin the following remarks in the author's own words:—"The superior maxillary bone diminishes in length with the decreasing number of teeth which it supports. The transverse or external pterygoid bone elongates in the same ratio, so as to retain its position as an abutment against the shortened maxillary, and the muscles implanted into this external pterygoid style communicate through it to the maxilary bone the hinge-like movements backwards and forwards upon the ginglymoid articulations, connecting that bone with the anterior frontal and palatine bones. As the fully-developed poison-fangs are attached by the same firm basal anchylosis to shallow maxillary sockets, which forms the characteristic mode of attachment of the simple or solid teeth, they necessarily follow all the movements of the superior maxillary bone; when the external pterygoid is retracted, the superior maxillary rotates backwards, and the poison fang is concealed in the lax mucous gum, with its point turned backwards: when the muscles draw forward the external pterygoid, the superior maxillary bone is pushed forwards, and the recumbent fang withdrawn from its concealment and erected. "In this power of changing the direction of a large tooth, so that it may not impede the passage of food through the mouth, we may perceive an analogy between the Viper and the Lophius; but in the fish the movement is confined to the tooth alone, and is dependant on the mere physical property of the elastic medium of attachment. In the serpent the tooth has no independent motion, but rotates with the jaw, whose movements are governed by muscular actions. In the fish the great teeth are erect, except when pressed down by some extraneous force; in the serpent the habitual position of the fang is the recumbent one, and its erection takes place only when the envenomed blow is to be struck. "The peculiar structure of the poison-fang was first described by Fontana, as it exists in the Viper, and subsequently received additional elucidation by Mr. Smith's careful examinations of the fangs of the *Hydrus*, *Naja* and *Crotalus*, and by Mr. Clift's illustrative drawings appended to Mr. Smith's paper. A true idea of the structure of a poison-fang will be formed by supposing the crown of a simple tooth, as that of a *Boa*, to be pressed flat, and its edges to be then bent towards each other, and soldered together so as to form a hollow cylinder open at both ends. The flattening of the fang, and its inflection around the poison-duct, commence

immediately above the base, and the suture of the inflected margins runs along the anterior and convex side of the recurved fang; the poison-canal is thus in front of the pulp-cavity. The basal aperture of the poison-canal is oblique, and its opposite outlet is still more so, presenting the form of a narrow elliptical longitudinal fissure, terminating at a short distance from the apex of the fang. "The character most commonly adduced from the dental system, as distinguishing the venomous from the non-venomous serpents, is, that the former have two, the latter four, rows of teeth in the upper jaw; the two outer or maxillary rows being wanting in the venomous species, and their place being supplied by the single poison-fang. The exceptions to this rule are however too numerous for its value as a distinguishing character in a question of such practical moment as the venomous or non-venomous properties of a serpent. In all the family of Marine Serpents the poison-fang is only the foremost of a row of fixed maxillary teeth. In the *Hydrophis striatus* there are four teeth, and in *Hydrophis schistosa* five teeth, behind the venom fang, of rather smaller size than it; the Two-Coloured Sea-Snake (*Pelamys bicolor*) has also five maxillary teeth in addition to the perforated one. The poison fang in this genus is relatively smaller than in the venomous serpents of the land, but present the same peculiar structure. The poison-gland presents a correspondingly small development; it is pyriform, and its structure, according to Dr. Cantor ('Zool. Trans.,' vol. ii. p. 304), minutely cellular; it is covered by the aponeurotic expansion of the articulo-maxillaries, and transmits a straight duct horizontally to the basal opening of the venom-fang. It is a curious fact that the smaller non-venomous teeth of the poisonous serpents all present a trace of the structures of the functional venom-fang, being more or less deeply grooved along the convex anterior side; and in the *Hydrus* this groove commences by a depression analogous to the oblique basal aperture of the poison-canal in the true fang. "The colubriform poisonous serpents of the land have comparatively short venom fangs, but they are larger than those of the pelagic serpents; and behind the venom-fangs there are likewise some smaller grooved teeth in the maxillary bones; there are three such teeth in the *Bungarus Pama*, and five in the *Bungarus annulatus*. In the *Hamadryas*, or Great Hooded Poisonous Tree-Snake of India, the venom-fang is relatively as large as in typical poisonous serpents, but three or four smaller grooved teeth are implanted behind it on the maxillary bone. "In the most deadly venom-snakes, as the Viper (*Berus*), the Puff-Adder (*Vipera*), the Asps or Hooded Snakes (*Naja*), the Rattle-Snakes (*Crotalus*), and the Cophias and Fer-de-Lance (*Trigonocephalus*,) the poison-fangs acquire their largest size, and are associated only with their successors. These are clustered in greater or less number behind them, presenting the same structure, but of a size proportionate to their degree of development, and further differing in being loosely imbedded in the thick and wide mucous gum, which likewise conceals the fixed and functional fang in its ordinary position of retraction and repose. This fang is more strongly curved backwards than the ordinary teeth, but its acute and slender apex is frequently bent slightly in the contrary direction, as in the Rattle-Snake. The mechanism by which the short maxillary bone and the poison fang are rotated backwards and forwards upon the ginglymoid joint that connects the maxillary with the præfrontal and palatine bones has already been noticed; and as some description of the secreting apparatus to which the peculiar modification of the venom-fang is subservient might here be expected, I have selected for its illustration the accurate figure which Professor Muller has given of the salivary and poison-glands in the *Trigonocephalus lanceolatus*, in his great work on the glandular system. ('De Glandularum Scernentium Structura Penitiori,' fol., tub. vi. fig. 1, p. 55.) "The poison-glands occupy the sides of the posterior half of the head; each consists of a number of elongated narrow lobes, extending from the main duct which runs along the lower border of the gland upwards and slightly backwards. Each lobe gives off lobules throughout its extent, thus presenting a pinnatifid structure; and each lobule is subdivided into smaller secerning cæca, which constitute the ultimate structure of the gland. The whole gland is surrounded by a double aponeurotic capsule, of which the outermost and strongest layer is in connection with the muscles by whose contraction the several cæca and lobes of the gland are compressed and emptied of their secretion. This is then conveyed by the duct to the basal aperture of the poison-canal of the fang. We may suppose, that as the analogous lachrymal and salivary glands in other animals are most active during particular emotions, so the rage which stimulates the venom-snake to use its deadly weapon must be accompanied with an increased secretion and great distension of the poison-glands; and as the action of the compressing muscles is contemporaneous with the blow by which the serpent inflicts its wound, the poison is at the same moment injected with force into the wound from the apical outlet of the perforated fang. "The duct which conveys the poison, although it runs through the centre of a great part of the tooth, is nevertheless, as we have seen, really on the outside of the tooth, the canal in which it is lodged and protected being formed by a longitudinal inflection of the parieties of the pulp-cavity or true internal canal of the tooth. This inflection commences a little beyond the base of the tooth, where its nature is

readily appreciated, as the poison-duct there rests in a slight groove or longitudinal indentation on the convex side of the fang; as it proceeds it sinks deeper into the substance of the tooth, and the sides of the groove meet and seem to coalesce, so that the trace of the inflected fold ceases in some species to be perceptible to the naked eye; and the fang appears, as it is commonly described, to be perforated by the duct of the poison-fang. "From the real nature of the poison-canal, it follows that the transverse section of the tooth varies in form in different parts of the tooth; at the base it is oblong, with a large pulp-cavity of a corresponding form, with an entering notch at the anterior surface; farther on, the transverse section presents the form of a horse-shoe, and the pulp-cavity that of a crescent, the horns of which extend into the sides of the deep cavity of the poison-fang. A little beyond this part the section of the tooth itself is crescentic, with the horns obtuse and in contact, so as to circumscribe the poison-canal; and along the whole of the middle four-sixths of the tooth the section shows the dentine of the fang inclosing the poison-cavity, and having its own centre or pulp-canal, in the form of a crescentic fissure situated close to the concave border of the inflected surface of the tooth. The pulp cavity disappears, and the poison canal again assumes the form of a groove near the apex of the fang, and terminates on the anterior surface in an elongated fissure. "If the end of each inflected fold of cement in the tooth of the *Labyrinthodon* were dilated sufficiently to contain a tube, that tooth might convey the ducts of fifty poison-glands deeply imbedded in its substance, and yet all of them actually on the outside of the tooth itself; it is the existence of a single fold of the same kind, but more simple, inasmuch as it is straight instead of wavy, which forms the complication of the viper's fang subservient to the completion of its peculiar offensive weapon. "The venom-fangs of the Viper, Rattle-Snake, and Fer-de-Lance are coated only with a thin layer of a subtransparent and minutely cellular cement. The disposition of the calcigerous tubes is obedient to the general law of verticality to the external surface of the tooth. Since the inflected surface of the tooth can be exposed to no other pressure than that of the turgescent duct with which it is in contact, the tubes which proceed to that surface, while maintaining their usual relation of the right angle to it, are extremely short, and the layer of dentine separating the poison-tube from the pulp-cavity is proportionally thin. The calcigerous tubes that radiate from the opposite side of the pulp-cavity to the exposed surface of the tooth are disproportionately long. "The pulp-cavity, following the form of the tooth itself, presents in a transverse section of this part the form of a fissure describing four-fifths of a circle; the fissure is widest at the middle and at the two extremities; the exterior calcigerous tubes, in quitting the pulp-cavity, form a graceful curve, the convexity being turned towards the nearest horn of the crescent; at the middle of the pulp-fissure the tubes proceed straight to the opposite surface; and at the two extremities of the crescent the central tubes are nearly straight, while the lateral ones radiate in graceful curves which become bolder as they diverge from the central and straighter tubes. Throughout the greater part of the tooth the calcigerous tubes describe their various inflections in a plane transverse to the axis of the tooth; but towards the apex they begin gradually to rise from that plane; and as the pulp-cavity reassumes, with the tooth itself, the simple conical form beyond the termination of the poison-canal, the calcigerous tubes extend to equal distance from the linear-remnant of the pulp-cavity, which has again passed to the centre of the tooth, and those tubes which are continued from its extremity pass to the apex of the fang in a line parallel with the axis of the tooth. The calcigerous tubes present secondary curvatures of a slightly wavy character, which become more marked and irregular near their termination. In whatever part of the section an entire tube could be clearly traced to its termination, it formed an anastomotic loop at the periphery of the dentine with an adjoining tube. The calcigerous tubes present a diameter of the 118,000th of an inch, and they are separated by interspaces equal to four of their own diameters. Each calcigerous tube gives off many primary branches in its course, but is rarely seen to divide dichotomously until it begins to form its irregular sinuosities near the periphery of the tooth. In the transverse section, the primary branches are sent off from the concave side of the tube, at an acute angle with the trunk; the secondary smaller and more numerous branches proceed from the same side of the main tube or of its primary branches, at a less acute angle, into the clear uniting substance; they are remarkably parallel with each other and straight. In old poison fangs the pulp-cavity or fissure is obliterated by ossification of the remains of the pulp. "The external layer of cement is very thin where it covers the crown of the tooth; it is best seen at the line of union of the coadapted margins of the inflected tooth. At this part the cement is more abundant in the viper's tooth, and its transparency permits a bristle inserted into the poison-canal to be seen through it. The layer which coats the inflected surface of the fang is thinner than the outer one, which, from its transparency, has been regarded as enamel. There is however no trace of true enamel upon the teeth of the poisonous serpents, any more than upon those of the innocuous species. The cells of the cement are more minute and

inconspicuous in the poison-fang than in the simple teeth of the Python and Boa. "The teeth of all Ophidians are developed and completed in the original seat of the tooth-germs in all animals, namely, the mucous membrane or gum covering the alveolar border of the dentigerous bones. This gum presents the same lax tissue and is as abundantly developed as in the Pike, Lophius, and many other fishes, in which it likewise serves as the nidus and locality for the complete development of the teeth. "The primitive dental papilla in the common harmless snake very soon sinks into the substance of the gum and becomes inclosed by a capsule. As soon as the deposition of the calcareous salts commences in the apex of the papilla, the capsule covering that part becomes ossified and adherent to the dentine, and the tooth begins to pierce and emerge from the gum, before its mould, the pulp, is half completed. Fresh layers of cells are successively added to the base of the pulp, and converted by their confluence and calcification into the tubular dentine, until the full size of the tooth is attained, when its situation in the gum is gradually changed, and its base becomes anchylosed to the shallow cavity of the alveolar surface of the bone. "In the posterior part of the large mucous sheath of the poison fang, the successors of this tooth are always to be found in different stages of development; the pulp is at first a simple papilla, and when it has sunk into the gum the succeeding portion presents a depression along its inferior surface, as it lies horizontally, with the apex directed backwards; the capsule adheres to this inflected surface of the pulp. But how the cylindrical cavity of the dilated fold is occupied in the loose growing poison-fang, and by what contrivance it is brought into the same relation with the severed duct of the poison-gland as the displaced fang which it succeeds, is not yet clearly understood." The following list of the distribution of the Asiatic species of *Ophidia* is given by Dr. J. E. Gray in his 'Catalogue of Snakes' in the British Museum. In this list the *Colubridæ* are not included:—

ASIA AND ITS ISLANDS.

Tri esurus viridis
T. albolabris. *China.*
T. carinatus.
T. purpureus.
T. maculatus. *Borneo.*
T. subannulatus. *Philippines.*
T. Philippensis
T. strigatus *Ceylon*
T. Sumatranus. *Sumatra.*
T. formosus. *Borneo.*
T. Ceylonesis *Ceylon.*
Parias flavomaculatus. *Philippines.*
P. ornatus. *Philippines.*
P. variegatus. *Philippines.*
Megœra trigonocephala. *Ceylon.*
Atropos acontia. *Java.*
Enhydrina Bengalensis.
E. Valakadyen.
Trigonocephalus Halys *Tartary.*
T. Blomhoffi, *Japan.*
T. rhodostoma. *Java.*
T. hypnale. *Ceylon.*
T. zara
Daboia elegans.
D. Russellii.
D. Xanthina. *Xanthus.*
Echis carinata.
Pelamis bicolor
P. ornata.
Lapemis curtus.
L. Hardwickii.
Aturia ornata.
A. Belcheri.
A. Lapemoides.
Microcephalophis gracilis.
Phytolopsis punctata.
Tropidophis schistosus.
Hydrophis obscura.
H. Lindsayii.
H. fasciata.
H. nigrocincta.
H. subcincta.
H. sublævis.
H. mentalis.
H. spiralis
H. subannulata.
H. aspera.
H. cœrulescens.
Chitulia inornata.
C. fasciata.
C. schistosa.
Kerilia Jerdonii
Hydrus annulatus
Tomogaster Eydouxii.
Chersydrus granulatus.
C. annulatus
Aeroehordus Javanicus. *Java.*
Cerberus cinereus.
C. acutus *Borneo.*
C. unicolor. *Philippines.*
Ferania Sieboldii
Homalopsis buccata.
H. Hardwickii.
Myron trivittatus (?).
Hypsirhina plumbea.
H. Hardwickii.
H. Aer.
H. bilineata.
H Chinensis.
H. Bennettii.
Fordonia leucobalia.
F. unicolor.
Raclitia Indica.
Miralia alternans
Xenodermus Javanicus. *Java.*
Python reticulatus.
P. molurus.
Liasis amethystina. *New Ireland.*
L. Macklotii.
Nardoa Schlegelii.
Cliftia fusca.
Enygrus carinatus.
Cusoria elegans.
Gongylophis conica.
Clothonia Johnii.
Cylindrophis melanota.
C. rufa.
C. maculata.—*Eng. Cyc.*

(5881) OPHIOGLOSSACEÆ, *Adders Tongues*, a natural order of Acrogenous Plants, belonging to the alliance Filicales. They have an erect or pendulous stem, with a cavity in the middle instead of pith, and two or three woody bundles placed round it in a ring; the stalks of the leaves and the stem become blended together below; the leaves have netted veins; the spore-cases are collected into a spike formed out of the sides of a contracted leaf, 2-valved, without any trace of an elastic ring; spores resembling fine powder. These plants are a transition from Ferns to *Lycopodiaceæ*. The species are most abundant in the islands of tropical Asia. They occur however in the West Indies and in the tropical parts of Africa, at the Cape, and in Tasmania. They are of little or no known use. The following genera with about 25 species belong to this order:—*Ophioglossum*, *Ophiodema*, *Helminthostachys*, *Botrycyium*.—*Eng. Cyc.*

(5882) OPHIOGLOSSUM (ὀφις, a snake, and γλῶσσα, the tongue), a genus of Plants belonging to the natural order *Ophioglossaceæ*. The thecæ are connate, disposed in a simple distichous spike attached to an undivided frond.—*Eng. Cyc.*

(5883) OPHIORRHIZA MUNGOS Loheh of Avicenna, *Roxb. Fl. Ind.* i. 701.

Wal, eka, weriya, Cing.

A native of Java, Ceylon, and Sumatra; all parts are intensely bitter: it has high reputation as a remedy for snake-bites. Roxburgh altogether discredits its supposed virtues. This plant is often confounded with the Ophioxylon serpentinum, of the family of *Apocyneæ*, (*Chundra*, Bengalee), described by Roxburgh, (Fl. Ind. ii. p. 530, *ed. Carey*) and by Ainslie, vol. ii. 441.—*O'Shaughnessy*, *p.* 400. Dr. Wight, in Icones gives, Ophiorrhiza eriantha, 1067; grandiflora, 1069; Harrisonii, 1162; Roxburghiana, 1068.

(5884) OPHIOXYLON (from ὄφις, a serpent, and ξύλον, wood, because it has a twisted

root and stems), a genus of Plants belonging to the natural order *Apocynaceæ*. It has a 5 cleft permanent calyx, a funnel shaped corolla with a long tube, thickest in the middle, and a five cleft oblique limb. The anthers are subsessile, inserted into the middle of the tube. The ovary is double, each lobe with one ovule, a filiform inclosed style and a capitate stigma. The drupes are baccate, black, about the size of a pea, twin, or solitary by abortion, each containing a 1-seeded wrinkled nut.—*Eng. Cyc.* Wight gives Ophioxylon Belgaumense, 1292; Ceylanicum, 1291; macrocarpum, 1292; Neilgherrense, 1292; serpentinum, 819.

(5885) OPHIOXYLON SERPENTINUM. Scarlet Flowered Ophioxylon, Lin. Various parts of India. See Roxb. Fl. Ind. i. p. 694.

Soovana Amel podie, Mal.	Chandraca, Sans.
Chota Chand, Hind.	Chota Chand, Beng.
Acawerya, Cyng	

Serpentine Snake-Wood, is a native of the East Indies. In rich soil it becomes a climbing plant, but in poor soil it is a small erect shrub. The leaves are in threes or fives; they are short-stalked, oblong, pointed, wavy, and smooth. The peduncules are long, smooth, round, sometimes nearly erect, somtimes drooping. The pedicles and calyxes are of a bright red colour, and the corollas white. In India the root of this plant is employed by the Telinga physicians as a remedy in many diseases. *Eng. Cyc* The stems are woody, erect, climbing, and twining. The root is used as a febrifuge, as an antidote to snake poison, and to *promote delivery* in tedious cases. *Lindley, page* 532., *O'Shaughnessy, page* 447. Soovana Amelpoodie is the name given on the Malabar Coast to this plant, the root of which is supposed to have sovereign virtues in cases of snake bites and scorpion stings: it is prescribed in decoction to the extent of a pint in the twenty-four hours and the powder is applied externally to the injured part. See *Hort. Mal. Part.* 6, *page* 82. This plant is by some believed to be that to which the Mungoose (chneumon) was said to have recourse in his battles with poisonous serpents.—*Ains. Mat. Med. p.* 115.

(5886) OPLISMENUS STAGNINUS. Cultivated in the gardens at Kotah, but the inhabitants do not believe in its reputed virtues.—*Genl. Med. Top. p.* 185.

Enormous islets of living water-grasses (*Oplismenus stagninus*) and other plants, float on the Megny river.—*Hooker, Him. Jour. Vol.* II *page* 338.

(5887) OPIUM.

Ufyoon, Arab.	Opium, Lat.
Hapium, Bali.	Ufyoon, Caruppa, Mal.
Abim, Cyng.	Sheer-i-kush-khush, Ufyoon, Pers.
Opium, Fr.	Opio, Port.
Mohnsaft, Ger.	Chasa, Apaynum Sans.
Ufeem, Ufyoon, Guz. & Hind.	Opio, Sp.
Oppio, It.	Apini, Tam. & Tel.
Apium, Jav.	Majoon, Turk.—*Faulk.*

Opium is the concrete inspissated juice of the white poppy, *Papaver somniferum* and its varieties, obtained by scratching the capsules and collecting the exuding juice. The plant has been long known, and is perhaps one of the earliest described. It is a native of Western Asia and probably also of the South of Europe, but it has been distributed over various countries. In 1826, the imports of opium into the United Kingdom were 79,829 lbs., of which 28,329 lbs. were consumed in England. The imports and consumption in subsequent years are shown by the following figures:—

	Imports. lbs.	Consumption. lbs.
1827	113,149	17,322
1830	209,076	22,668
1833	106,846	35,407
1836	130,794	38,943
1839	196,247	41,632
1842	72,373	47,432
1845	259,644	38,229
1848	200,019	61,055
1849	105,724	44,177
1850	126,318	42,324
1851	118,024	50,682
1852	205,780	62,521

Few who have not looked into the statistics of this trade, are aware of the enormous consumption of opium all over the world, but chiefly in China and India. In 1845, 18,792 chests of opium were sent from Calcutta to China, and nearly the same number of the Malwa opium from Bombay and Damaun. The total production of India exported to China, in 1844, was 21,526 chests from Bengal, and 18,321 from Bombay, in all 39,847 chests. The number of persons in China given to the consumption of opium was estimated, in 1837, at three millions, and the average quantity smoked by each individual is about 17½ grains a day. The consumption of Indian opium (independent of Turkey opium) in China has gradually increased from 3,210 chests in 1817, to 9,969 chests in 1827, and about 40,000 chests in 1837, valued at 25,000,000 dollars. Now it has reached 50,000 to 60,000 chests. Notwithstanding severe penalties, imprisonment, temporary banishment, and even death, the number of those who smoke opium has multiplied exceedingly, and the contraband trade in the drug is carried on to so large an extent, that it is to be feared the practice will become general throughout the empire. According to Mr, E. Thornton's statistics, the production of opium in Bengal has increased cent. per cent. in the last ten years:—

	chests.
1840-41	17,858
1841-42	18,827
1842-43	18,362
1843-44	15,104
1844-45	18,350
1845-46	21,437
1846-47	21,648
1847-48	30,515
1848-49	36,000

The chest is about 140 lbs., so that the production in 1849 was 5,040,000 lbs. According to the statements annexed to the statistical papers relating to India, the income from the opium monopoly is obtained by two principal means, namely, by a system of allowing the cultivation of the poppy by the natives of British India on account of Government, and by the impost of a heavy duty on opium grown and manufactured in foreign states, but brought in transit to a British port for exportation. The former system obtains in Bengal, the latter in Bombay. According to the statements published, Bengal opium yields a profit of 7s. 6d. per lb., whilst the duty derived in the Bombay presidency is only equal to a surplus of 5s 8d. per lb. By these means the total revenue realised by the opium monopoly, in Bengal and Bombay, in the year 1849-50 yielded £3,309,637.

The white variety of the poppy is that which is exclusively brought under cultivation for the production of the drug in India and Egypt. For the successful culture of opium a mild climate, plentiful irrigation, a rich soil, and diligent husbandry are indispensable. One acre of well cultivated ground will yield from 70 lbs. to 100 lbs. of "chick," or inspissated juice, the price of which varies from 6s. to 12s. a pound, so that an acre will yield from £20 to £60 worth of opium at one crop. Three pounds of chick will produce one pound of opium, from the third to a fifth of the weight being lost in evaporation. A chief chemical feature, which distinguishes Bengal opium from that of Turkey and Egypt, is the large proportion which the narcotine in the former bears to the morphia, and this proportion is constant in all seasons. It is a matter of importance to ascertain whether the treatment which the juice receives after its collection can influence in any way the amount of alkaloids, or of the other principles in opium. In Turkey it is the custom to beat up the juice with saliva, in Malva it is immersed as collected in linseed oil, whilst in Bengal it is brought to the required consistence by mere exposure to the air in the shade, though, at the same time, all the watery particles of the juice that will separate are drained off, and used in making *Lewah*, or inferior opium.

The lands selected for poppy cultivation are generally situated in the vicinity of villages where the facilities for manuring and irrigation are great

est. In such situations and when the soil is rich, it is frequently the practice with the cultivators to take a crop of Indian corn, maize, or vegetables off the ground during the rainy season, and after the removal of this in September, to dress and manure the ground for the subsequent poppy sowings. In other situations, however, and when the soil is not rich, the poppy crop is the only one taken off the ground during the year, and from the commencement of the rains in June or July, until October, the ground is dressed and cleaned by successive ploughings and weedings, and manured to the extent which the means of the cultivator will permit. In the final preparation of the land in October and November, the soil, after being well loosened and turned up by the plough, is crushed and broken down by the passage of a heavy log of wood over its surface, and it is in this state ready for sowing. The amount of produce from various lands differs considerably. Under very favorable circumstances of soil and season, as much as twelve or even thirteen seers (26 lbs.) of standard opium may be obtained from each biggah of 27,225 square feet. Under less favorable conditions the turn out may not exceed three or four seers, but the usual amount of produce varies from six to eight seers per biggah. The chemical examination of different soils in connection with their opium-producing powers, presents a field for profitable and interesting inquiry; nor is the least important part of the investigation that which has reference to variations in the proportions of the alkaloids (especially the morphia and narcotine), which occur in opium produced in various localities. That atmospheric causes exert a certain influence in determining these variations is probable; that they influence the amount of produce, and cause alterations in the physical appearance of the drug, are facts well known to every cultivator: thus the effect of dew is to facilitate the flow of the juice from the wounded capsule, rendering it abundant in quantity, but causing it at the same time to be dark and liquid. An easterly wind (which in India is usually concomitant with a damp state of atmosphere), retards the flow of juice, and renders it dark and liquid. A moderate westerly wind, with dew at night, form the atmospheric conditions most favorable for collection, both as regards the quantity and quality of the exudation. If, however, the westerly wind (which is an extremely dry wind) blow violently, the exudation from the capsules is sparing. Whilst the effect of meteorological phenomena in producing the above results are well marked, their action in altering the relative proportions of the chemical constituents of the juice of the poppy plant is more obscure, and it is highly probable that the chemical composition of the soil plays a most important part in this respect. Dr. O'Shaughnessy is

certainly the most accomplished chemist who had ever, in India, turned his attention to the subject, and he has published the results of his analyses of specimens of opium from the different divisions of Behar Agency, which are worthy of much attention. In the opium from eight divisions of the agency, he found the quantity of morphia to range from 1¾ grains to 3½ per cent., and the amount of the narcotine to vary from ¾ grain to 3½ grains per cent, the consistence of the various specimens being between 75 and 79 per cent. In the opium from the Hazareebaugh district (the consistence of the drug being 77), he found 4 ½ per cent. of morphia, and 4 per cent narcotine; whilst from a specimen of Patna-garden opium he extracted no less than 10¾ per cent. of morphia, and 6 per cent. of narcotine, the consistence of the drug being 87. With respect to the last specimen, Dr. O'Shaughnessy mentions that the poppies which produced it were irrigated three times during the season, and that no manure was employed upon the soil. It is much to be regretted that these interesting results were not coupled with an analysis of the soils from which the specimens were produced, for to chemical variations in it must be attributed the widely different results recorded above.

Opium as a medicine has been used from the earliest ages; but when it was first resorted to as a luxury, it is impossible to state, though it is not at all improbable that this was coeval with its employment in medicine, for how often do we find that, from having been first administered as a sedative for pain, it has been continued until it has taken the place of the evil. Such must have happened from the earliest ages, as it happens daily in the present; but as a national vice it was not known until the spread of Mahomedanism, when, by the tenets of that Prophet, wine and fermented liquors being prohibited, it came in their stead along with the bang or hascheesh (made from hemp), coffee, and tobacco. From the Arabs the inhabitants of the Eastern Archipelago most probably imbibed their predilection for opium, although their particular manner of using it has evidently been derived from the Chinese. China, where at present it is so extensively used, cannot be said to have indulged long in the vice. Previous to 1767 the number of chests imported did not exceed 200 yearly; now the average is 50,000 to 60,000. In 1773 the East India Company made their first venture in opium, and in 1796 it was declared a crime to smoke opium. In different countries we find opium consumed in different ways. In England it is either used in a solid state, made into pills, or a tincture in the shape of laudanum. Insidiously it is given to children under a variety of quack forms, such as "Godfrey's cordial," &c. In India the pure opium is either dissolved in water and so used, or rolled into pills. It is there a common Native practice to give it to children when very young, by mothers, who require to work and cannot at the same time nurse their offspring. In China it is either smoked or swallowed in the shape of *Tye*. In Bally it is first adulterated with China paper, and then rolled up with the fibres of a particular kind of plantain. It is then inserted into a hole made at the end of a small bamboo, and smoked. In Java and Sumatra it is often mixed with sugar and the ripe fruit of the plantain. In Turkey it is usually taken in pills, and those who do so, avoid drinking any water after swallowing them, as this is said to produce violent colics; but to make it more palatable, it is sometimes mixed with syrups or thickened juices; in this form, however, it is less intoxicating, and resembles mead. It is then taken with a spoon, or is dried in small cakes, with the words "Ma-sha-Allah," imprinted on them. When the dose of two or three drachms a day no longer produces the beatific intoxication, so eagerly sought by the opiophagi, they mix the opium with other drugs. It then acts as a stimulant. In addition to its being used in the shape of pills, it is frequently mixed with hellebore and hemp, and forms a mixture known by the name of majoon, whose properties are different from that of opium, and may account in a great measure for the want of similitude in the effect of the drug on the Turk and the Chinese. In Singapore and China the refuse of the chandu, the prepared extract of opium, is all used by the lower classes. This extract, when consumed, leaves a refuse, consisting of charcoal, empyreumatic oil, some of the salts of opium, and a part of the chandu not consumed. Now one ounce of chandu gives nearly half an ounce of this refuse, called Tye, or Tinco. This is smoked and swallowed by the poorer classes, who only pay half the price of chandu for it. When smoked it yields a further refuse called sam shing, and this is even used by the still poorer, although it contains a very small quantity of the narcotic principle. Sam shing, however, is never smoked, as it cannot furnish any smoke, but is swallowed, and that not unfrequently mixed with arrack.

Preparation of Opium in India.—Towards the end of March when the plant is nearly ripe the bleeding of the capsules takes place. This operation is performed in the evening, and consists of tracing four parallel lines with a sharp knife or shell, penetrating the epicarp and sarcocarp of the capsule; a milky juice immediately exudes and its flow is promoted by the deposition of dew during the night; each set of incisions yields on an average one grain of opium. This is removed the ensuing morning, and the incisions repeated as long as any milk flows. The whole of the opium collected daily, and which is

necessarily mingled with variable proportions of dew, is mixed together in earthen or wooden vessels. Should the quantity of dew have been excessive, a partial solution of the opium occurs, and an exudation of drops of a black, shining liquid (Pasewa) occurs, on the surface of the opium. This pasewa contains many of the active principles of the drug, and should be mixed with it again to secure the uniform power of the mass. The proportion of pasewa is often much increased by the fraudulent admixture of water by the growers, in hope of having their opium purchased by the gross weight. When brought to the factories the opium is usually of the consistence of 64 to 68, that is, containing that proportion of solid matter per 100. It is then placed in large tanks of brick work, or in wooden vats, with the upper surface exposed to the air. From these reservoirs, portions are daily removed and exposed on wooden trays three inches deep by four feet long and two broad; evaporation takes place under such circumstances with tolerable rapidity, and the opium eventually reaches the consistence of 70—the standard of the factory for the Chinese investment. The degree of inspissation is estimated on the purchase of the drug, as well as during its subsequent evaporation, by drying average portions of 100 grains each, on a metallic table heated to 208° by steam. A sufficient quantity of opium, average quality, is permitted to attain the consistence of 80°, and in that state is issued under the name of "Abkaree" to the licensed dealers of the bazars. Lastly, the finest opium which can be procured is set apart for medical purposes, and allowed to lose by evaporation nearly the entire of its water. The *Chinese investment opium* is of a rich chesnut colour, translucent at the edges of thin masses, tears into portions with ragged margins; its structure is granular, its taste hot and bitter, its smell rich, peculiar, and agreeable; if a small portion be rubbed between the finger and thumb for a few seconds, it draws out into long colourless threads, and from the number, fineness, and tenacity of these threads the Chinese form their first estimate of the value of the drug. The *abkaree*, or Bengal bazar opium is more solid than the Chinese investment drug, of a darker colour, and often of a heavy ascescent smell. For the Chinese investment the opium is made into cakes, each containing 4 lbs., and enveloped in a case made of the petals of the poppy, and agglutinated with a paste made of opium and water, (Lewa). The abkaree opium is also vended in balls weighing 2lbs. covered by strips of a coarse kind of silk cemented by a mucilage of gum. The medicinal opium is solid, brittle in the cold season, of a brown colour, and fine smell. The medicinal drug is packed with great care in 4lb. and 2lb. squares, covered with layers of talc, and further defended by a case of brown wax ½ an inch in thickness. Besides the above, several kinds of opium are to be met with even in Indian commerce—that from Malwah demands most attention.

Malwah opium.—There are many varieties of this opium, some of which the Bengal Committee who investigated the drugs, had oportunities of examining through the kindness of Dr. Morehead of Bombay. The specimens were (average) 1½lb. in weight, hard, brittle, containing from five to ten per cent. of moisture, mixed with fragments of leaves and seeds, and impregnated with oil, apparently used in the collection; the colour was almost a rusty brown, the odour very powerful, and taste intensely bitter and lasting. Besides the opiums above mentioned, it is necessary to notice the chief varieties alluded to in works on European Materia Medica. *M. Berthemot*, in a paper published in the "Journal de Pharmacie," for September 1838, describes three principal kinds, viz.—1st. the opium of Alexandria; 2d. of Constantinople; 3rd. of Smyrna.

Alexandrian opium is in small, very dry, pieces, enveloped in fragments of leaves, of a very deep brown colour, clean and shining fracture, of faintly virose smell.

Constantinople, variety is in two forms, usually in flattened morsels contained in large leaves, sometimes rather soft, occasionally dry and brittle, softening between the fingers, and translucent when pressed into thin layers. The smell is stronger than that of the former kind, and is deemed a sufficient distinguishing sign between both.

Smyrna opium, lastly, is either in flat pieces, or roundish balls; one kind is very dry, wrapped up in large leaves, of shining fracture, reddish brown colour internally, of bitter, acrid, and enduring taste. The second kind is rolled in seeds of the Rumex, is soft, and easily torn, of fawn colour internally, but darkens rapidly on exposure to the air, transparent when drawn out, and often mixed with the seeds which constitute its outer covering. The Smyrna opium is the most valuable of the varieties now described, containing the largest proportion of the narcotic alkali morphia, and in a state which permits this principle to be purified with greatest ease.—*O'Shaughnessy, p.* 172-174.

Preparation in Asia Minor.—Men, women, and children, a few days after the flower falls from the poppies, proceed to the fields, and with a shell scratch the capsules, wait twenty-four hours, and collect the tears, which amount to two or three grains in weight from each capsule. These being collected and mixed with the scrapings of the shells, worked up with saliva and surrounded by dried leaves, it is then sold, but, generally speaking, not without being still more adulterated with cow's dung, sand, gravel, the petals of flowers, &c. Different kinds of opium are known in the markets of Europe and Asia.

The first in point of quality is the *Smyrna*, known in commerce as the *Turkey* or *Levant*. It occurs in irregular, rounded, flattened masses, seldom exceeding two pounds in weight, and surrounded by leaves of a kind of sorrel; the quantity of morphia said to be derived from average specimens is eight per cent.

Second, *Constantinople Opium*, two kinds of which are found in the market, one in very voluminous irregular cakes, which are flattened like the Smyrna; this a good quality. The other kind is in small, flattened, regular cakes, from two to two and a half inches in diameter, and covered with the leaves of the poppy; the quantity of morphia is very uncertain in this description of opium, sometimes mounting as high as 15 per cent., and sometimes descending so low as six, showing the great variety in the quality of the drug.

Third, *Egyptian Opium*, occurs in round flattened cakes, about 3 inches in diameter, and covered externally with the vestiges of some leaf. It is distinguished from the others by its reddish color, resembling "Socotrine Aloes." The quantity of morphia in this is inferior to the preceding. It has one quality which, when adulterated, ought to be known, that is a musty smell. By keeping it does not blacken like the other kinds.

Fourth, *English Opium*, is in flat cakes or balls enveloped in leaves. It resembles fine Egyptian opium more than any other kind. Its color is that of hepatic aloes, and in the quantity of morphia it is inferior to the preceding, but in the strength of the mass it is said by one of its most extensive cultivators to be superior.

Fifth, *French*, and sixth *German Opium*, require no particular remarks.

By a recent notice, the French are cultivating the poppy in Algeria, from which they get opium giving a small per centage of morphia.

Seventh, *Trebizond* or *Persian Opium*, is sometimes met with of a very inferior quality in the form of cylindrical sticks, which by pressure have become angular.

Eighth, *Indian Opium*, divided into four kinds, Cutch, Malwa, Patna and Benares. Of these *Cutch* is but little known or cultivated. It occurs in small cakes covered with leaves, and its color is much inferior to Smyrna. *Malwa* opium is to be met with of two kinds. The inferior is in flattened cakes, without any external covering, dull, opaque, blackish brown externally, internally somewhat darker, and soft. Its color is somewhat like the Smyrna, but less powerful, and with a slight smoky smell. Superior Malwa is in square cakes, about three inches in length and one inch thick. It has the appearance of a well prepared, shining, dry, pharmaceutical extract; its color is blackish brown, its odor less powerful than Smyrna; it is not covered by petals as the following kinds are, but smeared with oil; it is then rubbed with pounded petals. The *Behar*, *Patna*, and *Benares* Opium, being strictly in the hands of Government, no adulteration can take place, without a most extensive system of fraud; but it will not be uninteresting to trace the progress of the opium from the hands of the natives, to the condition in which it is delivered to the public by the Government. From the commencement of the hot season to the middle of the rains the Government is ready to receive opium, which is brought by the natives every morning, in batches, varying in quantities from twenty seers to a maund. The examining officer into each jar thrusts his examining rod, which consists of a slit bamboo, and, by experience, he can so judge of the qualities of the specimens before him, which are sorted into lots of No. 1 to No. 4 quality. Opium of the first quality is of a fine chesnut color, aromatic smell, and dense consistence. It is moderately ductile, and, when the mass is torn, breaks with a deeply notched fracture, with sharp needle-like fibres, translucent and ruby red at the edges. It is readily broken down under water, and the solution at first filters of a sherry color, which darkens as the process proceeds. One hundred grains of this yield an extract to cold distilled water of from 35 to 45, and at the temperature of 212 degs., leaves from 20 to 28 per cent., having a consistency of 70 to 72, the consistence of the factory. The second quality is inferior to the first, and the third quality is possessed of the following properties, black paste, of a very heavy smell, drops from the examining rod, gives off from 40 to 50 per cent. of moisture, and contains a large quantity of "Pasewa;" while the fourth or last number embraces all the kinds which are too bad to be used in the composition of the balls, comprising specimens of all varieties of color and consistence. This number is mixed with water, and only used as a paste to cement the covering of the balls. The three first qualities are emptied from their jars into large tanks, in which they are kept until the supply of the season has been obtained. The opium is then removed and exposed to the air on shallow wooden frames, until it becomes of the consistency of from 69 to 70, when it is given to the cake maker, who guesses to a drachm the exact weight, and envelops the opium in its covering of petals, cemented by a covering of quality number 4. The balls are then weighed and stored, to undergo a thorough ventilation and drying. Formerly the covering of the balls was composed of the leaves of tobacco; but the late Mr. Flemming introduced the practice of using the petals of the poppy, which was such an improvement that the Court of Directors presented him with 50,000 rupees. The balls, forty in number, are packed in a mango wood case, which consists of two stories with twenty pigeon

holes in each, lined with lath and surrounded by the dried leaves of the poppy. Sometimes these balls are so soft as to burst their skins, and much of the liquid opium running out, is lost. In 1823 many of the chests of Patna lost five catties from this cause, and to this day we have the same thing continuing to occur. Patna chests are covered with bullock hides, Benares with mummies. Dr. Impey, who resided in Malwa from 1843 to 1846, published at Bombay, in 1848, a valuable treatise on the cultivation, preparation, and adulteration of Malwa opium. It was some time before he obtained permission to publish the result of the experience he had acquired in Malwa, and as Government inspector of opium at Bombay. It is the most practical treatise Mr. Simmonds had met with, although a very elaborate, useful paper, by Mr. Little, surgeon, of Singapore, appears in the 2nd vol. of the "Journal of the Indian Archipelago," from which I have quoted the preceding remarks. Mr. Little furnishes a complete history of the drug, and the physical and mental effects resulting from its habitual use. There are also some able remarks in Dr. O'Shaughnessy's Bengal Dispensatory:—For the successful cultivation of opium, a mild climate, plentiful irrigation, a rich soil, and diligent husbandry, are indispensable. In reference to the first of these, Malwa is placed most favorably. The country is in general from 1,300 to 2,000 feet above the level of the sea: the mean temperature is moderate, and range of the thermometer small. Opium is always cultivated in ground near a tank or running stream, so as to be insured at all times of an abundant supply of water. The rich black loam, supposed to be produced by the decomposition of trap, and known by the name of cotton soil, is that prepared for opium. Though fertile and rich enough to produce thirty successive crops of wheat without following, it is not sufficiently rich for the growth of the poppy until largely supplied with manure. There is, in fact, no crop known to the agriculturist, unless sugar cane, that requires so much care and labor as the poppy. The ground is first four times ploughed on four successive days, then carefully harrowed; when manure, at the rate of from eight to ten cart loads an acre, is applied to it; this is scarcely half what is allowed a turnip crop at home. The crop is after this watered once every eight or ten days, the total number of waterings never exceeding nine in all. One begah takes two days to soak thoroughly in the cold weather, and four as the hot season approaches. Water applied after the petals drop from the flower, causes the whole to wither and decay. When the plants are six inches high, they are weeded and thinned, leaving about a foot and a-half betwixt each plant; in three months they reach maturity, and are then about four feet in height if well cultivated. The full-grown seed-pod measures three and a-half inches vertically, and two and a-half in horizontal diameter.

Early in February and March the bleeding process commences. Three small lancet-shaped pieces of iron are bound together with cotton, about one-twelfth of an inch of the blade alone protruding, so that no discretion as to the depth of the wound to be inflicted shall be left to the operator; and this is drawn sharply up from the top of the stalk at the base, to the summit of the pod. The sets of the people are so arranged that each plant is bled all over once every three or four days, the bleedings being three or four times repeated on each plant. This operation always begins to be performed about three or four o'clock in the afternoon, the hottest part of the day. The juice appears almost immediately on the wound being inflicted, in the shape of a thick gummy milk, which is thickly covered with a brownish pellicle. The exudation is greatest over night, when the incisions are washed and kept open by the dew. The opium thus derived is scraped off next morning, with a blunt iron tool resembling a cleaver in miniature. Here the work of adulteration begins—the scraper being passed heavily over the seed-pod, so as to carry with it a considerable portion of the beard, or pubescence, which contaminates the drug and increases its apparent quantity. The work of scraping begins at dawn, and must be continued till ten o'clock; during this time a workman will collect seven or eight ounces of what is called "chick." The drug is next thrown into an earthen vessel, and covered over or drowned in linseed oil, at the rate of two parts of oil to one of chick, so as to prevent evaporation. This is the second process of adulteration—the ryot desiring to sell the drug as much drenched with oil as possible, the retailers at the same time refusing to purchase that which is thinner than half dried glue. One acre of well cultivated ground will yield from 70 to 100 pounds of chick. The price of chick varies from three to six rupees a pound so that an acre will yield from 200 to 600 rupees worth of opium at one crop. Three pounds of chick will produce about two pounds of opium, from the third to a fifth of the weight being lost in evaporation. It now passes into the hands of the Bunniah, who prepares it and brings it to market. From twenty-five to fifty pounds having been collected, is tied up in parcels in double bags of sheeting cloth, which are suspended from the ceilings so as to avoid air and light, while the spare linseed oil is allowed to drop through. This operation is completed in a week or ten days, but the bags are allowed to remain for a month or six weeks, during which period the last of the oil that can be separated comes away; the rest probably absorbs oxygen and becomes thicker, as in

paint. This process occupies from April to June or July, when the rain begins. The bags are next taken down and their contents carefully emptied into large vats from ten to fifteen feet in diameter, and six or eight inches thick. Here it is mixed together and worked up with the hands five or six hours, until it has acquired an uniform color and consistence throughout, become tough and capable of being formed into masses. This process is peculiar to Malwa. It is now made up into balls of from eight to ten ounces each, these being thrown, as formed, into a basket full of the chaff of the seed pods. It is next spread out on ground previously covered with leaves and stalks of the poppy; here it remains for a week or so, when it is turned over and left further to consolidate, until hard enough to bear packing. It is ready for weighing in October or November, and is then sent to market. It is next packed in chests of 150 cakes, the total cost of the drug at the place of production being about fourteen rupees per chest, including all expenses. About 20,000 chests are annually sent from Malwa, at a prime cost charge of two lacs and eighty thousand rupees. It may easily be supposed that manipulations so numerous, complex, and tedious, as those described, give the most ample opportunities for the adulteration to which the nature of the drug tempts the fraudulant dealer.

In order to enable the cultivator to carry on his agricultural operations, he receives from time to time certain advances, the amount of which reaches in the aggregate to about one-half of the value of the estimated out-turn of produce. If the land has been under cultivation in previous seasons, its average produce is known; if it be new land, and considered by the Sub-Deputy Agent as eligible, then the cultivator, in addition to the usual advances, receives an advance of so much per biggah to enable him to bestow a certain amount of extra care in tilling and dressing the soil. The first advance is made on the completion of the agreement or bundobust, and this takes place in September and October. The second advance is made on the completion of the sowings in November, and the final or Chook payment is made immediately after the delivery and weighing of the produce. Nothing therefore can be fairer, to the cultivator than this system of advances; he is subject to no sort of exaction, in the shape of interest or commission on the money which he receives, and it puts within his power the certain means of making a fair profit by the excercise of common care and honesty. It is an established rule in the Agency that the cultivator's accounts of one season shall be definitively settled before the commencement of the next, and that no outstanding balances shall remain over. When a cultivator has from fraud neglected to bring produce to cover his advances, the balances due by him are at once recovered, if necessary by legal means; whereas, if he can satisfactorily show that he has become a defaulter from calamity and uncontrollable circumstances, and that the liquidation of his debt is placed entirely beyond his power, his case is then made the subject of report to the Government by the Agent, with the request that the debt may be written off to profit and loss. These provisions are most wise, for outstanding balances may be made the means of oppression, and to their operation, may be traced a considerable amount of litigation and agrarian crime in the indigo districts of lower Bengal. It is clear that when such balances become so large that the cultivator cannot discharge them, he is no longer a free agent, but is perfectly subservient to the will of his creditor, for whom he must cultivate whether he desire it or not. Such burdens may even be handed down from father to son. The fairness of the Agency system, and the justice with which the cultivators are treated are best evidenced by the readiness with which they come forward to cultivate, and also by the comparative rarity of agrarian crime, arising out of matters connected with the poppy cultivation. Opium is grown to some extent in Egypt; 39,875 lbs. were produced in 1831, and sold at two dollars a pound. At the end of October, after the withdrawal of the Nile waters the seed, mixed with a portion of pulverised earth is sown in a strong soil, in furrows; after fifteen days the plant springs up and in two months has the thickness of a Turkish pipe, and a height of four feet; the stalk is covered with long, oval leaves, and the fruit, which is greenish, resembles small orange. Every morning before sunrise, in its progress to maturity, small incisions are made in the sides of the fruit, from which a white liquor distils almost immediately, which is collected in a vessel; it soon becomes black and thickish, and is rolled into balls, which are covered with the washed leaves of the plant; in this state it is sold. The seeds are crushed for lamp oil, and the plant is used for fuel.—*O'Shaughnessy*, 589. Dr. Royle tells us that Opium seems to have been known from early times. Hippocrates is supposed to have employed it, and Diagoras condemned its use in affections of the eyes and in ear-ache. Dioscorides describes it: but opium does not appear to have been much employed until the time of the Arabs, except in the form of the confections called Mithridatica, Theriaca, and Philonium. The Arabic name *afioon*, the Hindu *ephim*, and the name *afooyung*, by which it is known in China, must all have proceeded from the original Greek name, which is itself derived from *οπος*, juice. The Sanscrit *apoynum* seems to have a similar origin. Opium is obtained by a very simple process, consisting merely in making incisions in the evening into the capsules of the Poppy, shortly after the petals fall off, taking care not to penetrate into the interior, when a milky juice exudes, and

either concretes upon the capsule, whence it may be taken off in little tear-like masses, or earlier in the morning in a softer state. Upon this will depend whether the grains run together, or remain separate even when pressed. When thus collected, they require nothing more than being dried in a warm and airy room, when the opium becomes of a brown colour, with a shining fracture, and has a strong and peculiar odour. Some opium which Dr. Royle prepared in this manner in the Saharunpoor Botanic Garden in 1828-29, was pronounced by the Medical Board of Bengal to be like Turkey opium. Most of the opium made in the Himalayan mountains is similarly prepared, and is of very fine quality. Belon and Olivier describe the Opium of Asia Minor as formed by the assemblage of the small tears collected off the capsules. Dioscorides, however, describes the process as consisting in making incisions into the capsules when the dew has evaporated, collecting the juice in a shell, mixing the several portions, and rubbing them up in a mortar. Kæmpfer gives this as the Persian process, and M. Texier describes it as being adopted in Asia Minor; and it is certainly practised with the immense quantities collected in India in the provinces of Behar and Benares, and of which an excellent description has been given by Dr. Butter in the Journal of the Asiatic Society, v. p. 136. When this method is adopted, the mass will appear homogeneous; when it is omitted, it will appear to be composed of agglutinated tears. Both appearances may be observed in the opium of commerce. Dr. Butter describes the quantity of opium from each capsule as varying according to soil, irrigation, and to the quantity of dew which falls, but averaging about 1 gr. from each quadruple incision. The tears are of a reddish-white colour externally but semi-fluid in the interior, and of a reddish-white colour. The juice is apt to be mixed with dew, and fraudulently with a little water, and will separate into a fluid portion (*passeera*) and into one which is more consistent, the former containing much the largest portion of the Bimeconate of Morphia. The whole of the day's collection is rubbed together in a mortar, so as to break down the grains, and reduce the whole to a homogeneous semi-fluid mass, which should be dried as quickly as possible in the shade, when it is called *pucka* or matured, being called *raw* in its former state. All samples of Opium brought for sale are submitted to a steam drying process, by which the quantity of fluid in each is easily ascertained. The Opium for the China investment contains about 30 per cent. of moisture: that for medical use in India is made quite dry. The Opiums known in European commerce have been described under the following heads by Prof. Guilbourt. That collected in Asia Minor, chiefly in Anatolia, is generally all included under the head of Turkey Opium, and most of it is exported from Smyrna; some of it, however, is taken to Constantinople, whence it is re-exported to other parts of Europe. Some Egyptian is imported into this country. The Persian is only known. The Indian kinds are exported to China.

Smyrna Opium, called also Levant Opium, is generally in flattened masses, and, in consequence of its original softness, without any definite regular form; weighing from a half to two pounds and covered with the capsules of a species of Rumex. It is at first soft, of a distinct brown colour, becoming blackish and hard when dried, losing weight from evaporation of water, having the strong and peculiar odour of Opium. "When examined with a magnifier, it is seen to be composed of yellowish agglutinated tears." This is the purest kind of Opium, yielding about 8 per cent. of Morphia and 4 per cent. of Narcotine, and, on an average, about 12 per cent. of Hydrochlorate of Morphia. An inferior kind is, however, also imported from Smyrna, which is more apt to be adulterated, is harder, of a darker colour, appears homogeneous, and may be seen covered either with Rumex capsules, or with the leaves of the Poppy. The Smyrna Opium is produced at several places, at from 10 to 50 days' distance in the interior; but that grown at Caisar, about 60 miles from Smyrna, is the most esteemed for its cleanness and good quality. Mr. Hamilton states that much is produced at Bogaditza: it is made into lumps about four or five inches in diameter, round which leaves are wrapped.

Constantinople Opium, M. Guibourt conceives, may be collected in the northern parts of Anatolia. One kind is in small lenticular pieces about two inches in diameter, weighing from four to eight ounces, and always covered with a Poppy-leaf, of the midrib of which the mark may be seen on the middle of the pieces of Opium. Another variety is in large irregular cakes. Both are more mucilaginous than the Smyrna kind, and, though of good quality, the Constantinople is less uniform in the quantity of Morphia it contains, some yielding less, and others as much as, the best kinds of Opium.

Egyptian Opium is in flattened roundish cakes about three inches in diameter and covered with the remains of some leaf which M. Guibourt was unable to distinguish. It looks well externally, is homogeneous, has something of a reddish hue, not blackening by keeping, but softening on exposure to the air, and has somewhat of a musty smell. It is generally inferior, and Mr. Guibourt obtained only ¼ of the Morphia yielded by Smyrna Opium.

Persian Opium, which Dr. Pereira calls Trebizond Opium, from his specimens having been obtained from thence. The specimens in the King's College Museum were sent by Mr. Mor-

son, to whom M. Guibourt was also indebted. This kind is of a black colour, apparently homogeneous in texture, and in sticks some inches in length, each wrapped up in a separate piece of paper, and tied with a piece of cotton. Some Opium has been collected in Algiers. A new variety imported from Turkey has been described by Mr. Morson (P. J. iv. 503). It resembled the Constantinople, but was soft and light-coloured; contained much wax, caoutchouc, and about 6½ per cent. of Morphia. Besides these, some Opium is occasionally met with of European manufacture; and it might easily be produced in England if the summer was more regular. In the south of Europe the summer is probably too hot and dry. In India it can only be cultivated in the cold weather. Some good English Opium has been produced, but it is irregular in strength. The quantity of Morphia said to have been obtained from some specimens of French and of German Opium is enormous,—being from 16 to 20 per cent.

Indian Opium, not being known in European commerce, requires a very short notice. The *Saharunpoor Garden Opium*, sent home in 1844, is of a brown colour, shining fracture, with the strong and peculiar smell of opium, and yielded the late Professor Daniell, in one of the last analyses he made previous to his sudden and lamented death, 8 per cent. of Morphia. [Some specimens of this opium, prepared when Dr. Royle was superintendant of the Saharunpore Botanic Garden, sent to the Medical Board of Bengal in 1829, were pronounced to be "very fine specimens, and to resemble Captain Jeremie's in almost every particular," and Captain Jeremie's they "considered equal, if not superior, to the finest Turkey opium that comes into the market at home."

Himalayan Opium possesses similar sensible properties and though liable to be adulterated, is when pure, of very fine quality.

Malwa Opium is in flat circular cakes, average weight 1½ lb., of a rusty-brown colour, strong odour, and bitter permanent taste, varying much in quality. Some Malwa Opium lately analysed yielded only 2 per cent. of Morphia, was oily and mucilaginous, and appeared to have been obtained by expression of the capsules. Dr. Smyttan, late Opium Inspector at Bombay, obtained from 3 to 5 per cent. of Morphia from some varieties, and from 7¼ to 8 per cent. from finer kinds. Some *Kandeish Opium* yielded to Mr. E. Solly 72 per cent. of soluble matter, and about 7 per cent. of Morphia. The E. I. Company's Opium, which is that known under the name of Bengal Opium, and which is chiefly produced in the provinces of Behar and Benares, with some in that of Cawnpore, is also of different qualities: that intended for medicinal use in the hospitals in India is of very fine quality, of a brown colour, and fine smell, packed with great care in 4 lb. and 2 lb. squares covered with layers of talc, and further defended by a case of brown wax half an inch in thickness. This Dr. Jackson, lately Opium Inspector at Calcutta, informed Dr. Royle is the *Patna Garden Opium*, cultivated, prepared, and selected exclusively for the Dispensary, and that it yields about 7 to 8 per cent. and sometimes more (10½), of Morphia. It is of this kind that Dr. Christison says, "I have examined specimens little inferior to average Turkey Opium in the quantity of Morphia they contained."

Chinese Investment Opium, which is highly esteemed by the Chinese, is made into cakes or balls, each containing about 4 lbs. and covered with a thick layer of poppy petals, made to adhere to the opium and to each other by means of a mixture of inferior kinds of Opium and water. It is of a dark brown colour, of the consistence of an extract when first cut into, containing 70 per cent. of solid matter, and about 2½ per cent. of Morphia.—*Royle*. The E. I. Company grant licences for the cultivation of the poppy, and contract for all the produce at certain rates, varying with the quality. No opium can be grown without this licence, and an advance equal to about two-thirds of the value of the produce is made to the grower. This produce is made over to district collectors, who approximately fix the worth of the contents of each jar, and forward it to Patna, where rewards are given for the best samples, and the worst are condemned without payment; but all is turned to some account in the reduction of the drug to a state fit for market. The poppy, and the capsules are sliced in February and March with a little instrument like a saw, made of three iron plates with jagged edges, tied together. The cultivation is very carefully conducted, nor are there any very apparent means of improving this branch of commerce and revenue. During the N. W., or dry winds, the best opium is procured, the worst during moist, or E. and N. E., when the drug imbibes moisture, and a watery bad solution of opium collects in cavities of its substance, and is called Passewa, according to the absence of which the opium is generally prized.—*Hooker Him. Jour. Vol.* I *p.* 83. At the end of March, he continues, the opium jars arrive at the stores by water and by land, and continue accumulating for some weeks. Every Jar is labelled and stowed in a proper place, separately tested with extreme accuracy, and valued. When the whole quantity has been received, the contents of all the jars are thrown into great vats, occupying a very large building whence the mass is distributed, to be made up into balls for the markets. This operation is carried on in a long paved room, where every man is ticketed, and many overseers are stationed to see that the work is properly conducted. Each workman sits on a stool, with a double stage and a tray before him. On the top stage is a tin basin

containing opium sufficient for three balls; in the lower another basin holding water: in the tray stands a brass hemispherical cup, in which the ball is worked. To the man's right hand is another tray, with two compartments, one containing thin pancakes of poppy petals pressed together, the other a cupful of sticky opium-water, made from refuse opium. The man takes the brass cup, and places a pancake at the bottom, smears it with opium-water, and with many plies of the pancakes makes a coat for the opium. Of this he takes about one-third of the mass before him, puts it inside the petals, and agglutinates many other coats over it: the balls are then again weighed, and reduced or increased to a certain weight if necessary. At the day's end, each man takes his work to a rack with numbered compartments, and deposits it in that which answers to his own number, thence the balls (each being put in a clay cup) are carried to an enormous drying-room, where they are exposed in tiers, and constantly examined and turned, to prevent their being attacked by weevils, which are very prevalent during moist winds, little boys creeping along the racks all day long for this purpose. When dry, the balls are packed in two layers of six each in chests, with the stalks, dried leaves, and capsules of the plant, and sent down to Calcutta. A little opium is prepared of very fine quality for the Government Hospitals, and some for general sale in India; but the proportion is trifling, and such is made up into square cakes. A good workmen will prepare from thirty to fifty balls a day, the total produce being 10,000 to 12,000 a day; during one working season 1,353,000 balls are manufactured for the Chinese market alone.—*Hooker Him. Jour. Vol.* I. *p.* 83 & 84. The poppy-petal *pancakes*, each about a foot radius, are made in the fields by women, by the simple operation of pressing fresh petals together. They are brought in large baskets, and purchased at the commencement of the season. The liquor with which the pancakes are agglutinated together by the ball-maker, and worked into the ball, is merely inspissated opium water, the opium for which is derived from the condemned opium, (Passewa,) the washing of the utensils, and of the workmen, every one of whom is nightly laved before he leaves the establishment, and the water is inspissated. Thus not a particle of opium is lost. To encourage the farmers, the refuse stalks, leaves, and heads are bought up, to pack the balls with; but this is far from an economical plan, for it is difficult to keep the refuse from damp and insects.—*Hooker Him. Jour: Vol.* I. *p.* 85. A powerful smell of opium pervaded these vast buildings, which Dr. Corbett assured Dr. Hooker did not affect himself or the assistants. The men work ten hours a day, becoming sleepy in the afternoon; but this is only natural in the hot season: they are rather liable to eruptive diseases possibly engendered by the nature of their occupation.—*Hooker Him. Jour. Vol.* I. *p.* 85. Even the best East Indian opium is inferior to the Turkish, and owing to peculiarities of climate, will probably always be so. It never yields more than five per cent of morphia, whence its inferiority, but is as good in other respects, and even richer in narcotine.—*Hooker Him. Jour. Vol.* I. *page* 85.

Cultivation.—The mode of raising the poppy in the Patna district in India, is thus described. "The ryot or cultivator having selected a piece of ground, always preferring (*cæteris paribus*) that which is nearest his house fences it in. He then, by repeated ploughings, makes it completely fine and removes all the weeds and grass. Next, he divides the field into two or more beds by small dikes of mould, running lengthwise and crosswise according to the slope and nature of the ground, and again into smaller squares by other dikes leading from the principal ones. A tank is dug about ten feet deep at one end of the field, from which by a leathern bucket, water is raised into one of the principal dikes and carried to every part as required; this irrigation is necessary because the cultivation is carried on in the dry weather. The seed is sown in November, and the juice collected in February and March, during a period, usually, of about six weeks; weeding and watering commence as soon as the plants spring up, and are continued till the poppies come to maturity. Cuts are then made in the rind of the seed vessel, with a small shell; from them the juice exudes during the night and is scraped off in the morning; when the heads are exhausted, they become whitish.—*Williams' Middle Kingdom, Vol.* II. *page* 383. This writer seems to exaggerate matters. In his bias he says: the cultivator is assisted by his family and must deliver a certain quantity at such a price to the collector, the amount being fixed by a survey of the field when in bloom; he receives about 165 dollars for a seer (1 lb. 13 oz.) of the poppy juice, which must be of a certain consistence. The ryot has, in most cases, already received the advance money for the opium, and if he sell it to any other than the collector, or if he fail to deliver the estimated quantity, and there is reason for supposing he has embezzled it, he is liable to punishment. In all the territories belonging to the company, the cultivation of the poppy, the preparation of the drug, and the traffic in it until it is sold at auction for exportation, are under a strict monopoly. Should an individual undertake the cultivation without having entered into engagements with the government to deliver the produce at the fixed rate, his property would be immediately attached, and be compelled either to destroy the poppies, or give

security for the faithful delivery of the product. The cultivation of the plant is compulsory, for if the ryot refuse the advance for the year's crop the simple plan of throwing the rupees into his house is adopted; should he attempt to abscond, the agents seize him, tie the advance up in his clothes, and push him into his house. There being then no remedy he applies himself as he may to the fulfilment of his contract. Vast tracts of the very best land in Benares, Bahar, and elsewhere in the northern and central parts of India, are now covered with poppies; and other plants used for food or clothing, grown from time immemorial, have nearly been driven out. In Turkey, Persia, India and China, many myriads of acres and millions of people are employed in the cultivation of poppies. [Note Chinese Repository. Vol. V., page 472.] *Williams' Middle kingdom, Vol.* II. *p.* 383. There are four sorts of opium brought to China: Turkey, which sells cheapest in China, and is brought chiefly from Smyrna; Patna and Benares, which are grown in the Company's territories, and sold at Calcutta; and Malwa, which is cultivated out of their jurisdiction, but pays them a revenue of about 200 rupees each chest for its transit to Bombay where it is shipped. The Portuguese also export a small quantity from their settlement in Damaun. The drug is rolled in balls, and then packed in strong boxes weighing from 116 lbs. for Patna to 134 lbs. or 140 lbs. for Malwa. The Malwa opium is grown and prepared entirely by natives, and is often so extensively adulterated as to be worthless. There are between 400 and 500 cakes in a chest of Malwa, and the cultivator there receives double the wages of the ryot in Bengal. —*Williams' Middle Kingdom, Vol.* II. *p.* 385. The chests of Patna and Benares are made of mango wood, and consists of two stories or parts, in each of which there are twenty partitions; the forty balls to fill these partitions are carefully rolled in dried poppy leaves. The chest is covered with hides or gunny bags, and the seams closed so as to render it as impervious to the air as possible, but considerable allowance is made for dry gage. After the drug is sold at Calcutta, it is shipped in small fasts ailing-vessels for China, more than half of the export from that and other parts in India being sent off in these clippers.—*Williams' Middle Kingdom, Vol.* II. *p.* 385.

Effects of Opium-smoking.—The vice of opium-smoking is now so prevalent in Calcutta, not only among the Chinese, but the degraded, and depraved of every sect and nation, that Dr. O'Shaughnessy had many opportunities of witnessing the results to which it leads. Stupor, reverie, and voluptuous listlessness are the immediate effects produced. In this state the individual can be at once and easily aroused to exertion or business. No sickness, constipation, or any other functional disturbance supervenes on each indulgence; gradually, however, the appetite diminishes, the bowels become irregular, emaciation takes place, sexual tendencies are destroyed, and premature old age speedily comes on. This he admits is an extreme case; when the habit is but moderately followed it appears to occasion no greater evil than the proportionate indulgence in wine or other spirituous liquors.—*O'Shaughnessy, page* 180. Opium, is at present, largely consumed in the Malayan islands, in China, in the Indo-Chinese countries, and in a few parts of Hindustan, much in the same way in which wine, ardent spirits, malt liquor, and cider, are consumed in Europe. Its deleterious character has been much insisted on, but, generally, by parties who have had no experience of its effects. Like any other narcotic or stimulant, the habitual use of it is amenable to abuse, and as being more seductive than other stimulants, perhaps more so; but this is certainly the utmost that can be safely charged to it. Thousands consume it without any pernicious result, as thousands do wine and spirits, without any evil consequence. I know of no person of long experience and competent judgment who has not come to this common-sense conclusion. Dr. Oxley, a physician and naturalist of eminence, and who has had a longer experience than any other man of Singapore, where there is the highest rate of consumption of the drug, gives the following opinion: "The inordinate use, or rather abuse, of the drug most decidedly does bring on early decrepitude, loss of appetite, and a morbid state of all the secretions; but I have seen a man who had used the drug for fifty years in moderation, without any evil effects; and one man I recollected in Malacca who had so used it, was upwards of eighty. Several in the habit of smoking it have assured me that, in moderation, it neither impaired the functions nor shortened life; at the same time fully admitting the deleterious effects of too much." There is not a word of this that would not be equally true of the use and abuse of ardent spirit, wine, and, perhaps even of Tobacco. The historian of Sumatra, whose experience and good sense cannot be questioned, came early to the very same conclusion. The superior curative virtues of opium over any other stimulant are undeniable, and the question of its superiority over ardent spirits, appears to me to have been for ever set at rest by the high authority of Sir Benjamin Brodie. "The effect of opium, when taken into the stomach," says this distinguished philosopher, "is not to stimulate but to soothe the nervous system. It may be otherwise in some instances, but these are rare exceptions to the general rule. The opium-eater is, in a passive state, satisfied with his own dreamy condition while under the influence of the drug.

He is useless but not mischievous. It is quite otherwise with alcoholic liquors.—*Psychological Inquiries, p*: 248. *Crawfurd Dict. page* 313. It may be worth while to show what is really the relative consumption in those countries in which its use is alleged to be most pernicious. In the British settlement of Singapore owing to the high rate of wages, and the prevalence of a Chinese population, the consumption is at the rate of about 330 grains, or adult doses, a year, for each person. In Java, where the Chinese do not compose above one in a hundred of the population, and where wages are comparatively low, it does not exceed 40 grains. Even in China itself where the consumption is supposed to be so large, it is no more than 140 grains chiefly owing to the poverty of the people, to whom it is for the most part inaccessible.—*Crawfurd Dictionary, page* 313. Opium is eaten to a very considerable extent by the Burmese, and the drug is easily procured.—*Mason*. That raised in Bahar (called Patna in commerce) and Benares is superior to the Malwa, and both are preferred by the Chinese to the Turkey opium. Good opium is moderately firm in texture, capable of receiving an impression from the finger; of a dark yellow color when held in the light, but nearly black in the mass, with a strong smell, and free from grittiness. That produced in different countries, however, varies considerably and experience alone can determine the best article. The value increases for a short time by age; but this soon ceases to be the case, and Turkey opium in particular deteriorates unless carefully preserved from the air. Opium is adulterated with leaves, dirt, and other substances; if very soft it is not usually good. The great consumption of this drug among the Chinese has made the opium trade a very important branch of commerce. About fourteen millions of dollars worth have been annually sold to them for many years past, and the demand is constant. The trade is now carried on by means of ships stationed at different points on the coast, to which the drug is carried in small vessels; or it is sold all along the coast in schooners from Haenan to Shanghae, especially at points opposite large towns. No efforts have been made by the Chinese authorities to suppress the traffic that deserve to be mentioned, since those of commissioner Lin in 1839, and it is now everywhere publicly smoked. It is probable that before long the progress of events will compel the Chinese to legalize the trade. The opium brought from India sells from $ 550 to $ 700 a chest, and the Turkey from $ 370 to $ 500 a pecul. The price of the commodity fluctuates, however, according to the extent of importation, and other causes. For minute information respecting the progress and effects of this traffic, see the Chinese Repository, *passim*. —*Morrison*. The extent to which the poppy is cultivated in China bears about as great a disproportion to the consumption of opium, as the growth of tea abroad does to its use; the provinces of Yunnan and Kwangsi are said to produce the greater part of the native article.—*Williams' Middle Kingdom, p*. 286.

Opium shipped to China from East India for following years is:—

	Bengal Opium. Chests.	Malwa Opium. Chests.
1820, ...	3,591	2,278
1830, ...	7,443	12,856
1835, ...	14,851	12,933
1840, ...	18,965	18,321
1845, ...	21,457	20,660
1846, ...	20,000	19,063
1847, ...	21,650	20,523
1848, ...	28,000	17,490
1849, ...	36,000	18,532

Bonynge America, page 170.

From London Home News Mail 10*th April* 1857,

Opium Receipts of the East India Company.—A return of the receipts and expenditure of the East India Company during the 10 years 1845-55, in respect of their opium monopoly, has been published, The net receipts were as follows:—

	Rupees.	As.	P.
1845-46	1,98,82,577	8	7¼
1846-47	2,09,61,421	7	8
1847-48	1,74,51,890	6	8¾
1848-49	2,46,27,136	12	5¼
1849-50	2,51,83,494	15	1¼
1850-51	2,23,72,576	7	1
1851-52	2,74,47,805	8	1¼
1852-53	2,73,89,125	8	9
1853-54	2,32,44,991	6	0½
1854-55	2,18,74,489	12	6
	23,04,35,509	13	0¼
Average	2,30,43,550	15	8¼

Opium Adulterations.—Good Opium, when it has been sometime made, is of a dark brown or blackish colour externally, and of a reddish-brown internally, either homogeneous in texture, or formed of agglutinated tears. Sp: Gr: about 3·36. The taste is strongly and permanently bitter, with some degree of acridity, and a little aroma. The odour is both powerful and peculiar. It is hard, and even becomes brittle, and breaks with a compact shining fracture, and produces a yellowish-brown powder. Some kinds, however, are soft internally, and others never become entirely dry. The London College, to preserve uniformity of strength, directs dried Opium only to be used for the several pharmaceutical preparations. Opium is softened by the application of heat, and burns at a higher temperature. The effects of the ordinary reagents are, that water, either temperate or warmed, dissolves about two-thirds

of good opium, and forms a solution of most of its active principles, and is of a bitter taste and of a reddish-brown colour. Rectified Spirit takes up four fifths of the whole mass, including all the active properties of Opium. Ether dissolves much of what is left undissolved by water. Diluted acids take up all its active principles. The alkalis precipitate them from their solutions, but redissolve them when added in excess. They are also precipitated by baryta, lime, and magnesia, and their salts, also by the soluble salts of lead and of other metals, as well as by solutions of tannin and astringent vegetable substance. As some of these are apt to be prescribed with opium, it is essential to attend to the form of exhibition, for the precipitate may contain all the active principles, and the solution be inert; or it may be made active again by using an excess of ammonia or potash; or the active principle may be taken up by the acid of some of the salts used. But these various effects of reagents can be duly appreciated only when the composition of Opium is understood. Several analys is were made of Opium before any just ideas were obtained respecting its constitution. Derosne in 1803 first obtained a saline body. Serturner and Seguin, the first a Hanoverian, and the second a French apothecary, both discovered in 1804 another crystallizable substance, upon which subsequent experience has proved the narcotic power of opium to depend. In a second memoir of Serturner published in 1817, he announced his discovery of the existence of *morphia* combined with *meconic acid*. This was confirmed by Robiquet. Since then, Geiger, Beltz, Pelletier, Couerbe, Schmidtz, and Mulder, have successively analysed and shown Opium to consist of a variety of principles. Of these, three are alkaline, *Morphia*, *Codeia*, and *Paramorphia*. A fourth, *Narcotin*, though neutral to colours, forms salts with acids: of this a great portion is in a free state, and may at once be separated from Opium by ether; the remainder, as well as the whole of the *Morphia* and *Codeia*, are in combination with the *Meconic* Acid and some *Sulphuric acid* found in Opium. Other bodies are also acid, as the *brown acid extractive*, the *resin*, and *oily matter*. Some are neutral, as *Narcein* and *Meconin*. Narcotin is sometimes enumerated among the neutral principles, and Thebaina, called also Paramorphia, though alkaline, does not combine with acids. Besides these, there is a trace of Volative Oil (the odorous principle ?), Gum, Bessorine, Albumen, Caoutchouc, Lignin, and Salts of inorganic bases. If adultered with

a. Water.—Heat 100 grs on a water bath for half an hour, the loss is water.

„ *b*. Starch, pease-meal, flour—boil 20 grs. with water, strain, allow to cool and tincture of iodine which gives a blue precipitate with these impurities.

„ *c*. Resins, dammar and clay,—subside as a harsh mass during the trituration of 100 grains in distilled water.

„ *d*. Catechu, Gab.—To solution "a" add a solution of isinglass, there is a copious precipitate.

„ *e*. Mucilaginous extracts of bel (fruit of Aegle marmelos) and mekanna, seeds of Euryale ferox—add alcohol to solution "a" previously concentrated to ¼th. A copious precipitate of gummy matter ensues, quite soluble in hot water.

„ *f*. The presence of datura, tobacco and bang can only be detected by the smell of the drug, which resembles that of a bad hookah.—*Ben. Ph.* 2. 8.

Dr. Royle says, Opium is of different degrees of value, according to its sensible properties, and the quantity of Morphia it contains; but it is subject to adulterations. First it may be mixed up with too much water, either intentionally, or in consequence of the dew having been very heavy. The quantity may be ascertained by the loss on evaporation. The most injurious fraud is that of washing out the soluble and most valuable parts of Opium, and bringing the residual mass for sale. In this case Butler states the Opium loses its translucency and redness of colour, also its adhesiveness. Sand, clayey mud, sugar, molasses, cowdung, Datura-leaves, the glutinous juice of Ægle Marmelos, and even pounded poppy-seeds, are employed to adulterate Opium. Malwa Opium often contains oil and other matters obtained by the expression of the poppy-heads. Some Opiums from which Morphia has been extracted have been occasionally met with in European commerce. To be enabled to judge of good Opium, one must be well acquainted with the different varieties of Opium, their respective colours, tastes, and textures, as well as the natural degree of moisture, and see that no mechanical admixtures are apparent, nor left on a filter. Several methods have been proposed for ascertaining the quantity of Morphia in Opium, but none of them are very satisfactory. In the E. P. it is proposed to ascertain it by the weight of the precipitate caused in an infusion of Opium by Carbonate of Soda. "A solution of 100 grs. macerated 24 hours in Aq. f ℥ ij. filtered, and strongly squeezed in a cloth, if precipitated by a cold solution of Carbonate of Soda ℥ fs. in two waters, and heated till the precipitate shrinks and fuses, will yield a solid mass on cooling, which weighs, when dry, at least 11 grains, and if pulverized, dissolves entirely in solution of Oxalic acid." Dr. Pereira

has not found this satisfactory, but considers the process of Thibaumary as the best, in which Ammonia is employed to precipitate the Morphia in infusion of Opium. (v. Mat. Med. p. 1742.) Dr. Christison considers Dr. Gregory's method of obtaining Muriate of Morphia as the only one; but it requires about a pound of Opium to be operated on which, if good, should not yield less than ten per cent. of a snow-white salt.

Action. Uses. Opium, applied *externally*, is at first stimulant, producing pain, as on the eye, and then sedative. When taken *internally*, in small doses, excitement is first produced, as apparent in the increased frequency of the pulse, and heat of the skin. This is soon followed by diminished sensibility, calmness, and sleep, with abatement of pain, suspension of mucous secretion, with the exception of that of the skin. But if the tendency to sleep be resisted, Opium, in moderate doses, and in those habituated to its use, in excessive doses, will produce intellectual excitement accompanied by bodily activity, soon to be followed by general debility, as is exemplified in Opium-eaters. In large doses, it is a narcotic poison. It is frequently employed as an anodyne and hyponotic, as a sedative, and to restrain inordinate discharges, as in diarrhœa and cholera, also as a diaphoretic, often as an antispasmodic, and even as a febrifuge. In Delirium Tremens it is beneficially given in large doses, and, combined with Calomel and sometimes with the addition of Ipecacuanha, even in inflammatory affections; though in general it is contraindicated when there is inflammation or much fever. It is no doubt the most important of all therapeutical agents, and that which is perhaps the most frequently employed.—*Royle.*

(5888) OPOBALSAM, Balm of Gilead, Judiacum de Mecca.

Akooyeela-semoon-i-roomie, Arab.	Balsamier de la Meque, Fr.
Balessan, Egypt.	Opobalsamo, It.
	Roghun-i-Bulsan, Pers.

A liquid gum-resin, obtained from the *Amyris Gileadensis*, a tree found in Arabia, Abyssinia, and Syria. It is first turbid and white; of a pungent smell resembling turpentine, but sweeter; and of a bitter, acrid, astringent taste. When old it becomes thin, limpid, of a greenish hue, then of a golden yellow, and at length of the colour of honey. It is chiefly used as a cosmetic by the Turkish ladies.

(5889) OPOPONAX, a genus of Plants belonging to the natural order *Umbelliferæ*; it has an obsolete calyx, roundish entire petals rolled inwards, with a rather acute lobe; compressed fruit with a dilated convex border, bipinnate leaves with unequally cordate segments, crenated and obtuse. The umbels are compound; the involucre both universal and partial, and the flowers yellow.

(5890) OPOPONAX CHIRONIUM. *Syn.* Pastinaca Opoponax. Ferula op: παναχες ηραχλειον *Dioscor.*

(5891) OPOPONAX CHIRONUM, is native of the south of Europe and Asia Minor, on dry hills, margins of fields, and thickets. It is a plant 6 or 7 feet high, of a dull-yellowish colour, and resembling a parsnip. The stem is strongly furrowed; the leaves from 1 to 2 feet long, or more, flat, bipinnate, with ovate cordate leaflets, which are usually oblique at the base, often confluent, and surrounded by a cartilaginous, crenated border. The calyx is inconspicuous, the styles rather short and stout. Although this plant is a native of the south of Europe, the resinous gum which exudes from the stalk or root when wounded is brought from the Levant and East Indies in roundish drops of a reddish-yellow colour, with specks of white. It is supposed to be an emmenagogue, but it is seldom used; it is similar in its effects to assafœtida. This is a plant of easy culture, and may be propagated either by seeds or dividing at the root.—*Eng. Cyc.*

(5892) OPOPONAX.

Jawasheer, Arab.	Opopo-nace, It.
Opopanax, Fr.	Gawshier, Pers.
Panax gummi, Ger.	Opoponaca, Sp.
Jawasheer, Guz. Hind.	

Off. Prod. Opoponax, gum resin obtained from the stalks of a tall plant (*Opoponax chironium*). According to Pelletier's analysis 100 parts contain—resin 42, gum 33, starch 4, extractive and malic acid 4, volatile oil 5, with traces of caoutchouc and wax, and 9 of woody fibre. The sp. gr. 1622; with water it forms a milky fluid. Opoponax is derived from ὀπος juice, παν all, and ἀχος a remedy, meaning that it is a remedy for all diseases! In action it resembles asafœtida, but is much feebler. The plant occurs in dry fields in the south of Europe and Asia Minor. A milky juice exudes from the root when wounded, and hardens into a fœtid gum resin, in most of its properties closely resembling asafœtida. The resin is found in all the Bazars of Bengal, and is even exported from this country to Europe.—*O'Shaughnessy, page* 361.

(5893) OPOSSUM. [Didelphina; Marsupiata.]

(5894) OPUNTIA, a genus of Plants belonging to the natural order *Cactaceæ*. In the gardens the species are called Indian Figs, and are remarkable for their stems consisting of flat joints, broader at the upper than the lower end, but which eventually lose that appearance, becoming both cylindrical and continuous. On one of them, *O. cochenillifera*, the cochineal insect is fed, and others yield a pleasant sub-acid fruit, which is eaten in hot countries. The lavas of Ætna are in some places covered with the spiny bushes of *O. vulgaris*, whose large purple juicy fruits are carried for sale to the neighbouring

markets. It is however only a naturalised plant, its native country being South America within the tropics.—*Eng. Cyc.*

(5894) OPUNTIA TUNA, has been figured in Dillenius's 'Hortus Elthamensis,' tab. 389, and is the original of what Linnæus called *Cactus Tuna*; it has been since called *Cactus Bonplandii* by Mr. Kunth. It differs from the two following in the long whitish spines that arm it, in its very broad oval joints, its fully-expanded flower, which resembles that of *O. Hernandezii*, except that it is larger. This is the sort which in the Jardin-des-Plantes at Paris nourishes the wild cochineal: it was brought from Peru by Dombey, and according to Humboldt is in much esteem in that country as the food of a valuable sort of cochineal.—*Eng. Cyc.*

(5895) ORACHE, or MOUNTAIN SPINAGE. Of these there are several varieties, commonly known as red and green sag—the leaves are slightly acid; both sorts are boiled as spinage, but the red is most esteemed. Propagated by seed—no particular soil required.—*Riddell.*

(5896) ORANGE, AURANTIUM, Lin. Citrus Aurantium, *Risso*, the common or Sweet Orange.

Panneh dodang, CYNG.	Laranjas, PORT.
Orangen, DUT.	Pomeranezu, RUS.
Oranges, FR.	Naga-runga, Swadoo Naringa, SANS.
Pomeranzen, GER.	Naranja, SP.
Narunghie Kounla, GUZ. HIND.	Kichlie-pullum, Collungie pullum, TAM.
Melarance, IT.	Kichidie-pundoo, TEL.
Jeruklegi, JAV.	Naringhie, DUK.
Simoa-manis; Madra Narrange, MAL.	Jerooc Manis, MALAY.
Narungee, PERS.	*Faulkner, Ainslie.*

The parts used are Aurantium Fructus, Aurantii Flores, L. Aurantii Oleum; L. Volatile Oil of the Flowers, Neroli Oil. E. Aurantii Aqua; Orange Flower Water, E. Fructus succus et tunica exterior. Flores. Folia, D. Like the Lemon, this is a native of India, being found in the forests on the borders of Silhet, and also on the Nielgherries, perhaps also in China. The Sanscrit *Nagrunga* and the Arabic *Narunj* are no doubt the European names of *Naranja* (Spanish), *Arancia* (Italian), whence we have *Aurantium* and *Orange*. The orange is not mentioned either by the ancients or the Arabian medical authors. It is supposed to have been introduced into Europe after the middle ages. The Orange-tree attains a height of 16 or 20 feet and bears great abundance of fruit. It is remarkable, as well as others of the genus, for bearing the fruit at all ages at the same time with the flowers. Though a native of India, it does not ripen its fruit there until the winter, and hence has been able to travel so much further north than others of its compatriots. Leaves coriaceous, ovate-oblong, acute; margins usually finely toothed; petioles margined, sometimes winged. Petals 5, white. Stamens about 20, 5 of them often distinct and appressed against the stigma, the remainder in 5 bundles alternating with them. Fruit globose, rind thin, with convex oil vesicles, adhering loosely to the pulp, which is sweet. Oranges are cultivated in the south of Europe and in the Axores, whence they are largely imported into England. The parts which are officinal are the flowers, L. D., and their essence, L.. also called Neroli Oil and distilled water, E. Juice of the Fruit and leaves. D.

Aurantii Folia. Leaves of the Orange are officinal in the D. P. on account of their bitterness and the aromatic properties of the essential oil stored up in the vesicles with which their substance is studded. This essential oil may be obtained by distillation, as also a distilled water. Or an infusion of the leaves may be employed as a bitter and aromatic excitant and diaphoretic.

Aurantii Fructus. The ripe fruit of the Orange is well known for its extremely agreeable and refreshing juiciness, whence it is so much esteemed as a fruit even for the sick, and as a refrigerant. When of a small size, the fruit which falls off is dried, and forms the *Aurantii baccæ* or Curacoa Oranges, so called from being employed in flavouring Curacoa. The smaller ones are smoothed, and used for making issues. The rind or peel for the fruit is sometimes substituted for that of the Bitter Orange, as are also the flowers and their essential oil, also the oil expressed from the grated rind, likewise Orange flower water; all being used for the same purposes as those produced from the Bitter Orange.—*Royle.* One variety of the orange fruit (of which there are various sorts) is in high estimation amongst the tamool Medical Practitioners, who suppose that it purifies the blood, improves the appetite and cures Catarrh.—*Ainslie.* The wood of the Orange tree is not available of any size, or in any quantity—*M. E. J. R.* This tree is now extensively cultivated all over the Deccan. The finest sorts are the Cintra, Cowlah, and a small sweet orange which grows on a tree more like a creeper. The principal method of culture is by budding, the stocks generally being either seedlings or cuttings from the sweet lime. The best Cintra, with a thin close rind, is produced upon the seedling stock, and it is said that the fruit grown upon the sweet lime stock is generally loose and soft: this is very perceptible with some of the oranges. The best time for budding is in the cold season.—*Riddell.* The leaves are rather bitter, and contain essential oil. A still more fragrant oil, called oil of *neroli* by perfumers, is afforded by the flowers. The berries while unripe are gathered, dried, and turned in the lathe to the size of peas, and are usedi n issues on account of their fragrant odour. The

rind or peel of the orange is bitter and aromatic, and affords a very useful stomachic tincture and syrup. The juice of the ripe fruit contains sugar, malic and citric acids, citrate of lime, mucilage, albumen and gum. Like the lemon juice it makes an excellent cooling drink, and is an invaluable specific in the treament of scorbutic diseases. The seeds of the orange yield oil by expression.—*O'Shaughnessy.* In Tenasserim Oranges are quite abundant, but for the want of proper attention they are much inferior to the West India oranges, and to those cultivated in the South of Europe. The trees are often exceedingly prolific. A seedling planted, produced in the ninth year more than two thousand oranges. —*Mason.*

(5897) ORANGE-DYE PLANTS. The flowers of the buteas with an alkali, the corolla tubes of the tree of mourning, and the leaves of the henna tree, yield beautiful orange dyes. The latter are used in India to dye skins a "reddish-yellow."—*Mason.*

(5898) ORANGE-TREE. The orange, lemon and lime trees (Citrus,) are evergreens that seldom exceed about 15 feet in height. The wood is only met with as an object of curiosity; it is of a yellow colour, but devoid of smell.—*Tred.*

(5898) ORANGE WINE (*Auranta*) prepared by Mr. Rundall, Razole, Rajahmundry District, is quite a novelty, and is an agreeable beverage. On being tasted, it was found sound and good, although of a somewhat peculiar flavour, resembling Malmsey or Muscat. It is recommended for flavouring jellies. The jury at the Madras Exhibition considered the manufacturer is deserving of a second class Medal.—*M. E. J. R.*

(5899) ORANG-UTAN, OR ORANG-OUTANG, names by which the *Pithecus Satyrus* of Geoffroy (*Simia Satyrus* of Linnæus), the Red Orang, is now generally designated. [APE; CHIMPANZEE.] The following are its generic characters:—Muzzle large, elongated, somewhat rounded anteriorly; forehead sloping backwards slight supraciliary ridges, but strong sagittal and lambdoidal crests. Facial angle 30°. Auricles small. Twelve pairs of ribs; bones of the sternum in a double alternate row. Arms reaching to the ankle-joint. No ligamentum teres in the hip joint. Feet long and narrow; hallux not extending to the end of the metacarpal bone of the adjoining toe; often wanting the unguical phalanx and nail. Canines very large, their apices extending beyond the intervals of the opposite teeth. Intermaxillary bones anchylosed to the maxillaries during the second or permanent dentition. Height under five feet. It is an inhabitant of the islands of Borneo and Sumatra (*Owen.*) Professor Owen remarks that the young individual exhibits the anthropoid character in the relative smallness of the face to the cranium, resulting from the state of dentition, but that it corresponds with the adult skeleton in the number of ribs and in the relative proportion of the and lower exteremities. With regard to the number of vertebræ, he observes that the figure of the adult skeleton, which was taken by permission of the board of curators from the specimen in the Museum of the Royle College of Surgeous, exhibits the abnormal number of five lumbar vertebræ instead of four, which is the number existing in the trunk of the mature Orang preserved in the Museum of the Zoological Society of London, and in the Skeleton in the Museum of Comparative Anatomy in the Jardin-des-Plantes. The form of the living animal, and its habits in captivity, have been made familiar by several specimens which have been kept in the Zoological Gardens.—*Eng. Cyc.*

(5900) ORCHIDACEÆ, a natural order of Endogenous Plants, with the stamens and style consolidated into a central column, and with an inferior ovary: they constitute the whole of the class *Gynandria monandria* of the Linnæan classification. There is no order of plants the structure of whose flowers is so anomalous as regards the relation borne to each other by the parts of reproduction, or so singular in respect to the form of the floral envelopes. [ONCIDIUM.] Unlike other endogenous plants, the calyx and corolla are not similar to each other in form, texture, and colour; neither have they any similitude to the changes of outline that are met with in such irregular flowers as are produced in other parts of the vegetable creation. On the contrary, by an excessive development and singular confirmation of one of the petals called the labellum or lip, and by irregularities either of form, size, or direction of the other sepals and petals, by the peculiar addition of these parts to each other, and by the occasional suspression of a portion of them, flowers are produced so grotseque in form that it is no longer with the vegetable kingdom that they can be compared, but we are forced to search for resemblances in the animal world. Hence we have such names among orchideous plants as the Bee, Fly, Man, Lizard, and Butterfly Orchis, and appellations of the like nature in foreign countries. Of these things some idea may be formed by the *Oncidium raniferum*, or the Frog-Oncidium, so called because its lip bears at its base the figure of a frog couchant; 2, *Peristeria elata*, the Spirito Santo Plant of Panama, in whose flowers we find the likeness of a dove in the act of descending upon the lip; 3, *Prescottia colorans*, whose lip is a fleshy hood; 4, *Gongora fulva*; 5, *Cirrhæa tristis*; 6, *Cycnoches ventricosum*, singularly like a swan, the arched column forming the head and neck; 7, *Oncidium pulvinatum*; 8, *Bolbophyllum barbigerum*; 9, *Catasetum viride*; and 10, *Peristeria cerina*. In consequence of their singular forms, their

gay colours, and the delicious fragrance of many of these plants, they have of late years been cultivated with great zeal, [EPIPHYTES.] Orchidaceous plants inhabit all parts of the world, except those which are excessively dry or excessively cold, both of which appear uncongenial to their nature; and they are most abundant in such as have an equable, mild climate, moist and warm during the greater part of the year. Thus we have not a single species from Melville Island, or Nova Zembla, or from the upper regions of northern mountains, nor from the deserts of Africa; and the whole province of Mendoza, one of the dry western states of South America, produces but one, and that in a marsh. On the contrary, the woods of Brazil and equatorial America, of the lower ranges of the Himalayas, and of the Indian Archipelago, possess countless myriads of these productions. In general, in hot countries the species are epiphytes, inhabiting the branches of trees, or the sides of rocks and stones, to which they cling by means of long twisting fleshy roots; and terrestrial species, that is to say, such as grow exclusively in the ground, are rare and unknown: in colder countries, on the contrary, the former are unknown and the latter only represent the order. Thus in North America, where Orchidaceous Plants are plentiful, the epiphytal species are almost unknown, a single species only occurring in Florida upon the branches of the *Magnolia*. Some of them are true parasites, deriving their food from the roots of trees upon which they grow. In England there are two cases of the kind, one the *Neottia Nidus-Avis*, or Bird's-Nest Orchis, a brownish scaly plant springing up occasionally in woods, and the other the *Corallorhiza innata*, or Coral-Root, an occasional but very uncommon inhabitant of marshes.

The differences in the structure of the column, anther, and pollen furnish botanists with the best means of classifying the order, and of breaking it up into sub-orders, in the following manner: —

1. *Malaxideæ* (*fig.* 1), anther opercular; pollen waxy, with neither caudicula nor gland.

2. *Epidendreæ* (*fig.* 2), anther opercular: pollen waxy, with the caudicula folded back upon the pollen grains, and no gland.

3. *Vandeæ* (*fig.* 3), anther opercular; pollen waxy, with a membrano-cartilaginous caudicula and gland.

4. *Ophrydeæ* (*fig.* 4), anther erect; pollen sectile or granular.

5. *Arethuseæ* (*fig.* 5), anther opercular; pollen granular or powdery.

6. *Neottieæ* (*fig.* 6), anther dorsal; pollen powdery.

7. *Cypripedieæ*, anthers two, separated by a broad sterile lobe. This order contains 394 genera and about 3000 species.—*Eng. Cyc.* Orchideæ are, perhaps, the largest natural order in the Khasia Hills where fully 250 kinds grow, chiefly on trees and rocks, but many are terrestrial, inhabiting damp woods and grassy slopes. I doubt whether in any other part of the globe the species of orchids out-number those of any other natural order or form so large a proportion of the flora.—*Hooker, Vol.* II. *page* 281. Fortune says, that having landed "I made the best of my way to the farm of Don Inego Gonzales de Azaola, whom I had met in Manila, and who had kindly offered me the use of his house in the interior. My chief object in visiting this part of the country was to procure, if possible, a supply of the beautiful orchid (Phalœnopsis amabilis), which Cumming had sent home a few years before, but which was still extremely rare in England. His Grace the Duke of Devonshire purchased the first plant, for which he gave the large sum of one hundred guineas. As I had very little time to spare, I was anxious to make the most of my opportunities. I made an Indian's hut in the wood my head quarters where I held a sort of market for the purchase of orchids. The Indians knew the hour at which I should return to the hut, and on my arrival I generally found the ground in front strewed with orchids in the state in which they had been cut from the trees, and many of them covered with flowers. The Phalœnopsis, in particular, was singularly beautiful. I was very anxious to get some large specimens of the plant, and offered a dollar, which was a high sum in an Indian forest, for the largest which should be brought to me. The lover of this beautiful tribe will easily imagine the delight I felt, when, one day I saw two Indians approaching with a plant of extraordinary size having ten or twelve branching flower-stalks upon it and upwards of a hundred flowers in full bloom. "There," said they, in triumph, "is not that worth a dollar?" I acknowledged that they were well entitled to the reward, and took immediate possession of my prize. This plant is now in the garden of the Horticultural Society of London; and although it was a little reduced, in order to get it into the plant case at Manila, is still by far the largest specimen in Europe. This beautiful species may be well called the "Queen of orchids." The air-plants are not found so frequently in the dense shaded parts of the Forests as in the edges of the woods, on trees by the road sides, and in exposed situations. I found the genus Aerides very often in the most dense parts of the woods, but never a single plant of Phalœnopsis. The latter was commonly found growing on the branches of the Mango in the cleared parts of the woods, near the cottages of the Indians, and sometimes on the very tops of high trees where it was fully exposed to the sun. I confess this fact was quite contrary to the opinion I had formed of the habits of these plants; for I expected to have found them principally in damp shaded forests, where the sun's

rays could seldom penetrate, but such is not the case, at least in the Philippine islands. With the exception of the orchids, the Philippines are not very rich in plants of an ornamental kind. As far as I had an opportunity of judging, the vegetation of Luzon bears a great resemblance to the island of Java, and the other parts of the Malay Archipelago. The country is however very rich in birds and shells, and many of the land species of the latter are extremely valuable. Mr. Cumming, who is well known in this part of the world, made very large collections of them and has already distributed them over the greater part of Europe and America."—*Fortune's Wanderings, p.* 381.

(5901) ORCHILLA WEED. ARCHILL, ORCHELLA.

Orseille, FR.	Oriecllo, Orcella, IT.
Orseille, GER.	Orchilla SP.

A whitish lichen (*Lichen orcella*) found in Guernsey, Portland Island, but chiefly obtained from the Canary, Cape de Verde, and Madeira Islands. It grows on rocks about three inches in length, roundish, and many stalks proceed from one root. This weed yields a rich purple tincture, used chiefly in dyeing silks and ribbons, but rarely employed alone, on account of the fugitive nature of the colour. Litmus is a preparation of orchill in square cakes. *Waterston.* Orchilla weed is imported into Bombay from Zanzibar, and is exported to England.—*Faulkner*

(5902) ORCHIS, a genus of Plants the type of the natural order *Orchidaceæ*, and belonging to the tribe *Ophrydineæ*. The old Linnæan genus *Orchis* is now divided into many genera [ORCHIDEÆ], but a large number of species are still retained under this designation. The tribe *Ophrydineæ* is distinguished by the pollen masses being divisible into lobes, which are waxy and definite in number. The anthers are wholly adnate. The genus *Orchis* belongs to a section of this tribe, in which the cells of the anther have a rostellate process between their bases. In *Orchis* the perianth is ringent and hooded; the lip 3-lobed, spurred; the glands of the stalks of the pollen-masses are in a common pouch.—*Eng. Cyc.*

(5903) ORCHIS COMMELINÆFOLIA. —Root of two or more spindleshaped succulent tubers; scape erect, about eighteen inches high; round, smooth-jointed; with cylindric sheathes, about half the length of the joints. Flowers white, scentless; appear about the middle of the rains on pasture lands in the Southern Concan. Several species are found on the hills.—*Riddell.*

(5904) ORCHIS MASCULA. The Salep plant, is found on the Mahabuleshwar hills. It blossoms in June, and the roots are dug up and gathered after the rains in November or December. Another variety is found in the hills and jungles near Candeish, but possessing a very bitter principle. It is dug up by the Bheels, and sold when fresh for a few pice the seer. It requires a great deal of soaking and preparation before it can be deprived of its bitter quality. When dry, it is in appearnce as fine as the Persian. It requires being boiled in at least six different waters, and then dried in the sun, when it will become perfectly sweet and fit for use. —*Riddell.*

(5905) OREODAPHNE, Mountain Laurel (from ὀρειος, mountainous, and δάφνη, a laurel), a genus of Plants belonging to the natural order *Lauraceæ*. It is hermaphrodite, diœcious, or polygamous, with a 6-parted nearly equal calyx, the limb eventually disappearing. It has 9 stamens, oblong anthers, with narrow filaments, 4-celled, the three inner looking outwards. The fruit is succulent, more or less immersed in a deep thick cup formed out of the altered tube of the calyx. The flowers are panicled or racemose, axillary, and occasionally umbellulate — *Eng. Cyc.*

(5906) OREODAPHNE CUPULARIS, is a very large tree with a strong-scented wood; it has ovate elliptical leaves, acute at both ends, sometimes blunt at the apex, ending in a chanelled stalk, obsoletely netted, smooth; the axils of the costal veins without pores. The flowers are in clustered few-flowered rough hoary racemes below the axillary and terminal bud. The calyx of the fruit is nearly globose. This species is the cinnamon of the Mauritius, where it grows, and also in Bourbon and Madagascar.—*Eng. Cyc.*

(5907) ORIGANUM from ὀρίγανον), a genus of Plants belonging to the natural order *Labiatæ*, or *Lamiaceæ*. It has an ovate tubular calyx, 10-13 nerved, striated, with nearly 5 equal teeth, the throat villous inside. The corolla has a tube equal in length to the calyx; the upper lip sub-erect, emarginate; the lower spreading, trifid, with nearly equal lobes. There are 4 protruding stamens, somewhat didynamous. The lobes of the style are nearly equal. The species are herbs.—*Eng. Cyc.*

(5908) ORIGANUM CRETICUM. (Linnæus) is the Ὀρίγανον of Hippocrates, 'Morb. Mul.,' 1, 6 9; the Ὀνήτις of Dioscorides, 3, 30; and the Λευκὸν ὀρίγανον of Theophrastus, 6, 2.

(5909) ORIGANUM DICTAMNUS. the *Amaracus dictamnus* of Benthan: the Δίκταμνος κρητικὸς of Hippocrates; the Δίκταμνον of Theophrastus, 'Hist. Plant.,' 9, 16; and the Δίκταμνος of Dioscorides, 3, 37. It has almost sessile leaves, clothed with dense wool on both surfaces as well as the branches. The leaves are broad, ovate-obtuse, quite entire, rounded at the base; the floral leaves are small, almost glabrous. The corolla purple, without a spur. The heads of the flowers nutant.—*Eng. Cyc.*

(5910) ORIGANUM HERACLEOTICUM is a very variable species, but is recognised by the bracts being longer than the calyxes, by the loose spikes, and small flowers. The stamens are more

or less villous, the leaves pale-green, glabrous, or pubescent. The flowers are white and one-half the size of the preceding species. This, the Winter-Sweet Marjoram, seldom ripens seed in this country, and is propagated by slips and cuttings. It requires a dry and sheltered situation. It is a native of the region of the Mediterranean, Greece, and about Odessa on the Black Sea. It has an aromatic sweet flavour, and is much used as a relishing herb in cookery. This is the *Culina gallinacea* of Pliny, 20, 16; Cato, De Re Rustica,' c. 127; Seren. v. 909; and the 'Ορίγανον ἡρακλεωτικὸν of Dioscorides, 3, 29.

(5911) ORIGANUM MARJORANA, of Linnæus.

Murwa, Duk. | Maroo, Tam.

A native of India, very easily reared in beds or pots, either by slips from the roots, or seed. It is used for flavoring sauces, &c. This delicate sweet smelling plant the Hindoos offer at the shrines of Vishnoo and Sheva. —*Jaffrey*. Is the *Marjorana hortensis* of Moench, and the 'Αμάρακον of Theophrastus, 'Hist, Plant.' 6, 7; the Σάμψυχον of Dioscorides; 3, 41. It has nearly glabrous racemosely panicled branches, petiolate oblong-ovate leaves clothed with heavy tomentum on both surfaces, oblong sessile spikelets glomerate on the branchlets. This plant is a tree or shrub in its native country, but an annual in our gardens It is native of the North of Africa near Mascar, on hills, and of Asia, on the mountains of Kumaon. The bracts and calyxes are complanate, closely imbricate. The corollas small, purplish or white. As the seed seldom ripens in England, it is generally procured from France. When in blossom, the plant is cut and dried for winter use, as a savoury ingredient in cookery.—*Eng. Cyc.*

(5912) ORIGANUM SMYRNEUM VEL SYRIACUM. Is the 'Τσσωπος of Dioscorides, 3, 27. and of Hippocrates, 'Morb. Mul.,' 3. 490. The ancient plant is usually referred to *Hyssopus officinalis*, but according to Fraas this plant does not grow in Greece, Asia Minor, or Syria. *O. sipyleum* of Linnæus is the Μάρον of Dioscorides, 3,42.

(5913) ORIGANUM VULGARE, Marjoram, has stalked ovate-obtuse leaves, ovate bracts longer than the calyx, the heads of the flowers roundish, panicled, and crowded. The bracts are usually purple, ovate-obtuse, and at least half as long again as the calyx. It is a native of Great Britain in dry uncultivated places, and of Europe, North of Africa, and of Middle Asia and America. It is an ornamental and aromatic plant, and yields what is sold as oil of thyme in the shops, a common remedy for toothache It is frequently mixed with olive oil as a stimulating liniment against baldness, in rheumatic complaints, and against strains and bruises. The dried leaves used instead of tea are very pleasant; they are likewise employed in fomentations. The essential oil is so acrid that it has been used by farmers as a caustic. It is the 'Ορίγανον μέλαν of Theophrastus, lib. vi., cap 2, and the 'Αγροφίγανος of Dioscorides, 3, 31.

(5914) ORMOCARPUM SENNOIDES, Hedysarum sennoides of Roxburgh.

Kanana, Sans. | Junglee moonghee, Hind.

Root considered tonic and stimulant.—*O'Sh. page* 317.

(5915) ORNITHOLOGY, the science which teaches the natural history and arrangement of Birds. This term is derived from the Greek words Ορνις, a bird, and λόγος, a discourse; signifying literally 'a discourse upon birds.' [Birds.]

(5916) OROBUS. Fischeri. Bitter Vetch.—Readily cultivated from seed in any good soil, colours various.—*Beg. Banopsha Per. Riddell.*

(5917) OROBANCHE (from ορομβυς, a kind of vetch, and ἄγχω, to strangle, because its species grow on the roots of vetches, and were supposed to destroy them by strangulation), a genus of Plants, the type of the natural order *Orobanchaceæ*. It has 2 lateral, undivided or cloven permanent sepals; a ringent withering corolla, the upper lip concave, notched, the lower reflexed, in three unequal wavy lobes; a gland under the ovary; the anthers sagittate with the lobes pointed at the base; the filaments almost as long as the tube of the corolla, downy and glandular; the capsule ovate, pointed, with four parietal parallel placenta. The species are parasitical, usually simple, rarely branched, scaly erect herbs. Eleven species of this genus are British.—*Eng. Cyc.*

(5918) ORRIS ROOT, Iris Florentine.

Ussul-ul-sosun-ul maa joonie, Isra, Arab.	Violen wurzel, Ger.
Iris de Florence, Fr.	Ireos, It.
	Kewra-ka-jur, Guz. Hind.

Is obtained from the south of Europe and Asia Minor. It is tuberous, oblong, about an inch thich, white, odour like that of violets, taste when dry, bitter. An inferior description of orris root is imported into Bombay from the Persian Gulf, which is procurable in most bazars. Orris root is used by perfumers, and in medicine.—*Faulkner.*

(5919) ORSIDUE, Brass Leaves, Dutch Leaf or Gold, Flittergold, Manheimgold.

Klatergoud, Dut.	Orpelio, It.
Oripeau, Oliquant, Fr.	Oropel, Sp.
Flittergold, Ger.	

An article resembling gold leaf, made of copper and zinc, and largely used in tinselling dolls, toys, images, &c. It is made up into books, and in this state is packed in casks and cases for exportation from Manheim in Germany, where it is chiefly manufactured. —*Faulkner.*

(5920) ORTHANTHERA VIMINEA is a plant of the family *Asclepiadeæ* well calculated to yield fibre. Dr. Royle found it growing at the foot of the Himalayan Mountains—'*Himmalayan Botany*,' p. 274. It attains a height of ten feet, and is also remarkable for the length and tenacity of its fibres. This grows luxuriantly along the foot of the mountains; and its long, straight, leafless, slender, and wand-like stems, point it out as seemingly well suited for rope-making."—*Royle. Fib. pl. p.* 1306.

(5921) ORTOLAN, the French and English names for a species of Bird belonging to the family *Fringillidæ*, much esteemed by epicures for the delicacy of its flesh when in season. It is the *Hortulanus* of Gesner and others, *Miliaria Pinguescens* of Frisch, *Emberiza hortulana* of Linnæus, Ortolano of the Italians generally, Tordino Berluccio of the Venetians, Garten Ammer and Fellammer of the Germans, and Gerste Kneu of the Netherlanders. Willughby writes the name Hortulane; and Montagu terms it the green-Headed Bunting. [EMBERIZIDÆ] This bird is found in the south of Europe, which may be considered the summer and autumnal head-quarters of the Ortolan, though it is a summer visitor in the central and northern parts. In Italy it is said to be common, by Temminck and others. Prince C. L. Bonaparte states that it is found in the Sabine Mountains, but not commonly, in the summer, and that it rarely occurs in the plain of Rome, but is frequent in Tuscany. India, Lapland, Russia, Denmark, Sweden, and Norway, are among the countries visited by it. In Britain it seems to be only entitled to rank as an accidental visitor, but it is by no means clear that it does not occur more frequently than is generally supposed: for, especially to an unpractised eye, it might be mistaken for the Yellow-Hammer, and in some states of its plumage for other Buntings. It has been taken in the neighbourhood of London; and one of these specimens was alive in 1837, in the aviary of the Zoological Society in the Regent's Park. Bewick's figure ('Green-Headed Bunting,' last edition, Supp., p. 24) was captured at sea off the Yorkshire coast, in May, 1822. In southern Europe it is common from May to August, and every spring and autumn may be observed at Gibraltar on its migration. Mr. Strickland saw it at Smyrna in April. North Africa is its winter residence. Colonel Sykes notes it in his 'Catalogue of the Birds of Dukhun' (Deccan). When properly fed, for which purpose there are large establishments in the south of Europe, where they are placed after having been trapped and furnished with plenty of millet-seed and other grain, till they become sheer lumps of fat, they are delicious morsels. Mr. Gould states that this is effected in Italy and the south of France in a dark room. Prince C. L. Bonaparte says, "Nella vicina Toscana, dove gli Ortolani sono frequenti, si mantengono nelle Uccelliere illuminate giorno e notte finché restino soffocati dalle pinguedine." (In the neighbouring districts of Tuscany, where the Ortolans are numerous, they are kept in aviaries which are illuminated day and night, where the birds are fed till they are suffocated by their fatness), and he adds the relishing words, "carne squisita" (flesh exquisite).—*Eng. Cyc.* A kind of lark called an Ortolan was found by Dr. Hooker in the Parwah district. He says abundant; this is not, however he says the European delicacy of that name, though a migratory bird; the flocks are large, and the birds so fat, that they make excellent table game. At this time they were rapidly disappearing; to return from the north in September.—*Hooker. Him. Jour. Vol.* I. *page.* 98.

(5922) ORYZA, a genus of Plants belonging to the natural order of Grasses. It is the name by which rice was known to the Greeks and Romans, and which has been adopted by botanists as the generic name of the plant yielding that valuable grain. The Greek name would appear to be derived from the Arabic Aruz, and this is allied to Uri, the Telinga name of cultivated sorts; but the Sanscrit names are Unoo, Dhanya, and Vrihi; the wild kind being called Nivara, while that of the great tanks is called Arizee in the Tamul language. The European names are evidently all derived from the same sources, but the name Paddy is applied to the rice in its natural state, or before being separated from the husk. The natives of India call it Dhan in this state, as well as the plant, and the rice itself is called Chanwul. The genus *Oryza* has two glumes to a single flower; palea two, nearly equal, adhering to the seed; stamens six, and styles two. Dr. Roxburgh describes two species; one, *O. sativa*, distinguished by its diffuse panicle; the other, *O. coarctata*, has the panicle contracted, the valvulets of the calyx subulate, and the leaves culm-clasping. This species is a native of the delta of the Ganges, and was first discovered there by Dr. Buchanan in 1796, but was not found to be applied to any use. The Common Rice, *O. sativa*, unlike many long cultivated grains, is still found in a wild state in and about the borders of lakes in the Rajahmundry Circars of the Peninsula, though never cultivated, because the produce is said to be small compared with that of the varieties in cultivation. [RICE, in ARTS AND SC. DIV.]

(5923) ORYZA SATIVA RICE. Lin.

Arisee, TAM.	Beeum, TEL.
Chawul, HIND. & DUK.	Brass, MALAY.

This appears to be indigenous in the upper provinces of Hindoostan.—*Ainslie. p.* 217.

(5924) ORYZA SATIVA. Var.

Adypilloo Arisee, TAM.

This grain is found in uncultivated tracts of the Southern parts of the Peninsula, and is said to be

eaten only in times of great scarcity.—*Ainslie. p.* 217.

(5925) ORYZA SATIVA. Var.

Amalay Arisee, Tam.

This small grain is never brought to market, nor have I ever seen it growing: it is said to be met with in the Ramnad country and to be eaten by the poor only, in times of scarcity.—*Ainslie. p.* 217.

(5926) OSBECKIA. A pretty species of osbeckia having the stamens all of equal length, is in flower on the Maulmain hills in August. —*Mason.* Dr. Wight gives Osbeckia aspera, 377; Gardnerina, 997; hispidissima, 1612; Leschenaultiana, 996; truncata, 375, 996; virgata, 376; Wightiana, 927-8.

(5927) OSSARA REWUND, See Gamboge.

(5928) OSTEOCOLLA. The term applied to an inferior kind of glue, manufactured from bones.

(5929) OSYRIS WIGHTIANA, Santalaceæ. The Lotel. A small tree with twiggy erect growing branches; in flower and fruit most of the year. The fruit when ripe is of the size of a small sloe, of a yellow color, with a mark on the top like a "blaeberry." It is sweet and very pleasant when tasted, and is deservedly ranked amongst the wild fruits by Col. Sykes.—*Riddell.* Dr. Wight gives *Osyris peltata*, 817-1883; and Wightiana, 1853.

(5930) OTTER. The common Otter of India, and any of the others of this country (so far as is known), is not identical with the European Otter; but in the museum of the Asiatic Society there is a specimen of an Otter from Algeria, which (externally at least) is undistinguishable from the common Otter of Bengal, that is so extensively tamed and *trained* along the course of the Brahmaputra, as Cormorants are also trained in China.—*Bligh.*

(5931) OTTO OF ROSES.

Utter, Guz. | Uttur-i-Gul, Per.
Gulab-ka-Uttur, Hind.

This far-famed, highly valuable, and delightful perfume, is prepared in Persia, Upper Egypt, Tunis, Cashmere, and Ghazipore in Bengal. It is estimated that one hundred thousand roses, yield 189 grains or one tola of the utter. The otto of roses purchased in the bazars is generally adulterated with sandalwood and sweet oil; the genuine article being only procurable at a high price.—*Faulkner.*

(5932) OTIS TARDA. Bustard

Neel naray, Tam. | Beetmiakie, Can,
Jungliekaboot, Hind. | Cowdun, also Jerz, Pers.
Beetmiaka, Tel.

Various species of this genus of birds are to be met with in many parts of India, but the *O. tarda* is more rarely seen, in the lower and southern tracts of the Peninsula, than in the more northern regions. In Mysore, which, from its great elevation, is much colder than other countries of the same latitude, the Bustard is still common. —*Ainslie's Mat. Med p.* 296. Bustard is the English name of a bird belonging to the genus Otis. The species are land birds whose proper position in the ornithological system has caused some embarrassment to Zoologists.—The Bustards live generally in open countries, preferring plains or wide-spreading extensive downs dotted with low bushes and underwood-localities which give them an opportunity of descrying their enemy from afar.—They are found in Europe, Asia, and Africa; but not in America. The *Otis tarda*, the great Bustard, is the *Otis* and *Avis tarda* of Belon and others; Ostarde Houtrade, Outarde, Bistarde of the French; Starda and Starda commune of the Italians; Der Grosse Trappe, Trapp, Trappgans, and Ackentrapp of the Germans; Abutarda (*Aris tarda*) of the Spaniards; and Gustard of the old Scotch. The *Otis nigriceps* is a native of Asia. The specimen from which the figure in Mr. Gould's magnificent work ('Century of Birds from the Himalaya mountains') was taken, was brought from the highlands of the Himalaya, but it is by no means confined to that locality. Colonel Sykes observed it in the wide and open country of the Mahrattas, where it lives in large flocks, and where it is considered one of the greatest delicacies as an article of food. It was indeed so abundant in the Deccan, that Colonel Sykes records, in the 'Proceedings of the Zoological Society,' that one gentleman shot nearly a thousand. The male has the body above pale bay, lightly undulated with rufous-brown; neck, a few spots on the wings, and belly, white; the head, which is crested, the outer wing-coverts, the quills, and the large mark on the breast, black; irides deep-brown; bill and feet yellowish. Length, inclusive of tail, 56½ inches; tail, 13½ inches. The female resembles the male in plumage, but is only 41½ inches including the tail, which is 10½ inches. The eggs, of which Colonel Sykes found only one in a hole in the earth on the open plain and that considerably advanced in the process of incubation, were in shape a perfect oval, and in colour a brown-olive, with obscure blotches of darker brown olive. Length 3 $\frac{4}{10}$ inches, diameter 27 inches.—*Engl. Cyc. page* 701.

(5933) OVEÆ (Gray). a sub-tribe of the tribe *Bovina* and family *Bovidæ*. It includes the common Sheep and allied species. The following is Dr. J. E. Gray's definition of this family:—Forehead flat or concave. The horns are more or less spiral, wider than deep at the base, and slightly annulated in front. The females

are often horuless. The skull has a more or less deep rounded suborbital pit, without any fissure; the masseteric ridge ascending high before the orbit: the auditory bulla small; the basi-occipital flat, more or less expanded anteriorly by the extension of the anterior pair of tubercles, the posterior ones small; the cutting-teeth are nearly equal-sized and shelving; and there are no supplemental lobes to the grinders. The hoofs are triangular, and being shallow behind, they have distinct interdigital fossæ. Males emitting no stench. The Genera included in this family are—

(5934) OVIS, Crumen distinct. Tail elongated. Skin covered with wool or adpressed hair.

Caprovis. Crumen distinct. Tail very short. Skin covered with thick hair, covering the wool.

Pseudois. Crumen none. Tail rather elongated. Forehead convex. Skin covered with thick hair.

Ammotragus. Crumen none. Tail rather elongated. Forehead concave. Skin covered with short hair, and elongated tuft of hair.

(5935) OVIS ARIES, the Common Sheep, is subject to great variety, and many of its forms have been raised to the rank of species. Dr. Gray, in the 'British Museum Catalogue,' enumerates no less than 33 varieties of this species.

The following is a list of the varieties from the 'British Museum Catalogue':—

The Spanish Sheep. It is the *Ovis Hispanicus* of Linn.; called also the Merino Sheep and the British Middle-Wooled Sheep.

The Common Sheep (*Ovis rusticus*, Linn.; *O. Gallica* Desm.; *O. brachyurus* Pallas; *O. leptura*, Schreb.): the Horuless Sheep (*O. Anglicana*, Linn.). Of this variety there are numerous forms, such as the Muggs Sheep and Shetland Sheep, the Southdown Sheep, the Old Lincoln Sheep, the Romney Marsh Sheep, the Cobwold Sheep, the New Leicester Sheep, the Cheviot Sheep, the Old Teeswater Sheep, the Improved Teeswater Sheep, the Dunky Sheep, the Zetland and Orkney Sheep, the Welsh Mountain Sheep, the Soft-Wooled Sheep of Wales, the Wicklow Mountain Sheep, the Kerry Sheep, the Exmoor Sheep, the Black-Faced Sheep, the Black-Faced Heath-Sheep, and the Rass or Roosh (*Ovis Polii*, Blyth.)

3. The Barwall Sheep *Ovis* (*Aries Barwal* Hodgson); *Ovis Barwal*, Hodgson; *O. Ammonoides* var. 1, Gray. It inhabits Nepaul.

4. The Huniah Sheep (*Ovis Hunia*, Hodgs.); The Hoonia, or Black-Faced Sheep of Tibet Also a native of Nepaul.

5. The Cago (*Ovis Cagia*, Hodgs.) the Kago, or Tame Sheep of Cabul region; the Cago Sheep of Gray. A native of Nepaul.

6. The Seling. A native of Nepaul.

7. The Curumbar Sheep of Mysore.

8. The Sheep called Garar in India.

9. The Dukhun Sheep.

10. The Shaymbliar Sheep of Mysore.

11. The Broad-Tailed Sheep (*O laticaudatus*, Erxl., Geoff., 'Mem. Egypt,'; Lesson, 'Comp. Buffon,' x. 812; *O laticauda platyceros. Arabica*, Linn.; *O. Turcica*, Charlet; *O. cauda abesa* Ludolf), It is a native of Barbary. There are several forms of this variety, of which the following are most prominent:—The Fat-Rumped Sheep (*O. Steatopyga*, Pallas; the Tartarian Sheep of Bewick); the Persian Sheep *O. A. ecaudatus*, Geoff.); the Fat-Tailed Sheep (*O. A macrocercus*, Schreb.); the Aora Fivel, or Abyssinian Sheep; the Bucharian Sheep *O. Bucharica*, Pallas); the Tibetan Sheep *O. Thibetanus*, Fischer); the Cape Sheep *O. Capensis*, Erxleb.); the Sheep of Belkah.

12. *Many-Horned Sheep* (*O. polyceratus*, Linn.). It is also called the Four-Horned Ram, and the Dumba Sheep. It is a native of Nepaul.

13. The *puchia*, or Hindustan Dumba (*O. puchia*, Hodgson).

(5936) *Coprovis Vignei*, this genus embraces the Sha, or Koch. It is the Mountain Sheep of the North of India, and is found in Tibet.

C. Argalis, the Argali. It is the *Ægoceras Argali* of Pallas, and often confounded with the former. It is a native of Siberia. Dr. Gray says of this species—"The Nyens or Bambheras, or Wild Sheep, seldom or never cross the Hemachal, the Indian side of which range in the special habitat of the Nahoors, while to the north and west beyond Thibet, our animal is replaced by other species, so that Thibet may be considered as the special habitat of one species (*Ovis Ammonides*), and the plateaux north of Thibet as far as the Altai of another (*Ovis Ammon*), cited as types of the true ovine form; and it may be added, that the six sorts of tame sheep of Thibet and the Sub-Himalayas all without exception exhibit the essential characters of that form. "There are several species that may be confounded under this head: the Siberian Argali is found in the most northern part of that country, and it is probably different from the Himalayan animal; but I have not been able to discover any difference between the specimen received from Mr. Hodgson and those which were sent from Siberia by the Russian naturalist."—*Eng. Cyc.*

(5937) *Pseudois Nahoor*, the Nahoor, Nervate or Sua, is a native of Nepaul.—*Eng. Cyc.*

(5938) OVIS AMMON OF PALLAS, stands from four to five feet high, and measures seven feet from nose to tail. It is quite a Tibetan animal, is seen as high as 18000 feet and is seldom seen below 14000 feet except when driven lower by snow.—*Hooker, Vol. 1, p. 244.*

(5939) OVIS POLII, O. ammonoides, Capra hymalaica, C. jemblaica, were sent to the Paris Exhibition of 1855.—*Paris E. J. R.*

(5940) OXALIC ACID.

Sauerk-lees-aure, Ger.

A vegetable acid, found in considerable quan-

tity in sorrel and rhubarb. Accidents have frequently occurred from its being administered instead of Epsom salts, which it resembles in appearance. It is used in calico printing, and by straw-hat makers. It is an object of considerable importance in Switzerland, where it is prepared from the juice of wood-sorrel. Oxalic Acid is obtainable from the Salt in the leaves of Gram, Cicer Arietinum.—*Faulkner. Taylor.*

(5941) OXALIS (from ὀξύς, sharp, acid; the leaves have an acid taste), a genus of Plants belonging to the natural order *Oxalideæ* or *Oxalidaceæ*. It has 4 sepals connected below, and 5 petals which are likewise frequently connected below. The stamens are 10 in number, and monadelphous; the 5 outer ones shorter than the rest. The styles 5, and the capsules oblong and 5-cornered.—*Eng. Cyc.*

(5942) OXALIS ACETOSELLA, Common Wood-Sorrel, is a small perennial plant with a subterranean rootstock consisting of many scaly joints; the leaves are ternate, leaflets obcordate and having the peduncles longer than the leaves, with two scaly bracts at about the middle; the corolla is about 4 times as long as the calyx, and of a white colour beatifully veined with purple. Mr. Curtis remarks that the leaves are often purplish beneath, and that the fruit darts forth its seeds at the smallest touch when ripe. This species of wood-sorrel has a pleasant acid taste, dependent on the presence of oxalic acid, and is frequently used in salads; its flavour approaches near to that of lemons or tartaric acid, with which its medicinal effects also correspond, as it is esteemed a refrigerant antiscorbutic and diuretic. The expressed juice of this species, evaporated and set in a cool place, affords a crystalline salt, which may be used whenever vegetable acids are wanted. It is sold in the shops under the name of Essential Salts of Lemons, and is employed to take iron-moulds and ink-spots out of linen.

(5943) OXALIS CORNICULATA, Sorrel Yellow-Wood sorrel. Lin. (Three leaved sorrel.)

Pooliary keery, Tam.	Poollie chinta koora. Tel.—*Ainslie's Mat. Med. p.* 256.
Umbutie ke baujee, Duk.	
Shooklika, Sans.	
Umbuti, Duck.	Chukaika, Ambashta, Amilka, Sans.
Pallachinta, Tel.	
Amrool, Hind.	Chooka-tiputtee, Beng.

Oxalis Corniculate, Horned Wood-Sorrel, has a decumbent stem, branched and rooting; the leaves are ternate with obcordate leaflets; oblong stipules united to the base of the petioles; the peduncles are two-flowered, and shorter than the leaves. It is a native of Europe, particularly in Spain, Italy, and Greece, as well as of Japan, Mexico, North, America, and England. The flowers are yellow. The flowers of the North American plant are larger than the European. This species is common all over India, possesses exactly the same properties, and yields the same products as the European sorrel. The small leaves, tender shoots, and flowers, are given in electuaries by the Hindoos as a cooling medicine in fevers, the extent of two tea-spoonsful daily —*O'Shaughnessy, p.* 257. The stem of this plant is imported from Delhi: very sour: used to cure flatulent indegestion.—*Gen. Med. T. p.* 153. A common weed on lawns and in gardens—used by the natives in making chatney; and in curries, a good substitute for lime juice or tamarind imparting a peculiar acid taste.—*Jaffrey.*

(5944) OXALIS ROSEA. Tuberous rooted plants, from the Cape of Good Hope, easily cultivated at the commencement of the rains; the small tubers should be allowed to remain in the pots in which they have grown and be carefully removed into fresh earth after the rains have set in, and if well attended to, will readily spring up, and produce abundance of rose coloured flowers.—*Riddell.*

(5945) OXLEYA XANTHOXYLA, is a native of Australia. It attains a height of 100 feet. The wood is yellow, and employed for building boats. It is called yellow-wood. [Swietenia; Cedrela.]—*Eng. Cyc. page* 802.

(5946) OXYLOBIUM CORDIFOLIUM. These are ornamental plants, easy of culture, in any common soil; the colours are yellow, orange and scarlet.—*Riddell.*

(6947) OXYSTELMA ESCULENTUM. *Syn.* Periploca esculenta. Asclepias rosea.—*Roxb. Fl. Ind.* ii. *p.* 40. A twining perennial, deciduous plant, flowers in the rains, large white, with a slight tinge of rose colour, and streaked with purple veins; texture thin and delicate.—*Riddell.* Common in India on the banks of rivulets, used by the natives in decoction as a gargle in apthous ulcerations of the mouth, and in sore throat: cattle eat the roots. (*Royle.*)—*O'Shaughnessy, p.* 457.

(5948) OXYURA CRYSANTHEMOIDES. Native of Britain, and North America, cultivated in any garden soil.—*Riddell.*

(5949) OXYURA. Mountain sorrel.

(5950) OYSTER.

Huitre, Fr.	Seepee, Hind.
Austern, Ger.	Ostreæ, Lat.
Ostriche, It.	Ostras, Sp.
Kaloo, Guz.	

A well-known and generally diffused shell fish.—*Faulkner.*

(5951) OYSTER SHELL, See Mother of Pearl Shell.

P.

(5952) PABUT: PALOOD. In the Punjab and Cashmere, there are different kinds of white earths, which are used by the Hindoos under under the name of Pabood in the religious ceremonies. The genuine, what I got at Lahore was carbonate of magnesia combined with a very small quantity of oxyde of iron. I received an inferior kind in Cashmere, which was a product of the hills, namely, from Amernat, this earth was carbonate of lime and magnesia with very little oxyde of iron.—*Honigberger. p.* 321.

(5953) PACHYDERMATA (literally Thick-Hides; Dickhauter of the Germans; Pachyderm of the French), the seventh order of *Mammalia* according to the system of Cuvier.—*Eng. Cyc.*

(5954) PACHYRHIZUS, has a long compressed pod, with kidney-shaped seeds and no dissepiments, and is remarkable for its principal species, *P. angulatus* (formerly *Dolichos bulbosus*), producing a root of the size and substance of a turnip. It is reported to have been carried to the Pilippines from South America, and thence to have been introduced into the west of Asia. The side leaflets are nearly triangular, that in the middle lozenge-shaped, slightly toothed, and shaggy on both sides. The flowers are very beautiful, of a violet-blue colour, and arranged in axillary nearly erect racemes, from one to two feet long. Its root is a common article of food in the Malay Archipelago, but no other part of the plant is eaten.—*Eng. Cyc.*

(5955) PADDY.

Bhatt, Guz. & Hind.

A term applied to rice in the husk.—*Faulkner.*

(5956) PADDY BIRD FEATHERS are extremely light, soft, and delicate; resembling the down of the Eider duck. Their colour is white, sometimes slightly variegated with black. Muffs, tippets, and other similar articles, made of these feathers, are often brought from India, as presents.—*Comp. Desr.*

(5957) PADMAK. The wood of a tree from the Himalayas, considered to be refrigerant.—*Gen. Med. Top. p.* 149.

(5958) PÆDERIA, a genus of Plants belonging to the natural order *Cinchonaceæ*. It has a small 5-toothed permanent calyx, a funnel-shaped corolla, hairy inside, 5-lobed, and with a plaited æstivation. There are 5 stamens, sometimes abortive; the anthers oblong, nearly sessile in the middle of the tube. The style is not protruded, and the stigma bifid. The berry is small, roundish, and globose, tricelled, with a seed in each cell. The flowers are small, white, and usually unisexual.—*Eng. Cyc.*

(5959) PÆDERIA FÆTIDA.

Gundha-Badhalee. Beng. | Gundale, Hind.

Pæderia has a woody twining stem, round and smooth. The leaves are oblong or lanceolate, cordate at the base, and glabrous. The panicles axillary, terminal, opposite, short, and few-flowered. The flowers are usually of a deep pink, the bracts ovate, the calyx 5-toothed, the corolla with a long tube somewhat gibbous and woolly inside; the limb narrow and divided into 5-cordate crenulate segments. The berry is dry, compressed, having 5 lines on each side, 1-celled, and 2-seeded. The seeds are smooth, compressed, enlarged with a somewhat membranous ring all round. The leaves have a very fœtid and aliaceous odour when bruised, yet they are used to impregnate baths, and are administered in a decoction medicinally in cases of retention of urine and some febrile complaints. According to Roxburgh the root is used by the Hindoos as an emetic. It is a native of the East Indies, and of Japan and the Moluccas.—*Eng. Cyc.*

(5960) PÆDERIA TERNATA has an erect smooth trichotomous steam, with triangular branchlets; leaves 3 in a whorl; oblong-lanceolate axillary trichotomous corymbs shorter than the leaves; the limb of the calyx campanulate and obscurely 5-toothed. It is a native of the East Indies on the mountains which border on Silhet. The flowers are rather large, funnel-shaped white, on long filiform pedicels, each pedicel having a pair of linear ciliated bracts above the middle. The flowers are said to be fragrant when fresh, but emit a very offensive smell on being steeped in water after they have been dried.—Lindley, *Flora Medica.*—*Eng. Cyc.*

(5961) PÆONIA is a genus of Plants belonging to the natural order *Ranunculaceæ*. The species are very generally cultivated in gardens for the sake of their large gaudy flowers. They are characterised in their order by a permanent leafy calyx of 5 unequal sepals, 5 petals, stamens whose anthers split open by two fissures along their face, a fleshy elevated disc, and from 2 to 5 many-seeded carpels, terminated by a fleshy recurved stigma. Their fruit consists of leathery follicles, splitting on one side, and exposing to view a number of round, black, shining seeds adhering to a crimson placenta.—*Eng. Cyc.*

(5962) PÆONIA ARBOREA. These beautiful flowering plants, the herbaceous species of which are so generally cultivated in England, and thrive best in the conservatories, are not known in Western India. *Riddell.*

(5963) PÆONIA MOUTAN is a shrub, of which several varieties, with beautiful whitish flowers stained with pink, are now in British gardens. Of these the most showy is that called *P. papaveracea*, which has a broad crimson stain at the base of each petal. If grown on the north side of a wall, or in a situation where it is but little exposed to the sun in the early part of the day, this species will bear the open air of England without protection; but it sprouts so early in the spring, it exposed to the sun, that it is very liable to be cut off by the late frosts of England. It is a native of China. Of the other species, *P. Brownii* and *P. Californica* are remarkable for being the only species inhabiting America; they are natives of California and of the country to the northward, and have little beauty: the first exists in English gardens, but is extremely rare. The rest of the genus consists entirely of European and Asiatic plants, which, according to De Candolle, form fifteen species; but there can be no doubt that the greater part of these supposed species are mere varieties, chiefly of *P. officinalis*, *P. albiflora*, *P. tenuifolia*, and *P. peregrina*. All these plants are liable to produce double flowers, which, by the conversion of their numerous stamens into petals, are generally extremely beautiful: they have however no smell, or not an agreeable one. Being quite hardy, growing readily in any kind of soil, and easily multiplied, either by seeds or by division of the roots, they are generally favourites in gardens. All the species have an acrid principle concentrated in their roots and seeds, which are accordingly emetic and cathartic in moderate doses. They were formerly in great repute as a medicine; and Dioscorides, whose Παιονία was probably both *P. officinalis* and *P. peregrina*, gives no fewer than sixteen names, by which it was known.—*Eng. Cyc.* See MOUTAN.

(5694) PAGRUS, a genus of Fishes belonging to the family *Sparidæ*, with the following characters—Four or six strong concave teeth in front, supported by smaller conical teeth behind them, with two rows of rounded molar teeth on each side of both jaws. [PAGELLUS]—*Eng. Cyc.*

(5965) PAGURIDÆ, OR PAGURIANS, a tribe of the apterurous section of the Anomurous family of *Crustacea*, composed of a considerable number of species, the greater part of which are remarkable for the more or less complete softness of the abdomen, the want of symmetry in the appendages of this part of the body, the shortness of the two posterior pairs of feet, and many other characters. Modern writers recognise several genera of this family. The *Pagurus* of Aristotle is not a Hermit-Crab; but he describes three kinds of hermit-crabs under the name Καρκίνιον. They are termed Καρκίνας by Oppian, Ælian, and Galen.—A great resemblance exists among all the *Paguri*, *Pagurus* (Fabricius), properly so called, not only in the details of their organisation, but in their habits. The cephalo-thoracic portion of their body is shorter than the abdominal portion.—*Eng. Cyc.*

(5966) *Pagurus Deformis.* Ocular peduncles very stout and short, rather longer than the basilary portion of the external antennæ, but much shorter than the anterior border of the carapace; cornea large, and occupying half the length of the terminal joint of the ocular peduncles. Anterior feet short and stout, especially on one side, smooth externally but spiny above; a dentilated crest on the upper border of the large moveable finger. Succeeding feet smooth, and with but little hair, furnished externally with a projecting crest, which extends over the two first joints, and which, in the third foot, is very much developed and finely dentilated. Nothing similar on the opposite side. Abdomen furnished with four large transverse plates, each with an ovriferous false foot, the first three of these are large, and terminated by three elongated and ciliated laminæ in the female. In the male all these appendages are small, and terminated by a single lamina. Length 5 inches. It is a native of the Mauritius and the Seychelles.—*Eng. Cyc.*

(5967) *Cenobita* (Latreille).—This genus, in the opinion of M. Milne-Edwards, establishes the passage between the *Paguri*, properly so called, and *Birgus*.

(5968) *Cenobita rugosa.* Stomachal region nearly flat; labial border of the branchial regions very projecting, and slightly curved. Ocular peduncles nearly twice as long as they are high; their basilary scale moderate and pointed. Feet granulous and slightly muricated; the great claw moderate, and furnished above with a row of small, oblique, and parallel crests. Tarsi short and triangular. Upper and external edges of the two last joints of the third left foot elevated into an obtuse crest. Length about 3 inches. It is found in the Indian Ocean. There are three other species.—*Eng. Cyc.*

(5969) PAGUMA TRIVIRGATA.

SYN. Paguma trivirgata, Gray.
Viverra „ Reinward, Mus. Leyd.
Paradoxurus trivirgatus, Gray.

In Burmah, this animal is very common, and occasionally enters houses in the towns in pursuit of rats. When young it is easily domesticated, and valuable as a rat-catcher. It does not appear to have been seen in Arracan.—*Mason.*

(5970) PALANG POSH OR PALAMPORE. The former term is composed of two Persian words, literally "Bedcover." These are manufactured in the district of Cuddalore at Ponnary

also at Sydapett in the outskirts of Madras, but especially in the town of Masulipatam, the last always of a superior kind and in various sizes, 5½ to 6 cubits in breadth and 7 to 8 long and are sold from 6 Rupees to Rs. 15 according to size. The Cuddalore, Pannary and Sydapet fabrics are of ordinary quality and are sold at from Rupees 2 to 7 each.

(5971) PALAS GUM. Pulas goond or Dhak ke goond. Produce of Butea frondosa, in ruby red, transparent grains or irregular tears.

(5972) PALEMONIDÆ, a family or tribe of Macrurous Decapodous *Crustacea*. They belong to Milne-Edward's family of *Salicoques*, or Shrimps, and his tribe Palemonians The characters of this tribe are as follows:—Body laterally compressed, but the abdomen never sharp. Thorax large, carapace armed in front with a great sabre-like rostrum, nearly always dentated above. Antennæ placed as in the preceding tribe, but longer, and the first pair often with three terminal filaments. All the feet are slender, and the first two pairs are generally didactylous, whilst the last three pairs are never didactylous. The abdomen is of great size. (Milne-Edwards.) The genera are, *Guathophyllum*; *Hippolyte*; *Rhynchocinetes*, *Pandalus*; *Lysmata*; and *Palemon*.

(5973) *Rhynchocinetes*. (Edwards).

R. Typus. Front armed with three spines, of which the median, placed above the base of the rostrum, is followed by another median spine; rostrum very large, longer than the lamina of the external antennæ, armed above with two spines situated near the base, and with seven or eight dentilations situated at its extremity; its inferior border furnished with a score of very large teeth. Length about 2½ inches. It is a native of the Indian Ocean. (Milne-Edwards.)

(5974) *Palemon*. (Fabr.) THE PRAWN. Body compressed but little, and generally rounded above. M. Milne-Edwards remarks that the nervous system of the Palemons presents a much greater concentration than that of the Crawfishes (Ecrevisses); for all the thoracic ganglions are approximated, so that they nearly touch each other. The branchiæ, he observes, are eight in number on each side of the body. The species of this useful and delicious genus are numerous. M. Milne-Edwards records seventeen, besides the Indian *Palemon bivimanus* and *P. Coromandelinus* of Fabricius. Those of British coasts are well known to the epicure; and some of the species which are found in warm climates attain to a considerable size: such are the *P. Carcinus* of the Indian seas and the Ganges, which attains to nearly a foot in length, and the *P. Jamaicensis* of the Antilles, which is from 10 to 12 inches long. The prawns generally inhabit sandy bottoms near the coasts, but some are found at the mouths of rivers, and far up. They mostly boil red.

(5975) *Alpheadæ*. The shrimps comprised by M. Milne-Edwards under this tribe, are stouter in their forms than those of the preceding division, but they are not depressed as the Crangons are. [CRANGONIDÆ] The genera are *Atya*, *Ligmenocera*, *Alpheus*, *Pontonia*, *Autonomea*, *Caridina*, *Nika*, and *Athanas*.

(5976) *Alpheus* (Fabr.).—Carapace advanced above the eyes, forming above each of those organs a small vaulted buckler. They are found in the seas of warm climates. Some species are found in the Mediterranean, but the greater part in the seas of the Antilles or in the Indian Ocean.

5977) *Pontonia* (Latr.).—Carapace short and convex: the front with a short but robust and inflected rostrum; the eyes are cylindrical, projecting, and very moveable. M. Milne-Edwards divides the *Pontonia* into the following sections:—

P. macrophthalma, from Asiatic seas, where it was found by M. Dussumier.

(5978) *Stenopus* (Latreille). *Penœdæ of* Milne-Edwards: Body not compressed laterally, and teguments comparatively soft. Carapace terminated anteriorly by a small rostrum.

Stenopus hispidus; *Palemon hispidus*, Oliv., from the Indian Ocean.

(5979) *Acetes* (Milne-Edwards).—Analogous to *Sergestes* in its conformation, but placed at a distance from all the animals of the same order by the absence of the last two pairs of feet.—*A. Indicus*.—*Eng. Cyc.*

(5980) PALI.

Pali. TAM.	Palari, PORT.
Irambu. MAL.	

The Ceylon wood known in England by the name of Iron wood. It grows to about thirty feet in height, and twenty inches in diameter. It is very useful for stocks of anchors, piles for jetty heads, beams in store houses and places where strength is required; for such purposes it will be found useful and durable: it may be obtained in great quantities at a very moderate rate.—*Edye. Ceylon.*

(5981) PALINURUS, the name given by Fabricius to a genus of *Crustacea* which forms the tribe of Langoustiens in the system of M. Milne-Edwards, being the fourth of his family of Cuirassed Macrurians, and characterised by the existence of antennæ of the ordinary form and the absence of didactylous pincers. It is also regarded as the type of a family of the *Palinuridæ*. The *Palinuri*, or Sea-Crawfish, as they are popularly called, have the body nearly cylindrical. Their carapace is nearly straight from before backwards, very convex transversely, and presents about its anterior third part a deep transverse furrow, which is directed forward on each side and separates the stomachal from the cardial and branchial regions, the only ones which can be well distinguished.—*Eng. Cyc.*

(5982) PALINURUS FASCIATUS, Antennular ring armed above with two conical rather large teeth situated near its anterior border. Carapace armed with a small number of spines, and slightly granular, or only dotted on its posterior half; lateral tooth of the anterior border of the carapace small; no spines on the median line of the stomachal region; median tooth of the anterior border of the epistome very large. Length about a foot. It is a native of the Indian Ocean.—*Eng. Cyc.*

(5983) PALINURUS VULGARIS, the common Sea Craw-Fish, or Spiny Lobster; Langouste of the French. Length about 18 inches. Weight sometimes from 12 to 15 lbs. It inhabits the seas of Europe, and is common on the rocky coasts of Britain especially in the South, and on the like coasts of France, especially in the south and west.—*Eng. Cyc.*

(5984) PALMACEÆ, *Palms*, a natural order of Endogenous Plants, usually trees, with simple stems, inhabiting the warmer parts of the world and especially tropical countries. They constitute a most important order, on account of the many uses to which the species or their products are applied. They are nearly allied to the Liliaceous and Juncaceous or Rushy Plants of northern countries. Linnæus, who had scarcely any means of judging of the real structure of their fructification, and was therefore uncertain where to station them in his sexual system, placed them in an Appendix by themselves and called them the Princes of Vegetation. It has now however been ascertained that they chiefly belong to *Hexandria*, *Monœcia*, and *Diœcia*. In general they adhere to the soil by clusters of strong simple roots which not uncommonly form a hillock elevated above the surface of the ground. Their trunks are solid, harder on the outside than the centre, and are sometimes, as in the Cane Palms, coated by a layer of siliceous matter; they are usually quite simple, growing exclusively by a single terminal bud, called in the *Areca* its cabbage, and eaten as a delicacy when boiled; but in the *Hyphæne*, or Doom-Palm, they are regularly forked. In the majority of the order the stem is nearly cylindrical, but in some it is thickest at the base, and in others swollen in the middle; occasionally it is defended by strong hard spines, but is more frequently unarmed, and marked by rings which indicate the places whence the leaves fall off. The leaves, called fronds by Linnæus, are alternate, with a very hard epidermis and a distinct petiole, from the base of which a coarse network, called reticulum, sometimes separates next the trunk; they are usually either pinnated or fan-shaped, but are occasionally nearly split in two; their veins are parallel, the spaces between them plaited, and the whole size sometimes very great, as in the Fan-Palm, in which specimens have been seen as much as 18 or 20 feet in breadth. [CORYPHA.]

The flowers appear in panicled spikes from the inside of hard dry spathes, which are often boat-shaped, and although small, they are sometimes so extremely numerous that each panicle will weigh many pounds. They are generally hermaphrodite, but often monœcious, diœcious, or polygamous. The calyx and corolla consist each of three pieces, which are either distinct or more or less united. The stamens vary in number, from 3 to a large multiple of that number, and bear 2-celled linear anthers, which open along their inner face. The ovary consists of 3 carpels, which are sometimes distinct, sometimes consolidated, and occasionally in part abortive, so that the ovary is only 1-celled. The ovaries are almost always solitary, and erect in each cell, but sometimes two are present, which in that case stand side by side; they are orthotropous in some genera and anatropous in others. The styles are very short, the stigmas simple. The fruit varies extremely in its consistence and appearance. Sometimes it is 3-celled, often 1-celled; in such species as the Cocoa-Nut it is a kind of drupe covered by a coarse fibrous rind; in others it is a soft sweet eatable pericarp, as in the date; in others its surface is broken up into lozenge-shaped spaces, as in the *Sagus*, whose fruit looks as if covered with scale-armour. The seed is single, either solid or hollow, and consists principally of albumen of a fleshy, oily, horny, or cartilaginous texture, within which is lodged a very small cylindrical embryo at some part of the surface distant from the hilum. Palms appear to prefer a soil in some measure salt, although many species are inhabitants altogether of inland districts and even of high mountains. Their geographical limits appear to be within 36° N. lat. in America, 44° N. lat. in Europe, 34° N. lat. in Asia, and 38° S. lat. in the southern hemisphere; and according to Von Martius, their powers of migration are extremely small; none of them have been able to cross the ocean without the aid of man. Their favourite stations are said to be the banks of rivers and water-courses, and the sea-shore, some species scattered singly and others collected together into large forests. There is scarcely a species of this order in which some useful property is not found. The Cocoa-Nut [COCOS], the Date [PHŒNIX], and others are valued for their fruit; the Fan-Palm and many more for their foliage, whose hardness and durability render it an excellent material for thatching; the sweet juice of the Palmyra [BORASSUS] when fermented yields wine; the centre of the Sago-Palm abounds in nutritive starch; the trunk of the *Iriartea* or *Ceroxylon* exudes a valuable vegetable wax [CEROXYLON]; oil is expressed in abundance from the Oil-Palm; an astringent matter resembling dragon's blood is produced by *Calamus Draco*; many of the species contain within their leaves so hard a kind of fibrous mat-

ter, that it is employed instead of needles, or so tough that it is manufactured into cordage; and finally, their trunks are in some cases valued for their strength and used as timber, or for their elasticity, or their flexibility, as in the Cane-Palm.[CALAMUS.]—*Eng. Cyc.* Thus, the Palms, so conspicuous in tropical countries for their lofty pillar-like stems, surmounted by apparently inaccessible fruit or gigantic foliage, are no less remarkable for the many useful purposes they are calculated to fulfil. The fruit of some is edible, of others abounding in oil, the sap of a few forms a pleasant beverage, and may by evaporation yield sugar or be fermented into a spirit. The stems of some species are gorged with farinaceous matter, which may be separated as a starch-like powder or granulated into sago. The broad leaves, from their great size and hard surface, are useful for thatching the cottages of the poor, or for making umbrellas for the rich. The narrow-leaved kinds are plaited into mats and baskets, or smoothed so as to be fit for writing on; while the leaves of several, when in a young and tender state, are eaten, both raw and in a cooked state, and are hence called Cabbage Palms. Some abound in strong unyielding fibre, while others form wood which is applicable to all the purposes of timber. Hence, several are valuable articles of culture in the countries where they are indigenous, or where the soil and climate are suitable for their growth—as, for instance, the Date Palm in Arabia and Africa, the Oil Palm in the West of Africa, the Cocoa-nut in India and its Islands, together with the Betle-nut, Palmyra, and Talipat Palms; while the Sago, the Ejoo, and the Betle-nut Palms flourish in the moist warm climates of the Malayan Peninsula and of the Indian Archipelago. The Palms abound chiefly in the tropical parts of South America, as well as of the Old World; but a few species extend to rather high latitudes, as an Areca to lat. 38° S. in New Zealand, and a Sabal (Chamærops, *Auct.*) to lat. 40° N. in North America; while the Dwarf Palm, a native of the North of Africa, is now at home in the South of Europe. There even the Date Palm is grown in a few sheltered situations; though it is in the hot and dry soil of Arabia and Africa that it attains the greatest perfection, and furnishes a principal part of the diet of its inhabitants, as well as an article of commerce. *Phœnix sylvestris*, a variety or species of the same genus, is common in most parts of India. A Chamærops is found in Nepal, and one on the Khasya Hills, at elevations of from 5000 to 8000 feet; while *C. Ritchiana* is found in the Khybur Pass, and probably all along the mountainous range from Affghanistan to Sindh. But it is in far southern latitudes and in a different climate that the Cocoa and the Betle-nut Palms are objects of extensive culture; as well as the Sago Palms, of which the Ejoo or Gomuto of the Malays is one

(the *Arenga saccharifera* of botanists), abounding in sap, which can be used as palm wine or converted into sugar; yielding at all times strong and durable fibre. The older trees when cut down yield sago, as do *Sagus Rumphii* and *S. lævis*, especially abundant in and near Sumatra. The latter is remarkable among Palms for throwing up young plants around it in the same manner as the Plantain. Both kinds of Sago tree are strongly recommended for cultivation—the Arenga on low coasts near the sea, but the species of Sagus even on the edges of the marshes which abound in such situations. It is no doubt to some one of these Sago trees that Sir John Maundeville alludes, when he says: "In that land grow trees that bear meal, of which men make bread, white and of good savour; and it seemeth as it were of wheat, but it is not quite of such savour. And there are other trees that bear good and sweet honey; and others that bear poison.—And if you like to hear how the meal comes out of the trees, men hew the trees with an hatchet, all about the foot, till the bark be separated in many parts; and then comes out a thick liquor, which they receive in vessels, and dry it in the sun, and then carry it to a mill to grind, and it becomes fair and white meal; and the honey and the wine, and the poison, are drawn out of other trees in the same manner, and put in vessels to keep." ('The Book of Sir J. Maundeville," chap. xviii.) The leaves of many Palms are employed for thatching, for making chattahs or umbrellas, punkahs, and hats. The stems of *Licuala acutifida* afford the well-known walking sticks known by the name of "Penang Lawyers.' (Griffith) Thus, those of *Licuala peltata*, the *Chattah-pat* of Assam, are in universal demand in that valley. Scarcely a single ploughman, cow-keeper or cooly, but has his Jhapee or Chattah made of Chattah-pat (Jenkins). But the leaves of this Palm are coarser than those of another, the *Toka-pat* of the Assamese, which has been named in honour of the zealous Commissioner of Assam, *Livistona Jenkinsiana*, by the late Mr. Griffith. Col. Jenkins says that this species of Palm is an indispensable accompaniment of every native gentleman's house, but in some parts it is rare, and the trees are then of great value. The leaves are in universal use throughout Assam, for covering the tops of doolees (palkees), and the roofs of khel boats; also, for making the peculiar hats, or rather umbrella-hats (jhapees) of the Assamese. For all these purposes the leaves are admirably adapted, from their lightness, toughness and durability." To the above list of useful Indian Palms, we might easily add some, such as *Zalacca macrostachya*, used for making baskets and for tying Nipa leaves (p. 36), as well as mention the native names of others employed for many of the same purposes as the foregoing. The Chinese are said to make cables of Palm

leaves. The *Areca vestiariâ* is so called from clothing being made from its fibres, and *Rhapis cochinchinensis* is employed for thatching, &c. *Lodoicea Seychellarum* (the Palm yielding the formerly much famed "Cocos de Mer" or "Double Cocoa-nut") are formed into baskets and flowers —for a specimen of which, in the Mauritius collection, a Prize Medal was awarded at the Exhibition of 1851. The Palms prove the great value of these plants to the regions where they are indigenous —yielding flour and sugar milk and honey-like fluids, demulcent drinks and fiery spirit, fibre for cordage and for clothing, leaves for thatching and for platting, as well as wood for a variety of purposes. There is little doubt that some may yield the fibre which so abounds in their leaves, sufficient easily to be useful to the paper-maker.—*Royle, Fib. p.* Further information on the various palms of Eastern and Southern Asia, the Coco-nut palm, Palmirah, Corypha, Caryota urens, Arenga Saccharifera, will be found under these several heads. This natural order of plants is one of the largest, the most beautiful, as well as the most useful of the whole vegetable kingdom. They are almost exclusively plants of tropical countries. They belong, systematically speaking, to the Endogens or monocotyledons, the same great division which comprises the grasses, Sedges, Lilies, Orchids and Screw-pines and most of them attain the size and assume the aspect of trees. Palms having arrived at the proper age, flower every year until they die, or only once during the whole course of their existence, and have sometimes from 200,000, to 600,000 flowers on a single tree. The fruits are almost of every colour, and a single spathe of the Seje Palm of the Orinoco bears as many as 8 000 of them. The common cocoanut is one of the largest of the fruits and the double cocoanut of the Seychilles measures about four feet in circumference and probably surpasses all others in dimensions. There are not less than 1 00 known species of this useful plant. Palms are associated with the most sublime truths of Christianity, and in our every day life we speak of our "Palmy day" and "carrying of the palm," as happy and excellent times and seasons of rejoicing. Various products are largely made use of by the inhabitants of the countries in which they grow, and they are exported to peoples thousands of miles away, who employ them for many purposes, useful and economic. The sweeper of the crossings of London, holds in his hand a broom, the fibrous portion of which was cut by the wild Indians of Brazil from the stems of a palm: the gentleman who prides himself on his Penang Lawyer, is but carrying a young plant of the Licuala acutifida. The knob of the ladies parasol, is formed from a Coquilla-nut, turned into that shape. The chip hats, so extensively worn on fine summer days, are made of the leaves of a Cuban palm (*Thrinax argentea*). Heaps of dates are to be seen in all the shops of Europe which were gathered by the Bedouin Arabs, or on the borders of the great desert of Sahara; and cocoanuts grown on the shores of the Indian Ocean, in the myriads of islands which form its Archipelago, or on the shores of the Carribean sea, are sold in every city of the colder regions of the world, where they are ever beheld with unabated curiosity. The cordage and rigging of the ships, and the thick mattings used on stair cases in England, spun and woven, are from the husk of the cocoanut, and many articles of furniture are made from the woods of Palms. Toys and ornaments are made from the kernels of the vegetable Ivory palm. The stearic candles so well known are composed of the fatty substance extracted from the oil palm and the cocoanut. The sago which ministers so powerfully to the recovery of the sick, and which is seen in such varied guise on our tables, is the pith of palms that flourish in many tropical regions, the famous Betel nut dentifrice formed of the charcoal of that nut, colored with dragons blood, is the produce of two palms, and the toilet soaps of Europe are made from palm oils. Every where we meet with numerous products of Palms, either in a raw state, or turned by the ingenuity of man to some useful purpose; and millions of people who never saw a palm are benefitted by the products of these useful trees But if this be felt in remote regions of the cold north, in the tropical regions of Asia, Africa, America and Australia, where these elegant members of the vegetable kingdom flourish in all their native splendour, the inhabitants derive from them many of the necessaries, comforts, and luxuries of life, and come more or less in contact with them in almost every action of daily life. In household economy, parts of them are formed into spoons, and cups, and ladles and lamps, and hats and clothes, and combs, and hammocks, and bowstrings, and fishing lines, and fish-hooks. The light rafters of their houses are obtained from the straight cylindrical trunks of the Jara Palm (Leopoldinia pulchra), the date or palmyra tree. The roof is thatched with the leaves of palms. In one region, the door of the house is made of the split stems of the Pashiuba Palm, (Iriartea exorhiza), and in another the thickly matted leaves of the cocoanut and palmyra serve as a door for the gardens and parterres. The harpoon for catching the cow fish, is formed of the blackwood of the Pashiuba barriguda (Iriartea ventricosa.) The people eat the fruits the produce of many of this tribe of trees, and in the palm-wine and Arracks from the various plants, they enjoy palatable refreshing and stimulating drinks.—*Seemann.*

The *Chamærops Khasiana* The fan-palm, ("Pakha," Khas.), grows on the cliffs near Mamloo on the Khasia hills: it may be seen on looking over the edge of the plateau, its long

curved trunk rising out of the naked rocks, but its site is generally inaccessible : while near it grows the *Saxifragis ciliaris* of English Gardens, a common plant in the north-west Himalaya, but extremely scarce in Sikkim and the Khasia mountains. This species of Chamærops is very closely allied to, if not identical with *P. Martiana* of Nepal, which ascends to 8000 feet in the western Himalaya, where it is annually covered with snow : it is not found in Sikkim, but an allied species occurs in Affghanistan, called P. Ritcheana. The dwarf palm of Southern Europe is a fourth species.—*Hooker, Him. Journ, Vol.* II. *p.* 280. There are upwards of twenty kinds of Palm in the Khasia district, including *Chamærops*, three species of *Areca*, two of *Wallichia, Arenga, Caryota*, three of *Phœnix, Plectocomia, Licuala*, and many species of Calamus. Besides these there are several kinds of *Pandanus*, and the *Cycas pectinata*—*Hooker, Him. Jour. Vol.* II. *p.* 267. Palms of the Khassia hills amount to fourteen, of which the *Chamærops* and *Arenga* are the only genera not found in Sikkim.—*p.* 281.

(5985) PALM. The term applied in Southern India to the bars of iron, manufactured from Cutties.

(5986) PALM BOOKS. The books and separate leaves employed for writing on, in Asia, are made from the leaves of the Taliput Tree *Corypha Umbraculifera*, also from the Tara, Taleet, or Tallier of the Bengalese *C. Taliera*, Roxb. All the Burman books are made of the leaf of a species of corypha, but the orders that are issued from the Burmese courts are written on strips of palmyra palm-leaf.—*Mason.* Those used in Southern India for the accounts of shop-keepers, the orders of Collectors, and village accounts are made of the leaf of the palmyra.

(5987) PALMA CHRISTI. Castor Oil Plant.

Jarak Malay, & Jav.	Tangan-tangan, Philippine.
Kaliki Sunda & Mad :	

(5988) PALM OIL.

Huile de palme, Huile de Senegal. Fr.	Olio di palma, It.
Palmol, Ger.	Aceite de palma. Sp.

A fatty substance, obtained from the fruit of several species of palms, but chiefly from that of the *Elais Guineensis*, growing on the Western Coast of Africa. It has the consistence of butter, a yellowish colour, and scarcely any particular taste ; and becomes rancid on being kept for any length of time. It is chiefly used in England for the manufacture of toilet soap, pomade-perfumery ; also in medicine and surgery. The African Palm Oil of Commerce, so much imported into England for the Manufacture of Prices' Patent Stearic Candles, is the produce of this Elais Guineensis ; Linn., a native of Africa. Another species, E. melanococca, Gaertn : is a native of America : both species might be profitably introduced into India.—*Seeman.*

(5989) PALM WINE. Toddy.

Tuwak, Malay & Jav.	Nera, Malay.
Taree Sendee & Narellie, Hind.	Kulloo, Tam. & Telegoo.

The fermented juice of several species of palms.

(5990) PALM-WOODS. Two or three varieties only, of the four or five hundred which are said to exist, are imported into Great Britain from the East and West Indies. They are known in England by the names, palm, palmetto, palmyra, and nutmeg, leopard, and porcupine wood, &c. from their fancied resemblances, as when they are cut horizontally, they exhibit dots like the spice, and when obliquely, the markings assimilate to the quills of the porcupine. The trunks of the palms are not considered by physiological botanists to be true wood, they all grow from within, and are always soft and spongy in the centre, but are gradually harder towards the outside : they do not possess the medullary rays of the proper woods, but only the vertical fibres, which are held together by a much softer substance like pith or cement, so that the horizontal section is always dotted, by which they may be readily distinguished from all true woods. The colours and hardness of the two parts differ very materially, and through the kindness of Sir James Sutherland, and Colonel Sykes, are given the distinctive names of the following three :—

The *Areca Catechu*, or betle-nut palm, is remarkably perpendicular, it grows to the height of about 30 feet, and rarely exceeds 4 or 5 in diameter, it bears a small tuft of leaves, and the fruit is in clusters like grapes. The betle-nut is chewed along with quick lime and the leaf of the Piper Betle, in the manner of tobacco. The general colour of the wood is a light yellow brown, the fibres are large, hard, and only a few shades darker than the cementitious portions.

The *Cocos nucifera*, or cocoa-nut palm, flourishes the best in sandy spots near the sea beach, and sometimes grows to 90 feet in height and 3 feet in diameter, but is generally less ; it is rarely quite straight or perpendicular, and has broad pendent leaves from 12 to 14 feet long, in the midst of which is a sort of cabbage, which, as well as the fruit, the cocoa-nut, is eaten : the husk of the nut supplies the material for coir rope and matting. No part of this interesting tree is without its grateful service to the native of the Tropic, the leaves are used for making baskets, mats, and the covering of his dwelling ; he also obtains from this tree, oil, sugar, palm-wine and arrack, and although the upper part of the trunk is soft and stringy, the lower supplies

an useful wood, the fibres of which are of chesnut brown, and several shades darker than the intermediate substance; the wood is employed for joists, troughs for water, and many purposes of general carpentery. The Asiatic Society has specimens marked, male, 1st; and; 3rd; 4th sorts, and the same number of female varieties: no material distinction is observable between them.

The *Nirpeire palm*, Caryota urens, is much darker than either of the preceding kinds; the fibres are nearly black and quite straight, and the cement is of a dark brown, but in other varieties with these black fibres, the softer part is very light-coloured and so friable that it may be picked out with the fingers; Colonel G. A. Lloyd has mentioned that at the Isthmus of Darien, they use the fibres of some of the palms as nails for Joinery work.

Palmyra wood, or that of Borassus flabelliformis, says Mr. Laird, is largely imported into Madras and Pondicherry, from the Jaffna district at the northern part of Ceylon, for the construction of flat roofs, the joists of which consist of two slabs, the third or fourth part of the tree, bolted together by their flat sides so as to constitute elliptical rafters. They are covered first with flat tiles, and then with a white concrete called Chunam, consisting of shell lime, yolks of eggs, and Jaggree (Sugar), beaten together with water in which the husks of cocoa-nuts have been steeped.

The *prickly pole* (Cocos Guianensis) of Jamaica. &c., a palm growing 40 feet high, and of small diameter, is said to be very elastic, and fit for bows and rammers.—*Capt. Symonds.*

The *palm woods* are sparingly employed in England for cabinet and marquetry work and sometimes for billiard cues which are considered to stand remarkably well; they are also turned into snuff boxes, &c. The smaller kinds are imported under the names of Partridge canes (called also Chinese or fishing canes,) Penang canes from the island of that name, together with some other small palms which are used for walking sticks, the roots serving to form the knobs or handles. The knobs of these sticks exhibit irregular dots something like the scales of snakes, these arise from the small roots proceeding from the principal stem; which latter shows dotted fibres at each end of the stick, and streaks along the side of the same. The twisted palm sticks, are the central stems or midribs of the date palm; they are twisted when green, and stretched with heavy weights until they are thoroughly dry: they are imported from the Neapolitan coast but are considered to be produced in Egypt. The shells of the cocoa-nut and coquilla-nut, and the kernels of the areca or betle-nut, and those of the corosos or Ivory-nut, have likewise their uses in English workshops.—*Tredgold.*

(5991) PALMINE may be prepared from the commonest castor oil in the country, and can possibly be obtained from other oils also, by treating them with nitric or nitrous acids. A process is given in Braude's Manual of Chemistry Vol. II p. 1257, and supposed to be the substance which has been lately patented for the use of railway carriages in this country, and whether as regards its origin, the facility of making it, the abundance of the castor oil plant in India, its consistence and cheapness, it well deserves attention. The Nitric or Nitrous acid, *Shore ka tezab* is usually obtained by distilling nitre, *Shora*; HIND, with Sulphuric acid, *Gundhuc ka tezab*; of which two materials various proportions are employed When Nitrous or Nitric acid is made to act upon castor oil, it is converted into a solid wax like substance, and a similar, though much more rapid, result takes place when olive oil the *Zeitoon ka tel* of the bazars, is similarly treated with Nitrate of Mercury; but it deserves notice that castor oil is the only one of the drying oils which is susceptible of this species of solidification. On adding nitrous acid to castor oil a yellow liquid is at first formed, and the time required for its solidification varies with the quantity of acid employed; when about a twentieth part of acid is used, it solidifies in seven or eight hours, and this or somewhat less, is the best proportion. If too much acid be used, a third part, for instance, or a half, the temperature rises to 130° or 140°; effervescence ensues and the oil becomes opaque, and instead of indurating remains viscid. Palmine thus obtained is yellow, but when purified by solution in boiling alcohol, it is white, of a waxy fracture and requires a temperature of about 150, for its fusion. When this is kept for some months it occasionally acquires a resinous appearance and presents an almost vitreous fracture. It has appeared to me that a large and profitable trade might be had in Palmine made from the cheap oils of Southern Asia, the difficulty of transporting which is well known. The same effect is produced on this oil and on Olive oil by adding the Nitrate of Mercury.—*Author.*

(5992) PALMYRA. BORASSUS FLABELLIFORMIS.

Tar kajhar, HIND | Tatty Chettoo, TEL.
Panna marum, TAM.

This tree is very abundant, especially in sandy tracts near the sea. It is used chiefly for rafters, joists and reapers, when of good age, the timber is very valuable for this purpose, the trunk is split into 4 for rafters, into 8 for reapers, these are dressed with an adze. Those of Jaffna Palmyrahs are famous, and were largely imported in former times. From the structure of the fibres, it splits easily in the direction of its length, but supports a greater cross strain than any other wood: iron nails, however, rust rapidly in it. The fruit and the fusiform roots of the young trees (in the Northern Circars) are used

as an article of food by the poorer classes. The leaves are used for thatching and coarse fibre. Jaggery and Toddy are extracted from the Tree, the former is extensively used in the manufacture of Sugar in Vizianagrum and Rajahmundry. Very neat baskets of Palmyrah leaf are exhibited from Tinnevelly.—*M. E. J. R.* Some clean but brittle fibres were exhibited at the Madras Exhibition of 1855, by the Tinnevelly, Madura and Travancore local committees and well twisted rope accompanies most of the samples, but the material is said to be stiff, brittle, and liable to rot when wet. This substance did not appear to have undergone any preparation, and it contained so much woody fibre that it is questionable whether it would ever be suited for manufacturing purposes. Its chief uses are for securing thatch and tying bamboos, in building native huts. The dried leaves of this plant are used for writing upon with an iron style, also in thatching, making fans, and light baskets for irrigation. The Palmira tree of Europeans (*Borassus flabelliformis*), and the *Tar* of the natives of India, is to be seen in almost all parts of India, and occasionally as far as 30° N. lat. It is stated by Dr. Roxburgh to be next to *Caryota urens*, the largest Palm on the Madras coast, and that it seems to thrive equally well in all soils and situations. The seeds, when young are eaten by the natives, being jelly-like and palatable. The tree, during the first part of the season, yields a pretty large quantity of toddy (palm wine). This is either drank fresh drawn from the tree, or boiled down into a coarse kind of rob called jaggery, or it is fermented for distillation. The wood, near the circumference of old trees, is very hard, black, heavy, and durable. By the natives the leaves are universally used for writing upon with an iron style. They are also employed for thatching houses, for making small baskets, mats, &c., and some also formed into large fans, called visshries, Tam: The fibres of the leaves (*Palmyra nar*) are employed on the Madras side for making twine and small rope. They are about two feet in length, strong, wiry, and not unlike those of the Esparto of Spain. Near the base of the leaves there is also found a fine down, which is used for straining liquids through, and also for stopping bleeding from wounds.—*Royle, Fib. Plants, p.* 93. The palms undoubtedly constitute the noblest tribe of plants in the whole vegetable kingdom; and there is a large number of species indigenous, and cultivated in the Tenasserim Provinces. Excepting the areca and cocoanut, the palmyrah palm, is more generally diffused than any other.—*Mason.*

(5993) PALOO. A hard, fine, close grained, heavy Ceylon wood: heart-wood deep red brown, recent layers reddish yellow; its compact, even structure, indicates that it is admirably adapted for turning work.—*Exhibition of* 1851.

(5994) PALUDINIDÆ a family of Prosobranchiate Gasteropodous *Mollusca*. The species are all inhabitants of the fresh water. They embrace Lamarck's family of Peristomians. The genera included in it are *Paludina, Valvata, Ampullaria, Amphibola*, and *Bithinia*. Through *Ampullaria* the family is allied with *Neritidæ*.

Paludina (Lam). – This form is widely spread. Species have been found in Europe, Asia, Africa, and America. The European species are the inhabitants of temperate climates. The number of recent species of *Paludinæ* given by Woodward is 60 and of fossil species 50.

Ampullaria (Lamarck).—*Eng. Cyc.*

(5995) PAN. PIPER BETEL. Betel Pepper. This is cultivated in spots by itself; it requires much water and care, and is too well known to need any further description here. The leaves are eaten raw.—*Riddell.*

(5996) PANAX, (intended to be formed from πᾶν, all, and ἄκος, a remedy), a genus of Plants belonging to the natural order *Araliaceæ*. The flowers are polygamous, the calyx obsolete and 5-toothed. It has 4 petals, 5 stamens inserted with the petals under the edge of the disc, and alternate with them. The fruit is succulent, compressed, orbicular, from 2- to 3-celled; the cells leathery and 1-seeded. The species are herbs and shrubs and trees, having the leaves and inflorescence variable.—*Eng Cyc.*

(5997) PANAX FRAGRANS.

Gooti-soona, HIND.

A shrub, with fragrant flowers of a green color, a native of Nepal.—*Riddell.*

(5998) PANAX FRUTICOSUM is used in China and Cochin-China as a febrifuge, and as an astringent tonic. It has a shrubby unarmed stem, pinnately decompound leaves; petiolate oval oblong leaflets, coarsely and dentately serrated, the ultimate ones deeply trifid, the panicle corymbose, with the branches umbelliferous at the apex. It is a native of the islands of Ternate, Java, and Amboyna. (Lindley, *Flora Medica*; Burnett, *Outlines of Botany*.—*Eng. Cyc.* Commonly grown in Indian gardens, easily propagated from cuttings.—*Riddell.*

(5999) PANAX OBTUSUM. A shrub, like the former, but not so commonly cultivated in gardens, the roots of all are said to possess medicinal qualities, and are much esteemed by the Chinese for their beneficial influence on the nerves.—*Riddell.*

(6000) PANAX PSEUDO-GINSENG. Dr. Wallich has discovered in Nipal a species of Panax closely allied to P. quinquefolius and of which he has published an account in the 4th vol. of the Transactions of the Medical and Physical Society of Calcutta, and in his *Plantæ Asiat Rarior*. vol. ii. p. 30, t. 137. Dr. Wallich names his species *Panax Pseudo-ginseng.*

(6001) PANAX QUINQUEFOLIUS GINSENG. *Syn.* AURELIANA CANADENSIS.

The roots are about the thickness of the finger, like those of parsley, of a whitish yellow colour externally, white within, two to three inches long, wrinkled, or with rings, often divided into two branches, rarely into three or four, and these presenting a slight likeness to the human form, whence the Chinese name is derived; the parenchyme is formed of a horny and compact tissue, displaying some resinous points. Above the neck is a knotty twisted tissue formed by the remains of the old stalks. The odour is sweet, and weakly aromatic, the taste saccharine, somewhat like that of liquorice, subsequently bitter, and rather aromatic. The root of an Umbelliferous plant, the *Sium Ninsi*, is often mixed in the druggist's shops, or mistaken otherwise for the ginseng; the essential difference consists in the ginseng having the neck covered with fibrous threads, the remnants of the cortical part of the stalk. The root abounds in gum and starch, and has a little resin and essential oil. The plant is about a foot high, with glabrous, straight, simple stalks, terminating in three leaves, each composed of six uneven leaflets, a little pedicelled, oval, lanceolate, acute, and toothed at the edge. The flowers are borne on a central peduncle, and disposed in an umbel. The berries are kidney-shaped, red, compressed, crowned with the calyx and styles, and containing two semicircular seeds The ginseng root is one of the substances which, without any obvious cause, has attained the highest celebrity and esteem among mankind for its alleged medicinal virtues. The Dutch were the first nation who made it known in Europe, where they brought it from Japan in 1640 The Japanese themselves were indebted for it to China. The plant grows in the great forests of Tartary between the 39th and 47th degrees of north latitude; it is also found in abundance in Virginia and Canada, a circumstance which has rendered the roots so common that they are now cheap in China, where they once sold for their weight in gold. It would be superfluous to follow M. Fe[illegible] and other authorities in the details they afford regarding the cultivation and gathering of the ginseng. The Chinese in their hyperbolical phraseology name the root, "the pure spirit of the earth," the "recipe of immortality," the "queen of plants," &c., and in short regard it as a panacea for all the diseases to which they are liable.—*O'Shaughnessy, p.* 373-74.

Five-leaved panax or *Ginseng*, has a fusiform root more or less branched, of a whitish colour, and terminating in fibres. The stem is smooth, round, and green, often with a tinge of red, divided at the top into three petioles with a flower-stalk in their centre. The petioles are round, smooth, and swelling at their base. The leaves ternate, quinate, or septenate. The berries are kidney shaped, of a bright red colour, and contain 2 semicircular seeds. The flowers are of a yellowish colour. It is a native of Chinese Tartary and North America. In China, it has been considered an invaluable drug from time immemorial. In 1709 the Emperor of China commissioned 10,000 Tartars to go in quest of as much of this root as they could find; each one was to give two pounds of the best of it to the emperor, and to sell the rest for its own weight in fine silver. The roots enter into the composition of every Chinese medicine. It is reckoned a stimulant and restorative, and both rich and poor consider it a remedy for every disease. By Europeans and Americans however it is comparatively disregarded, and looked upon as a mere succulent, similar in its qualities to liquorice; hence the question arises, is the Chinese plant the same as the North American? For we cannot regard all that the Chinese say and practise as merely imaginary. The common name of the plant, Gen-seng, Jin-chen, or Nindsin, signifies 'wonder of the world,' or the 'dose for immortality;' and the Chinese firmly believe that its powers are almost miraculous.—*Eng. Cyc.* [GINSENG.]

(6002) PANDA, one of the names of the genus *Ailurus* (F. Cuv.), an animal belonging to the class *Mammalia* and the order *Carnivora*.

A. fulgens (F. Cuvier) is the only species of the genus. It was first described by General Hardwicke, who states that its haunts are about rivers and mountain-torrents. It lives much in trees, and feeds on birds and the smaller quadrupeds, and is frequently discovered by its loud cry or call resembling the word Wha, often repeating the same. Hence is derived one of the local names by which it is known. It is also called the Caitwa. It is found in the Himalaya chain of hills between Nepaul and the Snowy Mountains (Hardwicke, 'Linn. Trans.' vol. xv.). It is in Mr. Hodgson's Catalogue of the Animals observed in Nepaul ('Zool. Proc., 1834). Cuvier declares the *Ailurus* to be one of the most beautiful of quadrupeds. He places *Ailurus* among the Bears, between *Procyon* (Raccoon) and the Benturongs (*Ictides*) J. F. Fischer arranges it between *Gulo* (Glutton) and *Arctictis* (F. Cuv., *Paradoxurus* and *Ictides* of F. Cuv. and Valenciennes) —*Eng. Cyc.*

(6003) PANDAN, MALAY: SCREWPINE.

(6004) PANDANACEÆ, SCREW-PINES, a natural order of Endogenous Plants. The species are arborescent or bushy plants, with long rigid sword-shaped leaves, resembling those of the pine apple, usually arranged in a manner so obviously spiral that they are commonly called Screw-Pines. In a natural arrangement they are classed with Endogens, among which they are, more especially in the genus *Pandanus*, remarkable for their stems forking repeatedly. Their flowers have the sexes separate, and quite covering the spadix on which they grow. The male

flowers consist of single stamens with 2-celled anthers; the females of naked 1-celled ovaries, with solitary ascending or numerous parietal ovules. The fruit consists of a mass of ovaries collected into a tuberculated head, and either dry and fibrous or fleshy and succulent. These plants chiefly abound in the Mascaren Islands and in the Indian Archipelago, of which they form a conspicuous feature. The species of *Pandanus*, Vaquois, or Screw-Pine, are readily known by their spiral leaves, dichotomous habit, and the long roots emitted by the sides of their trunk for the purpose of holding it down in the loose sand among which they grow, in order to assist in which each root is furnished with a partial exfoliation of the end, which, in the form of a cup, adheres to the root, for the purpose, as is supposed, of holding water during the period that the root is passing through the dry air. The genus *Freycinetia*, on the contrary, is composed of plants with long scrambling or rooting stems, not branching like *Pandanus*, indeed seldom becoming what can be called a tree; and, when in flower, adorned with gaily coloured spathes from which the young inflorescence protrudes. Some of the species yield seeds which are edible. The order contains 7 genera and 74 species.—*Eng. Cyc.* The Screw Pines, are remarkable for their gigantic Bromelia-like leaves, arranged in a spiral manner. Though abounding most in Mauritius and Bourbon, species are also found in the southern parts of India, as well as in the Straits and Burmah." The leaves are composed of tough longitudinal fibres, white and glossy, which enable them to be employed for covering huts, making matting, as well as for cordage, in the South Sea Islands; and in Mauritius for making sacks for coffee, sugar, and grain." ('Himal. Bot.' p. 408.) The species which is best known in India is the *Keora* or *Ketgee*, the Kaldera bush of the Madras Peninsula, called *Pandanus odoratissimus* by botanists, on account of the exquisite perfume of its flowers. Dr. Roxburgh ('Fl. Indica,' iii, p. 741) has, under this plant, mentioned the uses to which the species most common in the Mauritius is applied; which, as well as some of the other species, is known there by the name Vacoa or Baquois. It appears to be the *Pandanus sativus* of Du Petit Thouars, but which Mr. Henley mentions as *P. Vacoa*. He having observed the valuable uses to which the plant was applied in the Mauritius, recommended its introduction into India; in some of the dry southern parts of which, it would, no doubt, though slow of growth, be a valuable acquisition, from the facility with which good sacking may be manufactured from its leaves. Mr. Henley describes this most useful Vacoa of the Mauritius to grow to the height of thirty feet, when permitted to do so; but in general, the cropping of the leaves, which commence in the third year, keeps the plant down to the height of from six to ten feet. The plant is remarkable for the aerial leafless roots which it sends down as supports for its stem, and which are of so fibrous a nature as to be employed for making paint brushes for common purposes. The leaves are cut every second year, beginning when the plant is three years old, and each plant yields enough for two large bags. The preparation must begin with the leaves immediately they are removed from the trees, and consists, first, in splitting the leaves into fillets, which are from three fourths to one inch broad at the base, but they taper to a point, and are from three to four feet in length. One of them will support the weight of a bag of sugar, or about 104 lb., without breaking. Mr. Henley states that the leaves of the other species with which he is acquainted are comparatively weak. ('Jour. Agric. Soc. of India,' 1843, p. 92.)—*Royle, Fib. pl. p.* 35.

(6905) PANDANUS, a genus of Plants, the type of the natural order *Pandanaceæ*. This name is derived from the Malay Pandang, and that of a genus of Plants, from which the natural family of *Pandanaceæ*, or Screw-Pine tribe, has derived its name, being so named from their leaves, which resemble those of the pine-apple, and are inserted spirally along the stem. The species are found in the islands of the tropical ocean, in those of Mauritius and Bourbon, as well as in the southern parts of India. One species, *P. odoratissimus*, being highly fragrant, is much esteemed in all Asiatic countries, either where it will grow or where its essence is known. It is constantly referred to by the Sanscrit poets, as may be seen in Wilson's 'Hindu Theatre,' by the name Ketaka, and as the Keora and Ketgee of the Hindoos. The Arabs call it Kazee, and Avicenna describes it under the name of Armak. Oil impregnated with the odour of its flowers and the distilled water are highly esteemed both for their odour and their medicinal use as stimulants. Dr. Roxburgh states that it is the tender white leaves of the flowers, chiefly those of the male, which yield the very delightful fragrance for which this plant is so celebrated. This species is common in the peninsula of India, where it is called Caldera Bush; in Mauritius it, as well as other species, is known as the Vaquois Plant; in Otaheite, a species is called the Wharra Tree, being in all highly esteemed for its odour, as well as for the useful purposes to which it may be applied. The lower pulpy part of the drupes is sometimes eaten, as is also the terminal bud, like that of the cabbage-palm, and likewise the tender white base of the leaves, either raw or boiled, during times of scarcity. It forms an excellent hedge, but occupies too much space. The roots are composed of tough fibres, which are used by basket-makers to tie their work, and are soft enough to be employed as corks. The leaves are composed of tough longitudinal

fibres, white and glossy, a quality which adapts them for covering huts, making matting, as well as for cordage in the South Sea Islands, and in Mauritius for making sacks for their coffee, sugar, and grain.—*Eng. Cyc.*

(6006) PANDANUS. HIGHLAND SCREW-PINE. Smaller and finer mats in common use are fabricated from the leaves of this species of screw-pine, that grows, in Tenasserim, on the highlands above tide-waters.—*Mason.*

(6007) PANDANUS FURCATUS. LOWLAND SCREW PINE. The large coarse mats in universal use in Tenasserim, are made from the leaf of a species of screw-pine, that grows abundantly on the lowlands near tide-waters.—*Mason.*

(6008) PANDANUS ODORATISSIMUS, CALDERA BUSH, Lin.

Talay ella, TAM.	Keteka, SANS.
Kewoore Ka Paut, DUK.	Keora, HIND.
Moghenakoo, TEL.	Kea kaida, BENG.
Kaida, HORT. MAL.	Kildaro, RHEED.

Its Flowers.

Talum poo, TAM.	Mogili poo, TEL.
Keoore Ka pool, DUK.	Katuca, SANS.

Magulick is the Telinga name of the male plant and Goz doogoo that of the female. Kaldera is the name they are known by amongst Europeans on the coast of Coromandel. It is a native of all the warmer parts of Asia: all soils and situations seem to suit it equally well; it flowers chiefly during the rainy season. This plant is much employed to make hedges, for which it answers well, but requires too much room. It grows readily from branches which renders it rare to find the full grown ripe fruit. The lower yellow pulpy part of the drupes is sometimes eaten by the natives during times of scarcity and famine; the tender white base of the leaves is also eaten raw or boiled, during the same melancholy periods. The fusiform roots already mentioned are composed of tough fibres which basket makers split and use to tie their work with, they are also so soft and spongy as to serve the natives for corks. The leaves are composed of longitudinal, tough, useful fibres like those of the Pine Apple. This plant is of extensive use in most parts of the island of Mauritius for its leaves, which are employed for the purpose of [illegible]kage bags for the transportation of Coffee, Sugar and grain from one place to another and for exportation. The preparation of the leaves for working into matting is simple and short: as soon as gathered, the spines or their edges and dorsal nerve are stripped off, and the leaf divided into slips of the breadth proper for the use they are required for: this operation is performed with the blade of a common straight knife, they are then laid in the sun for a few hours to dry when required for working into mats, the slips are passed under the blade of a knife applied with a moderate pressure to remove all asperities on their surface which gives them a polish and makes them plain, and more convenient to the hands—*Rox.* The Natives are fond of the scent of the flower which they place among their cloths. I was assured in the District of Ganjam, that the flowers are frequently tenanted by a small and very venomous Snake.—*Rohde M.S.S.* This plant grows abundantly in Travancore along the backwaters and canals, the fibres are extensively used, being good and strong.—*M.E. of* 1857. With the Leaves of the caldera bush, the Natives of lower India (like the inhabitants of the Friendly islands) make a fine kind of mat to sleep on, which they stain yellow and red with Cassia leaves and Vattiuga cuttay. They are also used to make the common kind of umbrellas, called by the Tamools Talay elley kedri. Dr. Roxburgh, in his "Coromandel plants," tells us that the yellow, pulpy part of the drupe of this plant is sometimes eaten by the Indians, in times of scarcity. He adds, that the fusiform roots are composed of tough fibres, which basket makers use to tie their work with. They are, at the same time so soft and spungy as to be employed as corks.—*Ain's Mat. Med. page* 145. It is in mats of these leaves, that the fine furnitures of Madras are packed.—*Nobis.* The male flowers of the fragrant pandanus or screwpine, are exceedingly fragrant, and great favourites with the Burmese. The palm-like shrub that bears them, dropping roots from its branches, like the banyan, is a very curious plant, and not inelegant.—*Mason.* This very fragrant flower which is of a pale yellow colour is offered up at the shrines of Mariama (Mariatale) and Vishnoo, but is supposed not to be acceptable to Sheva.—*Ains. Mat. Med. page* 159.

(6009) PANDANUS SAIL-LEAF. On many of the Burmese boats, sails are seen made of large narrow leaves, sewed together. They are the leaves of a species of screw-pine that has a trunk like a palm, which is very abundant and usually grows near the sea. The fruit is used by the Karens to hackle their thread.—*Mason.*

(6010) PANEOLA PLUM. Flacourtia Sapida.

(6011) PANDION. [FALCONIDÆ.]

(6012) PANDORA. [PYLORIDÆ.]

(6013) PANGIACEÆ. *Pangiads*, a natural order of Diclinous Exogenous Plants. This order embraces three genera, the species of which are trees with alternate stalked entire leaves, polypetalous axillary monœcious flowers, with scales in the throat of those bearing pistils. The stamens are five, the seeds large and oily. Dr. Lindley says, "What the distinction is between these plants and Papayads, except that the last are monopetalous, and have no faucial scales in the ♀ flowers, it is hard to say." The species are found in the hotter parts of India. They are all poisonous. The natives of India employ extensively in medicine the seeds of *Gynocardia*

odorata, which are known by the name of Chaulmoogra and Petarkura. The genus *Hydnocarpus*, formerly referred to *Flacourtiaceæ*, belongs to this order. [FLACOURTIACEÆ] (Lindley, *Vegetable Kingdom.*)

(6014) PANGOLINS, a name in common use to designate the Scaly Ant-Eaters, said to be derived from the word Pangoeling which signifies in the Javanese language, according to Seba, an animal which rolls itself into the form of a ball. The Bengalese name is Badjarkita, or 'reptile of stone.' These animals form the genus *Manis* of Linnæus. The Pangolins are toothless, and furnished with a very extensible tongue; but their tegumentary covering is very different, for their body, limbs, and tail are clad in a panoply consisting of great trenchant scales overlapping each other like tiles, so as to form a sort of scale armour when the animal is on its feet. When it is vigorously attacked, and often on the first approach of danger, it rolls itself up in the shape of a ball; and then the trenchant scales are said to be erected, and offer their sharp edges to the enemy.

(6015) *Manis* has the following characters: — Lower jaw very small; tongue very extensible. Body and tail entirely covered above with large triangular trenchant scales disposed quincuncially, and overlapping each other like tiles. Toes five, armed with robust claws. Body endowed with the faculty of rolling itself up more or less into the form of a ball, Dental Formula, 0. The Pangolins,are slow in motion, and live on worms and insects, especially termites and nuts, which they seize by means of their extensible and glutinous tongue.

(6016) *Manis pentadactyla* (*M. brachyura* of Erxleben and probably the Phattage of Ælian, xvi. 6), Indian, Broad-Tailed, or Short-Tailed Manis. It has the head small, pointed, and conic; muzzle elongated and narrow. Body rather stout. Tail short and very broad at its base. Dorsal scales disposed in longitudinal rows to the number of eleven; under part of the body, head, and feet naked; some long, fair-coloured hairs spring from under the scales. Middle claw of the fore feet far exceeding the others in its proportions. It is a native of the East Indies, coast of Tranquebar, &c. It feeds much on termites, or white ants, for the destruction of whose conicale nests the great middle claw is admirably adapted. Thunberg states that it is found much in Ceylon, especially near Negumbo. The Dutch call it the Negumbo Devil, and the Cingalese, Caballe. Its flesh was given to the sick to eat by way of remedy. Thunberg further informs us that the inhabitants have a method of making a hole in its skin with a knife, and thus of guiding and governing the animal at their pleasure, the point of the knife, which is kept in the hole, goading and irritating him. The cruelty of this proceeding does not however seem to have struck the traveller. The Land-Carp is also an Asiatic name for this species. It is the Kuwlee Manjar, or Tiled Cat, of the Mahrattas, according to Colonel Sykes, who notices it as very common in Dukhun (Deccan), and living on white ants. Mr. Hodgson, in his catalogue of the quadrupeds of Nepaul, mentions a new species of *Manis* allied to *M. Javanica* (Desm.), as being of frequent occurrence in the hills of the lower region, and in the mountains of the central tract. ('Zool. Proc.,' 1830, 1831, and 1834.)—*Eng. Cyc.*

(6017) PANICHIE, the Tamil and Portuguese names of a tree which grows in Ceylon and Travancore, from thirty to sixty feet high, and ten to twenty-four inches in diameter. In Ceylon it grows tall and straight, in Travancore it is not more than twenty feet high, and is curved. It produces a fruit which resembles externally the small russet apple: when pressed it yields a very glutinous juice, which is used as a substitute for glue; and may be considered in that country as very superior to glue for the use of joiners. In Ceylon this tree is converted into masts, yards, &c. for country vessels; and the native carpenters consider it the best sort of all the jungle woods for that purpose. — *Edye, Ceylon.*

(6018) PANICUM, a genus of Grasses the name of which is applied to one of the species (Millet) by the Romans, and which, Pliny states, is so-called from its flowers being in a panicle: though others derive the name from 'panis,' bread, from its uses as such. The genus contains a very large number of species, which abound in the hot parts of the world, though a few extend to higher latitudes and ascend the cool mountains of hot countries. They are chiefly valuable as pasture grasses, and for their seeds, which forms a large portion of the food of the poorer classes of many nations, and thus engage a considerable share of the attention of the agriculturists of those countries. The genus *Panicum* is distinguished by having a 2-flowered spikelet, with the lower flower masculine or neuter, and the upper hermaphrodite. Glumes 2, unequal, concave, blunt. Masc. paleæ 2, stamens 3, sometimes neuter, the upper palea and the stamens abortive. Fertile flowers, paleæ 2, unequal, concave, the lower one embracing the upper; scales 2; stamens 3; styles 2, ovary sessile. Besides those, mentioned below, which are the most commonly cultivated species, the grains of other species of *Panicum* growing in a wild state are collected, and form articles of diet with the poorer classes of the natives of India, as of *P. floridum* (Burtee), *P. Helopus* (Koorae), *P. hispidulum* (Dhand). The uses of this genus are not confined to its grain, for the herbaceous part of several species forms the most valuable pasture grasses of the hot countries both in the Old and New World. Some of the species of

Panicum of the Brazils are of gigantic stature, and yet tender and delicate in their herbage. The Coapim de Angola of Brazil grows 6 or 7 feet high, and other equally gigantic species constitute the field crops on the banks of the Amazonas; while *P. maximum*, or Guinea Grass, forms the most valuble pasture for cattle in Jamaica. This is said to have been introduced into that island from the coast of Africa, the seeds having been transmitted as food for some birds which were sent to Chief Justice Ellis. The straw of several of the species is esteemed as fodder for cattle in India, but no pasture grass in any country is probably more highly thought of than the Doob of India, which by the Brahmins is held sacred to Ganesha (Janus?) under the name of Doorsah. This is fortunately common throughout India, and forms probably three-fourths of the food of their horses and cows. It is seldom cultivated; but Europeans, in the northern parts, frequently form lawns by planting small pieces of this grass, which forms excellent hay. The usual mode of obtaining it is to send out the grass cutters into the uncultivated parts of the country, who scrape off the ground the creeping stems and leaves of this species, which is easily distinguished by its smooth and creeping habit; its spikes being fascicled and digitate, filiform, from 1 to 2 inches long, with the flowers disposed in two rows on the under side. It is the *P. Cynodon dactylon* of botanists, and occurs also in England.—*Eng. Cyc.*

(6019) PANICUM FRUMENTACEUM, the Shama or Samwuk of the natives of India, is a wholesome and nourishing grain, and forms there an article of diet, chiefly of the lower classes. There are several varieties of it, which yield from 50 to 60 fold; it delights in a light, tolerably dry, rich soil; the same ground yields two crops between the first of the rains in June, July, and the end of January, in the Circars, but only one crop in the northern provinces.

(6020) PANICUM ITALICUM. Setaria italica, *Kunth.*

Kungoo, Beng.	Tenney, Tam.
Kala-kanguee, Hind.	

India: cultivated in Europe. Seeds small, roundish, straw-coloured, pericarp brittle, with a round and partially pellucid grain, alimentary, but gives a heavy, disagreeable bread.—*O'Shaughnessy, page* 637.

(6021) PANICUM MILIACEUM, Millet. Common Millet. Lin. Κεγρος, Hesiod, Diosc. Hippoc.

Chamy, Can.	Samaloo, Tel.
Savee, cheena-waree, Hind.	Millet. Eng.
Varugoo, Tam.	Panicum Miliaceum
Shamakh, Duk.	Shamaka, Sans.
	Ainslie, page 217.

Millet, is the best known species, being cultivated in the south of Europe as well as in tropical countries. Two varieties are well known, one brown, the other yellow-coloured, imported from the Mediterranean chiefly for feeding poultry, but forming in the south of Europe as well as in India a portion of the food of the inhabitants. In the latter country it is cultivated in the cold weather with wheat and barley, and the only one of the small grains that is so at the season of the year.—*Ainslie. Eng. Cyc.*

(6022) PANICUM MILIARE, is another species generally cultivated on an elevated rich soil in the peninsula of India: the seed is one of the sorts of dry or small grain which forms an article of diet of the Hindoos, who inhabit the higher lands, and cattle are fond of the straw.—*Eng. Cyc.* Cultivated in Europe, seeds oval, slightly compressed, brilliant, about a line in length; bark or envelope blackish, brown or fair; parenchyme, white, or sweet taste. Alimentary, but the pericarp is very difficultly separated from the grain; chiefly used in a kind of gruel or bouillie.—*O'Shaughnessy, page* 637.

(6023) PANICUM. Panic grass. Several very common grasses belong to the genus panicum. One species in Tenasserim grows about three feet high, and after a field has been subdued, it will often spring up so thick that every thing else is destroyed. Cattle eat it both dry and green.—*Mason.*

(6024) PANICUM SEMIVERTICILLATUM. Rottler.

Koodraywalie chamay Tam. | Lupta Hind.

This is an inferior grain to several of those hitherto mentioned and is eaten by the poor people in the districts in which it is cultivated; such as Coimbatore, and other dry grain countries.—*Ainslie, p.* 219.

(6025) PANMUHORI. Seeds of Fæniculum Panmorium.—*Ben. Phar.*

(6026 PANNAM KALUNG. The people of Southern India and Ceylon have for many hundred years been in the habit of eating the bulb or root, which is the first shoot from the palmyra nut which forms the germ of the future tree, and is known locally as pannam kaling. It is about the size of a common carrot though nearly white. It forms a great article of food among the natives for several months in the year; but Europeans dislike it from its being very bitter. Recent experiments have proved that a farina superior to arrowroot can be obtained from it, prepared in the same way, and 100 roots, costing 2½d, yield one and half to two pounds of the flour.—*Simmonds' Comml. Products, p.* 376. In Madras, 100 cost 1½d.

(6027) PANRI. Leaves of a small plant imported from Bombay, considered refrigerant and to promote digestion: are sweet-scented, and used by attars; one seer costs one and a half rupees. —*Genl. Med. Top. p.* 149.

(6028) PAN SOOPAREE, from *Pan*, betel leaf, and soopeearee, areca nut; see BETEL.

(6029) PANSY, HEARTSEASE. May be raised from seed, sown at the commencement of the rains, will hardly repay the trouble.—*Jaffrey.*

(6030) PAPAVER, a genus of Plants the type of the natural order *Papaveraceæ*. The history of this, like that of many other cultivated plants, is little known, as well as the time when it began to be cultivated for the sake of its inspissated juice, though it was well known to the Greeks, and cultivated at very early periods on account of its seeds. (Theoph., lib. ix. cap. xiii., ed. Bodæus and Staple, p. 1097.) Some authors are of opinion that it is the Μήκων of Dioscorides, and that the kind with black seeds was called' Αγρία, and that with white seeds Ημερος; and that it is the juice of this plant which Hippocrates recommends under the name of ὀπός μήκωνος or 'juice of the poppy.' Pliny (xx. c. 18) uses 'opium' to express the inspissated juice of the poppy. Sprengel, in his 'Hist. Rei Herb.,' i. p. 176, quotes Diosc., lib iv. c. 65, as referring to *Papaver somniferum*, and to *P. Rhœas*; but in his edition of that author (ii. p. 600) he mentions only the latter plant; hence we may infer that he conceives the former to have been unknown, as he nowhere else mentions it. We do not in this instance get the same degree of assistance as in many others from Arab authors. Opium is described by them under the name of Afeeyon, while Apaynum is quoted by Dr. Ainslie as its Sanscrit name. The poppy plant is described by the Arabs under the name of Khushkhush, while the Sanscrit is Chosa; and the Persian and Hindoo, Post. The species of *Papaver* are chiefly found in European countries; but a few species expand to the Caucasus and Armenia, and one species grows in the Himalayas, though Egypt is the country where we find the earliest notice of the opium poppy. This species is now common in most parts of Europe, but having been so long cultivated, it may appear indigenous in many countries where it has only escaped from cultivation. It is, as is well known, extensively cultivated in India, but it can nowhere be seen in a wild state, as the climate is too hot to support it, except for a few months in the year. The genus *Papaver* has two convex deciduous sepals; petals 4; stamens numerous; style wanting; stigmas 4 to 20, radiating and sessile upon a disc which crowns the germen; capsule obovate, 1-celled, opening under the crown of the stigmas with short valves; placentæ intervalvular, incomplete; flower-stalks inflexed at the apex before the flowers have expanded; the flowers of all are large and showy, but last a short time. Herbaceous plants abounding in milky juice. The species are numerous. The English species are distinguished as having a rough and a smooth capsule; of the former, *P. hybridum* has an obovate globose capsule, and *P. Argemone* an elongated club-shaped capsule; of those smooth capsules, *P. Rhœas* and *P. dubium*, the former has a globose and the latter an oblong capsule.—*Eng. Cyc.*

(6031) PAPAVER CROCŒUM. This species, which is almost always variegated, is sown only as a border flower, for its large and handsome appearance The scent is anything but agreeable. The seed should be sown where the plants are to remain, and six inches the least space allowed between each plant. They do not bear transplanting. The common cultivated species, from the capsule of which opium is procured, is of various colours, and when sown in beds, has a very pleasing effect. The seed (kus kus) is usually used by natives in confectionery having the taste of sweet almonds. Is propagated by seed only.—*Riddell.*

(6032) PAPAVER RHŒAS, (corn poppy). This unimportant species is found in gardens in upper India. The petals are of a beautiful red colour, and are used to colour a syrup, the Syrups rhoœados of the English pharmacopœia; no active or narcotic principle has been found in this species.—*O'Shy., p.* 171.

(6033) PAPAVER SOMNIFERUM, OPIUM POPPY. Linn, The Garden or white Poppy. var. *a* with black, var *b* with white seed.

Post, HIND
Khuskush, ARAB. and DUK.
Koonar, PERS.
Chosa, SANS.
Μμκων GREEK.

It appears to have been one of the early cultivated plants, as Homer is thonght to allude to it as growing in gardens. Hippocrates mentions two kinds, the *black* and *white poppy*, so the Arabs and Persians distinguish the *khushhash abiuz* or white, from the *khushkhash aswad*, or black poppy. The white Poppy is now cultivated in the plains of India, and the black, or rather deep-red, variety in the Himalayan mountains. Mr. Hamilton says, "The opium is chiefly obtained from the single white poppy; I have also seen the red and purple colours though only one is usually seen in a field. I hardly remember to have noticed any mixture of colour in one piece of ground. The kind here cultivated generally grows to a height of three feet."—*Hamilton, Travels in Asia Minor p.* 115. It was early cultivated, as it still is, in Egypt, also in India, Persia. Asia Minor, as well as in some parts of Europe, The Garden Poppy is probably a native of Persia. It has, however, been so long grown in gardens in various parts, that it is sometimes found apparently wild, especially in the southern parts of Europe. The roots are from 2—4 feet high, the stems are round and straight, glaucous, smooth, with a few hairs towards the white and tapering

extremity, and on the peduncles. The leaves are large sessile, amplexicaul, smooth, of a glaucous green, margins wavy, cut and toothed. The flowers are large and terminal, drooping before flowering, with smooth concave sepals; 4 large petals, roundish in form, white or of a purplish colour with a darker coloured spot near the claws. The capsule is oval, or nearly globose, large, smooth, with parietal placentæ equal in number to the stigmas, which are covered with numerous white or brownish coloured, kidney-shaped seeds. Flowers in June and July, and the capsules ripen about two months later.—*E. B.* 2145. Some consider that there are two distinct species instead of varieties of this plant. *P. Officinale.* (Gmelin, var, *album* is larger and less glaucous, with white petals and seeds, capsules ovate-globose and remaining closed under the crown of stigmas while *P. somniferum* (Gm.) var. *nigrum* has the flowers violet or [illegible], seeds black, capsules globose, opening by foramina under the stigmas. The White Poppy is a native probably of Asia Minor, or of some part of the Persian region of botanists, but having been so long cultivated, is found wild in many parts of Europe. The species is distinguished by its obovate or globular capsules, smooth as well as the calyx, the stem smooth and glaucous, leaves embracing the stem incised and repand, with sub-obtuse teeth. There are two distinct varieties, which by some botanists are considerad to be distinct species: the dark, the red-flowered, and black-seeded is called by Gmelin *P. somniferum*; and the white flowered with white seeds, *P. officinale.* The latter is characterised as having an ovate globose capsule; foramina under the stigma either none or obliterated; peduncles solitary. The former (*P. somniferum*) has globose capsules, opening by foramina under the stigma; seed black; peduncles many. The flowers are usually red of different tints, though sometimes white. Dr. Royle states that he has seen only the white-flowered variety in the plains of India, and the red-flowered in the Himalayas, and both cultivated for the sake of the opium. The poppy is cultivated in many parts of Europe on account of its seeds, which yield a bland oil much esteemed in France; and in England chiefly on account of the capsules, which are used medicinally. It is extensively cultivated in Turkey and Asia Minor, Egypt, Persia, and India, on account of its inspissated juice, so well known as opium, though this is occasionally prepared also in Europe. The cultivation of the poppy is very simple, though the weeding requires care, and the plants must not be crowded too much together. They are carefully watered and manured, the watering being more copious as the period of flowering approaches, and until the capsules are half grown.—*Eng. Cyc.*

This most important plant is a native of the south of Europe and Asia Minor, and is now naturalized by cultivation in India. The *Capseeles* are employed in medicine for the preparation of a sedative decoction and syrup, much used for children. They are devoid of odour; of slightly bitter taste. If collected before the concrete juice is removed the capsules contain a minute portion of all the active principles of opium; for medicinal purposes those should be rejected which are marked with longitudinal and paralled cuts resulting from the extraction of opium. An infusion of poppy heads in cold water should strike a red colour with permuriate of iron—*O'Shaughnessy, page* 171.

Poppy Oil.—The seeds of the poppy yield by expression 56 per 100 of a bland and very valuable oil, of a pale golden colour, fluid to within 10 degrees of the freezing point of water; Sp. Gr. 939; it dries easily, is inodorous, of agreeable flavour, is partially soluble (8 in 1000) in alcohol, dissolves the oxides of lead. The mass from which the seed is expressed is found to be extremely nutritions to cattle; for all pharmaceutical purposes, this oil is equal to that of the olive, employed in European pharmacy, and accordingly recommended in Dr. O'Shaughnessy's formulæ for Hospital use.—*O'Shaughnessy, Eng. Cyc. page* 172.

Opium is an invaluable remedy, and important article of commerce, and requires to be treated of in considerable detail and reference is made to the article Opium.

(6034) PAPAVERACEÆ, *Poppyworts*, a natural order of Hypogynous Exogenous Plants. The species are readily known by their deciduous calyx, usually tetramerous flowers, indefinite hypogynous stamens, and parietal placentæ; added to which, they have leaves without stipules, and their stems discharge a turbid white, yellow, or orange-coloured juice when wounded. Their seeds moreover contain a bland oil, lodged in a copious albumen, within which is stationed a minute embryo. They consist for the most part of herbs, which are usually of only annual duration; but a few are shrubby, the most remarkable case of that kind being a genus called *Dendromecon* a native of California, which is a true shrub, with the aspect of a *Cistus.* The greater part of the species inhabit the temperate parts of the Old World; but a few also occur in Australia, at the Cape, and in South America. Their active qualities are usually deleterious, but are for the most part of little moment, except in the case of the *Papaver somniferum*, or Opium Poppy. It is however probable that in most cases the milky juice is narcotic, and the oil of the seeds harmless. An apparent exception to the latter statement occurs in *Argemone Mexicana*, the seeds of which are said to be narcotic, especially

when smoked; but it is probable that in this case it is in the coats of the seed that the poisonous principle resides, rather than in the oil itself. Some *Papaveraceæ* have no petals, as *Bocconia*, thus corresponding with *Thalictrum* and other apetalous *Ranunculaceæ*, with which order they are closely connected through *Platystemon*, a Californian annual with disjointed carpels. They are also related to *Nymphæaceæ* and *Sarraceniaceæ*. The order embraces 18 genera and 130 species.—*Eng. Cyc.*

(6035) PAPAW, CARICA PAPAYA. This is the American pawpaw, not the pawpaw of the Mississippi valley, *Porcelia triloba*; but the pawpaw of South America and the West Indies. Europeans call it papaya, from the Portuguese *papayo*; and by the Portuguese it was probably introduced into India, The fruit resembles a melon in appearance, and often tastes no better than a good English turnip.—*Mason*. The fruit and leaves of the papaw, or Muh-Kwa tree melon, are eaten, after being cooked; the Chinese are aware of the supposed intenerating property of the exhalation from the leaves of this tree, and make use of them sometimes to soften the flesh of ancient hens and cocks by hanging the newly killed birds in the tree, or by feeding them upon the fruit beforehand.—*Williams' Middle Kingdom, p.* 284.

(6036) PAPAYACEÆ. *Papayads*, a small natural order of Exogenous Plants. The species are apparently allied to *Cucurbitaceæ* and *Passifloraceæ*, with the former of which it corresponds in its gourd-like fruit, with parietal placentæ, and in its disunited sexes; while it approaches the latter also in placentation, in its superior succulent fruit, and in the structure of its seeds. The order is remarkable in its fructification for having monopetalous male flowers and polypetalous females, and in its vegetation for its simple unbranched stems, growing only by the gradual development of a terminal bud. The species of most importance in this order is the Papaw-Tree, *Carica Papaya*. The order as at present constituted contains 8 genera and 25 species.—*Eng. Cyc.*

(6037) PAPEETA: NUT OF Strychnos Sancti Ignatii *Ben p.* 219.

(6038) PAPER.

Karta, ARAB.	Kaghas, PERS.
Papiers, DUT.	Kaedum, TAM.
Papier, FR.	Kakitum, TEL.
Papier, GER.	Papel, PORT.
Kaghuz, Kaghul. GUZ HIND.	Bumaga, RUS.
Carta, IT.	Papel, SP.
Charta, LAT.	

In histories of the manufacture of paper, the Chinese are generally acknowledged to have been the first to have made paper from pulp. The Egyptian paper, or Papyrus, was made by gumming slices of vegetable tissue together under pressure, and what is called the Rice paper of China consists only of thin slices of cellular tissue of a plant. The Arabs are supposed to have learnt the art in the eighth century from the Chinese, but much more probably from the Hindoos, as they translated many of their works and adopted much of their science. The Arabs are further said to have introduced the art of paper-making into Spain in the ninth or tenth century. Paper was first made at Nuremburg in the year 1390, but in England not till the year 1450. There is no doubt however, that the manufacture of paper from pulp has been known in China from very early times: it is said for at least 2000 years. They employ a vast variety of fibrous substances for this manufacture, and apply paper to a variety of uses little thought of in other countries. They make up an infinite variety of kinds, from the coarse, heavy, half-inch thick touch-paper, for retaining a slow, enduring fire, to the beautiful so-called India paper suited for the finest proof engravings. In the tea chests there is a lavish use of many thicknesses of paper. If a hut or boat is leaky over-head, the bed is protected by a large sheet of oiled paper. If a shopkeeper wants to tie up a parcel, he seizes a strip of tough paper, and by rolling it on his thigh at once converts it into a strong packthread, and even a torn sail is at times patched with tough paper. In China it is the cheapest of materials in daily use, and the manufactures are very numerous. They make it of Rice straw, of young Bamboos, of different fibres, and of the bark of the Paper Mulberry; showing that the inventors of the art make use chiefly of unwoven fibres, though they also employ refuse cloth and silk, &c. So India, though hardly ever mentioned in histories of the art, is a country where considerable quantities of paper are made, though not generally of a good quality, as the thick ink in use does not so much require this. There are small manufactories of it in most parts of the country, and to a considerable extent at such places as Ahmedabad, Lucknow, Aurungabad, &c. As will have been seen in these pages, a great variety of fibres, such as Jute, Sunn, Ambaree, Moorva, and old sacks and fishing nets are also employed, though in general the natives of India, prefer the Sunn fibre. The Himalayan process with the inner bark of the Paper plant very much resembles that of the Chinese with the Paper Mulberry. It is probable therefore that the art was introduced from that country into the Himalayas, and not from India, into which it had probably been carried at a very early period, and from thence learnt by the Arabs; who would hardly else have used Cotton, an Indian product. The Hindoos themselves, according to Professor Wilson, still used, about the beginning of the Christian era, or as late as the age of their Dramas, the inner bark of the *Bhurja* or Birch (*Betula Bhojputtur*) for writing on. In the Southern regions of India the leaves of the Pal-

mira and of the Talipat are well known to have been long used, as they still are, for writing on with a style. But the manufacture of paper from pulp has long been established in India, and before the Arabs began to make translations from the Sanscrit, at the same time that they did so from Greek writers. Dr. Buchanan, in his survey of the lower provinces of the Bengal Presidency, has given an account of the manufacture of paper from Pat or Jute (*Corchorus olitorius*) at Dinagepore, and in Behar, &c., from Sunn (*Crotalaria juncea*). It is also so made in other parts of the country, as well as from Hibiscus fibre. And there can be no difficulty in doing so with the other numerous fibrous materials which India produces in such vast variety. It is objected by manufacturers of paper that pulp from unwoven fibres does not draw through the present machinery so well as that made from rags. A modification of machinery would remedy this. But it is probable that if the half-stuff were made from the clean bark without first separating the fibres, these might probably be so entangled as to answer some of the effects of the weaving. As rags have to be collected, cut, cleaned, and bleached, Dr. Royle thinks that the primitive method of using the bark of suitable plants and trees will afford both a cheap and an effectual substitute. Besides which, the supply of rags must come short of the increasing demands of the world for paper. Bengal and the east coast of the Bay of Bengal, as well as the Malabar or west coast of India, are the places where the growth of suitable materials, from the warmth and moisture of the climate, is most abundant, and the conveyance by sea is at the same time most easy. In Arracan the price of Bast, even made into rope, is but one rupee per maund, and Mr. Henley observes that "it is to India we must look for extensive and cheap supplies, for it is there alone we find the necessary conditions of very low-priced and intelligent labour, with an abundance of elementary suitable materials; and that as articles of small price are particularly sensitive of charges, such as of freight, &c., it is only by large operations that an average of low charges can be accomplished." Suitable materials being abundant, he proposes that it should be reduced to the state of half-stuff by the aid of the Dhenkee, already mentioned as an instrument to be found in almost every house in Bengal, being used for husking rice, the preparation of tobacco, of drugs, stuffs, and brick dust. "The method proposes to avail itself of one of their own simple arts; it brings the question as nearly as possible to the state of a domestic industry, ever the most economical in such countries; it reduces to the lowest point the charge of collecting from extensive districts the various elementary matters which might present themselves." Dr. L. Playfair observes, that the price of 2*d.* to 2½*d.* per lb. for a partially prepared pulp, is by most makers considered to be too high, and that materials should be looked for at 1*d.* to 1½*d.* per lb. roughly prepared pulp; but if bleached or in as far an advanced state with regard to colour and texture as cotton or linen rag, then 2½*d.* to 4*d* per lb. might be obtained. To serve as points of comparison we may here insert a notice of the ordinary and the lately increased prices of rags from the 'Journal of the Society of Arts.'

A.	26*s.*	.....	32*s.* to 34*s.* per cwt.
B.	16*s.*	.....	20*s.* ,,
C.	11*s.* 6*d.*	.....	15*s.* ,,
D.	7*s.*	.....	10*s.* ,,

Bleaching salts, alkali, alum, hide pieces for size, are other articles required; and all have increased in price. Of the quantity of paper making material required, some idea may be formed from the fact that 177,633,009 lb. weight of paper were produced in 1853 in Great Britain. Paper is, in Europe, made chiefly from linen or cotton rags, but also from the refuse and sweepings of cotton-and flax-mills, as also of the coverings of our cotton bales and of worn-out ropes. Paper is also made from the stems and leaves of many grasses, as from rice straw, and from the bamboo by the Chinese, and of late from common straw in this country, and even from wood shavings. The fibrous part of many Lily and Aloe-leaved plants have been converted into excellent paper in India, where the fibres of Tiliaceous, Malvaceous, and Leguminous plants are employed for the same purpose: as in the Himalayas, one of the Lace-bark tribe is similarly employed, and in China one of the Mulberry tribe, and the Nettle in Holland. Plants belonging to the same families as the above abound in India and other warm countries, and are capable of yielding a very abundant and never-failing supply of sufficiently cheap and very excellent material for paper-making of all kinds. Some may be used without any further process of bleaching, but all are capable of having any colour they may possess destroyed by chemical means not excepting even the jute canvas or gunny bagging because specimens of jute of a beautiful silk, white, both plain and manufactured into fabrics for furniture, &c, &c., were shown by the late Colonel Calvert at the East India House. As the Chinese make paper of rice straw, and of the young shoots of the bamboo, while the Hindoos make ropes of different grasses (such as *Saccharum Munja* and *S. Sara*) strong enough for their Persian wheels as well as for towing lines, it is evident that these, and probably many others, contain a sufficiency of fibrous material for paper-making. The cultivated Cereals cannot well be turned to much account, for their straw forms the chief food for cattle; but as Southern Asia abounds with grass jungles, which are in the autumn of every year

burnt down in order that the young blades may spring up and afford pasturage for cattle, it is evident that there are many situations where a sufficiency might be cut down before it has become perfectly dried up, and converted into half-stuff for paper-makers and the refuse of the Sugar-cane might be similarly employed. Of the Sedges in India, some are employed for making ropes, as the Bhabhur or *Eriophorum Cannabinum*, for making rope bridges for crossing some of the hill torrents, and the *Cyperus tegetum*, is used in India for mat-making. As these plants as well as Rushes grow together in large quantities, it would be quite possible in many places to turn them to profitable account. Many parts of the world abound in the Lily and Aloe-leaved plants which have been alluded to above, and of which the leaves contain much easily separable fibrous materials. These belonging to the genera Agave, Aloe, Yucca, Sanseviera, Bromelia, and others, all of which abound in white-coloured fibres, applicable to various useful purposes, and of which the tow might be used for paper-making, and considerable supplies obtained. Paper used to be made from the Sanseviera in Trichinopoly, some has been made at Madras, of the unbleached Agave alone, as also mixed with old gunny bags. And recently also, from the leaf of the Pandanus. The Arrow root and Ginger tribes, containing such plants as those yielding the fecula called Arrow-root, Tous les Mois, Tikkur, &c, and Ginger, Turmeric, Cardamoms, &c., all have annual stems and leaves, which are the refuse of the present culture, and might yield an abundant supply of half-stuff. Among cultivated plants there is probably no one so well calculated to yield a large supply of material fit for making paper of almost every quality as the Plantain (*Musa paradisiaca*) so extensively cultivated in all tropical countries on account of its fruit, and of which the fibre-yielding stems are applied to no useful purpose. The plant, as every one acquainted with tropical countries knows, is common near the poorest huts and in the largest gardens, and is considered to yield by far the largest quantity of nutritious matter. Its fruit in many places supplying the place of bread, and in composition and nutritious value approaching most nearly to the potato, may, if produced in too large a quantity, be preserved in the same way as figs, or the meal may be separated, as it resembles rice most nearly in composition. Each rootstock throws up from six to eight stems, each of which must be yearly cut down, and will yield from three to four pounds of the fibre fit for textile fabrics, for rope-making, or for the manufacture of paper. As the fruit already pays the expenses of the culture, this fibre could be afforded at a cheap rate, as from the nature of the plant, consisting almost only of water and fibre, the latter might easily be separated. One planter calculates that it could be afforded for £9 13*s*.4*d*. per ton. Some very useful and tough kinds of paper have been made in India from the fibres of the Plantain, and some of finer quality from the same material both in France and in England. All the plants which have been already mentioned are devoid of true bark, and are called Endogenous in structure. Simple pressure between rollers, and washing, would appear to be sufficient for the separation of the fibres of most of them. But the following families of plants are all possessed of true bark which requires to be stripped off, usually after the stems have been steeped in water, before their respective fibres can be separated from the rest of the vegetable matter. The Flax plant abounds in fibre, but this is too valuable to be converted into paper. India, however, grows immense quantities of the plant, on account of its seed (linseed) which is both consumed in the country and exported in enormous quantities. But nowhere is the fibre turned to any account. This is no doubt owing to the climate not favouring the formation of soft and flexible fibre; but the short fibre which is formed, and might be easily separated, would be valuable for paper-making, and might add to the agriculturists' profits without much additional outlay. So some Malvaceous plants are cultivated on account of their fruits being used as articles of diet, as Okhro (*Hibiscus esculentus*), in the West Indies and in the United States. The *Ram Turai* of India is closely allied to it, and is cultivated for the same purpose. Both plants abound in fine flexible fibre, which is not, but might be easily separated, and afford a considerable supply, especially if the cultivation was extended in the neighbourhood of towns. Paper is made from a species of *Hibiscus* in Japan, and *H. Sabdariffa* is cultivated in India on account of its jelly-yielding calices. Numerous other species of Hibiscus, of Sida, and of other genera of this family, abound in warm climates; several are cultivated in different countries, as *Hibiscus cannabinus* in India, and *Sida tiliæfolia* in China, might be more so. They grow quickly, and to a large size, and abound in fibrous material of a fine, soft, flexible quality: on which account they might be cultivated with profit, and the tow be useful to the paper-maker. The stems of Cotton plants would also yield a supply. The Tiliaceæ are likewise remarkable for the abundance and fine quality of fibre which many of them contain. *Tilia europea* produces the enormous quantities of bast exported from Russia. *Corchorus olitorius* and *C. capsularis*, the leaves of both of which are used as a vegetable, yield the Jute of commerce, as well as the gunny cloth and bags so largely used and exported even to America. Several species of Grewia yield an edible fruit, on which account they are cultivated. Others abound in the jungles of South-

ern Asia, and most would yield a valuable fibre, as some of them already do, for commercial purposes. The Indian Basts are cheap, and abound in fibre. Some of the Leguminosæ also abound in valuable fibre. *Crotalaria juncea* yields the common *Sunn* of India. *Sesbania aculeata* or *cannabina* yields the *Dhanchi* of Bengal; while *Bauhinia racemosa* is used for making rope bridges in the Himalayas. The fibre of *Parkinsonia aculeata* was sent to the London Exhibition of 1851, expressly as being fitted for paper making: though colourless, it wants strength. Some paper is made from gunny bags in India. Several plants produce large quanties of a silky cotton like substance, not applied to any use, such as the Silk Cotton tree, the Mudar of India, several species of Saccharum, &c., which might be collected where labour is cheap, and would no doubt be well fitted for conversion into pulp for paper. The Dogbanes and Asclepiads, also deserve attention. The Nepal Paper plant *Daphne cannabina* has been mentioned above. Among the Nettle, the Mulberry, and Bread-fruit tribes of plants, there are many which seem well calculated to yield material for paper-making. The Chinese, we know, employ the inner bark of *Morus*, now *Broussonetia papyrifera*. This, no doubt, produces some of the Chinese papers, which is remarkable for toughness. The refuse cuttings of the bush cultivation of the Mulberry in Bengal might be turned to profitable account. The barks of many stinging (*Urtica*), and of stingless (*Boehmeria*) Nettles, abound in fibres remarkable for strength; the tow of these might be converted into paper-stuff, if not required for mixing with wool, as might also the bark cloths. The weeds of tropical countries, which grow in such luxuriance, and among which are species of Sida, of Grewia, of Corchorus, of Triumfetta and of many other genera, might all yield an abundance of fibrous material, if the refuse of the above cultivated plants were found not to be sufficient. Some simple machinery for separating the fibre would greatly facilitate operations, while the expenses of freight might be diminished by compression, or as suggested, by packing the material as dunnage. The cheapness of labour, as of everything else in many of these countries, would enable material for paper-making to be conveyed to England in great abundance and at a sufficiently cheap rate, if ordinary pains were taken by the consumers in Europe, to encourage the planter or colonists of a distant region. Dr. *Forbes Royle*. East India House, May 3, 1854. Paper is a thin flexible leaf usually white, artificially prepared from some vegetable substance, chiefly for writing or printing upon with ink. A species of paper was manufactureed at a remote period in Egypt, from the *papyrus* or *paper-reed*, a plant growing freely on the banks of the Nile. A manufacture of paper from the bark of trees and other substances existed also in China, from a very early date; but among the nations of antiquity, before the introduction of paper, such substitutes were used as lead, brass, bricks, and stone, on which national edicts and records were written or engraved; or tablets of wood, wax, and ivory, skins of fishes, intestines of serpents, backs of tortoises, and the inner bark of trees for ordinary purposes. Indeed there are but few sorts of plants that have not been used for making paper and books, and hence have arisen the terms *biblos*, *codex*, *liber*, *folium*, *tabula*, *tillura*, *philura*, *scheda*, &c., which express the several parts of the plant which were written on. The use of these was discontinued in Europe after the invention of papyrus and parchment, but they are still used in other parts of the world. The two early kinds of manufacture above alluded to, must first be noticed, before we describe the later invention of making paper from cotton and linen rags, which in the greater part of the world has superseded all other methods of producing a material for writing on. The Egyptian papyrus was made by laying thin plates of bark, taken from the middle of the paper-rush, side by side, but close together, on a hard smooth table: other pieces of the same size and thinness were then laid across the first at right angles; the whole was moistened with the water of the Nile, which was supposed to have some agglutinating property, (though this probably resided in the plant itself,) and pressure was then applied for a certain number of hours. Thus a sheet of paper was formed which required no other finishing than rubbing and polishing with a smooth stone, or with a solid glass hemisphere, and drying in the sun. This very simple process was rather a preparation of a natural paper, than a manufacture—properly so called. The process adopted by the Chinese comes more legitimately under that head. The small branches of a tree resembling our mulberry-tree, are cut by them in lengths of about 3 feet, and boiled in an alkaline ley for the sake of loosening the inner rind or bark, which is then peeled off, and dried for use. When a sufficient quantity of bark has been thus laid up, it is again softened in water for 3 or 4 days, and the outer parts are scraped off as useless; the rest is boiled in clear ley, which is kept strongly agitated all the time, until the bark has become tender, and separates into distinct fibres. It is then placed in a pan or sieve, and washed in a running stream, being at the same time worked with the hands, until it becomes a delicate and soft pulp. For the finer sorts of paper the pulp receives a second washing in a linen bag; it is then spread out on a smooth table, and beaten with a wooden mallet, until it is extremely fine. Thus prepared, it is put into a tub with a slimy infusion of rice, and a root called oreni; then it is stirred until the ingredi-

ents are properly blended: it is next removed to a large vessel to admit of moulds being dipped into it. These moulds are made of bulrushes cut into narrow strips, and mounted in a frame; as the paper is moulded, the sheets are placed on a table covered with a double mat. The sheets are laid one on the other, with a small piece of reed between; and this, standing out a little way, serves afterwards to lift them up leaf by leaf. Every heap is covered with a board and weights to press out the water; on the following day, the sheets are lifted singly by means of the projecting reeds, and are placed on a plank to be dried in the sun. This paper is so delicate, that only one side can be written on, but the Chinese sometimes double the sheets, and glue them together so neatly, that they appear to be a single leaf. This manufacture of the Chinese extended also to the making of sheets of paper from old rags, silk, hemp, and cotton, as early as the second century of the Christian era, and is supposed to have been the source whence the Arabs obtained their knowledge of paper-making. The latter people first introduced the valuable art of making paper from cotton into Europe, in the earlier half of the twelfth century, and established a paper manufactory in Spain. In 1150, the paper of Xativa, an ancient city of Valencia, had become famous, and was exported to the East and West. Notwithstanding its fame, this paper was of a coarse and inferior quality, so long as its manufacture was confined solely to the Arabs, in consequence of their employing only mortars, and hand or horse mills for reducing the cotton to a pulp; but when some Christian labourers obtained the management of the mills of Valencia and Toledo, the different processes of the manufacture were greatly improved. Cotton paper became general at the close of the twelth and beginning of the thirteenth centuries, but in the fourteenth century, it was almost entirely superseded by paper made of hemp and linen rags. The paper made of cotton was found not to possess sufficient strength or solidity for many purposes; a very strong paper was therefore made of the above substances, not weakened by bleaching, according to the present mode, which, by removing the natural gum, impairs the strength of the vegetable fibre. Some of these old papers, having been well sized with gelatine, are said to possess their original qualities even to this day. The manufacture of paper from linen rags became general in France, Italy, and Spain in the fourteenth century; the first German paper-mill was established at Nuremberg in 1390. English manuscripts on linen paper, date as early as 1340; but it is believed that the manufacture did not exist here until the end of the fifteenth century, when the *Bartolomæus* of Wynkyndde Worde appeared (1496), in which it is stated that paper of a superior kind was made for that work by John Tate, jun., at his mills in Stevenage, Hertfordshire. Probably the manufactory established by Tate was unsuccessful, for we hear no more of it, and in 1588 a German named Spielman, jeweller to Queen Elizabeth, established a paper-mill at Dartford. [This mill is celebrated by a poet of that age in a work entitled, "A Description and Discourse of Paper, and the benefits it brings; with the setting forth of a paper-mill, built near Dartford, by a High-German, called Mr. Spilman, jeweller to the Queen. Lond. 1588. 4to."] Still for a lengthened period England's supply of the finer kinds of paper was chiefly obtained from abroad. In 1770 the manufacture of fine paper was established at Maidstone, in Kent, by a celebrated maker, J. Whatman, who had worked as journeyman in some of the principal paper-mills on the Continent. Not long before this, *wove* moulds had been invented by Baskerville to obviate the usual roughness of *laid* paper, and these, attracting attention in France, led to the improvements which characterised the vellum paper of that period. Holland, too, contributed its share to the advancement of this manufacture, by inventing cylinders with steel blades for tearing the rags, and thus facilitating their conversion into pulp, which by the old method of stampers only, was a very slow and defective process. In 1799 the first attempt to produce paper in an endless web was made in France by a workman in the employ of M. Didot. The invention was brought to England by M. Didot in 1801, and made the subject of patents, which in 1804 were assigned to the Messrs. Fourdrinier. Mr. Bryan Donkin the engineer, carried out the desired plans, and produced, after intense application, a self-acting machine or working model, on an improved plan, of which he afterwards constructed many others for home use and for exportation, which were perfectly successful in the manufacture of continuous paper. In the year 1851 Messrs. Donkin & Co. were constructing their 191st machine. In 1809 Mr. Dickinson, the celebrated paper-maker, invented another method of making endless paper, the highly ingenious details of which will be noticed hereafter. The Fourdrinier machines have been greatly improved by the inventions of Mr. T. B. Crompton, Mr. Brown, of Esk Mills, near Edinburgh, Mr. Ibotson, of Poyle, and other skilful manufacturers, English and foreign; so that at the present time, England, which was long dependent for its supplies on foreign countries, is not only able to produce an abundant supply for home use, but to export paper to a considerable amount. At one time there were serious apprehensions that the supply of linen rags would fail, and various researches were entered upon by ingenious individuals to find substitutes. A book written in German by M. Schaffers so long ago as 1772, [Sammtliche Papierversuche von Jacob Christian

Schaffers, Prediger zu Regenburg. *Regensburg*, 1772.] contains 60 specimens of paper made of different materials. This ingenious person made paper from the bark of the willow, beech, aspen, hawthorn, lime, and mulberry; from the down of the asclepias, the catkins of black poplar, and the tendrils of the vine; from the stalks of nettle, mugwort, dyer's weed, thistle, bryony, burdock, clematis, willow-herb, and lily; from cabbage-stalks, fir-cones, moss, potatoes, wood-shavings, and saw-dust. Paper has been likewise made from straw, rice, hop-bine, liquorice-root, the stalks of the mallow, and the husks of Indian-corn. The fear of a failure of linen rags, and the consequent necessity for these experiments, were obviated by the discovery of chlorine. This powerful bleaching agent will restore many varieties of coloured linen to its original whiteness, as well as discoloured papers and manuscripts, so that the same substances may be used over and over again as a material for paper.—*Tomlinson.*

(6039) PAPER, BURMESE, PAPER PLANT. The Burmese make a coarse paper from the bark of a large creeper, a species of Daphne, that is found in the forests. The paper is as thick as paste board, and the surface is blackened and written upon with a steatite pencil. Mr. Mason had never seen the plant in flower, but it is probably a species of Daphne.—*Mason.*

(6040) PAPER, CHINESE, OF BAMBOO, such as that on which the Hon'ble Mr. Morrison's book was printed, was manufactured from the common yellow bamboo paper of the Chinese by sizing it in water saturated with alum, to which glue is added; the sheets are dried and smoothed by rubbing them on a warm wall. The glazing which is upon writing paper is made by waxing the sheet, and afterwards rubbing it with a smooth stone; two, three, and four sheets are made into one thick sheet for ledgers, or other account books, by the same process, after wetting the inner surfaces with glue water, and drying the sheet in the sun. There is also a thin paper, called Nanking paper, which is manufactured from cotton wool, that is tougher and more flexible than the bamboo paper. Colored paper is exported in considerable quantities; the exportation of all kinds is principally to India and the archipelago. The consumption of Chinese writing paper is great in that part of the world, on account of its not being injured by the climate; foreign paper sized with glue being liable to spoil.—*Morrison.* Mr. Fortune tells us that in the canals near the city there were large quantities of bamboos partially covered with mud so as to be pressed under water. These were intended to be made into paper after they had been soaked for some time. The whole of the process of making paper from the bamboo did not come under his notice while travelling in the country, but it is carried out somewhat in the following manner:—After being soaked for some time in the way noticed, the bamboos are split up and saturated with lime and water, until they become quite soft. They are then beaten up into a pulp in mortars, or where water-power is at hand, as in the hilly districts, the beating or stamping process is done by means of stampers, which rise and fall as the cogs which are placed on the axis of the water-wheel revolve. When the mass has been reduced to a fine pulpy substance it is then taken to a furnace and well boiled until it has become perfectly fine, and of the paper consistency. It is then formed into sheets of paper. Bamboo-paper is made of various degrees of fineness, according to the purposes for which it is intended. It is not only used for writing upon and for packing with, but a large quantity of a coarse description is made for the sole purpose of mixing with the morter used by bricklayers. It was in the fields about Cading he found two fine species of carabus, under stones, which were highly prized by entomologists at home. On the first discovery of these insects he showed them to a group of children who were with him, and offered to buy all they brought, at the rate of thirty cash for each perfect specimen.—*A Res. among the Chi. p.* 333.

(6041) PAPER, COUNTRY.

Naat Cardasie, TAM.	Nulla kakidum, TEL.
Kagus, DUK.	

The coarse kind of paper prepared by the natives in Madras, was in Ainslie's time commonly made of old gunny bags or old fishing nets. In the process lime water and rice cunjee were employed and frequently a little Indigo to give it a blue tinge. Supposing from the whiteness and great tenacity of the Marool (or Munchie) nar that a valuable kind of paper might be prepared with it, he recommended a trial of it to the paper makers at Trichinopoly, in July 1813. They hesitated, never having heard that paper can be made from this substance, but were induced to make the experiment, and succeeded in making a much better and whiter paper than what is commonly made with old gunny bags. He could not learn that Paper is ever made in India as it is in the Ava dominions, either from the bark of the paper Mulberry (Morus papyrifera,) or from the macerated filaments of the Bamboo.—*Ains. Mat. Med. p.*190.

(6042) PAPER HANGINGS. Paper stained or printed with tasteful designs, and used for pasting on the walls of a room &c. There are many varieties, which are manufactured in England, France, Germany,

(6043) PAPER, HIMMALAYAN. The art of making paper is considered to be a Chinese invention, but it has long been known in India, where paper is made both of cotton and of the substitutes for hemp and flax. In the Himalayas it is made of the inner bark of *Daphne Cannabina*, and in sheets of immense size. A large

collection was exhibited from different parts of India, but, though well adapted for writing on, in India, it is not suited for Europe, in consequence of the difference in the ink used.—*Royle, Arts &c. of India, p.* 486.

(6044) PAPER, MULBERRY, BROUSSONETIA PAPYRIFERA, is a native of the i-les of the Southern ocean, as well as of China and of Japan. It has long been famous for its fibrous bark, which is made into a kind of cloth, as in Otaheiti and in the Sandwich islands, as well as into paper, in Japan. In making this paper the bark is boiled into pulp in a ley of wood ashes, and then well washed by agitation of it in water, until it becomes like tufts of tow. If too much boiled, the paper will be weak but white; and if insufficiently washed it is coarse but strong. It is then heaped on a table and beaten into a pulp, by batons of hard wood. Mucilage obtained from boiled rice, or from a plant called oreni, is added to the pulp, which is stirred with a clean reed until reduced to a homogenous liquor, and when of a due consistence it is ready for conversion into sheets of paper.

(6045) PAPER-NAUTILUS. [OCTOPODA].

(6046) PAPER PLANT OF NEPAUL is Daphne Bholua or Cannabina, one of the same family as the Lace Bark Tree, Daphne Legetta, now called Lagetta lintearia, of the West Indies. It is supposed to be identical with the D. Odora of Thunberg. It is extremely abundant in the Himalayas, and the paper is made by boiling the inner bark, in a ley of wood ashes, and reducing them to pulp by beating. Daphne or Gnidia eriocephala is very common on the Western Ghauts, and on the hilly parts of the Southern Mahratta country and Dekhan. On a trial of the paper by an engraver, he reported it as affording finer impressions than any English made paper, and nearly as good as the fine Chinese paper which is employed for what are called India paper proofs. Dr. Campbell describes the paper as strong and durable as leather.

(6047) PAPER, RICE. As this, says Fortune, was my first visit to this fine island and as I knew we had only a short time to stay, I lost no time in going on shore. Before leaving the vessel, I had been examining with a spy-glass some large white flowers which grew on the banks and on the hill-sides, and I now went in that direction in order to ascertain what they were; when I reached the spot where they were growing, they proved to be very fine specimens of Lilium japonicum—the largest and most vigorous I had ever seen. As I was admiring these beautiful lilies which were growing as wild as the primroses in woods in England, another plant of far more interest caught my eye. This was nothing less than the rice-paper plant—the species which produced the far-famed rice-paper of China named by Sir W. Hooker Aralia papyrifera. It was growing apparently wild, but the site may have been an old plantation, which was now over-grown with weeds and brush-wood. The largest specimens which came under my notice were about five or six feet in height, and from six to eight inches in circumference at the base, but nearly of an equal thickness all up their stem. The stems, which usually bear all the way up, were crowned at the top with a number of noble looking palmate leaves on long footstalks, which gave to the plant a very ornamental appearance. The under side of each leaf, its footstalk, and the top part of the stem, which was clasped by these stalks, was densely covered with down of a rich brown colour, which readily came off upon any substance with which it came in contact. I did not meet with any plant in flower during my rambles, but it is probable the plant flowers at a later period of the year. It flowers and seeds during the winter and spring months at Hong-kong and Calcutta. Numerous small plants are coming through the ground in various directions, which a Chinese soldier carefully dug up for me, and which I took with me to Shanghae and deposited in Mr. Bealis' garden. These, with a few samples of the largest stems I could find, have been sent to England and India; the latter will prove an interesting addition to our museums of vegetable productions. The proportion of pith in these stems is very great, particularly near the top of vigorous growing ones, and it is from this pure white substance that the beautiful article erroneously called "rice-paper" is prepared. The Chinese call this plant the Tung-tsaou. What it was, or to what part of the vegetable kingdom it belonged was long a mystery to botanists, who were often times sadly misled by imaginary Chinese drawings, as some of those which have been published will clearly show, now that our knowledge has increased. Indeed the only drawing I have seen in Europe, which has any claim to be considered authentic, is that brought from China by the late Mr. Reeves many years ago, and which I have seen in the library of the Horticultural Society of London. The Tung-tsaou is largely cultivated in many parts of the island of Formosa, and with rice and camphor forms one of the chief articles of export. Mr. Bowring, who read a paper upon the rice-paper plant, before the China branch of the Royal Asiatic Society, informs us that the Canton and Fokeen provinces are the chief consumers, and that the town of Foo-chow alone is supposed to take annually not less than 30,000 dollars' worth of this curious and beautiful production. The cheapness of this paper in the Chinese market, as Mr. Bowring justly remarks, is evidence of the abundance of the plant in its place of growth, and more especially of the cheapness of labour. "That 100 sheets of this material (each about three inches square), certainly one of the most beautiful and delicate substances with which we

are acquainted, should be procurable for the small sum of 1½d. or 1¾d., is truly astonishing: and when once the attention of foreigners is directed to it, it will doubtless be in considerable request among workers in artificial flowers in Europe and America, being admirably adapted to their wants." The larger sheets, such as those used by the Canton flower-painters, are sold for about 1½d. each. If the Tung tsaou proves hardy, in England, its fine foliage will render it a favourite amongst ornamental plants in English gardens. Judging, however, from its appearance when growing on its native island, and from the temperature of Formosa, I fear we cannot expect it to be more than a greenhouse plant with us. Before I left China, it has been completely naturalised on the island of Hong-kong. A noble plant was growing in the garden head quarters house: several very fine ones were observed in Messrs. Jardine's garden at East point, to which Mr. Bowring had introduced it, and younger plants were seen springing up in all directions. It is really a most striking looking plant and highly ornamental. At all times the fine, broad palmate leaves which crown the stem have a noble appearance, and in the winter months its large panicles of flowers make it more interesting — *A Res. among the Chi. p.* 231. The paintings on Chinese pith paper, or *rice paper*, as it is commonly but incorrectly called, are much sought after for their splendid colorings. This substance, whose velvety surface contrasts so admirably with brilliant colors, is a delicate vegetable film, consisting of long hexagonal cells whose length is parallel to the surface of the film, and which are filled with air when the film is in its usual state; the peculiar softness which so well adapts it for receiving colors is owing to this structure. Mr. Williams says it is obtained from a plant allied to the Artocarpus or bread-fruit, growing in the western provinces, but no very accurate information is possessed of its habits or appearance; some say it is a water plant. The pith is carefully taken out and cut in sheets by running a knife around it, and smoothing them with an iron. When the tissue breaks, the fracture is connected by a lamina of mica. An india-ink outline is first transferred by damping and pressing it upon the paper, when the ink strikes off sufficiently to enable the workman to fill up the sketch; one outline will serve for limning several copies, and in large establishments the separate colors are laid on by different workmen.

ture of these paintings at Canton een two and three thousand hands. ie sometimes used by the Chinese more remarkable for its singularity , is the reticulated nerve-work of the fleshy green part of the leaf removed by maceration, and the ed with isinglass. The appearance of a painting on this transparent substance is pretty, but the colors do not retain their brilliancy.—*Williams' Middle Kingdom, Vol.* II. *p.* 145. *Eng. Cyc.*

(6048) PAPER OF THIBET. Most of the paper used in Thibet is made from the bark of various species of *Daphneæ*, and especially of *Edgeworthia Gardneri*, and is imported from Nepal and Bhotan; but the Tibetans, as MM. Huc and Gabet correctly state, manufacture a paper from the root of a small shrub: this I have seen, and it is of a much thicker texture and more durable than Daphne paper. Dr. Thomson informs me that a species of Astragalus is used in western Tibet for this purpose, the whole shrub, which is dwarf, being reduced to pulp.—*Hooker, Him. Jour. Vol.* II. *p.* 162.

(6049) PAPIER MACHE. A name properly applied to articles composed of paper-pulp, boiled in a solution of gum or size to give it tenacity, and then pressed into moulds; though the term is also applied to trays, snuff-boxes, and other things made by glueing several piles of paper together, and then varnishing. Birmingham is the chief seat of this manufacture.—*Faulkner.*

(6050) PAPILIO, a genus of Lepidopterous Insects, established by Linnæus, and divided by subsequent entomologists into many groups and genera. It includes that very natural and beautiful assemblage of insects popularly known as Butterflies. The first section of *Lepidoptera*, named *Rhopalocera* (club-horned) in the arrangement of Boisduval, and *Diurna* in that of Latreille, corresponds with the Linnæan genus *Papilio*. The insects composing it have mostly thin and elongated antennæ terminated by a club. They are all day-fliers. Their larvæ, which are variously shaped, have six pectoral, eight abdominal, and two anal feet. The pupæ are usually angulated and, with a few exceptions, naked. The perfect insect varies in size from less than an inch across the wings when expanded, to nearly a foot in breadth. Equally variable are their colouring and outlines. They are short-lived. Their powers of flight are very great, and the mode of flight varies in the several species. The males are usually more gaily coloured than the females.—*Eng. Cyc.*

(6051) PAPILIO MACHAON. Choongtam in Sikhim boasts a profusion of beautiful insects, amongst which the British swallow-tail butterfly (*Papilio Machaon*) disports itself in company with magnificent black, gold, and scarlet-winged butterflies, of the Trojan group, so typical of the Indian tropics.—*Hooker Him. Jour. Vol.* II. *page* 26.

(6502) PAPYRUS, a genus of Plants belonging to the natural order *Cyperaceæ*. This generic term has been derived from the name of a

water plant, whose soft cellular flower-stem afforded the most ancient material from which paper was prepared, and our English word paper is derived from it. It has a stem from 3 to 6 feet high, with 3 acute angles, one of which, according to Bruce, is always opposed to the current of the stream in which it grows, as if to break its force. Its leaves are long and grassy, with a sharp keel. The flowers, which are green, are produced in very large compound umbels, with extremely numerous drooping triangular slender radii, terminated by very long filiform involucral leaves, within which are placed the spikes of flowers, each consisting of from 6 to 13 florets. It has been regarded as a species of *Cyperus*, and called *C. Papyrus*. It is also considered a distinct genus, and is named *Papyrus antiquorum*. It is a very common plant in Abyssinia, Egypt, and Syria, and is also met with in Calabria and Sicily; in gardens it is not uncommon. It inhabits both stagnant waters and running streams, and, independently of its ancient employment in the fabrication of paper, has been applied to other uses. The flowering stems and leaves are twisted into ropes; the roots are sweet, and have been employed as food. In Abyssinia boats are constructed from it, according to Bruce. In Syria the plant is called Babeer.—*Eng. Cyc.* A curious correspondence has taken place between M. Egger, a member of the Institute of France, and M. Firmin Didot, the printer and publisher, on Ancient substitutes for Paper. M. Rhizo Rhangabe, now Minister of Foreign Affairs in Greece, published, some time since, a copy of the remaining portions of an inscription detailing the expences incurred by the Athenians in the construction of the Erectheion, in the year before Christ 407. M. Egger drew the attention of M. Didot, by letter, to two of the items published by M. Rhangabe, in which, the cost of two tablets for writing the accounts on is given at one drachma (nearly 9d.) each, and the price of two leaves of paper for copies at one drachma and two oboli (or nearly 1s.) each. M. Egger states, that these accounts were drawn up on wooden tablets coated with white wax, like those used for the annals of the Roman Pontiffs, and called albums, from their colour. The paper is conceived to have been formed of leaves of the papyrus, and not of the skins of animals, used in Asia for the purpose (as stated by Herodotus), nor of parchment, Charta Pergamena, so called from Pergamus in Mysia. M. Egger assumes that wax tablets were used in place of paper on account of their costing less money, though at the present time they would, of course, be by far the dearer material of the two. A family consisting of four adults, could, it is stated, live in Athens on a sum equivalent to £ 20 a year,—and, starting from this data, M. Egger infers that the cost of the wax tablets must, according to the present value of money, have been about 3d. and that of a leaf of papyrus nearly 4s.:—and he writes to M. Didot to inquire whether the papyrus which fetched so exorbitant a price relatively had any qualities to compensate for its dearness. In reply, M. Didot says that the price paid at the period alluded to for a leaf of papyrus corresponds exactly with that of a sheet of vellum at the present day. He agrees with M. Egger, that the paper referred to was the papyrus leaf then an important article of commerce with the Egyptians. The Greeks called it biblos, and the paper made from it chartas, whence the Latin charta, the prepared skins used by the Persians were called dipteri or derris. When the Ptolemies, out of mere literary jealousy, stopped the export of papyrus, in order to deprive Eumenes and Attalus (the king of Pergamus) of the materials for forming books, the latter, whose collection of books already vied with the Library of Alexandria, caused great attention to be paid to the manufacture of skins,—these were called Pergaminon and bembrani, whence membrana. The high price of papyrus had, of course, a great effect upon the cost of books. Plato is said to have paid 100 minæ (equal to about £360.) for the three treatises written by Philolans, the Pythagorean philosopher,—and Aristotle paid three talents (equal to nearly £650.) for a few volumes which had belonged to Spensippus, a disciple of Plato. As the papyrus was of a spongy texture, and the ink ran into it and made the writing difficult to read, the ancients had a plan of sticking two leaves together cross wise as regards the fibres. This however, only produced a partial cure, and experiments were made in applying a coating of size to fill up the pores. A man named Philtotecis at length invented a paste of starch and vinegar, which was looked upon as so important a discovery that the Athenians erected a statue in his honour. It is stated as a remarkable fact that, although the papyrus plant was used so extensively by the Egyptians, who constructed boats and covered houses with the stems, made sails from the bark, fuel of the roots, and clothing and ropes from the fibres, not a single specimen of the plant is now to be found in that country. M. de Sauley states, however, that it may be found in great abundance on the banks of a rivulet in Judæa, between Jaffa and Kaisarieh. When the Arabs began to make paper from the cotton, called charta Damascena, from the original place of manufacture, papyrus began to decline in value,—still the competition between the two articles was maintained with vigour until the application of waste flax and the making of paper was discovered in the twelfth century. The last named, however, themselves doomed to be superseded by the application of rags to the manufacture of paper. London *Athenæum*, May 1857.

(6053) PAPYRUS PANGOREI, Syn CYPERUS TEGETUM.

Madoorkati, HIND.

The Papyrus Pangorei is a sedge, extremely common about Calcutta and is very extensively employed in Bengal for making the elegant shining useful mats for which the Capital of India is famous, and which are frequently imported into Europe. Strips of this sedge are suited for platting.—*Eng. Cyc.*

(6054) PARAS NATH, a mountain in Behar of great sanctity: it is the eastern, as Mount Aboo is the Western Metropolis of Jain worship. —*Hooker. Him. Jour. Vol.* 1, *p.* 18.

(6055) PARATROPIA. PARATROPIA DIGITATA. PARATROPIA VENULOSA. The Karens make an infusion of the leaves of a species of paratropia, a plant of the ivy family, which they use for many internal diseases.—*Mason.*

(6056) PARCHMENT. Consists of the skins of sheep and goats, prepared in such a manner, as to render them suitable for being written upon. It is chiefly employed for charters and other writings where great durability is desirable. —*Faulkner.* Parchment, the skin of an animal prepared for writing on. The name is from the Latin *Pergamena*, from *Pergamus*, the reputed place of its invention. Eumenes II. king of that place (who reigned B. C. 197—159), has the honour of the invention, he being stimulated thereto by the prohibition of the export of papyrus from Egypt. Some authorities consider Eumenes to have been only an improver of the art of preparing skins for writing on, which Herodotus says were commonly used for that purpose in his time; and it is even asserted that the word *pergamena* was not used until several centuries after the death of Eumenes. According to Mabillon, the first writer who uses the term is Tatto, a monk of the fourth century; before his time, the word *membrana* was employed, as in the Greek Testament, 2 Tim. iv. 13.—*Tomlinson.*

(6057) PARCUTILLE, the Tamil name of a Ceylon tree, which grows to about twenty-four inches in diameter, and fifteen feet in height. It is used by the natives in boats, houses, and other works: it is not of great value.—*Edge, Ceylon.*

(6058) PARDANTHUS CHINENSIS. TIGER LILY. A showy yellow and orange flower, whose petals are spotted like a leopard's skin, and belonging to the iris tribe, is very commonly cultivated by the Burmese as well as by Europeans. —*Mason.*

(6059) PAREIRA BRAVA, VELVET LEAF.

Grieswurzel. GER.

A medicinal root, procured from the *Cissampelos Pareira*, a native of the West Indies and South America.—*Faulkner.* Dr. O'Shaughnessy writing on the *Pareira brava*, or wild vine, says Dr. Roxburgh, Fl. Indica, vol. iii. p. 848, describes six species of cissampelos, viz.

(6060) *C. Glabra*, (*vern.* Peer grug,) a native of Sylhet, root acrid and used in medicine by the natives.

(6061) *C. hexandra*, (*vern.* Neemooka,) a native of Bengal.

(6062) *C. convolvulacea*, a native of Coromandel and Malabar.

(6063) *C. Caapeba*, from the Moluccas.

(6064) *C. hernandifolia*, a native of Chittagong.

(6065) *C. tetrandra*, brought from Amboyna. The C. glabra, hexandra, hernandifolia, and convolvulaca, natives of the Peninsula, are all referred by Wight and Arnot to the same species, which differs from C. Pareira chiefly in the form of the sepals, and the length of the staminal columns. We have used the Neemooka of Bengal with decided advantage under the same circumstances as the *Pareira brava* would be employed in. With this and the Menispermum cordifolium we are but little dependent on other countries for the valuable remedy so justly lauded by Brodie and others. —*O'Shaughnessy, page* 200.

(6066) PARIDÆ. A natural family of Perching Birds (Insessores.)—*Eng. Cyc.*

(6067) *Parus xanthogenys*, has the head with a full crest of black feathers; occiput, supercilliary stripe, and cheeks, yellow; ear-coverts black; back olive; wings and tail black, the former spotted, and the latter tipped with white; a broad black line passing down the throat, and extending along the middle of the abdomen; sides of the chest and flanks pale-yellow; bill and feet black; size rather less than that of the Greater Tit, *P. Major*. (Gould). This bird is a native of the Himalaya Mountains. —*Eng. Cyc.*

(6068) PARINARIUM EXCELSUM. POMACEA. A large tree brought to Bombay from Goa: the fruit, which ripens in December and January, resembles a coarse plum, and is held in much estimation.—*Riddell.*

(6069) PARIS, a genus of Plants belonging to the natural order *Asparageæ*. It has a patent horizontal perianth, 8-parted to the base, the four inner parts, or corolla, narrower than the others. There are 8 stamens, the anthers fixed to the middle of a subulate filament. The styles are 4 in number, the berry 4-celled, the cells with from 4 to 8 seeds.—*Eng. Cyc.*

(6070) PARIS QUADRIFOLIA, Herb-Paris, the only British species, has usually four leaves in a whorl, a stem about a foot high springing from the extremity of a long rhizoma, usually with four, occasionally from three to six leaves at its summit. The flowers are solitary and terminal, the sepals lanceolate, the petals subulate. It

has no root-leaves, and is found in damp woods in England. It is considered to be a narcotico-acrid poison.—*Eng. Cyc.*

(6071) PARITIUM MACROPHYLLUM. AND P. TILIACEUM, the bet-mwœ-shaw of the Burmese, furnishes that nation with a material for ropes. Another species, the P. tiliaceum is the Burm, Gyeé-nya-shaw.—*Mason.* Captain Benson exhibited fibres of Paritium macrophyllum, Nos. 8720 and Urena lobata (both malvaceous plants) from Moulmein. These samples possess much merit and the former especially so, being long, soft, pliant and strong, color brown.—*M. E. Juries Reports.*

(6072) PARITIUM TILIACEUM. HIBISCUS. TILIACEUS. Tortuous hibiscus. The banks of our tide-water streams are often damasked with the changeable red and yellow flowers of this large luxuriant bush, whose crooked wandering branches, crossed and locked with each other, spread along the ground heaping the earth with its evergreen foliage.—*Mason.*

(6073) PARKIA, a genus of Plants belonging to the natural order *Leguminosæ* and the tribe *Mimoseæ*. It was named by Mr. Brown in honour of the great African traveller Mungo Park. The genus contains only a few unarmed trees, which are found on the west coast of Africa, the peninsula of India, Silhet, and in the Islands to the eastward of the Bay of Bengal. *Parkia* is distinguished among the Mimosa-like *Leguminosæ* by the tubular 5-cleft calyx and the corolla with 5-distinct petals having a more or less imbricate æstivation; stamens 10, hypogynous, monadelphous. Legume many-seeded, 2-valved, with a farinaceous pulp around and between the seeds. Inflorescence an axillary peduncled and club-shaped spike.—*Eng Cyc.*

(6074) PARKIA AFRICANA is the Nitta, or Doura-Tree of Soudan. The farinaceous matter surrounding the seeds is eaten, and also made into a pleasant drink when steeped in water. The seeds are roasted as coffee is with us, then bruised and allowed to ferment in water. When they begin to become putrid, they are well washed and pounded, and the powder is made into cakes resembling chocolate, which form an excellent sauce for all kinds of meat. (Brown, in Denham.) A species of this genus, the *Mimosa pedunculata* of Roxburgh, is said by him to be similarly valued by the Malays, that is, they eat, the mealy matter which surrounds the seeds, as well as the seeds themselves, which are said to taste like garlic.—*Eng Cyc.*

(6075) PARKIA BIGLANDULOSA. MIMOSEÆ.

Chendoo Phool, HIND.

A very elegant tree; the flower-buds resemble balls of red velvet, legumes filled with a farinaceous edible pulp.—*Riddell.* A very elegant tree of large size, introduced from Africa, the legumes are filled with a farinaceous pulp, the wood is hard and promising, surrounded by an astringent bark. A watery extract has been prepared, but the value of which for tanning purposes has yet to be tested. A supply of timber is not yet procurable. Hort. garden 24.—*M. E. J. R.* The sweet and farinaceous pulp within the pods is highly esteemed and made into sweetmeats. The natives also make a pleasant drink by diffusing the farina through water. This tree has now been introduced, for many years, into some of the Gardens about Madras; the farina is a new article of food in this Presidency and deserves attention.—*M. E J. R.*

(6076) PARKIA SUBGLOBOSA, sweet, farina is prepared from the pods, and used in making sweetmeats—*Eng. Cyc.*

(6077) PARKINSONIA, a genus of Plants belonging to the natural order *Leguminosæ*.—*Eng. Cyc.*

(6078) PARKINSONIA ACULEATA, the Barbadoes Flower-Fence, is a well known West Indian shrub, very generally employed in such climates as an ornamental plant, and especially for the construction of hedges, for which its strong spines render it well adapted. It has long pinnated leaves, with a winged petiole, and grows as much as 12 or 15 feet high. The flowers are large, yellow, very numerous, and a little variegated with red spots, and are succeeded by long narrow knotted pods. When in flower it is said to be one of the most splendid objects in the vegetable kingdom.—*Eng. Cyc.* This small graceful tree, with pretty yellow flowers in loose pendulous racemes, grows readily from seed, and is well adapted for hedge rows, the stem from which the leaves spring is capable of being converted into a white fibre, and might be used for paper making.—*Riddell.* Though this is an American plant, it may, like the Agave, be enumerated among Indian products, because it may now be met with as one of the most common trees in villages and cantonments, flourishing with less care than any other. Some of its fibre, of a beautiful white colour, was sent to the Exhibition of 1851, as a material for paper-making, and which could probably be afforded at a cheap rate, from the cuttings of the shrubs of this plant. It, however, has been considered in this country as wanting in strength. It might, nevertheless, be found useful in mixing with other fibrous substances, and beaten up into half-stuff.—*Royle, Fib. Pl. p.* 298.

(6079) PARSLEY. Apium Petroselinum. A well known seasoning herb, used in soups, garnishing, &c., grows well during the cold months, requires a free rich soil, and planted on a bed raised 6 inches above the surface level, raised from seed.—*Jaffrey.* Is cultivated from seed: may be sown in beds or rows, where it is to remain. The plants, when about two or three in-

ches high, should be thinned, and a space of at least a foot left between each. It will, if watered and taken care of, continue all the year round. A good plan is occasionally to cut down the leaves to within four inches of the root, as it makes the parsley throw out young and fresh leaves. It bears transplanting well. Always give the preference to Europe seed. The common parsley of the country is very insipid. The roots of parsley are much used in French cookery.—*Jaffrey.*

(6080) PARSNIP. This vegetable is very difficult to rear, as it does not often happen that the seeds come up; they should be sown broadcast in beds of a rich soil, and the plants, when of a sufficient size, carefully thinned, leaving a space of one foot between each plant and removing all weeds. They may be transplanted, but it must be done with the same care as recommended for beet-root. The proper time for sowing the seed is the latter end of July, and they will come in during March and April. It goes to seed freely, but the roots grown from it were by no means fine the second year.—*Jaffrey.*

(6081) PARTHENOPIDÆ, or *Parthenopians* of Milne-Edwards. This tribe, in the arrangement of M. Milne-Edwards, corresponds nearly to the genus *Parthenope* as established by Fabricius, but the species are separated by Milne-Edwards into the genera *Eumedonus*, *Eurynome*, *Lambrus*, *Parthenope*, and *Cryptopodia*, forming a natural group which, in the opinion of the last-named zoologist, establishes the passage between the Maians [MAIDÆ] and the Cyclometopes. The tribe is widely distributed, and species are found in the English Channel, the Mediterranean Sea, and the Indian Ocean.

Species:

Lenang [illegible]chinatus. It is found on the coasts of quarter, [illegible]ry.

Bengal, s[illegible]*anus*, is found at Pondicherry, Amboyna, &c.

L. serratus. It inhabits the Indian Ocean. —*Eng. Cyc.*

(6082) *Parthenope Horrida*, is a native of the Indian and Atlantic Oceans.

Cryptopodia fornicata. (Edwards.) Inhabits the Indian Ocean.—*Eng. Cyc.*

(6083) PASPALUM (from one of the Greek names for Millet), a genus of Grasses, which, like some species of *Panicum*, forms one of the small grains cultivated in tropical countries as food for the poorer classes of the community. The genus is characterised in habit by having a continuous spiked rachis, on one side of which the spikelets are attached. The glume is 2-valved, 1-flowered, closely pressed to the two plane convex paleæ. Seed adhering to the paleæ.—*Eng. Cyc.* One or more species of paspalum are products of Tenasserim fields.—*Mason.*

(6084) PASPALUM FRUMENTACEUM. Linn.

Warroogoo. TAM.	Kodow, HIND.
Kodorow, DUK.	Khodra, GUZ.
Arikehloo, TEL.	Kodravaha, SANS.
Harakah, CAN.	

This small, valuable grain tastes something like rice, and is prepared in the same way by the Indians. There is a variety of it, called in Tamul Serrookoo Warroogoo and in Teloogoo, Tikka Arikehloo, which, if not dressed in a particular manner, is said to produce vertigo, nausea and other unpleasant symptoms. Dr. D. White of Bombay, writes that this variety is called in Guzerattie, Menya, which he naturally supposes is taken from the Sanscrit word Mana, signifying causing Phrensy.—*Ainslie, p.* 220.

(6085) PASPALUM PILOSUM, Roxb.

Pani Warroogoo, TAM.

This is a grain cultivated in Coimbatore, where it is eaten by the poor.—*Ainslie, p.* 220.

(6086) PASPALUM. SCROBICULATUM, the Koda of the natives of India, is cultivated over almost all parts of India. It delights in a light, dry, loose soil, but will grow in a very barren one. The seed is an article of diet with the Hindoos, particularly with those who inhabit the mountainous parts of the peninsula, as well as in the most northern parts of the country, or where the soil is barren and unsuited to the cultivation of those grains which are more beneficial. Dr. Roxburgh states that the boiled grain is as palatable as rice. He distinguishes from this another species, which Linnæus called *Paspalum Kora*, but it appears to be only a variety growing in moist situations. Both species are much relished by cattle either in a green or dry state.—*Eng. Cyc.*

(6087) PASSIFLORA, a genus of twining Plants, the species of which are called Passion Flowers. This name is derived from a fancied resemblance between the parts of their flower and the emblems of Our Saviour's crucifixion. In the five anthers the Spanish monks saw his wounds, in the triple style the three nails by which he was fixed to the cross, and in the column on which the ovary is elevated the pillar to which he was bound; a number of fleshy threads which spread from a cup within the flower were finally likened to the crown of thorns. "There are cuts," says Sir James Smith, "to be found in some old books, apparently drawn from description, like the hog in armour [illegible] to represent the rhinoceros, [illegible] is made up of the very things [illegible] genus comprehends a large number of [illegible] chiefly found in a wild state [illegible] within or near the tropical parts [illegible] nent. They are all twining [illegible] bling over trees to a considerable length, and [illegible] many cases are most beautiful objects on account

of their large gaily- or richly-coloured flowers. This makes them favourites in gardens, where many are cultivated, particularly the *P. alata*, *P. quadrangularis*, *P. edulis*, *P. cærulea*, *P. racemosa*, *B. Londoni*, *P. onychina*, *P. palmata*, and *P. filamentosa*, all of which are strikingly handsome. It is however chiefly for their fruit that they are valued in the countries where they grow wild, in consequence of the pulp which envelopes the seeds being cool and refreshing, with something of a fragrant bouquet. Under the name of Granadilla, the *P. quadrangularis* is well known in Brazil, where its fruit is as large as a child's head; the Water-Lemon of the West Indies is the produce of *P. laurifolia*; *P. maliformis* bears what is called the Sweet Calabash; and the pleasant pulp of *P. edulis* furnishes the confectioner with the most delicate material for the flavouring of ices. Many however are of no value for their fruit, and some are actually fœtid.—*Eng. Cyc* The greater number do well on the plains, they require abundance of water. Not at all adapted for pot culture, easily propagated by cuttings during the rains under glass; some of the common varieties can be propagated in the open air during that season, require a well manured soil. Natives of the tropics, many of which have been hybridized.—*Jaffrey.*

(6088) PASSIFLORA. PASSIFLORACEÆ.—Passion Flower. Passiflora Alata.—These ornamental climbers, are common in most parts of India, the species are numerous, being of easy culture. Some of them are fruit bearing, as the P. edulis and P. laurifolia, the latter is known from its dark shining leaves. There are several wild varieties.—*Riddell.*

(6089) PASSIFLORA FŒTIDA. A species of passion flower with fœtid flowers, but very elegant moss-like involucres, though rarely noticed in gardens, may be often seen creeping over the hedges in Maulmain like an indigenous plant.—*Mason.*

(6090) PASSIFLORA LAURIFOLIA. LAUREL-LEAVED PASSION FLOWER. Numerous species of passion flower are seen wandering over the arbors and trellises of our sunny greens, but none exceed in beauty, and fragrance the laurel-leaved passion flower, called in the West Indies, water lemon vine, which appears to have been the first of the tribe introduced into Burmah.—*Mason.*

(6091) PASSIFLORA LESCHENAULTII.

(6092) PASSIFLORA QUADRANGULARIS. GRANADILLA. This luxuriant exotic from the Jamaica passion flowers, flourishes well on the Tenasserim Coast, and is very prolific. The smooth oblong fruit grows nearly as large as a cucumber, and contains a succulent pulp, which makes a cooling delicious dish, and when prepared in tarts, can scarcely be distinguished from green apple. The Rev. Mr. Bennett of Tavoy, has recently introduced it among the Karens, by whom it is highly esteemed, and much sought for. It will no doubt soon be generally diffused through the Provinces, as it possesses all the attractive qualities of fine fruit, handsome fragrant blossoms, and when trailed over an arbor, a rich passing shade.—*Mason.*

(6093) PASTINACA (from *Pastinum*, the Latin name for a two-pronged fork), a genus of Plants belonging to the natural order *Umbelliferæ* and the tribe *Peucedaneæ*.—*Eng. Cyc.* Wight gives pastinaca hookeriana, 1010; rigens, 1009; Sprengeliana, 1008;

(6094) PASTINACA SATIVA, the Parsnip, has an angular furrowed stem; pinnate leaves, downy beneath: ovate-oblong leaflets, crenate, serrate, often with a lateral lobe at the base. It is extensively cultivated in Guernsey and Jersey as fodder for cattle In the north of Ireland parsnips are used in the composition of a kind of beer brewed with hops. Wine and ardent spirits are likewise made from the roots.—*Eng, Cyc.*

(6095) PASTINACA SEKAKUL is another edible species of this genus, and is a native of Syria and Egypt. It has a gray root; a terete downy branched stem; pinnate downy leaves; pinnatifid cut leaflets, blunt and unequally toothed. —*Eng. Cyc.* Pastinaca Secacul is the Shakakel misree (Sium Sisarum, Ainslie) so much used by Eastern doctors, and not without reason, for this root is a very efficacious medicine. Dr. Royle thought it came from Cashmere to Hindostan, but I heard that it is imported from Egypt; and hence, probably it is called the Egyptian (misree)—*Honigberger, p.* 322.

(6096) PATA. Leaf of [illegible] whit. —*Rheede Malabar.* 10. p. 79. —*Rottlera tinctoria*.—*Ben. Ph.* 219.

(6097) PATA ROC[illegible] of Pondicher[illegible] long Indian of Sida Acuta.—*Ben.* [illegible] *L. longim*[illegible] met with

(6098) PATCHOULY OR PUCHAPAT, POGOSTEMON PATCHOULI, is an article well known in Bengal, and though its source was long doubtful, it is found in every bazar almost throughout India, and seems to grow abundantly as well as on the opposite shore of the Malay Peninsula, in province Wellesley, in India, and in a perfect wild state at Penang. M. de Hugel found it growing wild near Canton. Dr. Wallich says that it obviously belongs to the family of Labiatæ, and remarks that "whether *Marrubium Odorotissimum*, *Betonicoe folio*. J. Burm. Thesaur. Zeylon, p. 553, tab. 71, fig 1, (Marrubium Indicum, N. L. Burman. Flor. Ind. p. 127), be our plant or not, it is difficult to say"; but he thinks that there is at least a considerable affinity between them. Viney, in the "French Journal of Pharmacy," suggests that it is the Plectranthus graveolens of R. Brown. The name of the plant however,

is the *Pogostemon Patchouli*. The odour of the dried plant is strong and peculiar, and to some persons not agreeable, the dried tops imported into England are a foot or more in length. In Europe it is principally used for perfumery purposes, it being a favorite with the French, who import it largely from Bourbon. They were led to use it because, a few years ago, real Indian shawls bore an extravagant price, and, purchasers distinguished them by the odour of Patchouly with which they were perfumed, and on discovering this secret, the French manufacturers got in this way of importing the plant to perfume articles of their own make, and thus palm off home spun shawls for real Indian. The Arabs use and export it more than any other nation. Their annual pilgrim ship takes up an immense quantity of the leaf, they use it principally for stuffing matrasses and pillows, and assert, that it is very efficacious in preventing contagion and prolonging life. The characteristic smell of Chinese and Indian Ink, is owing to an admixture of this plant on its manufacture. Some people put the dry leaves in a muslin bag, and thus use it as we do lavender, for scenting drawers in which linen is kept; and this is the best way to use it, as this odour, like musk, is most agreeable when very dilute. In India it is used as an ingredient in Goorakoo tobacco for smoking and for scenting the hair of women. It requires no sort of preparation, being simply gathered and dried in the sun: too much drying, however, is hurtful, inasmuch as it renders the leaf liable to crumble to dust in packing and stowing on board. By distillation it yields a volatile oil, on which the odour and remarkable properties depend. This oil is in common use in India for imparting the peculiar fragrance to clothes: among the superior classes of natives in Penang it sells at the rate of a dollar and a quarter, to a dollar and a half, per pekul. In Bengal, some which was imported from Penang several years ago, sold at 11 rupees eight annas per maund. Later investments have sold at a much lower rate.

(6099) PATELLIDÆ, a family of Prosobranchiate Gasteropodus *Mollusca*. The shell is conical with the apex turned forwards; the muscular impression horse-shoe-shaped, open in front. The genera belonging to this family are *Patella*, *Acmæa*, *Gadinia*, and *Siphonaria*. *M.* De Blainville referred these Molluscs to his order *Cervicobranchiata*, and Cuvier to his order *Cyclobranchiata*. Ex. *P. compressa*. Inhabits the Indian Seas. Lam. The *Patellæ* are very widely spread, and few seas are without them. None however appear to have been observed in the Arctic Seas, either by Captain Parry (1819) or Captain Ross. The larger species are found principallly in warm climates.—*Eng. Cyc.*

(6100) PA-THA-YOU-SHA, a bast of Arracan strips seven feet in length; fine in texture, light coloured: formed of several easily diffusible layers: the outer layers, rather dense and compact, and the inner cancellar. A musa species? —*Royle.*

(6101) PATTUNGA CUTTAY, VATTUNGA CUTTAY.

Vattunga Cuttay, TAM.

This is a Tamul name of a wood which is used for dying cotton cloth, mats &c. of a bright red colour. The dye is fixed by means of the Chebulic Myrobalan and alum.—*Ains. Mat. Med. p.* 204.

(6102) PATOO OR ASTA, is a bast from Beerbhoom, is like the Putwa from Bhagulpore.—*Royle.*

(6103) PAUCHONTEE TREE. Isonandra Polyandra. In 1855, General Cullen forwarded a drawing and description of a large forest tree, abounding at the foot of the Ghauts N. E. of Trevandrum. The plant delineated, was evidently one of the Sapotaceæ and the Malayalim name is "pauchonthee," and the product, of which a good sample was forwarded, on examination bears a strong resemblance to gutta percha, both in external appearance and mechanical properties. At the same time Lieutenant Col. F. Cotton, Engineers, forwarded from the Neilgherries a small sample of a product similar to gutta percha in its smell, general appearance and fracture. No drawing of the tree was submitted, but a few leaves which surrounded the exudation, very closely resembled the real *Isonandra gutta*. The trees are said to be very large and numerous in the forest.—*M. E. J. R.* It seems to be a practice with the people who collect the Gutta Percha of the Malayan peninsula, to mix the juices of several other species of Isonandra with that of the true Isonandra Gutta. And though this mixture confessedly depreciates the value of the gum, as the products of the several species have, to some extent, similar properties, the adulteration allows the commercial article to be applied to many purposes in the arts, which the higher price and the scarcity of the true gum gutta would exclude it from. It was therefore with pleasure that we perused an interesting communication from Mr. Lascelles along with one from a former correspondent, Wynaadensis: for the latter confirms what had previously been surmised, the existence on the Koondahs of several species, five if not six, of this genus of useful plants. These correspondents are both inclined to believe that the true Isonandra Gutta grows in Wynaad, but we do not think that this opinion is entertained by those best capable of judging. Mr. Lascelles mentions that the scientific men there, have had some difficulty in defining the species of the tree recently discovered. Mr. Lascelles seemed too hastily to decide against General Cullen's discovery of the Pauchountee tree being the Isonandra Polyandra. For if Wynaadensis' present report be

correct, that there are "*five if not six*" species of Isonandra on the Koondahs, the one sent by General Cullen may really be what it was named, although Mr. Jaffrey confined his observations to stating that the tree examined by him was the Isonandra Polyandra of Wight's Icones, thus evidently leaving it to Dr. Wight to settle the correctness of his own nomenclature. On the matter of priority of discovery, it is evident that, as with many other objects, the existence on the Western coast of India, of a Gutta Percha seems to have become known to General Cullen and Mr. Lascelles about the same time, but the former, by figuring the plant in February 1855, and sending specimens of its flower, its fruit, its leaves, and its gum, gave that prominent publicity to it without which an article may as well remain undiscovered. We formerly made some observations on the wood of this tree. We learn that the wood of the *Pauchountee* tree is in gravity not less than 55 lbs. the cubic foot, and that a bar of one inch square, with 18 inches clear of the supports, at each end, broke with a long fibrous fracture, after a weight of 440 lbs. had been imposed: —though not till this weight had for some minutes been suspended from the bar. This tenacity, we believe, is as high if not higher than that of teak. The above experiment has been made by General Cullen, who has likewise ascertained that the Pauchountee tree when tapped, two taps at every three feet, from the base to sixty feet high, or 40 taps in all, yielded in twelve hours about eight pints or pounds of the sap. This abundant flow supports Mr. Lascelles' opinion that Malabar alone will supply Gutta Percha to the world for the next quarter century, and we trust therefore that the orders recently issued by Government to protect the trees from wasteful destruction have been at once acted upon by the several authorities of the districts there.—See Report of the Madras Museum of 1856; by the Author

(6104) PAVETTA BREVIFLORA 1635; Brunonis, 1065; Indica, 148; Rothiana, 1065.

(6105) PAVETTA INDICA. Lin.

Pavatty kai, TAM.	Pappana, SANS.
Paputta kaia. TEL.	

An ornamental shrub 4 or 5 feet high with white flowers, timber very small.—*M. E. J. R.* The berries are considered amongst the Kais or garden stuffs of the Tamools: they are not however very palatable.—*Ainslie, p.* 243.

(6106) PAVETTA TOMENTOSA. PAVETTA. An indigenous species of pavetta, with flowers resembling a white ixora is found at Tavoy.—*Mason.*

(6107) PAVIA, a small division of the natural order *Æsculaceæ*, differing from *Æsculus* itself in little except its converging petals and spineless fruit. It consists of small trees or bushes with yellow or red flowers, inhabiting North America, where they are called Buck's-Eye Chestnuts. They are often cultivated in shrubberies under the name of the Yellow or Scarlet Horse-Chestnut. Two species, *P. Indica* and *P. Punduana*, have also been found in the colder parts of India, but they have not been introduced into our gardens.

(6108) PAVONIA ODORATA. Wild.

Peramootie poo, TAM.	Bulla, SANS.
Mootopolaghum, TEL.	

It is this flower to which Mr. Moor alludes in his "Hindoo Pantheon," under the name of Bela, (p. 450) and which he erroneously supposes to be that of a species of Jasmine. It is a most delightful smelling flower, and is one of those with which the arrows of Kama, the god of love, are said to be tipped.—*Ains. Mat. Med. p.* 163.

(6109) PAVONIDÆ. a family of Rasorial Birds, to which the Peacock belongs. The genus *Pavo* of Linnæus stands next to *Didus* [DODO] in the 'Systema Naturæ,' and is immediately succeeded by *Meleagris*, which is followed by *Crax*, *Phasianus*, *Numida*, and *Tetrao*. Cuvier makes his Paons consist of the true Peacocks (*Pavo*, Linn.) and *Lophophorus*. This group is followed by the Dindons *Meleagris*, Linn.) the Peintades (*Numida*, Linn); and the Faisans (*Phasianus*, Linn., including the Cocks and Hens—*Gallus*, Briss; the true Pheasants (*Phasianus Colchicus*, &c. including *Argus*, Temm.); the Crested Pheasants (Houppiferes, Temm., *Phasianus ignitus*, &c.); the Tragopan, (*Tragopan Satyrus*, &c.); and *Cryptonyx*. The *Tetraonidæ* immediately follow. Mr. Swainson makes the *Pavonidæ*, the first family of the order *Rasores*, according to his arrangement, consist of the genus *Pavo*, with the sub-genera *Argus*, *Polyplectron*, and *Meleagris*; the genus *Phasianus*, with the sub-genera *Phasianus*, *Nycthemerus*, and *Ceriornis* (*Tragopan*); the genus *Gallus*; the genus *Lophophorus*; and the genus *Numida*. In this work, *Phasianus*, with its sub-genera, *Tragopan*, *Gallus*, and *Euplocamus*, are treated of under the title PHASIANIDÆ. Two species only of this magnificent genus are recorded, *P. cristatus* and *P. Japonensis.*—*Eng. Cyc.*

(6110) PAVO CRISTATUS.

Mohr, HIND.-MALL.	Nemelay, TEL.
Aumail, TAM.	

The Common Peacock. This is the Ταὼς & Ταὼς and of the Greeks; *Pavus* and *Pavo* of the Romans; Pavon and Pavone of the Italians; Pavon of the Spanish; Paon of the French; and Pfau of the Germans. The head is surmounted by an aigrette of 24 upright feathers. In the male the tail-coverts consist of feathers with loose barbs and of unequal size, the upper one shortest, each terminated by numerous eyes or circlets of a metallic iridescent brilliancy:

these the bird has the power of erecting into a circle or wheel, which presents, when the sun shines on it, an object of dazzling splendour which sets all description at defiance. The female has the aigrette, but has not the splendid ornament with which the male is gifted; her colours generally are sombre. This species is spread over the north of India and the islands of Malaisia in its natural state. It is the Mohr of the Mahrattas, according to Colonel Skyes, who describes the wild bird as abundant in the dense woods of the Ghauts; it is readily domesticated, and many Hindoo temples in the Dukhun (Deccan) have, he tells us, considerable flocks of them. On a comparison with the bird as domesticated in Europe, the latter, both male and female, was found by the Colonel to be identical with the wild bird of India. Colonel Williamson, in his account of peacock-shooting, states that he had seen about the passes in the Jungletery district surprising quantities of wild pea-fowls. "Whole woods were covered with their beautiful plumage, to which the rising sun imparted additional brilliancy. Small patches of plain among the long grass, most of them cultivated, and with mustard, then in bloom, which induced the birds to feed, increased the beauty of the scene. "I speak within bounds," continues Colonel Williamson, "when I assert that there could not be less than twelve or fifteen hundred pea-fowls, of various sizes, within sight of the spot where I stood for near an hour."—*Eng. Cyc.*

(6111) PAVO JAPONENSIS. Aldrov. (*P. Javanicus*, Horsfield.) Mr. Bennett, who had an opportunity of examining two living birds in the garden of the Zoological Society of London, in addition to stuffed specimens, gives the following accurate description of this species. Prevailing tints blue and green, varying in intensity and mutually changing into each other according as the light falls more or less directly upon them. In size and proportions the two species are nearly similar, but the crest of *P. Javanicus* is twice as long as that of *P. cristatus*, and the feathers of which it is composed are regularly barbed from the base upwards in the adult bird, and of equal breadth throughout. Head and crest interchangeably blue and green. A naked space on the cheeks, including the eyes and ears, is coloured of a light yellow behind, and bluish-green towards its fore part. The feathers of the neck and breast, which are broad, short, rounded, and imbricated like the scales of a fish, are at their base of the same brilliant hue as the head, and have a broad, lighter, somewhat metallic margin; those of the back have still more of the metallic lustre. The wing-coverts are of the general hue, with a deeper tinge of blue; the primary quill-feathers are light chestnut. The tail-feathers and their coverts (train) are of a splendid metallic brown, changing into green; their barbs are extremely long, loose, silky, and somewhat decomposed; and the latter are almost all terminated by ocellated spots similar to those which mark the tail (train) of the common species, and of nearly the same size. As in it, they are of beautiful deep purple in the centre, which is about the size of a shilling; this is surrounded by a band of green, becoming narrow behind, but widening in front, and filling up a kind of notch that occurs in the blue; then comes a broad brownish band; and, lastly, a narrow black ring, edged with chestnut, all beautifully metallic, or rather representing the hues of various precious stones when viewed in certain lights. Bill of a grayish horn-colour, rather longer and more slender than in the common species; iris deep hazel. Legs strong, naked, reticulated, dusky black; spurs large and of the same hue. ('Gardens and Menagerie of the Zoological Society.') The bird above described is the *Pavo muticus* of Linnæus, who, as the name implies, described it as being devoid of spurs, relying probably on Aldrovandus, whom he quotes, and who figures it without spurs, describing it under the name of *Pavo Japonensis*. It is the Japan Peacock of Latham, the *Pavo spicifernus* of Vieillot, the *Pavo Aldrovandi* of Wilson, and *Pavo Javanicus* of Dr. Horsfield, who saw it in Java. Of these names, that of Aldrovandus has the priority; then comes that of Linnæus, which may mislead; then that of Horsfield; then that of Vieillot. We do not see anything objectionable in the name given by Aldrovandus, and therefore we have retained it.

(6112) *Meleagris* (Linn).—The Meleagris of the ancients was not a turkey, but a guinea-fowl. (Linnæus however having given this as the generic name for the Turkeys, which were not known to the ancients, ornithologists have continued it.) Nor is this now of much consequence, certainly not of sufficient importance to change the name; for notwithstanding the confusion and doubt thrown over the subject by the learned discussions of the earlier modern ornithologists, it is generally known and satisfactorily proved that the Turkeys were only known to Europeans after the discovery of America, from which one species has been spread in a domesticated state over the greatest part of the civilised globe It has the following generic characters:—The bill rather short, strong, curved, convex, vaulted, its base furnished with a naked skin; a fleshy caruncle surmounting the bill of an erectile nature and conical form. Head and neck surrounded with a wrinkled mammillated skin, hanging loose like a dewlap as far as the upper part of the breast. Hind toe touching the ground. Two species are known: one, *M. Gallopavo*, the original stock from which the domesticated turkey is derived; the other, *M. ocellata*, a much more beautifully plumaged bird, did not exhibit in the only known specimen any trace of the

tuft of hair on the breast. That character therefore is omitted above; but it is not certain that the last-mentioned species is entirely without the tuft, for the plumage of the specimen was damaged.

(6113) *M. Gallopavo.* This is the *M. occidentalis* of Bitram; *M. fera* of Vieillot; Gallo d' India, Gallinaccio (male), Gallina d'India (female) of the Italians; Coq d'Inde and Dindon, Dinde (female), of the French; Indianische Hahn of the Germans; Wild Turkey and Domestic Turkey of the British and Anglo-Americans.

(6114) *Polyplectron* (Temm). This beautiful form was raised to the rank of a genus by M. Temminck, who established it upon the bird which was named *Pavo Tibetanus* by Brisson, the Chinese Peacock-Pheasant by Edwards, *Pavo bicalcaratus* by Linnæus, and L'Eperronier by Buffon. Cuvier placed it among the Peacocks, properly so called, but other species have been since discovered, which, throwing further light upon the modifications of form, well justify its genuine separation. It is the *Diplectron* of Vieillot. —*Eng. Cyc.*

(6115) *Polyplectrum Emphanum.* Male, Length about 19 inches. Forehead and crown ornamented with a crest of long, narrow, loose feathers, which together with the plumage of the neck and breast, are rich bluish-black with metallic reflections. Towards the end of each feather there is a blackish bar. This beautiful and ample tail is supposed not to be erectile, but to be capable of very wide expansion. This is the Eperonier a Toupet of M. Temminck; the Crested Polyplectron. Probably inhabits Sunda and the Molucca Isles.—*Eng. Cyc.*

(6116) *Polyplectron Tibetanum.* This is the *Pavo Tibetanus* of Brisson and Gmelin, the Chinquis of Buffon, the Thibet Peacock of Latham, the Peacock Pheasant of Edwards, and the Eperronier Chinquis, Polyplectron Chinquis of Temminck. It is supposed to be a native of the mountain chain which separates Hindustan from Tibet. In the *Polyplectron Chalcurum* the plumage is comparatively sombre. The ocellated spots on the wings and tail are absent, and the latter, instead of being rounded, has a more elongated pheasant-like form, approaching to that of *Argus.* The beautiful birds above briefly noticed, and inhabiting the Indian Islands or China, are described as being almost as hardy as the Peacock, and there is little doubt that they might be domesticated in England. The Tibetian Polyplectron is procured for the aviaries of the wealthy Chinese, and M. Temminck's drawing was taken from a bird that had lived for five or six years in an aviary at the Hague.

(6117) ARGUS (Temm.). The only species known is *Argus giganteus.* This bird is remarkable for the beauty of its plumage. The wings, the secondaries of which are three times as long as the primary quills, are painted and ocellated in a manner that defies description. This bird is the beautiful Chinese Pheasant described in 'Phil. Trans.,' vol. 55, p. 88; L'Argus ou Luen of Buffon; Argus Pheasant, *Phasianus Argus* of Latham; L'Argus, *Argus giganteus* of Temminck. The unwieldy size of the secondaries forms an impediment to the bird in its progress through the air, but they assist its pace when running, which it does swiftly with their aid. Its flight, when it does rise on the wing, is heavy and short. When the bird is at rest or unexcited, the beauty spots on the secondaries are hardly visible; but when showing himself off in the presence of his females, the wings of the *Argus* are expanded, and trailed upon the ground to display their beauties; and at this time the tail is comparatively spread, and is raised erect; when at rest it is carried in a line with the body, and with the two long feathers folded together. The rest of its habits are not known, but it is said not to thrive well in confinement. It is a native of Sumatra, and probably other Indian Islands, but principally of Malacca. No proof appears of its having been brought from China and Chinese Tartary, although ornithological writers name those countries as the places of its habitation. The feathers and drawing of the bird described in the 'Phil. Trans.' by G. Edwards were sent from Canton to Dr. Fothergill, and are stated to have come from one of the most northern provinces of China.

(6118) *Lophophorus*, Temm. (*Monaulus* Vieill.)

(6119) *L. Impeyanus* (*L. refulgens*, Temm.; Impeyan Pheasant, *Phasianus Impeyanus*, Lath.) We must refer our readers to the bird itself, or to the excellent figure in Mr Gould's 'Century of Birds from the Himalaya Mountains,' for anything like an adequate idea of the beauty of its tints; for the greater proportion of the plumage is dazzling with changing hues of green, steel-blue, violet, and golden-bronze. The bird looks as if it were principally clothed in a scale-armour of iridescent metal; but the plumage is soft and velvety to the touch. The crest on the head consists of naked-shafted feathers, with an oval or battledore tip of the same quality as the rest of the plumage, and of a metallic green; the centre of the back is pure white; the tail is rounded and bright chestnut. Size of a hen turkey. The principal food of this species consists of bulbous roots, for scooping out which its bill is well adapted. Nothing certain seems to be known of the rests of its habits. It is a native of the mountain ranges of Nepaul and the Himalayas.

(6120) *Numida* (Linn.). The birds known to the ancients under the name of *Meleagrides* and *Gallinæ Numidicæ* belonged to this genus. They are all natives of Africa, living principally on berries, small slugs, &c.

(6121) *N. Meleagris* (the Gallina di Numidia of the Italians; Poulle de la Guinee and Peintade Meleagride of the French; Pintado of the Spanish; Perl Huhn of the Germans; and Pearl Hen, Guinea Hen, and Common Guinea Fowl of the English) is too well known to need description. The bird has been spread very widely, and few poultry-yards are without it. In Jamaica, where they do much mischief to some of the crops, they have resumed their wild habits, and are shot like other game.—*Eng. Cyc.*

(6122) PAYA WOOD. Paya kurra.

(6123) PAYUNG in Malay and Javanese, and Songsong in Javanese only, an umbrella. This is the universal badge of rank from the prince to the humblest office-bearer among the civilised nations of the Malayan Archipelago, and stands instead of the crowns, coronets, stars and ribbons of the nations of Europe. The quality of the party is expressed by its size, colour, or material.—*Crawfurd Dict. p.* 330.

(6124) PEACH, AMYGDALUS PERSICA. Amongst the more important of the acquisitions which, says Fortune, I made in the vicinity of Shanghae, I must not forget to mention a fine and large variety of peach, which comes into the markets there about the middle of August and remains in perfection for about ten days. It is grown in the peach orchards, a few miles to the South of the City; and it is quite a usual thing to see peaches of this variety eleven inches in circumference and twelve ounces in weight. This is probably, what some writers call the Peking peach, about which some exaggerated stories have been told. Trees of the Shanghae variety are now in the garden of the Horticultural Society of London.—*Fortune's Wanderings, p.* 404

(6125) PEACH PALM. (Guilielma speciosa), the "Pupunha, produces an agreeable fruit of a red and yellow colour."—*Seeman.*

(6126) PEACH WOOD, NICARAGUA. An inferior kind of brazil-wood, used to dye a fugitive "fancy red."—*Waterston.*—*Faulkner.*

(6127) PEACOCK, in Malay and Javanese, Marak, and in the polite dialect of the latter, Manura, which is Sanscrit. The bird known by this name is the Pavo muticus of ornithologists, and a distinct species from the Indian one which is that of our poultry-yards. It appears to be confined to Java, Sumatra, and the Malay Peninsula, and has never been domesticated by the natives of the Archipelago.—*Crawfurd Dictionary, page* 330.

(6128) PEAH SAUL OR YEGASEE.

Yegassee, TEL.	Peeah saul, HIND.

(6129) PEAR, PYRUS COMMUNIS.

(6130) PEARLS.

Looloo, ARAB.	Margaritæ, LAT.
Mootoo, CYNG.	Murwareed, PERS.
Paarlen, DUT.	Sheintschug, Perlu, RUS
Perles, FR.	Perlas, SP.
Perlet, GER.	Motu, TAM.
Moottee, GUZ. HIND.	Motu, TEL.
Perle, IT.	

Are well-known globular concretions found in several species of shell fish. They consist of alternate concentric layers of membrane and carbonate of lime. The best pearls are of a clear bright whiteness, free from spots or stains, with the surface naturally smooth and glossy. Those of a round form are preferred, but the larger pear-shaped ones are esteemed for earrings. *Seed* pearls are those of the smallest size. The most extensive pearl fisheries are those of the Gulf of Manaar in Ceylon, and Bahreen in the Persian Gulf. Pearls are imported into Bombay from the latter place, and are re-exported to England and China.—*Faulkner.* Pearls are fished up on nearly all parts of the Ceylon coast and are frequently large and beautiful. The Chinese taught the natives their value by offering them very high prices for the finest qualities. The pearl fisheries for which the Island was once famous have very much diminished in their yield. The natives account for the diminution by declaring that the pearl oyster has the power of locomotion and has shifted its former quarters to some new ground not yet discovered. The scarcity is probably owing to the fact that the pearls have been disturbed before they have reached their full development which is said to require a period of seven years. Since that period the proceeds have gradually fallen off until at present they amount to almost nothing. Diving for the pearl-oyster is a favorite occupation among the natives of Ceylon, as a skilful diver can earn ten times the wages of a farm laborer, and the employment is not, as has been stated, unfavorable to health, but on the contrary conducive to strength and vigor of body.—*American Expedition.* Pearls are found in China; and Marco Polo speaks of a salt lake, supposed now to be in Yunan, which produced them in such quantity that the fishery in his day was farmed out and restricted lest they should become too cheap and common, but such is not now the case judging from the numbers annually imported from India. The Quarterly Review speaks of an artificial mode practised by the Chinese of making pearls by dropping a string of small mother-of-pearl beads into the shell which in a year are covered with the pearly crust.—*William's Middle Kingdom, p.* 272.

Pearls, to the amount of £500,000, are annually brought to Canton; *coral* is also a part of cargoes from the Archipelago to China.—*Williams.* Pearls are obtained from a shell-fish, commonly called the pearl oyster. The principal fisheries are on the Coast of Madura, the Strait between Ceylon and the Continent, the Island of Baharen, in the Persian Gulf, and at Hainan, on the Coast of China. The pearl divers pile the shells upon the shore in little pits, and cover

them with sand, till the shell opens, and the fish is destroyed. The pearls are then procured, cleansed, and passed through a kind of sieve, according to their sizes: the smallest are denominated *seed* or *ounce* Pearls, and are of very inferior value. The quality or value of Pearls depends chiefly upon their size and colour. Their true shape is a perfect round. The colour should be a pure white; not dull and lifeless, but clear and brilliant; free from foulness, spot, or stain; surfaces naturally smooth and glossy. The shell, which is the *Mother of Pearl*, is compressed and flat, nearly orbicular; the inside exquisitely polished, and of the whiteness and water of the pearl itself. It has the same lustre on the outside, when the external coats have been removed by aquafortis. It is used (especially by the Chinese and Japanese) in a variety of inlaid works, toys, &c.—*Morrison.* Pearls worth fishing are found in the seas about the Arrow Islands, and in those of the Sulu Archipelago, but none in size or quality to be compared with those of the Manar or Persian gulfs. Mother-of-pearl oysters are found in the same situations and on the coasts of several of the Bisaya islands of the Philippines much more abundantly. From Manilla there are yearly exported about £ 200,000 pounds worth of them. Mr. Windsor Earl has given the following very satisfactory account of the fishing of the Arrow Islands on the coast of New Guinea. "But the great sources of wealth are the pearl and tripang banks, which lie on the eastern side of the group, and are often several miles in width, being intersected by deep channels some of which will admit vessels of burden. The pearl oysters are of several varieties; first, the large oyster with its strong thick shell from six to eight inches in diameter which furnishes the mother of pearl shell of commerce. These are obtained by diving and are highly prized, being nearly always in demand at Singapore for the European and Chinese markets. This oyster produces few real pearls, but gnarled semitransparent excrescences are occasionally found on the surface of the inner shell, which are so highly esteemed by the Chinese that they often fetch enormous prices. The other description is the small semitransparent pearl oyster, having the inner surface of the shell of a bluish tint. The shell is of small value as an article of commerce, but the oyster itself often contains pearls which although individually of no great value, are so numerous, as amply to repay the labour of collection. Pearls of sufficient size to undergo the process of boring are sometimes found, but the greater portion are what go by the name of seed pearls, and are only marketable in China, where they are much valued as a medicine when pounded and mixed with some liquid." Journal of the Indian Archipelago, Vol. iv. p. 490. The names for the pearl in Malay and Javanese, mute, mutya, and mutyara, are all Sanscrit, and I am not aware that in any of the Malayan languages there are native names for it. Occasionally the Persian word lulu is used. The name for the mother of pearl oyster, indung-mutyara, is exactly equivalent to our own, for the Malay word indung signifies mother or matrix. From this we may suppose that both the pearl and mother of-pearl were most probably made known to the Malayan nations by the Hindus. It may be remarked, that the pearl-fishing of the Sulu Islands was certainly carried on before the arrival of Europeans, for they are mentioned by the indefatigable Barbosa. "Going on," says he, "in a northerly direction towards China, there is another island abounding in the necessaries of life called solar (Sulu) inhabited by a gentile people almost white, and in person well made. They have their own proper king and language. In this island is found much gold by washing the soil, and over against it, the people go to fish small pearls, and even find occasonally larger ones, fine as to colour and roundness." Ramusio, Vol. i.—*Crawfurd, Dictionary page* 330.—*Eng. Cyc.* The pearl is a shell secretion of a spherical shape formed in a species of oyster, or pearl mussel, and said to be produced by a malady in the animal, which requires nearly seven years for its full development, after which the oyster dies. Small pearls which have been immersed in acetous acids, and thus reduced to their membranous constituents, have the appearance of being formed of concentric coats of membrane, and carbonate of lime, thus resembling in composition the mother-of-pearl with which oyster-shells are lined. The precise origin of pearls is unknown, but it appears probable that some minute substance, such as a grain of sand, may have found its way into the shell and produced irritation, and that the animal, unable to expel it, renders it less injurious by covering it with calcareous matter. It is sometimes affirmed, that to produce pearls, the oyster must have received some external injury: and this is corroborated by the fact that nearly all the shells in which pearls are found are outwardly contorted, and that a smooth regular shell is a pretty sure sign of the absence of the pearl. It was therefore suggested to the Swedish government by the celebrated Linnæus, to pierce small holes in the shell of the freshly-caught pearl oyster, and then restore it to its original bed. The experiment was tried, but without success. A somewhat similar plan is said to be adopted by the Chinese, and with favourable results. These ingenious people thread upon fine silk small beads of mother-of-pearl, and fasten them within shells of pearl oysters, when they rise to the surface of the water at the beginning of summer. The animals are then restored to their bed, where they soon cover the beads with calcareous matter, and thus convert them into pearls. In whatever way pro-

duced, pearls of considerable size, on account of their beauty and rarity, have been valued at enormous prices in past ages, and are still among the choicest objects of the jeweller's art. Their delicate and silvery lustre has been as widely celebrated as the brilliance of the diamond. The Hindoos poetically describe them as drops of dew falling into the shells when the fish rise to the surface of the sea in the month of May, and becoming by some unexplained action of the sun's rays transformed into pearls. Pearl fisheries exist in Ceylon, on the Coromandel coast, and in the Persian Gulf, the last-named being the most productive. Fisheries of less importance also exist in Algiers, and in the Zooloo Islands. Two thousand years ago, the Romans found pearls in Britain, and in modern times the rivers of Scotland have afforded considerable quantities, though not of the best quality. Several rivers, of Saxony, Silesia, Bavaria, and Bohemia afford pearls, and they are also found in two or three Russian provinces. There are also pearl fisheries in the western hemisphere. The coast of Columbia and the Bay of Panama have furnished considerable quantities, but they are not considered equal to the pearls of the East in shape or colour. Detailed accounts of the pearl fishery of Ceylon have been given by the Count de Noe and others, who have had ample means of watching the operations of the pearl-divers during a residence in that island. It appears that the pearl oysters occur in banks at greater or less depth in the sea on the western side of the island of Ceylon, the average depth, however, being about 12 fathoms, and the distance from the shore about 15 miles. The right to fish on these banks is sold by the Government every season, and single auction sale is generally made to one individual, who afterwards disposes of shares in the fishery to other parties. The biddings at the auction are regulated by the produce of some thousands of oysters taken from the beds at hazard. If the average quality of pearl contained in them be good, the competition is strong in proportion. The pearl fishery commences in April and lasts till towards the end of May. It attracts a concourse of visitors not only from the interior of the island, but from various parts of India, whose diversities of language, dress, and manners produce a striking effect. The sea-shore, at other times solitary, is on the eve of the fishery suddenly covered with innumerable huts, composed of a few poles stuck in the ground, interwoven with bamboo and covered with the leaves of the cocoa-nut palm: these temporary dwellings often shelter as many as 150,000 persons. The signal for commencing the fishery is given at day-break by the firing of cannon, and at that moment the several boats cast anchor in the fishing ground, for at midnight they had left the shore in an extensive fleet, so as to be on the spot at the desired moment. Each boat has its own proper bounds, beyond which it is not lawful to work, and government vessels are on the spot to see that no infringement of contract takes place. The boats each carry a captain, pilot, and 20 men, of whom 10 are experienced divers. 5 divers descend at once, the other 5 taking the plunge when the first ascend. Thus a little time is allowed for regaining strength. In order to descend as rapidly as possible through the water, the diver places his feet on a large stone made fast to one end of a rope, the other end being secured to the boat. He also takes another rope, to the end of which is attached a net, or basket, to contain the oysters. The upper extremity of this second rope is held by two men in the boat. The diver is also provided with a strong knife for detaching the oysters, and as a means of defence against sharks, which are very numerous in those seas, but which do not often attack the divers, being perhaps scared by the noise of the assemblage, and the continual plunging of so great a number of persons. The diver no sooner reaches the ground than he gathers oysters with all possible speed into his basket, and then letting go the rope to which the stone is attached, he pulls that which is held by the sailors, and rapidly ascends to the surface. Some divers make very dexterous use of their feet, holding the net with one foot, clasping the stone with the other, and thus leaving one hand free to close the nostrils, while the other hand holds the rope in descending. The time during which the divers can remain submerged is variously stated, and no doubt it differs greatly according to the constitution of the individual. Some observers declare that in their experience it never exceeded 50 seconds; but Captain Percival, in his work on Ceylon, gives two minutes as the usual time of remaining under water. Dr. Faraday found that by first exhausting the lungs, by several deep exhalations, so as to expel the carbonic acid, and then taking deep inspiration of fresh air, he was able to hold his breath for two minutes and a half. Serious effects are produced by this employment, and the divers may frequently be seen with blood issuing from their mouth and nostrils. Yet this does not hinder them from going down in their turn. They will make from 40 to 50 plunges in one day, and bring up on each occasion about 100 oysters. Their day closes before noon, for as soon as the sea-breeze sets in, the signal is given for the return of the boats to the shore. Their owners, and a large assemblage of persons of all classes, are eagerly looking out for the arrival of the flotilla, and are soon busily employed in examining and stowing away the cargoes. Each owner has a shallow pit fenced round and secured for his own use, in which his store of oysters is deposited, and left open to the air. This pit, or *coutto* as it is called, is in the midst of a group of huts belong-

ing to the same owner, so that it is under the guard of his party. Here the oysters are allowed to putrefy under a burning sun, and a stench arises from them which would seem enough to depopulate the shore of its thousands of inhabitants. Yet such is not the case. The health of the people does not appear to be materially affected, and the oysters are allowed to remain till dry, when they can be easily opened and the pearls extracted. To open them when fresh would require much greater force, and would be likely to injure the pearls. When the putrefaction is sufficiently advanced, the oysters are taken from the *coutto*, and placed in troughs made of the trunks of trees. Sea-water is thrown over them: they are easily opened, and render their pearls to the washing and shaking of a number of men who stand all on one side of the trough, while inspectors at each end closely watch their proceedings, and other inspectors examine the shells which are thrown away, lest they should contain some of the precious substance. The workmen engaged in washing pearls dare not lift their hands to their mouths under penalty of a flogging, yet a man will sometimes contrive to swallow a pearl of high price. After all the pearls are washed out, the largest are carefully picked out from the sand at the bottom of the troughs and washed repeatedly in clean water: the next in size are spread out on white napkins to dry in the sun. The remainder are left to the care of women, who pick them up and dry them. Pearls are assorted by means of three sieves placed one above another, the meshes in which are smaller as the pearls descend. Thus the pearls which will not pass through the uppermost sieve are of the first class, and so on with the others. Another assortment is made as to colour, regularity of form, &c., and here the tastes of different nations have to be consulted. The Europeans prefer pure white pearls, the Indians yellow pearls, and the natives of Ceylon those which are tinged with rose-colour. Besides the number of persons who arrive in Ceylon in the fishing season for the sake of speculating in pearls, there are also numerous Indian artisans who are very expert in piercing and drilling pearls, and who practice their trade on the spot on economical terms. Captain Percival thus describes their operations:—"A machine made of wood, and of a shape resembling an obtuse inverted cone, about 6 inches in length and 4 in breadth, is supported upon 3 feet, each 12 inches long. In the upper flat surface of this machine holes or pits are formed to receive the larger pearls, the smaller ones being beat in with a little wooden hammer. The drilling instruments are spindles of various sizes, according to that of the pearls; they are turned round in a wooden head by means of a bow handle, to which they are attached. The pearls being placed in the pits which we have already mentioned, and the point of the spindle adjusted to them, the workman presses on the wooden head of the machine with his left hand, while his right is employed in turning round the bow handle During the process of drilling he occasionally moistens the pearl by dipping the little finger of his right hand in a cocoa-nut filled with water, which is placed by him for that purpose; this he does with a dexterity and quickness which scarcely impede the operation, and can only be acquired by much practice. They have also a variety of other instruments both for cutting and drilling the pearls. To clean, round, and polish them to that state in which we see them, a powder, made of the pearls themselves, is employed. These different operations in preparing the pearls occupy a great number of the black men in various parts of the island. In the black town or pettah of Columbo, in particular, many of them may every day be seen at this work, which is well worth the attention of any European who is not already acquainted with it."—*Tomlinson*.

(6151) PEARLS, ARTIFICIAL. The art of making artificial pearls has been brought to such perfection in Paris, that even jewellers and pawnbrokers have occasionally had a difficulty in deciding between the artificial and the real. The origin of this successful imitation is given as follows: A French bead maker named Jaquin, observing that when the small fish called *ablette*, or bleak (*Cyprinus alburnus*), was washed, the water was filled with fine silver-coloured particles, collected some of these for the purposes of his trade. He found that the soft shining powder thus obtained had to a remarkable degree the lustre of pearls; hence, he called it essence of pearl, or *essence d'orient*. He first made small beads of gypsum and covered them with this substance: they were greatly admired and eagerly sought after; but it was found that this pearly coat, when exposed to heat, separated itself from the bead, and attached itself to the skin of the wearer, in a manner that was anything but pleasant. The ladies themselves, it is said, suggested to Jaquin, the making of hollow glass beads, and covering the inside with essence of pearl. This he did, and established a manufacture, of which some idea may be gained by the following account. Slender tubes of glass are first prepared, called *girasols*, a term applied to opal, and sometimes to the stone called cat's-eye, and given to these tubes because the glass is of a peculiar bluish tint. From these the artist blows minute globules, to the extent of from two to six thousand per day, not caring to make them all perfectly regular, or free from blemish, because the natural pearls are not so. The pearl essence is then mixed with a solution of isinglass, and is blown while hot into each bead by means of a fine glass pipe. The solution is spread equally

over the whole internal surface, by shaking the pearls in a vessel placed over the table where the workman sits, and to which he gives motion by his foot. When the varnish is equally diffused and dry, the beads are filled with white wax; this gives them the necessary weight and solidity, and renders them less fragile. They are then bored with a needle, and threaded on strings for sale. The holes in the finer sort are lined with thin paper, that the thread may not adhere to the wax. To produce one pound of scales no fewer than 4,000 fishes are required; but this quantity of scales only yields 4 ounces of pearl essence. The fish are about 4 inches long; they are sold at a cheap rate in the markets after being deprived of their scales. The value of a pound of washed scales in the Chalonnais is from 15 to 25 livres The early manufacturers suffered great inconvenience from not knowing how to preserve the scales from putrefaction, and consequently being obliged to use the essence immediately it was obtained, lest it should acquire the intolerable odour of decayed fish. Attempts were made to preserve them in spirit of wine or brandy, but those liquors wholly destroyed their lustre. At length it was discovered that these fishy particles can be kept for a long time in solution of ammonia, and this enables the manufacturers of artificial pearls to carry on a considerable traffic with distant places where the fish is plentiful, the supply from the Seine, though abundant, being insufficient for the purposes of the trade of Paris. Down to a late period the heirs of M. Jaquin continued to manufacture pearls to a considerable extent, in the Rue de Petit Lion, at Paris. An elaborate account of this art is given by De Beost in a work entitled, "*L'Art d'imiter les Perles fines.*" from which most English descriptions of this manufacture have been obtained.—*Tomlinson.*

(6132) PEARLASH. The term is applied to calcined potash. It has a spongy texture, and a whitish pearly lustre. Pearlash, can be prepared from nitre and charcoal.

(6133) PEARL, MOTHER OF.

Seepie Moothoo. TAM. | Indong Mootiara. MALAY. Sudf, HIND.
Gohur parvur, PERS.

Mother of Pearl is commonly sold by the Lubbie Stone Merchants, cut into beads and other ornaments which first they call Surat Munnie, owing to their being brought from Surat.—*Ains. Mat. Med.* *False pearls* are sent from China to India for ornaments, as well as employed by the Chinese.

(6134). PEASE. PISUM SATIVUM.

Erwten, DUT. | Kirseneh, PERS.
Pois, FR. | Goroch, RUS.
Erbsen, GER. | Hareuso, SANS.
Buttana, GUZ. HIND. | Pesoles, Guisantes, SP.
Piselli, IT. | Gondoo Sanigheloo, TEL.
Wan, JAP. | Puttanie, TAM.

The product of a well-known leguminous plant, of which two species are commonly distinguished in Britain; the grey field pea, and the white or yellow pea. Of these two species there are many varieties. Leguminous crops are very extensively cultivated in India.—*Faulkner.*

The large white, green, and brown, are now the common pea in the Deccan; the latter sort are boiled and eaten often in the shell. Peas may be sown in the beginning of June, and continued at pleasure until February, when the weather becomes warm and the stalks dry up, although I have known peas to be had much later in the sheltered gardens in the city of Aurungabad. The method of sowing is very simple; they should not be too thin, or placed deeper in drills than two inches, and a space of three feet between the rows. I generally sow my first crop in double rows, with a space of a foot between: when they are ready to climb, I earth up both sides well, leaving room for the water to run in the middle. I then place good strong sticks in the centre of the rows, and on the outer side of each lay good old manure, after which little trouble is required. Keeping them free from weeds is of course essential, and if you wish to preserve the seed, take care and remove any of the plants that appear of a different kind when in blossom; also draw out all the thin and bad looking plants, to prevent the pollen impregnating the good, and if this seed be the produce of the rain crop, you will find that if sown again in the cold weather they will be much finer and last longer than the seeds of the former season. I was led to observe this from seeds that had fallen and grown up of themselves. If you sow for late crops, I recommend their being put down in single rows, and the lines from east to west: this enables the sun to act upon the whole, and tends to prevent mildew from damp on the stalks. In growing crops that you do not intend to stick, it is advisable to put brushwood on one side for them to creep over, and prevent much loss in seed from damp and otherwise. —*Riddell* The kinds that grow best at Madras are the Bangalore and Cape seed, sown in drills after the heavy rains are over. The best manure for this vegetable is street sweepings and wood ashes: do little good at Madras after the middle of February. May be sown successively once a fortnight during the cold months. Native country unknown.

The *Japan pea* has been introduced into the United States, and return two and three hundred per cent. Agricultural Report for 1854 from Commissioners of Patents to House of assembly.

(6135) PEAT. A kind of fuel, composed chiefly of the decayed fibres of mosses.—*Faulkner.* On our arrival at Calcutta in the following February, Dr. Falconer showed us specimens of very modern peat, dug out of the banks of the Hoogly, a few feet below the surface of the soil, in which

were seeds of the *Euryale* ferox: this plant is not now known to be found nearer than Dacca (sixty miles North East, see p. 255), and indicates a very different state of the surface at Calcutta at the date of its deposition than that which exists now, and also shows that the estuary was then much fresher.—*Hooker.* This peat Dr. Falconer also found to contain bones of birds and fish, seeds of *Cucumis Madrazpatana* and another Cucurbitaceous plant, leaves of *Saccharum Sara* and *Ficus cordifolia*. Specks of some glistening substance were scattered through the mass, apparently incipient carbonisation of the peat.—*Hooker Him. Jour. Vol.* II. *page* 341.

(6136) PECTINIDÆ, OR OSTREIDÆ, a family of Conchiferous *Mollusca*, to which the common Oyster belongs. It has the following characters:—Shell inequivalve, slightly inequilateral, free or adherent, resting on one valve; beaks central, straight; ligament internal; epidermis thin; adductor impression single, behind the centre; pallial line obscure; hinge usually edentulous. Animal marine; mantle quite open, very slightly adherent to the edge of the shell; foot small and byssiferous, or obsolete; gills crescent-shaped, two on each side; adductor muscle composed of two elements, but representing only the posterior shell-muscle of other bivalves. (Woodward.) The principal genera referred to this order are—*Pecten*, *Ostrea*, *Lima*, *Placuna*, *Anomia*, *Placunomia*, *Hinnites*, *Spondylus*, and *Plicatula*.

Pecten (Lamarck).

(6137) PECTEN PLERURONECTES. Shell sub-equivalve, rather thin, smooth externally somewhat convex on both sides. This species has the upper valve always coloured, generally reddish or rich reddish-brown and the lower one white, whence its name. In the inside of the valves are projecting radiated somewhat distant ribs. It is found in the East Indian seas, and fossil in France, at St. Paul-Trois-Chateaux, in the department of Drome.—*Eng. Cyc.*

(6138) PECTEN SPONDYLOIDEUM, is the only species. The shell is ovato-cuneiform, planulate; whitish tinged with red or purplish, especially near the umbones; the upper valve flat and striated longitudinally; the lower valve largest, with the lateral edges turned up and raised above those of the upper valve. There is a smaller variety, much more round, and generally more delicate. It is a native of the East Indian Seas (Isle of France, &c.), where it is found half-imbedded in coral-reefs.

(6139) *Ostrea* (*Gryphæa* (Lam.), fossil principally;

(6140) *Exogyra* (Say), fossil only).

(6141) *Placuna* (Brug.).—Animal very much compressed. The species now known are from the East Indian and Red Seas, and have been taken on sandy bottoms. M. Deshayes remarks that the animal is not known, but that he is convinced that it has a great analogy to that of *Anomia*. The number of species recorded in the list of M. Deshayes is three living and one fossil (tertiary).

(6142) PEDALIACEÆ, a natural order of Monopetalous Exogenous Plants, very nearly related to *Verbenaceæ*, having like it irregular and usually didynamous flowers and a few-seeded 2- or 4-celled fruit; but differing in having the radicle directed towards the base instead of the apex of the fruit. From *Bignoniaceæ*, with which they are more generally compared, their wingless seeds offer the principal distinction. They are all exotic tropical herbaceous plants, with opposite leaves and axillary flowers, and are of little known use, with the exception of the genus *Sesamum*, whose seeds afford a bland oil not inferior, when fresh, to that of the olive. [SESAMUM]

(6143) PEDALUM MUREX. An infusion of this Pedalium,—*Gokeroo*, is a good mucilaginous demulcent, much used by the natives as a drink in gonorrhœa.—*Beng. Phar. p* 304.

(6144) PEDALIUM MUREX. Nat. BURRAY-GOKERROO. A succulent plant, with small yellow flowers which appear in the rains, the green leaves when agitated in water render it mucilaginous: this is prescribed by the natives in dysuria, the seeds are supposed to possess similar virtues.

(6145) PEDALIUM MUREX. PRICKLY FRUITED PEDALIUM. Lin.

Anaueringie, TAM.	Khussuke kubeer, ARAB.
Burra gokeroo, HIND. and DUK	Yeanugapulleroo, TEL.
	Ghejasoodumoostra, SAN.

A pretty large plant, with small yellow flowers which appear in the rains.—*Riddell.* Succulent, ramous, annual, growing generally over the country, but chiefly on the Coromandel coast, in a moist sandy soil; flowers in the rainy and cold seasons. The fresh leaf of this plant, when agitated in water, renders it mucilaginous, in which state it is prescribed by the natives, in cases of Dysuria and Ischuria. The seeds which are contained in the prickly capsule are supposed to have similar virtues and are administered in decoction. This plant is called Caca Mullu in the Hort Mal.—*Ains. Mat. Med. page* 69. The fresh plant renders water or milk very mucilaginous without altering the taste, colour, or smell of the liquid. This thickening disappears in a few hours. A watery infusion of this kind sweetened with sugar is a favourite and excellent native demulcent in acute gonorrhœa. Butter milk is often fraudulently thickened by the use of the leaf. *Roxb. Fl. Ind.* iii. *p.* 114.—*O'Shaughnessy, page* 480.

(6146) PEDDA JANY.

Pidda janee, TEL.	Buree janee, HIND.

(6147) PEDDA NEERODEE.

Pidda neroodee, TEL.	Burree neerodee.

(6148) PEDDA TAPASEE.

Pidda tapasee, TEL.	Burree tapasee, HIND.

(6149) PEDDAWK WOOD.

Peddawkoo kurra, TEL.

(6150) PEDILANTHUS TITHYMALOIDES, JEW BUSH. West Indies. Introduced into the Calcutta Garden, and now common everywhere about Calcutta in hedges. A shrub about 6 feet high, abounding in white bitter milk, known and used in America as ipecachuana: in numerous trials no proof was obtained of its efficacy; this is probably the result of deterioration of properties through the influence of the climate of Bengal.—*O'Shaughnessy, p.* 566. This American plant, which is used in the West Indies as a substitute for ipecacuanha, is seen in cultivation occasionally, and in the neighborhood of Calcutta it is an abundant as a wild plant.—*Mason.*

(6151) PEEDOO MARUM.

Peedoo Marum, TAM. | Peemah wood, ENG.

A small tree wood used for building in Wynaad where it grows plentifully.

(6152) PEGANUM, from πήγανον, the Greek name of Rue, of which three kinds are described by Dioscorides—the Garden, the Mountain, and the Wild. The last is said to be called Moly in Cappadocia and Galatia, and by some Harmala. It is remarkable that even in the present day a plant is found in the north of India, the Punjab, and Cabul, which is called Hoormul by the natives of the above countries, and sometimes distinguished in India by the name of Lahooree-Hoormul, indicating that it was introduced from the direction of Lahore. The Persian works on Materia Medica in use in India give Molee as its Greek name, according to Dr. Royle ('Illustr.,' p. 155). It is interesting to find that the plant to which these names are assigned by the natives of the country is the *Peganum Harmala* of botanists, a fact which shows that the investigations of the West had arrived at the same conclusion as those in the East respecting the plant alluded to by Grecian authors; and this enables us to put more faith in the results of such investigations than is sometimes done. The plant, which is called Syrian Rue in gardens, belongs to the natural family of *Rutaceæ*, and is of easy culture in any light soil. The seeds, which were formerly in use in medicine in Europe, still are so in the East, but are not possessed of any peculiar or very active properties.—*Eng. Cyc.*

(6153) PEGANUM HARMALA, occurs in many parts of India, and is found in the Taj garden at Agra. The seeds are used in native medicine, and called Lahoree Hoormul. In the "Mukzzunul-Udwieh," the seed is called *Moolie*; the same as the πήγανον, of Discorides. Royle, p. 155.—*O'Shaughnessy, p.* 260.

(6154) PEKEA, a genus of Plants inhabiting Guyana, and furnishing the Saouari or Sawarra Nuts of the shops, a very different fruit from that to which the name of Saouari is given in Guyana. *Pekea* comprehends two species, the *P. butyrosa* and *P. tuberculosa*: the former is unknown in this country; the latter, which yields the fruit in question, is a very large tree inhabiting the woods of Guyana, were it is called Tatayouba by the Garipou Indians. It has opposite digitate leaves, whose leaflets are oval, smooth on the upper side, but white with down beneath; the terminal leaflet is said to be 8 inches long by 3½ inches in breadth, while those at the sides are much smaller. The flowers are unknown. The fruit consists of greenish compressed drupes, which adhere around a common centre, and contain a single seed of large size, covered with a brownish rugged woody shell, and containing a kernel of a soft consistence, and of the most delicate buttery quality. It is by far the best of the South American nuts that are brought to England, and much superior to English walnuts, almonds, and filberts; but it is scarce and dear in most seasons.—*Eng. Cyc.*

(6855) PELARGONIUM is the name given by botanists to the gaily painted flowers which are usually called Geraniums in greenhouses. The latter differ obviously from *Pelargonium* in having regular flowers, and in being herbaceous plants, while the genus in question consists almost entirely of shrubs with flowers as irregular as those of the Pansy. There is a large number of genuine species of this genus, chiefly inhabiting the Cape of Good Hope; and as these intermix very readily, producing in great abundance shrubs which are capable of being perpetuated by cuttings, a prodigious number of spurious species, as well as acknowledged varieties, have found their way into the writings of systematic botanists. For example, De Candolle enumerates 369 supposed species, of which at least one-half are of artificial origin. While however science has been embarrassed by this facility of cross breeding, the gardens have been enriched by crowds of the most beautiful objects, in which the features of their savage progenitors can no longer be recognised; and it is probable that of all the flowers which have been acted upon by the hand of man, the *Pelargonium* is that in which the result has been most striking. By care and attention to a few simple points of practice these plants may be cultivated and multiplied by any one who has a greenhouse, and hence they have become universal favourites. These points are the following, namely:—1, water; 2, warmth; 3, a gentle bottom heat; 4, abundance of air; 5, as much light as the leaves will bear; and 6, a rich soil during the season of growth; and a cool atmosphere, less water, abundance of light, and close pruning afterwards—*Eng. Cyc.* Many kinds of this genus, thrive well in India and are easily raised from seed, the Horseshoe and Oak-leaf bear flowers abundantly, but it

is generally remarked that plants grown from English seed do not blossom. Many of the species thrive well when put out in the garden, but are better for being grown in large pots, and if so placed, as only to receive the morning and evening sun, will blossom most abundantly.—*Riddell.*

(6156) PELAN. A very hard, fine, close-grained, heavy Ceylon wood.

(6157) PELECANIDÆ, a family of *Natatores*, or Swimming birds. The genus *Pelecanus* of Linnæus, placed in the 'Systema Naturæ' between *Diomedea* and *Plotus*, contains the True Pelicans (*Pelecanus Onotrocalus*), the Frigate Bird or Man-of-War Bird (*Trachypetes*), under the designation of *P. aquilus*, the Cormorants (*P. Carbo* and *P. Graculus*), and the Solan Goose and Boobies.

Pelecanus (Linn. —Bill long, straight, wide, very much depressed; upper mandible flattened, terminated by a very strong hook or nail, which is compressed and very much bent; lower mandible formed by two osseous branches, which are depressed, flexible, and united at the point, and from which a naked skin in the form of a bag is suspended. The species of *Pelecanus* are widely spread (Europe, Asia, Africa, and America), though not numerous: two are European, P. *Onocrotalus*, and *P. Crispus*.

Phalacrocorax (Brisson).—Bill moderate or long, straight, compressed. This is the genus *Halieus* of Illiger, *Carbo* of Meyer, and *Hydrocorax* of Vieillot.—*Eng. Cyc.*

Pelecanus carbo, the Common Cormorant. (Old.) Under the throat a large white or whitish collar, the upper extremities of which reach to just below the eyes. The geographical distribution of this bird is very extensive. It is an inhabitant of the New as well as the Old Continent. In the latter it is widely diffused. It is spread over a considerable portion of Europe, especially the north. It is a common bird in England. Its voracity is indeed great, and the way in which it will dispose of a large fish, a place for instance, aided in a great measure by the powers of compression and dilatation conferred on it by the apparatus noticed above, is surprising. The species is easily domesticated. Montagu, who kept one, gives a favourable account of its disposition, and indeed their docility is shown by the use made of them formerly in fishing. Pennant cites Whitelock, who says that he had a cast of them manned like hawks, and which would come to hand.

(6158) *Phalacrocorax sinensis* Sir George Staunton ('Embassy to China') states that the embassy, in its journey to Han-choo-foo, "had not proceeded far on the southern branch of the canal, when they arrived in the vicinity of the place where the Leu-tze, or famed Fishing-Bird of China (*Phalacrocorax Sinensis*) is bred, and instructed in the art and practice of supplying his owner with fish in great abundance. It is a species of the Pelican, resembling the Common Cormorant, but which, on a specimen being submitted to Dr. Shaw, he has distinguished in the following terms:—'Brown Pelican or Cormorant with white throat, the body whitish beneath and spotted with brown; the tail rounded; the irides blue; the bill yellow.'" The bird, an undoubted Cormorant, is figured in the 'Atlas,' pl. 37, and a vignette at the end of the chapter shows two Chinese fishermen carrying their light boat, around the gunnel of which their cormorants are perched, by a pole, resting on their shoulders between them. Sir George further says, "On a large lake close to this part of the canal, and to the eastward of it, are thousands of small boats and rafts, built entirely for this species of fishery. On each boat or raft are ten or a dozen birds, which at a signal from the owner plunge into the water; and it is astonishing to see the enormous size of fish with which they return grasped between their bills. They appeared to be so well trained that it did not require either ring or cord about their throats to prevent them from swallowing any portion of their prey, except what the master was pleased to return to them for encouragement and food. The boat used by these fishermen is of a remarkably light make, and is often carried to the lake, together with the fishing-birds, by the men who are there to be supported by it."

(6159) PELECANUS CRISTATUS (Cormoran Largup of Temminck; Crested Corvorant of Pennant: Shag or green Cormorant of Gould) It is probable that *P. Desmarestii* is identical with *P. cristatus*. The habits of *P. cristatus* are very similar to those of *P. Carbo*.

(6160) *Plotus* (Linn., Klein).—Bill longer than the head, quite straight, firm though slender, obliquely dentilated on the edges, which are bent inwards, and terminating in a very sharp point. This is the genus *Anhinga* of Brisson; *Plotus* of Scopoli; and *Plinx* of Mœhr.

(6161) *Plotus Levaillantii* (*P. Africanus* of Swainson), It is found in Senegal, Cape of Good Hope, and part of the coast of Asia. (Lesson).

(6162) *Fregata* (Ray.) Feet short; the toes united by a membrane which is deeply notched. This is the genus *Tachypetes* of Vieillot. The Man of-War Birds, or Frigates, are eminently raptorial. Ray speaks of their eagle-eyes, vulturine claws, and kite-like glidings. Their immense extent of wing and dashing habits have obtained for them the name of the swiftest sailing ships of war that sweep the seas.

(6163) *F. Aquilus*. Tail forked, body black, bill red, orbits black. The male is entirely black: abdomen of the female white. Some accounts state the extent of the wings to be fourteen feet, an almost incredible expanse.

(6164) PELIJUREE. THALICTRUM. Root of Thalictrum foliolosum.—*Ben. Phar.*

(6165) PELLEVANDRUM (a bliater) in Ganjam.

(6166) PELLITORY: PYRETHRUM. AKURKURA.

Akurkurra. ARAB.	Akulkurra or Akkurkurha, GUZ. HIND.
Akkarapntta, CYNG.	Pietro Parietaria, IT.
Sesin. CHIN.	Akkarakarum, TAM.
Pyrethre, FR.	
Zahn, Wurtzel, GER.	

Root of Anacylus (or Anthemis) Pyrethrum.—*Ben. Phar. Anthemis Pyrethrum*, is a native of the Levant, Barbary, Persia, and the South of Europe, cultivated for its root, which is used in medicine as a masticatory and a stimulant. The root is without smell, and when dry, it is some inches long, tough, fibrous, of the thickness of a quill, externally gray, internally white. Pellitory is to be found in most Indian bazars, it being an export from Mocha to Bombay. —*Faulkner*. Ainslie says, "this root is to be found in most of the Indian bazars though I cannot learn that the plant grows in this country, I am therefore inclined to think that the medicine is brought to these provinces from the more Northern parts of Africa where we know that it is produced. With regard to its Asiatic names there is this singularity that the Tamul, Arabic and Dukhanie appellations are nearly the same. The Vytianas prescribe an infusion of Akkaracarum in conjunction with the Lesser Galangal and Ginger as a cordial and stimulant in the lethargic stage of Typhus fever and in paralytic affections. They also use it as a masticatory for the tooth ache."—*Ains. Mat. Med. p.* 34.

(6167) PENANG LAWYER. The walking stick, so well known by this name, is a young plant of the Licuala acutifida, the *Plass tikooss*, of the Malays. It is a miniature palm, inhabiting Penang, and attaining generally only three or five feet, and in exceptional cases from fifteen to twenty feet in height. The "Penang lawyers" are prepared by scraping the young trunk with glass, so as to wholly remove the epidermis, and nothing more, the inside being the substance of rattan. It is on this account that the smaller thin, sticks are so muchmore sought after than the larger thicker ones, and are so rare. The stikes are ultimately straightenedby fire, and then polished.—*Seeman*.

(6168)PENCILLARIA SPICATA: BAJREE: SPIKED MILLET. Holcus spicatus, Linn.

Kumbooloo, Sujilloo. TEL.	Bajari, GUZ.
Bajra, HIND. and DUK.	Mattaree, MAL.
Cumboo, TAM.	Caughoo, SANS.

This grain is reckoned more delicate and of a less heating nature than Cholum: like it, it is made into cakes and porridge. Park, in his Travels in Africa informs as that the Natives of some parts of that country prepare from this grain a kind of Malt, which they use for making Beer.—*Ainslie, Vol.* II. *p.* 218.—*M. C. C.*

(6169) PENCILS.

Pinseelen, DUT.	Penuelli, IT.
Pinceaux, FR.	Pinceles, SP.
Pinsel, GER.	

The instruments used by painters in laying on their colours. They are of various kinds and materials; some being formed of the bristles of the boar, and others of camel's hair, the down of swans, &c.—*McCulloch. Faulkner.*

(6170) PENERAPAH WOOD OR RED WOOD.

Muha Nambo, TEL.

(6171) PENKNIVES.

Canifs. FR.	Temperini, IT.
Federmesser, GER.	Kulm-trash, PERS.
Chakoo, Churree, GUZ. HIND.	Corta-plumas, SP.

Small knives used in making and mending pens. They are extensively manufactured in London, Sheffield, &c.

(6172) PENNYROYAL. MENTHA PULEGIUM. A mint used in cookery as seasoning and in distillation, propagated by division of the plant, like spearmint, requires a rich free soil, plenty of water and shade.—*Jaffrey.*

(6173) PENS.

Plumes a ecrire, FR.	Kulm, GUZ. HIND. PERS
Schreibferdren, GER.	
Penne da scrivere, IT.	Pera Stwoli, RUS.

Are well-known writing instruments, formed of the quills of the goose, swan, fowl, or some other bird. Metallic or steel pens, now extensively used, are manufactured in vast quantities at Birmingham, London, and Sheffield. —*Faulker.*

(6174) PENS, Reed for writing Persian with.

Perin Nanil, TAM.	Burro, Kulm, GUZ. HIND. and PERS.
Beroo. DUK.	*Ains Mat. Med. p.* 194.
Pedda Relloo, TEL.	

The Reed pens used by all mahomedans in writing the Arabic or Persian character, are the product of the Saccharum Sara. This species of thin hollow jointed reed, is used in Eastern countries for writing with. Persian reeds or pens are most esteemed, being tougher and capable of being used much longer than the Indianareed. The Arundo karka, Linn. is also similarly used in Scinde.

(6175) PENSTEMON. SCROPHULARINEÆ. —Penstemon Digitalis.—They are herbaceous plants, and are cultivated as the Chinese, they are of every variety of colour.—*Riddell.*

(6176) PENTADESMIS, a genus of plants belonging to the natural order *Clusiaceæ*. *P.*

Butyracea is a tree found in Sierra Leone, from which a fatty substance is obtained, which has given rise to its name of the Butter-Tree and Tallow-Tree. It has an ovate fleshy fruit, about as large as a citron, and its stamens are collected, into five parcels, whence its botanical name.—*Eng. Cyc.*

(6177) PENTAPTERA ARJUNA.

Urjoona or Urjoon sadra, Duk.

This tree, like the former, is a common jungle tree, the bark is used internally by the natives as a tonic and is also applied externally as a vulnerary.—*Riddell.*

(6178) PENTAPTERA ARJUNA and P. GLABRA.

Touk-kyau. Burm.

This is also a valuable timber, found growing in all the Teak Forests; it consists of two kinds, both of equal value. The timber is as strong as Teak and usually attains a girth of from seven to nine feet, with height in still more lofty proportion. This timber has never, I believe, been fairly tried for ship-building. Dark-brown wood. —*McClelland.*

(6179) PENTAPTERA CORIACEA.

Arrematti Marum, Tam.

A tree of considerable size. Native of the mountains of Coromandel, chiefly those of the western parts, the bark is very thick and deeply cracked, outwardly of a dark gray colour.—*Rhode M. S.S.*

(6180) PENTAPTERA GLABRA, Tella Muthie wood.

Tella muddi kurra, Vel maroodum.

See P. Arjuna.

(6181) PENTAPTERA TOMENTOSA, Combretaceæ. Nulla muthee wood.

Nulla Muddee, Tel.	Aans Beng,
Carroo Maruda, Tam.	Peeasal or Usan, Duk.
Madi, Can.	

A large jungle tree with thick leathery leaves; fruit smooth, five winged; the fibre of the wood is very tough, and used for making shafts to gigs, &c. Found in various parts of India: grows to be a large timber tree of much utility, Flowering time April and May; the seed ripens in the cool season. I have found this timber in use only in the Rajahmundry circar: it is very hard and heavy and not so stiff as teak.—*Rohde M.S.S.*

(6182) PENTAPETES PHŒNICEA, Byttneriaceæ. An erect growing plant; flowers axillary, large, of a beautiful bright red colour, appear during the rains.—*Riddell.*

(6183) PEPPER. The black pepper of commerce is obtained from the dried unripe fruit (drupes) of *Piper nigrum*, a climbing plant common in the East Indies, and of the simplest culture, being multiplied with facility by cuttings or suckers. The ripe fruit, when deprived of its outer fleshy covering by washing, forms the white pepper of the shops. The dried fruiting spikes of *P. longum*, a perennial shrub, native of Malabar and Bengal, constitute long pepper. The fruit of *Xylopia aromatica* is commonly called Ethiopian pepper, from being used as pepper in Africa. The seeds of some species of fennel-flowers (*Nigella sativa* and *arvensis*), natives of the south of Europe, were formerly used instead of pepper, and are said to be still extensively employed in adulterating it. In Japan, the capsules of *Xanthoxylum piperitum*, or *Fagara Piperita*, are used as a substitute for pepper, and so is the fruit of *Tasmania aromatica* in Van Diemen's Land. According to Dr. Roxburgh, *P. trioicum* is cultivated in the East, and yields an excellent pepper.

The pepper vine rises about two feet in the first year of its growth, and attains to nearly six feet in the second, at which time, if vigorous and healthy, the petals begin to form the corolla or blossom. All suckers and side shoots are to be carefully removed, and the vines should be thinned or pruned, if they become bushy at the top. Rank coarse weeds and parasitical plants should be uprooted. The vine would climb, if permitted, to the elevation of twenty feet, but is said to bear best when kept down to the height of ten or twelve feet. It produces two crops in the year. The fruit grows abundantly from all the branches, in long small clusters of from 20 to 50 grains; when ripe it is of a bright red colour. After being gathered, it is spread on mats in the sun to dry, when it becomes black and shrivelled. The grains are separated from the stalks by hand rubbing. The roots and thickest parts of the stems when cut into small pieces and dried, form a considerable article of commerce all over India, under the name of *Pippulamoola*. Almost all the plants of the family *Piperaceæ*, have a strong aromatic smell and a sharp burning taste. This small group of plants is confined to the hottest regions of the globe; being most abundant in tropical America and in the East Indian Archipelago, but more so in the equinoctial regions of Africa.

The common black pepper, *P. nigrum*, represents the usual property of the order, which is not confined to the fruit, but pervades, more or less, the whole plant. It is peculiar to the torrid zone of Asia, and appears to be indigenous to the coast of Malabar, where it has been found in a wild state. From this it extends between the meridians of longitude 96 deg. and 116 deg. S. and the parallels of latitude 5 deg. S. and 12 deg. N., beyond which no pepper is found. Within these limits are the islands of Sumatra and Borneo, with the Malay peninsula and part of Siam. Sumatra produces by far the greatest quantity of pepper. In 1842, the annual produce of this island was

reckoned at 30,000,000 lbs., being more than the amount furnished by all the other pepper districts in the world. A little pepper is grown in the Mauritius and the west India Islands, and its cultivation is making some progress on the Western Coast of Africa, as England imported from thence 2,9 9 bags and casks in 1846, and about 110,000 lbs. in 1847. Mr. J. Crawfurd, F.R.S., one of the best authorities on all that relates to the commerce and agriculture of the Eastern Archipelago, recently estimated the produce of pepper as follows :—

	lbs.
Sumatra (West Coast),	20,000,000
,, (East Coast)	8,000,000
Islands in the Straits of Malacca,	3,000,000
Malay Peninsula,	3 733,333
Borneo,	2,666,667
Siam,	8,000,000
Malabar,	4 000,000
Total.	50,000,000
If we add to this,	
Western Coast of Africa and B. W. Indies,	53,000
Java,	4,000,000
Mauritius and Ceylon.	80,000
It gives	54,133,000

As the total produce of the world.

Black pepper constitutes a great and valuable article of export from the Indian Islands; which, as we have seen, afford by far the largest portion of what is consumed throughout the world In the first intercourse of the Dutch and English with India, it constituted the most considerable and important staple of their commerce. The production of pepper is confined in a great measure to the western countries of the Eastern Archipelago, and among these to the islands in the centre and to the northern quarter, including the Peninsula. It is obtained in the ports on both sides of the coast of the latter, but particularly the north-eastern coast. The principal quarters (according to Mr. Crawfurd,) are Patani, Tringanu, and Kalantin. In the Straits a large quantity is produced in the island of Singapore, and above all in Pinang, where the capital of Europeans and the skill and industry of the Chinese have been successfully applied to its culture. The western extremity of Sumatra, and the north-west coast of that island, are the most remarkable situations in it for the production of pepper, and here we have Acheen, Tikao, Bencoolen, Padang, and the country of the Lampungs. The production of the eastern extremity of Sumatra or Palembang is considerable, but held of inferior quality. In the fertile island of Java, the quantity of pepper grown is inconsiderable, nor is it remarkable for the goodness of its quality. The province of Bantam has always furnished, and still continues to produce, the most pepper; but the culture of this creeper is fast giving place in Java to staples affording higher profits and requiring less care. The exports were, in the following years—

	piculs.		lbs.
1830	6,061	1843	3,737,732
1835	11,868	1848	461,680
1839	11,044	1851	95,037
1841	13,477	1852	135,690

The number of pepper vines in the district of Bencoolen, in the close of the year 1852, was as follows:—1,571;894 young vines; 2,437,052 bearing ditto; total, 4,008,946. Up to the end of September there had been delivered to the Government 1,145 piculs white pepper, and 1,128 piculs black pepper, while of the harvest of 1852 there were still probably to be received 330 piculs white, and 4,967 piculs black pepper. The south, the west, and the north coasts of the great island of Borneo produce a large quantity of pepper; as early as 1721 it was a staple commodity of this island. Banjarmassin is the most productive place on the south coast, and the State of Borneo Proper on the north coast. The best pepper certainly does not grow in the richest soils, for the peppers of Java and Palembang are the worst of the Archipelago, and that of Pinang and the west coast of Sumatra are the best. Care in culture and curing improves the quality, as with other articles, and for this reason chiefly it is that the pepper of Pinang is more in esteem than that of any other portion of the Archipelago. From the ports and districts of Siam 3,500 to 4,000 tons are exported annually. The duty at present levied on pepper in England is 6d. per lb., while the wholesale price for that of Pinang, Malabar, and Sumatra is about 4d. per lb. White pepper ranges from 9d. to 1s. 6d. per lb. The prime cost in Singapore is not more than 1½d. per lb. About 70,000 or 80,000 piculs of pepper are annually exported from Singapore, of which between 30,000 and 40,000 piculs have, until within the last two years, gone on to Great Britain. More than one-half of the pepper exported from Singapore is grown in the island by Chinese settlers. The low selling price of the article in the English market, the high duty levied upon it, and the large freight paid for its carriage to Great Britain, now leave so small a price to the cultivator in Singapore, that the cultivation ceases to be remunerative, and is carried on at a loss; and has consequently within the last year or two begun to decrease rapidly, involving the Chinese growers, who are generally of the poorest class, and without capital, in great distress. A reduction in the duty on pepper has always been followed by a very large increase in the consumption of the article, as will appear from the following table, showing the importation and consumption in Great Britain during some of the first and last years of the different rates of duty :—

Year.	Quantity consumed.	Duty s.	d.	Singapore price s.	d.	s.	d.
1811 ...	1,457,383 ...	1	10½ ..	0	7½ to	0	7¾
1814 ...	941,569 ...	1	10½ ..	0	11 „	1	1
1820 ...	1,404,021 ...	2	6 ..	0	6½ „	0	6¾
1824 ...	1,447,030 ...	2	6 ..	0	4½ „	0	5½
1826 ...	2,529,027 ...	1	0 ..	0	4 „	0	4½
1836 ...	2,749,491 ...	1	0 ..	0	0 „	0	0
1837 ...	2,625,075 ...	0	6 ..	0	0 „	0	0
1845 ...	3,210,415 ...	0	6 ..	0	2½ „	0	4¾

In a memorial from the mercantile community of Singapore, sent home in 1848, it is asserted that a reduction in the duty of pepper being always attended by a large increase in the consumption, would not lead to any serious loss in the revenue, while it would confer a great boon on the poorer classes, to whom it has now become a necessary article of life. The reduction would also be of great advantage to British manufacturers, as well as to our Indian possessions, by giving rise to an increased demand for British goods and productions, and of the highest benefit to the agricultural settlers in the island of Singapore, by enabling them to procure for their labor an honest means of livelihood. The pepper vines, which are allowed to climb poles or small trees, are tolerably productive at Singapore; and pepper planting is esteemed by the Chinese to be a profitable speculation, particularly if they are enabled to evade the payment of quit-rent. An acre of pepper vines will yield 1,161 lbs. of clean pepper. In Sumatra a full grown plant has been known to produce seven pounds; in Pinang the yield is much more. The average produce of one thousand vines is said, however, to be only about 450 lbs. Colonel Low, in his "Dissertation on Pinang," published at Singapore some years ago, gives an interesting account of the culture:—"Pepper was, during many years, the staple product of Pinang soil, the average annual quantity having been nearly four millions of pounds; but previous to the year 1810, the above amount had decreased to about two-and-a-half millions of pounds, which was the result of the continental system. The price having fallen at length to three and three-and-a-half dollars the picul—with only a few occasional exceptions of rises—the cultivation of this spice was gradually abandoned, and the total product at this day does not exceed 2,000 piculs. The original cost, when pepper was at a high price, together with charges of transporting it to Europe, amounted to £86,357 for every five hundred tons, and the loss by wastage was estimated at £5,405. In 1818 there remained on this island 1,480,265 pepper vines in bearing, and the average value of exports of pepper, from Pinang, including that received from other places was averaged at 106,870 Spanish dollars. As might have been foreseen, the fall of prices has so greatly diminished the cultivation of pepper to the eastward, that a reaction is likely to take place; and has in fact partly shown itself already. Some Chinese in Pinang and Province Wellesley seem to be preparing to renew the cultivation. There is abundant scope for the purposer on both sides of the harbour, and every facility is at hand for carrying it on. The pepper plant or vine requires a good soil, the richer the better, but the *red* soil of the higher hills is not congenial, the Chinese think, to it. The undulations skirting the bases of the hills, and the deep alluvial lands, where not saturated with water, or liable to be overflowed, are preferred. The Chinese have always been the chief cultivators, and when the speculation flourished they received advances from the merchants, which they paid back in produce at fixed rates. When pepper was extensively cultivated on Prince of Wales Island, the European owner of the land had the forest cleared by contract, and the vines planted by contract, and when the vines came into bearing the plantation was farmed to the Chinese from year to year, on payment of a specific quantity of pepper. Any other plan would have ruined the capitalist, as the culture is almost entirely in their hands in the Straits' Settlements, and they will not work so well for others as when they are specially interested. The Plants are set out at intervals, *every way*, of from seven to twelve feet, according to the degree of fertility of the soil, so that there are from 800 to 1,600 vines in one orlong of land; to each vine is allotted a prop of from ten to thirteen feet high, cut from the thorny tree called *dadap*, or where that is scarce, from the less durable *boouglai*; these props take root, thus affording both shade and support to the plant. The plant may be raised from seed pepper, but the plan is not approved of, cuttings being preferable, as they soonest come into bearing. The pits in which these cuttings are set should be a foot-and a-half square, and two feet in depth; manure is not often applied, and then it is only some turf ashes. However unpicturesque a pepper plantation may be, still its neat and uniform appearance renders the landscape lively, and there can be little doubt that the island has suffered in its salubrity since the jungle usurped the extensive tracts formerly under pepper cultivation. When the vine has reached the height of three or four feet, it is bent down and laid in the earth, and about five of the strongest shoots which now spring up are retained and carefully trained up the prop, to which they are tied by means of ligatures of some creeping plants. One Chinese, after the plantation has been farmed, can take care of two orlongs of land. The usual mode is this:—an advance is made by the capitalist to the labourer for building a house, and for agricultural implements; he then receives two dollars monthly to subsist on, until the end of the third year, when the estate or plantation is equally divided betwixt the contracting parties. The Chinese and even European cultivators used

formerly to engage the Chinese who had just arrived from China; they paid off their passage-money, and then allowed them two dollars monthly, for provisions, for one year, with a suit of clothes, by which means the cost of the labor of one man averaged about three dollars monthly; but this plan is attended with risks. The cost attendant on the cultivation of two orlongs of land, with pepper, for three years—the Chinese laborer receiving the usual hire of *five* Spanish dollars monthly—will be nearly as follows:—

	Spanish dollars.
Price of land, clearing, and planting.....	40
Quit rent, at 75 cents per annum per orlong	9
Two thousand plants.....	4
„ dadap props.	6
Implements.....	6
House	10
Labor.....	200
Interest, loosely calculated at	30
Total Spanish dollars.....	305

In a very good soil a pepper vine will yield about one-eight of a pound of dry produce at the end of the first year; at the end of the second, about a quarter of a pound; and at the expiration of the third, probably one pound; at the end of the fourth, from three to three-and-half pounds; ditto fifth, from eight to ten pounds. After the fifth year up to the fifteenth, or even the twentieth year, about ten pounds of dry merchantable produce may be obtained from each vine, under favourable circumstances. The Chinese speculator used to rent out his half-share of a new plantation for five years, to his cultivating partner, after the expiration of the first three years, at the rate of thirty piculs per annum; the total produce of these five years giving about fifty-six piculs annually as an average. A pepper plantation never survives the thirtieth year, unless in extremely rich soil, and then it is unproductive; nor will the young vine thrive on an old worn out pepper land, a peculiarity which is applicable to the coffee tree. The chief crop lasts from August to February. Four pounds of dry produce, for ten of green, is considered a fair estimate. Great care is requisite in the management of the vine, and especially in training and tying it on the props. It is subject to be injured by the attacks of a small insect. The green pepper dries in two or three days, and if it is intended that it shall be black, it is pulled before it is quite ripe. To make white pepper, the berry is allowed to remain somewhat longer on the vine; it is, when plucked, immersed in boiling water, by means of which process and subsequent friction, before drying, the husk is separated. The exports of pepper from Pinang in four years have been—In 1849, 2,591,233 lbs.; in 1850, 6,397,783 lbs.; in 1851, 2,366,933 lbs.; in 1852, 2,142,133 lbs." A small quantity of pepper seems to be annually exported from Ceylon, which is presumed to be the growth of that islands; thus there were:—

54	cwts.	shipped in	1842
83	„	„	1843
102	„	„	1844

In the Customs returns of Ceylon, it is classed with cardamoms, and 160 to 170 cwt. of the two were shipped in each of the years 1850 and 1851. In 1852, the quantity was smaller. Pepper cultivation has been introduced into the Mauritius, and in 1839 more than 500,000 lbs. were imported from thence, but as the shipments have since decreased, it has, it is is presumed, given place to the more profitable staple sugar.—*Simmonds, p.* 428. The natural family piperaceæ includes four plants of great utility to mankind. Two of these, Piper nigrum or black pepper and Piper longum more recently named Chavica Roxburghii or long pepper are chiefly used for dietetic and culinary purposes while others piper Cubeba now Cubeba Officinalis and Artanthe elongata or the matico plum are principally employed in medicine. The plant which yields cayenne, Capsicum annuum, often improperly termed cayenne pepper does not belong to the family of Piperaceæ at all but to that of Solenaceæ. The pepper of commerce is furnished by Piper nigrum, and it is to this species, therefore, that on the present occasion we shall have to direct attention. The black pepper plant grows both in the East and West Indies, in Sumatra, Java, and other islands, it is a shrubby, climbing plant, which attains the height of from eight to twelve feet. The berries, or peppercorns, grow on terminal flowers-stalks or spadices. They are at first green, but change subsequently to red and then to black. When any of the berries on a spadix have begun to turn red, the whole are gathered, dried in the sun, and the stalks separated by the hand. In drying, the succulent part of each berry becomes contracted and wrinkled, forming a hardened wrinkled cortex, the corrugations being much raised, and describing a kind of elevated network. The following more detailed particulars concerning the growth of the pepper plant and the gathering of the berries are extracted from M'Culloch's "Dictionary of Commerce." "It climbs to the height of twenty feet but is said to bear best when restrained, to the height of twelve feet. It begins to produce at about the third year, and is in perfection at the seventh; continues in this state for three or four years; and declines for about as many more, until it ceases to be worth keeping. The fruit grows abundantly from all its branches, in long, small clusters of from twenty to fifty grains. When ripe it is of a bright red color. After being gathered it is spread on mats in the sun, when it loses its red color and becomes black and shrivelled as we see it. The

grains are separated from the stalks by hand-rubbing. That which has been gathered at the proper period shrivels the best but if plucked too soon, it will become broken and dusty in its removal from place to place. The vine produces two crops in the year but the seasons are subject to great irregularities. Those berries are the best which are not too small nor too much corrugated, which are heavy and sink readily in water. The two varieties of pepper known as "black" and "white" pepper are both obtained from the same plant: black ground pepper is the entire berry reduced to powder, while the white consists of the same berry, decorticated or deprived of its outer and black husk or covering. We learn from Pereira that three kinds of black pepper are distinguished by wholesale dealers. These are:—"Malabar pepper.—This is the most valuable it is brownish-black free from stalks and nearly free from dust." "Penang pepper. This is brownish-black larger, smoother, free from stalks, but very dusty. It is sometimes used in England to manufacture white pepper." "Sumatra Pepper. This is the cheapest sort; it is black mixed with stalks and contains much dust. Under the name of Sumatra pepper, some dealers include the Penang or brownish-black sort, and the black Sumatra sort. Three kinds or varieties of white pepper have also been distinguished. "Tellicherry pepper, which is of two kinds: large fine Tellicherry pepper is larger and whiter than any other description of white pepper, and fetches a higher price; small or coriander-like pepper is shrivelled." Common white pepper comes from Penang by Singapore, it is round, and not shrivelled, its value depends on its size and whiteness." "English bleached or White pepper. When the two preceding sorts are scarce, brown, Penang pepper is bleached. The yellowest and largest are chosen for this purpose for neither an expensive nor small sort would pay."

Structure of the Berry. The berry of the black pepper plant possesses a structure of considerable complication and of much interest and since without an accurate knowledge of its minute orginisation we cannot hope to be in a position to detect the numerous adulterations to which this article is subject, it becomes necessary to describe somewhat minutely the tissues which enter into its formation. In a section of the berry, two parts are to be distinguished an outer and an inner, the first is black or reddish black; and the second more or less, white, hard and brittle, except in the centre of the seed where it is frequently soft and pulverulent. The active properties of black pepper depend upon an acrid resin, a volatile oil, and a crystallisable substance called piperine, which exists also in long pepper, and in cubebs. The resin is situated chiefly in the outer part of the cortex, the volatile oil in the inner part or fourth layer, and the piperine in the yellow cells of the seed itself. It has long been notorious that pepper is one of those articles most liable to adulteration, notwithstanding which fact and the importance of the subject in a fiscal point of view, but little has hitherto been effected in bringing to light the nature of the sophistications practised, and more particularly in describing the methods of their detections. Of statements indeed we have several but of either proofs or directions scarcely any worthy of notice or entitled to confidence. In support of these assertions, we proceed to make reference to the more important as well as recent authorities on the subject of the adulteration of food. Thus in the "Supplement" to Dr. Ure's "Dictionary of Arts, Manufactures and Mines," we do not meet with any information respecting the adulteration of pepper worth quoting. In M'Culloch's "Commercial Dictionary" we observe the solitary remark, "Black pepper, sold ground is said to be adulterated with burnt crust of bread." In Mitchell's "Treatise on the Falsification of food" we find the following observations. "In the state of powder pepper is nearly always adulterated; substances being sold for the express purpose. It is often mixed with powdered husks of mustard, which are openly sold for this purpose, as is also the sweeping from the pepper warehouses under the name of P. D. or Pepper dust; and yet an inferior kind of these adulterations is sold under the name of D. P. D. signifying the dust or dirt of pepper dust." No directions, be it observed, are given for the detection of the adulterations referred to in the above quotation. Normandy, in his "Commercial Handbook of Chemical Analysis," remarks, "Both black and white pepper, when ground, are very often adulterated, and sometimes in an extraordinary degree, with ground oil-cake, linseed-meal, and other like substances. The best way of providing against adulteration is, like that for coffee, to buy the article in the grain, and to examine whether it has the appearance which we have described above, and which is the criterion of a good quality," and in a subsequent paragraph he writes. "For the purpose of ascertaining whether ground pepper is genuine and of good quality, the best way consists in ascertaining the amount of piperine contained in the pepper under examination." Thus here, again, no instructions are given, by which the nature of the adulterations practised in each case may be determined, but we are recommended to ascertain the amount of piperine present, and which, when known, tells us nothing about the adulterations of the article, but simply indicates quality; a pepper may be either good or bad, and accordingly contain much or little piperin, and yet be perfectly "genuine." Although the work of Mr. Normandy was published in the year 1850 not a syllable is said about the application of the me-

croscope to the detection of the adulterations of pepper. The last authority to whom we shall refer is Pereira who in the description of piper nigrum as contained in the new edition of his "Materia Medica" and under the head adulteration writes "Sago is said to have been used to adulterate ground white pepper. The microscope would readily dedect the fraud the starch grains of sago, being very much larger than those of pepper from which they also differ in shape. The above paragraph comprises the whole that is said by Dr. Pereira, on the adulteration of pepper. We have now to state that by means of the microscope applied to the elucidation of structural botany we have succeeded in detecting in the most satisfactory and conclusive manner the adulteration of pepper by not less than five different substances namely linseed, mustard-seed wheat-flour pea-flour and ground rice. On Factitions Pepper berries. Some years since it was not uncommon to meet with artificial pepper corns instances of their occurence are mentioned in "Thompson's Annals of Chemstry and also by Accum in the second edition of his celebrated Death in the pot. Thus Accum writes I have examined large packages of both black and white pepper by order of the Excise and have found them to contain about sixteen per cent of this artificial compound. This rpurious pepper is made of Oil cake (the sesidue of the linseed from which the oil has been pressed, common clay and a portion of cayenne pepper formed into a mass and granulated being first pressed through a seive and then rolled in a cask. The period during which this fraud prevailed was probably confined to the time, which expired in 1823, when the duty amounted to no less than 2s. 6d. on a single pound of pepper. It appears. First, that more than half of the peppers purchased previous to the recent convictions were adulterated. Second, that a much less, although still a considerable proportion of the samples procured subsequent to those convictions were likewise adulterated. The present duty on pepper is 6d per pound, and 5 per cent, thereon, which yielded, for the year 1850, no less than £85,526 8s. 1d. We thus perceive how great is the interest of the Government to prevent the adulteration of this article, by which thousands are lost to the Exchequer annually. The sum of £85,526 8s. reduced to sixpences, gives the number of pounds consumed in the year 1850 viz., 1,710,536 pounds. Mr. Culloch estimates the quantity of pepper retained for consumption in the year 1842 at 2,679,624 pounds and the income derived from the duty at only £70,348 3s. 4d. These two statements it is impossible to reconcile, for, if correct upwards of 1,000,000 pounds must have escaped the duty altogether. There were entered for home consumption, in the year 1852, 3,524,502 lbs; in 1853, 3,461,333 lbs: and in the first six months of 1854, 1,656,721 lbs. We believe, that were the duty on pepper still further reduced, the revenue would be found to suffer scarcely at all, and that the increased consumption and lessened inducement to adulteration which would exist, would cause the sum fully to equal, if it did not exceed, the present amount.—*Food and its Adulterations, p.* 42. Pepper is a regular crop on the Western Coast, of India in, Coorg, Mysore, Canara and Travancore.

The following varieties were examined.

Black Pepper.	Long, Pepper.
White Pepper,	Cubebs.

The two first are the same substance, but the white pepper is less pungent than the black, from which the wrinkled covering has been removed by bleaching, which improves the colour, but deteriorates the quality. The quantity of black pepper exported is immense, that of Malabar is the best.—*M. E. J. R.*

BLACK PEPPER EXPORTED FROM SINGAPORE.

	Piculs.	Value in rupees.
1841...Total Exports..	66,810	
„ ...Growth of Singapore ...	21,231...	47,674
1842...Exports...	74,228	
„ ...Growth of Singapore ..	32.277...	72,473
1843...Exports	57,883	
„ ...Growth of Singapore ...	35,585...	79,900
1844...Exports	67.148	
„ ...Growth of Singapore ..	42,995...	386,152
1845...Exports	65 892	
„ ...Growth of Singapore ...	39,019...	350,443
1846...Exports	56 709	
„ ...Growth of Singapore ...	35,712	——
1847...Exports	60,994	
„ ...Growth of Singapore ...	36,565...	328,397

Pliny, the naturalist, states that the price of pepper in the market of Rome in his time was, in English money, 9s. 4d. a pound, and thus we have the price of pepper at least 1,774 years ago. The pepper alluded to must have been the produce of Malabar, the nearest part of India to Europe that produced the article, and its prime cost could not have exceeded the present one, or about 2d. a pound. It would most probably have come to Europe by crossing the Indian and Arabian oceans, with the easterly monsoon, sailing up the Red Sea, crossing the desert, dropping down the Nile, and making its way along the Mediterranean by two-thirds of its whole length. This voyage, which in our times can be performed in a month, most probably then took eighteen. Transit and customs duties must have been paid over and over again, and there must have been plenty of extortion. All this will explain how pepper could not be sold in the Roman market under fifty-six times its prime cost. Immediately previous to the discovery of the route to India by the Cape of Good Hope, we find that the price of pepper in the markets of Europe had fallen to 6s. a

pound, or 3s. 4d. less than in the time of Pliny. What probably contributed to this fall, was the superior skill in navigation of the now converted Arabs, and the extension of their commerce to the islands of the Eastern Archipelago, which abounded in pepper. After the great discovery of Vasco de Gama, the price of pepper fell to about 1s. 3d. a pound, a fall of 8s. 1d. from that of the time of Pliny, and of 4s 9d. from that of the Mahommedan Arabs, Turks, and Venetians.

In 1826, 14,000,000 lbs. of pepper were imported into the United Kingdom, of which about 6,500,000 were re-exported. In 1841, 15,000,000 lbs. were imported, of which 6,500,000 where reshipped to other countries. The home consumption, it will be seen, now raveages about 3,250,000 lbs :—

	Imports. lbs.	Home consumption. lbs.
1845	9,852,984	3,209,718
1846	5,906,586	3,299,955
1847	4,669,930	2,966,022
1848	8,125,545	3,185,337
1849	4,796,042	3,257,911
1850	8,028,319	3,170,883
1851	3,996,496	3,303,403
1852	6,641,699	3,524,501

The following return shows the number of bags of pepper imported into the United Kingdom, with the quantity retained for home consumption :—

	Imports.		Retained for home consumption.	
	Black. bags.	White. bags.	Black. bags.	White. bags.
1843	37,840	3,861	21,163	2,257
1844	60,705	2,123	23,525	2,122
1845	80,600	3,208	30,294	2,861
1847	37,194	1,236	28,768	2,654
1848	65,518	3,042	31,665	2,950
1849	43,651	2,616	32,246	3,859

—*Simmonds.*

(6184) PEPPER, LONG. CHAVICA ROXburghii.

Dar-Filfil, ARAB.	Chabi jawa, JAV,
Tipili, CYNG.	Piper Longum, LAT.
Poivre long, FR.	Tabee, MAL,
Lange Pfeffer, GER.	Filfill-i-daraz. PERS.
Pepeelee Guz. HIND.	Tipili, TAM.
Pippali, Krishna SANS.	Pipuloo, TEL.
Pimenta larga, SP.	Pipel. DUK.
Pepe lungo, IT.	

This species of pepper is the produce of a perennial plant (*Piper longum*), a native of Bengal, Siam &c. The fruit is hottest in its immature state, and is therefore gathered whilst green, and dried in the sun. It is met with in entire spikes about an inch long, possessing a darkish brown, or gray colour. It has a weak aromatic odour, an intensely fiery, and pungent taste, and its properties correspond closely with those of black pepper.—*Faulkner.*

(6185) PEPPER ROOT.

Filfel-Mooch, ARAB.	Granthika, Pippali-Mula, SANS.
Pepeelee-Mool, GUZ. and HIND.	Tipili mooluin, TAM.

The root of the long-pepper is a favourite medicine of the Hindoos; it possess the virtues of the berry, but in a weaker degree, and is prescribed by them in cases of palsy, tetanus, and apoplexy. The long pepper is produced in abundance in many parts of Upper, as well as Lower Hindoostan.—*Ainslie.* Pepper root is procurable in most Indian bazars.

(6186) PEPPER, WILD. Filfil burree. the fruits of several species of Vitex.—*Ben. Ph.* 230.

(6187) PEPPERMINT. MENTHA PIPERITA. An aromatic herb, raised from seed. This plant might be grown for distillation on the hills, and become a valuable article of commerce : grows freely on the plains.—*Jaffrey.*

(6188) PERCIDÆ, or *Percoides* of Cuvier, a family of Acanthopterygious Fishes, of which the Common Perch may be regarded as the type. They have the body covered with scales whose outer surface is more or less rough, and the free margins of which are denticulated. The flesh of these fishes is generally well-flavoured and wholesome. They inhabit both salt and fresh water. The first division of the Percoides, according to Cuvier, comprises all those species which have the ventral fins placed under the pectorals, five soft rays to the pectoral fins, seven branchiostegous rays, and two dorsal fins. This section includes the following genera :—

(6189) *Perca* proper, in which the pre-operculum is denticulated ; the operculum is produced behind into a flattened spine ; the infraorbitals are obscurely denticulated, and the tongue is smooth. The Common Perch (*Perca fluviatilis* of Linnæus) is the best example. It is a common fish in the fresh-waters of Great Britain. Closely allied to this is the *P. Italica* of Cuvier and Valenciennes, a species found in tolerable abundance in some parts of Italy ; it differs from the *Perca fluviatilis* in being of a shorter and deeper form, and is destitute of the black bands. Several true perches are found in North America ; species have also been discovered in Java and New Zealand : it is highly probable therefore, from the extensive geographical range of the Perches proper thus exhibited, that very many species still remain to be discovered.

(6190) *Labrax* (Cuv. and Val.) differs chiefly from the true Perches in having the infra orbitals destitute of denticulations as well as the subopercular ; the operculum (which, as well as the preoperculum, is entirely covered with scales) has two spines on the posterior part, and the tongue is furnished with minute teeth. [LABRAX.]

(6191) *Lates* (Cuv. and Val.), a genus also closely allied to *Perca* proper, in fact differs only in having the infra orbitals more deeply denticu-

lated as well as the humerals; large spines are observable on the angle of the preoperculum; the anterior dorsal is shorter and higher than in the Perch; the tongue is smooth, as in the last-mentioned fish. The fishes of this sub-genus are usually of large size, good eating, and are chiefly found in the rivers in the warmer parts of the Old World.

4. *Centropomus* (Lacep.).

5. *Leucioperca* (Cuv and Val.).

6. *Huro* (Cuv. and Val.).

7. *Etelis* (Cuv. and. Val.)—Only one species of *Etelis* is known; its body is elongated, the muzzle is rather obtuse, the eyes very large, and the outer rays of the tail-fin are elongated. This fish (the *E. carbunculus*, Cuv. and Val.) is remarkable for its brilliant red colour, and is adorned with longitudinal golden stripes. It is found in the region of the Seychelle Islands, north of Madagascar.

8. *Niphon* (Cuv. and Val.).

9. *Enoplosus* (Lacepede).

10. *Diploprion* (Kuhl and Van Hasselt), like the two preceding genera, contains but one species (*Dip'oprion bifasciatum* of the authors just quoted). It is found off the coast of Java.

11. *Apogon* (Lacepede).

12. *Cheilodipterus* (Lacepede).

13. *Pomatomus* (Cuv. and Val.).—Only one species of this genus is known, the *Pomatomus telescopium* of Risso, and this is said to be exceedingly rare, living, it appears, in very deep water.

14. *Ambassis* (Cuv. and Val.).—In the form of the body it approaches the common perch. It is the *A. Commersonii* (Cuv and Val.): a second species is found off the Malabar coast, and there are several in the Indian seas, most of which are described by Hamilton in his 'Account of the Fishes found in the River Ganges and its Branches,' under the generic name *Chanda*.

15. *Aspro* (Cuv. and Val.).

16. *Grammistes* (Cuv. and Val.)—The *G. orientalis* (Cuv. and Val.) is of a small size; its colour is deep brown, and the head and body are adorned with numerous longitudinal white lines; the number of these lines, it would appear, varies in different individuals. It inhabits the Indian seas.

The second division comprises those species in which the first or spinous dorsal is united with the second or soft-rayed dorsal, so as to form one continuous fin, and is composed chiefly of the great genus *Sternarus*. The third division embraces those Percoid Fishes which differ from the preceding in having less than seven branchiostegous rays.

1. *Myripristis* (Cuv. and Val.).

2. *Holocentrum* (Cuv. and Val.).

3. *Beryx* (Cuv. and Val.).

In the fifth division of Percoid Fishes the ventral fins are placed in advance of the pectorals. It contains the genera *Trachinus*, *Percis*, *Pinguipes*, *Percophis*, and *Uranoscopus*. In the sixth and last division the ventral fins are placed behind the pectorals. It comprises the genera *Sphyræna*, *Parulepis*, and *Polynemus*.

(6192) PERDICIDÆ, the name of a family, or, according to some, a sub-family of *Tetraonidæ*: in the latter case the form should be *Perdicinæ*.

The genus *Perdix*, Briss., in Mr. Swainson's arrangement, is made to contain the sub-genera *Perdix* (Partridges); *Choetopus* (Francolins); *Coturnix* (Quails); *Ptilopachus*, Sw.; and *Ortyx*, Stephens.

The *Perdicinæ*, according to Mr. G. R. Gray's arrangement, form the first sub-family of the *Tetraonidæ*, and consist of the following genera:—*Ithaginis*, Wagler; *Francolinus*, Briss.; *Perdix*, Lath.; *Starna*, Bonap.; *Lerwa*, Hodgs.; *Arborophila*, Hodgs.; *Colurnix*, Briss.; *Ptilopachus*, Swains.; *Lipornyx*, Vieill. *Ortyx*, Stephens; *Lophortyx*, Bonap.; *Callipepla*, Wagler; *Odontophorus*, Vieill.; and *Tetraogallus* (*Lophophorus* of Jardine and Selby), J. E. Gray. The birds of this group are widely spread over the earth, no quarter of the globe being without some of the family, all of which are more or less esteemed as affording a nutritious and sapid food to man. The ardent temperament of the Partridge has been the theme of many writers on natural history from Pliny downwards, and the parental affection of the female for her young seems to be not less strong than the sexual ardour of the male. The rough nest, which is placed on the ground in corn-fields, meadows, &c., contains from twelve to eighteen or even twenty eggs of a greenish ash-colour; and the hen sits so close that her head not unfrequently falls before the scythe of the mower, as represented in one of Bewick's admirable cuts.

(6193) *Francolinus*. The species occur on the old continent and its islands. The form occurs in Europe, Asia, and Africa. The Francolins are forest birds, perch on trees, and feed on seeds, bulbs, &c. The species is widely distributed. In Europe its habitat appears to be exclusively confined to the southern regions, as Sicily, Malta, and the Neapolitan territories, but it is also found in the north of Africa, and over the greater portion of the Asiatic continent, and in the Himalaya Mountains.

(6194) *Francolinus Ponticerianus*, *Perdix Ponticeriana* of Latham, Ferruginous and Gray Francolin, appears to be confined to Asia. This species, according to Colonel Sykes, is the Teetur of the Mahrattas, and is called a partridge in the Dukhun (Deccan), where it is the most common of birds, frequenting gardens and cultivated lands. The Colonel describes the irides as intense red-brown, and its length, inclusive of the tail (which is 3 inches 6-10ths) as 14 inches. He states that it is not met with in the Ghauts, unless in well

cultivated valleys, and not at all on the mountains. It roosts on trees, in which situation the Colonel, on more than one occasion, shot them during the day-time; but this was a rare occurrence. ('Zool. Proc.,' 1832).

Another Francolin, *Francolinus spadiceus*, measuring with the tail (which is 5 inches) 14 inches 7-10ths, is very common in the thick brushwood of the Ghauts. Colonel Sykes had both sexes alive in his possession for some time, and has no doubt that they might be successfully introduced into Europe. He describes them as excellent eating, and says that they rarely take wing or perch The male has a harshtrysillabic call, Kok-[illegible], whence the Mahrattan name Koku-tree. The female in confinement uttered little notes, like the twittering of a chicken. A male in Colonel Sykes's collection had three large spurs on one leg and two on the other. ('Zool. Proc.,' 1832.)

(6195) *Coturnix* (Brisson).—The species of this genus are vernacularly known as Quails. They are found in the Old World and Australia only.

C. dactylisonans, Mayer (*Tetrao Coturnix*, Linn. *Perdix Coturnix*, Latham). This well known bird, a description of which would be superfluous, seems to be the Ὄρτυξ of Aristotle, who mentions the bird repeatedly in such terms as to its habits and migration as to leave little or no doubt on the point; and the *Coturnix* of the Romans. It is the Quaglia of the Italians; Caille of the French; Wachtel of the Germans. Sofliar and Rhine of the Welsh; and Quail of the English; Lohah and Lowa of the Mahrattas. Col. Sykes, in his valuable paper 'On the Quails and Hemipodii of India' ('Zool. Trans,' vol. ii.), in which he states that he found the tongue and the cæca of birds to be of considerable importance in indicating affinities or dissimilarities between genera, notices *C. dactylisonans*, *C. textilis*, *C. erythroryncha*, *C. Argoondah*, and *C. Pentah*.

(6196) *Coturnix Argondah*, the Rock-Quail of Dukhun (Deccan), "is readily distinguished by the numerous transverse narrow black bars upon the breast; but the young males and the females want these bars, and vary so much in the markings on the back, that with those disposed to manufacture species from plumage alone, the eleven specimens before me from Dukhun would furnish at least four new species." (Sykes.) The flesh is perfectly white. Col. Sykes says that this is the species used for Quail fights by the natives, and not *C. dactylisonans* or *C. textilis*.

(6197) *Hemipodius*, Temm.; *Turnix*, Bonn.; *Tridactylus*, Lacep.; and *Ortygis*, Ill. The species are found in Europe, Asia, Africa, Austr alia, and Oceania. Colonel Sykes, in his paper above alluded to, describes three species—*H. pugnax*, *H. Taigoor*, and *H. Dussumieri*. In the stomach of the first he found the remains of black ants, minute coleopterous insects, and grass-seeds; the flesh was in brown and white layers, and the Colonel states that its pugnacious qualities are quite unknown in Dukhun, and even in Java. They were frequently in pairs, but mostly solitary, haunting cultivated lands, especially Chillie fields (*Capsicum annuum*). Their flight he describes as lazy and short, nor are they readily put on the wing. He adds that the Zoological Society had a specimen from Madras, and that it would appear therefore to have an extended geographical range over the Eastern islands and India. We shall presently notice *H. Taigoor*.

(6198) *Hemipodius Dussumieri*, the Button-Quail of European sportsmen in India, he says that it affects short thick grass and fields of pulse of *Dolichos biflorus*, *Phaseolus Max*, and *Ervum Lens*. He never found the bird otherwise than solitary, and says that it is so difficult to flush, that it not unfrequently rises from beneath the feet; and when on the wing, its flight is so abrupt, angular, and short, that it is generally down before the gun is well up to the shoulder.

H. Taigoor is chestnut above, feathers margined with straw colour, and with undulated bands of black; wing coverts straw-colour banded with black; quills brown, chin and throat white, breast banded with black and white, belly and vent dilute ferruginous, irides pale-yellow, bill blackish. Length of the body 4 inches 8-10ths, of the tail 1 inch 7-10ths. (Sykes.) Dr. Smith remarks that in the Museum of the Army Medical Department at Fort Pitt, Chatham, there are the male and female of an Indian species of *Hemipodius* very closely resembling the Doctor's *Hemipodius Lepurana*. They differ however, he observes, in so many minor points, that he feels disposed to regard them as belonging to a distinct species. In the Catalogue of the Fort Pitt Collection, Dr. Smith has named this Asiatic species *Hemipodius Sykesii*, in honour of Colonel Sykes, who has added so much to our knowledge of the zoology of India. ('Illustrations of the Zoology of South Africa.)' Before we quit this sketch of the Partridges and Quails, we must notice two forms which particularly demand attention, as leading to other types. The first of these, the Sanguine Partridge (*Perdix cruenta*, Pl. Col., 332), appears to bear the following generic names: *Ithaginis*, Wagler *Plectrophorus*, J. E. Gray, and *Ptilopachus*, Sw. It is described as a pheasant in 'Linn. Trans.' vol. xiii., and may be considered as uniting the Partridges with the Pheasants and the Polyplectrons, like the latter of which, it has often more than one spur upon the tarsi. The plumage of this bird, which is a native of Nepaul, is brilliant, and the feathers of the head and neck are elongated.

The *P. Lerwa*, described by Mr. Hodgson ('Zool. Proc.,' 1833) inhabits, according to that gentleman, the northern region of Ne-

paul, and forms by its half-plumed tarsi a sort of link between the Partridges and the Grouse, the latter of which it resembles in its habits. It is found close to the permanent snows, among rocks and low brush-wood, feeding upon aromatic buds, leaves, and small insects. The plumage is black, lineated transversely with white and chestnut; the breast is brown. Mr Hodgson remarks that the great comparative expanse of the wing, the diminution of its rounded form by the second quill-feather being the longest, the increased length and strength of the tail, and the extent of the feathering of the tarsi, are very remarkable characters, which give to this species a strong interest,—*Eng. Cyc.*

(6199) PERGULARIA ODORATISSIMA, Asclepiaceæ. Fragrant Pergularia. This is a creeper with a climbing woody stem, cracked bark, flowers yellow, and very fragrant, well adapted for covering trellis work.—*Jaffrey.*

In the gardens in Maulmain, this fragrant flowered creeper is often cultivated. *Mason* Pergularia pallida, 585. is given by Wight.

(6200) PERINSIRAGUM. Anethum Fæniculum Linn. Sweet Fennel

Perinsiragum, Tam.	Souf, Duk.
Variari, Guz.	

Perinsiragum is a name sometimes also given to Aniseed.—*Ainslie's Mat. Med. p.* 267.

(6201) PERIPLOCA SYLVESTRIS. Willd: Root of the Periploca of the woods.

Sirroo Coorinja vayr, Tam.

This bitter root is supposed by the Native Practitioners to possess virtues in cases of snake bite. Internally it is prescribed in decoction and the powder is applied to the part that is bitten. The plant of which this is the root is called by the Cyngalese Binnuga, the root itself they suppose to possess virtues similar to our Ipecacuan. —*Ains. Mat. Med. p.* 114.

(6202) PERISTROPHE LANCEOLARIA, Acanthaceæ. Peristrophe Speciosa, Vide Justicia.

(6203) PERISTROPHE MONTANA.

(6204) PERISTYLUS. This elegant terrestrial Tenasserim orchid with snowy blossoms is occasionally seen. *Mason.* Wight, in Icones, gives Peristylus exilis, 1698; Lawii, 1695; plantagineus, 921; Richardianus, 1697; robustior, 1699; spiralis, 1696.

(6205) PERRY. A fermented liquor made from pears, in the same manner as cider is from apples. It is chiefly made in Worcestershire.

(6206) PERSEA, a genus of Plants belonging to the natural order *Lauraceæ. P. gratissima* is the Avocado Pear of the West Indies, and receives its name in consequence of the resemblance in form between its fruit and that of a European pear. The plant which bears it is a tree about the size of an apple-tree; the leaves are oblong, veiny, and the flowers small, and of a greenish-yellow colour. The fruit is the size of a large pear, and is regarded as one of the best produced in the West India Islands. In the inside it is yellow, and contains a kernel inclosed in a soft rind. In taste it is said to resemble the peach, but to be much more agreeable, though not so sweet. It is sometimes eaten with pepper and salt, but more frequently with a little sugar and lime-juice. Three varieties are mentioned, the red, the purple, and the green.—*Eng. Cyc.* Wight gives; Persea gratissima, 1823.

(6207) PERSIAN. A silken fabric of various colours, and exceedingly flimsey in its texture. It is chiefly used in lining.—*Faulkner.*

(6208) PERSOONIA. Proteaceæ. The Dele, the Embothrium, the Hakea, Banksia, and Persoonia, are interesting plants introduced from the Cape and New South Wales, the species being chiefly confined to the southern hemisphere. They are handsome green shrubs, and prized by gardeners for the neatness of their appearance and beauty.—*Riddell.*

(6209) PERUVIAN BARK, Cinchona Bark, Cascarilla Bark. (so named in America). A celebrated medicine obtained from a genius of trees (*Cinchona*), confined to the lofty Cordilleras of the Andes in South America, and well known for its febrifuge properties. There are many varieties, and as mixtures and adulterations are very common, great experience is requisite to be able to select the finer kinds. Four sorts are distinguished by British druggists, under the appellations of *Crown* bark, *Gray* bark, *Yellow* bark, and *Red* bark.—*Faulkner.*

(6210) PESSALOO. PHASEOLUS RADIATUS.

Pessaloo, Tel.	Haree moong, Hind.
Pucha payaroo, Tam.	

(6211) PETREA. Verbenaceæ. This is a climbing plant with dark shining green leaves, and beautiful lilac or purple flowers hanging in racemes. It is a native of South America, and only requires to be regularly watered, and grown in a good garden soil, to cause it to extend itself over an immense space, its long slender whip-like shoots should be lopped down, to make it throw out branches, at the end of which the flowers appear in most elegant festoons towards the close of the cold season. It is easily propagated by layers.

(6212) PETROLEUM. BITUMEN. Rock. Oil.

Mantylum, Tam.	Minna tanna, Malay.
Mattee ka tail, Duk. and Hind.	Boomie tylum, Tel.
Neft, Arab.	Japoo, Sumatran.
	Kesoso no abra, Japanese.

This substance is called earth oil by the English in India, and is brought to this country from Bussorah from the Sooloo island, or from the kingdom of Ava: it is also found in Japan and Sumatra.—*Ainslie's Mat. Med., page* 31. Petroleum is officinal but little used by the Hakeems at Lahore. Petroleum Punjabinum is a product of the hills on the west side of the Indus, called Tukle Reisar near Banu, and Tank, procurable in the bazar of Dhera Ismail Khan. It is of a reddish color, lumped as spirit at Lahore. I used this and also another sort, which I had from Bombay.—*Dr. Honigberger, p.* 322.

Petroleum, as its name indicates, is an oil-like exudation from rocks, which has been employed in medicine from the earliest times, though little used now. It is very abundantly diffused, and in other forms, as of Asphalte, Naptha, &c. Besides in Barbadoes and Trinidad, Petroleum is found floating on some springs of water in this country, as at Colebrooke Dale, &c., in many parts of Europe, also at Baku on the shores of the Caspian, and very abundantly at Ranangoong, or Earth-oil Creek, on the banks of the Irrawaddy. Col. Symes describes the wells as about 500 in number, and that upwards of 400,000 hogsheads are taken away in boats. It may readily be obtained by digging into the sand in warm weather. This was examined by Drs. Christison and Gregory, who found in it Paraffin, Eupion, which Reichenbach met with among the products of the destructive distillation of wood; whence they infer that "Rangoon Petroleum is the product of the destructive distillation of vegetable matter," probably from subterraneous causes now in operation. Petroleum has the consistence of treacle; reddish-brown or black colour, with a bituminous taste; floats on water, in which it is insoluble; burns with a dense black smoke, leaving a carbonaceous residuum. Acids, alkalis, and Rectified Spirit have little effect on it; Ether and both Volatile and Fixed Oils dissolve it. Exposed to the air, it hardens into Asphalte: if exposed to heat, a yellowish coloured liquid distils over, which resembles the Naphtha obtained in making Coal-gas. Both are free from Oxygen, and therefore used for preserving Potassium and dissolving Caoutchouc.

Action. Uses. Stimulant; has been recommended externally in Rheumatism and in Cutaneous affections; internally as a Vermifuge. The Rangoon is probably as good, if not better, than other kinds. *Royle.*—Petroleum was collected in a recent survey of Chedooba, on the Arracan coast, and is found abundantly in the Burman Empire. The town of Rai-nan-ghong, is the centre of a small district, in which there are some hundred petroleum wells, (more than five hundred, *Mason*) in full activity. The district in which they are situated consists of a sandy loam, resting upon alternate strata of sandstone and indurated clay: under these is a layer of pale, blue, argillaceous schist, of considerable thickness, impregnated with petroleum; and resting upon coal. The petroleum flows into the well when it is sunk a few feet into the schist, and when it begins to fail the well is deepened. It is remarkable that no water ever penetrates into these wells. The annual quantity of petroleum produced by the district, exceeds 400,000 hhds. The uses of petroleum, where it abounds are very important. It serves the lower classes, instead of oil, for lamps, and mixed with earth or ashes, answers the purposes of fuel. A composition of petroleum and resin is an excellent material for covering wood work and for paying the bottoms of ships and boats, as it protects the timber from the attacks of worms and insects. When rectified by distillation, it affords naphtha.—*Tomlinson.*

Asphaltum, or *black Bitumen*, (Zift-roomie, *Pers.*) is a deep black, pitch-like solid; hard, softens at 150°, and melts above that; highly inflammable, believed to be the result of the natural distillation of petroleum. It is produced in abundance in Barbadoes and Mesopotamia. It is a valuable lacquer for the protection of iron or tinned iron vessels. A lump rubbed over the Asphalt-heated metal coats it with a hard adhesive brilliant coat, which resists most of the common corrosive agents.—*O'Shaughnessy, page* 693. See BITUMEN: also NAPHTHA: also ROCK OIL.

(6213) PETROSELINUM, (Πετροσέλινον, which means Rock Parsley, rock being the habitat of the species), a genus of Plants belonging to the natural order *Umbelliferæ.*—*Eng. Cyc.*

(6214) PTEROSPERMUM INDICUM. KIABOOCA. A handsome specimen of this ornamental wood was exhibited by Dr. Sanderson, it is imported from Singapore It is beautifully mottled, of different tints, evidently produced by excrescences from the tree. The wood is chiefly used for inlaying or for making desks, snuff boxes, puzzles, &c.—these are exhibited by the Madras Local Committee.—*M.E.J.R.*

(6215) PETROSELINUM SATIVUM, Common Parsley, has tripinnate shining leaves; leaflets of the lower leaves ovate-cuneate, trifid, and toothed; of the upper leaves ternate, lanceolate, entire. It grows wild on rocks and old walls, and is extensively cultivated—*Eng. Cyc.*

(6216) PETUNIA. SOLANACEÆ. This is an ornamental genus of plants, and easy of cultivation, the colours are white, purple, crimson and purple, or rose coloured; they grow readily from seed either in the rains, or cold weather, and form pretty border flowers.—*Riddell.*

(6217) PETUNTZE, the Chinese name for a white earth used with Kaolin in the manufacture of porcelain. It is stated that while [KAOLIN] is derived from the decomposition of the felspar of granitic rocks, the latter, or Petuntze, is the same mineral which has not suffered decomposition, and that on account of its fusibility it is employed in glazing the porcelain.—*Eng. Cyc.*

(6218) PEWTER.

Rissa, ARAB.	Stagno, IT.
Etain, FR.	Olowo, RUS.
Zinn, Zinngeisserzinn, GER.	Estano, Peltre. SP.

A factitious metal made of four parts of tin, and one of lead; but a finer kind is said to consist of tin mixed only with a little antimony and Copper. It is used in making plates, dishes, spoons, and such other domestic articles. *Faulkner.*

(6219) PHACELIA. *Hydrophylleæ.*—Hardy plants, flourishing in any common soil; the flowers are curious, from the manner in which they slowly unroll themselves. Some are perennials, and others biennials; the flowers are chiefly pink and blue coloured—propagated from seed.—*Riddell.*

(6220) PHAETON, Linnæus, a genus of Palmipede Birds, placed by some ornithologists among the *Pelecanidæ*, and by others among the *Laridæ*. This genus, so well known to navigators as the harbinger of the tropics, is distinguished at once by the two long slender tail-feathers, which have obtained for the species, of which two only are recorded, the French name of Paille-en-Queue, and from the English the Boatswain. Their length of wing and comparative feeble feet proclaim them formed for flight, and they are accordingly swift and untired on the wing, disporting in the air far at sea; and when on land (to which they do not often retreat for any length of time together, except at the period of nidification), perching on rocks and trees. They rarely quit the torrid zone and its neighbourhood. M. Lesson remarks that the two species form a well-defined artificial and purely geographical group. Their habitual domicile in the torrid zone does not separate them from the land; and they can reach, as they do nearly every night, the isles and lofty rocks that serves them as a place of refuge. Nevertheless M. Lesson met with them so often in sea-tracts entirely devoid of land, and heard them so often above his head in the calms and fine tropical nights, that he thinks they should be considered as oceanic birds. The same author remarks that sudden squalls or hurricanes, so frequent in the equatorial zone, often sweep these birds beyond their natural limits; and he thus accounts for seeing them, as he many times did, in 30° S. lat. The Common Tropic-Bird (*Phaeton æthereus,*) he says, "semble être confine dans l'ocean Atlantique, et s'arreter dans les mers de l'Inde." The other species (*Phaeton phœnicurus*), he remarks, appears to belong more particularly to the great equinoctial ocean. Nevertheless, he adds, that both species exist in nearly equal numbers at the islands of Mauritius and Bourbon. He describes the flight of these birds as calm, quiet, and composed of frequent strokes of the wing, sometimes interrupted by a sort of falls or sudden movements.—*Eng. Cyc.*

(6221) PHAETON ŒTHEREUS, Linn., the Tropic Bird of Catesby, Sloane, and others. The following is Catesby's description:—"This bird is about the size of a partridge, and has very long wings; the bill is red, with an angle under the lower mandible, like those of the gull kind, of which it is a species; the eyes are encompassed with black, which ends in a point towards the back of the head; three or four of the larger quill-feathers towards their ends are black tipped with white; all the rest of the bird is white, except the back, which is variegated with curved lines of black; the legs and feet are of a vermilion red; the toes are webbed; the tail consists of two long straight narrow feathers almost of equal breadth from their quills to their points. "These birds," says the same author, "are rarely seen but between the tropics at the remotest distance from land. Their name seems to imply the limits of their abode; and though they are seldom seen but a few degrees north or south of either tropic, yet one of their breeding-places is almost nine degrees from the northern tropic, namely, at Bermudas; where, from the high rocks that environ those islands, I have shot them at the time of their breeding; but those cliffs being inaccessible, prevented my seeing their nests and eggs. They breed also in great numbers on some little islands at the east end of Porto Rico. There was a specimen in Tradescant's Museum.—*Eng. Cyc.*

(6222) PHAETON PHŒNICURUS. Length from the extremity of the bill to the origin of the tail, 13 inches 6 lines; of the bill from the point to the commissure, 3 inches 8 lines; breadth across the expanded wings, 31 inches. Length of the tail, 5 inches; of one lengthened tail-feather (brin) taken at the extremity of the tail, 7 inches 6 lines; of the second and smaller long tail-feather (brin) taken from its origin, 6 inches. Ten tail-feathers, without counting the long one, which at its origin is enlarged like the other feathers; the tail forms a fan. Feet, taken from the leg to the toes, 3 inches. Legs white, with a light bluish tint in some places; webs partly black, that between the hind toepale flesh-colour slightly glazed with white. Bill red, denticulated; nostrils near the origin of the bill, rather large, presenting forwards a canal which scarcely extends to the middle of its length, and of a blackish tint. Plumage satin-white; in front of the eyes a large brown spot. The anal feathers present a great black spot in their centre, as well as some

of the feathers which approach the body. The long tail-feathers (brins) are red, the smallest being of the deepest hue. The shafts of the greater quill-feathers, of the tail feathers, and the long tail-feathers (brins), are black, but towards the extremity they are white. ('Manuel.') —*Eng. Cyc.*

(6223) PHALLUS ESCULENTUS Morilla (Fungus) Morels are imported from the hills into Lahore but are very little used by the natives; and the English use them, not medicinally, but for culinary purposes. The Morels which are brought from the Hazara country, are large.—*Honig. p.* 323.

(6224) PHARBITIS, a genus of Plants belonging to the natural order *Convolvulaceæ*. It has 5 sepals a campanulate funnel-shaped corolla, 1 style, a capitate granular stigma, a 3-celled, rarely 4-celled ovary, and 2-seeded cells. The species of this genus are easily distinguished from others of the same order. They are mostly climbing American herbs, usually beset with retrograde hairs.—*Eng. Cyc.*

(6225) PHARBITIS CÆRULEA. Wall. Syn. IPOMÆA CÆRULEA. *Kon. Rox. Fl. Ind.* i. p. 501. Nearly allied to Pharbitis Nil; but probably a distinct species.

Hub ul nil, ARAB.	Kaladana and Mirchai, HIND. and BENG.

Common all over the tropics every where, and in India even ascends the mountains to 5000 feet elevation.—*O'Shaughnessy, p.* 505. Its *Seeds*, called Hub ul nil, Kaladana, Mirchai, are black, angular, weighing on an average ½ a grain each, in powder of a grey colour, of sweetish, and subsequently rather acrid taste, and heavy smell. On analysis yields resin, gum, starch, fixed bland oil, fibre, and colouring matter. The powdered seeds in doses of 30 to 40 grains act as a quick, safe, and pleasant cathartic. Dr. O'Shaughnessy made this seed the subject of numerous experiments. In 100 cases in which it was given under his direction in the Police Hospital of Calcutta it proved purgative in 94, occasioned vomiting in 5, and griping but in 15, and produced on an average 5 stools within 2½ hours; the operation generally commenced in an hour, and in these experiments was never delayed beyond four hours. The alcoholic extract, which consists of resin and oil, is deep brown, ductile, of excellent pillular consistence, and keeps for several months. In 10 grain doses it produces all the effects of jalap with certainty and speed; the taste is scarcely perceptible. Dr. Chapman has used it in several cases at the General Hospital, and reported on it most favourably to the Medical Board; Dr. Leckie of Bhagulpore, Dr. Green of Howrah, Drs. Martin, Stewart and Goodeve, have given similar accounts of its efficacy. The seeds sell for four seers (8. lbs.) for the rupee; these will yield from 15 to 20 per 100 of alcoholic extract, and the whole of the alcohol may be recovered by distillation. We have thus a remedy of unparalleled cheapness, perfectly equal to jalap as a cathartic, superior to it in portability, and flavour, and occurring in all parts of India. We are consequently independent in every respect of the South American article.—*O'Shaughnessy. page* 505—6.

(6226) PHARBITIS HISPIDA. CONVOLVULACEÆ. The Pale blue large flowered Pharbitis.—*Riddell.*

(6227) PHARBITIS NIL, has twining annual round hairy branches, and stem stalked; 3-lobed downy leaves; axillary peduncles, from 2- to 3-flowered. The flowers large, of a beautiful light bright bluecolour; the capsule is much shorter than the calyx, smooth, 3-celled, with two seeds in each cell. The seeds are sold in the apothecaries' shops of Calcutta under the name of 'Kala Dana,' and are said to act as a purgative and an effectual speedy carthartic. They are roasted like coffee, powdered, and administered in doses of from 30 to 40 grains. It is a native of the tropics in every part, and in the South Sea Islands. There are about 15 species of this genus, but the one described is the only one of use.—*Lind. Flor. Med.*—*Eng. Cyc.*

(6228) PHARID-BUTI. A mucilaginous plant found at Ajmeer: used in sherbets.—*Gen. Med. Top. p.* 142.

(6229) PHARNACEUM MOLLUGO: LADIES BED STREW.

Ghimasag, HIND.

Wild in gardens during the rains, sometimes used as a pot herb.—*Gen. Med. Top. p* 188.

(6230) PHASEOLUS, a genus of Plants of the tribe *Phaseoleæ*, in the natural order *Leguminosæ*. The name is said to be derived from Phaselus, a little boat, which the pods are thought to resemble; but it may be that the meaning of 'boat' is derived from the resemblance of a boat to the form of a bean. Two species are very well known in England, *P. vulgaris*, the Common Kidney Bean, and *P. multiflorus*, the Scarlet Runner; their unripe pods being much esteemed as legumes, and also for pickling. The ripe seeds are however employed on the continent, and form the Haricots of the French. The genus is however one of which the species are indigenous in tropical parts both of the Old and New World. Several are cultivated in India, and are some of the principal articles of the agriculturist's attention, as the ripe seeds of several species form pulses which are much used by the natives as a portion of their diet, and some of which, like the Kidney Bean, abound in nutritious matter.

Phaseolus is characterised by having a bell-shaped 2-lipped calyx. The corolla is papilionaceous, and has the keel, as well as the diadelphous stamens and the style, spirally twisted.

The legume is compressed or cylindrical, with two valves, and is many-seeded, with more or less conspicuous cellular partitions between the seeds. The hilum of the seeds is oval oblong. The plants are herbaceous or suffrutescent in habit. The leaves are pinnately trifoliate, the leaflets with partial stipules. Racemes axillary. Pedicels usually in pairs, single flowered. Wight, in Icones, gives Phaseolus lunatus, 755; psoraleoides, 249; Pulniensis, 202; rostratus, 34; and trilobus, 94.

(6231) PHASEOLUS ACONITIFOLIUS, Lin.

Tulka, pyre, TAM.	Kooncooma pesuloo, TEL.
Mat, GUZ.	
Moat, DUK. & HIND.	Vasunta, SANS.

This is a small pleasant tasted pulse, much cultivated in the higher provinces of India, where there are two kinds of it.—*Ainslie, page* 246. Moth of the natives, is cultivated in the north-western provinces, and used for feeding cattle.—*Eng. Cyc.* Phaseolus Aconitifolius is culvitated in the Punjab, and for food. Its roots, as well as those of Phaseolus radiatus, are said by Royle, to be narcotic.—*Dr. Honigberger, p.* 323.

(6232) PHASEOLUS AUREUS, or Sona Moong of the Bengalees, is found in a cultivated state in the Bengal presidency, but is not known on the Coromandel Coast. It is sown, like the others, about the end of October or beginning of November, and reaped in February or the beginning of March.—*Eng. Cyc.*

(6233) PHASEOLUS LUNATUS, DUFFIN BEAN.

Bunburbutee, HIND.

Sown in rows the same as other beans, but with a much greater space between; they require very strong sticks for support, and are ready in about six months. No very particular care is necessary.—*Jaffrey.* This is a most valuable bean, much prized by the European inhabitans of India; by some of whom it is preferred to the Windsor bean. It was originally brought to this country from Mauritius and is extremely prolific.—*Ainslie, p.* 240.

(6234) PHASEOLUS LUNATUS. Var. COUNTRY BEAN; DUFFEN BEAN. This is a pleasant tasted bean much cultivated by the Europeans in these provinces whither it was brought some years ago from the Isle of France. —*Ainslie, p.* 239.

(6235) PHASEOLUS MAX. BLACK ULANDOO.

Carpoo Ulandoo, TAM.	Benoo mash, PERS.
Klie Oorood, DUK.	Wooddoo, MAL.
Nulla Woodooloo, also Minomolu, TEL.	Chicuda, CAN.
Mash, ARAB.	Masha, SANS.

This pulse differs but little from the common Ulundoo, except that it is of a darker color, and somewhat larger.—*Ainslie, p.* 237.

The Moong of the natives, and Black Gram of the English, is like *P. Mungo* but distinguished by its black seeds, and is, like it, found in a cultivated state; it takes about the same time to ripen, and yields nearly the same produce.—*Eng. Cyc.*

(6236) PHASEOLUS MULTIFLORUS, the Scarlet Runner, is a native of South America. Both are delicate, and in England cannot be safely planted in the open air till the beginning of May. —*Eng. Cyc.*

(6237) PHASEOLUS MUNGO. MASH.

Woothooloo, TEL.	Woolooathoo, TAM.
Mash, HIND.	

(6238) PHASEOLUS MUNGO, MELANOSPERMUS. BLACK GRAM. Mason says that one of the most common pulses seen in Burmah is the *Phaseolus max*; which is the plant that produces the black gram of India.—*Mason.*

(6239) PHASEOLUS MUNGO.

Moong ka dal, HIND.

Cultivated in the rains wherever the soil will permit.—*Genl. Med. Top. p.* 203.

(6240) PHASEOLUS MUNGO. ULANDOO, Lin.

Ulandoo, TAM.	Hessaru, CAN.
Arad, GUZ.	Moong, MAH.
Oorood, DUK. & HIND.	Danie Masha, SANS.
Wooddooloo, TEL.	

This very pleasant tasted pulse is much prized, dressed in various ways. Phaseolus Mungo, or Moong, is one of the dry leguminous grains of India, which are of great value whenever the periodical rains fail and rice cannot be grown, and famine is the consequence.—*Eng. Cyc.*

Two sorts of this pulse are grown in all parts of Mysore and are exported to Mangalore. It will keep good for about three years if carefully preserved by packing it in parcels. Ordinary price at Bangalore is a Rupee for 7 seers.—*Ainslie, page* 247. *M. E. J. R.*

(6241) PHASEOLUS NANUS. DWARF KIDNEY BEAN.

Frash bean, HIND.

Cultivated. in Ajmere—*Med. Top. p.* 203.

(6242) PHASEOLUS RADIATUS. INDIAN GREEN GRAM, or Rayed kidney Bean.

Putsa pasaloo, TEL.	Harie Moong, DUK.
Harree moong, HIND.	Husaroo, CAN.
Putchee payaroo, TAM.	Harita, SANS.
Mag, GUZ.	Cherroo Poiur, MAL.
Masha, SANS.	Moong, Thikiree, HIND.
Mash Kulia, BENG.	

Roots said to be narcotic by Royle—*O'Shaughaes p.* 317. Phaseolus Radiatus called by the natives Mash and Oorud, is like P. Max and P. Mungo found in a cultivated state, and is the most esteemed of all the Indian leguminous plants. Besides using it as an article of diet, the natives make bread of the meal for some of their religious ceremonies.

(6243) PHASEOLUS RADIATUS (Var.) BLACK GRAM.

Nulla woothnoloo, TEL. | Karooppoodoolooanthoo, TAM.
Kalee Koolter, HIND. | Pauay Pyroo, TAM.

This valuable pulse gets its Tamool name from being nourished by the dews in January and February. It is a variety of the Patchay pyre. —*Ainslie, p.* 243.

(6244) PHASEOLUS TRILOBUS, THREE-LOBED BEAN.

Moojanee, BENG. | Kulaee, HIND.
Trianguli. HIND.

Sown like other native beans. This species of phaseolus, the genus which furnishes the common French bean, grows spontaneously everywhere in the Tenasserim Provinces. Roxburgh describing the species says, that he never found it "*but in its wild state*;" while Voigt is made to say, by a mistake of the printer no doubt, "Cultivated, in which state only it was found by Dr. Roxburgh."—*Mason.* The leaves are said to be tonic and sedative, and are used in cataplasms to weak eyes.—*O'Shaughnessy, p.* 137.

(6245) PHASEOLUS VULGARIS, Kidney-Bean, is said to be a native of India, but Dr. Royle states that seeds were brought to him from Cashmere, and he is therefore inclined to consider that it was introduced into Europe from the most northern parts, such as Cabul and Cashmere and that this accounts for our being able to cultivate it at a lower temperature than other species of the genus.—*Eng. Cyc.*

(6246) PHASIANIDÆ, a family of Rasorial Birds related to the *Pavonidæ*. [PAVONIDÆ.] Mr. G. R. Gray arranges the *Phasianidæ* as the second family of *Rasores*—*Cracidæ* being the first, and he divides the *Phasianidæ* into the subfamilies *Pavoninæ*, *Phasianinæ*, *Gallinæ*, and *Meleagrinæ*. The *Phasianinæ* consists of the genera *Argus*, *Phasianus*. *Syrmaticus*, *Thaumalea*, and *Gennæus*. The *Gallinæ* comprehend the genera *Euplocamus*, *Monaulus*, *Lophophorus*, *Gallus*, and *Tragopan*.

(6247) *Phasianus* (Linn.).—Bill of mean length, strong; upper mandible convex, naked at the base, and with the tip bent downwards. Nostrils basal, lateral, covered with a cartilaginous scale; cheeks and region of the eyes destitute of feathers, and covered with verrucose red skin. Wings short, the first quills equally narrowed towards their tips, the fourth and fifth the longest. Tail long, regularly wedge-shaped, and composed of 18 feathers. Feet having the three anterior toes united by a membrane as far as the first joint, and the hind toe articulated upon the tarsus, which in the male birds is furnished with a horny cone-shaped sharp spur. (Gould.) The type of this genus is generally considered to be *P. Colchicus*, Linn., the Common Pheasant, a bird which, though not originally British, is completely naturalised in that Island, and indeed appears to adapt itself with great facility to most countries where ordinary care is taken to preserve it, and the temperature is not too low for its constitution. The species is too well known to need description. Various instances of the Common Pheasant breeding with other gallinaceous birds are on record. Edwards has figured a bird supposed to have been produced between a pheasant and a turkey. Three or four of these were discovered in the woods near the house of Henry Seymour, Esq., of Handford, Dorsetshire, and he shot one in October 1759, the bird which he sent to Edwards. Mr Yarrell ('British Birds') observes that he has twice been shown birds that were said to be the produce of the Pheasant and the Guinea Fowl, and the evidence of the plumage was in favour of the statement. We have seen such a bird, and its feathers corroborated the allegation that it had been so produced. Hybrids between the Pheasant and Gray Hen are also recorded. Mr. Thompson of Belfast describes ('Magazine of Zoology and Botany') another hybrid shot at Lochnaw, Wigtonshire, where it had been seen several times on the wing by persons who supposed it to be a wild turkey. In the surrounding plantations pheasants and black grouse were numerous; but this individual, which was preserved for Sir Andrew Agnew, Bart., M.P., was the only one of the kind observed. Mr. John Leadbeater, in 1837, exhibited a hybrid between the Pheasant and Black Grouse, shot near Alnwick, at a meeting of the Zoological Society This the Duke of Northumberland presented to the British Museum. The union between the Common Hen and the Cock Pheasant is by no means rare, as is well known to those whose homesteads border upon pheasant preserves. The produce of this union is called a Pero.

Before we leave the True Pheasants we must notice some of the magnificent Indian species, which exhibit such a prodigality of splendour and beauty in their plumage as almost realises the birds which we read of in fairy tales. Such are the well-known gorgeous Gold Pheasant (*Phasianus pictus*, Linn: Genus, *Thaumalea*, Wagler; *Chrysolophus*, J. E. Gray; *Nycthemerus*, Sw.), the equally wellknown delicately-pencilled Silver-Pheasant (*Phasianus Nycthemerus*, Linn.: Genus, *Gennæus*-Wagler; *Nycthemerus*, Sw.; *Euplocomus*, J. E. Gray), and the noble Reeves's Pheasant (*Phasianus reevesii*, Temm.: Genus *Syrmaticus*, Wagler.) The first two of these (natives of China) are common in almost every aviary, and there is no reason why they should not thrive well if turned out in English preserves; the second species has, we believe, been so turned out with success; the last is also found in China, but, as it would seem, on the very confines of the empire. It is very rare in Pekin. Dr. Latham's description was taken from Sir John Anstruther's drawings, and from some writing under them in the Persian language it appeared that the bird

was called Doom dumar, or Long-Tail, and it was found on the snowy mountains of Surinagur. To Mr. Reeves we are indebted for the first individual ever brought alive to Europe. It was a male, and continued to live for some time in the garden in the Regent's Park. Tail-feathers from it were exhibited to the Society in 1831, measuring each about 5 feet 6 inches in length. A second male specimen was also sent to their menagerie by the same liberal donor in 1834. Then there are the beautiful Diard's Pheasant (*Phasianus versicolor*, Vieill.) which haunts the Japanese woods, and exhibits the manners and habits of our Common Pheasant; the rare and elegant Sommering's Pheasant (*P. Sœmmeringii*, Temm.), also a native of Japan. We should also call the reader's attention to the beautiful *P. Staceii* (figured and described by Mr. Gould in his 'Century') as one of the True Pheasants and to *P. Pucrasia* and *P. albocristatus*, also there figured. *Pucrasia* appears to lead the way from the True Pheasants to the *Lophophori*; and *P. albo-cristatus* to be an *Euplocamus*, which, even more immediately than *E. ignitus*, forms a transition from the genus *Phasianus* to the genus *Gallus*. The Argus Pheasant, which is not a species of *Phasianus*, has been brought alive to this country, and a specimen is now in the Gardens of the Zoological Society of London in the Regent's Park.

(6248) *Euplocamus* (Temm.).—Sir George Staunton, in his 'Embassy to China,' first made this highly-interesting form known to European zoologists. His host at Batavia had, it appears, a very curious collection in the several departments of natural history. He made presents to his guest of several specimens, and among them was this beautiful pheasant, which was sent to England and described by Dr. Shaw.

(6249) *E. ignitus*, the Fire-Backed Pheasant of Java, the Macartney Cock, *Phasianus ignitus* Latham. Length of adult *male* about two feet. Skin of the nostrils stretching backwards over the sides of the head behind the eyes, and bluish-purple. A crest upon the crown of the head composed of naked-shafted feathers, expanding at their tips into slender spreading barbs. Head, neck, breast, belly, and upper part of the back, deep chalybean or steel-blueshot black; lower part of the back fiery orange-red or flame-colour, varying in intensity according to the incidence of the light, and passing like a zone round the body, though more obscure on the abdomen; rump and tail-coverts broad and truncated, brilliant bluish-green with a paler bar at the tip. Tail when erect folded in some degree like that of a hen; the middle feathers white, and the outside ones black with green reflections. Legs and feet vermilion, spurred.

Female.—Length about 20 inches. Plumage almost entirely rich cinnamon-brown; feathers of the upper parts slightly mottled with black; throat white; lower parts of a paler tint than those above, and having the feathers bordered with white. Elongated head-feathers capable of being erected into a crest, but not equal to that of the male. Tail folded. Legs spurless. It is a native of Sumatra. ('Atlas' to Staunton's 'Account of Lord Macartney's Embassy to China.')

(6250) *Gallus* (Brisson).—Bill moderate, strong, convex above, curved towards the point, cultrate at the base, and furnished with two pendent and compressed caruncles or wattles. Head surmounted with a fleshy crest or comb. Tarsi (in the male) furnished with a long and recurved spur; the hind toe only resting on the ground at its tip. Wings short and graduated. The 14 tail-feathers forming two vertical planes with the backs of the feathers towards each other, and so making what may be called a folded tail; the middle feathers longest and recurved. The ancestors from which our domestic poultry have descended were undoubtedly natives of Asia; but some doubt still hangs over the questions of the precise breed from which they came, and the exact locality where they were found. That fowls were domesticated at a very early period there is no doubt, and both historians and poets speak of the high antiquity of the race. Thus Peisthetærus relates why the cock is called Περσικὸς ὄρνις (the Persian Bird), and how it reigned over that country before Darius and Megabazus. (Aristoph., 'Birds,' 483 et seq.) To the forests and jungles of India we must look for the race in a state of nature; and though the denizens of the farm-yards may be the result of a mixture of many of the species which there inhabit, zoologists in general agree with M. Temminck in thinking that to the Malay Gigantic Cock or Fowl (*Gallus giganteus*, Temm.), and the Bankiva Cock (*G. Bankiva*, Temm.), we are chiefly, if not entirely indebted for our common poultry. The Domestic Cock and Hen are the Ἀλεκτρυών and Ἀλεκτορίς of the Greeks; Gallus and Gallina of the Romans; Gallo and Gallina of the Italians; Haus Hahn and Haus Henne of the Germans; and Coq (Gau, Geau, Gal, Gog), Gelline, and Poule, of the French. Bold, ardent, and vigilant the cock has been always considered the emblem of watchful courage, while the hen has been considered a pattern of maternal solicitude. In [illegible] and other polygamous [illegible] the object to be attained is the effective [illegible]nation of the greatest numbers of females by the most vigorous male. In the cock accordingly the spurs are developed as the sexual organs are matured; and it is principally with these weapons of combat that the battle which is to leave the field in the possession of the strongest is decided. The conqueror in his turn, as the weakness of age comes upon him, yields to a younger and more powerful rival; and thus a numerous, healthy, and stout progeny is secured.

(6251) *G. giganteus*, the Gigantic Cock, the

Kulm Cock of Europeans, often stands considerably more than two feet from the crown of the head to the ground. The comb extends backwards in a line with the eyes; it is thick, a little elevated, rounded upon the top, and has almost the appearance of having been cut off. The wattles of the under mandibles are comparatively small, and the throat is bare. Pale golden-reddish hackles ornament the head, neck, and upper part of the back, and some of these spring before the bare part of the throat. Middle of the back and lesser wing-coverts deep chestnut, the webs of the feathers disunited; pale reddish-yellow long drooping hackles cover the rump and base of the tail, which last is very ample and entirely of a glossy green, of which colour are the wing-coverts; the secondaries and quills are pale reddish-yellow on their outer webs. All the under parts deep glossy blackish green with high reflections: the deep chestnut of the base of the feathers appears occasionally, and gives a mottled and interrupted appearance to those parts. (Jardine principally.) Lieutenant-Colonel Sykes, in his Memoir on the Birds found in the Dukhun (Deccan), states that it is only there met with as a domestic bird, and that he has reason to believe that it is not a native of India, but has been introduced by the Mussulmans from Sumatra or Java. The iris, he says, of the real game bird should be whitish or straw-yellow. The Colonel landed two cocks and a hen in England in June, 1831; and they bore the winter well. The hen laid freely, and in September, 1832, had reared two broods of chickens. The cock had not the shrill clear pipe of the domestic bird, and his scale of notes appeared to be more limited. A cock in the Colonel's possession stood 26 inches to the crown of the head, but they attain a greater height. The length from the tip of the bill to the insertion of the tail, 23 inches. Hen one-third smaller than the male. ('Zool Proc.' 1832.)

(6252) *Gallus Bankiva*, the Bankiva Cock, is the Coq et Poule Bankiva of Temminck; Ayam Utan, or Brooga ('Linn. Trans.,' xiii.); Javan Cock of Latham; and many Bantams resemble it very closely. The space round the eyes and throat bare, comb, much [illegible]ped, deeply lobated along the upper [illegible]les of the lower mandible rather large, [illegible]lear, brilliant, golden-orange hackles cov[illegible]head, sides of the neck, back, and rump. Upper part of the back below the hackles bluish-black, the middle and lesser wing-coverts rich deep chesnut, with the webs of the feathers disunited; greater coverts steel-blue, secondaries the same, with a broad chesnut border; quills brownish-black, edged with pale reddish-yellow. Tail black, richly glossed with green and blue. Under parts black. Sir W. Jardine states that he has seen three or four specimens of another bird very closely allied to *G. Bankiva*, but rather larger, and certainly distinct: they were all from the continent of India.

(6253) *Gallus aheneus*, the Bronzed Cock, figured by M. Temminck from a specimen sent from the interior of Sumatra by M. Diard. This is somewhat larger than the Bankiva Cock, and its large comb is without dentilations; indeed the edge is quite unbroken; the feathers of the head, neck, and upper part of the back are rather elongated, but not hackles. The Fork-Tailed Cock (*G. furcatus*, Temm.; *G. Javanicus*, Horsf.) has the comb also entire, and the throat is adorned with a single large wattle springing from the centre. The head, neck, and upper part of the back are covered with feathers, which are not hackles, shorter and more rounded than those in the Bronzed Cock.

(6254) *Gallus Sonneratii*. This is the Coq Sauvage of Sonnerat; Coq et Poule de Sonnerat of Temminck; Sonnerat's Wild Cock of Latham; Rahn Kounrah of the Mahrattas; Jungle Cock and Jungle Fowl of the English sportsmen in India. The size of the male is nearly equal to that of a domestic cock; but the bird is altogether lighter, more graceful, and has a higher bred look about it; comb large, and with an unequal margin, but though this margin is jagged, it is not deeply dentilated; wattles double, depending from the base of the lower mandibles; hackles of the neck and of the wing and tail-coverts dark-grayish, with bright golden-orange shafts dilating in the centre and towards the tip into a flat horny plate. In some of these feathers the shaft takes an elliptical or oar-like shape; in others it puts on the appearance of a long inverted cone, from the centre of the base of which a battledore-like process arises. The substance and appearance of these plates have been not inaptly compared with the wax-like plates which ornament the wings and tail of the Bohemian Chatterer. The effect produced by this modification of the shafts is singular and beautiful. Feathers of the middle of the back, breast, belly, and thighs, deep rich gray, with paler shafts and edges; tail generally rich deep-green; the feathers which immediately succeed the hackles are rich purple, with a pale yellow edge; those next in succession are golden-green, with gray edges, and all are glossed with brilliant metallic reflections. Bill, legs, and feet, yellow. The living bird presents altogether a rich and striking object, especially when the sun shines on the plumage. Female less than the cock by about a third, without comb or wattles, but a trace of nakedness round the eye. The plumage (generally) is without the horny structure which distinguishes that of the male. Upper parts uniform brown; neck feathers with dark edges, those of the back and wing-coverts with a pale streak along the shaft, and those of the wings, tail-coverts, and tail, waved and mottled with darker pencillings; throat and front of the neck white; feathers of the rest

of the lower parts, greyish-white, edged with dark brown, which predominates towards the vent. Legs and feet bluish-grey. Colonel Sykes, in his valuable Catalogue, notes this noble bird as being very abundant in the woods of the western Ghauts, where (and this is well worthy the attention of ornithologists) he says there are either two species or two very strongly marked varieties. In the valleys, at 2000 feet above the sea, he tells us Sonnerat's species is found slender, standing high upon the legs, and with the yellow cartilaginous spots on the feathers, even in the female. In the belts of wood on the sides of the mountains, at 4000 feet above the sea, there is a short-legged variety. The male has a great deal of red in the plumage, which Sonnerat's has not: the female is of a reddish-brown colour, and is without cartilaginous spots at all: "in fact," continues the Colonel, "the female of this variety is the *G. Stanleyi* of Mr. Gray's 'Illustrations.'" Dr. Latham remarks that this Jungle Fowl is by far the boldest and strongest for its size, and that it is anxiously sought after by cockfighters in Hindustan, who rely on it for victory when pitted against larger game cocks.

(6255) *Tragopan*, Cuvier (*Ceriornis*, Swainson).—Head crested on the crown, partly naked (on the cheeks and round the eyes), the naked parts terminating in horn-like caruncles behindthe eyes; under the lower mandible and on the forepart of the throat a subpendent composite carunculated wattle. Tarsi armed with a blunt spur in the male; unarmed in the female. Mr. Gould ('Century of Birds from the Himalaya Mountains') remarks that the genus *Tragopan* appears to take an intermediate station between that of *Meleagris*, and the more typical *Phasianidæ*, forming one of the links of a chain connecting these groups of the Rasorial order. The affinity of this genus, he observes, to that of *Meleagris*, is evident in many characters; nor are some wanting which indicate a relationship to *Numida*, and even to *Francolinus*.

(6256) *T. Satyrus* appears to have been the only species originally known. Mr. Gould, in his 'Century,' describes another species, *T. Hastingsii*, and refers to another, which Dr. Gray, of the British Museum, has dedicated to M. Temminck. ('Indian Zoology.')

(6257) *T. Hastingsii*. Head of the adult male covered with a pendent crest of feathers, which, as well as the ear-coverts and throat, are black; the neck and shoulders are rich maroon; the chest, rich, glossy orange-red; the naked skin around the eyes is red; the fleshy horns and wattles mingled blue and purple; the upper parts exhibit a mixture of zigzag lines and marks of dark and light brown, with numerous and distinct spots of white; each of the upper tail-coverts ends in a large white eye, bordered on the sides with brown, and tipped with black; the tail deepens till it ends in uniform black; the feathers of the under surface are maroon, largely tipped with black, in the centre of which is a large white spot; the beak is black, the tarsi brown. In the young male the plumage is much less brilliant, the wattles being of a pale flesh-colour, and little developed, as is also the naked skin of the face. The plumage of the female consists of a uniform brown, mottled and barred with mingled lines and dots of various tints, the feathers of the back and chest having a central dash of a lighter colour; the head is crested, with short rounded feathers; the sides of the cheeks are clothed, and there are neither fleshy horns nor wattles. (Gould.) Mr. Gould observes, that although this species and *T. Satyrus* are closely allied to each other, and doubtless possess similar habits and manners, he is led to believe that their local distribution is somewhat different; at least, he generally receives but one species in a collection from the same quarter; *T. Satyrus* being transmitted from the Nepaulese Hills, while *T. Hastingsii* is sent from the more northern range of the Himalayas. He further well observes that the changes of plumage which birds of this genus, especially *T. Hastingsii*, undergo in passing from youth to maturity (and this is well illustrated in Mr. Gould's beautiful plates), are such as to have caused an apparently erroneous multiplication of species.

(6258) *T. Satyrus*, according to the same author, is an exclusive inhabitant of the colder regions of the mountains, in conjunction with the *Lophophorus*, its approximate relative, feeding on grains and roots, the larvæ of ants, and other insects.

(6259) PHASMIDÆ, a tribe of Orthopterous Insects, embracing a number of exotic forms which have been often included in the *Mantidæ*, from which they are distinguished by the fore-legs being of the ordinary size, and fitted like the rest for walking rather than running. From the other *Orthoptera* they are distinguished by the hind legs not being saltatorial. The body is generally long and slender. The head is of moderate size, of an oval subdepressed form, porrected, with large globular eyes, in front of which the antennæ are placed, which are variable in form, but ordinarily long, slender, and composed of a great number of articulations. The ocelli are rudimentary or obsolete. The labrum is deeply notched in front; the jaws are strong and horny. The dorsal surface in both sexes consists of nine segments, but only seven are distinct in the females. All the legs are alike, being long and slender, often armed with short spurs along the edges. The fore wings are of small size, and attached at the posterior part of the mesothorax. The true wings are very large and attached to the anterior part of the metathorax. As they far exceed the wing-covers in size, it is essential that provision should be made for their defence. This is effected not as in the earwig, by the

transverse folding of the wing as to enable it to be folded beneath the small wing-cover, but by the front margin of the hind wing being greatly thickened, serving as a flat plate, beneath which the other part of the wing is folded longitudinally, the latter part being often differently coloured. Thus in some species the short wing-covers and the front margin of the wing are pale-green, whilst the other part of the wing is pink. Many species however remain throughout their lives without ever acquiring wings or wing-covers." (Westwood, 'History of Insects.') The odd appearance of these insects have got for them the name of Walking-Sticks, Straws, Leaves, Spectres, &c., and certainly nothing can be imagined more curious than the forms they assume. In many instances they might be mistaken for a portion of the branch of the trees on which they rest.—*Eng. Cyc.*

(6260) PHILADELPHACEÆ, *Syringas*, a natural order of Exogenous Polypetalous Plants, with an inferior ovary, the principal genus being that after which the order is named. The species are American, European, and Asiatic shrubs of temperate climates, with opposite leaves, distinct styles, and capsular fruit, containing a large number of minute seeds.—*Eng. Cyc.*

(6261) PHILADELPHUS, a genus of plants the type of the natural order *Philadelphaceæ*, which is also the name of a tree, now unknown, mentioned by Athenæus, but was applied to the present genus by Bauhin. *Philadelphus* is characterised by having a calyx with an obovate-turbinate tube and a 4-5-partite limb. The greatest number of species are indigenous in North America, whence they have been introduced into the shrubberies of this country, to which they form a highly ornamental addition. A species has also been discovered in the Himalayas, at elevations of 6000 and 7000 feet, of which there are two varieties, sometimes considered distinct species, *P. tomentosus* being apparently only a more advanced state of *P. triflorus*. The best known species however is *P. coronarius*, commonly called Syringa, which is so easy of culture, and found in most gardens. It is supposed to be a native of the south of Europe, but it has hardly ever been found in a wild state, and even, in these few cases, it may have escaped from cultivation. As one species has been found in the Himalayas, there is no reason why other species should not exist still farther to the north-west, as in the Hindoo-Koosh, and that the Syringa may be found to be one of those plants which, was in early times introduced from some part of the Persian Region of botanists into the south of Europe.—*Eng. Cyc.*

(6262) PHILADELPHUS CORONARIUS. PHILADELPHEÆ. A handsome shrub, producing white blossoms, having the appearance and [illegible] of orange flowers; propagated by seed or [illegible].—*Riddell.*

(6263) PHILLYREA. Of this genus, Wight gives, *Panicularia alaterna*, 1242; and *terminalis affinis*, 736.

(6264) PHILLYREA PANICULATA. OLEINEÆ. A small tree with oblong ovate leaves; flowers in terminal panicles, pure white, bending down the branches, and giving the tree a graceful appearance. Introduced from China.—*Riddell.*

(6265) PHILOMELA, a genus of Birds belonging to the family *Sylviadæ*. *P. Luscinia* the Nightingale, is the most celebrated of the song-birds of the Old World. This well-known species is the Ἄηδων of the ancient Greeks; *Luscinia* of the Romans; Rossignuolo, Rusignuolo, and Usignuolo, of the Italians; Rossignol of the French; Ruisenor of the Spanish; Nachtigall of the Germans; Nachtegahl of the 'Fauna Suecica;' Nattergale of Brunnich; and Eos of the Welsh. It is the *Luscinia* of Gesner, Aldrovandus, Willughby, Ray, and Brehm; *Motacilla Luscinia* of Linnæus; *Sylvia Luscinia* of Latham and others; *Curruca Luscinia* of Fleming; and *Philomela Luscinia* of Selby, Gould, and Swainson. The following is a description of this bird:—Rich brown above; rump and tail with a reddish tinge; throat and middle part of belly dirty or grayish white: lateral parts of the neck, breast, and flanks, gray; bill and legs light brown. Sexes alike. The Nightingale shuns observation, abiding in the thickest coverts, and in these the nest is sometimes placed on a low fork, but generally on the ground. Withered leaves, particularly those of the oak, very loosely confined with dried bents and rushes, and lined internally with fine root-fibres, form the structure. The eggs, of an olive-brown, are four or five in number. After the young are hatched, generally in June, the melodious song of the male ceases, and is succeeded by a low croak, varied occasionally with a snapping noise; the first is considered to be meant for a warning, and the last as a defiance. The food consists, of insects, such as flies and spiders, moths and earwigs. Green caterpillars were the food brought by the parent birds to the nest of young nightingales taken by Colonel Montagu. It is not improbable that the bird's choice of localities is in some measure determined by the absence or presence of some favourite insect food. There is another European Nightingale (the Thrush Nightingale, *Philomela Turdoides* of Blyth, *Luscinia major* of Brisson, *Sylvia Philomela* of Bechstein) inhabiting central Europe. The song of this species is loud, but far inferior to that of the true Nightingale. It is said to be common in Egypt.—*Eng. Cyc.*

(6266) PHILYDRACEÆ, *Waterworts*, a natural order of Endogenous Plants, constituted by Brown to receive the genus *Philydrum* and *Helonias*. They are allied, according to Lindley, to *Commelinaceæ*, *Orchidaceæ* and *Irridaceæ*. The species are grassy-looking plants, with dis-

talous flowers, to calyx, three stamens, of which two are abortive, and an embryo in the axis of a fleshy albumen; they have erect stems, and ensiform leaves. They are found in Australia, Cochin China and China, (Lindley, *Vegetable Kingdom.*)—*Eng. Cyc.*

(6267) PHLOMIS INDICA. Linn.

Toombi keeray, Tam.	Toombi koora, Tel.
Toombikee baujee, Duk	Drona, Sans.
Choomra, Hind.	

This green possesses a considerable degree of acrimony which the Natives temper by an admixture of some agreeable acid. "I am inclined to think that it is not a wholesome vegetable. Rumphius tells us that the acrid juice of the plant, which is called Dawn beran in Malays, the Woriahs in Amboyna squeeze into their eyes to make them bold and intrepid in War. Vide Rumphius, From vi. p. 40.—*Ainslie's Mat. Med. page* 257.

(6268) PHLOMIS. Labiatæ. Phlomis Russelliana.—Jerusalem Sage.—These are perennial and shrubby plants, with coarse hairy leaves resembling the common sage; the flowers are purple, red, yellow, &c., growing readily from seed in any common soil.—*Riddell.*

(6269) PHLOX. Polemoniaceæ. Phlox Drummondii.—This is an elegant genus of plants, and from their lively colours have a pretty appearance when grown in patches, the colours are red, purple, lilac, white, &c., grow readily from seed in a light garden soil.—*Riddell*, Phlox Drummonda and variety Lepoldina are useful annuals, succeed well on the plains either in pots or the flower beds, should be sown thinly, and when one or two inches high, transplanted where intended to flower, require in pots a somewhat loamy soil well manured and drained. Native of Texas, ripens freely, which is to be preferred to that imported.—*Jaffrey.*

(6270) PHŒNICOPHAUS TRISTIS, "Maboka" of the natives, with a note like that of the English cuckoo, as heard late in the season.—*Hooker. Him. Jour. Vol.* I. *p.* 27.

(6271) PHŒNIX, a genus of Palms, which has been so named from one of its species, the Date-tree, having been called so by the Greeks: this name is thought by some to be derived from Phœnicia, because dates were procured from thence. The genus is common in India and in the north of Africa, and one of the species grows in Arabia, the lower parts of Persia and along the Euphrates to Syria. The genus is characterised by having flowers dioecious, sessile in a branched spadix, supported by a simple spathe; calyx 3-cleaved, 3-toothed; corolla 3-petalled; stamens 6 or 3; filaments very short, almost wanting; anthers linear; (female) calyx urceolate, 3-toothed; corolla 3-petalled, with the tinct from each other, of which one only ripens; stigmas hooked; drupe 1-seeded; seeds marked on one side with a longitudinal furrow; albumen reticulate; embryo in the back of the seed; palms with stems of a moderate height and ringed, or marked with the scars of the fallen leaves; fronds or leaves pinnate; pinnæ or leaflets linear, with the spadix bursting among the leaves, surrounded with an almost woody 2-edged sheath; flowers yellowish-white; fruit soft, edible, of a reddish-yellow colour.—*Eng. Cyc.* Phœnix Palms, of which the date tree is at once the most important and popular representative, is a genus indigenous to Africa and Asia and embraces several species, the products of which are brought into the markets of India. Its trunk, marked with the scars of fallen leaves, is, in some species, so short that it hardly appears above ground It is not decided whether the East Indian *P. sylvestris*, Roxb. be or not the *P. dactylifera* of Linnæus in a wild state.—*Seeman.*

P. dactylifera,—the Date-Palm is spread over the whole of Southern Europe, Northern Africa, and South-Eastern Asia, and its fruit is largely imported into India. It has many varieties but is a noble tree, from fifty to eighty feet high, and attaining the age of one hundred years.—*Seeman.*

(6272) PHŒNIX ACAULIS? Buch: the *Schaap* of the Lepchas is a small stemless palm which grows in Sikkim on the driest soil and in the deep valleys. The Lepchas eat the young seeds and use the feathery fronds as screens when hunting.—*Hooker Vol.* I. *p.* 143. Phœnix Acaulis, a dwarf palm growing east of Siligoree in the Terai; a sure sign of a hungry soil.—*Hooker Him. Jour. Vol.* I. *p.* 400.

(6273) PHŒNIX DACTYLIFERA. Date. Linn.

Payr-Eetchum pullum. Tam.	Khurma, Pers.
Paynd K'hujoor, Duk.	Kehjoor, Hind.
Carjoora pundoo, Tel.	Choorma, Malay.
Temr, Arab.	Carjoora, Sans.

P. dactylifera, the Indian Date Tree, is common all over India, from thirty to forty feet high, and is one of the trees from which the *Toddy* or *Palm-wine* is drawn, the toddy being either drunk when fresh, boiled into sugar, fermented into an intoxicating fluid, or fermented for distillation into Arrack. Mats and baskets are made of the leaves.—*Seeman.* The Date-Tree, or Date-Palm, is one of the best known, and probably the earliest known of the palms, and though belonging to a family which abounds and flourishes most in tropical regions, itself attains perfection only in comparatively high latitudes. It is no doubt the species to which the name *Palma* was originally applied, as we may infer from its being common in Syria, Arabia, the lower parts of Persia as well as Egypt and the North of Africa, where it has

cultivated in many places, not only as a curiosity, but on account of its leaves, which are sold twice in the year, in spring for Palm Sunday, and in September for the Jewish Passover; and also, from the name not being applicable to the other species known to the ancients, as it is considered that the bunches of dates were likened to the fingers of the hand, as appears from the present specific name *dactylifera*, from the Greek δάκτυλος, a finger. It is the Palm-Tree of Scripture, and was emblematic of Judæa, as we see in coins with the inscription of *Judæa capta*. It is found in oases in the desert, and round Palmyra, which is supposed to have been named from its presence. This appears indeed to be only a translation of the Oriental name, which is Tadmore, supposed to be a corruption of Tamar (from 'Taur,' a Date), a city built in the desert by Solomon. The date-Tree is therefore a subject of classical as well as of scriptural interest, besides its fruit forming a large portion of the food of a great part of the Arab race, and also a considerable article of commerce. The Date-Palm being dioecious, that is, the stamens and pistils, or the male and female parts being not only in different flowers, but even on different plants, the crops entirely fail, or the fruit is worthless and unfit for food if fertilisation is in any way prevented. To ensure this, the Arabs have long been in the habit of hanging the clusters of male flowers on the trees which bear only female ones, and therefore the Date-Tree is one of those which led to a knowledge of the sexes of plants. The extensive importance of the Date-Tree is, says Dr. Clarke, one of the most curious subjects to which a traveller can direct his attention. A considerable part of the inhabitants of Egypt, Arabia, and Persia subsist almost entirely on its fruit. They make a conserve of it with sugar, and even grind the hard stones in their hand-mills for their camels. In Barbary they form handsome beads for paternosters of these stones. From the leaves they make couches, baskets, bags, mats, brushes, and fly-traps; the trunk is split and used in small buildings, also for fences to gardens, and the stalks of the leaves for making cages for their poultry. The threads of the web-like integument at the bases of the leaves are twisted into ropes, which are employed in rigging small vessels. The sap is obtained by cutting off the head of the palm and scooping out a hollow in the top of the stem, where, in ascending, it lodges itself. Three or four quarts of sap may be obtained daily from a single palm, for ten days or a fortnight, after which the quantity lessens, until, at the end of six weeks or two months, the tree is exhausted, becomes dry, and is used for fuel. This liquor is sweetish when first collected, and may be drunk as a mild beverage, but fermentation soon takes place, and a spirit is produced, which is distilled and forms one of the kinds of aruk (arrack), or spirit of eastern countries. Such being the importance and multiplied uses of the Date-Tree, it is not surprising that in an arid and barren country it should form so prominent a subject of allusion and description in the works of Arab authors, and that it should be said to have 30 names in their language. Many of these are however applied to different parts of the plant, as well as to these at different ages.—*Eng. Cyc.* The true DATE TREE (*Phœnix dactylifera*), the Palm tree of Scripture, flourishes in comparatively high latitudes, and is well known to afford the principal article of food the natives of Arabia and of the North of Africa: while the leaves are employed in making mats, baskets, &c.; and at Cairo cordage is made of fibres obtained from the footstalks of the leaves. Though the tree grows well in India, it does not there produce any edible dates; but *Phœnix sylvestris*, the *Kujjoor*, of India, which closely resembles the former in character, is found in every part of that country, near Madras, in Mysore in Bengal and the North-West provinces up into the Punjab. This tree is especially valued in many places as its sap or Palm juice (*tari*) is either drank fresh from the tree, or fermented for distillation, when it yields a common kind of spirit or *aruk*. In Bengal it is valuable as yielding a considerable quantity of the sugar produced in that province, and known as Date sugar. Each tree, "on an average, yields 180 pints of juice, of which, every twelve pints are boiled down to one of *goor* or *jaguri*, and four of goor yield one of good powder sugar; so that the average produce of each tree is about seven or eight pounds of sugar annually." (Roxburgh.) The leaves are very generally employed for making mats and baskets and also bags in Bengal. The footstalks of the leaves are beaten and twisted into ropes, which are employed for drawing water from the wells in Bellary and other places. One species of *Phœnix* (*P. paludosa*), the *Hintal* of Bengal abounds in the Sooonderbunds while another *P. farinifera* common on dry, barren, sandy lands on the coast, and on the hilly country between the Ganges and Cape Comorin. Its stem abounds in farinaceous matter, which the natives make use of as food in times of scarcity. The leaflets are wrought into mats for sleeping on. The common footstalks of the leaves are split into three or four, and made into baskets of various kinds.—*Fib. Pl. p.* 96. In Tenasserim, Mr. Mason has seen young date trees raised from the seeds of the dried dates that are imported, and there is no apparent reason why the tree might not be cultivated. The dates that grow in India are of a very inferior quality to those brought from Persia and Arabia. The finest Arabian date we are told by Dr. Herbert, come from a town called Hagiar in the province of Bahrain.—*Mason. Ainslie. p.* 36.

(6274) PHŒNIX FARINIFERA. Is a

dwarf species. The fruit ripens in May, and a species of sago is procured from the trunk, which is split and dried, and then beat in wooden mortars until the farinaceous parts are detached.—*Jaffna*. It is a native of dry ground or sandy hills, not far from the sea on the Coromandel Coast. It flowers in January and February, and the fruit ripens in May. The leaflets are wrought into mats for sleeping on, and the common petioles are split into three or four, and are used for making baskets. The small trunk is generally about 15 or 18 inches long, and about 6 inches in diameter. It incloses in its substance a large quantity of farinaceous matter, which the natives use for food in times of scarcity. To procure this meal, the small trunk is split into six or eight pieces, and dried and beaten on wooden mortars till the farinaceous part is detached from the fibres; it is then sifted, to separate them; the meal is then fit for use. The only further preparation which this meal undergoes is the boiling it into a thick gruel, or conji. It seems to possess less nourishment than common sago, which is obtained in a similar manner from another palm, and is less palatable when boiled, but it has saved many lives in times of scarcity.—*Eng. Cyc.* Seeman tells us it is a dwarf plant, the trunk about one or two feet high, and so enveloped in the leaves as to appear like a bush. It is common on the peninsula of India, on dry barren sandy ground. Its leaflets are wrought into sleeping mats. The common petioles are split into three or four, and used to make baskets of various kinds. The exterior or woody part of the trunk consist of white fibres matted together, these envelope a large quantity of farinaceous substance which the natives use for food in times of scarcity. To procure this meal, the small trunk is split into six or eight pieces, dried, and beaten in wooden mortars, till the farinaceous part is detached from the fibres; and the meal, when separated by sifting, is fit for use, by being boiled into a thick gruel or conjee. It is, in fact, an inferior sago.—*Seeman.*

(6275) PHŒNIX PALUDOSA. Roxb. THE MARSHDATE PALM. This dwarf palm, grows plentifully on the Sunderbuns, South of Calcutta. *Hooker Him. Jour. Vol.* I. *p.* 1. On the low islands in the rivers, and on the shores which are inundated with the highest tides, the marshdate palm abounds, a small tree about twenty feet high, no thicker than a walking cane; whose fruit looks precisely like a bunch of dates, but it is not edible. Griffith says: "It is well worth cultivating on account of its elegance, and its being adapted for bank scenery."—*Mason.* P. paludosa, is the most Southern Indian species of the phœnix palms, and its elegant impenetrable tufts, well adapt it for bank scenery. The trunks of the smaller trees serve for walking sticks, the long trunks for rafters and the leaves for thatch.—*Seeman.*

(6276) PHŒNIX SYLVESTRIS. ECTCHA WOOD TREE.

Ectcha maram, TAM.

Phœnix sylvestris. Capt. Pharye informed Mr. Mason that he saw a wild date palm near one of the kyoungs in Amherst province, but though so abundant on the Hooghly this is the only one he ever heard of in the Provinces.—*Mason.* Phœnix Sylvestris is a species common in the arid parts of India, and there commonly called Khujjoor by the natives, and the Date-Tree by Europeans, which it resembles in appearance. In its parts of fructification it is like P. farinifera, but differs in growing to be a tree, with a tall pretty thick trunk and large yellowish or reddish fruit. It yields Tari, or palm wine, commonly called Toddy. The mode of obtaining this is by removing the lower leaves and their sheaths, and cutting a notch into the centre of the tree near the top, from which the liquor issues, and is conducted by a small channel, made by a bit of the palmyra-tree leaf, into a pot suspended to receive it. This juice is either drank fresh from the tree, or boiled down into sugar, or fermented for distillation when it gives out a large portion of spirit, called Aruk. Mats and baskets are made of the leaves. Sugar has always been made from this species, and accounts of it have been given by Drs. Roxburgh and Buchanan Hamilton. Date-sugar is not so much esteemed in India as that of the cane, and sells for about one-fourth less. It has sometimes been imported in considerable quantities into England, but is not distinguished from the cane sugar. Dr. Roxburgh calculated, 40 years ago, that about 100,000 lbs. were made annually in all Bengal. At the age of 7 or 10 years, when the trunk of the tree is about 4 feet high, it begins to yield juice, and continues productive for 20 or 25 years. The juice is extracted during the months of November, December, January, and February, during which period each tree is reckoned to yield from 120 to 240 pints of juice, averaging 180 pints. Every 12 pints, or pounds, is boiled down to one of goor, or jagari, and four of goor yield one of good sugar in powder, so that the average produce of each tree is about 7 or 8 lbs. of sugar annually.—*Eng. Cyc.* This tree grows all over East India, but it is said to do best on the sea coast. It produces 8 to 10 lbs. of sugar, and even 12 lbs. per tree.—*Bonynge, American, page* 143.

(6277) PHOLADIDÆ, a family of Conchiferous *Mollusca*, embracing the genera *Pholas*, *Pholadidea*, *Xylophaga*, and *Teredo*. The *Pholadidæ* perforate all substances that are softer than their own valves. The burrows of *Pholas* are vertical, quite symmetrical, and seldom in

distinct. The Ship-Worms (Teredines) also make symmetrical perforations, and, however tortuous and crowded, never invade each other, guided either by the sense of hearing or by the yielding of the wood. The burrow has frequently a calcareous lining, within which the shell remains free. *Teredina* cements its valves to this tube when full grown; the opening of the burrow, at first very minute, may become enlarged progressively by the friction of the syphous, which are furnished with a rough epithelium, but it usually widens with much more rapidity by the wasting of the surface. As the timber decomposes the shelly tubes of the *Teredo* project; and as the beach wears away the *Pholas* burrows deeper. (Woodward.) The number of living species of *Pholas* noted by Mr. Deshayes in his Tables is 15, and of these one, *P. candida*, is recorded as living and fossil. Woodward, in his Manual of the Mollusca, gives 23 recent species of *Pholas* and 25 fossil. Forbes and Hanley give the following as British species:—*P. dactylus*, *P. parva*, *P. crispata*, *P. candida*, *Xylophaga dorsalis*, *Pholadidea papyracea*.

(6278) PHOLAS. Animal more or less thick and elongated rarely shortened.

(6279) *Teredo* is the name given by Linnæus to a genus of Testaceous Molluscs, highly interesting on account of the ravages which one of the species commits upon submerged wood. Linnæus, in the twelfth edition of the 'Systema naturæ,' placed the genus among his *Vermes Testacea*, between *Serpula* and *Sabella*. Cuvier, in his last edition of the 'Regne Animal,' makes *Teredo* one of the genera of his Enfermes, the fifth family of his Acephalous Testaceans, arranging the genus between *Pholas* and *Fistulana*.—*Eng Cyc.*

(6280) PHOLIDOTA ARTICULATA. In the suburbs of Maulmain, a white flowered species of pholidota is not rare.—*Mason.*

(6281) PHOOL-EL-KA-TEL, an odoriferous oil made by placing sweet scented flowers, in three or five successive patches, over gingelly oil seed, and then expressing the oil. The best is made at Gingi, and is sold at 1½ rupee for two pounds.—*Herklots.*

(6282) PHOOT. Cucumis Momordica.—Field Cucumber. A wild species of cucumber sown generally in the fields amongst Jaworie, and is something between the melon and cucumber; it keeps for a long time if not too ripe and would be valuable as a store vegetable for sea.—*Riddell.*

(6283) PHORMIUM, a genus of Plants of the natural family of *Liliaceæ*, tribe *Agapanthæ* of Endlicher, *Asparagæ* of Lindley, contains only a single species, which is remarkable for its useful product, so well known under the name of New Zealand Flax, and which is found indigenous in New Zealand and Norfolk Island.—*Eng. Cyc.*

(6284) PHORMIUM TENAX has a coloured tubular perianth, of which the tube is very short, and divides into six segments, of which the three inner are the longest; stamens six, inserted into the base of the tube, ascending, exserted; capsule oblong, 3-cornered: seeds numerous, compressed; embryo in the centre of the seed, longer than half the albumen, with its radicle next the umbilicus. The root is tuberous, fleshy, and bitter tasted; the leaves are numerous, all radical, linear-lanceolate, five or six feet long, and from an inch and a half to two inches broad, 2-rowed, equitant at the base, leathery, and very tough. Its flowers are numerous, showy, yellow-coloured, arranged on a tall branched panicle. The leaves of this plant yield a very beautiful and a very strong fibre, which has been imported in considerable quantities under the name of New Zealand Flax. It was expected to be much more useful than it has proved to be, in consequence of its having the defect of breaking easily when made into a knot. Being a plant of high southern latitudes, it was supposed that it might easily be grown in different parts of Europe. The French have attempted to cultivate it near Cherbourg, Toulon, and other places, and it has been introduced into Ireland, the moist insular climate of which is probably favourable to its growth. It grew remarkably well for a number of years in the Chelsea Botanic Garden, but was killed by the severe winter of 1837-38. Its cultivaton has also been attempted in Australia, but has not yet succeeded to any extent.—*Eng. Cyc.*

New Zealand Flax (*Phormium tenax*)—was discovered by the celebrated Cook in New Zealand—as he says "the country produced a grass plant, like flags, of the nature of hemp or flax, but superior in quality to either; of this the natives make clothing, lines, nets, &c." It grows both on the north and the south coast. It was introduced in the year 1798 into the south of Ireland, and has been found to flourish on the west coast of Scotland, though European winters are occasionally too severe for it. The native name of the plant is *koradi* or *korere*, while the fibre is called *muka*. The leaves of the plant are perennial, hard, sword-shaped, from five to seven feet in length, with a flower-stalk rising four or five feet above them, and bearing a profusion of yellow flowers, followed by triangular seed-vessels, filled with flat and thin black shining seeds. According to Salisbury, three-year old plants yield on an average, thirty-six leaves, beside offsets from the roots. Six leaves produced one ounce weight of dry fibres, after being scutched and cleaned; and he calculated that an acre cropped with these plants, three feet apart (but they could not be placed so near without interfering with each other), will yield

more than sixteen cwt. "The leaves are cut when full-grown, macerated in water for a few days, and then passed under a weighted roller." The natives of New Zealand cut the leaves when full-grown, and separate the fibres while yet green. Mr. G. Bennett states that a lateral incision is made with a large shell on each side of the leaf, merely to cut through the epidermis, which is first removed, and then, what he calls the internal epidermis, probably a part of the cellular tissue, "which agglutinates the fibres, and, if not removed, deteriorates the flax." The principal operation is scraping with the shell, and then separating the fibres with the thumb-nails, and then employing combs for a more minute separation. The fibres are subsequently dried in the sun, and are perfectly white; some stout and strong, others fine and silky. It is said that "the plant may be shorn of its leaves in the morning, and before the sun has set be ready for weaving into cloth." The same thing may, no doubt, be done with others of these naturally white endogenous fibres. Considerable quantities were at one time imported, and a factory was established by Capt. Harris for their manufacture, but the supply seems to have been irregular, and now to have fallen off rather than increased. Mr. J. Wood, in the year 1844, in a communication to the Agricultural Society of India, called attention to the New Zealand Hemp, as a plant which was very hardy and would thrive in any soil or climate, but that it preferred swampy lands. He stated that it was often met with in New Zealand, thriving three or four feet under sea-water, (but it is also found at some distance from the seashore). He therefore thought the locality of the Soonderbunds, extending from near Calcutta to the sea, to be well adapted for this plant: and which would be profitable in a country where labour was so cheap. But it seems to have been forgotten, in this, as well as in a paper in the first volume of the 'Transactions of the Society,' that a plant which flourishes so far south as New Zealand, and succeeds well both in Scotland and in Ireland, is not likely to do well in so tropical a situation as that of the Soonderbunds. An interesting set of specimens of New Zealand Flax, showing the native method of preparing the fibre and of dyeing it black, were sent to the Exhibition of 1851, by Taohui, a New Zealand chief; and another, a very valuable and suggestive set of specimens of the fibre and its tow, by Mr. E. W. Trent (v. 'Illust. Col.,' xli, p. 187), which he described as having been separated entirely by machinery invented by himself. If this fibre can be so prepared, then it is evident that others of the same nature may be successfully treated in a similar manner. These fibres are applicable to a variety of purposes, either of a textile nature or for cordage, and will, like the other white fibres we have mentioned, take colour. The strength of the fibres is considerable, for in some experiments by De Candolle, in which, however, that of Agave is understated, there is no doubt that the New Zealand Flax, which bore 28·7, was stronger than either Flax or Hemp, which bore respectively 11¾ and 16¾. It has also the advantage of being lighter, but has the disadvantage of many of the white fibres of breaking at a knot. Mr. J. Murray, in his pamphlet on this plant, printed on paper made from its leaves, states that the ship Atalanta, which plied between Southampton and the Channel Islands, was completely equipped with cordage and rigging made of *Phormium tenax*. He further continues—"I have seen specimens of ropes, twine, yarn, lines, sailcloth, sacking, bedtick, &c., made of *Phormium tenax*, also fine fabrics of various kinds, affording demonstrable evidence that its fibre is susceptible of being woven into tissues of the most delicate description, or manufactured into materials of the strongest and coarsest kind. The sails, cables, and running rigging of the beautiful model of the frigate presented by his late Majesty William the Fourth to the King of Prussia, were entirely formed of *Phormium tenax*. Capt. Harris's yacht, a perfect gem in naval architecture, was supplied with a mainsail composed of three different varieties of New Zealand flax, and the cordage made of *Musa textilis*," that is, of Manilla hemp, of which we have before treated.—*Royle. Fib. Pl.*

(6285) PHOTINIA GLABRA, is common in China and ornamental. It is a noble evergreen, which in the winter becomes covered with bunches of red berries.—*A Res. among the Chi, p.* 51.

(6286) PHOTINIA SERRATIFOLIA.

Doukyat, Burm.

Found in the neighbourhood of Rangoon and along the banks of the streams in the Rangoon districts, in the direction of the Teak forests. Red wood, adapted to cabinet making.—*McClelland.* The leaves of this plant are used for a green dye.—*McClelland.*

(6287) PHRAGMITES, a genus of Plants belonging to the natural order *Gramineæ*. *P. communis*, the Reed, is a plant formerly regarded as a species of *Arundo*, but now separated from that genus on account of its lower floret being male while the others are hermaphrodite, and its rachis being fringed with long silky hairs. It is a tall plant with annual stems and a perennial root and is found exclusively in places overflowed even during summer. In such situations it is found abundantly in Great Britain, and occurs all through Europe, is common in Siberia, Japan, North America, and even Australia, forming thick coverts, and yielding an abundance of stout durable grass of great value for the pur-

need of thatching the roofs of buildings. This is undoubtedly the φραγμίτης of the Greeks. A second species is said to grow in Egypt, and a third in the island of Mauritius; the two latter species are however little known.—*Eng. Cyc.*

(6288) PHRYNIUM DICHOTOMUM.

Theen, BURM.

Very plentiful in the forests of the Pegu and Tounghoo districts. It is said to afford a strong fibre.—*McClelland.*

(6289) PHYLLANTHUS. Of this genus of plants Dr. Wight gives bacciformis, 1893; leprocarpus, 1895; Madraspatensis, 1895; multiflorus, 1901; myrtifolius, 1902; Niruri, 1894; polyphyllus, 1895; rhamnoides, 1895-98-1900; Rheedii, 1895; scandens, 1895-99; tetrandrus, 1900-1902-1903; turbinatus, 1897; vitis idœa, 1293-1900.

(6290) PHYLLANTHUS. There is a small tree very abundant at Maulmain, and in many other localities on the Tenasserim Coast, belonging to the genus phyllanthus which bears a small intensely sour fruit, that is valued by the natives.—*Mason.*

(6291) PHYLLANTHUS EMBLICA, Linn. EMBLIC MYROBALAN.

Oosarica, TEL.	Topoo nellee, TAM.
Aola, Anola, HIND.	Awla or Aunlee, DUK.

This grows to a pretty large tree and is cultivated throughout most parts of India, and is found wild throughout the Concan and Deccan. —*Riddell.* The tree is cultivated at Ajmeer, but grows wild in Kotah and Mewar.—*Genl. Med. Top. p.* 208.

The Flower.

Nelliepoo, TAM.	Woosheri ke poo, TEL.
Aonli ka pool, DUK.	Amalaka. SANS.
Vurdi Amludge, ARAB.	

This flower is supposed to be cooling and gently aperient, and is prescribed in conjunction with other articles in the form of electuary.—*Ains. Mat. Med. p.* 94.

The Fruit.

Nellie pullum, TAM.	Amuleh, PERS.
Aoula ka pull, DUK.	Aunwera, HIND.
Amluj, ARAB.	Woosherikaia, TEL.

Anola, Aola, Phyllanthus Emblica. Emblic Myrobalan. The fruit is brought from Kotah and Mewar. It is used abundantly fresh or dried as a condiment, being pickled also; and in dyeing, and to weigh the hair with; the fruit is very acid and astringent, and contains gallic acid. The use of this fruit was supposed beneficial as an adjuvant in treating the scurvy at Nusseerabad.—*Gen. Med. Top. p.* 124 & 208. The fruit resembles the gooseberry, having a sharp acid juice, and is eaten raw by the natives, and is sometimes made into preserves; the bark is strongly astringent and is used for tanning leather.—*Riddell.*

(6292) PHYLLANTHUS LONGIFOLIUS.

Cheera nella, HIND.	Hurpororí, DUK.

A small tree, commonly cultivated for the sake of its fruit, which is the size of a large gooseberry; it is more esteemed by the Europeans than the Emblica, and is used both as a pickle and preserve—*Riddell.* In Ajmeer, in gardens, but wild in Kotah, the acid berry is eaten.—*Med. Top. p.* 208.

(6293) PHYLLANTHUS MULTIFLORUS, PHYLLANTHUS, MANY FLOWERED, BARK OF. Willd.

Poola Puttay, TAM.

This bark, which is also called Neerpoola Puttay, from the plant growing near water, is occasionally employed by the Natives of India in the process of dyeing reddish brown.—*Ains. Mat. Med. p.* 191.

(6294) PHYLLANTHUS NIRURI, Native of the East Indies.

Sadee hazar munee, HIND. and BENG.	Nella userekee, TEL.

A common weed, according to many writers; the root is bitter and astringent, and a powerful diuretic. *P. urinaria*, (hazar munee. yerra userekee,) East Indies and Bourbon, is of similar properties, and used in several maladies; flowers sessile, capsules dull, scabrous, young plants deeply dark red.—*O'Shaughnessy, page* 551.

(6295) PHYLLANTHUS SIMPLEX, RETZ. Roxb. iii. p. 654.

Oochie userekee, TEL.

Fresh leaves, flowers, and fruit, with cummin seeds and sugar are made into an electuary, and given by the natives as a remedy for gonorrhœa; fresh leaves bruised with buttermilk are used to cure the itch. *Roxb.*—*O'Shaughnessy, page* 552.

(6296) PHYLLANTHUS VIROSUS. Up among the Circar mountains, where this chiefly grows, it is frequently a middle sized tree. In the forests of the low countries it is much smaller or only a large shrub. It flowers during the hot and beginning the wet season. The bark is a strong astringent and possesses the power of intoxicating fish, when thrown into the water where they are, which, like the berries of Menospermum cocculus, renders them easily taken.—*Roxb.* from *Rohde M. S. S.*

(6297) PHYLLANTHUS VITIS IDŒA.

Khaton Nirouri, RHEED.	Yerrapooroogoodoo, TEL.
Hunkata jooli, BENG.	

This is one of the most common of the family. It is found wild in every part of India, and seems to thrive well in all soils and situations, but amongst the mountains, it grows to be a tree; where as in the low lands, it is generally a large

shrub. It flowers and produces fruit all the year round. The wood is white hard and durable. The hill people employ it for various economical uses. Cattle eat the leaves. In drying for the hortus siccus they always become very black; it is frequently employed for ornamental hedges in gardens for which end it is well chosen, as its thick evergreen foliage and constant succession of beautiful red berries gives it a pretty appearance. *Roxb.—Rohde M.S.S.*

(6298) PHYLLODOCE, a genus of Plants belonging to the natural order *Ericaceæ*. It has a 5-parted calyx, an ovate corolla with a contracted 5-toothed mouth, 10 stamens inclosed, slender glabrous filaments longer than the anthers, short truncate cells opening by pores at the apex. The seeds are compressed and shining. The species are small evergreen shrubs, natives of the North of Europe, Asia, and North America.—*Eng. Cyc.*

(6299) PHYLLOPODA, (Latreille), a section of Entomostracous *Crustacea*, [ENTOMOSTRACA]. —*Eng. Cyc.*

(6300) PHYLLOSOMA, a family of *Crustacea*, called by Milne-Edwards Double-Cuirassed (Bicuirasses). It is composed of forms which are very remarkable for their rounded shape and the transparency of their teguments. The species are found in the seas of warm countries. M. Milne-Edwards remarks, that were it not for the beautiful blue of their eyes, they would not be perceived as they float on the surface of the water, so transparent are their bodies The seas of Africa and India, Australia and New Guinea furnish the greatest number of species. M. Milne Edwards divides the genus into three natural groups.—*Eng. Cyc.*

(6301) *Phyllosoma commune*, has the cephalic plate less than the thoracic plate, covering the base of the second pair of feet (or external jaw-feet); elongated, and narrowed forwards. It inhabits the seas of Africa and India.—*Eng. Cyc.*

(6302) *Phyllosoma claviconne*, from the seas of Africa and Asia, is another example of this section.—*Eng. Cyc.*

(6303) *Amphion Rehnaudii*, the only species known, was taken at Sea in the Indian ocean, by *M. Reynaud*, naval surgeon. Its length is about an inch; and its teguments, with the exception of those of the abdomen, are diaphanous. —*Eng. Cyc.*

(6304) PHYSALIS (from φῦσα, a bladder, in reference to the inflated calyx), a genus of Plants, belonging to the natural order *Solanaceæ*. It has a 5-toothed calyx; a campanulate rotate 5-lobed corolla; converging anthers opening longitudinally; a capitate stigma; smooth 2-celled berry, covered with the angular membranous inflated calyx. The species are annual or perennial herbs, rarely shrubs.—*Eng. Cyc.*

(6305) PHYSALIS ALKEKENGI, the Winter Cherry, is an herbaceous downy plant, with a perennial creeping root, ovate deltoid leaves; spotless flowers, ovate coloured calyx, and subulate segments. It is a native of Europe on exposed hills, and of Japan. The corolla is a dirty white; the calyx reddish-yellow, inclosing a red berry. The fruit of this plant was well known to the ancients, and is described by Dioscorides. In England however the fruit is seldom eaten, and the plant is cultivated chiefly on account of its appearance. In Arabia and Armenia, Spain, and Germany however the berries frequently supply the place of other eatable fruits. They have a subacrid and not unpleasant flavour, but the persistent calyx with which they are invested is very bitter. Ray speaks of these berries as a preventive of gout, and others have extolled them as diuretics, and recommended them in the treatment of dropsy.—*Eng. Cyc.* The Physalis Alkekengi, having some repute as a febrifuge, M.M. Dessaignes and Chautard analysed it, and succeeded in procuring a bitter substance, which they have called Physaline, forming a light white powder with a very slight shade of yellow, leaving in the mouth after a time a very marked taste of bitterness. This substance does not seem to have been used medicinally, nor has its value, if any, been ascertained. Were it otherwise it might be well to examine Physalis flexuosa of this country, used in native medicine as stimulent and diaphoretic.—*Ind. Ann. Med. Sci. for Apl.* 1856. *p.* 384. Honigberger, *p.* 324, tells us that its fruit (Halicacabum), the winter cherry, is what the Easterns call Kagnuj. The English have given the name of Kagnuj to the Physalis flexuosa or somnifera, as this is the name of the plant in the lower parts of Hindostan, in Bengal? The winter-cherry is used by the Hakims as a diuretic, and in ulceration of the urinary bladder. It is said to be purgative and is much used in veterinary medicine. The winter-cherry has long been abandoned in European practice and is now regarded as useless.—*Honigberger.*

(6306) PHYSALIS ANGULATA. COUNTRY GOOSEBERRY, OR WINTER CHERRY. Linn.

Takalie pullum, TAM.	Kaknuj, PERS.
Poplah, DUK.	Takkali pundoo, TEL.
Jouzul huruj, ARAB.	Agnimunda, SANS.

This has got the name of country Gooseberry in India, from its resemblance in taste to that fruit: it is the produce of a small bush which has been called by Botanists, "The tooth leaved Winter Cherry," and is of the class Pentandria and order Monogynia.—*Ainslie, p.* 233.

(6307) PHYSALIS FLEXUOSA, as also Physalis somnifera, grows among the ruins of the old city of Lahore. The Punjabees call the plant *agsend* not as stated by so many authors as also in the Bengal Dispensatory, *Asgend*. Asgend

(Ygrund) *Nagowri*, is a root officinal with the native doctors in the Punjab, and is imported from Hindostan. The seeds used by Honigberger under the name Physalis flexuosa semina, were not the seeds of the Lahore plant, but had been imported from Mooltan. They are kept by the druggists, who call them *Penir ke. big*. Piddington states that *Peneru* is Physalis flexuosa. Penir is the Persian name of chee-e, and as these seeds are employed in the coagulation of milk for making cheese, the derivation of its name is palpable. The plant which yields these seeds grows on the west side of the Indus river. The leaves which are very bitter, are used as an infusion by the Loanis in fever. Galium verum, Linn, was formerly used in Europe for the coagulation of milk. Its flowers are yellow, those of Peniru not known. The fruit of Physalis flexuosa is accounted diuretic, and the root and leaves powerfully narcotic, the latter are used in India as a poultice to inflamed tumors.—*Honigberger*, *p.* 324.

Common at Ajmeer the roots are sold by punsaris, and are considered stimulating and diaphoretic.—*Gen. Med. Top. p.* 183.

(6308) PHYSALIS PERUVIANA.

Tapureea, Hind.

The Winter Cherry. This plant, commonly called Cape Goosberry or Brazil Cherry, grows luxuriantly in a good soil. The seed should be sown at the commencement of the rains. The young plants when about six inches high should be set out in rows at least two feet apart from each other, sufficiently wide apart, in fact, to allow the gardener to pass easily between them. They may be grown either on sticks or on trellis, and should be carefully pruned. The young shoots bear the finest fruit, and if carefully attended to, will bear almost all the year round,—the excellence and abundance of the fruit well repaying for any extra care bestowed on the cultivation of the plant. Being of easy culture, it is hardly known to what a state of improvement this apparently worthless fruit may be brought. Produced under an improved method of cultivation, it is a most wholesome and useful fruit; none more so for tarts, or even for dessert, and for making jam or preserve. After seeing the common fruit, grown without care or attention, one would scarcely credit the size of that produced under proper and careful management. The bush should every now and then be carefully pruned, cutting out the old wood, as the new shoots provide the finest flavored fruit.—*Riddell.*

(6309) PHYSALIS PUBESCENS, Downy Winter Cherry, is a native of North America and the East Indies. The whole plant is densely clothed with down. The corolla is yellow marked with five roundish brownish-violet spots at the throat. The berries are yellowish when ripe; they are called Gooseberries, and are used as a substitute for them in many parts, and when preserved with sugar make an excellent sweetmeat. It is the Camaca of Brazil.—*Eng. Cyc.* Cultivated in Ajmere gardens for the fruit.—*Gen. Med. Top. p.* 183. "Brazil gooseberry," is occasionally seen in Tenasserim gardens.—*Mason.*

(6310) PHYSALIS SOMNIFERA. *Syn.* P. FLEXUOSA. Roxb. Fl. Ind. i.

Usgund, also Kakunj, Hind. | Amookanam (root): also Amkootang kaling, Tam.

A native of rocky places on the sea coast of the south of Europe and the East.—*O'Shaughnessy*. *Physalis somnifera*, has several shrubby branched stems, round and downy. The leaves are in lateral pairs, short-stalked, ovate, downy, and from two to four inches long. The flowers are axillary, subsessile, small, crowded, and of a greenish-yellow or white. The berry is red and smooth, and about the size of a pea. This plant is the Στρύχνος ὑπνωτικὸς of Theophrastus ('Hist. Plant.,' 9, 12); and the Στρύχνον αλικάκαβον of Dioscorides (4, 72). It is a native of rocky places in the south of Europe and the East Indies. It is reputed to be narcotic, diuretic, and alexipharmic. The leaves steeped in oil are in India applied to inflammatory tumours, and they are used in a similar way in Egypt. Kunth recognised this plant in Egyptian mummies.—*Eng. Cyc.*

(6311) PHYSOLOBIUM. Leguminosæ.—These plants are not much known. They are natives of the Swan River, and take their name from Physa, a bladder, and lobos, a pod, alluding to the shape of the seed vessels—*Riddell.*

(6312) PHYTELEPHAS (from φυτόν, a plant, and ἐλέφας, ivory), a genus of Plants belonging to the natural order *Pandaneæ*, of Brown, and originally referred by Lindley to the order *Cyclanthaceæ*, but in his 'Vegetable Kingdom' he places it with the Palms. Under this name it was first described by Ruiz and Pavon, in their 'Systema Vegetabilium Floræ Peruvianæ.' It was also described by Willdenow under the name *Elephantusia*, but the former name is now generally used. The substance called Vegetable Ivory consists of the seeds of species of *Phytelephas*. This genus is characterised by possessing pinnated fronds and an erect stem. The flowers are arranged on a spadix inclosed in a universal spathe, and are of two sorts, the one containing both stamens and pistils; the others only pistils. The spadix is crowded with flowers, and the stamens are very various; the style is divided into 5 or 6 deep segments; there is no visible calyx or corolla; the fruit consists of quadrilocular drupes, which are aggregated into a large muricated coriaceous head. The seeds are about the

size of a pigeon's egg, and of an oblong-ovate triangular shape. When young, they contain a crystalline liquor without odour or taste, which is regarded as a refreshing drink by travellers. In the process of growth however this once opaline liquid becomes milky and opaque, acquiring some taste and odour, and at last it is converted into a substance in many instances whiter and harder than ivory. If the liquid of the seed is kept long, even when it is clear, it becomes sour, thus indicating that although clear and tasteless it contains some carbonaceous principle, as well as water. There are two species of *Phytelephas*, yielding seeds of the same kind: the *P. Macrocarpa* has a low stem and large fruit, whilst the *P. microcarpa* has little or no stem and small fruit. These plants, which have an external character something between a palm and a cycas, occur in South America, in the valleys of the Peruvian Andes, and especially on the borders of the river Magdalena. The natives of these districts have used the seeds from time immemorial, for the purposes of making buttons, heads to walking-sticks, and various trinkets; but it is only within a recent period that they have been used for such purposes in Europe. They are now extensively so, as far as their size will permit them, for the manufacture of almost all the articles for which ivory had been in use before; and, as they can be made at a cheaper rate, their sale is at present somewhat extensive. In the use of the nuts for turning, considerable difference is found in their quality; some are comparatively oily and soft, and work up with ease, whilst others are so brittle as to be unmanageable in the lathe. They do not answer so well as ivory for the construction of delicate articles, as they are much more easily fractured; and although at first these seeds are whiter than ivory, they are not found to retain their colour so well. It might at first appear difficult to account for the germination of these plants, as the albumen, which is destined to nourish the young plant, is as hard as ivory; but this is provided against by the hard albumen absorbing water, and thus not only becoming soft and capable of being used by the embryo, but it also loses its whiteness. It regains these properties when dry. The embryo is small compared with the size of the seed, of a sweet taste, and lies inclosed in a little bag at one end of the seed, the presence of which is indicated by a slight swelling on the external part of the seed. When the seeds are brought into England they are contained in a soft external tegument of a light colour, and about the eighth of an inch in thickness, with a dark mark indicating the point of attachment. This covering is easily removed, and the seed underneath is of a dark brown colour, from a membrane which is closely attached to the albumen. In some cases this is of a reddish colour, especially on the smaller seeds, and these are probably the produce of the smaller species of the plants. When the seed is cut completely through, an irregular cavity is found in the centre. This should be attended to in working it. (Ruiz and Pavon, *Systema Vegetabilium Floræ Peruvianæ*; Cooper, Paper *On Vegetable Ivory*, in *Microscopical Journal*, No. 16.)—*Eng. Cyc.*

(6313) PHYTOLACCA, a genus of Plants the type of the natural order *Phytolaccaceæ*.—*Eng. Cyc.*

(6314) PHYTOLACCA ACINOSA. Roxburgh describes a *Phytolacca acinosa* obtained from Nipal, where the leaves are eaten after boiling, as is the case with the American species described below. It flowers in the Botanic Garden of Calcutta about the end of the cold season, and certainly demands careful trial.—*O'Shaughnessy, page* 527.

(6315) PHYTOLACCA DECANDRA. Poke weed, North America. Bigelow states that in emetic properties the root is very nearly equal to Ipecacuana, its use is however sometimes attended with slight narcotic symptoms. It is also used as an external application in itch, and tinea capitis.—*O'Shaughnessy, page* 527.

(6316) PHYTOLACCA ICOSANDRA. An herbaceous plant; leaves alternate, entire, without stipules; flowers racemose. A tincture from the ripe berries has the reputation of being a remedy for chronic rheumatism and syphilitic pain.—*Riddell.*

(6317) PIACABA, ATTALEA FUNIFERA. A most valuable palm, found in the native forests of the maritime provinces of Brazil, the fibres of its leaf stalks and other parts furnishes the best Cordage of South America.—*Seeman.* A coarse black fibre is obtained from the dilated base of the petioles. It is collected by the natives, and partly used for home consumption, partly exported to Europe, tied up in bundles of several feet in length, and sold in London under this name at about £ 14 the ton. It is manufactured into cordage in its native countries, and as it is light, cables made of it do not sink in the water. —*Seeman.*

(6318) PICIDÆ, a family of Scansorial Birds. The order *Picae* of Linnæus is thus characterised:—Bill (cuneus sarriens) cultrated, with a convex back. Feet walking, short, rather strong. Body 'tenaciusculum,' impure. Food 'quis, quiliæ.' Nest in trees; the male feeding the incubating female. Monogamy. Order analogous to the *Primates*.

The following is Mr. Swainson's systematic arrangement:—

Picidæ.—Bill straight, more or less conic. Toes placed in pairs.

Sub-family :—*Piciaæ* (*Picina*?), the True Woodpeckers. Bill wedge-shaped. Tongue vermiform.

(6319) *Picus*, Typical-Woodpeckers.—Bill perfectly wedge-shaped, cylindrical; the culmen straight; lateral ridges removed from the culmen. Versatile (outer posterior) toe always longer than the anterior (outer fore toe).

Sub-genera :—*Picus* (America and India); *Hemicircus* (India); *Dendrobates* (Africa, except two species from Tropical America); *Apternus* (Arctic Regions); and *Dendrocopus* (Universal.)

(6320) *Chrysoptilus*, Green-Woodpeckers.—Versatile and anterior toes of equal length. Lateral ridge nearest to the culmen, which is sharp, and either quite straight or very slightly bent. Bill depressed or widened at the base. Colour green banded or spotted with black. Sub-typical genus.

Sub-genera :—*Dendromus* (Africa and India); *Chloronerpes* (Tropical America); *Dryotomus* (America and Europe); *Chrysoptilus* (Tropical America).

(6321) *Malacolophus*, Rasorial-Woodpeckers.—Versatile toe shorter than the anterior, culmen curved. The lateral ridge (except in the typical group) wanting. Tarsus shorter than the versatile toe. Hind head with a crest of very soft feathers.

Sub-genera :—*Brachylophus* (Old World only); *Hemilophus* (India only). Typical :—*Malacolophus* (Tropical America only); *Meiglyptes* (India); *Chrysonotus* (India only).

(6322) *Colaptes*.—Tarsus lengthened and equal to the versatile toe; which latter is shorter than the anterior. Bill broader at its base than it is high; the sides compressed; the culmen considerably curved from its base; the lateral ridge either obsolete or entirely wanting. Nostrils partially defended by feathers.

Sub-genera :—*Geocolaptes* (Africa only); *Colaptes*.

(6323) *Melanerpes*.—Bill straight, more or less cylindrical; base wide; the ridge of the culmen slightly bent, but not very prominent; the sides rounded; the lateral ridge slight, and placed near but not close to the culmen. Gonys very long, as in the typical group. Nostrils nearly concealed. Wings long; the first quill spurious or very small; the second nearly as long as the third. Toes various. Habits gregarious and migratory. Colours black, varied with white and red. The fissirostral type (America only).

Sub-genera :—*Centurus*, *Leuconerpes*, *Melanerpes*, *Tripsurus*. Sub-family : *Buccoinae*, Barbets [BARBETS]. Bill surrounded with long bristles. Tail short, soft.

(6324) PICUS SHORII. Upper part of the head and elongated crest of the head and rump rich scarlet; a white line, extending from the base of the upper mandible to the occiput, edges the scarlet of the head; a black band originates behind the eye below this white line, passes through the ear-coverts to the back of the neck, and there spreads as far as to the back; cheeks and sides of the neck white, separated from the throat and forehead by a wavy black line passing from the gape to the sides of the chest; base of the lower mandible bordered by a brownish mark; throat white; back orange passing into various tints of scarlet on the shoulders and wing coverts, and on the rump into bright scarlet; quills, tail, and upper tail-coverts black; under surface dirty brownish-white, with black scale-like marks; bill and tarsi black. Length 12 inches. It is also found in the Himalaya Mountains. This three-toed woodpecker exhibits a close affinity with *P. tiga* (Horsf.) an inhabitant of the Indian Archipelago, as well in colouring as in the absence of the hinder toe, which in both birds is represented only by a rudimentary tubercle. Few, if any, of the tribe surpass it in brilliancy of plumage.—*Eng. Cyc.*

(6325) PICUS SQUAMATUS. Top of the head and occiput scarlet; above and below the eye a yellowish-white streak; a black line extending from the base of the lower mandible along the sides of the neck; the upper surface of a bright green; quill-feathers and tail dull olive-black, barred with white; throat and breast grayish-green; abdomen and under surface of a still lighter tint, marked with black scales closely and regularly disposed; bill yellowish-white, hornbrown at the base; tarsi brown. Length 12¼ inches. It is found in Asia, in the Himalaya Mountains.—*Eng. Cyc.*

(6326) PICUS CANUS, of the continent may be considered as a type of an intermediate class, and which are the only species found in Europe—the present species, as well as P. occipitalis, also a Himalayan bird, may be classed; all these birds being found, like the typical Woodpeckers, to frequent trees as a resort for food, while at the same time they equally subsist, like the ground-feeding species, on ants and other insects which they obtain on the surface of the ground. Mr. Gould further states that the locality of *P. squamatus*, as well as *P. occipitalis*, is believed to be confined solely to the higher parts of the mountains.

(6327) PICKLES AND THEIR ADULTERATIONS. To persons unacquainted with the subject, the title of this article, "Pickles and their adulterations," may appear somewhat singular, and they may be disposed to ask, Are not the girkins, cabbages, beans, &c., which we see in the bottles, what they appear to be? And are other vegetables than those commonly known to us mixed with the ordinary kinds? To these question we thus reply. "Girkins," on close examination, often turn out to be

but shrivelled or sliced cucumbers; the "young tender beans" to be old and tough; the "cauliflowers" to have run to seed, and the "red cabbage" to be nothing more than white cabbage turned into red by colouring matter, as a dyer would change the colour of a dress; further, that amongst the vegetables, not unfrequently employed for the purpose of pickle-making, are some which do not enter into the calculation of the epicure, as vegetable marrows,—which, when cut into pieces, form a very respectable imitation of cucumbers,—and sliced turnips, the identification of which would be apt to puzzle even a botanist, as well as certainly all those who are uninitiated in the secrets of a pickle-manufactory.

1st. That the vinegar used for pickling is of a very weak description, the percentages of acetic acid ranging between 1·48 and 2·91. It will be remembered, that, vinegar of good quality ought to contain from four to five per cent. of pure acetic acid.

2nd. That nineteen out of twenty of the vinegars submitted to analysis, poor as they were, yet owed a portion of their acidity to sulphuric acid, the amount of which varied, in the different samples, from. 38 to 2·52 in the 1000 grains; the largest quantity of this acid being detected in the vinegars in which the red cabbages were pickled.

3rd. That in the whole of the sixteen different pickles analysed for copper, that poisonous metal was discovered in various amounts: two of the samples contained a small quantity; eight rather much, one, a considerable quantity: three a very considerable quantity; in one, copper was present in highly deleterious amount; and in two, in poisonous amounts.

4th. It will be observed, that the pickles which contain the largest quantity of copper, are those which consist entirely of green vegetables, as girkins and beans.—*Food and its Adulterations, p.* 383.

(6328) PICRORRHIZA.

Teeta, Beng. | Nepalese Hoon ling, Thib.

This name is given in Bengal to the roots of bitter herbs. This name is given in East Nepaul in the Yaloong valley, to this plant which is used as a febrifuge: the *Picroshiza*, is a plant allied to speed well, and grows at from 12,0 0 to 15,000 feet elevation, and is a powerful bitter, called "Hoonling" by the Tibetans.—*Hooker Him. Jour Vol.* 1 *p.* 272.

(6329) PICRORRHIZA KURROOA. (Syn. Veronica Lindleyana, Wal. Cat.) Grows in Gosainthan, Kemaon, and Kedarkanta. A fleshy, rooted perennial. Flowers sessile, deep blue, in dense spikes. The root is intensely bitter, and used as a medicine in India.—*O'Shaughnessy p.* 478. This plant grows on the hills of Hindostan, as also in the Cashmerian mountains, and the root is much in use at Lahore; but more in veterinary than in human medicine.—*Dr. Honigberger, p.* 335.

(6330) PICTURE PLANT, Graptophyllum hortense, Justicia picta: variegated leaf: blood red leaf. The justicia, one variety of which has variegated leaves, and the other deep purple, is multiplied throughout the Tenasserim Provinces.—*Mason.*

(6331) PIENCHE, the Tamil name of a Ceylon tree which is of a dark colour and very heavy and close-grained. It grows to about twelve inches in diameter, and fourteen feet in height. From this tree the native carpenters make the frames of vessels, it being considered durable: it produces a fruit which is of no use.—*Edye, Ceylon.*

(6332) PIERARDIA. Of this genus, Wight gives Courtallensis, 1972-13; macrostachys, 1912-13.

(6333) PIERARDIA SAPOTA.

Kanayœ, Burm.

Plentiful in the Pegu and Tounghoo forests, as well as about Rangoon. Dark brown wood. —*McClelland.*

(6334) PIGEON PEA is the seed of the plant called by Linnæus *Cytisus Cajan*, and by De Candolle *Cajanus bicolor* and *Cajanus flavus*. It is a kind of pulse highly esteemed by all classes of the natives of India, and is by them regarded as holding the third rank among such articles of food. —*Eng. Cyc.* See Cajanus Indicus.

(6335) PIGMENTS. In illustration of the variety of indigenous pigments, says Dr. Cleghorn, I may state that finding my colour-box becoming exhausted, I have been enabled to supply, on more than one occasion, all its deficiencies without difficulty from the natural products of the surrounding forests of the Malabar Ghauts, including yellow from the *Garcinia*, blue from various species of *Indigofera*, red and purple from *Oldenlandia umbellata*, *Pupplaychukkay* (*Ventilago* ?) and *Vatica laccifera*.

(6336) PIMELEA. A species of this plant is abundant in the Wynaad, where its fibre is made into sewing thread by the Natives. The plant is common all over the Neilgherries.—*McIvor, M. E. J. R.*

(6337) PIMELEA SPECTABILIS. Thymelaceæ. These are a beautiful genus of shrubby plants, growing to the height of two or three feet, they require a rich soil, and if carefully watered, produce numerous heads of flowers, the colours are white, red, rose and yellow, readily cultivated from seed.—*Riddell.*

(6338) PIMENTA VULGARIS. The "Allspice" tree, introduced from the West Indies. Several large trees are at Madras, but the cli-

mate of the Carnatic does not seem to suit them. —*Hort. Gyneu.* 46. *M E.J.R.* The pimento, *Eugenia Pimenta* (*Myrtus Pimenta*), is a native of Mexico, and the West Indies. It flourishes spontaneously and in great abundance on the north side of the Island of Jamaica; its numerous white blossom mixing with the dark green foliage, and with the slightest breeze diffusing around the most delicious fragrance, give a beauty and a charm to nature rarely equalled, and of which he who has not visited the shady arbors and perfumed groves of the tropics can have little conception. This lovely tree, the very leaf of which when bruised emits a fine aromatic odor, nearly as powerful as that of the spice itself, has been known to grow to the height of from 30 to 40 feet, exceedingly straight, and having for its base the spinous ridge of a rock, eight or ten feet above the surface of the hill or mountain. A single tree has frequently produced 50 lbs. of the raw, or 100 lbs. of the dried fruit. The fruit has an aromatic odor, and its taste combines that of cinnamon, nutmeg, and cloves; hence its common name of allspice. The fruit of *Eugenia acris* is used for pimento. The trunk is of a grey color, smooth and shining, and altogether destitute of bark. It is luxuriantly clothed with leaves of a deep green, somewhat like those of the bay tree, and these leaves are, in the months of July and August, beautifully contrasted and relieved by an exuberance of white flowers. The leaves yield by distillation a delicate odoriferous oil, which is said to be sometimes passed off for oil of cloves. The berries are gathered before they are ripe, and spread on a terrace, exposed to the sun for about a week, during which time they lose their green color, and acquire that reddish brown tint which renders them marketable. Some planters kiln-dry them. Like many of the minor productions of the tropics, pimento is exceedingly uncertain, and perhaps a very plenteous crop occurs but once in five years. In 1800 there were 12,759 bags and 619 casks of pimento imported from Jamaica; in 1824 there were 33,398 bags and 599 casks shipped from the island; in 1829 the quantity exported was 6,069,127 lbs. In the year ending October 1843, the export of pimento from Jamaica was 29,322 bags and 156 casks; in the year ending October 1844, 12,055 bags and 88 casks; in the year ending October 1845, 233 casks, valued at 30s. each, and 59,494 bags, valued at 20s. From 1st January to 1st August, 1851, 128,277 lbs. pimento were shipped from the port of Montego Bay, Jamaica. There was a very considerable pimento plantation made in Tobago, some years ago, by a Mr. Franklin, but it was abandoned by his sons, that they might attend the more exclusively to sugar culture. —*Simmonds.*

(6339) PIMPINELLA, a genus of Umbelliferus Plants inhabiting the meadows and mountains of Europe principally, is chiefly interesting on account of its comprehending among its species the Anise of the shops. This plant is an annual, with a smooth stem, one to one and a half foot high; the lower leaves roundish, cordate, lobed, and both serrated and cut; those of the stems pinnated with wedge-shaped lanceolate segments, and the upper trifid, with the lobes undivided and leaner. The flowers are small and white. The fruit is narrow, slender, rather hairy, with five filiform ridges to each pericarp. The latter is employed extensively as a carminative medicine, and for the purpose of flavouring liqueurs. The plant inhabits Egypt and the islands of the Grecian Archipelago, especially Scio.—*Eng. Cyc.*

(6340) PIMPINELLA ANISUM, Aniseed. (Ανισον. Dioscor.) Egypt, Scio, Levant. Lin.

Somboo, Tam.	Sonf, Hind.
Anisa, Guz.	Aneesoon, Arab.
Sonf, Duk.	Sataphuspha, Sans.
Razyanchroomee, Pers.	Mahoree, Beng.

Aniseed in various forms is much employed in medicine as a stomachic, especially in the diseases of children, and is also used as a condiment among all eastern nations. The seeds are often fraudulently mixed with clay, are liable to spoil by spontaneous fermentation in the packages. They are much richer in essential oil than the majority of the Umbelliferæ, 8 lbs. having given 3½ ounces of the oil —*O'Shaughnessy, p.* 358.

Essential Oil of Aniseed.—Is white, yellowish, a little lighter than water, congealing at 78 Fahr. into a soft mass, sp. gr. 0.985. It is liable to adulteration with spermaceti and several fixed oils, some of which may be detected by alcohol, all by leaving a greasy stain on paper when evaporated over a lamp. This oil contains nitrogen according to the analysis of Saussure. It only exists in the pericarp, the interior of the seed yielding a tasteless and inodorous fixed oil. This is often mixed with the essential oil, and is as much an adulteration as if castor or olive oil had been employed. The pure essential oil can only be obtained by distilling the seeds with water. The oil is a good and safe stimulant, and is much used in prescriptions for children suffering from flatulence and colic. (See Essential Oils.)—*O'Shaughnessy, p.* 359.

(6341) PIMPINELLA CANDOLLEANA, 341; involucrata, 335-567; Leschenaultii, 1005. Are given in Wights Icones.

(6342) PINCHBECK, Petit, or Similor.

Tombak, Dut.	Wellaety-Soona, Guz.
Similor, Tambac, Fr.	Hind.
Tomback, Ger.	Tombacco, It.
	Tambac, Tambaga, Sp.

A name given to one of the many imitations of gold, consisting of zinc combined in various proportions with copper or brass. It is frequently used as a substitute for gold, in the formation of watch-cases, rings, chains, lockets, &c. —*Faulkner.*

(6343) **PINE APPLE.** BROMELIA ANANAS. ANANASSA SATIVA.

Nanat, BURM.	Nanas, MAL.
Anasi, CHIN.	Koida chocka, MALEA.
Ananas, GUZ. & HIND.	Anasie-pullum, TAM.
Anasso, IT.	Ananas-puudoo, TEL.

A well-known succulent fruit of a tropical plant (*Ananassa sativa*), indigenous to America, and the East and West Indies, and now reared in hot houses in England. In its aboriginal state, it is inferior in every respect than when carefully cultivated, which may account for the superiority of the English pine apples. *Pine Apples* are perhaps the best of all the cultivated fruits of Pegu, and they require so little care, that they are brought into market in Rangoon in vast quantities of the finest quality from the end of April until the middle of August. In the upper parts of the province, about Prome and Tounghoo, they are scarce.—*Mc Clelland.* One of the most abundant fruits in the Tenasserim Provinces is the pine apple, also an American production. With the plant, the native American name appears to have been introduced into Burmah, for *nanas* is said to be the name it had among the Peruvians where it was originally found, and the Burman name is *nanat*; which the Sgaus have abbreviated to *nay*.—*Mason.*

The *Pine Apple Tribe* or *Bromellaceæ*. The Bromel worts, or the Pine apple tribe is a natural order of Endogens, consisting of dry herbaceous plants, remarkable for their hardness and dryness of foliage. The flowers of most are pretty, and some of them, remarkably handsome and sweet scented; but except in the genus "*Ananassa*" the fruit is in no case of any value: the order contains 23 genera and 130 species.—*Eng. Cyc. p.* 669. The Pine-apple, or Ananas, is one of this tribe of plants, and is an object of the most careful culture in Europe, on account of its pleasantly sweet and aromatic fruit. Its long and rigid leaves, which are thorny at the edges and point, abound in a quantity of fine white fibres, which are, in some countries, woven into the finest fabrics, netted or twisted into lines for fishing and into ropes possessed of considerable strength. These are said not to be injured by constant immersion in water—a property which the natives increase by tanning them. The Pine-apple (*Ananassa sativa*, formerly Bromelia Ananas), being a native of the moist forests of South America, from the level of the sea to elevations of about 1800 feet, requires, for its successful culture as a fruit, a warm and moist climate; but, like others of the family, the species are capable of existing in a warm, dry air. The Pine-apple is said to have been introduced into India by the Portuguese, in the year 1594. It has, in some parts, become so naturalised, as to appear indigenous. Capt. Turner, in his journey to Teshooloomboo, mentions it as very abundant at the foot of the Himalayas. It flourishes in Assam, and forms thickets near Rangoon, producing, also, according to the accounts of different visitors, very juicy, well-flavoured fruit. Dr. Wallich, in the year 1836, presented to the Agricultural Society, a bag made on the Khasia Hills, of Pine-apple fibre, having purchased it for a trifle at Cheraponjee. He mentions the enormous quantity of Pines grown on that range, and Dr. Oxley writes that thousands of acres of pine-apple plant, cover the adjacent islands, so that the supply might be considered inexhaustible, of a fibre remarkable as well for fineness as for strength.—*Royle Fib. Pl. p.* 377

Pine Apple or *Pina Fibre*, or *Bromelia*. The leaves of several plants, of the genus and family (*Bromeliaceæ*,) to which the cultivated pine-apple, ananassa sativa, belongs, abound in fine white fibres very soft, silky and pliant, as long in the stalk as flax and can be worked up with the same machinery. In some countries it is woven into the finest fabrics, netted or twisted into lines for fishing and into ropes possessed of considerable strength. These are said not to be injured by constant immersion in water—a property which the natives increase by tanning them. The Pine-apple being a native of the moist forests of South America, from the level of the sea to elevations of about 1800 feet, requires, for its successful culture as a fruit, a warm and moist climate; but like others of this family the species are capable of existing in a warm, dry air. The Pine-apple is said to have been introduced into India by the Portuguese, in the year 1594. It has, in some parts, become so naturalised, as to appear indigenous. Capt. Turner, in his journey to Teshooloomboo, mentions it as very abundant at the foot of the Himalayas. It flourishes in Assam, and forms thickets near Rangoon, producing, also, according to the accounts of different visitors, very juicy, well-flavoured fruit. Dr. Wallich, in the year 1836, presented to the Agricultural Society, a bag made on the Khasia Hills, of Pine-apple fibre, having purchased it for a trifle at Cheraponjee. He mentions the enormous quantity of Pines grown on that range, and that the plant appears as if it were quite a natural production. Dr. Helfer describes the Pine-apple as so abundant in the Tenasserim provinces as to be sold in Amherst Town in the months of June and July at the rate of one rupee for a boat-load. It chiefly abounds in low grounds, though it is also to be found in the hills amongst the Karens. The natives know it only by the American name, which they transform into *Nannah thi*—thi designating fruit. They do not seem to be acquainted with the beautiful fibre yielded by the leaves. The Pine-apple is described as growing in great abundance in the Philippine Islands, but as producing only a small, rather dry fruit. But we require some precise information to enable us to judge whether

this is actually the plant escaped from cultivation. M. Perrotet considers it a distinct species, and has named it *Bromelia Pigna*, from the Spanish name *Pigna* or *Pina*, signifying a cone. There, this wild plant is valued on account of the fine hair-like fibres which are separated from out of the leaves. Of these fibres, the celebrated pine-apple cloth of the Philippines, sometimes called "batiste d'ananas," and resembling the finest muslin-like fabric, is woven. This is embroidered by the nuns of the convents in Manilla, with great skill and taste. Some beautiful specimens of these, under the name of Pina muslin, were to be seen in the Exhibition of 1851. This is sometimes called grass-cloth, but erroneously. With a magnifier the fibres may be seen to be very numerous and fine, but not twisted at all, as in grass-cloth or the finest muslins and cambrics. Mr. Bennet, in his 'Wanderings,' observes that one of the coarser fibres may be subdivided into threads of such fineness as to be barely perceptible, yet sufficiently strong for any purpose. Mr. Bennet mentions visiting a plantation near Singapore, made by a Chinaman, for the preparation of the fibres of the ananas or wild pine-apple, which are exported to China, being used there "in the manufacture of linens." The Chinese said he got 1½ rupees the catty, for the fibre. The leaves recently gathered—and the largest are preferred—are laid upon a board and the epidermis is removed with a broad knife. Upon its removal from the upper surface of the leaf, the long and beautiful fibres were seen lying upon the lower and denser epidermis, running in a longitudinal direction; the fasciculi of fibres were then readily detached by the hand, on being raised with the broad knife. The separation of the fibre of the ananas is practised in other places besides the Philippine Islands. The Singapore Committee forwarded specimens (*Talinanas*) from Malacca, as well as some of three different qualities prepared at Singapore, and a portion as ready for weaving, that is, with the ends gummed, or joined together by some adhesive substance; thus forming the "invisible knots" of an old author. Specimens were also sent from Java and the island of Celebes. Dr. Roxburgh does not appear to have paid much attention to the separation of the ananas fibre; but in the year 1839, Miss Davy sent specimens of a thread prepared from the wild pine-apple plant of Assam, of various degrees of fineness, observing that the thread must be prepared when the leaves are green, as nothing can be done with them in a dry state. Miss Davy subsequently sent specimens of cloth manufactured from this thread to the Agricultural Society of Calcutta, observing that she had had much difficulty in getting it woven, as the principal manufacturers in Dacca positively refused to undertake making it into cloth. A weaver in the jungles near Dacca, afterwards undertook to do so, and wove the cloth which was sent. Of this, Miss Davy had some embroidered in silver,—a style of work in which the natives of that part of the country excel. The specimens of the fibre were shown by Mr. E. Solly to spinners in England, but who did not consider it would be substituted for flax in the manufacture of textile fabrics. A patent was, however, taken out by Mr. Zincke, for the manufacture of thread from this fibre, because, when bleached, it could be spun in the same way as flax. The process of bleaching, by destroying the adhesion between the bundles of fibres, renders it much finer; and hence enables it to be extended between the rolls in the process of spinning. He considers that from its beautiful silky lustre, combined with considerable strength, it is well adapted to form a substitute for linen. Pine-apple fibres (*anasa nára*), and the tow or oakum from them, were also sent to the London Exhibition of 1851, from Madras and from Travancore, showing that the art of separating these fibres is extensively diffused. Dr. Hunter received some very fine, strong, and silky fibres from Porto Novo, prepared by Mr. Lima. Besides the fibre, some twine and cord made with it was also sent from Madras and from the Eastward. Mr. Bennett says, that at Singapore, from the cost of labour, the pine-apple fibre could not be prepared under thirty-eight or forty dollars the pecul; but in Penang, or other places where labour is cheap, and women and children could be employed upon it, the expense would hardly exceed ten dollars per pecul. In the experiments which Dr. Royle made with these various fibres, a certain quantity of those prepared at Madras bore 360 lb., while a similar quantity from Singapore bore 350 lb. before they broke; but of New Zealand flax the same proportions bore only 260 lb. In a report from the Arsenal of Fort William, dated June 3d, 1853, the results are given of some experiments made by Conductor Wilkins on several kinds of rope manufactured by Messrs. W. H. Horton and Co., of Calcutta; and among these there is one of Pine-apple fibre, of three inches and a quarter in circumference. The Government proof is that a rope of this size should bear a weight of 42 cwt., but it bore no less than 15 cwt. more, that is, it broke with a weight of 57 cwt. ('Journ. of Agric. Soc. of India,' vol. viii, p. 182); proving incontestably that Pine-apple possesses strength for cordage, as well as fineness for textile fabrics.—*Royle Fib. Pl. p.* 87.

(6344) *Bromelia. Pinguin*, or "Broad leaved wild ananas," is common in Jamaica and other West India Islands. Its leaves yield a strong fibre, which is made into cloth of which they make hammocks, and twisted into ropes. Amongst others Bromel worts may be mentioned, *B. karatas*, or "upright leaved wild ananas," common in South America, *B. sagenaria*, common on the coasts near Pernambuco, also *B.* (*now Billbergia*) *vari-*

egata, yields excellent twine for nets in Brazil: and the so called New Orleans moss or "longbeard" of which a bale was sent to the Exhibition in 1851, and proposed as a substitute for hair for stuffing chairs, cushions and mattresses.

(6345) PINE NUTS, (Neoza Chilghoza. from N. W. India, Caubul, &c. See Pinus Gerardiana.

(6346) PINNOTHERIDÆ, a family of the Brachyurous Crustacea called Pinnotherans by Milne Edwards, known by the Common name of Pea-Crabs; of these *Elamena* (M. Edwards) is founded on *Hymenosoma Mathæi*, figured by M. Ruppell, in his work on the 'Crustacea of the Red Sea' and separated from that genus by Mr. Milne-Edwards, who thinks that it seems to establish the passage between the *Hymenosomata*, the *Oxystomes*, and the *Oxyrhyncki*.

E. Mathæi (Ruppell, 'Krabben,' pl. v. f. 1), is found in the island of Mauritius and the Red Sea.

(6347) PINS.

Epingles, Fr.	Tauck nec, Guz., Hind
Stecknadeln, Ger.	Alfeen, Hind.

Well-known little instruments, manufactured on a large scale in Birmingham, Warrington, Sheffield, Gloucester, and London.—*Faulkner.*

(6348) PINUS, a genus of Gymnospermous Exogenous Plants, consisting for the most part of timber trees, inhabiting various temperate countries in the northern hemisphere. They are commonly called Pine-Trees, and are distinguished from the Firs by their leaves, always evergreen, and needle-shaped, growing in pairs, threes, fours, or fives, surrounded by a membranous sheath at their base. In reality each parcel of leaves indicates a small branch axillary to a membranous, deciduous, withering leaf. The species are generally of great beauty as objects of ornament, or of much value on account of their timber, and are in much request by the planter: on which account we give a very brief enumeration of the best known species.—*Eng. Cyc.*

(6349) PINUS or CEDRUS DEODARA, leaves and twigs used in native medicine. Kelon, *Hind.* the most celebrated of the Himalayan pines, noticed by Avicenna, found in Nipal, Kemaon, Kashmere, at 7,000 to 12,000 feet. *Prod.* A turpentine called *Kelon ka tel*, used as a stimulant to foul ulcers.—*O'Shaughnessy, p.* 612.

(6350) PINUS EXCELSA, Wall. Pl. Rar. t. 201. Narambetty, Nipal, Simla, Bootan. *Kuel* of Sirmoor and Gurhwal, resembles the Weymouth pine, and is remarkable for its drooping branches.—*O'Shaughnessy, p.* 612.

(6351) PINUS EXCELSA.

Tongschi, Chin.

Though common in Bhotan, is, as I have elsewhere remarked, not found in east Nepal or Sikkim; the wood is admirable, being durable, close-grained, and so resinous as to be used for flambeaux and candles.—*Hooker Him. Jour. Vol.* II. *p.* 45.

(6352) PINUS GERARDIANA. Neoza chilgoza of Elphinstone. The Neoza Pine. Trunk lofty, with a conical head. Leaves 3, short, stiff, glaucous, obsoletely serrated, with deciduous sheaths. Cones very like those of *P. longifolia*. Seeds large, eatable. A native of the coldest forests of the Himalayas.—*Eng. Cyc.* The seeds form one of the principal articles of subsistence in Kunawur.—*O'Shaughnessy, p.* 613.

(6353) PINUS HALEPENSIS, the Alleppo Pine. Trunk slender, erect. Leaves 2, long, slender, light green. Cones ovate, stalked, solitary, very regular in form, with depressed truncated scales. A beautiful species, found wild in the western parts of Europe, from Genoa to Constantinople, and also throughout Syria. It grows fast, and is at once known by its fine light-green foliage; but its wood is not of much value, and it bears the climate of England with impatience.—*Eng. Cyc.*

(6354) PINUS LATTERI. Some twenty years ago the residents of Maulmain were not a little surprised to find, among the drift wood of the Salwen, a log of some coniferous tree. This was the first intimation that any tree of the pine tribe grew on the borders of these Provinces; but whether it were of the genus pinus, or abies, or larix—a pine, a fir, or a larch, did not appear. It was several years after this occurence, that a commissioner told Mr. Mason, he had offered a hundred rupees to any of the foresters who would bring down a spar of this tree. Spars have been since brought down, but it is believed that Capt. Latter was the first European to visit the locality where the tree is indigenous, and from specimens of the foliage and fruit, which he brought away, it appears to be a new species of pine that may be characterized thus:

P. Latteri. Arbor 50—60 pedalis, cortice scabro, foliis geminis 7—8 uncialibus caniculatis serratis scabbriosculo, strobilis 4 uncialibus ovato-conicis, squamis rombeis inermis.

Hab. In provincia *Amherst*: in convalli fluvii *Thoungyeen.*

Descr. A tree from 50 to 60 feet high, or more and from 1½ to 2 feet or more in diameter. Sheaths of the leaves arranged spirally, tubular, membranous.—*Mason.*

(6355) PINUS LONGIFOLIA. Himalayas.

Cheer, sullah, surul, thanaa, Hind.

The Long-Leaved Pine. Trunk erect, with a coarse rugged bark, and whorled branches.

Leaves very long, drooping, slender, bright-green, channelled, and serrated. Cones shorter than the leaves, oblong ovate, woody, and rugged, with pyramidal obtuse, mucronate, corky, recurved scales. Seeds large, eatable. An Indian species inhabiting the valley and lower hills of Nepaul, (*Eng. Cyc*): also the Entrance to Nipal in the Kheree Pass, along Touse and Jumna rivers, at elevations of 5,000 and 6,000 feet. *Produce*, gunda biroza, birje or cher ke gond. Birozehtur, *Pers.* same name also given to Indian olibanum.—*O'Shaughnessy, p.* 612. This pine is called by the Lephas "guiet-koong," and by the Bhoteeas "Tea-dong" in Sikkim only: it grows in low valleys, where better timber is abundant—*Hooker, Vol.* II. *p.* 45. The scenery of the valley Nyong in East Nepal is the most beautiful in the lower Himalaya: the Cheer Pine (*P. longifolia*) is abundant, cresting the hills, which are loosely clothed with clumps of oaks and other trees, bamboos, and bracken (*Pteris.*) —*Hooker. Him. Jour. Vol.* 1. *p.* 182.

(6356) PINUS SINENSIS, the Chinese Pine. A large tree. Leaves 3, slender, deep green, serrulated. Cones ovate, brownish, on short stalks, with flattened truncate, unarmed scales. Native of China. Very little is known of it, except from Chinese drawings. In England it only exists in the garden of Mr. Weels. of Redleaf, near Tunbridge, where it is found to be 'tolerably hardy.'—*Eng. Cyc.* It is repeatedly noticed by Mr. Fortune. He says, *Pinus Sinensis*, is met with on the sides of every barren hill, both in the south and north of China, and is generally badly used by the natives. —*Fortune's Tea plants, page* 7. The Chinese pine (Pinus sinensis), which is grouped about in all directions, attains to a great size. Many of these hills are well wooded. I remarked as we went along good forests of Chinese pine (Pinus sinensis), the Japan cedar (Cryptomeria Japonica), and the lance-leaved fir (Cunninghamia lanceolata). The forests of the Japan cedar and the lance-leaved fir were extremely picturesque and beautiful. The trees generally were young and not remarkable for size but were growing vigorously, and likely, if allowed to stand for a few years, to make valuable timber. In addition to this consideration, there was a symmetry and grace in the general appearance of these forests which one rarely sees in temperate climates, if we except perhaps the Himalaya mountains.—*Fortune's Res. p.* 189.

(6357) PINNAY, Calophyllum Inophyllum.

(6358) PINEY VARNISH TREE. VATERIA ROXBURGHIANA. Trees which yield this beautiful varnish so extensively used in Hindustan, are very common about Maulmain, yet I am not aware that the varnish is collected.—*Mason.* The tree grows from cuttings and is found planted by the road side in Malabar. The resin or substance as it flows from the tree, applied while in its fluid state, makes a good varnish called Peiny varnish in the Malabar coast, and there, the tree is commonly called the Peiny varnish tree, or Peiny maram. It is mentioned by Dr. Buchanan in his Journey through Mysore, Canara and Malabar. In Vol. 2 P. 476, he says some men of the Panchala tribe, which here is called Peninglan, paint and varnish by the following process. They take butter milk and boil it with a small quantity of quick lime until strings form in the decoction, and separate from the watery parts, which they decant. The stringy matter is then mixed with the paint, which has been well powdered: with these the wooden work is first painted, it is then allowed to dry for one day, and afterwards receives a coat of Pundum, which is the fresh juice of a tree called Peiny Marum. The Pundam must be used while it is fresh and will not keep for more than two or three days after the first coat of paint is given, and that is followed by another of varnish. In the same manner leather may be painted and varnished. The varnish effectually resists the action of water. A valuable Tallow, which has lately been sold in England at 44s. 6d. the pound, nearly equal to the price of the best Russian Tallow, is prepared by boiling the seeds in water: it is said to be free from any disagreeable smell—*Rohde. M.S.S.*

The *Vateria Indica* (*Chloroxylon Dupada*, Buchanan and Ainslie, and Pinney marum of the Hindoos) produces a resin resembling Copal, much finer than that procured from the other species, natives of India, the finer specimens of which are as transparent as amber and nearly colourless. It is procured by the very simple process of cutting a notch in the tree, sloping inwards and downwards. This is soon filled with the juice, which in a short time hardens by exposure to the air. When used as a varnish the usual practice is to apply the balsam before it has become hard: but when that is not procurable the resin melted by a slow heat and mixed with boiling linseed oil forms a varnish which answers equally well for most purposes. As this varnish is of the finest description, the following formula for its preparation may prove useful to some who are unacquainted with the process. Into a new and perfectly clean earthen vessel (a chatty) put one part of the Piney dammer, in coarse powder, cover closely, and apply a *very gentle* heat until the whole is melted; then add about two parts of linseed oil, nearly boiling hot, and mix well with a wooden spatula. Should the varnish prove too thick it can at any time be reduced by the addition of more oil, or, if required, may be made thicker in the first instance. It is essential to the success of the process that the Piney be melted in a covered vessel over a very slow fire, and the whole of it reduced to a fluid before the addition of the oil, which must, to

ensure an equal mixture, be nearly boiling hot. This varnish is used for carriages and other fine furniture requiring to have their paint well protected, or to which it is desirable to impart a fine gloss. A spirit varnish is prepared by reducing to powder about six parts of Piney and one of Camphor, and then adding hot alcohol sufficient to dissolve the mixed powder. Alcohol does not dissolve Piney without the aid of the Camphor, but once dissolved will retain it in solution. The varnish thus prepared is employed for varnishing pictures, &c., but before being used requires to be gently heated to evaporate the Camphor, which otherwise will produce by its after evaporation a roughness and inequality on the surface of the picture, and spoil its appearance.—*O'Shaughnessy page* 755.

(6359) PINEY TALLOW or DOOPADA OIL. Vateria Indica.

Piney Yennai Tam. | Doopada Nunee, Tel.

This most valuable tree, which, besides the product under consideration, yields a Resin nearly equal to copal, and an excellent building wood, grows plentifully in the jungles of the Western Coast. The oil, which is perfectly solid even in hot climates, is prepared by cleaning the seeds, then roasting and grinding them into a mass. To 5 seers of seed, add 12 seers of water, and boil until the oil rises to the surface. Remove the oil, stir the contents of the vessel, and allow it to stand until the following day, when more oil will be observed on the surface, which may be collected and the process repeated. The oil is principally used for lamps, but is very suitable for soaps and candle making.—*M. E. J. R.*

(6360) PIPECLAY. A very plastic and tenaceous kind of clay, of a grayish, or yellowish-white colour, found near Poole in Dorsetshire, in the Isle of Purbeck, and in many places in India. It is manufactured into tobacco pipes; and is besides used as the basis of the queens's-ware pottery, as well as a detergent by scourers of cloth.—*Waterston. Faulkner.*

(6361) PIPER, a genus of Plants belonging to the natural order *Piperaceæ*. It has stamens varying in number from 1 to 10; stigma 3-lobed; fruit baccate. Wight gives in Icones Piper arborescens, 1940; argyrophyllum, 1941; attenuatum, 1933; hymenophyllum, 1942; Nepaulense, 1938; nigrum, 1934; Sylvestre 1937; trioecum, 1935-6; Wightii, 1939.

(6362) PIPER BETLE, Linn. Roxb. Fl. Ind. i. p. 158. Bot. Mag. t. 3132 φυλλον μελαβαθρον *Dioscor.*—*O'Sh.*

Vettilay, Tam.	Pan, Hind.
Pan, Duk.	Tamalapakoo, Tel.
Tanbool, Arab.	Bargi tambol, Pers.
Tambuli, Sans.	—*Ainslie.*

The leaves of this and P. Siriboa are extensively used by the natives of the East Indies and lately the West, to chew along with the nut of the *Areca catechu* and quicklime, as a restorative of the powers of the stomach and promoter of digestion. It is capable however of producing, like some other species of *Piper*, intoxicating effects, and should be used in moderation.—*Eng. Cyc.* Piper Betle in Pegu, grows both in a wild and cultivated state. It is cultivated in small quantity for domestic consumption in every part of the province, except the Tharawaddy district, and grows wild in the Pegu Forests, on the Cadoojway Choung.—*McClelland.*

(6363) PIPER CUBEBA. Cubebs. Lin.

Val mellaghoo, Tam.	Salava mirialoo, Tel.
Kubab-chinie, Hind.	Kababah, Arab.
Dumke mirchie, Duk.	Suganda marichi, Sans.
Komoon koos, Malay.	

A native of Java. Powdered Cubebs given in doses of one to two drams, in water or milk, is employed in Gonorrhœa with almost certain success; according to Blume, the Piper Caninum which corresponds with the P. Cubeba of Rox., Fl. Ind. 1. p. 164, is also a native of Java, and the chief source of the Cubebs of commerce.—*O'Shaughnessy, p.* 574. The fruits of both are stalked, but that of the former is larger and has more pungency than the latter. Both are common in Java, where, as in other parts of India, they are used as a grateful condiment, as common pepper is in Europe. They are also employed medicinally in the same complaints as give them repute in Europe. The berry is small, about the size of black pepper-corns (but with a little foot-stalk, from one-third to half an inch long, hence called sometimes *P. caudatum* or *P. pedicellosum*, more or less round, of a blackish-gray or grayish-brown colour, with a thin vascular reticulated husk, which incloses a hard round oily seed. The husk has a pleasant taste; the seed a bitterish, acrid, peppery, aromatic, and camphor-like flavour. Those which come from the islands of the Indian Archipelago are the best. A sort from the Mauritius, small, or about the size of a millet-seed, are from some unknown species. The Guinea or African cubebs is the produce of *P. Afzelii*. Indian cubebs are frequently adulterated with black pepper, pimento berries, or the fruits of the *Rhamnus catharticus*. Genuine cubebs consist of waxy matter, two kinds of volatile oil, a peculiar resin (cubebin), balsamic resin, &c. The volatile oil by rest deposits a camphor, which crystallizes in four-sided plates. The resin is analogous to that of copaiva, and has, like it, a peculiar influence over mucous membranes especially those of the urino-genital-organs.—*Eng. Cyc.*

(6364) PIPER LONGUM, Long pepper. *Roxb. Fl. Ind.* i. p. 154.

Pipilie, Tam.	Pippali, also Krishna, Sans.
Pipuloo, Tel.	Dar filfil, Arab.
Pipilie, Duk.	Filfil-i-Daraz, Pers.
Pipel, Hind.	

Piper Longum, Long Pepper, is a native of the East Indies, the female spike of which having attached to it the dried half-ripe berries (resembling the catkin of the birch), is used in medicine. It has nearly the same chemical composition and properties as black pepper, though feebler. It is said to contain piperin. The root is employed by the Hindoos, but it is still weaker than the fruit.—*Eng. Cyc.* This grows wild in India, along water-courses towards the Circar mountains, but is much cultivated. Root (Granthicka, *Sans.*) sliced and dried constitutes the *Pippula moola* of the native druggists, a substance much used as a stimulant remedy and spice. The analysis of the fruits of the long pepper corresponds closely in results with those of the *Piper* nigrum.—*O'Shaughnessy, p.* 575. Long Pepper is a creeper of easy culture and should be trained on poles, or have strong sticks to grow upon. It is common in all parts of India.—*Jaffrey. Long Pepper* (Piper longum, Lin.) is extensively cultivated in the Northern Circars, its use is rather limited; as in the commercial returns it is always included with black pepper, the quantity cannot be ascertained.—*M. E. J. R.*

(6365) PIPER METHYSTICUM. Ava pepper. A native of the Society, Friendly, and Sandwich islands, where it is called "Ava;" used in a tincture in chronic rheumatism, and in infusion as an intoxicating beverage, which is also deemed antisyphilitic. To cure venereal, the patient drinks an infusion until he become drunk, after which copious perspiration ensues. *O'Shaughnessy, p.* 575.

(6366) PIPER NIGRUM, Willd: BLACK PEPPER. Hip.

Mellaghoo, TAM.	Gol murch, HIND.
Gammiris, CING.	Kala murch, DUK.
Merialoo, TEL.	Filfil Uswud, ARAB.
Marchu, SANS.	Filfil-seeah, PERS.

A native of Malacca, Java and Sumatra, cultivated all along the Malabar Coast. Dr Roxburgh describes it as being found wild among the hills of the Rajamundry district—*Ainslie, p.* 265. *O'Sh. page* 571. Piper Nigrum, Linn, Black Pepper, a climbing plant of the East Indies, and very extensively cultivated there, the plantations stretching from 98° to 115° E. longitude, and S. lat. to 12° N. lat. which limits comprise Penang, Sumatra, Borneo, the Malay Peninsula, and all lands to the east of the Gulf of Siam. The best, perhaps the only, comes from Malabar, the least esteemed from Java and Sumatra. The plant is allowed to grow, trained to the stem of the *Areca catechu*, and other trees, especially the Jack (*Artocarpus*) and *Hyperanthera moringa* (or Horse-Radish Tree), four years before the fruit can be collected. The berries are gathered when yet green, before they are perfectly ripe, and quickly dried on mats, by which they turn black. When plucked too young, they speedily fall into a state of powder. These are separated from the others by sieves and winnowing. In this condition it is termed black pepper. White pepper is the same fruit freed from the outer rind: for this purpose, the ripe berries are allowed to macerate in water, and the husk is removed. These are smaller, smooth, of a greyish-white colour, varying to yellow, with a less powerful odour and taste than the black.—*Eng. Cyc.* Although principally the produce of the Eastern islands, it is grown of a superior quality in the Malabar coast. The root is a tonic and cordial.—*Riddell.* Black pepper (piper nigrum) and long pepper (piper longum) grow wild in considerable quantities in the hilly tracts of Goodem, and probably along the whole of the pestiferous range of the Eastern Ghats The latter finds its way in small quantities down to the bazars on the coast, but the black pepper is entirely neglected, and does not appear to be gathered even for local use.—*M. C. C.*

(6367) PIPER NIGRUM AND PIPER LONGUM. BLACK PEPPER AND LONG PEPPER. These substances appear to have been used as febrifuges in the east from the earliest periods. The powder and the root of long pepper have been much employed in Hindu medicine.—*Ind. Ann. Med. Sci. for Apl. p.* 394.

(6368) PIPER SYLVATICUM. Roxb. Fl. Ind. i. p. 156. N. W. Mountains of Bengal, (*Pahari pippul,*) used while green, and ripe also, as long pepper.—*O'Shaughnessy, p.* 575.

(6369) PIPER TRIOECUM. Roxburgh. Fl. Ind. i. p. 154.

Mirial tiga, TEL.

Circar mountains, in shady places, with rich soil, fruit succulent, small, round, red, excessively pungent, an article of important commerce from Madras.—*O'Shaughnessy, p.* 575.

(6370) PIPPALLY CATTY, the dried long pepper vine.

(6371) PIPRINÆ, Mr. Swainson's name for the Manakins, which he makes a sub-family of the family *Ampelidæ*, Fruit-Eaters, or Chatterers, and thus characterises:—Size small. Feet lengthened, slender, weak. Bill very short: the upper mandible much curved. Mr. Swainson is of opinion that the *Piprina*, called Manakins from their diminutive size, which is seldom larger than that of a tom-tit, constitute the sub-typical group of this family.

(6372) *Phœnicurus, Pipra* (with its sub-genus *Stiopia*), *Calyptura*, and *Pardalotus*, are the genera arranged by Mr. Swainson under this subfamily.

(6373) PIPTANTHUS NEPALENSIS. Amongst the plants on the Tendong in Sikkim, conspicuous is the beautiful laburnum-like *Pip-*

tanthus Nepalensis, with golden blossoms, —*Hooker. Him. Jour. Vol.* II. *p.* 5.

(6374) PIRI, the Tamil name of a Ceylon tree which grows to about twenty feet in height, and two feet in diameter. It is very close in its grain, and is used by the natives for the frames of vessels and in house-work. It produces a fruit which is of no use.—*Edye, Ceylon.*

(6375) PISONIA GRANDIS, NYCTAGINEÆ, Riddell.

Bag-Achera, DUK.

A straggling shrub, armed with strong axillary recurved thorns; flowers small, in axillary terminal panicles. Forms an excellent hedge plant.

(6376) PISONIA INERMIS.

Kongi-putri, DUK.

Without thorns.

(6377) PISONIA MORINDIFOLIA. THE LETTUCE TREE.

Lutchee-kottay-ellay, TAM.

The leaves of this pretty tree are used in various ways; sometimes by Europeans; they make tolerable greens cooked with cocoanut, chillies, &c., &c., to be found only in gardens, leaves of a light green colour, turning nearly white during the hot months.—*Jaffrey.*

(6378) PISTACIA, a genus of Plants belonging to the natural order *Anacardiaceæ*. It has diœcious, apetalous flowers. The male flowers with the raceme amentaceous, with 1-flowered bracts; calyx 5-cleft; stamens 5; anthers subsessile, 4-cornered. Female flowers with the raceme more lax; calyx 3-4-cleft; ovary 1-3-celled; stigmas 3, rather thick. Drupe dry, ovate, with a somewhat bony nut, usually 1-seeded and 1-celled. Seeds solitary, each without albumen. *Eng. Cyc.*

(6379) PISTACIA LENTISCUS. MASTIC TREE. A Native of the South of Europe and of Asia Minor, introduced into the Calcutta Garden in 806. The bud, bark, leaves, and fruit have all been used in medicine, but have been laid aside in modern times.—*Roxburgh.* The bush is found on the coasts of the Mediteranean. The leaves are evergreen, equally pinnate; leaflets 8 to 12, usually alternate, with the exception of the two upper, which are opposite, oval, lanceolate, obtuse, often mucronate, entire, and perfectly smooth. Flowers very small, in axillary panicles, similar to those of the other species; fruits very small, pea-shaped, reddish when ripe. The sweet fragrant stimulant resin called *Mastich* is obtained from the trunk by incisions made in the month of August. It is used to strengthen and preserve the teeth and in diarrhœa.

(6380) *Mastic Resin*, Roomie Mastike, or Turkish olibanum, Manna of Lebanon.

Sakes, ARAB. | Kunnoli, TUR.
Koondar Roonee, PERS. | Ulmastiga, SP.

This valuable substance occurs in oval tears of variable size, smooth, diaphanous, brittle, breaking with plane brilliant, glassy, and pale yellow surface, and owing to its brittleness being usually covered with its own dust. Its odour is agreeable; flavour weakly balsamic; it softens in the mouth, and becomes ductile like white wax. It melts at a moderate heat, and then exhales a sweet odour. Mastic is quite insoluble in water, it yields to alcohol 80 per 100 of soluble matter, leaving a substance resembling caoutchouc, which is slowly dissolved by ether. This resin gives its name to the process of *mastication*, being universally chewed in the East; it is much used by dentists for filling up carious teeth; it is burned as incense; and in some parts of Greece it is added to bread in small quantities to give it an agreable flavour. Mastic is extensively employed as a transparent varnish, dissolved in turpentine or alcohol, with other resinous bodies. A species of mastic called *tum* is obtained in Africa from the Pistacia Atalantica. The true resin is sold in all the Bazars for about three rupees the seer.—*O'Shaughnessy, p.* 278.

(6381) PISTACIA TEREBINTHUS. Pist. vera. Terebinthus vulgaris.

Katinge Roomie, ARAB. | Butum, ARAB.
Zangbarie, PERSIAN. | Sukhur, PERS. (Royle).

A native of Barbary, Greece, and the South of France. A resinous juice of much value is afforded by this tree.—*O'Shaughnessy, p.* 276.

(6382) PISTACIA VERA, is a small tree, or large bush, from 15 to 20 feet high; its leaves are alternate, unequally pinnated, without stipules, and consist of from 3 to 5 oval blunt leathery smooth leaflets. The flowers are small, and arranged in short branched racemes from the old wood; some are male and others female; the latter are succeeded by dry drupes about the size of an olive, of a reddish colour, with a very thin rind, a brittle 2-valved shell, and contain a single almond-like seed with a green embryo. The tree is originally from Asia Minor, but is now naturalised all over the South of Europe, where the fruit is in request for confectionary and for the dessert, under the name of Pistachio Nuts. —*Eng. Cyc.* According to Mr. Elphinstone it grows wild in the Hindu-kosh. The almond and pericarp are imported into India from Cabul, with a kind of gall termed *Gool-i-pista* and a resin called *Alook-ul-imbat*. *Royle's Illustra.*, p. 178.—*O'Shaughnessy, p.* 277.

(6383) PISTACHIO NUTS.

Pistaches, DUT. | Pistacchi, IT.
Pistaches, FR. | Pistacias, LAT.
Pistaschen, GER. | Alfocigos, SP.
Pistach, GUZ. & HIND.

The produce of *Pistachia vera*, which grows

abundantly in Arabia, Persia, Syria, and Sicily. They are oblong and pointed, about the size of a filbert, inclosing a kernel of a pale greenish colour, covered with a yellowish or reddish skin. They have a pleasant, sweetish, unctuous taste, and are chiefly served up at the dessert. Pistachio nuts are imported into Bombay from the Persian Gulf.—*Faulkner.*

(6384) PISTIACEÆ, *Lemnads*, or DUCK Weeds, a natural order of Endogenous Plants. The species are floating or land plants with very cellular, lenticular, or lobed fronds or leaves, some of them wholly destitute of spiral vessels, except perhaps in the pistil. The flowers appearing from the margin of the fronds 2 or 3, naked, inclosed in a spathe, but without a spadix. In the male flowers the stamens are definite, often monadelphous: in the female flowers the ovary is 1-celled, with one or more erect ovules; style short, stigma simple, ovules anatropal, hemianatropal, or atropal. Fruit membranous or capsular, not opening, one or more seeded; seeds with a fungous testa and a thickened indurated foramen; embryo either in the axis of fleshy albumen and having a lateral cleft for the emission of the plumule, or at the apex of the nucleus, covered in by a hardened endostome. The common Duck-Weed *Lemna* may be regarded as the most simple of all Phænogamous Plants. It inhabits the ditches of the cooler parts of the world. [LEMNA.] *Pistia* is found in the tropics; *Ambrosinia* in the basin of the Mediterranean.—*Eng. Cyc.*

(6385) PISUM, a genus of Plants belonging to the natural order *Leguminosæ*, and the tribe *Viciceæ*. It has a calyx with foliaceous segments, the two upper ones being shortest; the vexillum ample, reflexed; the style compressed, carinated, villous above; the legume oblong, rather compressed, but not winged; the seeds globose, numerous, with a roundish hilum.—*Eng. Cyc.*

(6386) PISUM ARVENSE has 1-flowered peduncles and always red flowers, and yields the gray peas of the fields.—*Eng. Cyc.*

(6387) PISUM SATIVUM. PEASE. Lin.

Puttanee, TAM.	Herenso. SANS.
Patana, GUZ.	Butanee, HIND.
Buttaneh, DUK.	Common Pea. ENG.
Gooadoo sanigheloo TEL.	*Ainslie, p.* 244.

Pisum Sativum has two or many-flowered peduncles, with red or white flowers and is the common pea of our fields and gardens.—*Eng. Cyc.* These are indigenous to the Mahratta countries. The native country pea is sown after the rains in drills, and varies in price according to the quality; when green, they are tolerable as a vegetable, but are best in soup. Procurable in December and January.—*Riddell.*

(6388) PITA OR AGAVE, commonly called Aloe (*Agaveæ*, a tribe of *Amaryllideæ*).

Cantala and Bans-keora. HINDEE.	Petha-kalabuntha. TAMUL.

The species of Agave, commonly called aloe plants, are natives of America, which have become so naturalised in many parts as to appear to be indigenous in Africa, parts of India, and in the south of Spain. So much is the latter the case, that some authors take this American plant to be the aloe wood mentioned in Scripture. But there is not the slightest foundation for this opinion, nor indeed for the true aloe plants, of which the agaves so frequently assume the name. The Aloes wood of Scripture is the *Ahila* wood of the East, so famed for its fragrance, yielded by *Aquilaria Agallochum*, &., (*v. Ahalim* by Dr. Royle, in Kitto's, 'Cycl. of Biblical Literature,' i, p. 90.)] But, as they also yield some fibre, it is better to retain for them their appropriate name of Aloe. The Agave plants, to which the name of American aloes is so frequently applied, resemble the true aloes in their sword-shaped leaves with parallel veins, which, however, grow to a gigantic size—that is, from eight to ten feet in length—in a cluster from the root, with their margins usually armed with short thorns, and their points with a hard and sharp thorn. This makes these plants so useful in the construction of hedges; a use to which they are applied in the south of Spain and of Italy, as also in Sicily. These plants come to perfection in about three years, though they do not flower for eight, and, in some situations, perhaps not for twenty years, when they throw up a tall candelabra-like flower stalk. This has, no doubt, given origin to the fable of their flowering only once in a hundred years. It is the leaves of these plants which abound in fibres of great length, and of considerable strength. Being also tough and durable, they are separated for the purpose of making string and rope, not only in their native countries, but also in those into which they have been introduced. Dr. Royle, in his 'Illustrations of Himalayan Botany' (p. 375), observed, respecting these plants: "The species of agave are not only ornamental as plants, and useful as hedges, but are important for their products. The roots, as well as leaves, contain ligneous fibre (*pita thread*) useful for various purposes: these are separated by bruising in water, and afterwards beating; practices which the natives of India have adopted, either from instruction or original observation. The Mexicans also made their paper of the fibres of agave leaves laid in layers. The expressed juice of the leaves evaporated, is stated by Long, in his 'History of Jamaica,' to be also useful as a substitute for soap. But the most important product of agave, and especially *A. americana*, the species now most common in the South of Europe, is

PITA OR AGAVE.

the sap, which exudes upon the cutting out of the inner leaves, just before the flower scape is ready to burst forth; of this a very full account is given by the illustrious Humboldt, in his 'Political History of New Spain' (book iv, c. 9). The fibres of these Agave leaves are, in Mexico, converted into twine, cord, or rope; the last used in mines, and on the western coast, towards Guayaquill, for the rigging of ships. Humboldt describes a bridge over the River Chambo, in Quito, 131 feet in span, of which the main ropes, four inches in diameter, were made of the agave; and upon these ropes the road-way was placed. In the West Indies, the negroes are described as making ropes, fishing-nets, and hammocks of agave fibres. The fibre is thus prepared: the longest and most perfect leaves being cut off, are laid upon a board and scraped with a square iron bar, which is held in both hands, until all the juice and pulp are pressed out, the fibres only remaining. Stedman says, the fibre is like white silk, and hence it obtains the name of silk-grass; though this seems to be also applied to the fine fibres of *Agave vivipara*, and of *A. yuccæfolia*. But others of these white endogenous fibres are better entitled to the name, as they are softer and more flexible. Stedman says, ropes made of this material are stronger than any in use in England; but that they are liable to be sooner damaged by immersion in water. In Portugal the fibre is called *filo de pita*, and applied to various purposes. In Spain also, the fibre is called Pita, and used for making string and rope, the plant being abundant in the southern provinces. In Sicily, the fibre is said, by Dr Balfour, to be called Zambaroue, where cordage and mats are made of it. Pita fibre is extensively used in South America for even considerably sized rope.

Pita fibre and rope have been stated to be prepared from the Agave so common in the south of Spain, though not to the extent at which the manufactory might easily be carried on. M. Romon de la Sagra recommends the introduction of other kinds from Guatimala and Columbia, which are known there by the names of "Cabulla" and "Cocaiza." Species of Fourcroya also yield excellent fibre. *F. gigantea* is common at St. Helena and has been introduced into Madras. Pita fibre was sent to the Exhibition of 1851 from the island of Madeira, and also from Barbadoes and Demerara. Thread and paper made from *Agave americana* were also sent from Mexico, and fibre is also said to be obtained here from a species called "*Moogai*"—*Agave tiacantha* by botanists.

The name Pita seems to be also applied to similar fibres obtained from species of Bromelia and of Yucca, as well as of Agave, according to Dr. Hamilton, of Plymouth and it is probable that it is so, for these are all very similar to each other. Dr. Hamilton further states, that the weight of Pita fibre being one sixth less than that of hemp, the difference would be very considerable for the entire rigging of a ship and produce a sensible reduction in the top weight, and thus increase the stability of the hull. He considers it also more durable than hemp, and that it bears the alternate action of humidity and of dryness with little injury; hence it is preferred for cables, standing rigging of vessels, nets for fishing, &c. The difference in hygrometric action is also in favour of the Pita. In a few months' trial in H M.S. Portland, a log-line, 300 feet long, of Pita, contracted sixteen feet two tenths, whilst a similar one made of hemp contracted twenty-one feet six tenths; the contraction, moreover, of the Pita ceased the third day, while that of hempen cord continued the whole time. The two lines have been deposited in the stores of the dockyard at Plymouth. At Amboyna, says Labillardiere, the natives produce threads from the bastard Aloe, called *Agave vivipara*: the master of the house went and cut a leaf off this plant, and, resting it on his thigh, in order to scrape it with his large knife, he took off its pulp, and obtained from it a fascicle of threads as long as the leaf, and as strong as those of our best hemp. The Agave grows well on the north coast of Africa, and its fibre has been paid much attention to by the French since their occupation of Algeria. There, it is stated, when fodder is scarce, cattle will eat the younger leaves when cut into transverse slices. A clock and paper made of this fibre were sent to the Exhibition of 1851; and ropes have been made of the fibres—of these the strength is very considerable. The Agave or Pita fibre being so extensively employed in different parts of the world, there is no doubt that it would be a valuable culture for many parts of India. It was probably introduced into India by the Portuguese, and is now common in both the northern and southern parts of India. The species which D. Royle found most common in the north-west of India was *Agave vivipara*. This seems to be the same as the *Agave americana* of Roxburgh ('Herb Amb.,' v, 94). He observed that on rich soils, the plant invariably produced bulbs, but no seeds, while on a poor stony soil and dry climate, like that of Delhi, seeds alone are produced. This species must be closely allied to the *A. cantala* of Dr. Roxburgh, which is, no doubt, a naturalised plant. These species or varieties flourish in dry parts of the country, where few fibre-yielding plants succeed so well, such as in the Deccan and in Mysore. For in the north-west, the outer hedge of the Saharunpore Botanic Garden was formed of the Agave, and the fibres were commonly used for all garden purposes. Dr. Buchanan, at the beginning of the century, found the villagers in Mysore employing it for

making strong hedges, and separating the fibres for cordage; and Mr. Webb, who was employed with Dr. Anderson in cultivating the Nopal for the Cochineal insect, had a plantation of the Agave, near Madras. Of this the fibres were made into rope, and reported upon at the arsenal of Fort. St. George, as long since as the year 1798. Mr. William Webb having made a plantation of the Agave plant, in the year 1798 manufactured ropes from its fibres, which he considered superior in a strength to that made in Europe. He also stated that he believed rope without tar to be preferable for all military purposes. He submitted a coil of this rope to the Military Board of Fort St. George, with a suggestion that he should be allowed to supply it in lieu of rope made in Europe. Capt. P. Malcolm, of H. M. S. Suffolk, writing from Cochin, reported upon it, "as strong, if not more so, than Coir, and as having the advantage in pliability." A Committee of the Military Board were "of opinion, that its appearance promises well, and that from a trial that has been made of it, it is at least equal when new to the best Europe rope of the same size in point of strength. Sixteen of the battering guns having been mounted with it before it gave way, while Europe rope of a larger kind failed after it had been employed in mounting only four guns." But it was observed that the yarns were made too large, and that diminishing their size would augment their strength. With respect to its durability, the Committee had no experience, but report that a coil which Mr. Webb stated "had been fixed to the anchor of his boat at Ennore, and kept constantly under water for six months, appear to have undergone no other alteration than Europe rope would have done in the same situation." In another report made by the Commissary of Stores, Fort St. George, dated 27th July, 1801, on a coil of Aloe rope manufactured at Seringaptam, it is stated that "the coil of Aloe rope was, on its being received at the Arsenal, the 10th of June, immersed in a tub of water for twenty-four hours, and then exposed to the open air in the yard; since which date, a few showers of rain have fallen, after each of which the coil was turned; and upon being examined and tried the 27th instant, it was found to be quite rotten." From this it was inferred that Aloe rope will not stand wet; and it was stated that this was also the result of similar rope supplied to H. M.'s squadron then in India. ('Madras Artillery Records' for 1839.) Though nothing is so objectionable in a rope for naval purposes as inability to bear exposure to wet, the above experiments are inconclusive, because we are without any information respecting the species of Agave which was cultivated, and also respecting the soil and climate where it was grown, as well as the time which the fibre was macerated before it was separated. All which influence not only the strength of fibre, but its capability of bearing moisture. The result of the experience in India is moreover, contrary to that of South America. The employment of the fibres of this plant seems very general, as it has since become widely distributed through the Madras Presidency. Thus it is so employed at Masulipatam and at Bellary. At Cuddapah, the natives make ropes of it thirty cubits in length. The plant is abundant about Madura, whence fibre and cordage were sent. The fibres are prepared by pressing the leaves between two horns and then washing the pulp away. The ropes are described as being manufactured in great abundance, and at trifling expense; and that they are much used for lashing bales of calico. The fibres are also separated on the Malabar coast, and specimens were sent from the prisoners in the jail. But the most varied assortment of specimens was sent from Madras, prepared at the instigation of Dr. Hunter in his School of Arts, and by the prisoners in the Jails at Madras. Of these, the Agave was in the state both of fibre and of oakum; also made into string, cord, and rope, and dyed orange, red, maroon, and green, showing how well this fibre takes these colours. Also, some good paper, made with this fibre, mixed with that of gunny bags. In Madras, this plant is called *petha kalabuntha*. The usual way of preparing these fibres is to steep them in water for three days, and then to clear away the herbaceous part. But the best way of steeping is that practised by the natives in some places; that is, of baking the leaves in wet sand. But the fibres may also be separated by first beating, and then scraping away the rest of the vegetable tissue. The beating is required on account of the hardness of these succulent leaves. Pressing them through grooved cylinders, would, no doubt, be efficacious and also expeditious. The Agave is also common in the Bengal Presidency, where it is called *pantala*; and also *bans keora*, or "Bamboo Pandanus." Though, probably most valuable in the upper provinces, yet, in December, 1839, Mr. Bond, master-attendant at Balasore, sent to the Agricultural Society of Calcutta, a piece of cloth manufactured by him from a species of the Aloe plant, of which he sent a leaf; and stated that the cloth had been woven without the thread having been spun. As already mentioned the fibre was constantly employed for garden purposes at Saharunpore. Mr. Tonnochy, B. C. S., succeeded in spreading the culture in the Boolundshuhur district, by exposing, in his office, some of the dressed fibre, and also a couple of sattranjees or carpets made of them, together with heaps of seed. These all disappeared. Mr. Tonnochy encouraged the culture as a hedge plant, because it was not only valuable on its own account, but also, because enclosing the fields so much enhances the value

of land. The long, flowering stem was, moreover, found useful as a ridge-pole for cottages. In the year 1852, Sir R. C. Hamilton, resident at Indore, forwarded some specimens of the fibre of the *Agave Cantala* which grows freely in Malwa, and to which attention had been directed during the temporary want of "Bakkul," the fibrous bark of the roots of certain trees, which is used in that part of India as a cheap substitute for string and cord. Dr. Tranter found he could pull out single fibres, measuring from twenty to thirty inches in length; but he separated a larger quantity by macerating the leaves in water for a week and then beating them with a stick. Capt. A. Thompson, of Messrs. T.'s rope-manufactory at Calcutta, having tested the fibres, found the strength quite equal to the best Russian hemp. He also states, in June, 1852, that a considerable quantity of fibre, exactly similar, had lately been imported from the Malabar coast, and that he had some made into rope, which very much resembled Manilla rope: but time was required to test its durability. It was then worth about four rupees per bazar maund in the Calcutta market. Though this Pita or Agave fibre is so much employed in different parts of the world, its great merits seem to be, generally, but little known. We have seen that in South America, ropes made with it are considered both strong and durable. The ropes made at Algiers have been found to possess great strength; and the log-lines in H. M. ship Portland to be both durable and not shrinking after the third day. In lightness and colour they resemble ropes of Manilla hemp, though they are not usually so strong. But in a "comparative trial made at Paris, between ropes made of hemp and of the aloe from Algiers, the latter was found to bear 2,000 kilogrames, while the former, of equal size, bore only 400." So, in some comparative trials made at the French dock yard at Toulon, on ropes made from these fibres and from hemp, the following results were obtained, both being immersed in the sea for six months, and exposed to the atmosphere for the same time.

PITA.	Weight supported.	HEMP.	Weight supported.	Difference in favour of Pita
	Pounds.		Pounds.	Pounds.
Plunged in sea, ...	3,810	Plunged in sea, ...	2,538	1,272
Exposed to air, ...	3,724	Exposed to air, ...	3,022	702

In the year 1841 some rope was made under the direction of Mr. Hornby at the Allipore Jail rope-walk, of Aloe, or rather Agave fibre, obtained from plants which had been grown by the convalescent insane, near Calcutta. Mr. Hornby tested this rope against others made of Country Hemp (that is *Sunn*), Jute, and Coir, and he found the Agave rope exceed the others

in strength, as appears from the following statement sent by him to the Agricultural Society of India:

CALCULATION OF THE POWERS OF ALOE FIBRE ROPE, COUNTRY HEMP, JUTE, AND COIR ROPE, TRIED AT THE ALLIPORE JAIL ROPE-WALK.

			lb. Troy.
Aloe Fibre Rope, 1 fathom long, and 3 inches in circumference, broke in a weight of...	...	...	2510½
Coir	do.	do.	do. 2175
Country Hemp	do	do.	do. 2269½
Jute	do.	do.	do. 2456½

In some experiments made by Dr. Royle, he found a bundle of the fibres bore 270 lb., while a similar bundle of Russian hemp bore only 160 lb. Dr. Wight had some cord prepared with the Agave fibre in Coimbatore, and found it bore 362 lb.; when similar rope, made from Crotolaria juncea broke with 407 lb. The following are the results of—

EXPERIMENTS MADE IN THE ARSENAL AT FORT ST. GEORGE, JULY 30TH, 1850, ON ROPES MADE IN JAIL AT MADRAS, IN 1850. For similar experiments on rope, &c., made from plantain fibres, see FIBRES.

	Circumference.	Length.	Weight required to break.	After 24 hours in water, and used 7 days after.	Immersed in water 10 days and dried.	Manilla Rope.	English Hempen Rope.	Weight of one fathom of each. Pita.	Manilla.	Europe.
	In.	Fms.	lb.	lb.	lb.	lb.	lb.	oz.	oz.	oz.
Rope, ...	1⅛	2	2218	1994	2016	—	—	19 1/16	—	—
Ditto, ...	1¼	2	1154	—	—	1490	1184	8 14/16	9½	13
Line, ...	⅜	1	86¼	—	—	—	—	0 7/16	—	—
Cord, ...	0 3/16	1	39½	34½	37 14/16	—	—	0 2/16	—	—

These experiments prove incontestibly, that the Pita fibre is possessed of very useful properties; and we have seen that the Agave plant has become naturalised in many widely separated parts of the Indian territories. Its characteristics have been dwelt upon in detail, because it seems calculated to prove extremely useful in India.

First, because it grows in dry climates and poor soils, such as may be met with both in the Deccan and in Mysore. It will, in such situations form a very effective hedge—useful, not only in keeping off from the crops the innumerable herds of deer, &c, but also in assisting in saving the soil, a road or a railway, from being covered with the sand blown from the desert. The leaves would form a continual source of employment for the people, in separating an abundant supply of material for cordage. This will, at all events, be sufficiently good for all agricultural purposes, for the harnessing of cattle, the baling of produce, and for the rigging of vessels employed in river navigation. The fibre is also sufficiently good to form an exportable article of considerable value, especially as the prejudice against white cordage will by degrees be removed, and the two will be invaluable for the manufacture of paper. It is desirable that some comparative experiments should be made on the age at which the leaves should be collected, and on how long they should be steeped. Also, whether this process is necessary at all; that is, whether the fibre may not be separated by mechanical means. The climate best suited to the growth of the strongest fibre should be ascertained, as well as what are the differences of quality between the fibre of different species of Agave. Also, the susceptibility of different kinds to the effects of moisture, either with or without superficial tarring. In the preparation of the cordage submitted to trial, care should be taken that the fibres are so prepared as to cut each other as little as possible when tested; and also that the cordage is made by a regular rope-maker.—*Royle, Fib. Pl. p.* 4.

(6389) PITCH.

Poix, Fr.	Pece, It.
Pech, Ger.	Smola-gustaja Rus.
Pitch, Guz. & Hind.	Pez, Sp.

The residuum which remains on inspissating tar, or boiling it down to dryness. It is extensively used in ship-building, and for many other purposes.—*McCulloch. Faulkner.*

(6390) PITCH BLENDE. A ponderous metalliferous ore, of a blackish colour, much valued by porcelain painters. Localities, Saxony, Bohemia, Hungary, and Cornwall.—*Waterston. Faulkner.*

(6391) PITH MODELS. The Trichinopoly Local Committee exhibited a large collection of figures and architectural models, carved in the Pith of the Typha. The attitudes of the figures are stiff but the draperies are characteristic. The figures introduced into the model of the Trichinopoly Fort are out of proportion being far too large for the scale of the buildings.

Pith Models of Pagodas..... { Trichinopoly and Salem.

Pith work made from the rushes called "Nultee"..... { Tanjore.

Model of the Pagoda.

(6392) PITTA, M. Vieillot's name for a genus of remarkable birds, placed by Mr. Swainson among the *Myiotherinæ*, or Ant-Thrushes. [Muscicapidæ.] *Eng. Cyc.*

Pitta (Vieill., Temm.).—M. Lesson remarks that, under the name of *Myiothera*, Illiger and Cuvier united the Brèves of Buffon and the Ant-Thrushes properly so called. These Brèves are remarkable, he observes, for the livid colours of their plumage, their long legs, and their very short tail. They are only found, he adds, in the Malaisian Islands, whilst the Ant-Thrushes belong to the New Continent as well as to the Old World. Mr. Swainson notices the genus *Pitta* as one of remarkable beauty, and observes that they have the gradually-curved bill of the true Thrushes, but much stronger.—*Eng. Cyc.*

(6393) PITTA GIGAS, Brève Geant, or Giant Pitta. Size equal to that of a magpie, but the tail is short and squared, and the wings cover it entirely. A very brilliant azure-blue covers the back, the scapulars, the rump, and tail; a less vivid tint is spread over the wings, the quills of which are black, covered with azure towards the tips; summit of the head, nape, and demi-collar of the lower part of the neck black; feathers of the front and eye-brows ashy-brown; throat whitish; an ashy-brown tint is spread over all the lower parts; the feet are very long and of a horny-ash colour. Total length 9 inches. It is found in Sumatra. (Temminck.) —*Eng. Cyc.*

Cidaris ma thalassinum (*Kitta thalassina, Pitta Thalasin*, Temm.). Greater part of the plumage very brilliant celadon-green; a velvety black band springs at the angle of the bill, passes backwards so as to include the eye, and surrounds the occiput; tail deep tarnished green; wings reddish, but the three or four secondary feathers nearest the body are opaline bluish-ash; iris, bill, and feet, very bright vermilion-red. Total length 11 inches 2 or 3 lines. The male and female have nearly the same livery. The young of the year differ in the colour of their bill and feet, which are black; in that of the wings, which is a tarnished rusty-red, and in the very clear blue, which is nearly whitish, of all the rest of the plumage. This blue tint is more vivid in middle age, and passes by degrees from bright azure-blue to celadon-green. Individuals during moult have the plumage varied with these two tints very vivid and pure. It is a native of Java and Sumatra. (Temminck.)—*Eng. Cyc.*

(6394) PLANKS.

Planker, Dan.	Takhta, Guz. Hind.
Planken, Dut.	Tolstale doski, Rus.
Planches, Fr.	Plankor, Sw.
Planken, Ger.	

A term applied to thick, strong, boards, cut from various kinds of wood.—*Faulkner.*

(6395) PLANTAGO, a genus of Plants, the type of the natural order *Plantaginaceæ*. It has a 4-cleft calyx, a corolla with an ovate tube, and a 4-parted reflexed limb. The capsules burst transversely; they are 2-4 celled, and have from 2 to 4 seeds. The seeds of *P. Ispaghula* are of a very cooling nature, and with boiling water form a rich mucilage, which is much used in India in catarrh, gonorrhœa, and nephritic affections. Soda is obtained in Egypt from the ashes of *P. squarrosa*.—*Eng. Cyc.*

(6396) PLANTAGO ISPAGHULA.

Ispagool, Pers.	Fuslioon, Greek.
Buzr-kaloona, Arab.	

In India the Plantago Ispaghula is cultivated during the cold season for the seeds, which are used as an emollient and light article of diet for convalescents.—*O'Shaughnessy, page* 510. In making a decoction of Ispaghool take of Ispaghool seeds two drachms, distilled water one pint. Boil and strain. This preparation is a simple demulcent. That of Isphaghool is used in dysenteries, and recommended by Mr. Twining. —*Bengal. Phar. p.* 277.

(6397) PLANTAINS, Banana.

Biyu, Bali.	Kudali, Sans,
Kehl-kang, Cyng.	Valiepullum, Tam.
Kayla Guz. Hind.	Arietie pundoo, Tel.
Gadang, Jav.	*Faulkner.*
Pesang, Mal.	Vellacoy, Maleal.
Ng-hyet-Praw, Burm.	

It is probable that the plantain and the banana are merely varieties, indeed that all the plantains are derivable from one species, the Musa sapientum, also called M. paradisiaca, the original of which is the wild Musa. The Musa is found in all tropical countries, and in India the common edible varieties flourish in the poorest of soils, from the most northern parts of India to Cape Comorin, and from the sea shore to elevations of 7000 feet. M. Coccinea M. Cavendishii are found in China. M. Glauca is indigenous in the Malayan Peninsula. M. Ornata in Chittagong. M. Superba is found in the valleys of the south of the Peninsula, and of the mountains at Dindigal. The varieties cultivated in Southern India, *Rustaley, Poovaley, Payvalley, Monden, Shevalley, and Putchey valley*, are to be found in most bazars. The plantain is one of the most useful of plants; in some countries supplies the place of bread and forms the chief nutriment of the people; its ripe fruit is eaten everywhere in India as a delicacy, and is also made into preserves. The farinaceous parts can be separated in the form of flour. The shoots or tops of young plants are given as fodder for sheep and cattle and are said to be a delicate edible. The leaves serve for thatch and bedding and the stem yields valuable fibres. Humboldt has calculated that the same amount of ground planted with the Banana will support a far greater number of people than when planted with wheat, but the productiveness according to the following statements differs with the mean temperature. Professor Johnston being the authority for the yield of dry food.

	Temperature.	Produce of Plantains per Imperial acre.	Or of Dry Food per acre.	
	Fah.	tons.	tons.	
In Warm Regions,	81½	72	19½	Humboldt.
At Cacua,.....	78⅘	59	16	Gondot.
At Hague, ...	71⅔	25	6¾	Boussingault.

In South America, Mexico and in Bombay, the fruit cut into slices and dried in the sun, and packed in the leaves of the plant forms an article of trade; they can also be baked, and in this state the sugar on the fruit is sufficient to preserve them for years; in the process of drying, the plantain is taken when fully ripe and laid in light cane frames exposed to the sun. When shrivelling commences the skin is peeled off, after which the drying process is completed, and the fruit is pressed with masses for the convenience of transport; in the moist climates of India it would be necessary to bake them in ovens. In 1850-51, 267 cwt., valued at Rs. 1456, were exported from Bombay to Cutch and Guzerat. The several varieties of the edible plantain which are known and cultivated throughout the West Indies, Africa, and in the East, are all reducible to two classes, viz., the Plantain and the Banana (*Musa Paradisiaca* and *sapientum*). The difference between these two plants is even so slight as to be scarcely specific; it is therefore most probable that there was originally but one stock, from which they have, by cultivation and change of locality, been derived. The plantain and its varieties invariably bear male, female and hermaphrodite flowers within the same spathe, all of them being imperfect and consequently unproductive of seed. An individual may, even from excess of culture, moisture, &c., be entirely incapable of flowering. During the prevalence of a disease or blight among the plantain walks of Demerara in the years 1844 and 1855, it was seriously proposed to introduce male plantains, or obtain fresh stock by seed. It was therefore necessary to determine with exactness if possible, whether the Plantain or Banana, (whichever be the parent stock) exists anywhere at present, or has been known to have existed as a perfect plant, that is bearing fertile seeds; or, whether

it has always existed in the imperfect state, that is, incapable of being procreated by seed, the only state in which it at present exists in our colonies. Linnæus conjectured (Spec. Plant, 1763) that the "Bihai" (*Heliconia humilis*), a native of Caracas, which produces fertile seeds, was the stock plant of the plantain; but the existence of a wild seed-bearing plantain, renders it unnecessary to pursue that speculation. The banana, from time immemorial, has been the food of the philosophers and sages of the East, and almost all travellers throughout the tropics have described these plants exactly as they are known to us, either as sweet fruit eaten raw, or a farinaceous vegetable roasted or boiled. The foliage of the plantain affords food and bedding, and is used for thatch, making paper, and basket making; and from its petioles is obtained a fine and durable thread. The tops of the young plants are eaten as a delicate vegetable; the fermented juice of the trunk produces an agreeable wine. The abundance and excellence of the nutritive food which the plants of this valuable genus supply are well known; but of the numerous uses to which they are applied I may mention the following:—The fruit is served up both raw and stewed; slices fried are also considered a delicacy. Plantains are sometimes boiled and eaten with salt meat, and pounded and made into puddings, and used in various other ways. In their ripe state these fruits contain much starchy matter. From their spurious stems, the fibres of the spiral vessels may be pulled out in such quantity as to be used for tinder. *M. textilis* yelds a fibre which is used in the manufacture of fine muslins, and the coarser woody tissue is exported in large quantities from Manila, under the name white rope or Manila hemp. Horses, cattle, swine, and other domestic animals are fed upon the fruit, leaves, and succulent trunks. The same extent of ground which in wheat would only maintain two persons, will under the banana yield sustenance to fifty. That eminent naturalist and elegant writer, the Baron Von Humboldt, states ("Political Essay on New Spain," vol. ii.) that an acre of land cultivated with plantains produces nearly twenty times as much food as the like space sown with corn in Europe. He refers to a place in Venezuela, where the most careful tillage was rendered to a piece of land, yielding produce supporting a humble population residing in huts, each placed in the centre of an enclosure, growing the sugar cane, Indian corn, the Papaw tree, and the Musa—a tropical garden!—upon the elaborate culture of which a whole family relied for subsistence. Lindley enumerates ten species of Musa, some of which grow to the height of 25 or 30 feet, but the valuable species *M. Cavendishii*, does not grow more than four or five feet high. The bananas of the family of the Musaceæ, appear to be natives of the southern portion

of the Asiatic continent (R. Brown, "Bot. of Congo," p. 51). Transplanted at an unknown epoch into the Indian Archipelago and Africa, they have spread also into the New World, and in general into all intertropical countries, sometimes before the arrival of Europeans. According to Humboldt it affords, in a given extent of ground, forty-four times more nutritive matter than the potato, and 133 times more than wheat. These figures must be considered as only approximative, since nothing is more difficult than to estimate the nutritive qualities of different aliments. The plantain may be deemed the most valuable of fruits, since it will, in some measure, supply the place of grain in time of scarcity. To the negroes in the West India Islands the plantain is invaluable, and, like bread to the Europeans, is with them denominated the staff of life. In Jamaica, Demerara, Trinidad, and other principal colonies, many thousand acres are planted with these trees. The vegetation of this tree is so rapid that if a line of thread be drawn across, and on a level with the top of one of the leaves, when it begins to expand, it will be seen, in the course of an hour, to have grown nearly an inch. The fruit when ripe is of a pale yellow, about a foot in length and two inches thick, and is produced in bunches so large as each to weigh 40 lbs. and upwards. In the Straits' settlements of the East, the following are the most approved varieties:—The royal plantain, which fruits in eight months; one which bears in a year, the milk plantain, the downy plantain, and the golden plantain or banana. A species termed *Guindy* has been lately imported from Madras, where it is in great request. It has this advantage over the other kinds, that it can be stewed down like an apple while they remain tough. The Malays allege that they can produce new varieties, by planting three shoots of different sorts together, and by cutting the shoots down to the ground three successive times, when they have reached the height of nine or ten inches. In some districts of Mexico it is, indeed, dried in the sun, and in this state forms a considerable article of internal commerce under the name of "plantado pasado." When dried, and reduced to the state of meal, it cannot, like wheat flour, be manufactured into maccaroni or vermicelli, or at least the maccaroni made from it falls to powder when put into hot water. The fresh plantain, however, when boiled whole, forms a pretty dense firm mass, of greater consistency and toughness than the potato. The mass, beaten in a mortar, constitutes the *foo-foo* of the negroes. The plantain meal cannot be got into this state unless by mixing it up with water to form a stiff dough, and then boiling it in shapes or bound in cloths. The advantages to the paper manufacturers in employing the prepared fibre instead of rags, will be numerous, for the fibre is equal in texture,

clean, and aromatic; whilst rags are dirty, full of vermin, and very often pestilential. A large stock of the plantain can always be secured, without fear of its being injured by keeping. The paper will be superior to that made of rags, and the process of making it will be more economical, inasmuch as the *sorting* of the material will not be required. Another advantage is, that a new article of commerce will be opened for the benefit of the colonial shipping interests and a stimulus will be given to the cultivation of a fruit which is the favorite food of large masses of the population. The following is a "specification" of articles requisite for making three tons of prepared fibre in a day:—Four wooden boilers lined with lead, in the form of coolers, 7 feet deep by 6 in diameter. One hydraulic press, from 400 to 500 tons. One stout screw press, to compress the fibre before it is submitted to the hydraulic press. One iron mill with horizontal cylinders. Six waggons; twenty mules. Utensils, such as spatulas, cutlasses, hoes, rakes, &c. &c. One lever, to take out the fibre from the boilers. One steam boiler, equal to 12-horse power, to steam the four wooden boilers. It being very desirable that the works should be in the immediate neighbourhood of a river, the machinery should be worked by water-power; but if this mode should be inconvenient, a steam engine in addition must be obtained, of about 8 or 10-horse power; or if one steam engine of 20-horse power were employed, it would be sufficient for all purposes. Thirty men are required to make three tons of fibre in a day.—*Simmonds.* Although perhaps there is no province in India in which plantains are grown to so great an extent as in Pegu, yet there are scarcely any good plantains to be had in the country. This is owing to the Burmese habit of only eating green fruit, and their total indifference to the finer qualities of flavor. The great use of all fruit with the Burmese is to serve as an addition to their curry, for which purpose one kind of plantain is just as good as another. But now that a market is opened for the better description of this and other kinds of fruit, the introduction of a good stock becomes desirable.—*McClelland.* The plantain or banana, though a far less palatable fruit, holds the same place in Tenasserim that the apple does in England, and the United States. It is used as a vegetable as well as an article for the dessert, the great proportion being eaten with rice and meat in the place of potatoes. There is perhaps no plant of which so many preposterous things have been carelessly written in books of travels, and then copied into works of graver character, than this. Among other things equally veritable, it is said, "Three dozen plantains are sufficient to serve one man for a week instead of bread, and will support him much better." A Karen by me says he often eats ten at a time, and a hundred would not be sufficient for a man one day if he had nothing else, unless they were very large. Like the mango, the tree is indigenous, but the wild fruit is too full of seeds to be eatable. The plantain and banana, which were formerly regarded as distinct, are now considered by botanists as one species, but it embraces many varieties; I have, says Mr. Mason, the Burman names of *twenty-five* before me. "The numerous varieties," writes Voigt, "we have in vain tried to put in some order. The attempt made for this purpose, in Schultens, appears to us to have only increased the confusion." The *Manila hemp*, from which a fabric of the finest texture is prepared, is made from the leaves of a species of plantain tree, *M. textilis.* Another distinct species of this genus grows wild in Tenasserim jungles, and is rather an ornamental plant, which is all that it has to recommend it. Unlike the common plantain it never throws up shoots from its roots. The name of the plantain in Pali is *manza*, which is its Arabic name, *mauz*, with a final vowel added, to pronounce the last consonant, no words in Pali, ending in any consonant excepting *n*. Now if its Arabic name be so widely diffused, it seems quite certain that had the plant been known to the Hebrews, the Hebrew being cognate with Arabic, it would have had a similar name. This fact is a sufficient refutation of the *conjectural* interpretations of certain passages of Scripture that we meet with from time to time. Thus: "Loudolf's conjecture that *dudaim* (mandrakes) were the fruit of *Musa paradisiaca*, (plantain-tree,)" which has been recently revived in a modern work, cannot stand, on account of its name. For the same reason, the conjecture that the grapes which the spies brought from Canaan, were plantains, cannot be sustained. The plantain seems a favorite plant to build fancies upon, Gesenius in defining *teenah*, the fig tree, refers to Gen. 3.7, "Where," he says, "the *Ficus indica* or *Musa paradisiaca*, plantain tree, Engl. with very large leaves seems to be meant." This is perfectly conjectural and is wholly unsustained by the usage of the word, as well as that it bears no resemblance to its Arabic name.—*Mason.* See MUSA.

(6398) PLANTAIN LEAVES, MUSA PARADISIACA. Lin.

Valei elley, TAM. | Maoz ka pat, DUK.

These leaves are used in regimental hospitals, for dressing parts that have been blistered, and men's backs, after punishment.—*Ains. Mat. Med, p.* 191.

(6399) PLANTAIN MEAL, is prepared by stripping off the husk, slicing and thoroughly drying the core in the sun, after which it is powdered and sifted. It has a fragrant odour—and its flavour is said to depend a good deal on the rapidity by which the slices are dried. It

should be husked and sliced by nickel or bamboo knives, as those of steel knives injures the colour of the meal. It is calculated that the fresh plantain will yield 40 per cent of meal, and that an average bunch of 25 lbs. weight will yield 5 lbs. and that an acre of plantain walk of average quality producing 450 bunches during the year, would yield upwards of a ton of meal: In the West Indies plantain meal is largely employed as the food of infants, children and convalescents. In composition the plantain fruit approaches most nearly, in nutritive quality to the potato, and the meal of the plant to that of rice: the following are the proportions of Starch, Sugar &c. and protein compounds, on which depend their nutritive quality.

	Rice.	Potato.	Plantain.
Starch Sugar &c.	87·4	79·0	86·0
Protein Compounds.	7·5	8·9	5·2

—*Simmonds.* Plantain Meal has attracted notice in England. The nutritive quality of this substance, and its chemical composition are found to approach very closely to that of rice. There can be no doubt therefore of the value of this meal, and of the benefit of preparing it, whenever the fruit is produced in larger quantities than it can be consumed.—*M.E.J.R.* See MUSA.

(6400) PLANTAIN SKINS, MUSA PARADISIACA.

Valei palum tole, TAM.

These, as also lime skins, are used by the chucklers in dying leather black.—*Ains. Mat. Med. p.* 129.

(6041) PLANTAIN FIBRE. Almost every part of the plantain, may be converted into fibre, but it most abounds in the stem and leaves, and can be made available for textile or cordage purposes. The combings or tow separated during the preparation of the fibres is of value as a substitute for horse hair, for stuffing mattrasses &c. and the peduncle of the core can be pounded into half stuff for the paper makers and forms an excellent material for the finest or the toughest kinds of paper. While in the West Indies the spiral vessels are employed as tinder. In the process of separation, the stem should be cut down six inches above the ground, and then divided longitudinally into four parts, and the juice expelled by passing each slip longitudinally through the common sugar mill with grooved hard wood rollers, or a mill the rollers of which are three feet long and one foot in diameter. In the process of crushing, the stalks and the harder and softer parts of the stem should be passed through separately, which can be easily effected if the rollers be horizontal. In this way, the produce will be four or five pounds of fibre from each tree. The fibres from the midrib of the leaf are the best, and in general if the stem yield four pound nett of fibre the stalk will give 1 lb. out of four. After the crushing, the fibres are to be well washed and boiled in soda or other alkaline ley to separate the gluten and coloring matter, keeping the fibres from the several parts, quite separate, in this process of boiling. They are then bleached and the highest coloured fibres do not require more than six hours, but the darkest, from twelve to eighteen. The fibre from the stem, is fine white and silky, of considerable length; specifically lighter than Hemp, Flax and Aloe fibre, by $\frac{1}{7}$th or $\frac{1}{5}$th and possessing considerable strength. The fibre of this plant rapidly rots and becomes stiff, brittle and discolored by steeping in the green state, and it has been ascertained by trial that the strength is in proportion to the cleanness of the fibre. If it has been well cleaned, and all the sap quickly removed, it bears immersion in water as well as most other fibres, and has about the same strength as Russian Hemp. The coarse large fruited plantains yield the strongest and thickest fibres; the smaller varieties are suited for weaving, and if carefully prepared, these have a glossy appearance, like silk. But this glossy appearance can only be got by rapid cleaning, before the sap has time to stain the fibres, and it is lost soon if the plant be steeped in water. It yields an excellent substitute for hemp or linen thread; it can be made into string line or rope, and manufactured into cloth. The fine grass cloth, ship's cordage, and ropes used in the south sea Whale fisheries, are said to be made from the fibres of varieties of Musa. As in all the plantain tribe, the leaves yield the thickest and strongest fibres. Though hitherto little employed, there can be no doubt that it is the most conspicuous amongst the fibrous plants of India. It contains a valuable fibre. It is every where cultivated in India for its fruit, an article of universal consumption by the native population, and the stem can always be had in abundance for it. It is a tree which bears fruit only once, and as soon as the fruit has been removed it is cut down. There will therefore be no difficulty in obtaining from this plant alone, a large quantity of fibre of valuable quality, applicable to every species of cloth, or other articles usually made from flax or hemp and of equal quality. The finest plantain fibre when carefully cleaned and dressed, in what may be termed the "fresh process," in contradistinction to the system of rotting the fibres free, has been said to be well suited for the imitation of silk in carriage braid and carpet work. The average value put upon such fibres was said to be £70 per ton, when Russian hemp was selling at £50 per ton. In the West Indies, the total expense of producing a ton of fibres, is calculated at £9 18. 4. It seems worth consideration whether the wild, and at present useless plantains, growing along the foot of the Himalayas and on the Neilgherries may not yield a stronger fibre than any of the cultivated

kinds. The wild fruit is not edible, from its containing many seeds, on the Arracan coast, the layers of the stem of the plantain, termed there *Pa-cha-yoo-ein*, are sold in a dried state, some of it is even twisted into a bast-rope. It would probably command a good price as a cordage or paper material, or for textile fabrics. When the object is to obtain material for the paper maker, it has been suggested to use the implement like a tilt hammer so much employed in India. See MUSA.

(6402) PLASMA. A green, semi-transparent calcedony, having a dark tint, which is supposed to be coloured by chlorite. It is found chiefly in India, and is made into beads, and other ornaments. Occasionally specimens are found among the ruins of Rome.—*Waterston. Faulkner.*

(6403) PLATALEA, a genus of Birds belonging to the family *Ardeidæ*. The peculiar form of the bill in this genus has gained for these birds the common name of Spoonbill. It has the following generic characters:—Bill very long, strong, very much flattened, point dilated and rounded into the form of a spoon or spatula; upper mandible channelled, transversely furrowed at its base; nostrils at the surface of the bill, approximated, oblong, open, bordered by a membrane; face and head partially or entirely naked. Feet long, strong; three toes anteriorly united up to the second joint by membranes or webs; posterior toe touching the ground. Wings moderate, ample; the first quill nearly as long as the second which is the longest. The Spoonbills live in society in wooded marshes, generally not far from the mouths of rivers, and are rarely seen on the sea-shore. Their food consists of small fishes, spawn, and small fluviatile testaceous molluscs, as well as small reptiles and aquatic insects. According to circumstances they build their nests either in high trees, in bushes, or among rushes. Their moult is simple and ordinary, but the young bird does not take the confirmed livery of the adult till the third year; the bill is gradually developed, and appears covered with a membrane. The crest makes its appearance at the second year. The sexes have external distinctions, but the characters are but slightly marked. (Temminck.)—*Eng. Cyc.*

(6404) PLATALEA LEUCORODIA, Linn., the Common White Spoonbill. This species is, there can be little doubt, the Λευκερωδιὸς of Aristotle ('Hist. Anim.,' book viii. c. 3), of which he says that it haunts περὶ τὰς λίμνας καὶ τοὺς ποταμοὺς ("about the lake and rivers"); and which he thus describes:—"In size it is less than the other," the Ἐρωδιὸς (one of the Herons, perhaps *Ardea cinerea*) "and has a broad and long bill;" a description which, when coupled with the white colour indicated by the name, can hardly be deemed inapplicable; nor can the term 'broad' be with any propriety referred to the bill of any of the true Herons. It is the Becquarougeglia (Belon) and Cucchiarone (Bonaparte) of the modern Italians; Pale, Poche, Cueiller, Truble (Belon), and Spatule of the French; Weisser Loffeler and Loffel Gans of the Germans; Lepelaar of the Netherlanders; Llydon Big of the Welsh; and Spoonbill and White Spoonbill of the English. This bird has a very full long occipital crest, formed of loose and subulate feathers. It feeds on very small fish, spawn, testaceous mollusca, insects and aquatic worms, small reptiles, and the roots of some weeds and grasses. The Common Spoonbill haunts the mouths of rivers. Its nest is built sometimes on lofty trees, sometimes in rushes and reeds, according to circumstances and the eggs are from two to four in number, generally three, sometimes entirely white, but most frequently white marked with obscure red spots. They bred annually in the time of Ray in a wood at Sevenhuys, not far from Leyden, but the wood has been long destroyed.—*Eng. Cyc.*

(6405) PLATANACEÆ: PLANES, a natural order of Exogenous Plants. The species are amentiferous trees or shrubs, with alternate deciduous palmate or toothed stipulate leaves, and unisexual naked flowers in globose catkins. The barren flowers with stamens single, mixed with scales, Fertile flowers with ovary 1-celled, style thick and subulate. Ovules 1-2, orthotropal; suspended. Nuts clavate, with a persistent style. Seeds usually solitary and albuminous; radicle inferior. They are natives of the Levant and North American chiefly. They are fine trees, but their timber is not durable.

(6406) PLATANUS ORIENTALIS, Oriental Plane, has palmate leaves resembling those of the common Sycamore. It grows in the western parts of Asia, and extends as far east as Cashmere. Its wood is fine-grained and hard, and when old it acquires dark veins so as to resemble walnut-wood. The tree was valued for its shade by the Greeks and Romans, and it was held sacred in the East. *P. occidentalis* is found in most parts of North America, from Mexico as far as Canada. The timber is of a reddish colour, and will not bear exposure to the weather. There is but this one genus in the order and six species. The family resembles *Artocarpaceæ* and *Altingiaceæ*.

(6407) PLATINA. A metal of a colour between steel-gray, and silver-white, which, in respect of scarcity, beauty, ductility, and indestructibility, is hardly inferior to gold. It is found in the metallic state in Brazil and Peru, in Antioquia in South America, in Estremadura, in Spain, and latterly, in considerable quantities in the Uralian Mountains. The general appearance of it in the rough state, is that of small grains or scales darker than silver, and extremely heavy. This metal is peculiarly valuable in many chemical applications, and is much employed for crucibles, retorts for the distillation of sulphuric acid, mirrors for reflecting telescopes, &c. In Russia it is made into coins.—*Faulkner.* Platinum,

or Platina, is an important metal, although it was not known earlier than about the middle of the last century. It was first made known in Europe by Mr. Wood, assay-master in Jamaica, who met with its ore in 1741. In 1750 he published a paper upon it in the 'Philosphical Transactions.' The name of this metal is the diminutive of 'plata' silver, given to it on account of its colour, and it was originally called Platina del Pinto, because it was found in the auriferous sand of the river Pinto. It has since been found in Brazil, Colomba, St. Domingo, and in the Ural Mountains.—*Eng. Cyc.*

(6408) PLATYLOBIUM TRIANGULARE. LEGUMINOSÆ. These are free flowering shrubs, with pretty orange, yellow, or red coloured flowers, and are readily grown from seed in any tolerable garden soil.—*Riddell.*

(6409) PLATYSTEMON CALIFORNICUM. RANUNCULACEÆ. These are annuals with cream coloured flowers, natives of California, and said to grow best in sandy loam.—*Riddell.*

(6410) PLECTOCOMIA. A genus of palms growing in Malacca, Java, Assam and the Cossya Hills, with leaves of great length, having a hook at the end by which to support themselves.—*Seeman.* Plectocomia is the *Rhenoul* of the Lepchas and is not a very large plant: but it climbs lofty trees and extends 40 yards through the forest, 6500 is the upper limit of the Palms in the Sikkim Himalayas, the *Rhenoul* alone attaining this height.—*Hooker Vol.* I, *p.* 147.

(6411) PLECTRANTHUS (from πλῆκτρον, a cock's spur, and ἄνθος, a flower, in reference to the corolla being spurred or gibbous above the base), a genus of Plants belonging to the natural order *Labiatæ*. It has a campanulate 5-toothed calyx in the floriferous state; the teeth equal or the upper one largest. The corolla with an exserted tube; the upper lip from 3-4-cleft, the lower one entire, usually longer and concave. There are 4 stamens, declinate, didynamous, the lower ones longest; free toothless filaments; ovate uniform anthers. The species are herbs, subshrubs, and shrubs. There are 45 species of this genus described, which are of easy culture and propagation.—*Eng. Cyc.*

(6412) PLECTRANTHUS AROMATICUS. FRAGRANT PLECTRANTHUS.

Pathur-choor. HIND.

Cultivated in gardens at Ajmeer.—*Genl. Med. Top. p.* 200.

(6413) PLECTRANTHUS CORDIFOLIUS, a very aromatic plant of India of the family LABIATÆ.—*O'Shaughnessy, page* 491.

(6414) PLECTRANTHUS CRASSIFOLIUS is esteemed in India both as a perfume and a spice, being equally valued in the toilet and the kitchen. The Patchouly, so inimical to vermin and so efficacious in preserving cloths from moths, was said to be the leaves of *P. graveolens*, which have a very powerful odour, but the comminuted state in which it is imported renders this uncertain.—*Eng. Cyc.*

(6415) PLECTRANTHUS RUGOSUS. Rottler.

Sirroo Kaluig, TAM.

This seems peculiar to the Tinnevelly country; and has a wholesome pleasant tasted, bulbous root, much eaten by the Natives particularly during the period of their great festivals. Its leaf is rough and not unlike that of Burrage.—*Ainslie, p.* 250.

(6416) PLEURONECTES SOLEA. THE SOLE.

Naak meen, TAM.	Ekan leda MALAY.
Kowlie mutchie, DUK	

Ains. Mat. Med. p. 155.

(6417) PLEUROPTRA, a tribe of *Mammalia* generally known as Flying Lemurs (*Galeopithecus* of Pallas; Flying Cats and Flying Foxes of voyagers). They are generally arranged under the order Carnassiers, and some authors place them in the division *Cheiroptera*; but they differ from the Bats inasmuch as the toes of their anterior extremities, which are all furnished with sharp claws, are not more elongated than those of the hind feet, so that the membrane which occupies the interval between the extremities to the sides of the tail can hardly operate in executing more than the functions of a parachute. The dentition, according to Mr. Waterhouse, is as follows:—

$$\text{Incisors},\frac{2\text{-}2}{4};\ \text{Canines},\frac{0\text{-}0}{1\text{-}1};\ \text{Molars},\frac{2\text{-}2}{2\text{-}2};\ \text{Molars},\frac{4\ 4}{4\text{-}4}=\frac{34}{34}$$

Cuvier states that the *Galeopitheci* live on trees in the islands of the Indian Archipelago, and there pursue insects, and perhaps birds, as their prey: judging from the detrition of the teeth with age, he thinks that they must also feed on fruits. They have a very large cæcum. In their teeth they present many analogies to the *Lemuridæ*. Dr. Gray makes the *Galeopithecidæ* the fourth family of the *Primates*, and places it between the *Lemuridæ* and *Vespertilionidæ*. ('Outline, &c., in Ann. of Philosophy,' 1825.) Three species have been recorded:—1, *Galeopithecus rufus*, Geoff., Audeb. (*Lemur volans*, Linn.); 2, *G. variegatus*, Cuv., Geoff.; 3, *G. Ternatensis*, Geoff.: but the general opinion seems to have been that one only, the (*Lemur volans* Linnæus) had been satisfactorily made out. Mr. Waterhouse has however described two species, of which the following are the characters:—

(6418) *Galeopithecus Temminckii*, measures about 2 feet in total length, and its skull was 2 inches 11½ lines in length. The anterior incisors of the upper jaw is broad and divid-

ed by two notches into three distinct lobes; the next incisor on each side has its anterior and posterior margins notched; and the first molar (or the tooth which occupies the situation of the canine) has its posterior edge distinctly notched. This tooth is separated by a narrow space, anteriorly and posteriorly, from the second incisor in front and the second molar behind; the temporal ridges converge towards the occiput, near which however, he observed, they are separated usually by a space of about four lines. This is probably the *G. volans* of authors; but the identity cannot be said to be certain.

(6419) *Galeopithecus Philippinensis* is described by Mr. Waterhouse as being usually about 20 inches in length, and its skull as measuring 2 inches 7 lines in length. He observes that this species may be distinguished from *G. Temminckii* by the proportionately larger ears and the greater length of the hands. The skull is narrower in proportion to its length, the muzzle as broader and more obtuse, and the orbit as smaller. The temporal ridges generally meet near the occiput, or are separated by a very narrow space. The anterior incisor of the upper jaw is narrow, and has but one notch; the next incisor on each side is considerably larger, longer, and stronger than in *G. Temminckii*, and differs moreover in having its edges even—the same remark applies to the first false molar. In this species the incisors and molars form a continuous series, each tooth being in contact with that which precedes and that which is behind it. The most important difference perhaps which exists between the two species in question consists in the much larger size of the molar teeth, in the smaller skull, the five posterior molars occupying a space of 10 lines in length, whereas in *G. Temminckii*, a much larger animal, the same teeth only occupy 9 lines. (' Zool. Proc,' 1839.)

(6420) PLOCARIA, a genus of Plants belonging to the alliance *Algales*, the order *Ceramiacea*, and the sub-order *Sphærococcea*. One of the species, *P. Helminthocorton*, is called Corsican Moss, and has a considerable reputation as a vermifuge. It is a native of the Mediterranean.—*Eng. Cyc.*

(6421) PLOCARIA CANDIDA. Fucus Amylaceus.

Kyouk-pwen, Burm.

A sea weed, abundant on the Tenasserim coast, and exceedingly valuable for its nutritious and medicinal properties for invalids. It was first brought to public notice by Dr. O'Shaughnessy as the Edible moss of the Eastern Archipelago, and referred by him to the genus fucus. The fructifications however being in small tubercles, the Rev. Mr. Mason considers it as a species of Agardh's genus, Sphærococcus which now constitutes a member of the genus Plocaria. It is an allied species with the Ceylon moss (Gigartina lichenoides) first described as fucus amylaceus by Dr. O'Shaughnessy, the Plocaria lichenoides of Mr. Mason; also with a species found on the coast of Devonshire in England; Pl. compressa: with the Corsican moss of the Mediterranean P. Helminthochorton; also with the Agar-agar Pl: tenax a species used in China, as a substitute for glue and gum *Arabic*, but differs from the Irish moss or Chondrus crispus; and is not of the same natural family as the Iceland moss which, indeed, is a lichen, the Certraria islandica. The Tenasserim moss is said to be superior to all others, as it is wholly free from the bitter principle which renders other fuci so objectionable; but Mr. Mason seems to consider it identical with the Ceylon moss, for he gives the same account of it as Dr. O'Shaughnessy gives of that from Ceylon. It contains he says a considerable proportion of starch, and was hence named by Dr. O'Shaughnessy, the starch fucus, F. Amilaceus but its specific name has been since changed to *candida*, white, probably from a mistaken idea that the substance is naturally white, whereas it becomes so only by bleaching in the sun; its natural tint, is a shade between olive and purple, such as the natives designate red. According to Dr. O'Shaughnessy's analysis it contains as follows:

Vegetable jelly, ...	54.5
True starch, ...	15.0
Wax, a trace	0.5?
Ligneous fibre, ...	18.0
Gum, ...	4.0
Sulphate and muriate of soda,...	6.5
Sulphate and phosphate of lime, ...	1.0
Iron, a trace, ...	0.4?
	100.0

On the best mode of preparing it for use he adds: "In the first place, from the tendency of *pectin* or vegetable jelly to form insoluble compounds with saline and earthy bases, it is necessary to steep this fucus for a few hours in *cold rain water* as the first step in its preparation. This removes a large portion, if not the entire, of the sulphate of soda, leaving all the gelatine, and starch. It should next be dried by the sun's rays, and *ground to a fine powder*; I say *ground*, for cutting or pounding, however diligently or minutely performed, still leaves the amylaceous globules so mechanically protected, and so closely involved in an external sheath of tough ligneous fibre, that scarcely a particle of the starch can be extracted by boiling, even though the decoction is prolonged for several hours. When *ground*, boiling for 25 minutes or half an hour dissolves all the starch and gelatine. The solution while hot should be passed through muslin or calico, and thus the ligneous fibre is

removed; lastly, the strained fluid should be boiled down till a drop placed on a cold surface gelatinizes sufficiently. "With milk and sugar, and flavoured with lemon juice or sherry, this substance when prepared as now directed, would afford the invalid a pleasant article of diet, especially at sea, where other jellies or their materials cannot be so easily preserved. As this fucus is found abundantly on the eastern coast of Bengal, he entertained considerable hopes of its being hereafter found available also in several processes of art and various manufactures." —*Mason.*

(6422) PLOCEINÆ, a sub-family of *Fringillidæ*. The genus *Ploceus* (Weavers, Tisserins of the French) is thus defined by Mr. Swainson:—Size small. Bill conic, but with the culmen slightly bent, and the tip entire. Under mandible less thick than the upper. Claws large, very long. Wings pointed; but the first quill remarkably short and spurious. It inhabits the Old World only.—*Eng. Cyc.* Next to the sub-genus *Vidua*, in Mr. Swainson's arrangement, come the following:—

(6423) *Euplectes* (Sw.)—Bill shorter than the head. Nostrils round, partly concealed by the frontal feathers. Wings short; the second quill shorter than the third; tertials as long as the primaries. Tail short, even, or very slightly rounded. Feet large, gracile. Toes very long and slender; the lateral of equal length. Claws slender, very slightly curved.

(6424) *Ploceus* (Cuv.).—Bill considerably lengthened, as long as the head. Nostrils almost naked. Wings moderate; the second, third, fourth, and fifth quills nearly equal; tertials shorter than the primaries. Tail short, even. Feet large, thick. Toes robust; the lateral equal. Claws strong, thick, fully curved.

(6425) *Symplectes* (Sw.).—General structure of *Ploceus*; but the bill is more compressed, the commissure curved, but neither sinuated nor toothed. Wings short, rounded; the first quill half as long as the second, which, with the third, is graduated; the next three are nearly equal, and are the longest. Tail moderate, even. Feet strong. The middle toe abbreviated; inner toe shorter than the outer; hinder toe long, equal to the middle toe.

(6426) *Amadina* follows in Mr. Swainson's arrangement, and he speaks of the genus *Ploceus* thus defined as by far the most beautiful of the division of *Coccothraustina*. "It is," says he, "composed of the Weavers, a name given them on account of that surprising skill with which they fabricate their nests."

(6427) PLOMBAGO, Carburet of Iron. Black Lead, Plumbago. Is said to be occasionally sold for antimony in the bazars. It is found in Ceylon and in Travancore, also in the Northern Circar mountains in the Vizagapatam districts, though I am not aware of any having found its way into the market but I understand it has been procured thence by the proprietors of the Bimlipatam sugar works for use in machinery. I have had some of good quality for common purposes, found in the hill on which Capt. Orr's house stands.—*Rohde, M.S.S.* Plumbago abounds in the hills skirting the Western boundary of the Vizagapatam district. The deposits have never been worked, and that which is brought to the Coast is coarse and impure.—*M.C.C.* Of samples of plumbago from several localities, the finest and most varied series both as regards size and quality were those exhibited by General Cullen from Trevandrum. One large block occurs along with laterite and contains some pieces the size of a walnut, nearly equal to the fine kinds of Cumberland black lead. Other large blocks nearly a foot in cubic measurement appear of a softer and coarser quality. They have been sawed through, but are not so compact as the brightest portions of the first named block. This plumbago or graphite is well suited for the manufacture of ordinary pencils or for making crucibles. Mr. Caldecot exhibited some very fair samples from the same locality; the Zemindar of Vizianagrum also exhibited some fair specimens. Lieut. Evans, 51st Regiment M. N. I., exhibited plumbago of good quality from Ceylon, and of indifferent quality from beds of shale that accompany iron ore at Malacca. Some indifferent specimens of plumbago were also exhibited along with iron ore and slaty shales from Cuddapah.—*M. E. J. R.* Lately there have been made further observations on the Graphite or Plumbago of Kumaon and Travancore by Dr. Forbes Royle M. D. with an Extract from a letter from the Resident of Travancore and Cochin dated 9th February 1857. This Mineral was formerly found in its most pure state in Borrowdale in Cumberland, which indeed was the only Mine which produced Lead of that fine quality requisite for the manufacture of Drawing Pencils. The Cumberland Mines have been wrought since Elizabeth's time; pure Cumberland lead costing as much as from 30 to 40 shillings a pound. The lead is not found in veins but in detached pieces, so that the supply is occasionally irregular and the search for it laborious and often fruitless. Inferior descriptions of lead come from Spain and Ceylon, and are used in the manufacture of crucibles and of the inferior sort of Pencils and in polishing Cast Iron. At present Mr. Royle says, finely powdered Graphite can, by an extreme degree of pressure, be rendered nearly as compact as the best natural Graphite, or we should be without any more good drawing Pencils. The great Manufacturers of Pencils in England reported the Kumaon and Travancore specimens as quite useless for the manufacture of black lead pencils, observing that they could not use the specimens in the state

in which they had been sent without damaging their machinery, at the same time they could not conceive why purer specimens should not be found in the same locality. In regard to the objections made to the specimens forwarded, General Cullen, the Resident of Travancore, remarks that one motive of their selection was to exhibit the matrix or Laterite rock in which they were found. General Cullen has addressed a further report on the Plumbago or Graphite of Travancore. Two varieties of Graphite are found in Travancore, one in thin laminæ, another granular, and he sent specimens of both to the Exhibition of 1851. The granular or fibrous variety, "I have only yet discovered in two localities and both of them in laterite, a few feet only below the surface. One locality is about 5 or 6 miles N. E. of Trevandrum and the other about 12 or 14 miles N. E. I brought in from this latter locality on my visit to it, about 3 cwt. Some small deposits are also found immediately on the W. of the town of Trevandrum, but I have not yet heard of any other deposits of this granular variety though I think it probable they exist. Graphite in thin scales or laminæ is common nearly throughout the laterite tracts of Travancore and Cochin, but more or less abundant in particular places. It is found in some places in lamina of considerable size, particularly in a laterite hill about 25 miles N. E. of Trevandrum at a place called Caviatteucoodul, near the foot of the Ghât mountains. Having some specimens of this variety by me, I forward them. It is also found in laminæ of good size in the disintergrated gneiss of the Ghâts on the Tinnevelly side, also common in the Kunker or Travertine deposits near Culdacoorche and Ambasamoodrom. The Vizagapatam Graphite is perhaps also found in laterite, of which there is a large deposit at Bimlipatam. The objections made to the specimens of Graphite sent to the London Exhibition of 1851, were because of the impurities attached to it, but one motive in the selection of the specimens forwarded was to exhibit the matrix or laterite rock in which they were found. M. L S. Journal.—*General Cullen.*

(6428) PLOUGHING. The Chinese annual ceremony of ploughing is of very ancient origin. At Peking, it consists in ploughing a sacred field with a highly ornamental plough kept for the purpose, the Emperor holding it while turning over three furrows, the princes five, and the high ministers nine. These furrows were, however, so short that the monarchs of the present dynasty altered the ancient rule, ploughing four furrows and returning again over the ground. The ceremony finished, the emperor and his ministers repair to the terrace, and remain till the whole field has been ploughed. The ground belongs to the temples of Heaven and Earth, on the south of the city, and the crop of wheat is used in idolatrous services. The rank of the actors renders the ceremony more imposing at Peking, and the people of the capital make more of it than they do in the provinces. A monstrous clay image of a cow is carried to the spot, containing or accompanied by hundreds of little similar images; after the field is ploughed it is broken up, and the pieces and small images are carried off by the crowd to scatter the powder on their own fields, in the hope of thereby insuring a good crop. The heads of the provincial governments, the prefects and district magistrates, go through a similar ceremony on the same day. In Ningpo, an eye-witness describes the principal features of the ceremony as consisting in a solemn worship by all the local officers of a clay image of a buffalo and an idol of a cowherd. The prefect then ploughed a small piece of ground, and he and his associates dispersed till the morrow, when they came together in another temple at dawn. Here a series of prostrations and recitals of prayers were performed by the "fathers of the people" in their presence, some of whom seemed to have no respect for the worship they were engaged in, while others evinced deep reverence. As soon as this was over, the clay ox was brought out, and a procession consisting of all the officers passed around it repeatedly, striking the body at a given signal, and concluding the ceremony by a heavy blow on the head. The crowd then rushed in and tore the effigy to pieces, each one carrying off a portion to strew on his fields.—*Williams' Middle Kingdom, Vol.* II. *page* 109.

(6429) PLUMBAGO. *Plumbaginaceæ.*—The Lead Wort. (White) P. Zeylanica (Red) P. Rosea (Blue) P. Capensis.—The White Plumbago is common; so are the other varieties. The red and blue blossom throughout the year; but the latter, which is the handsomest of the whole, and introduced from the Cape, is by far the most esteemed. Is propagated by layers.—*Riddell.* These three different species of plumbago, the red, the white, and the blue flowered, are common in Tenasserim gardens; and the first two are cultivated by the Burmese for the vesicatory power of their roots.—*Mason.*

(6430) PLUMBAGO ZEYLANICA (Flower white)

(6431) PLUMBAGO CAPENSIS (Flower blue.)

(6432) PLUMBAGO EUROPÆA, South of Europe.

Chitra vani, Sans.

An erect, branching, smooth, herbaceous shrub. The whole plant, especially the root, is very acrid, and applied as paste to the skin, acts as a powerful vesicatory. Given internally in small doses, it is said to be a very efficacious emetic, but we would deem its administration as dangerous as that of cantharides. The bruised

root has been employed in Europe as an application to cancer, as a counter-irritant in toothache, and as a remedy for the itch.—*O'Shaughnessy, page* 508.

(6433) PLUMBAGO ROSEA. Lin.

Lal chitra, Duk.	Chitra, Beng.
Cditraca, Sans.	Shiturridge, Arab.
Chittra molum and kodivaylie, and Shencodie-vaylee, Tam.	Tumba codiveli, Hort. Mal.
Chitturmol, Duk.	Yerra Chittramoolum, T.
Chita, Hind.	Aroona Chitraca, Sans.

A native of various parts of the East Indies, an erect, herbaceous plant with a round striated stem, and ascending or erect branches. This like the Chittramoolum is a plant of the class Pentandria and order Monogynia and is nearly similar to it in its natural qualities. The bruised root tempered with a portion of same bland oil, is used as an external application in Rheumatic and Paralytic affections. It is also prescribed internally in powder, in small doses, for the same complaints.—*Ains. Mat. Med. p.* 112. The properties of this species and of the *P. scandens* and *zeylanica* are nearly identical. A paste made with rice congie and the bruised bark is applied by the natives to buboes in the incipient states: it acts as a vesicatory. Dr. O'Shaughnessy made numerous clinical experiments with the bark of the plumbago root of various species, especially the *P. rosea*, rubbed into a paste with water and a little flour, or congie; it occasions pain in about five minutes, which increases in severity till in a quarter of an hour it is equal to that of a cantharides blister or mustard sinapism. If the paste be removed in half an hour the pain is soon allayed, and in a period of 11 to 18 hours a large uniform blister, full of serum, is occasioned. The blistered surface heals readily without unpleasant ulceration. Applying Plumbago Rosea in the native, the skin in a few minutes is intensely blackened; in white-skinned persons a deep redness is occasioned. In all chronic cases and in many acute diseases this blister will prove an effectual and very cheap substitute for cantharides, over which it possesses the peculiar advantage of never producing strangury or any other form of irritation of the urinary organs. Dr. O'Shaughnessy speaks from the experience of from 3 to 400 cases. His experiments lead him to believe that the blistering quality resides in the Plumbagin, but on this he was as yet unable to speak in positive terms. The root, in various forms, is much employed as a poison in India; and as an irritant to occasion abortion it is introduced into the vagina and applied directly to the neck of the uterus. In a criminal case of the former kind, in 1837, Dr. O'Shaughnessy, succeeded in detecting the poison by acting on the contents of the stomach with alcohol, concentrating the tincture, re-dissolving in a small quantity of boiling water, and adding the sub-acetate of lead, by which the very characteristic red colour was immediately occasioned. By a modification of this process two grains of the powdered bark may be detected in a pint of a mixture of milk, blood, and various articles of food.—*O'Shaughnessy, page* 509—10.

(6434) PLUMIERIA. Several species of this genus, natives of Jamaica, Surinam, Brazil, the Malayan Archipelago, and Cochin China, are used as drastic cathartics.—*O'Shaughnessy.*

(6435) PLUMIERIA ACUMINATA. Apocynaceæ.

Gobur-Chumpa. Duk.

A small elegant tree, common; flowers white and yellow, tinged with red, very fragrant. A pure white caoutchouc is obtained from this tree.—*Riddell.* It is abundant and luxuriant in the Pinjore valley. (*Royle*)—*O'Shaughnessy, p.* 449. China champac. This, a small South America tree, is called by the Burmese, chúna champac, Its straggling, and often leafless branches shoot out from their extremities delicate orange-colored blossoms, tinged with red, and of sweetest fragrance.—*Mason.*

(6436) PLUMIERIA ALBA.

Gulachin, Duk.

The White Chumpa.

(6437) PLUMS. The well-known fruit of a tree (*Prunus domestica*), indigenous to the greater part of the Northern Hemisphere. No less than 274 varieties of this fruit are enumerated. Dried plums form an article of commerce under the names of prunes and prunellas.—*Faulkner.*

(6438) POA (the Greek πόα 'grass'), a genus of Grasses belonging to the tribe *Festuciueæ*. This tribe is characterised by very short styles, protruded stigmas, and the glumes shorter than the lowest flower. The genus *Poa* has its glumes rather unequal; the outer palea with 3 or 5 nerves, membranous below, scarious at the tip, compressed, keeled, unarmed; the styles terminal. The species of this genus are very numerous, constituting the commonest weed that follow the migrations of man, and generally containing a sufficient quantity of nutritive matter to render them fodder for various animals. Thirteen species of this genus are described by Babington as natives of the British Islands. Of these the most common are the *P. annua* and *P. pratensis*. The former is perhaps the commonest of British plants, springing up on every neglected spot around the habitations of man. The latter is known by the name of the Smooth-Stalked Meadow-Grass, and is found in most pasture lands. *P. nemoralis*, the Wood Meadow-Grass, is also a common grass in shady places. Many of the recent genera of Grasses were formerly referred to the genus *Poa*.—*Eng. Cyc.*

The sacred grass of the Hindoos, the *dab* or *koosha* of the Brahmins (*Poa cynosuroides*), is made into rope in North-West India. Species of Saccharum are used for thatching and for screens, and some for making writing-pens and for The fibres of the *Andrachus* or Vetiveyr are more remarkable for their agreeable odour than for their tenacity, while the Bamboo, the most gigantic of grasses, might be enumerated with timbers rather than with fibres, though its split stems are often employed for making mats in India, and the young shoots for paper-making by the Chinese. Many other of the grasses might be converted into half-stuff for paper-makers, and have the great advantage of affording large quantities of a cheap material.—*Royle.*

(6439) PODA WOOD.

Poda, Tel. | Pallas, Hind.

(6440) PODALYRIA GENISTOIDES. Leguminosæ. These are pretty shrubs with silky leaves, and should be grown in a light garden soil, their colours are mostly white, purple, blue or red, and should be raised from seed.—*Riddell.*

(6441) PODOLEPIS GRACILIS. Compositæ. The stems of these plants are covered with scales, the flowers are white, yellow and pink, these plants are adapted for borders, and may be raised from seed.—*Riddell.*

(6442) PODOPHYLLUM PETLATUM, (may-apple) is a native of the United States, where the root is considered to be a valuable, and powerful cathartic.—*O'Shaughnessy, page* 170.

(6443) PODOPHYLLUM EMODI, Wall. Occurs in Nipal and Kemaon, and on the Choor mountain in the Himalayas, at an elevation of 10,000 feet. A specimen of the root was forwarded to the Committee investigating the Bengal drugs, by Dr. Falconer, of Seharunpore, but the quantity obtained was too small for the requisite experiments being instituted upon its virtues.—*O'Shaughnessy, page* 170.

(6444) PODOPHYLLUM HEXANDRUM, was found by Dr. Royle on the Kedarkanta mountain, at an elevation of 12,000 feet.—*O'Shaughnessy, page* 170.

(6445) PODOSTEMON. Of this genus of plants, Dr. Wight in Icones gives, P. dichotomus, 1916-2; elongatus, 1917-1; griseus, 1918-3; olivaceus, 1918-2; rigidus, 1916-5; subulatus, 1918-1; Wallichii, 1916-1; Wightii, 1916-3.

(6446) PODOSTEMON. One species grew near the Jyntea Hills on the stones at the bottom of the Oongkot: it is a remarkable water-plant resembling a liver-wort in its mode of growth. Several species occur at different elevations in the Khasia, and appear only in autumn, when they often carpet the bottom of the streams with green. In spring and summer no traces of them are seen; and it is difficult to conceive what becomes of the seeds in the interval, and how these, which are well known, and have no apparent provision for the purpose, attach themselves to the smooth rocks at the bottom of the torrents. All the kinds flower and ripen their seeds under water, the stamens and pistil being protected by the closed flower from the wet. This genus does not inhabit the Sikkim rivers, probably owing to the great changes of temperature to which these are subject.—*Hooker Him: Jour: Vol.* II. *page* 314.

(6447) PODOTHECA CAPITATA. A yellow flowering plant of no great beauty—readily cultivated from seed.—*Riddell.*

(6448) POEE, Basella Alba et Rubra. Malabar Nightshade. This is a twining, succulent plant, with smooth fleshy leaves; it grows very rapidly and is generally cultivated as a spinach. There are two sorts.—*Jaffrey.*

(6449) POGOSTOMON. A genus of plants, one of which, P. Pachouli, furnishes the fragrant herb of that name, Dr. Wight gives in Icones, Pogostemon Heyneanus, 1440; hirsutus, 1442; rotundanus, 1441; speciosus, 1443. See Patchouli.

(6450) POINCIANA, a genus of Plants belonging to the natural order *Leguminosæ*. *P. aculeata*, or the Barbadoes Flower-Fence, is a tropical bush, about ten feet high, with bipinnate leaves, obovate leaflets, prickly branches, large terminal corymbose masses of inflorescence, covered with showy yellow or red flowers, having singularly long stamens. It has acquired its name from having been used, on account of its prickly branches, as a material for hedges in the West Indies, for which however it is ill adapted, because its branches are not much subdivided, and are always naked next the root. It is among the most beautiful of plants, and is chiefly on that account cultivated in the West Indies, to which it was introduced from the East Indies, where it is common in gardens, flowering and seeding all the year round. The leaves when bruised have a smell of savin, and are said to have the power of bringing on abortion. They are well known to be purgative, and to have been used as a substitute for senna. According to Roxburgh, the trunk of this little tree, or large shrub, when old, is constantly hollow, and occupied by a large red dark brown ant. From this place, when disturbed, the ants issue in swarms, and inflict a severe and painful bite on their disturbers.—*Eng. Cyc.*

(6451) PONICIANA ELATA. Willow.

Sooncaihla, Tel. | Neerangi, Can.
Pada Narrayan, Tam.

This Willow has been extensively and successfully used by Major Lawford, Madras Engineers, as a protection for the footings of rivers and channel banks. Where it is not wanted to spread

internally and to cause obstructions, it should be planted in cuttings in December; it grows quickly; its wood might be used for basket hoops. The tree affords a grateful shade, and though continually stripped of its leaves, which are extensively used for manuring indigo fields in Cuddapah, it quickly replaces them and that abundantly.—*Dr. Cleghorn.* Poinciana Gilliesii. Most of these plants are Natives of India; one well known as the Goolmohur flowers, grown from seed. P. Gilliesii is from Mexico.—*Riddell.*

(6452) POINCIANA PULCHERRIMA.

Krishna choora, Beng. | Gul-i-turah, Hind.

Is said to be much used in medicine in upper India, but for what purpose, is not stated. Ainslie notices the plant under the name of *Kurrish-churria.* A decoction of the leaves and flowers is given as a febrifuge in Tortola; the leaves are purgative, and when bruised smell like sabine; in infusion they are considered powerfully *emmenagogue.* These properties demand careful investigation.—*O'Shaughnessy, p.* 317. This gaudy ever-flowering shrub is planted in Barbadoes for hedges; it is much cultivated by the Burmese, and the variety with yellow blossoms is occasionally seen in their gardens. It is sometimes called peacock's pride, and Spanish carnation.—*Mason.* It is commonly cultivated at Ajmeer; it is a splendid shrub during the rains and very hardy.—*Genl. Med. Top. p.* 192. This beautiful plant, grows to the height of five or six feet, the leaves during the rains are green, and afterwards become of a bright scarlet having a most showy appearance, easily propagated by cuttings, both leaves and bark contain a milky juice which when dried and boiled possesses some of the properties of gutta percha.—*Riddell.* This plant has been recently introduced into the gardens in Maulmain; and its large vermillion-colored floral leaves render it, when in flower, a very ornamental plant.—*Mason.*

(6453) POINCIANA REGIA. A large tree with showy coloured flowers. Introduced from Madagascar, and still confined to gardens. The wood seems good. Hort. Garden 21.—*M.E.J.R.* This gorgeous shrub which has been introduced from Madagascar into India, bears a most magnificent and graceful flower; and as it flourishes well in the Tenasserim Provinces, if it were generally planted in gardens, it would add much to their beauty.—*Mason.*

(6454) POIVREA COCCINEA. *Syn.* Combretum purpureum. This at present is the popular favorite amongst climbing plants in Madras; requires a trellis not too high, the sooner it gets a procumbent position the more luxuriant it will grow and flower, best for pot cultivation, easily propagated by cuttings of the young wood in sand under glass. Native of Madagascar.—*Jaffrey.*

(6455) POIVREA GRANDIFLORA. *Syn.* Combretum grandiflorum. Similar to the above in habit but having far superior flowers. Native of S. Leone.—*Jaffrey.*

(6556) POIVREA ROXBURGHII. Among the fibrous barks sent from Assam to the Exhibition of 1851, was one that was named Roxburghia in the Catalogues. This is no doubt a mistake for some plant called after Dr. Roxburgh, probably *Poivrea Roxburghii,* one of the *Combretaceæ,* of which several are remarkable for tough wood as well as bark.—*Royle Fib. Pl. p.* 301.

(6457) POLANISIA (from πολ many, and ἄνισος unequal; stamens numerous and unequal), a genus of Plants belonging to the natural order *Capparideæ.* It has 4 spreading sepals; 4 petals; a small torus; silique sessile within the calyx, or hardly stipitate, terminated by a distinct style.—*Eng. Cyc.* Dr. Wight gives, Polanisir Burtporensis, 1072; chelidonii, 310; and icosandra, 7. The genera Cleome and Polanisia, embrace several species of supposed medicinal virtues. Ainslie describes five species. The *Cleome felina* (cat's cleome, *Eng.* Swarnakshira, *Sans.*) is used as an astringent in northern India and Ceylon. The *C. pentaphylla,* (*Vern.* Hurhuriya, *Beng.* Carnila, *Hind.* Hoolhool, *Duck.* Caravela and Varsar, *Sans.*) affords small, black, rather aromatic seeds, used by the natives in decoction as a stimulant drink in low fevers, and in some forms of convultion. The expressed juice too is considered stimulant, and sudorific. The *C. viscosa,* or viscid Cleome (*Vern.* Hoorhooria, *Hind.* Savana barbara *Sans.*) is also celebrated for its seeds, the *Chorie-ajooain,* of the bazars. These are believed to be vermifuge and stumulant, and are given to the extent of a tea spoonful twice daily (Ainslie.) The C. *dodecandria* and *icosandria* of Ainslie are identical with this plant, and are described by Lindley as *Polanisia icosandra.* In Cochin China the whole plant bruised is used like sinapisms for counter-irritation, and blistering. This fact deserves attentive experimental investigation.—*O'Shaughnessy, p.* 206.

(6458) POLANISIA ICOSANDRA, has a stem covered with viscid glandular hairs, 3-5 foliolate leaves, the leaflets obovate, cuneate, or oblong pubescent, scarcely longer than the petiole; the stamens are about 10 in number; the silique terete striated, rough with glandular horns, sessile and acuminated. It is a native of the East Indies, and is used in Cochin China as a counter-irritant in the same way as sinapisms in Europe, and as a vesicant. The root is used as a vermifuge in the United States of America.—*Eng. Cyc.* The leaves of this very common weed when bruised, are said to act as a sinapism.—*Mason.*

(6459) POLISHING SLATE, *Polier Schiefer*, a Mineral, occurring massive, with a slaty texture. Its colour is white, yellowish-white, or yellow. Brittle. Opaque. Specific gravity 0·59. It is found near Bilin in Bohemia, at Zwickau in Saxony, and Auvergne, and is supposed to be a volcanic product. Its analysis by Bucholz gives,

Silica	83·5
Alumina	4·0
Lime	8·5
Oxide of Iron	1·6
Water	9·0
	——106 6

Eng. Cyc.

(6460) POLKEE, WOODS KNOWN BY THIS NAME, VIZ.

White Polkee.

Tella polkee, TEL. | Suffaid polkee, HIN.

Black Polkee.

Nulla polkee, TEL. | Siah polkee, HIN.

Red Polkee.

Yerra polkee, TEL. | Taghanee kee lakree, HIN.

M. C. C.

(6461) POLYANTHUS, a garden variety of the Oxlip Primrose, with brown flowers, is one of those plants which have, from time immemorial, been favourites in gardens. It was probably obtained by accident, and is now propagated either by seeds or division of its root.—*Eng. Cyc.*

(6462) POLYANTHUS TUBEROSA, grows at Lahore and on the hills. The natives say its seeds are the white Todree of the oriental bazars which, as also the other Todrees, Europeans supposed to be from Malacca. Whatever they may be they are effective medicine.—*Dr. Honigberger, p.* 329. This, "the tuberose with her silvery light," a plant of the lily tribe, which has been introduced into India from Mexico or South America, is cultivated very extensively by the Burmans and in many English gardens. The flower has a delightful fragrance, and throws out its odours strongest at evening.—*Mason.*

(6463) POLYGALA SENEGA, SNAKE ROOT. *The roots.* Several species of Polygala are medicinally employed in Germany, South America, and Java. In Nipal and the Himalayas, the P. crotalarioides is used as a snake antidote. Of this species the stem is branched from the base, suffruticose, decumbent, downy; leaves obovate, wedge-shaped at the base, stalked; racemes 8—10 flowered, wings roundish, obovate, as long as the orbicular, ciliated capsule. In the Moluccas the *Soulamea amara* (Rex amarois) is stated to be employed with great advantage in cholera, and in ague. All parts, especially the roots and fruit, are excessively bitter.—*O'Shaughnessy, pages* 209-12.

(6464) POLYGALA SPECIOSA.—All the species of this genus are very handsome, showy flowers, they are natives of the Cape, some parts of Europe and America; their colours are chiefly pink, scarlet, red or white, they are readily grown from seed, and should be raised in a light soil.—*Riddell.*

(6465) POLYGONACEÆ, *Buckwheats*, a naturalorder of Apetalous Plants, with triangular fruit and usually with stipules united into a tube or ocrea, through which the stem passes. Their fruit is composed of three aspermous carpellary leaves joined by their edges, and surrounding a single erect ovule deriving its origin from a central placenta; and it proves the truth of the modern theory, that in many cases the ovules derive their origin immediately from the centre of vegetation, or the growing point, and not from the margin of carpellary leaves. The order consists of herbaceous plants more frequently than of shrubs, and a large part of them are mere weeds; as, for example, our docks, and wild polygonums; some however are handsome flowers,, as the *P. orientale*, or Garden Persicaria, and *P. amplexicaule*; others are valuable for cooking, as the rhubarb, whose roots also furnish the important tonic and purgative drug of that name; and in some a great quantity of astringent matter is found, as in the *Coccoloba uvifera*, or Seaside Grape of Jamaica, from which a kind of Kino has been prepared. [COCCOLOBA]. A species of Indian *Polygonum*, *P. tinctorium*, has recently been introduced into cultivation in Belgium as a substitute for indigo. The flour of the seeds of *P. Tartaricum*, *P. Fagopyrum*, and others, is made into a bad kind of bread in Lombardy and other countries. The genus *Rheum* also belongs to this order.

(6466) POLYGONUM (the Greek πολύγονον, 'much productive'), a genus of Plants belonging to the natural order *Polygonaceæ*. It has a 5-parted perianth, from five to eight stamens, and from two to three styles; a 1-seeded trigonous or compressed nut, lateral incurved embryo, the cotyledons not contorted. This is a very extensive genus, containing the Knotgrasses, Bistorts, Persicarias, and Buckwheats of English waysides, fields, and gardens. They grow in almost any soil, some being aquatic, and others flourishing in sandy sterile tracts.—*Eng. Cyc.* Roxburgh in his second volume, p. 285 et seq., (Octandria trigynia) names 15 species of Polygonum, but no information as to their properties. His *P. lanatum*, common round Calcutta, is called *Sweet panee merich*, or white water pepper; *P pilosum; burra panee merich*, or great water pepper, is also common near Calcutta, and flowers at the beginning of the wet season. The name denotes its analogy in properties to the P. Hyderopiper of Europe, which gives a yellow colour to wool; *P. flaccidum* is also called *Panee merich* in Calcutta.—*O'Shaughnessy, page* 523.

In China, two species of Polygonum are cultivated for the blue dye furnished by the leaves, which is extracted like indigo by maceration.—*Williams' Middle Kingdom, page* 282. In Icones. Dr. Wight gives Polygonum ambiguum 1797; *aviculare*, 1808; barbatum, 1798; Chinense, 1806; Donii, 1801; glabrum, 1799; horridum, 1803; Indicum, 1808; molle, 1807; Nepalense 1804; pedunculare, 1802; strictum, 1800; Wallichii, 1805.

(6467) POLYGONUM AMPHIBIUM. The Root-like stems of this polygonum, resemble sarsaparilla, as a substitute for which it has been used with alleged success.—*O'Shaughnessy, page* 523. Vegetates in Cashmere, and is considered as a veterinary medicine; whence its name, gurec (horse).—*Honigberger, p.* 330.

(6468) POLYGONUM AVICULARE, KNOT GRASS.

Nisomali, SANS. Machooti, HIND.

Considered medicinal in Behar. Fruit said to be emetic and cathartic.—*O'Shaughnessy, page* 522. Polygonum Aviculare has from one to three flowers together, axillary lanceolate leaves, or elliptical. Plane stalked lanceolate acute ocreæ, with few distant simple nerves at length by growth becoming torn, a triquetrous nut with raised points shorter than the perianth. Its numerous seeds supply abundant food for small birds; they are said to be emetic and cathartic. Thunberg says that in Japan a blue dye is prepared from this plant.—*Eng. Cyc.* Polygonum aviculare—grows at Cashmere, and is there officinal. Its fruit is said to be emetic and cathartic (Beng. Disp.)—*Honigberger, page* 330.

(6469) POLYGONUM BARBATUM, China and East Indies.

Aatalari, TAM. | Kuuda mallier, TEL.

Considered diuretic at the Cape of Good Hope and given in infusion by the native doctors in India in cases of colic.—*O'Sh. p.* 522.

(6470) POLYGONUM CYMOSUM. Wall. A wild buckwheat is abundant, at Choongtam in Sikkim which formed an excellent spinach: it is called "Pullopbi;" a name I shall hereafter have occasion to mention with gratitude. This is a common Himalayan plant, and is also found in the Khasia mountains.—*Hooker Him. Jour. Val.* II. *page* 31.

(6471) POLYGONUM LINIFOLIUM as also Poligonum aviculare and affinis species; grows about Lahore, where it is well known, but little used.—*By Dr. Honigberger, p.* 330.

(6472) POLYGONUM MACROPHYLLUM. grows among the Cashmerean mountains, where its roots are officinal.—*Dr. Honigberger, p.* 330.

(6473) POLYGONUM MOLLE, grows on the Cashmerean mountains and its roots are officinal at Cashmere.—*Dr. Honigberger, p.* 330.

(6474) POLYGONUM PERSICARIA. This is a very extensive genus of plants; the dwarf persicaria, a garden plant, is of easy culture, also the red and white: the P. Hydropiper, a water plant, has beautiful pink flowers.—*Riddell.*

(6475) POLYGONUM TINCTORIUM, *chinense*, and *barbatum*, yield a blue dye like indigo, in China and Japan.—*O'Shaughnessy, page* 523. See DYES.

(6476) POLYNEMUS, a genus of Fishes, placed by Cuvier in his third division of the *Percidæ*, the species of which are distinguished by the ventral fins being inserted farther back than the pectorals. These fishes are further distinguished by having several long filaments beneath the pectoral fin; these are, in fact, free rays of that fin; their teeth are minute and dense as the pile on velvet, or recurved like the teeth in a carding-machine; they are found on both jaws, as well as on the vomer and palate. The general form of the body of the *Polynemi* somewhat resembles that of the perch; the muzzle projects over the mouth; the eyes are rather large and placed very forward; the dorsal fins are short and widely separated, and the caudal fin is large, and more or less forked. The scales extend on the fins, as in many of the *Sciænidæ*, which these fishes appear to approach in some other characters. Considerable interest is attached to the *Polynemi* on account of their yielding isinglass. This fact was first made known by Dr. Cantor, who found that several species of *Polynemus* might be used for obtaining isinglass. "The species best known," says Dr. Cantor, in a communication to the Zoological Society, "is the *Polynemus Risua* of Hamilton (*P. longifilis*, Cuvier; the Tupsee, or Mango fish, of the Anglo-Indians): this inhabits the Bay of Bengal and the æstuaries of the Ganges, but enters the mouths of the rivers even higher up than Calcutta during the breeding season (April and May), when the fish is considered in its highest perfection, and is generally sought as a great delicacy. This species is the smallest, for its length seldom exceeds eight or nine inches, and one inch and a half or two inches in depth." It is remarkable for the great length of filaments, or free rays, of the pectoral fins, these being about twice the length of the body, and seven in number on each side. *P. aureus* and *P. Topsui* of Hamilton, Dr. Cantor states, are closely allied to this species. "*Polynemus Sele*, Hamilton (*P. plebeius*, Broussonnais; *P. lineatus*, Lacepède), is the Suleah Fish first mentioned in Pardoe's 'Oriental Herald,' as yielding isinglass. This species, as well as another closely allied to *P. quadrifilis*, Cuvier, which was dissected, figured, and described, under the name of *P. Saltish* (Saccolih), appears to be equally plentiful, in

shoals, all the year round, in the estuaries of the Ganges, and is appreciated by Europeans for its excellent flavour: both species attain a size from three to four feet in length, and eight to ten inches in depth." (Cantor.) Besides the species found on the coast of the mainland, two other species of *Polynemus*, *P. heptanemus* and *P. heptadactylus*, have been discovered off the coast of Java. On the coast of Africa and in the West Indies, certain species of the present genus are found. One of the African species is confounded by Cuvier with the Indian *P. longifilis*, and the mistake has been rectified by Mr. Bennett. It appears that this species (which is in all probability the *Pentanemus* of Artedion, which Linnæus established his *P. quinquarius*) differs from the Mango Fish of India in the number of free rays to the pectoral fins, the latter having seven rays, and the African species only five. Messrs. Cuvier and Valenciennes, not having found any species of *Polynemus* with so few as five free rays, and those longer than the body, imagine that the *P. quinquarius* was founded on a mutilated specimen. Several individuals however having this character being discovered by Captain Belcher, R. N. during his survey of a part of the Atlantic coast of North Africa, Mr. Bennett proposed to name the species after Artedi. The second African species belongs to that section in which the free rays of the pectoral fins are short, and has received the name of *Polynemus quadrifilis*. In the American *Polynemus* (*P. Americanus*) there are seven free rays to the pectoral fin, and these scarcely reach the tip of the ventral fins: it is about one foot in length, of a silvery colour; the pectoral fins are almost black, and the other fins are spotted with black.—*Eng. Cyc.*

(6477) POLYNEMUS INDICUS. Robal Fish.

Cala meen. Tam.

(6478) POLYODONTA ('many-toothed' tribe), a name applied by Lamarck and M. De Blainville to the *Arcacea* [Arcadæ] of the former, the Ark-Shells, &c., of collectors, comprehends the forms collected by Linnæus, in his 'Systema Naturæ,' under the genus *Arca*, and those designated by more modern zoologists as the genera *Arca*, *Cucullæa*, *Pectunculus*, and *Nucula*. "Cardinal teeth small, numerous, entering, and disposed in each valve in either a straight, a curved, or a broken line."

Arca (Linn.).—Animal more or less thick, generally rather elongated: mantle prolonging itself slightly backwards, and with a row of tentacular filaments on its borders; labial appendages very small and slender; foot pedunculated, compressed, and slit throughout its length. Shell navicular, rather thick, equivalve, inequilated, more or less oblique; umbones distant and often a little recurved forwards; hinge linear; straight furnished throughout its length with a numerous row of small teeth or transverse laminæ, which are equal and intrant; ligment entirely external M. Rang, who gives the above as the characters of *Arca*, remarks that the species sometimes adhere by their foot, and more frequently by means of a byssus.

(6479) *A. tortuosa* (Genus *Trisis*, Oken). Shell twisted, parallelopiped, striated; valves obliquely carinated: umbones small, recurved. It inhabits the Indian Ocean.

(6480) *A. antiquata*. Shell transverse, obliquently cordate, ventricose, many ribbed; the ribs transversely striated and blunt: the posterior ribs bifid. Colour white.

The *Arcæ* have hitherto been found on bottoms of sandy mud and dirt, at depths varying from the surface to seventeen fathoms. Some of the species are moored to stones, corals, &c.—*Eng. Cyc.*

(6481) POLYPIFERA, POLYPIARIA, or POLYPI, an order of Radiate Animals, thus characterised by M Milne-Edwards:—Animals organised for sedentary mode of life, having no locomotive organs, and being provided with a circle of retractile tentaculæ around the mouth, and a central gastric cavity, not communicating with an anus, and containing the reproductive organs when these exist, in general fissiparous, or multiplying by buds as well as by ovules.—*Eng. Cyc.*

(6482) POLYPODIACEÆ are one of the chief divisions of the natural order of Ferns. [Filices.] They constitute the highest form of Acrogenous or Cryptogamic vegetation, and are regarded as approaching more nearly to Cycadaceous Gymnosperms than to any other part of the vegetable kingdom now in existence. They are usually herbaceous plants, with a permanent stem, which remains buried and rooting beneath the soil, or creeps over the stems of trees, or forms a scarcely moveable point of growth, round which new leaves are annually produced in a circle; or it rises into the air in the form of a simple stem, bearing a tuft of leaves at its apex, and sometimes attaining the height of 50 or 60 feet. [Acrogens.] The stems seem always to produce roots in great quantities from their surface, even when elevated in air; such roots are more especially met with near and under the ground, where they form a stratum of some thickness, acting both as feeding-organs and as an external protection; on all Tree-Ferns they appear upon the stem at least in the form of tubercles; and in *Cibotium Billardieri* they cover over the whole surface from the top to the bottom with a dense layer several inches deep. The surface of tree-fern stems may be taken to represent that of the order in general. It is always marked with scars of considerable size, having either a lozenge form or that of an

irregular oval, and bearing within their area evident traces of the fracture of woody plates which passed from the stem into the leaves. These scars lengthen as the stem increases in age, till the lozenge or oval form is entirely destroyed; the scars then become separated to considerable distances, and extended into long and often irregular and indefinite spaces separated by deep furrows. Hence it happens that the appearance of the upper and lower end of the same tree-fern stem is so dissimilar, that they would not be supposed to belong to even the same species. Below the scars, or interposed among them, are found openings down into the interior of the stem filled with pulverulent matter, and of unknown use. They appear to be of the same nature as the apertures into the superficial cells of *Sphagnum*, or more especially as the perforations in the rhizoma of *Nymphæa*. Although tree-ferns are unknown in any countries except those having either a damp tropical climate, or at least an equable mild temperature and humid atmosphere, yet the common ferns of Britain, whose stems, vulgarly called roots, are formed under ground, exhibit the same kind of organisation as that just described, only in a less conspicuous manner. It does not therefore follow that the remains of tree-ferns found in this country in a fossil state prove Great Britain to have had formerly a tropical climate, especially as the number of such remains hitherto met with has been extremely small; the utmost value that can be assigned to their evidence is that of probability. In those tropical lands where the tree-fern acquires its full size, as for example Brazil, the Philippines, Pitcairn's Islands, &c., it becomes one of most majestic and graceful objects, having an enormous plume of the most delicate and verdant foliage at the extremity of a lofty flexible stem, which sways beneath the gentlest breeze.—*Eng. Cyc.*

(6483) POLYPODIUM, a genus of Ferns, type of the natural order *Polypodiaceæ*. The species of this genus are known by the thecæ being in clusters on the back of the frond, and by their opening transversely; the ring is usually vertical and incomplete. This is the case with *Allosurus* and *Noodsia*. *Polypodium* is distinguished by the sori being circular and naked, and the margin of the frond is flat, not reflexed. Several species are found in Great Britain. —*Eng. Cyc.*

(6484) POLYPODIUM. Reed Fern. There is a large terrestrial fern with hollow stems like a reed, which are often used by the natives of Tenasserim instead of quills for pens.—*Mason.* In Calcutta, the Hindoos boil the young tops of a *Polypodium* with their shrimp curries.—*Hooker.*

(6485) POLYPODIUM GIGANTEUM. A tree fern is very rare but is occasionally seen in the southern Provinces, resembling a small palm. Griffith found the same species in Assam. The natives have but one name for both the cycas and tree fern.—*Mason.*

(6486) POLYPODIUM PERTUSUM. Pitted Polypod. In Tenasserim, this fern is often found in company with the preceding species; and may be easily recognized by its creeping habit, and by the margins of the upper parts of its fronds being rolled together when in fructification.—*Mason.*

(6487) POLYPODIUM PROLIFERUM, is the only species of fern that the Soane valley presents at one season of the year. The rocks are then elegantly fringed with it.—*Hooker, Him. Jour Vol.* 1, *p.* 50.

(6488) POLYPODIUM QUERCIFOLIUM, Oak-leaved Polypod. In some parts of the forests of Tenasserim the trunks of almost every tenth tree have a great abundance of a large species of polypod growing upon them. The barren fronds are cordate, and stemless; but the fertile ones stand on long slightly winged stems, and are gashed like the leaves of an English oak. —*Mason.*

(6489) POLYPODUM SEKOUR, grows on the lower range of the hills, near Jowalla mukkee. Its dried roots are white, resembling slices of pears.—*Dr. Honigberger, p.* 330.

(6490) POLYPODUM TAXIFOLIUM. Lin.

Wellipanna-Kelengu, Hort. Mal.	Kadehou Maa, Sans.

Rheed says that the leaves of this plant, reduced to powder, and taken with honey, are powerful emmenagogues, and bring on abortions. He therefore adds, Mulieres, ergo, cavete vobis.—*Vide Hort. Mal. par.* 12. *page* 25.—*Ains. Mat. Med. p.* 134.

(6491) POLYPODIUM VULGARE. Bisfay. Common Fern is officinal at Lahore, whither it is brought from the hills. The Hakims use it to purge away the black bile in melancholy also in flatulent colic. They think it injurious to the liver.—*Dr. Honigberger, p.* 330. The root is brought to Ajmere from Arabia, via Bombay: considered heating and given in flatulence, and indigestion; not considered poisonous in any quantity: one seer costs four rupees.—*Irvine.*

(6492) POMACEÆ, Juss. Apple Tribe. The Pomaceæ form a tribe of Rosaceæ in the system of De Candolle, but by many botanists they are separated into a distinct family. They may be distinguished from other Rosaceæ by their leaves being usually simple, the tube of the calyx adherent to the ovary; and thus, including the carpels, a fleshy fruit is eventually formed, which is crowned by the limb of the calyx, and is well known in the Apple, Pear, Quince, &c., whence it is called a Pome. This may be from 2—5 celled, each cell formed of cartilaginous or

bony membrane, and containing 2 or more erect ovules.—They mostly inhabit the North temperate Zone and the great mountainous range of India. They are chiefly remarkable for their edible fruit when cultivated, abounding in saccharine matter with a pleasant acidity. In a wild state, they are austere or astringent and acid. By distillation of the seeds of some of the Pomaceæ a very little Hydrocyanic acid is obtained.—*Royle.* A wild apple, which bears a small austere fruit like the Siberian crab was found in the Bhoottea country in East Nepaul.—*Hooker, Him. Jour. Vol.* 1, *p.* 205.

(6493) POMEGRANATE.

Rana Rooman. Arab.	Dalema, Mal.
Delunghidie, Cyng.	Anaar, Pers.
Grenades, Fr.	Roomaas, Port.
Granatapfel, Ger.	Dadima, Sans.
Anaar Darim, Guz. &. Hind.	Granadas, Sp.
Granati, It.	Magilum palam, Tam.
Gangsalan, Jav.	Dadima Pundoo, Tel.
	Nar, Turk.

The fruit of a tree (*Punica Granatum*), common in the warmer parts of the temperate zone. Pomegranates when ripe, are about the size of an orange, are covered with a hard, light brown rind, and contain a reddish, seedy, juicy pulp. The rind of the pomegranate has of late years formed an article of export from Bombay to England, where it is used in medicine.—*Faulkner.* In China, dried pomegranates are said to be used for dyeing yellow; the rind is also a tanning substance. In the "Comptes Rendus," xxxv., p. 558, there is an account by M. J. Persoz, of a green coloring matter from China, of great stability, from which it appears that the Chinese possess a coloring substance having the appearance of indigo, which communicates a beautiful and permanent sea green color to mordants of alumina and iron, and which is not a preparation of indigo, or any derivative of this dyeing principal. As furnished to M. Persoz by Mr. Forbes, the American consul at Canton, it was in thin plates of a blue color, resembling Japanese indigo, but of a finer grain, differing also from indigo in its composition and chemical properties. On infusing a very small quantity of it in water, this fluid soon acquired a deep blue colour with a greenish tinge; upon boiling and immersing a piece of calico on which the mordants of iron and alumina had been printed, it was dyed a sea green color of greater or less intensity according to the strength of the mordant—the portions not coated remaining white.—*Fortune.*

(6494) POMPHRET. Stromateus. *Linn.* This fish is very abundant on the Tavoy coast, and in a smooth sea may be seen deep in the water in great numbers, but they are very shy of the hook. They are considered one of the best fish for the table.—*Mason.*

(6495) POMPHRET. Stromateus Argenteus. Fish.

Vowal meen, Tam. | Hulva mahie, Duk.

Ains. Mat. Med. p. 155.

(6496) PONDIGUL SLATE, a dark black monumental marble is procurable in any quantity at the village of Pondigul, distant from Masulipatam about 70 miles, and from Hyderabad about 90 miles, situated on the Guntoor side of the river Kistnah, and in the Guntoor district. Slabs from 5½ feet by 3 feet and from 2 inches thick are to be had at but little cost and labour, and there are good bandy roads in most directions, but the cheaper and more feasible mode of conveyance would be, on flat-bottomed boats or rafts down the Kistnah to Masulipatam, from whence it could be shipped to all parts. J. S. Stricke, P. A. A.—*Kimedy, 9th August* 1850.

(6497) PONERA (Latrelle), a genus of Insects belonging to the family *Formicidæ*. In this genus the neuters and females are armed with a sting. The peduncle of the abdomen is formed of a single knot; antennæ in these individuals thickened at the tip; mandibles triangular; head subtriangular. *P. contracta* is a small species, a native of England.—*Eng. Cyc.*

(6498) PONGAMIA. Of this genus Dr. Wight gives Pongamia elliptica, 420; glabra, 59; ovalifolia, 328.

(6499) PONGAMIA ARBOREA. From the seeds of the Pongamia glabra or Galidupa arborea, a honey-brown and almost tasteless oil is procured, which is fluid at common temperatures, but gelatinises at 55 degrees.—*Simmonds.*

(6500) PONGAMIA ATROPURPUREA; dark-purple pongamia. This tree is very common about Maulmain, and though vastly inferior to a multitude of others, Wallich thought it of sufficient beauty, to give it a place among his splendid engravings of rare Indian plants.—*Mason.*

(6501) PONGAMIA GLABRA. Indian Beech.

Poonga, Tam.	Hongay, Can.
Canaga, Tel.	Karung, Burm.

A graceful tree, and excellent for avenues: in good soil it attains a large size, has beautifully varnished green leaves all the year round; is valuable as a strong manure, for sugar-cane especially; requires no care.—*Dr. Cleghorn.* This large tree, attaining a height of 40 to 50 feet, is very common in S. India, flourishing equally well in the arid plains of the Carnatic, and on the Sub Alpine tracts of Mysore. Oil is made from the seeds. Roxburgh says the wood is light, white and fit for a variety of purposes. In Coimbatore it is used chiefly for fuel. The boughs and leaves are extensively used as manure. Wight No. 78, Travancore, 388, Bangalore, 55.—*M. E. J. R.*

According to Wallich, this, the karung oil tree, is indigenous in Amherst Province. The Burmese make an oil from this tree which may be the tree referred to by Wallich.—*Mason.* The wood said to be only fit for fuel Roxburgh on the contrary states that it serves for a variety of purposes. An oil is expressed from the seed.—*Rohde.*

(6502) PONTEDERA DILATATA. This much larger species is found in the neighborhood of Rangoon, and may exist in the Tenasserim Provinces.—*Mason.*

(6503) PONTEDERA VAGINALIS. PONTEDERA. The margins of many wild jungle streams in Tenasserim, are pimpled with a small species of the pontedera. It is

> "A bonnie wee flower all wild in the wuds,
> Like a wee twinkling star high up in the cluds,
> Which opens its cups sealed up in the dew,
> And spreads out its leaves of a beautiful blue."—
> *Mason.*

(6504) PONTEDERACEÆ, *Pontederads*, a natural order of Plants belonging to the class of Endogens. It has a 6-parted tubular coloured perianth, more or less irregular, with a circinate æstivation. The stamens arising from the calyx 6 or 3 opposite the petals, the anthers turned inwards, opening lengthwise. The ovary is free, more or less completely, 3-celled, many-seeded; one style, the stigma simple. The capsule 3-celled, occasionally acquiring an adhesion to the perianth, 3-valved with loculicidal dehiscence; the seeds are indefinite, attached to a central axis; ascending hilum small; the embryo with its radicle rather enlarged, orthotropal in the axis of somewhat mealy albumen. The species aquatic or marsh plants. The leaves sheathing at the base, with parallel veins in the larger species, arrow-headed, cordate, or dilated. The flowers are either solitary or in spikes or umbels, spathaceous; frequently blue, sometimes yellow. The aquatic plants comprehended in this order are distinguished by the divisions of their flowers being rolled inwards after flowering, to which may be added mealy albumen and an indefinite number of seeds. They are natives exclusively of North and South America, the East Indies, and tropical Africa. Very little is known of their uses. Some of the species are employed by the native Indian practitioners in liver complaints and diseases of the stomach. Rubbed down in butter and drank, they are said to remove redness of the eyes; powdered and mixed with sugar, to relieve asthma; and when chewed, to remove tooth-ache; brayed with milk, some are adminstered in fever and some eaten as pot-herbs.—*Eng. Cyc.*

(6505) PONTOPHILUS, a genus of Shrimps. (*Egeon*, Risso.)

(6506) POOAH OR POEE FIBRE. *Kienki*, by the Lepchis: and *Yenki* by the Lomboos. *Boehmeria frutescens*; grows to the height of six or eight feet: and the fibre when properly dressed, is quite equal to the best flax of Europe, used for fishing nets, game bags; twine and ropes. It is considered well adapted for making cloth and canvas, it has great strength and endures wet well. Occurs near Simla. Boehmeria frutescens furnishes the well known Pooah fibre, or Pooah Hemp. It is called "Pooah" by the Parbuttias, "kienki" by the Lepchis; and "yenki" by the Limboos. It is not cultivated, but grows wild and abundantly in the valleys throughout the mountains of Eastern Nipal and Sikkim, at the foot of the hills skirting the tarai to the elevation of 1000 or 1200 feet and within the mountains up to 3000 feet. Dr. Falconer recognised this plant, as common from Gurhwal to the Sikkim hills; from the Ganges to Burrampooter. In the outer hills of Gurhwal Kumaon it is called Poee. It does not grow in the forest but is chiefly found in open clear places, and in some situations overruns the abandoned fields of the hill people, within the elevations which suit it. It sheds its leaves in the winter; throws them out in April and May; and flowers and seeds in August and September. The exact period altering of necessity with the elevation—*Royle, p.* 368. See BOEHMERIA.

(6507) POODEENA. Mentha Verticulata. Mint. See MINT.

(6508) POON-WOOD, OR PEON-WOOD, of Singapore is of a light porous texture, and light greyish cedar color; it is used in ship-building for planks, and makes excellent spars. The Calcutta poon is preferred. A species of *Calophyllum* is called *poona* in the peninsula of India, and C. angustifolium, Dr. Roxburgh says, is a native of Penang and of countries eastward of the Bay of Bengal, and that it yields the straight spars commonly called Poon, and which in those countries are used for the masts of ships.—*Tredgold.* The wood called poon brought from the East Indies, to Britain, very nearly resembles a dull coloured and greyish specimen of mahogany, and would be useful for any purpose to which such kind of mahogany is applicable; besides having a greater degree of strength and stiffness compared with its weight. Poon is used for the decks, masts, and yards of ships, and it appears to be well adapted for these purposes both by its strength and lightness. In respect to durability we have not been able to collect satisfactory information; its texture is porous, but uniform; and the mean weight of a cubic foot in the dry state is 405 lbs. taken from our specimens. The cohesive force of *poon* is from 10,000 to 14,700 lbs. per square inch, the mean weight of the modulus of elasticity for bars of an inch square is 1,689,800 lbs. The specific gravity, and the relative strength, stiffness, and resilient power compared with Riga fir, as 1000, from Mr. Fincham's experiments are, as under:—

Specific gravity.	Strength.	Stiffness.	Resilience.	
579	1380	1270	1400	Barlow.
647	1226	1230	1146	Fincham.
613	1303	1250	1273	Mean of both.

From whence it appears that it is superior to Riga fir in the properties required for most wood. The poon of commence, is said by Dr. Wight to be from the

Dillenia Pentagynia. Dilleniaceæ.

Rowadah Tel.

This is a large timber tree, a native of the Northern Circars; it flowers in March and April. *Roxb.—Rohde. M.S.S.* The similarity of native names between this and Calophyllum inophyllum led Dr. Wight to suspect some mistake. The wood of Dillenia pentagyna is said to be exceedingly strong, and very durable, even when buried under ground. A stately forest tree, common on the face of the W. Ghauts. Dr. Wight is satisfied that this is the tree which furnishes the Poon spars, D. pentagynia is a tall and calophyllum inophyllum a short stunted tree.—*Wight.*

(6509) POONAHLITE, a Mineral occurring crystallised in long slender crystals. Primary form a right rhombic prism Fracture uneven. Colourless. Hardness 5·0 to 5·5. Transparent, translucent. Lustre vitreous. Found in Poonah in the East Indies. The following is an analysis by Gmelin:—

Silica	45·120
Alumina	30·446
Lime	10·197
Soda, with a trace of potash	00·657
Water	13·386
	99·806

Eng Cyc.

(6510) POONGA or KURUNJ OIL.—Dalbergia Arborea or Pongamia Glabra.

Poonga yennai, Tam.	Kurunj ka tel. Hind.
Kanoogoo noona Tel.	

This oil, which in some parts of the country is used to a large extent in adulterating lamp oil, is expressed from the seeds of a tree, common in most parts of the Madras Presidency. In North Arcot, Bellary, and the Nuggur Division of Mysore, the oil is procurable at Rs. 2-8-0 per maund. It is chiefly used as a Lamp oil by the poorer classes.—*M. E. J. R.*

(6511) POONEER.

Pooneer, Tam.

This is a very light white coloured earthy matter containing a great proportion of Carbonate of Soda, and from which, as well as from Over Munnoo, soda is prepared. Pooneer is employed in making glass, in dyeing blue and scarlet and also by the Chucklers in dyeing leather red.—*Ains. Met. Med. p.* 192.

(6512) POOTROONGIE, A new Oil.

(6513) POVERASIE, *Tam.*

Santa Maria, Port.

And called by Europeans Ceylon Tulip-tree. It is used at times by the coachmakers for wheels, &c. It is a tree generally planted to ornament walks in gardens, and is very common: it produces a yellow flower.—*Edye. Ceylon.*

(6514) POOVATHOO, a substance used in dyeing.

(6515) POPLAR,

Popelier, Dut.	Pioppa, It.
Peuplier, Fr.	Populus, Lat.
Pappel, Pappelhaum, Ger.	Alamo, Sp.

A fast growing tree (*Populus*), of which there are about fifteen varieties. The wood is soft and light, and not very durable, unless kept dry. It is used in the manufacture of domestic utensils, water-works, laths, and packing cases.—*Faulkner.*

(6516) POPPY OIL. Papaver somniferum.

Cas-cas Yennai, Tam.	Khush-khash-ka Tael,
Casa-casa Noona, Tel.	Hind.

The poppy is largely cultivated throughout Malwa and the Opium districts, where the drying oil obtained from the seed is more extensively used than any other, both in lamps and as food. At Bhopaul the oil is procurable at the rate of Rs. 4 8 0 per maund of 25lbs. or £40 6 per ton. By simple exposure to the rays of the sun in shallow vessels, this oil is rendered perfectly colourless, and a very excellent sample of the bleached article exhibited by Lieut. Hawkes received Honorable Mention. It is much prized by European artists.*M.—E. J. R.*

(6517) POPPY SEED, Cuscuss Seed, Maw Seed.

Gaysaggusa, Can.	Kushkush, Arab.
Ying suh, Chin.	Papavero, It.
Abinatta, Cyng.	Kes, Jap.
Capsules des pavots blancs, Fr.	Kush-kush, Kooknar, Pers.
Die kopse des weissen mohns, Ger.	Post, Chosa, Sans.
Cuscuss, Guz. & Hind.	Casa-casa, Tam.
	Cassa-cassa, Tel.

The seed of a most important plant (*Papaver somniferum*), a native of the South of Europe and Asia Minor, and now naturalized by cultivation in India. Poppy seeds are employed in medicine for the preparation of a sedative decoction and syrup. In India they are used by the natives in sweetmeats, and by some classes of the Hindoos at some of their festivals. Poppy seeds are exported from Bombay to England and France.—*Faulkner.*

(6518) POPULUS (from the Latin *Populus*), a genus of Plants belonging to the natural order *Salicaceæ.—Eng. Cyc.*

(6519) POPULUS FASTIGIATA, the Lombardy Poplar. Leaf deltoid, wider than long, crenulated, glabrous, in the bud involutely folded, petiole compressed. This tree is readily distinguished among the species by its peculiar conical cypress like form, and the total absence of horizontal branches. It grows to the height of 100 and 120 feet, and sometimes 150 feet. It is a native of Italy on the banks of the Po, and also of Persia and the Himalaya.—*Eng. Cyc.*

(6520) PORANA. Of this genus Dr. Wight gives, Porana *paniculata*, 1376; racemosa, 1376; volubilis, 347-1376.

(6521) PORANA VOLUBILIS; BHOWREE, *Hind.*—A twining plant, flowers white, in axillary and terminal racemes; propagated by seed; requires no particular soil.—*Riddell.*

(6522) PORCELLANIDÆ, a tribe of Anomurous *Crustacea*, placed by M. Milne-Edwards next to the *Paguri*, and immediately preceding the section of Macrurous Decapods.—*Eng. Cyc.*

(6523) PORCELLANA (Lam). The general form resembling that of the *Brachyura*.—*Eng. Cyc.*

(6524) PORCELLANA SCULPTA. Colour reddish with great white spots. Length about three lines. It inhabits the coasts of Java. Two others species are recorded, one of them from the China seas: the other is *P. viridis*, Gray, 'Zool. Misc.' *Pisidia viridis*, Leach.—*Eng. Cyc.*

(6525) PORPHYRY. Felspar of a granular texture, without crystals imbedded, is Claystone; with imbedded crystals of felspar it is Porphyry. Hornblende mixed with uncrystallised felspar makes some Greenstones; with imbedded crystals of felspar this becomes Greenstone-Porphyry. Hence, by this mode of designation, we have Pitchstone-Porphyry, Greenstone-Porphyry, Basaltic-Porphyry, Felspar-Porphyry, andeven so vague a term as Trap-Porphyry; and, on the other hand, more correctly, Porphyritic Pitchstone, Porphyritic Claystone, Porphyritic Greenstone, Porphyritic Basalt, and Porphyritic Granite. Among volcanic rocks, Porphyritic Trachytes are common. Fine examples of porphyry (crystals of felspar in a base of uncrystallised felspar) occur in Scotland, at Inverary and in Ben Nevis; in Cumberland, on Armboth Fell; and in Cornwall, commonly under the title of Eurite.—*Eng. Cyc.*

(6526) PORCELAIN.

Tse-ki, CHIN. | Chenee-kan, GUS. HIND.

A very fine species of earthern-ware, white, semi-transparent, and sometimes beautifully coloured and gilt. Chinese porcelain, which is of an exceedingly fine texture, has long been renowned; but British porcelain, although unable to boast of such fine specimens of costly workmanship, has risen to be a matter of great importance. Dresden has long been famous for the beauty of its porcelain productions; but the finest and most magnificent specimens of European china, have been produced at Sevres, in France. Sir John Davis has condensed all the important information concerning the materials and manufacture of porcelain,—a name given by the Portuguese to the semi-transparent cups they saw on their arrival, from their resemblance to the lustrous nacre of sea-shells, or *porcellana*, for they supposed it to be a composition of egg-shells, fish-glue, and scales—a good instance of the off-hand descriptions travellers formerly indulged in, just as Chinese writers now describe things new to them; as, for instance, when they call caoutchouc elephant's skin. The Kaolin or *Kau-ling*, i. e. High ridge, the name of a hill near Jauchau fu, is obtained from the disintegrated granite in that region, and is nearly pure felspar, or such as contains no metallic substance; by slow decomposition the alkali and part of the silex is removed, and water imbibed. An analysis of the clay used in Europe, which probably does not differ materially from that employed in China, shows the constituents to be silica 43, alumine 36, water 19, and a trace of magnesia and carbonate of lime. The petuntse, or *peh-tun-tsz*,' is nearly pure quartz, and the best is brought from Hwuichau in Nganhwui, but is procurable elsewhere; it is reduced to an impalpable powder by toilsome processes, and formed into cakes to sell to the manufacturers. Steatite or soap-stone called *hwah shih*, is also employed, and some forms of carbonate and sulphate of lime, which are mixed in to produce an inferior article, though still among the best now manufactured; the soap-stone ware is more brittle than the other, but fine, white, and very light. The proportions of the ingredients vary according to the desired fineness of the ware. After the paste or biscuit is thoroughly mixed and formed into the required shape, the dishes are painted by workmen, each of whom takes a single color and a single part of the picture. The whole surface of the dish is sometimes covered with gay figures, but the most common decorations consist of heroes, statesmen, &c., in different attitudes and costumes, and sentences beautifully written referring to them and their times. Most of the inscriptions and figures seen upon mantel-piece ornaments, tea-cups, and jars, are of this nature, explaining some event in the life, or a panegyric upon the personage there represented; this affords an opportunity for persons to show their scholarship in explaining the quotation.—*Williams' Middle Kingdom, Vol.* II *p.* 116. The colors used on the fine porcelain have long been admired, and Deguignes, who made many endeavours to procure samples of them and ascertain the mode of mixing them, has given the composition of

some of the principal colors, but at present there is probably little to learn from them in this branch. After the workmen have finished the painting, the pieces are covered with a liquid mixture of alkali, obtained from burning ferns with the quartzose petuntse, after which they are baked. The best articles are surrounded with a case lined with sand in order to protect them from the flame, and as the furnaces are only about six or eight feet square, the closest attention can be paid to the condition of the ware, and the exact time ascertained for reducing the heat and opening the kiln. Some of the pieces brought from the interior are perfectly white, and the patterns are afterwards painted and fixed on them according to the fancy of the customer. The finest specimens are from the kilns of Kingtch-chin in Kiangsi.—*Williams' Middle Kingdom, Vol.* II. *page* 117.

(6527) PORCUPINE: HISTRIX LEUCURUS. Large Porcupine. A large porcupine is not uncommon in Tenasserim, but the precise species is not known. It is probably identical with one of the Malay species. The one found in Arracan is the common Indian species, and that of Tenasserim, may possibly be the same.—*Mason.*

(6528) *Histrix alophas?* Small Porcupine. There is a small porcupine in the Tenasserim Provinces, which does not appear to have been discovered in Arracan. According to native description, it best accords with the small species described by Hodgson.—*Mason.*

(6529) PORTIA TREE OIL. Thespesia populnea.

Poorasum yennai, Tam. | Paris pippul, Hind.

This deep red coloured and somewhat thick oil is obtained from the seeds of the portia tree, which grows in great abundance in the vicinity of Madras, and other parts of the Presidency. It is extensively planted as an avenue tree, for which its quick growth and the beauty of its flowers renders it a favorite. The wood is capable of being worked when fresh cut and is used for boat building and cabinet work. The juice of the tree is used on the western coast, as a remedy for various cutaneous affections, and the oil which is yet unknown to the natives, might probably be of use in similar cases. Its expense precludes its use otherwise than medicinally.—*M. E. J. R.*

(6530) PORTULACA OLERACEA. Lin.

Corie Keeray, Tam. | Loonia, Hind.
Pirapoo keeray, Tam.

Is common in India, and eaten by the Hindoos; in Cochin China, the seed is considered emollient and diuretic.—*Ainslie p.* 253, *O'Sh. p.* 353. A common weed; cultivated by the market gardeners; used as spinach and in curries; almost tasteless.—*Jaffrey.*

(6531) PORTULACA. PORTULACEÆ. These are pretty annuals with succulent leaves, and very brilliantly coloured flowers, red, purple, yellow, white, &c., they are easily grown from seeds, and if well watered and kept in the shade, will blossom throughout the hot season; the hybrids, between the white, and dark colours are remarkably pretty.—*Riddell.* This pretty little succulent annual, opens its flowers in the sun. It is raised from seed, requires a sandy soil. Is a native of the tropics; requiring little care as regards soil; should be watered, sparingly at all times.—*Jaffrey.*

(6532) PORTULACA QUADRIFIDA. Lin.

Possarie-keeray, also Posselie-keera Tam.
Choroly ke bauge, Duk.
Batsali koora, Tel.
Oppadykee, San.
Bucklut-ul mobarik Arab.
Chowlee, Duk.

Is fully described by Ainslie. The bruised fresh leaves are prescribed as an external application in erysipelas, and an infusion given in dysuria.—*O'Shaugh. p.* 353. A small troublesome weed with fleshy leaves, used as greens, common every where.—*Jaffrey.*

(6533) PORTUNIDÆ, a family of Brachyurous *Crustacea*, nearly allied to the Cancerians. The species are generally known by the name of Paddling Crabs. The general form of the *Portunidæ* does not ordinarily differ much from that of the greater part of the Cancerians; but the carapace is always but little elevated, and sometimes has a lozenge-shape. The Crustaceans of this group are for the most part essentially swimmers, and live often out at sea. They are vulgarly called Paddlers. The following genera are arranged under the tribe by M. Milne-Edwards:—

(6534) *Carcinus.* (Leach).
(6535) *Platyonychus.* (Latreille).
(6536) *Polybius.* (Leach).
(6537) *Portunus.* (Fabr).
(6538) *Portunus integrifrons,* (Cancer Navigator (?). Herbst) Carapace pubescent: length about 2 inches. It is a native of the Indian Ocean.
(6539) *Lupea,* (Leach).
(6540) *Lupea tranquebarica.* (Cancer olivaceus, Herbst: C. Serratus (?) Forsk. Portunus Serratus R. Ruppell; P. Tranquebaricus, Fabr. This, the largest portunian known, is six or eight inches in length, of a grayish green and inhabits the seas of Asia.

(6541) *Lupea pelagica.* (Cancer Pelagicus Linn. Cancer reticulatus and Cancer Cedohulli Herbst: Portunus pelagicus, Fabr. Length from three to four inches. Colour grayish-green with yellow spots, found in the Red Sea and the whole Indian Ocean.—*Eng. Cyc.*
(6542) *Lupea sanguinolenta.* Indian Ocean.
(6543) *Platyonychus* (Latreille).
P. bipustulatus. Length from two to five inches. It is found in the Indian Ocean.
(6544) *Portunus* (Fabr.).

(6545) POST, *Hind.* Post, which, properly speaking, is the Sanscrit and Hindoostanee name of the Poppy, Papaver somniferum, is also an appellation given, in the higher provinces of India, to an intoxicating liquor, prepared by beating the husks or capsules of the Poppy with Jaggery and water.—*Ainslie's Mat. Med. p.* 267.

(6546) POTASH, CARBONAS POTASSÆ IMPURUM.

Mara Ooppoo, TAM.

Impure Carbonate of Potash. *Potashes. Pearl-ashes.* This is prepared on the great scale by subjecting to the action of flame crude or black Potash, the *black salt* of American manufacturers. Instead of fusing it to make the *Potashes* of Commerce, the alkaline mass is transferred to a large oven-shaped or reverberatory furnace, where the flame is made to play over it; and being well stirred about, the black impurities are burnt out, and the mass becomes a caustic salt of a white colour (W. and B.) with a tinge of blue, and constitutes the *Pearlash* of Commerce. American Potash and American Pearlash (2), as ascertained by Vauquelin, contained in 1152 parts.

Caust. Hydr. of Potash.	857	Sulph. of Potash.	154	Chlor. of Potash.	20	Insol.	9	Carb & Aq.	110	parts.
(2)	384	„	80	„	4	„	6	„	688	„

Russian Potash yields 772 parts of Caustic Hydrate; it used to be very impure, but is now more carefully prepared. For commercial purposes it is extremely necessary to have modes of ascertaining the quantity of alkali contained in any specimen of Commercial Potash. This is done by the process of Alkalimetry.—*Royle.* The Hindoos on the Malabar coast, as well as the Cingalese, who do not use over Munnoo (Impure Carbonate of Soda); in bleaching and washing linen, employ for these purposes, the ashes of burnt vegetables (chiefly Cocoanut leaves), which can only, in this way, be of service, from the Potash they contain.—*Ains. Mat. Med. p.* 193.

(6547) POTASH, CARBONATE OF; *Subcarbonate of Potash. Salt of Wormwood. Kali præparatum. F.* Carbonate de Potasse. *G.* Kohlensaures Kali. Potash, Salt of Tartar, Salt of Wormwood.

Potaske, DAN.	Potassa, IT.
Jhar ke Nemuk, DUK.	Potasz, POL.
Potasse, FR.	Potasch, RUS.
Potasche, GER.	Marnoopoo, TAM.
Jowkshar, GUZ. HIND.	Manje oopoo, TEL.

A term commonly applied to an impure carbonate of potash, obtained by the incineration of wood, lixiviating the ashes in barrels, first with cold, and then with hot water, filtering the ley, and evaporating it to dryness in an iron pot. This constitutes the potash of commerce, which is in hard irregular masses or fragments, of a light bluish gray colour, somewhat caustic, alkaline taste, inodorous, and very deliquescent. Potash is of great importance in the arts, being used in the soap and glass manufactures, the rectification of spirit, bleaching, in medicine, and for other purposes. It is procurable in most Indian bazaars.—*Royle. Fleming.* This substance is of great importance but no manufacture of it upon an extensive scale has ever been attempted in India. The common source of it, is the ashes of land plants and the English market is supplied from Russia and America. If attention were directed to the manufacture of this Salt in India, it would form a very valuable article of export. A source of Pearl ash, and one very interesting to us, seeing the enormous quantities of Saltpetre all over the country, is Nitrate of Potass and Charcoal, a sample of Pearl ash from a refined Saltpetre got from the Gunpowder Manufactory, and the Gram-plant. Charcoal, also used in that establishment, was after one crystallization, superior to the best Russian or American article, giving by the alkalimeter 94 per cent of pure Carbonate.—*P.M.C.C.* As this salt is obtained by the burning of vegetables, it must have been known at very early times Dioscorides describes it by the name τεφρα̃ς σαρμάτων, or *cinis sarmentorum*, ashes of vine-twigs. (" cineris lixivium " Pliny, xxxviii. c. 51.) The Arabs are usually supposed to have been the first to make known this alkali (*al-kali*); but the Hindoos, in works from which the Arabs copied, made use of the ashes of plants. Potash is found in most of the alkaline earthy minerals, as Mica, Felspar, Leucite, Nacrite. Carbonate of Potash has been found in a few mineral springs. It is probably found in the juices of some plants. But usually Potash is combined with other acids, then forming Acetates, Malates, Oxalates, Tartrates, &c.

By incineration, the Oxygen of the vegetable acid, combining with the Carbon of the vegetable substance, forms Carb., which, combining with the disengaged Potash, forms a Carbonate of Potash. This, in its most impure state, is the Potash of Commerce, or Rough Potash of Commerce. To obtain this, land plants are burnt in countries where forests are most abundant, as N. America, Russia, Sweden, Poland. The wood is piled in heaps and burnt on the surface of the ground, in a place sheltered from the wind. " The ashes which are left consist of a soluble and insoluble portion. The *soluble* part is made up of the Carb. together with the Sulphate, Phosphate, and Silicate of Potash, and the Chlorides of Potassium and of Sodium; and the insoluble portion, of Carbonate and Sulphosphate of Lime, Alumina, Silica, the Oxides of Iron and Manganese, and a little carbonaceous matter that had escaped incineration." (Wood and Bache.) —*Royle.*

(6548) POTASSÆ BITARTRAS, L. E. D. TARTARUM, D. Bitartrate of Potash. *Supertartrate and Supertartrite of Potash. Cream of Tartar.*

Argol. *Fr.* Tartrate acide de Potasse. *Ger.* Doppelt Weinsaures Kali.

Bitartrate of Potash (KO, 2 Tar. Acid, HO = 189) is well known by the name of Tartar, and must have been known ever since wine has been made from the grape, in the juice of which it exists. During the fermentation of wine, Sugar disappears and Alcohol is formed, and the salt not being soluble in this, is deposited on the bottom and sides of casks, as a crystalline crust, which, according to the colour of the wine, forms either *red* or *white Tartar* or *Argol*. This was known to the ancients, and is the Fex Vini of Dioscor. v. c. 13. (Hindoo Med. p. 97.) Its nature was determined by Scheele in 1769. It is largely purified both at Montpelier and at Venice.

Prop. The Bitartrate of Potash of commerce is in white crystaline crusts, formed of clusters of small crystals aggregated together, which are hard and gritty under the teeth, dissolve but slowly in the mouth, and have an acid and rather pleasant taste.—*Royle*.

(6549) POTASH, NITRATE OF: KO NO_5. This salt, also named *nitre* or *saltpetre*, is a natural product, but may be prepared by the addition of nitric acid to potash, or to carbonate of potash. The liquor, on being evaporated, deposits anhydrous crystals, which are six-sided prisms with dihedral summits. This salt is soluble in 7 parts of water at 60°, and in its own weight of boiling water. It has a cooling and saline taste, but has no action on vegetable colours. It fuses at a temperature below redness, and is completely decomposed under a strong heat. When mixed with combustible matter and heated, or thrown in a fused state on many metals, rapid oxidation takes place at the expense of the oxygen of the nitric acid. Gunpowder is an example of such a mixture, and there are many such in various pyrotechnic compositions, which burn independently of the atmospheric air, and even under water, oxygen being abundantly supplied by the nitric acid. In India, Egypt, and some other warm countries, after the rainy season, nitre is produced on the surface of the soil in the form of a white efflorescence. The soil is removed to the depth of about an inch, and treated with water, which dissolves the soluble salts. The solution is made in large basins or tanks; rapid evaporation takes place under the influence of the solar heat, and is completed by means of artificial heat; as the solution cools, a considerable quantity of nitrate of potash is deposited in large crystals. This forms *rough Indian nitre*. The mother-liquor is thrown away; it contains a considerable quantity of nitrate of lime and magnesia, and might still furnish nitre if mixed with potash salts. Bengal and the neighbourhood of Patna are the sources of the largest portion of the saltpetre supplied to the European market from Hoogly, but the Madras Presidency furnishes large quantities of the best quality. In Hungary there are saltpetre pits, and in some parts of Spain the soil becomes incrusted with this substance. Nitre is also obtained from certain natural caverns occurring in the limestone rocks of the island of Ceylon: the walls become covered with a nitrous efflorescence, which is detached, during six months of the year, with picks, together with a small portion of the rock which contains felspar, and this is doubtless the origin of the potash. The fragments are pounded, mixed with an equal portion of wood-ashes, and water is poured upon the mixture. The nitrates of the earths part with their acid to the potash in the ashes, and the earths are precipitated as carbonates of lime and magnesia. The clear decanted lye, containing the nitre of the ashes as well as that of the rock, is evaporated in pits exposed to the sun, and then in pans by the action of fire. The crude saltpetre, which crystallizes in cooling, is then fit for exportation. Similar caves exist in Italy, on the coast of the Adriatic, in North America, Africa, Teneriffe, &c. In France, nitre was formerly produced artificially in what are termed *nitre-beds*, by the oxidation of ammonia in the presence of a powerful base. Animal refuse of all kinds was mixed with old mortar, or hydrate of lime and earth, and the mixture was placed in heaps under a cover of some kind, to keep off the rain, but with free exposure to air. The heaps were watered from time to time with stale urine, and the mass was turned over in order to expose fresh surface to the air. When a considerable quantity of the salt had been formed, the mixture was lixiviated, in troughs of oakwood.

The rough nitre as imported into Great Britain from the East Indies, is in broken crystals of a brown colour, and more or less deliquescent. The loss which it sustains in refining is termed the *refraction*, and can only be ascertained by analysis; but it is not easy to obtain a fair sample of a cargo. "The samples which the merchants and brokers select for analysis, generally consist of portions drawn from each bag and afterwards mixed together, and if carelessly or unfairly taken, or exposed so as to become more moist or more dry than the bulk, the report of the analyst is often unsatisfactory. He should work upon not less than 20 to 30 lbs. of such sample, which should be ground or triturated so as to produce a properly uniform mixture of the whole, for it often includes lumps of pure nitre or of other salts: from 100 to 1000 grains of this mixture is then taken for analysis. The moisture is determined by the loss occasioned by careful drying on the sand-bath: it is then dissolved in water and tested, so as to acquire some general notion of the impurities; and by means of nitrate of silver, nitrate of baryta and oxalate of ammonia, the proportion of chlorine, sulphu-

rie acid, and lime may be determined: the lime is generally in the state of sulphate, and more or less sulphate of potash is also usually present. The chlorine is chiefly derived from the chlorides of potassium and sodium. Another portion of the sample should be dissolved in about thrice its weight of boiling water and filtered, by which any sand or other insoluble impurities are collected: the salt should then be crystallized in the usual way, during which the appearances and forms of the successive deposits will indicate, to the experienced eye, the nature of the foreign salts present, among which nitrate of soda, sulphate of potassa, sulphate and nitrate of lime, and chloride of sodium and potassium, with traces of chloride of calcium, and sometimes of a peculiar organic matter, are frequently found. It will be obvious that the accurate quantitative analysis of such a mixture of salts is not a very easy problem; and yet the separation of nitrate of soda from nitrate of potassa, and of chloride of potassium from chloride of sodium, are essential steps, as the value of the sample is affected by their relative proportions: for nitrate of soda, to say nothing of its unfitness for the manufacture of gunpowder, is cheaper than nitrate of potassa; and chloride of sodium is of no value, whereas chloride of potassium is purchased by the alum-makers: so that a sample of nitre, containing the latter salt, is in this respect worth more than where it only contains common salt. But inasmuch as the equivalent of chloride of sodium is only 60, and that of chloride of potassium 76, it is obvious that if the whole of the chlorine, as indicated by the weight of the chloride of silver, be considered as in combination with sodium (part of the sample consisting of chloride of potassium), the refraction will be estimated below the mark. Hence the necessity of ascertaining the relative proportions of both chlorides, which is best effected by converting them into sulphates and separating them by crystallization."

The refining of nitre on a large scale is founded on the property that its solubility increases rapidly with the temperature, while the solubility of the chlorides of sodium and of potassium remains nearly constant. For example, about 25 cwt. of rough nitre is dissolved in a large copper boiler in 150 gallons of water; the heat is gradually raised, and fresh portions of nitre are added until about 60 cwt. have been dissolved. The solution is kept stirred, and the scum removed. The water in the boiler, when raised to the proper temperature, is sufficient to dissolve the whole of the saltpetre, but not the whole of the foreign salts: a large portion of the chloride of sodium solidifies, and may be scooped out of the boiler. 100 gallons of water are then gradually added so as not to cool the solution too much; 2½ lb. of glue dissolved in warm water are then poured in, and the whole thoroughly agitated. The glue thus diffused through the liquid becomes entangled with the organic substances which rendered the solution viscous, and rises with them to the surface in the form of scum, which is carefully removed; and after boiling for some time, the liquor becomes clear. The fire is then withdrawn and the temperature let down to about 195°, when the liquor is carefully dipped out and removed to the crystallizing vessels. The liquor must be disturbed as little as possible during this operation, in order not to suspend the crystals of common salt deposited at the bottom. The crystallizing vessel is a shallow copper vessel, the edge of which is firmly screwed to a platform of oak.—*Tomlinson.*

(6550) POTASSIUM.

Potassium, Fr. | Kalium Kali metall. Ger.

Is a soft malleable metal. It is silvery white, and immediately tarnishes when exposed to the air, from its great affinity for oxygen, which it will take also from water, swimming and burning upon it with great brilliancy, and being converted into potash while the hydrogen escapes. It is preserved in fluids, such as petroleum, naptha, &c., as they contain no oxygen.—*Royle, Faulkner.*

(6551) POTATOES.

Ruta inuala, Cyng.
Aardappelen, Dut.
Patate, Fr.
Kartoffel, Ger.
Puttata, Aloo, Rutal, (sweet potatoes) Guz. Hind.
Patate, It.
Aloo, Pers.
Batata, Port.
Jabloki semlenne, Patata, Rus.
Patata, Sp.
Wallumi kilungoo. Tam.
Oorulay-gudda, Tel.

The roots of the Solanum tuberosum, of innumerable varieties.—*Faulkner.* Potatoes, are cultivated for the tubers attached to the roots. Those cultivated on the plains of India are hardly fit for human food, in consequence of their never arriving at maturity, they ought to succeed well on the hills; but wherever grown they will do little good if repeatedly planted on the same spot of ground, they require a change every year, propagated by division of the tuberous roots.—*Jaffrey.* This vegetable is now generally cultivated all over the Deccan, but was a few years ago confined to Surat and Seroor. The former was generally the finer, and could only be had during the cold season; but now the potatoes are grown all the year round on the Neilgherry and Mahabuleshwar hills, they are in abundance. They should be planted in rows about one foot apart, and five or six inches deep; the space between each row, if ground can be spared, eighteen inches, otherwise a foot. The ground should be light and loamy, and as little infested with white ants as possible. They can be sown at the commencement of the rains, and a spot should be selected where the water cannot lodge, but be easily let off; which may be done by keeping the end of the channel

between the ridges open. At this season, plant your potatoes on the top of the ridges, and do not water them unless necessary, as too much water makes them run to stalk. If your ground has not been well ploughed previous to the rains setting in, and all the weeds destroyed, the chance is your crop will fail; but should you have your ground ready, take your potatoes, intended for seed, and cut them into pieces, taking care that each slice has at least two eyes in it; and as you cut the slices, whilst fresh, dip the cut side of each into wood-ashes, and let them dry well, which takes place in a few hours: this prevents the white ant's attacks. Sow each slice from nine to twelve inches apart, and place by the side of each a small clove of garlic, which in some measure tends to prevent the attack of a large grub very destructive to the plant. Dr. Riddell thinks this insect's eggs must be in the manure when added to the soil, and has little doubt but that if the manure was previously worked up with the soil two or three times during the hot season, and exposed to the heat of the sun, the eggs would be destroyed: or the same purpose might be effected with a little fresh lime. He is sure the caterpillar does not travel to the plant.

The finest crops in the Deccan are sown from the beginning of October to the latter end of December, and this last crop will be found the most productive. Fine crops of potatoes have been grown where hemp has been first sown, and when about two feet high ploughed up into the ground. If, when your potatoes are about flowering, you perceive any of the stalks wither, carefully open the earth and look for a grub, which you may be certain is feeding upon it—of course destroy it. When these grubs are very numerous, it is necessary to search all the drooping plants daily: his idea is, that the larvæ is brought with the manure, and is the deposit of a beetle—however, nothing can be done but destroying them. He has heard recommended a bag with a small quantity of assafœtida to be placed in the water-course, as a remedy, when the plants were being irrigated. Another insect deposits its egg on the stalk of the plant. In the rains a small caterpillar eats its way into the stalk above the ground, when the plant immediately droops: the remedy is to remove the whole. Be careful at all seasons to keep the stalks well earthed up, and let the potatoes have a moderate supply of water—of course the season must be your guide. He, one year, at Kumhur, raised a very fine crop of potatoes during the rains, by sowing them on ridges, and only watered them at first, in consequence of want of rain: they were sown in the beginning of July, and a few taken up in September (the latter end). Some of the potatoes weighed from five to seven ounces, and were equal to any seen grown on the Hills. In the latter end of August, by way of exprtiment, he tore off shoots from the lower end of the stalks, when they were abundant, and planted them in rows, the same distance as for seed; and in November, on taking them up, was gratified by finding four or five large potatoes produced by each stalk, the size of a duck egg. This plan he strongly recommends to those persons who may not be able to get fresh seed after the rains. He did not find that the rows of potatoes from which the slips were taken produced fewer potatoes in consequence, as he weighed the whole and kept a memorandum in his journal.—*Riddell.*

Amongst tuberous rooted plants, which serve as food for man in various quarters of the globe, the principal are the common potato, yam, cocoes or eddoes, sweet potatoes, taro, tacca, arrowroot, cassava, or manioc, and the Apios (*Arracacha esculenta*). There are others of less importance, which may be incidentally mentioned. The roots of *Tropæolum tuberosum* are eaten in Peru, those of *Ocymum tuberosum* in Java. In Kamschatka they use the root of the *Lilium Pomponium* as a substitute for the potato. In Brazil the *Helianthus tuberosus*. The rhizome and seed vessels of the Lotus form the principal food of the aborigines of Australia. Many other plants and roots, furnish farinaceous substance and support in different countries. The comparative amount of human food that can be produced upon an acre from different crops, is worthy of great consideration. One hundred bushels of Indian corn per acre is not an uncommon crop. One peck per week will not only sustain life, but give a man strength to labor, if the stomach is properly toned to the amount of food. This, then, would feed one man 400 weeks, or almost eight years! 400 bushels of potatoes can also be raised upon an acre. This would give a bushel a week for the same length of time; and the actual weight of an acre of sweet potatoes (*Convolvulus batatas*) is 21,344 lbs., which is not considered an extraordinary crop. This would feed a man (six pounds a day) for 3,557 days, or nine and two-third years! To vary the diet we will occasionally give rice, which has been grown at the rate of 93 bushels to the acre, over an entire field. This, at 45 lbs. to the bushel, would be 4,185lbs.; or, at 28 lbs. to the bushel when husked, 2,604 lbs., which, at two pounds a day, would feed a man 1,302 days or more than three-and-a-half years! The common English or Irish potato (*Solanum tuberosum*), so extensively cultivated throughout most of the temperate countries of the civilised globe, contributing as it does to the necessities of a large portion of the human race, as well as to the nourishment and fattening of stock, is regarded as of but little less importance in Britain's national economy than wheat or other grain. It has been found in an indigenous state in Chili, on the mountains near

Valparaiso and Mendoza; also near Monte Video, Lima, Quito, as well as in Santa Fe de Bogota, and more recently in Mexico, on the flanks of Orizaba. Notwithstanding its utility as a food had become better known, no high character was attached to it; and the writers on gardening towards the end of the seventeenth century, a hundred years or more after its introduction, treated of it rather indifferently. "They are much used in Ireland and America as bread," says one author, "and may be propagated with advantage to poor people." The famous nurserymen, London and Wise, did not consider it worthy of notice in their "Complete Gardener," published in 1719. But its use gradually spread as its excellencies became better understood. It was near the middle of the last century before it was generally known either in Britain or North America, since which it has been most extensively cultivated. The period of the introduction of the common potato into the British North American colonies, is not precisely known. It is mentioned among the products of Carolina and Virginia in 1749, and by Kalm as growing in New York the same year. The culture of this root extends through the whole of Europe, a large portion of Asia, Australia, the southern and northern parts of Africa, and the adjacent islands. On the American continent, with the exception of some sections of the torrid zone, the culture ranges from Labrador on the east, and Nootka Sound on the west, to Cape Horn. It resists more effectually than the cereals the frosts of the north. In the North American Union it is principally confined to the Northern, Middle, and Western States, where, from the coolness of the climate it acquires a farinaceous consistence highly conducive to the support of animal life. It has never been extensively cultivated in Florida, Alabama, Mississippi, and Louisiana, probably from the greater facility of raising the sweet potato, its more tropical rival. Its perfection, however, depends as much upon the soil as on the climate in which it grows; for in the red loam, on the banks of Bayou Bœuf, in Louisiana, where the land is new, it is said that tubers are produced as large, savoury, and as free from water as any raised in other parts of the world. The same may be said of those grown at Bermuda, Madeira, the Canaries, and numerous other ocean isles. The chief varieties cultivated in the Northern States of America are the carter, the kidneys, the pink-eyes, the mercer, the orange, the Sault Ste. Marie, the merino, and Western red; in the Middle and Western States, the mercer, the long red, or merino, the orange, and the Western red. The yield varies from 80 to 400 bushels and upwards per acre, but generally it is below 200 bushels. Within the last ten years an alarming disease, or "rot," has attacked the tubers of this plant, about the time they are fully grown. It has not only appeared in nearly every part of America, but has spread dismay, at times, throughout Great Britain and Ireland, and has been felt more or less seriously in every quarter of the globe. To the greater uncertainty attending its cultivation of late years, must be attributed the deficiency of the United States crop of 1849, as compared with that of 1839. This is one of the four agricultural products which, by the last census, appears smaller than ten years since.—("American Census Reports for 1850.") The crops in Ireland, where the potato is the principal object of culture, vary from 1½ to 10½ tons per acre, according to the season; but in the average of three years ending 1849, the annual growth of Great Britain and Ireland amounted to nine million tons, which, at £3 per ton, exhibits the value at £27,000,000 sterling. Ireland produced in 1847 a little over two million tons, the yield being 7¼ tons per acre. In 1848 the produce was 2,880,814 tons, averaging only four tons to the acre. In 1849, 4,014,122 tons, averaging 5½ tons to the acre. In 1850, 3,954,990 tons; and in 1851, 4,441,022 tons; the average yield per acre not stated. In many parts of Scotland 24 tons to the acre are raised. The sales of potatoes in the principal metropolitan markets exceed 740,000 tons a year, which are irrespective of the sales which take place at railway stations, wharfs, shops, &c. The imports into the United Kingdom average about 70,000 tons annually. Potatoes are exported to the West Indies, Mediterranean, and other quarters. For emigrant ships, preserved or dried potato flour is now much used. Thoroughly dried potatoes will always produce a crop free from disease. Such is the positive assertion of Mr. Bollman, one of the professors in the Russian Agricultural Institution, at Gorigoretsky. In a very interesting pamphlet, Les Moyens deprevenir la Maladie des Pommes de Terre. Experiences et Conclusions de A. N. C. Bollman, Conseiller d'etat, Professeur, &c. 8vo, St Petersburg, 1853. By this gentleman, it is asserted as an unquestionable fact, that mere drying, if conducted at a sufficiently high temperature, and continued long enough, is a complete antidote to the disease.—*Simmonds.*

(6552) POTEE, round red cakes of cotton; The inferior kind is impregnated either with the red colouring matter of the prickly pear, a better kind is made by impregnating the cotton with the kaysur flower, the weeping Nyctanthus, *N. arbortristis*, but the best is from the Safflower, *Carthamus tinctorius*. The Potee forms a ready and durable substitute for red ink.

(6553) POTENTILLA. Of this genus, Wight gives Potentilla Leschenaultiana, 996; Mooniana, 232.

(6554) POTENTILLA ATROSANGUINEA. These are herbaceous plants, and handsome

when in flower, they grow in any garden soil, the colours are various, and easily raised from seed, or by dividing the roots, the shrubby species grow from two to three feet high.—*Riddell.*

(6555) POTENTILLA DENTICULOSA, is common in the plains of Northern India in the cold season, and at elevations of 4000 to 5000 feet in the Himalayas; two other species are found in the Neilgherries—*Royle, page* 202. *O'Shaughnessy, p.* 325.

(6556) POTENTILLA OFFICINALIS. Roxb. Fl. Ind. i. p. 431. Syn. Sciudapsus Officinalis.

Vushira, Sans. | Guj-pipul, Beng.

A large creeper, the fruit cut in thin transverse slices is the *guj-pipul* of the bazars, and highly esteemed as a stimulant tonic.—*O'Shaughnessy, p.* 626.

(6557) POTENTILLA TORMENTILLA. *Πεντάφυλλον μελαν, Dioscr.* and *Theopr.* A native of Europe, and officinal; the root is very rich in tannic acid.—*O'Shaughnessy, p.* 325.

(6558) POTHOS. Wight gives Pothos decursiva, 770; heterophylla, 777; officinalis, 778: peepla, 780; pertusa, 781; scandens, 776;

(6559) POTTA DELL. A soft, coarse, open-grained, light Ceylon wood.

(6560) POTTERY, *Encaustic Tiles, Cements.* The art of fashioning clay into vessels of a variety of shapes, and hardening it by the action of heat, is one of the most ancient of the arts. Fragments of pottery are everywhere found among the ancient cities of India, as in those of other parts of the world; pottery, as Brogniart has remarked, affording the best record of the early ages of man, as bones do of the earth.—*Royle, Arts &c. of India page* 476. So little is known of Indian pottery that it is usually described as being hemispherical in shape. Some of it is no doubt so, for the convenience of being carried on the head; but it is a fact, that in the recent exhibition of Indian pottery, numbers of the best judges have greatly admired its elegant, even classical gracefulness of form. It is also stated to be black, and red, or yellowish. The clays which are generally employed in the more populous part of the country, Dr. O'Shaughnessy has observed, "contain so much oxide of iron and carbonate of lime that the vessels melt into a slag at a temperature little above that of redness." "Deposits of a black stiff clay, containing much vegetable matter, occur in some districts; vessels made with it sustain a higher temperature." Clays capable of bearing great degrees of heat have, however, been discovered in different parts of India. As one great object is to have porous vessels for cooling water, the ordinary clays answer sufficiently well for this purpose; and some of the forms, as that of the tortoise shaped, expose a larger surface to the air. The Hindoos, moreover, never use a vessel the second time, so no great expense will be incurred by them; thus encouragement is wanting to improve the nature of their pottery. But very successful experiments have been made to make improved pottery in India, as by Mr. Julius Jeffreys, the ingenious inventor of the respirator, who succeeded in making stone ware, soda-water bottles, crucibles, fire bricks, tiles, &c., which seem to have been glazed by the silica uniting with the alkaline ashes of the furnace. Dr. O'Shaughnessy greatly improved the pottery in use in the dispensary of Calcutta, and which he glazed with the borate of lime. The glazed pottery of Pegu, of which two very large jars were sent, has long been known for its glaze not being affected by acids. Dr. Hunter sent some excellent specimens of pottery from the School of Arts at Madras, and for which a prize was awarded. The ancient potter's wheel is the instrument with which the Hindoo works; and while it revolves, with the aid of his naked hands he fashions vessels of elegant forms, many of which have been admired as being of classical shapes, and some would appear almost as if they were of Etruscan origin: but there is no reason to believe that the Hindoos have ever had any thing but their own unerring taste to guide them. This beauty of form is equally conspicuous in the pottery of Sewan near Patna, as in that of Azimgurh or of Ahmedabad, of Mirzapore, or of Moradabad.

Some of it is remarkable, also, for its extreme thinness and lightness, showing the great skill of the artist, and making it difficult to understand how it kept its shape when in a plastic state, as I cannot learn that the turning-lathe is used to give a finish to any of the articles. The painted pottery of Kotah, and the gilt pottery of Amroha, have also been admired. The handles and the various ornaments of the Ahmedabad pottery are no doubt attached, as in Europe, by means of slip. From the specimens of basket-work pottery sent, there is no doubt that, with better materials and a little instruction the natives could excel in this as in the forms of their pottery. If we had no other information, we might yet infer from the crucibles employed by the goldsmith, by the workers in brass, and by the makers of cast steel, that some very infusible clays are to be found in India; but recent investigations have proved that crucibles and firebricks, superior in infusibility to those made of Stour-bridge clay, have been made in India; and from the white goblets of Arcot, and the light-coloured pottery of Madras, as well as from the white bricks sent from the Ceded Districts, we see that there are many useful clays without the usual admixture of iron.—*Royle, Arts &c. of India page* 478. As connected with pottery might be mentioned the variously coloured *Encaustic* tiles, which have been used for the domes of some of the tombs

near Delhi and Agra, as well as in Southern India; but I cannot learn that the art is at present practised. It was probably introduced by the Mahomedans from Persia.

The art of making *pottery*, or vessels of baked earth, is so ancient and so universal that we seek in vain for any precise information as to its origin. It is alluded to in that most ancient record, the book of Job, and is also repeatedly mentioned in other parts of the Scriptures. The potters of Samos were celebrated in the time of Homer; and great quantities of pottery have been found in Egyptian tombs, which, to all appearance, have lain unopened since the time of the Pharaohs. The earliest use of pottery was doubtless that of ordinary drinking vessels; but there was also a religious employment assigned to earthen vessels, which has been the means of preserving them for the inspection of after generations. In vases of baked earth the ashes of the dead were frequently deposited, and even where the practice of burning the dead was not followed, still various earthen vessels have been found placed at the head and feet of the skeleton, and sometimes hanging on pegs along the sides of the tomb. Thus among many distant nations, having different languages, manners, and superstitions, pottery was considered a necessary part of the furniture of tombs. The potter's art is extremely valuable in an antiquarian point of view. While metal is liable to corrosion, and wood to decay, pottery remains almost unalterable, and has thus been the means of discovering to later ages many points respecting the history, religion, customs, and manners of the ancients, which must otherwise have remained unknown. The potter's art is represented in all its stages of the tombs of Thebes. The mixing of the clay was effected by kneading with the feet; after which a mass of convenient size was formed with the hand, and placed on a wheel of very simple construction, and turned with the hand. During its revolution the forms of the vessel were made out with the finger; the handles were afterwards affixed; the objects were placed on planks to dry, then carefully arranged in trays, and carried to the oven. Ornamental designs were traced with a wooden or metal instrument previous to the baking. There is a general agreement in the nature and uses of ancient pottery, but at the same time a distinctive character belonging to each country and nation. In this distinctive character consists the value of pottery in an historical point of view. The rude and simple urns of the early inhabitants of these islands; the more carefully fashioned pottery of the Romans with which our country abounds; the simple unglazed earthenware of ancient Greece; the more elaborate forms called Etruscan, of which the finest specimens are, however, attributed to the Greek potters of the Isle of Samos, so celebrated for the delicacy and perfection of their workmanship; the red and black potteries of India; the black and white potteries of North America, the latter interspersed with fragments of bivalve shells; the irregularly formed and fanciful pottery of South America;—all these possess a distinct individuality which makes them clearly recognisable by the student of this interesting art, while it reveals many valuable facts, taken in connexion with the localities in which they are found, their greater or less simplicity, their modes of ornamentation, and the relics which they frequently enclose. On the discovery of the extraordinary ruins of Mitla and Palenque, in Mexico, not many years ago, numerous specimens of pottery were met with, of a remarkably advanced kind for the period assigned to those ruins, namely, one thousand years before the Christian era. These potteries, although made without the turning lath, are ornamented in different colours, well baked, and covered with a fine vitreous glaze, such as was unknown to Europeans until about ten centuries ago.

As other branches of art advanced, so the potter's art became more and more developed, until at last a very fine hard description of pottery, thin and translucent, was invented and manufactured under the name of *porcelain*, a word, according to some, derived from *porcellana*, the Portuguese for a drinking-cup; according to others, from the Italian word *porcellana*, a univalve shell, of the genus *cypræidæ* or *cowries*, having a high arched back like that of the hog (*porco*, Ital.), and remarkable for a white, smooth, vitreous glossiness of surface. This is the more probable derivation, since there is abundant evidence that the word *porcelaine* existed in the French language in the fourteenth century, and consequently anterior to the introduction of Chinese porcelain into Europe. Porcelain is of comparatively recent origin in Europe, yet it was commonly known in China more than a century before the Christian era. It was not until four or five centuries after that period, however, that fine materials were employed, and that some degree of perfection was attained. Still taking the later date, the porcelain of China as a high antiquity, and must have been made at least 1250 years before our English porcelain. When the Chinese had acquired a certain amount of skill and perfection, they appear to have rested entirely satisfied with the results, and to have continued producing them without variation for ages. So exclusively were the Chinese the manufacturers of porcelain, that it acquired the name of their land, and became universally known (on its introduction to Europe in 1518) as *China*. For a long period it was also erroneously supposed that the fine clay necessary for the production of good porcelain, consisting of silica and alumina in variable proportions, and called by the Chinese *kaolin*, was peculiar to their land, and that

consequently no country in Europe could hope to attain eminence in this manufacture.

The ceramic [*Κέραμος, potter's clay*, is supposed by some to be derived from *κεράννυμι, to mix up*. Others derive it from *κέρας* an animal's *horn*, used as a drinking-cup. Others, again, suppose it to be from *γῆ, earth*.] art, in its widest sense, includes the preparation of all articles in clay or argillaceous matters, which are submitted to the action of fire; so that a comprehensive treatise on the subject would include the manufacture of bricks and tiles, as well as of the choicest specimens of pottery and porcelain. The essential ingredients in every kind of clay, and, consequently, in every article in pottery and porcelain, are silica and alumina. [See CLAY.] The pure compound *silicate of alumina* is, it is true, an ideal type; since no clay, or artificially prepared pottery or porcelain paste, is ever free from admixture with other ingredients, such as iron, lime, potash, &c. If, however, we remove from the paste either the silica or the alumina, we render it useless for the purposes of the potter; but by purging the paste of the accidental ingredients, the iron, lime, &c., we exalt those properties which render it fit for the preparation of fictile articles. An intimate mixture of silica and alumina with water acquires, by exposure to a high temperature, the required degrees of hardness and density; but for many purposes it is necessary to impart a certain degree of fusibility, to which end other substances are used in various proportions, capable of forming vitrifiable double silicates with alumina and silica. These substances, diffused through the paste formed by the simple silicate of alumina, in some cases with silica in excess, in others with excess of alumina, greatly contribute to the cohesion and hardness of the mass. The various mixtures employed in the different branches of the manufacture, have been thus classified by M. Dumas:—

Silica, alumina	Ideal type
Silica, alumina, lime	Earthenwares, crucibles, bricks, tiles, encaustic tiles, and common pottery
Silica, alumina, oxide of iron	
Silica, alumina, lime, oxide of iron	
Silica, alumina, potash	Hard porcelain
Silica, alumina, soda	Soft porcelain
Silica, alumina magnesia	Piedmont porcelain
Silica, alumina, baryta	Stoneware.

(6561) PRABANATHA. SEEDS OF CASSIA TORA: *Ben. Phar.*

(6562) PRANGOS, a genus of Plants of the natural family of *Umbelliferæ*, tribe *Smyrneæ*, so named by Dr. Lindley from the name by which the only species is known in its Tartarian habitat, where it was discovered by Mr. Moorcroft, in the neighbourhood of Imbal or Droz, and which he visited for the purpose of examining into the reputed qualities of this plant, of which the accounts seemed to border on exaggeration. Almost all the knowledge which we possess respecting the plant, is derived from the observations of that lamented and enterprising traveller. The Prangos Hay-Plant is herbaceous and perennial, having a large fleshy root stalk, usually measuring at the top from 18 to 22 inches in circumference, and formed by the aggregation of an infinite number of crowns or winter-buds, clustered together at or above the surface of the ground. These crowns being closely covered by the fibrous remains of the old leaves, are thus protected from the frosts of winter. The crop consists of the leaves, which rise in abundance from each crown, are finely cut, about two feet in length, and have a highly fragrant smell, extremely similar to that of very good new clover hay. This Mr. Moorcroft considered as a most important and interesting object of rural economy, and says that the properties of Prangos as a food appear to be heating, producing fatness in a space of time singularly short; it is also destructive to the *Fasciola hepatica*, or Liver-Fluke, which in Britain, after a wet autumn, destroys some thousands of sheep by the rot. The last mentioned property, of itself, if it be retained by the plant in Britain, would render it especially valuable to that country. But this, taken along with its highly nutritious qualities, its vast yield, its easy culture, its great duration, its capability of flourishing on land of the most inferior quality and wholly inadapted to tillage, impart to it a general character of probable utility unrivalled in the history of agricultural productions. When once in possession of the ground, for which the preparation is easy, it requires no subsequent ploughing, weeding, manuring, or other operation, save that of cutting and of converting the foliage into hay. Of its duration he relates that its seeds, having been carried westward along with those of yellow lucerne, above 40 years ago, and sown on the eastern frontier of Cashmere, vegetated, and that the plants of the first growth still remain in a flourishing condition. He conceived that by the cultivation of this plant, moors and wastes hitherto uncultivated may be made to produce large quantities of winter fodder, and that the yield of high lands and downs enjoying a considerable depth of soil may be trebled. Dr. Falconer, in his visit to Cashmere and Tibet, found it in the latter, as well as on a low trap hill in the former, but not so vigorous in the Cashmerian as in its Tibetan habitat. He states that though abundant in various directions, the Cashmerians do not esteem it of any value. Arrian, in describing Alexander's expedition across the mountains which he calls Caucasus and Paropamisus (iii. 28), says, nothing but *Silphium* and the Turpentine-Tree grow there, notwithstanding which it is very populous, and multitudes of sheep and neat cattle are seen, for they feed upon *Silphium*, of which the sheep especially are very fond. This bears so close a resemblance to the *Prangos*, both in locality and properties, that it is as likely to have been the *Silphium* of the ancients, as the assafœtida plant,

which it is supposed to be by others.—*Eng. Cyc.*

(6563) PRANGOSI PABULARIA. Vern. Fiturasulioon, north of India, near Dnz. This plant constitutes excellent fodder for cattle, fattens quickly, and destroys the "liver fluke" of sheep. Mr. Royle considers this one of the plants which yielded the Silphium of Alexander's historians.—*O'Shaughnessy page* 369. The celebrated Prangos Hay plant Grass was discovered by Mr. Moorcroft, in Tibet, and found by him to be employed as winter fodder for sheep and goats, and frequently for neat cattle. Mr. M, writing from the neighbourhood of Droz, describes the Prangos Hay plant as producing fatness in a space of time singularly short, and likewise as being destructive to the River Fluke; he therefore justly concluded that it would be an invaluable acquistion to any country to the climate of which it was suited, as its highly nutritious qualities, its vast yield, its easy culture its great duration, its capability of flourishing on lands of the most inferior quality and wholly unadapted to tillage, impart to it a general character of probable utility unrivalled in the history of agricultural productions. When once in the possession of the ground, for which the preparation is easy, it requires no subsequent ploughing, weeding manuring, or other operation, save that of cutting and of converting the foliage into hay."—(*Moorcroft* in a letter to W. Butterworth Bayley, Esq, formerly Chairman of the Court of Directors.) Various attempts have been made to introduce the Prangos Hay plant into Great Britain, but hitherto unsuccessfully; and it is probable it will only succeed, and be valuable in a climate similar to that where it is found indigenous. The Prangos is highly valued in the cold and arid region of Tibet, where it is indigenous, and which Mr. Moorcroft (v. p. 179) thought would be valuable as fodder for sheep and cattle in European countries. It is found in Tibet, and also most abundantly on Ahatoong, a low trap hill in the valley of Cashmere; but there it was not so vigorous as in its Tibetan habitat. Though abundant in various directions, the Cashmerians do not esteem it of any value, and Dr. Falconer is of opinion that its importance has been much over-estimated, in consequence of its being the only food in many of the bleak and barren tracts of Tibet. In Cashmere, where far from a deficiency of herbage there is actually a superabundance of pasture grasses, it is necessarily much less esteemed. The Prangos will, therefore, most probably be a valuable acquisition only in countries devoid of good natural pasturage and of which the climate is favourable to its growth.—*Royle, Pro. Res.*

(6564) PRAWN.

Eeral, Tam.	Roielleo Tel.
Jeengha, Duk.	Oodang, Malay.

Ains. Mat. Med. p 155.

(6565) PREMNA, a genus of Plants of the natural family of *Verbenaceæ*, which is characterised by a cup-shaped calyx, a 5-cleft bilabiate corolla. Stamens 4, didynamous. Drupe pea-shaped, with a 4-celled nut. The species consist of shrubs and small trees, which are indigenous in Asia and Australia, having opposite leaves, inflorescence in terminal cymes, with small flowers. The majority of the species are remarkable for the fetid odour of their leaves; though those of *P. cordifolia* are somewhat fragrant, and those of *P. esculenta* are employed as diet by the natives of Chittagong. *P. integrifolia* has roots of a burning taste, with leaves of a hircine odour. The leaves, applied to the head, are said to cure headache, and a decoction of the roots is employed as a stimulant in fevers, flatulence, &c. *P. latifolia* has wood of a white colour and firm texture, employed for various economical purposes, in which it agrees in character with the teak trees. *Gmelina arborea*, and others which belong to the same natural family. —*Eng. Cyclopædia.* Of this genus, Dr. Wight, in Icones, gives *Cordifolia*, 1483; glaberrima, 1484; integrifolia, 1469; latifolia, 869; serratifolia, 1469; thyrsoidea, 1485; tomentosa, 1468; Wightiana, 1485.

(6566) **PREMNA INTEGRIFOLIA.** Lin. Verbenaceæ, Icon. 1469.

Moonnay marum, Tam.

The greens.

Moonee Keeray, also Passoo-munna-keera, Tam.	Ghebboonelli Koora, Tel.
	Ugnie munda, Sans.

The Root.

Ghebboonelli cayroo, Tel.	Moonnei vayr, Tam.
	Ugniemanda, Sans.

A common but usually small tree, so that the timber is only useful for common purposes.—*Wight.* The leaves of this tree have a very unpleasant odour when pressed in the hand; used by the natives in soups and curry.—*Jaffrey.* Root warm and bitterish, given in decoction as a cordial and stomachic: decoction of the leaves used in colic and flatulence. (*Rheede.*) *O'Shaughnessy, p.* 486. The root has a somewhat warm and bitterish taste, an agreeable smell, and is prescribed, in decoction, as gentle cordial and stomachic in fevers, and on other occasions requiring medicines of this nature.—*Ains Mat. Med. p.* 90.

(6567) PREMNA LATIFOLIA.

Pedda Nellicekurra, Tel.

A native of most parts of the coast of [illegible] and Bemandel though by no means common [illegible]ction to be a small tree; flowers during the [illegible]g period The wood is firm, white and used [illegible]t the fine economical purposes, the leaves ha[illegible] good porstrong though not disagreeable sm[illegible]na in varia- much used in curries by the nat[illegible]he Chinese [illegible], and that

M. & S.

(6568) PREMNA SERRATIFOLIA.

Munnæ keeray, Tam.

Leaves used similar to those of P. Integrifolia. The natives are very fond of these two species.—*Jaffrey.*

(6569) PREMNA TOMENTOSA, Verbenaceæ, Icon. 1468.

Kolcuttay teak marum, Tam.

A small tree, the wood hard and close grained, of a brownish yellow colour, well fitted for ornamental purposes.—*Wight.* It is a native of the mountainous parts of the Circars.—*Rohde.*

(6570) PRESENTS IN JAPAN. There are three articles which, in Japan, always form part of an Imperial present. These are rice, dried fish and dogs. Some also said that charcoal was always included. Why these should have been selected, or what they particularly symbolize, was not learned.—*American Expedition to Japan. p.* 429.

(6571) PRESERVED PROVISIONS. supply of fresh meat and vegetables is essential not only to the comfort but even the health. Until recently this object could only be obtained in the navy by taking on board a large quantity of live stock, the maintenance of which at sea for weeks and months was not only very expensive but the supply thus procured was constantly lamentably short of the demand. The result of this deficiency of fresh provisions frequently displayed itself in the prevalence of scurvy and other disorders, now happily nearly eradicated, but which have been computed to have slain more seamen than ever fell in action. But by the art of preserving supplies, when the earth is covered with snow and when vegetation seems extinct—locked up as it were in the icy grasp of death.—our tables may be loaded with the choicest vegetable productions of the spring of the summer and of the autumn. When the salmon, the turbot, the mackerel, the lobster and other dainties of the ocean have become unfit for food or have left our rivers and our shores, a sufficient supply would remain ready for use in the canisters in which they are cooked, and which will preserve them for us in full flavour The free denizens of the air and of the forest will be also at our command at all seasons and at periods when the sportsman could not reach them or when otherwise they would be unfit for our consumption. Both the animal and vegetable kingdom would thus be at our command in all periods and seasons to administer to the wants and cap-
the-s of the stomach and to render our kitchens
tat- alone independent of the winds and of the
in th-s and of the mutations of the seasons but
whic- of the laws which regulate the economy
into organised Nature. By this art the house-
the- may add to his usually limited bill of
Almost any dainties and indulgences not other-
spec-ainable. The invalid also may com-
tions of t- moment's notice those articles of diet

PRESERVED PROVISIONS.

either best suited to his disorder or such as alone are acceptable to his capricious appetite. The process proposed by Mr. Forsyth appears recently to have been put into execution with very considerable success under the patent of M. Masson, Head Gardener to the Horticultural Society of Paris. The gentleman has succeeded in preserving in a very perfect manner various descriptions of vegetables and fruits, the substances thus preserved are dry and shrivelled, contain but little water, and it is evident from their appearance that a very essential part of the process of preservation consists in the abstraction of the water which forms so very considerable a portion of the weight and bulk of nearly all vegetables and fruits. When vegetables thus prepared are immersed in water for some time they swell up become soft and tender and resume to a very great extent the appearance, colour and flavour proper to them in the fresh state. M. Masson has managed to preserve completely spinach, Brussels sprouts, cabbage, beans, peas, sliced carrots, parsnips, potatoes, apples, &c. Having ourselves submitted samples of each of these fruits and vegetables to examination we are in a position to speak from personal knowledge and observation and are enabled to state that the results obtained apparently in so simple a manner are really surprising. In the ordinary mode, the article to be preserved is placed sometimes in the raw state but generally cooked in a tin canister, the lid of which is soldered down but is perforated with a small aperture or pin hole. It is then subjected to the action of either steam, boiling water, or a muriate of lime bath, until the contents of the canister, if not previously dressed, have become about two-thirds cooked. The aperture in the cover is then closed, and the canister and its contents are once more submitted for a shorter period,—that is until the article is completely dressed to the operation of heat. As soon as it has become cold the canister is covered over with a coating of paint; its preparation is then complete, and it is removed to the proving room. The proving room is simply an apartment the temperature of which has been raised to the degree most favourable to decomposition. If the operation of preservation has been well performed, the top and bottom of the canister, as also, in some cases, the sides, will have fallen in, or have collapsed to some extent: this indicates the exhaustion of the air within, and is regarded by the manufacturer as a tolerably correct proof that the process has been properly conducted. If, however, after some days' exposure in the proving room, the top and bottom of the canister first become flat, and subsequently even convex, it is a certain sign, that the contents have not been well cured, and that they are not in a condition to keep for any length of time. Such canisters

have therefore to be either rejected, or else subjected to the same process over again. It should be known that it is not only boiled provisions which may be preserved by the above process, but roasted also, with but a little extra care. The chief articles employed for the preservation of organised substances, are salt, sugar, oil, charcoal, acetic acid, or pyroligneous acid, and alcohol salt is used in the curing of fish of different kinds, bacon, hams &c., in the pickling of pork, and in the corning of beef. Salt possesses great affinity for water which it abstracts largely from the substance to which it is applied and to which affinity its power as a preservative agent is mainly due. Its effect in abstracting water from meat is well seen, in the pickling of pork, in the large amount of fluid termed brine which escapes from the meat. Unfortunately the effect of salt in its application to the preservation of meat is not confined to the removal of water; it hardens the fibre so as to render it tough and indigestible; and at the same time the water, the discharge of which it occasions dissolves out of the meat several of its most important constituents, as the albumen, Kreatine, Kreatinine, lactic acid, and soluble phosphates. Again this salted meat, by the subsequent boiling to which it is subjected, has its nutritive properties still farther impaired, for this extracts much of the gelatine and osmazome, thus at length little else of the meat is left besides the fibre which is so insoluble and comparatively destitute of nourishment. Salt exerts the same effect on vegetable substances as on animal: this is seen in its application to sliced cucumbers and other vegetable. Salt and water, termed "brine," is largely employed by pickle-makers for keeping a reserved stock ready for use, at all times and in all seasons, of the different kinds of vegetables used by them for pickling. The larger makers have some hundreds of hogsheads filled with various vegetables, in some beans, in others, gerkins, &c., thus preserved in salt and water. We have been given to understand that they keep well for months in this way. The salt and water is selected in preference to vinegar on the score of economy. Sugar is principally employed for preserving fruits, either entire or in the state of Jam or marmalade. In the condition of syrup it is semi solid, and operates partly by the barrier which it interposes to the free access of the atmosphere to the surface of the fruit, and partly in consequence of its being a non nitrogenous substance.

The use of oil as a preservative medium is extremely limited; sardines and anchovies are nearly the only articles commonly put up in oil. It appears to operate in the same manner as sugar. The powerful effect of charcoal retarding putrescence in meat and even in restoring tainted meat to a state of sweetness, is well known. Its action is due to its property of absorbing gases and effecting their oxydation as rapidly as they are developed from the decomposing meat and which is made to preserve at least the appearance of freshness. The use of dilute acetic acid or vinegar is confined to the preservation of vegetable substances, and is employed principally by pickle makers. We are not aware that its mode of operation is well understood, it probably acts chiefly by the coagulation of the vegetable albumen which it occasions Pyroligneous acid, which is an impure kind of acetic acid, possessing a smoky flavour, is applied in two ways to the preservation and curing of such articles as hams and red herrings, either in the fluid state on in that of vapour; in the latter case it proceeds from the wood or turf employed in the drying, and which being continually formed and evolved during the imperfect combustion of the wood or turf gradually penetrates into every part of the meat, imparting the flavour which is so much esteemed. Its action is no doubt the same as that of acetic acid. Alcohol is but little used in the preservation of alimentary substances, although some fruits, as cherries, are often preserved in brandy. For the preservation of anatomical preparations it is the best liquid known. Its action is in part due to its affinity for water.

(657.) *Pemmican* Pemmican consists of the muscular fibre of beef baked and reduced to a coarse powder. The preparation of the article has been described to us as follows.—The beef trimmed and deprived as far as possible of fat is cut into slices, which are placed on metallic plates, and baked until it becomes dry, hard, and cooked, lastly, the slices are reduced to a coarse and fibrous powder. The articles in this state constitutes what is known as common pemmican. There are, however, other preparations of pemmican: thus a proportion of fatty matter is commonly added with the intention of restoring the fat, of which the meat was necessarily deprived, in order that it might be baked and thus rendering it the better adapted to serve all the purposes of nutrition and respiration. Again, to this mixture of muscular fibre and fat, in some cases sugar is added, and in others, currants. Pemmican is prepared at Gosport in large quantities for the use of the navy, and we believe, is considered to form a valuable and nutritive article of diet. We have been informed that the North Star, which proceeded in search of Sir John Franklin, had a large supply on board. It is used, particularly that with sugar, mixed with the cocoa given for breakfast, and the other kinds with gruel, broth, or soup. Further information in regard to the preparation and use of pemmican will be found we believe, in "Sir John Richardson's Arctic Boat Voyage." Of all the processes used for the preservation of vegetable substances,

there appears to be none so satisfactory as that of M. Masson. That fruits preserved in bottles according to the method of Mr. Sadlington lose very considerably in flavour, is unquestionable, yet the process on the whole, yields valuable results. We believe that the most effectual means of preserving fruit is by immersion in syrup; the expence of this, however, is too great to allow of its use in all cases.—*Food and its adulteration, p.* 428.

(6573) PRESERVES, &c. The Chinese candy many things which are not considered fit for such purposes elsewhere, as millet seeds, bamboo shoots, slices of the lily root, &c., these are hawked about the streets. Ginger root, preserved in sugar, is the most common sweetmeat exported; it is made of the tender roots of the ginger plant (*Zingiber officinalis*), and when good has a bright appearance, a dark red color, and is somewhat translucent. If the roots are old, the conserve will be stringy, tough and tasteless. Much of this kind of sweetmeat is carried to India for consumption there, and for re-exportation to England and the Continent; the export to the United States is considerable; also to Sydney, South America, &c. Other kinds of conserves, as wampee, guava and pear, jelly, citron, kumquat, oranges &c &c., are also sent abroad; the total exportation may be put down at 10,000 boxes, value about $ 50,000. A box is estimated at 25 catties.

(6574) PRICKLY PEAR, *Opuntia Dillenii*, Cactus Indicus. The hedge prickly pear is often seen in gardens, and its large yellow flowers are quite ornamental. The natives of Tenasserim regard it as a species of euphorbia. —*Mason.*

(6575) PRIMULA. The Primrose. This family of plants includes the Auricula, Polyanthus, and the Primrose. They all form in Europe ornamental border flowers; but will not succeed in S. India.—*Riddell.* Wight gives Primula denticulata, 2000.

(6576) PRINCE'S FEATHER, Celosia. This is the most elegant plant, when cultivated by the Karens, that I ever saw of the amaranth tribe. It is not the prince's feather of English writers *Amarantus hypochondriacus*, but a species of Celosia which bears a long pendulous drooping panicle or plume like Roxburgh's *C. cernua*, but it is a different species. There are two varieties, one with bright yellow flowers, the other with red.—*Mason.*

(6577) PRINIA (Horsfield), a genus of Birds. It has the following generic character:—Bill rather lengthened, much compressed, entire; rictus smooth, wings rounded, tail broad and cuneate; feet large, strong.—*Swainson.*

(6578) PRINIA FAMILIARIS may be taken as an example. It is the Prinya of the Javanese, Familiar Creeper of Latham. It is abundant in many parts of Java, near villages and gardens, in the confines of which, among trees and shrubs, it builds its nest. It is a sprightly bird, sporting among the branches in short and rapid flights, and has received its native name from its lively and pleasant notes.—*Horsfield.*

(6579) PRINSEPIA, a genus of plants of the natural family of *Chrysobalanaceæ*, so named by Dr. Royle in honour of James Prinsep, Secretary of the Asiatic Society of Calcutta. The genus consists of only a single species, remarkable for its thorny appearance, but it may be considered typical of the labours of the individual whom it is designed to commemorate, as, early in the season, it is conspicuous for the abundance of its inflorescence, and, later, for that of the purple-coloured berries with which it is loaded. The seeds are large, and yield by expression an oil which is highly esteemed by the mountaineers of the Himalayas, where it is indigenous, and which by Europeans is thought a good substitute for salad oil.—*Eng. Cyc.*

(6580) PRINSEPIA UTILIS, is a common north-west Himlayan plant, only found at 8 00 feet in Sikkim: it is employed in hedges—*Hooker, Him. Jour. Vol.* II. *page* 291.

(6581) PRIONODON, Dr. Horsfield's name for a feline form (*Felis gracilis*, Delundung of the Javanese), and placed by him in a separate section under the name of *Prionodontidæ*, between *Felis* and *Viverra*. ('Zoological Researches in Java.') Mr. Swainson remarks ('Classification of Quadrupeds'), that of the genus *Prionodon*, at present, but one species has been found in Java. As a familiar appellation, expressive, in all probability, of its analogy to the *Soricidæ*, he terms it the Shrew Cat.

$$\text{Incisors, } \frac{6}{6}; \text{ Canines, } \frac{1\ 1}{1\ 1}; \text{ Molars, } \frac{5\ 5}{6\ 6} = 38.$$

(6582) PRIONODON GRACILIS, has the tail elongated, annulated, cylindrical; body pale flavescent, with four very wide dorsal bands and two narrow anal bands; two broad lateral striæ, the narrow cervical striæ, the numerous humeral and femoral spots, and the seven caudal rings very deep brown.—*Horsfield.*

Dr. Horsfield discovered this animal in 1806, during the early period of his researches in the district of Blambangan, situated at the extremity of Java; the natives distinguish it by the name above given. Dr. Horsfield was not able to ascertain that it is found in any other part of the island, or that it has another name; but he states that even in Blambangan it is rarely met with. He notices it as inhabiting the extensive forests which, with the exception of the capital of Banyuwangi and a few small villages, cover that district. He obtained but little information as to its habits and manners, and records nothing on the subject beyond what we have mentioned.—*Eng. Cyc.*

(6583) PROCELLARIDÆ, a family of Oceanic Birds belonging to the order *Natatores*.

They are well known to the seamen when far from land, and with which his superstition was once more busy than it is now; but even at the present day they are not unfrequently regarded as ominous, and many a hard-a-weather old quarter-master still looks upon 'Mother Carey's Chickens' as the harbingers of a storm. Though zoologists have differed as to the genera to be included in this extraordinary group, they have been pretty well agreed as to the forms which should be congregated in it. The genus *Procellaria* of Linnæus was formed by that great zoologist for the Petrels, and it is closely followed by his genus *Diomedea* (Albatrosses), between which and the Petrels there are many points of resemblance both in their structure and their pelagic habits. [DROMEDEINÆ; LARIDÆ.] Prince Bonaparte ('Geographical and Comparative List,' 1838) makes the *Procellaridæ* the thirty-fourth family of the birds, and places them between the *Laridæ* and the *Colymbidæ*. It includes the genera *Diomedea*, *Procellaria*, *Puffinus*, and *Thalassidroma*. Mr. G. R Gray ('List of the Genera of Birds,' 1854) makes the *Diomedeinæ* the first sub-family of the *Laridæ*. This sub-family comprehends the genera *Pelecanoides*, *Puffinus*, *Daption*, *Thalassidroma*, *Wagellus Procellaria*, *Diomedea*, and *Prion*. M. Temminck, in his 'Manual' (2nd part, 1820), arranges all the Petrels under the generic name *Procellaria*, Linn., but divides them into the following sections:—

1. Petrels properly so-called, *P. glacialis*.
2. *P. Puffinus*, *P. Anglorum*, and *P. obscura*.
3. Swallow-like Petrels (Petrels Hirondelles), *P. Pelagica*, and *P. Leachii*.

(6584) *Daption.*—*D. Capensis*, Stephens; *Procellaria Capensis*, Linn.; Cape Pigeon of the English; Peintada of the Portuguese, may be taken as an example of this form. Its plumage is variegated with brown and white. The total length of one measured by M. Lesson was 13 inches, that of the tube of the nostrils 6 lines. The testicles were rather deep-gray, the larynx had two muscles proper to it, and the total length of the intestinal tube was 47 inches. M. Garnot communicated to M. Lesson a species which the latter believed to be new, with an elaborate description and anatomical details, which M. Lesson quotes at length.

(6585) *Prion.* The type of this genus is the Blue Petrel (*procellaria vittata* and *P. cærulea*, Gmelin) discovered by Forster. Many individuals were taken during the voyage of the 'Coquille,' in 58° S. lat. The following is from M. Garnot's description of an individual of this species, which, in the form of its bill at least, appears to be leading the way towards the Lamellibranchiate Palmipedes. It is distinguished from the other Petrels by the disposition of its bill. The mandibles are hooked at their extremity; their base is very much widened. The edges of the upper mandible are directed a little outwards; they present within a projecting border striated transversely; the interval which separates them exhibits a small groove. The tongue is very thick and the mouth very dilatable. Total length, from the bill to the extremity of the tail, 11 inches (French). Length of the nasal tube 3 lines. Extent of wings 20 inches. Size a third larger than *Thalassidroma pelagica*; upper part of the body ashy-blue or gray-blue, deepest on the head and on the wings. A blackish band cuts across the wings and the lower part of the back near the origin of the tail. This portion is deepest in colour; the extremity of the tail has the same blackish deep-blue tint; lower part of the body and wings white; above the tail a line of a blue tint; bill and eyes plumbeous blue; middle of the upper mandible and tube of the nostrils blackish. The middle tail-feathers are rather the longest, which gives the tail a rounded appearance. The same author gives an interesting detail of the anatomy of the bird. —*Eng. Cyc.*

(6586) PROSOPIS SPICIGERA.

Vanjimaram Pallua, TAM. | Tshamie pundoo, TEL.

Parumbay marum, *Tam.* A thorny tree, not uncommon in the black cotton soils, attaining a large size in Mysore. Wood strong, hard, straight grained, and easily worked. The foliage of the tree and the character of the wood, closely resembles that of its congener *Acacia sundra*. Wight No 84. This tree attains a considerable size and the timber is strong and hard, used for bandy wheels and other common purposes. A specimen of this wood supported 592 lbs. Is it the same as the vunny marum? The botanical specimens which accompany both belonged to Prosopis spicigera. The specimens brought to Dr. Wight under this name were not in flower, but seem quite identical with those of the purrembay; this therefore is, he believes, the Tamool, the other the Mallayalum name. The wood, if I have not mistaken the species, is very strong, sustaining nearly 600 lbs; is hard, straight-grained and easily worked, but it may be another name for curreugaly, the foliage of which is very like that of Prosopis spicigera.—*Wight.* This pod is about an inch in circumference and from six to twelve long. When ripe it contains a quantity of a mealy substance which has a sweetish taste, and is eaten by the natives.—*Ainslie, p.* 3 4.

(6587) PROSOPIS SPICIGERA? MIMOSEÆ, Roxb. c. 63.

Punambay wood, ENG. | Parumbia marum or Vunny marum. TAM.

(6588) PROTEA. PROTEACEÆ. These plants are natives of the Cape, and would be found difficult to cultivate from their fleshy roots; the soil best suited for their growth is light loam mixed with sand, they require great attention as

they suffer either from a want or excess of water. —*Riddell.*

(6589) PROTIUM CAUDATUM. TEREBINTHACEÆ.

Malay Kloovy, TAM.

A moderate sized tree; the wood as shown by the branches is very brittle and full of sap, apparently of no value.—*Wight.*

(6590) PRUNELLAS.

Aloo Bokhara, GUZ. HIND. PERS.

Have a reddish-yellow colour, and a sweet grateful taste, with a slight and pleasant acidity. They are a variety of prunes, and are brought to Bombay from the Persian Gulf.—*Faulkner.*

(6591) PRUNES.

Aloo Bokhara, GUZ HIND. PERS.

A species of dried plum, of which there are many varieties. They are generally of an oblong shape, and sweet taste, and are prepared in France, Germany, Portugal, and other parts of the Continent. Those procurable in Bombay, are brought from the Persian Gulf.—*Eng. Cyc.*

(6592) PRUNUS, a genus of Arborescent Rosaceous Plants, belongs to the Amygdalous division of the order, and comprehends several of our domestic fruits. The Cherry, Bird-Cherry, Plum, Damson, Sloe, Bullace, and Apricot, are all comprehended in the genus as limited by Linnæus; but in the opinion of some modern botanists, the true Plums require to be separated from the others, and should exclusively constitute the genus *Prunus*, while the others are to be considered as belonging to two other genera, represented by the Cherry and the Apricot. In this view of the subject, each genus is characterised thus:—

(6593) *Armeniaca*, the Apricot.—Drupe woolly outside. Stone blunt at one end, sharp pointed at the other, with a furrow passing all round it, and an even surface. Young leaves rolled up.

(6594) *Cerasus*, the Cherry.—Drupe smooth, without bloom. Stones roundish, smooth. Young leaves folded flat.

(6595) *Prunus*, the Plum. Drupe smooth, covered with bloom. Stone sharp-pointed at each end, furrowed all round, and smooth on the surface. Young leaves rolled up. Of the Plum genus, thus restricted, there is in common use the Garden Plum (*P. domestica*), with all its numerous varieties, the Bullace (*P. insititia*), and the Sloe (*P. spinosa*). These plants are distinguished specifically by botanists, but apparently without reason. It is the opinion of the best experimental physiologists, that the Sloe of our hedges was the origin of the others; and certainly there is not more difference between a Sloe and a Greengage than there is between a German Quetsche and an English White Magnum-Bonum. Several other species belong to the genus, but they are of no moment, with the exception of a plant called *Prunus coccomilia*, which inhabits the mountains of Calabria, and has a great reputation in Italy on account of the tonic qualities of its bark.—*Eng. Cyc.*

(6596) PRUNUS ARMENIACA. AMYGDALINEÆ.

Zard alu, HIND.

The Apricot. This tree grows to a large size in gardens of the Deccan. It blossoms at the same season as the peach, from January to March; the fruit forms and attains the size of a common marble, after which it falls off, and this no care can prevent. Many efforts have been made to get buds to take both on the peach and almond stocks but without success, attempts to graft it by approach have hitherto been unsuccessful: the tree grows well on the first range of the Himalayas, bearing abundance of fruit in the months of May and June. Propagated in the same way as the peach.—*Riddell.*

(6597) PRUNUS CERASUS.

Padam, HIND

The Cherry. This tree is not found in any part of the Deccan; but abounds wild in the hills north of Deyrah Dhoon, producing a small common black fruit fit only for preserves, &c.—*Riddell.*

(6598) PRUSSIAN BLUE, BLUE PRUSSIATE OF IRON, FERRI FERROCYANIS, FERRO-PRUSSIATE OF IRON, PERCYANIDE OF IRON, SESQUIFERROCYANIDE OF IRON.

Bleude Prusse, FR.	Lasor Bexlinskaja, RUS.
Berlinerblau, GER.	Azul de Prussia, SP.
Azurro Prussiano, IT.	

A pigment or dye, composed of cyanogen and iron, and procured by a chemical process from carbonate of Potass, bullock's blood, green vitriol, and alum. It is prepared of different degrees of purity, and additions are made to it according to the purposes for which it is required. When pure, it is of a rich and intense blue, with a copper tint on the surface, inodorous, tasteless, insoluble in water, in alcohol and diluted acids; but is acted upon and dissolved by strong acids. Prussian blue is now extensively made in China, the art of manufacturing it having been carried from the West to the East by a Chinese sailor. —*Waterston*—*Faulkner.*

(6599) PRUSSIC ACID. HYDROCYANIC ACID. Is obtained by the action of muriatic acid on bi-cyanuret of mercury. It is limpid, very volatile, and of a strong pungent odour, resembling that of bitter almonds. Its taste is acrid, and it is virulently poisonous. In medicine it is used as a sedative.—*Waterston.*—*Faulkner.*

(6600) PSIDIUM, (from ψίδιον) the Greek name for a pomegranate), a genus of Plants belonging to the natural order *Myrtaceæ*. The tube of the calyx is ellipsoid or obovate, usually contracted at the apex; the limb ovate, undivid-

ed, but afterwards from 1- to 5-cleft. There are five petals and numerous free stamens inserted in a broad circle, almost through the whole undivided part of the limb; the style is filiform, the stigma capitate; the ovules are numerous, horizontal, and fixed to the margin of the placenta; the berry is many-seeded, corticate by the tube of the calyx, and crowned by its lobes. The seeds imbedded in the pulp in the mature fruit with a bony testa. The species are trees or shrubs, natives of America within the tropics The fruit is edible, and is known by the name of Guava. It has a fragrant but peculiar odour and very sapid taste, and is eaten both raw and when made into jelly.—*Eng. Cyc*

(6601) PSIDIUM POMIFERUM, Apple-Bearing or Common Red Guava, has tetragonal branches, oval or oblong lanceolate leaves, pubescent beneath, from 3 to 8 peduncles, or many-flowered. The fruit is globose, yellow, and somewhat astringent, with an agreeable odour; the root and young are astringent; and are esteemed strengthening to the stomach. It is a native of the West Indies, Mexico, and South America.—*Eng. Cyc.*

(6602) PSIDIUM PYRIFERUM. WHITE GUAVA.

Soopari am or Soopium HIND.	Peyara, BENG. Jam, DUK.

The Wood.

Guava wood, ENG.	Jama kurra, TEL.
Conya marum, TAM.	Sebe mara, CAN.

The guava tree is planted in Tenasserim perhaps more extensively than any other fruit tree in the country. Loudon has the most correct notion of the fruit. He says: "Most of the species are cultivated in the tropics for their fruit, which also ripens freely in this country, but is of little merit." The white guava is the species most usually cultivated but the red is not uncommon—*Mason*. Besides yielding fruit, the wood is useful for many purposes as handles of tools, mallets, pegs, &c., it is very hard.—*Rhode. M S.S*

The Fruit.

Coia pallum, TAM.	Pera coy, MAL
Jamb, DUK.	Guava, ENG.
Goia pundoo TEL.	Nichola, SANS.

This Indian fruit is generally preferred fresh from the tree in the morning early; as the heat of the day is supposed to injure its flavor. —*Ainslie, p.* 223. It grows in all parts of the Deccan. The fruit is both red and white, pear shaped and round: it is esteemed as a dessert fruit, but the scent when too ripe is unpleasantly powerful; it makes a most excellent jelly, and also is prepared in a similar manner to damson cheese at home. The fruit sometimes is as large as a common baking pear, and one weighed half a pound. They have been brought to great perfection in some gardens, and the fruit of a large size divested almost of seed: this sort generally has a very rough knotty coat, and is more spongy and less firm than the other varieties. A plants continually grown from layers in time cease to produce seed, perhaps this variety has been so procured. It is easily increased by seed, and only requires a good soil to thrive in. The trees should be pruned once a year, otherwise the branches become very straggling. Good gun-stocks are made from the old wood.—*Riddell.* In all Southern Asia the common Guava is found every where in gardens, which probably found its way to India from S. America through the Portuguese, Wood small, but very hard, and is used by Dr. Hunter for wood engraving, and commonly for pegs, mallets, handles of too's, &c.—*M E. J R.*

(6603) PSITTACIDÆ, an extensive and highly-interesting family of Birds, including those commonly called Parrots. They are remarkable for their beautiful colours, their powerful bill, their fleshy tongue, and their power of imitating the human voice. The articulation of some of the species is so perfect, that when the bird is unseen it is difficult to suppose that the words pronounced do not proceed from the mouth of man

Mr. Swainson is of opinion that the Parrots constitute the subtypical division of the *Scansores* wherein the powers of climbing are less developed. "If," says Mr. Swainson, "any group in nature be isolated, it is this. Possessing in themselves the strongest characteristics, there is no bird yet discovered which presents any point of connection to them: approximations indeed are certainly made towards them by the tooth-billed Barbuts (Barbets, *Pogonias*); but there is still a gap, which no genus yet discovered is calculated to fill up. On considering the relative difference between the Barbuts and the Parrots, we should say, theoretically, that of all the five groups among the latter, one only remains to give the typical structure." As the Parrots appear to Mr. Swainson to form a group precisely equivalent to the true Woodpeckers, he arranges them under five genera: the Maccaws, the Parrots, the Cockatoos, the Lories, and the Ground Lories (*Platycercus*, Vig.) In the synopsis at at the end of the work ('Classifiction of Birds'), we find the following arrangement:—

Psittacidæ.

Bill every short: the upper mandible greatly curved over the lower, which is considerably shorter.

Sub-Family *Macrocercinæ*. Maccaws.

Upper mandible greatly hooked; lower mandible much higher than broad. Tail very long, cuneated.

Genera: *Macrocercus*, Vieill.; *Conurus*, Kuhl; *Leptorhynchus*, Sw.; *Palæornis*, Vig.

Sub-Family *Psittacinæ*. Parrots.

Upper mandible very distinctly toothed; lower mandible longer than it is high. Tail short, even, or rounded

Genera: *Erythrolomus*, Sw.; *Chrysótis*, Sw. (Amazonian Parrots); *Psittacus* (Parrot of the Old World—most typical of this sub-family); *Agapornis*, Selby; *Poicephalus*, Sw.

Sub-Family *Plyctolophinæ*. Cockatoos.

Head large, ornamented with a folding or procumbent crest. Bill short, very broad; the culmen remarkably curved. Tail rounded, lengthened, broad; the feathers not narrowed.

Genera: *Plyctolophus* Vieill. (subtypical); *Licmetis*, Wagl.; *Microglossus*, Geoff.; *Centrourus*, Sw.

Sub-Family *Lorianæ*. Lories.

Bill but slightly curved; the margin of the upper mandible sinuated; the notch obsolete; lower mandible slender, conic, much longer than high; the gonys (typically) straight.

Genera: *Brotogeris*, Vig.; *Psittaculus*, Kuhl; *Trichoglossus*, Vig.; *Lorius*, Brisson; *Pyrrhodes*, Sw.

Sub-Family *Platycercinæ*. Loriets.

Tail long, very broad, considerably cuneated. Bill strong, thick, toothed; the culmen very convex. Under mandible deep, but very short: the gonys curved. Feet and toes slender. Tarsus longer than the hallux.

Genera: *Vigorsia*, Sw.; *Platycercus*, Horsf. and Vig.; *Nanodes*, Horsf. and Vig.; *Leptolophus*, Sw.; *Pezoporus*, Ill. (Swainson.)

The family is placed by Mr. Swainson between the *Rhamphastidæ* and the *Picidæ*.

Mr. G. R. Gray ('List of the Genera of Birds') also arranges the *Psittacidæ* between the *Rhamphastidæ* and the *Picidæ*.

The sub-family *Palæornina*, as it appears in Mr. Vigors and Dr. Horsfield's 'Description of the Australian Birds in the Collection of the Linnæan Society' ('Linn. Trans.,' vol. xv.), consists of the genera *Nanodes*, *Platycercus*, *Pezoporus*, *Palæornis*, and *Trichoglossus*.

(6604) *Palæornis*.—The Parrakeets forming this group belong to continental India and some of the neighbouring islands in the Indian Ocean and Africa, with the exception of *Palæornis Barrabandi* (*Polytelis* of Wagler), which is a native of Australia. India and its islands must however be considered as the principal locality of the species, which, according to Wagler's monograph, amounts to eleven, including *Palæornis inornatus* which he adds to the group with doubt.

The Ring Parrakeets, as they are generally termed, are justly held in high estimation for the symmetry of their form, the grace and elegance of their movements, the beauty of their colours, their great docility and powers of imitation, and their fond attachment to those with whom they are domesticated and who treat them with kindness. They were not less prized, as we know, by the ancients; and it becomes a not uninteresting inquiry to endeavour to ascertain what were the species known to them. Some suppose that *Palæornis Alexandri* was the only one: but though that species may have been and was probably the first introduced into Europe, we think that it will appear that those who confine the Parrakeets known to the ancients to that bird have taken too narrow a view of the subject.

This genus has the following characters:—Bill rather thick; the upper mandible dilated, the culmen round, the lower mandible broad, short, and emarginate. Wings moderate; three last quills (extimis) nearly equal, longest; external webs of the second, third, and fourth gradually broader in the middle. Tail graduated: the two middle very slender feathers much exceeding the rest in length. Feet with short and weak tarsi; the claws moderate, rather slender, and falcate. Body slender and neat (Vig.)

Mr. Vigors divides the genus into the following sections:—Lower mandible short.

(6605) *P. Alexandri*, *P. torquatus*, *P. flavitorquis*, *P. bitorquatus*, *P. xanthosomus*, *P. Malaccensis*, *P. erythrocephalus*, *P. Bengalensis*, *P. Pondicerianus*, *P. Barrabandi*,

Lower mandible elongated.

(6606) *P. Papuensis*.

(6607) *Lorius*.—The true Lories are remarkable for the elongated and weak form of the bill, and also for a formation of the tongue, similar to that in *Trichoglossus*. [See, col. 476.] They are inhabitants of the islands of the east, and are considered by Mr. Vigors to be the aberrant group of the family. Their colours are of the most rich and mellow description, and the birds are highly prized, not only for their beautiful plumage, but for their lively, active, and affectionate disposition, and their great docility in the articulation of words and even sentences. The genus has the following characters:—Bill elongated, weak. Wings pointed, two first quills longest. Tail moderate, rounded or gradulated; the feathers broad, and hardly narrow at their tips.

(6608) *Lorius Domicella*.—Rich scarlet; upon the upper part of the breast a yellow collar; crown of the head blackish-purple in front, passing into violet-purple behind; upper surface of the wings green, violet-blue at the bend and margins, as are the under wing-coverts; thighs externally azure, greenish at the base; bill orange-yellow. Length between 11 and 12 inches. It is a native of the Moluccas and other Eastern islands.—*Eng. Cyc.*

(6609) PSOPHOCARPUS. In this genus the pods are oblong, and have four longitudinal wings; the seeds are roundish. It comprehends the *Dolichos tetragonolobus*, a twining annual, the pods or tuberous roots of which are a common Indian esculent.—*Eng. Cyc.*

(6610) PSOPHOCARPUS TETRAGONOLOBUS, Goa Beans. A bean commonly cultivated and used as French beans; easily known by its having 4 fringed membraneous edges,

much used by Europeans, called by the French *Chevaux de Frise*. The plant is indigenous in the Mauritius.—*Jaffrey*. In Tenasserim there is a variety of the Goa bean which produces esculent roots that are eaten like potatoes, and are a very tolerable vegetable. The young pods are also eaten like French beans.—*Mason*.

(6611) PSYCHOTRIA.

Sgau, BURM.

The genus psychotria furnishes a handsome shrub, whose small white flowers throw a delightful fragrance on the path during a morning walk.—*Mason*.

(6612) PTERIS (from πτέρον, a wing), a genus of Plants belonging to the natural order *Filices*. The thecæ arise from the points of veins placed on a nerve-like receptacle running along the edge of the leaf, forming an uninterrupted marginal sorus; the involucres are continuous with the edge of the leaf, scarious, and opening inwards.—*Eng. Cyc.* The rhizomek of *Pteris esculenta* is used as food in Australia, and that of *Marattia alata* in the Sandwich Islands.—*Simmonds*.

(6613) PTERIS AMPLEXICAULIS, STIPE-CLASPING BRAKE. A large brake is common at Tavoy with pinnate fronds, whose leaflets have two lobes at the base which clasp their stipe.—*Mason*.

(6614) PTERIS AQUILINA, Common Fern, Bracken, or Brakes, is the most abundant of the British species. It has a long tapering rhizoma, creeping, externally black. The leaves are erect, from one to six feet high, repeatedly compound with horizontally spreading divisions, whose ribs are smooth; the primary leaves are nearly opposite, the lower ones more alternate, pinnatifid segments oblong, obtuse.—*Eng. Cyc.*

(6615) PTERIS GRAMINIFOLIA, GRASS FERN. The trunks of forest trees in Tenasserim are often clothed with the green drapery of the grass fern, which grows upon them precisely like bunches of long grass. It belongs to the same genus as the common brake.—*Mason*.

(6616) PTEROCARPUS (from πτέρον, wing, and κάρπος, a fruit, in reference to the pods being girded with a broad wing), a genus of Plants belonging to the natural order *Leguminosæ*. It has a 5-cleft calyx, a corolla with 5 petals, disposed into a papilionaceous form; 10 monadelphous or diadelphous stamens, an irregular indehiscent legume, somewhat orbicular, surrounded by a wing, woody, and often rugose, in the middle 1-3-celled. The leaves are unequally pinnated. The racemes axillary, or forming terminal panicles. The species are unarmed trees or shrubs.

(6617) PTEROCARPUS. *Species*.

Ausena wood, TAM.

(6618) PTEROCARPUS. *Species*.

Jumbagum marum, TAM.

Common about Nelambore and in Wynaad; a large tree; wood used for building and fene gardens; said to be durable.—*McIvor*.

(6619) PTEROCARPUS. *Species*.

Karoo Vagoo, TAM.

A very common tree on the Western Ghauts; wood strong, durable, and much used for building.—*McIvor*.

(6620) PTEROCARPUS. *Species*.

Nou or Nagoo marum, TAM.

A very strong and durable wood, common on the lower elevations of the Neilgherries; an ordinary sized tree.—*McIvor*.

(6621) PTEROCARPUS BILOBUS. BANKS.

Vayngie wood, ENG. | Vayugie marum, TAM.

This is reckoned by the natives a very useful wood. It is of a reddish colour, and is employed in making doors and windows, and for other common purposes.—*Ains. Mat. Med. p.* 207.

(6622) PTEROCARPUS DALBERGIOIDES.

Padouk. BURM.

This is found chiefly as a large tree about the neighbourhood of Prome and inhabited places to the north of that town, but rarely in the Forests; wood red, equivalent to mahogany.—*McClelland*. It is a native of the Andaman Islands, where it grows to an immense size, and forms a valuable timber-tree, of which the wood is known as Andaman red wood, from its resemblance to mahogany; but it is redder, heavier, and coarser grained, though that of the root is finer than that of the stem. It was introduced by Col. Kyd into the Calcutta botanic garden in 1794, whence it has been spread into the country.—*Eng. Cyc.*

(6623) PTEROCARPUS DRACO. THE RESIN. DRAGON'S BLOOD.

Dumul-ook-wain. HIND.

A native of the American Islands, and especially Guadaloupe. The bark, wood, and leaves are remarkably astringent. The dragon's blood *in mass* of commerce, according to Jacquin, is the produce of this tree. Another sort, and most likely that sold in Indian Bazars, is produced by the Calamus Draco of the Straits.—*O'Shaughnessy, page* 997. The Dragon's-Blood Pterocarpus, is a tree nearly 30 feet high, with alternate shining leaflets, about 5 on each side, and an odd one, rather obtuse, entire, veined smooth, pale green below; the legumes nearly smooth. The wood of this tree is white and heavy, the bark thick and of a rusty gray colour. When first cut it presents no marks of redness, but in a little time red drops of juice begin to collect and exude from the wood. If left in the sun for about ten minutes they become hard and clear, and are collected under the name of *Sanguis Draconis*, or Dragon's-Blood. This resin formerly constituted an extensive article of commerce

from Carthagena, but from its diminished consumption its collection has ceased, and all the dragon's-blood obtained now in the market is the produce of *Calamus Draco*.—*Eng. Cyc.*

(6624) PTEROCARPUS ERINACEUS, is a tree 40 or 50 feet in height. It has unequally pinnate leaves, smooth above, downy beneath; from 11 to 15 leaflets, alternate, distant on short stalks, ovate, oblong, obtuse, or emarginate, wiry at the edge; lanceolate stipules, solitary or clustered racemes, downy from the old wood below, the young branches much shorter than the leaves. The flowers are yellow, the legumes stipulate, compressed, membranous, velvety, serrated, and undulated, prickly on the centre. When the branches are wounded, a clear bright gum exudes from them, which is one source of the gum kino of commerce, and is mentioned as such by Park. It is a very powerful remedy in obstinate chronic diarrhœas and dysenteries, and in all diseases arising from laxity of tissue. Externally it is applied as a styptic to check hæmorrhages from wounds and ulcers, and to diminish discharges.—*Eng. Cyc.* It is a moderately lofty tree. Moon, in his travels into Africa, mentions a red gum as issuing from incisions in trees, and which he mistook for Dragon's-blood. Mungo Park discovered that the tree which yielded this substance was called Pao de Sangue (Blood-tree) by the Portuguese. His specimens were determined by Mr. R. Brown to belong to *Pterocarpus erinaceus*,—a tree which has since been well figured and fully described in the Flore de Senegambie.—*Royle.*

(6625) PTEROCARPUS FLAVUS is the Yellow Sandal-Tree, and is used for dyeing yellow. Its bark is very bitter.—*Eng. Cyc.*

(6626) PTEROCARPUS INDICUS, Wall.

Padouk, Burm.

According to Mr. Mason another Kino gum tree, the Pterocarpus Indicus of Tenasserim, is a majestic ever-green, whose yellow papilionaceous flowers clustering amid the bright drooping foliage, scent the air, like the large magnolias, for several hundred yards around. It is propagated by simply planting large branches in the ground at the commencement of the rains. There are, however, two species, the red, and the white as distinguished by the Burmese - the red producing the finest timber, but the white padouk is by far the finest ornamental tree.—*Mason.* The "padouk" is a handsome tree with long waving branches and clusters of yellow flowers, which scent the air. It produces very fine timber, and may be considered one of our most valuable forest trees. This species also yields Gum Kino. Hort. Garden 55, Firth.—*M. E. J. R.*

(6627) PTEROCARPUS MARSUPIUM.

Vangay wood, or Yagesah wood, Eng.	Beebla, Hind.
Vangai marum Tam.	Yegassee kurrah, peeah saloo, Tel.
Whonay. Can.	Peet Shala, Hind.
Vengay, Tam.	Benba, Bia, Beebla, Duk.
Yegis, Tel.	Yegah, Beng.
Pedong Burm.	
Dhin daga, Can.	

Pterocarpus Marsupium, is a tree with a very high trunk, scarcely ever found straight. The bark has a brown outer coat which is thin and spongy, and falls off in flakes, disclosing the inner bark, which is fibrous, red, and astringent. The branches are numerous, horizontal, and spreading. The leaves sub-bifarious, alternate, pinnate, with an odd one, 8 or 9 inches long. The panicles are terminal and very large, ramifications bifarious. The flowers are very numerous, white, and with a small spot of yellow in the centre. The bracts small, caducous solitary below each division and sub-division of the panicle. The seed is solitary and kidney-shaped. This tree is thought by Roxburgh to be the one yielding Gum Kino, a well known astringent, the juice hardening into a dark red and very brittle gum-resin, which, on being powdered, changes to a light brown, not unlike Peruvian bark. Its taste is strong, but simply astringent. The real kino-tree however appears to be the P. Erinaceus.—*Eng. Cyc.* It is common all round the foot of the Ghauts, wood much used in building but exudes a yellow dye, which discolours the chunam where it comes in contact with it.—*Mc. Ivor.*

The *Pterocarpus marsupium* is one of the most lofty and striking trees in the Indian forests —it is well described by Roxburgh, in the *Flora Indica*, Vol. iii. p. 234—and figured in his *Coromandel Plants*, ii. *t.* 116. It is a very large tree, affording excellent shade and timber, the latter is of a dark brown color, and dyes yellow; for building purposes it is almost as good as teak, but cannot be used for lintels of doors, windows, &c. as it discolors the whitewash. It grows luxuriantly on the eastern ghauts, on the hills between Vellore and Salem, and on the Malabar and Canara ghauts, where large quantities of the resinous substance it yields are collected, and sent to England under the name of "kino." The tree abounds not only near Tellicherry, but along the whole Malabar Coast. Dr. Cleghorn has seen it both in the ascent of the Eastern and Western Ghauts. Dr. Wight sent to him specimens from Coimbatore, and Roxburgh found it in the N. Circars. Buchanan Hamilton mentions it under the name of *Vijaya* as occurring in Nepal and also to the eastward of Bengal. The vernacular names are as follows: Beuba, Bia, Beebla, *Duk.*; Whonay, *Can.*; Yegy, Vayga, *Beng.* It has been observed in the Concans, (*Graham.*) Rajpeepla jungles, (*Dr. Lush.*) Assam, (*Voigt.*) It yields from incisions a large quantity of blood-red juice, which on being simply exposed to the sun, hardens and then quickly cracks into little

angular masses, and crumbling fragments which constitute, without further preparation, the kino of the shops. Specimens of the exudation sent by Dr. Cleghorn to Professor Christison in 1846 from Mysore, were considered by him "quite identical with the kino of commerce." The tree being thus widely diffused, and the exudation procurable in *large quantity*, it may possibly come into extensive use in *dyeing* and *calico-printing*. The product can be obtained with facility by simply incising the bark and requires no outlay save that of collecting.—*Cleghorn*. Mr. Melvor says, it is common all round the foot of the Ghauts, wood much used in building but exudes a yellow dye which discolors the chunam where it comes in contact with it.—*Melvor, M. E.* It grows to be a very large tree; flowering time, the beginning of the rains, the seed ripens about the close of the year. The timber will be found useful for many purposes: very little inferior to teak, it seems less liable to split after long exposure and is equally strong, but the wood is heavier. Vessels built in the Ganjam Districts are planked with it; and the door pannels and venetians of the neglected houses at Ganjam are formed of this wood and have stood better than teak similarly situated. Very great caution is requisite in using this wood to obtain it sound. It is more expensive than teak to work and when sawn green the outer planks bend considerably, its price on the Godavery is about 3 annas a foot. This is one among the unlucky woods of the natives though the prejudices against it have in part given way to profit. For general utility, it is superior to any other mahajante wood, a commercial term among the people of the Northern Circars including all wood used for building except teak.—*Rhode M.S.S.*

(6628) PTEROCARPUS SANTALINUS. Red Saunders Wood.

Segapoo chendanum, Tam.	Whonnay Can.
Sal Chundend. Duk.	Racta Chandana. Sans.
Sundel Ahmer. Arab.	Cheudana. Tel. Hind.
Buchum, Pers.	Beng.
	Ract handoon. Cyng.

This is a large, good timber tree, fit for furniture.—*Ains. Mel. Med. page* 210. It is a lofty tree having alternate stalked ternate leaves, petiolate alternate leaflets, smooth above, hoary beneath. The racemes are axillary, simple, or branched, and erect. The legume roundish, stalked, falcate upwards, compressed, smooth, keeled on the lower edge, the keel being membranous and undulated. From this tree is obtained the Red Sandal-Wood, a timber chiefly used by dyers and colour manufacturers of the present day, but which is also used to colour several officinal preparations, such as compound tincture of lavender. Its colouring matter forms beautiful coloured precipitates with many metallic solutions.—*Eng. Cyc.* It is a native of Coromandel, being abundant on the Naggery Hills, Ceylon, Timor, and other parts, the wood is exported to Europe in billets, it is very heavy, sinking in water, extremely hard, of a fine grain and bright garnet red colour which brightens on exposure to the air, it is employed to dye lasting reddish brown colours on wool, it yields its colouring matter to ether and alcohol but not to water, its price in bond in England was in 1882, 13£ to 14£ a ton.—*Rohde, M. S. S.* Dr. Wight says the wood of this tree is brought to Coimbatore in small quantities from Mysore, and sold by weight at an extravagant price. Seen under the microscope, the texture is the same as that of *P. marsupium* the colour only differs. It grows abundantly in the Naggary Hills, yields the "Red Sandal wood" of commerce. It is sold by weight as a dyewood, and forms a regular article of export. It takes a beautiful polish, but the high price of the wood for dyeing purposes, precludes its use as a timber. *M. E. J. R.* Simmonds tells us that *Red Sanders wood* is hard and of a bright garnet red color, and employed to dye a lasting reddish brown on wool. It only yields its color to ether or alcohol. The tree, which is a lofty one, is common in the Madras Presidency and other parts of India: it is also indigenous to Ceylon, Timor, and other Eastern islands. The exports of this wood from Madras in one year have been nearly 2,090 tons. The imports of red Sanders wood from Calcutta and Bombay chiefly into London are to the extent of 700 or 800 tons a year, worth £6 to £9 per ton.—*Simmonds.* In Ajmere, Red Saunders wood is used chiefly in suffumigations to the native gods: is also used in medicine: it is brought there from Delhie, costs ten rupees per maund.—*Gen. Med Top p.* 131. This colouring drug is little used by the Indian Practitioners, though they sometimes recommend it in powder in conjunction with certain herbs, and mixed with Gingilie oil, as an external application, and purifier of the skin, after bathing. The tree grows in abundance in the Bengal provinces on the Malabar coast and also in Mysore, where Dr. Buchanan tells us it is called Whonnay and that the bark contains much red coloured juice.—*Ains. Mat. Med. p.* 42.

(6629) PTEROCARPUS WALLICHII, and Pterocarpus dalbergioides. The gum kino tree, pterocarpus, or padouk, produces a timber which in its finest specimens bears so strong a resemblance to mahogany that a visitor mistook it for mahogany, and recorded it as such in the book of his travels. At Maulmain, it is called red-wood, and one of the trees, for there are the two above species, differs very slightly from the tree which yields the Andaman red-wood, of which Roxburgh wrote: "Wood not unlike mahogany, but more heavy, red, and coarse in the grain. That of the root beautifully variegated, closer grained, and darker coloured."—*Mason.*

(6630) PTEROPLEURA. [GECKOTIDÆ.]

(6631) PTEROPODA, a class of *Mollusca* placed between the *Gasteropoda* and *Brachiopoda* by some writers, and by others next the *Cephalopoda*. The number of species is not large. They pass their entire life in the open sea away from shelter, except that which is afforded by the gulf-weed. In appearance and habits they resemble the fry of the other forms of *Mollusca*. They are supplied with a pair of flippers or wings (hence their name), by means of which they pass rapidly through the water. They swarm in tropical and arctic seas, and are sometimes so numerous as to colour the ocean for leagues. They are the principal food in high latitudes of the species of whale and of sea birds. They are rarely found on the sea-shore, and only one or two species have been accidentally taken in the British seas. "In structure, the *Pteropoda* are most nearly related to the marine univalves, but much inferior to them. Their nervous ganglia are concentrated into a mass below the œsophagus; they have auditory vesicles, containing oolites; and are sensible of light and heat and probably of odours, although at most they possess very imperfect eyes and tentacles. The true foot is small or obsolete; in *Cleodora* it is combined with the fins, but in *Clio* it is sufficiently distinct, and consists of two elements; in *Spiralis* the posterior portion of the foot supports an operculum. The fins are developed from the sides of the mouth or neck, and are the equivalents of the side-lappets (*Epipodia*) of the sea-snails. The mouth of *Pneumodermon* is furnished with two tentacles supporting minature suckers; these organs have been compared with the dorsal arms of the cuttle-fishes, but it is doubtful whether their nature is the same. A more certain point of resemblance is the ventral flexure of the alimentary canal, which terminates on the under surface, near the right side of the neck. The pteropods have a muscular gizzard, armed with gastric teeth; a liver, a pyloric cœcum, and a contractile renal organ opening into the cavity of the mantle. The heart consists of an auricle and a ventricle, and is essentially opistho-branchiate, although sometimes affected by the general flexure of the body. The venous system is extremely incomplete. The respiratory organ, which is little more than a ciliated surface, is either situated at the extremity of the body and unprotected by a mantle, or included in a branchial chamber with an opening in front. The shell, when present, is symmetrical, glassy, and translucent, consisting of a dorsal and a ventral plate united, with an anterior opening for the head, lateral slits for long filiform processes of the mantle, and terminated behind in one or three points; in other cases it is conical, or spirally coiled and closed by a spiral operculum. The sexes are united, and the orifices situated on the right side of the neck. According to Vogt, the embryo Pteropod has deciduous vela, like the sea-snails, before the proper locomotive organs are developed.—*Huxley.*

"From this it would appear that while the *Pteropoda* present some analogical resemblances to the *Cephalopoda*, and permanently represent the larval stage of the sea-snails, they are developed on a type sufficiently peculiar to entitle them to rank as a distinct group; not indeed of equal value with the *Gasteropoda*, but with one of its orders.

"This group, the lowest of the univalve or encephalous orders, makes no approach towards the bivalves or acephala." (Woodward, 'Treatise on Shells.')

De Blainville divides this group into two sections, *Thecosomata* and *Gymnosomata*:—

A. Thecosomata.—Animal furnished with an external shell; head indistinct; foot and tentacles rudimentary, combined with the fins; mouth situated in a cavity formed by the union of the locomotive organs; respiratory organ contained within a mantle cavity. This section embraces two families, *Hyaleidæ* and *Limacinidæ*. *B. Gymnosomata.*—Animal naked, without mantle or shell; head distinct; fins attached to the sides of the neck; gills indistinct.—*Eng. Cyc.*

(6632) PTEROSPERMUM (from the Greek word πτερόν, signifying a wing, and σπέρμα a seed), a small genus of Plants belonging to the natural order *Byttneriaceæ*, which is found in the Indian Isles and the southern parts of India. The flowers being large and the foliage showy, have induced the cultivation of the species as ornamental trees all over India. The calyx is leathery, 5-partite, tomentose outside, hairy within; petals 5, shorter than the calyx; stamens 20 (5 sterile), united at the base into a column with the stalk of the ovary; style slender, club-shaped; seeds winged. The genus is small, but all the species form handsome trees, and, like most of the plants of the nearly allied order of *Malvaceæ*, abound in mucilage.—*Eng. Cyc.*

(6633) PTEROSPERMUM ACEROIDES,
Thamajamwai-zeke, BURM.

(6634) PTEROCARPUS SUBACERIFOLIUM.
Najee, BURM.

(6635) PTEROCARPUS ACERIFOLIUM.
Najee. BURM.

These three species of large timber are found growing along with Teak in all the Pegu Forests. The two first are plentiful, but the third kind is scarce. This timber is extremely valuable and is as strong as either Teak or Oak. Its durability for purposes of ship-building has never been tested, because it has never been desicated or killed like the Teak. It attains a girth of ten or twelve feet and rises to a lofty height: It has a dark-brown wood.—*McClelland.*

(6636) PTEROSPERMUM HEJNIE, LOLOOGA WOOD.

Lolooga kurra, TEL.

(6637) PTEROSPERMUM INDICUM, KYABOOCA. This wood is obtained from the knotty excrescences or burrs of Pterospermum Indicum? it is sawn off in slabs—2 to 4 feet long and 2 to 8 inches thick. It resembles the hue of the yew is very hard and full of curls—the colour being reddish brown, varying to orange. It is very ornamental, and much esteemed in China, India and England, where it is used for making small boxes, writing desks and other fancy ornamental work. The wood is brought to Singapore by Eastern traders, and is sold by weight.—*M. E. J. R.*

(6638) PTEROSPERMUM SUBERIFLORUM.

Taddee Marum, TAM.

A native of the mountainous tracts all over India. Flowering time the beginning of the hot season. Trunk erect, growing to be a timber tree of middling size. The wood is white and too soft to be of much use.—*Rhode M.S S.*

(6639) PTYCHOTIS, a small genus of Umbelliferous Plants, of which the seeds of some of the species have formed articles of condiment and of medicine from very early times. The genus extends from the south of Europe, through the Oriental region, to all parts of India. The calyx is 5-toothed; petals obovate, bifid, or emarginate, with a long inflexed point. Fruit compressed laterally, ovate or oblong. Seed roundish or flat before and convex posteriorly. The species are annual or biennial plants. Stem-leaves usually cut into numerous capillary segments. Flowers white, disposed in compound umbels, of which the involucels are many-leaved, and the involucre either wanting or few-leaved. The European species are not remarkable for any useful properties, the *P. copticum* and *P. Ajowan* probably yielded the seeds which formed the 'Ammi' of the ancients. Botanists and inquirers into the plants, condiments, and medicines of the ancients, have usually sought too exclusively in Europe for what was frequently derived from the East. Dioscorides states that the Ethiopic Ammi is called Cumin by some, and that it is thought to be distinct from the royal kind. The seeds of one kind were sent by Forskal to Linnæus, who named the plant *Ammi copticum*. This has now been removed to the present genus *Ptychotis*. Arabian authors give Nankhwah as the synonym of Ammi, and Persian authors consider Ajwain to be a synonym of the former. It is remarkable, according to Dr. Royle, that there is also an Indian plant which is everywhere called Ajwain, and celebrated for its aromatic smell, pungent taste, and for its employment both by natives and Europeans for culinary and medicinal purposes; so much so, that Dr. Roxburgh could not conceive that "this famous Indian plant should be unknown to European botanists." Dr. Royle says, "in Persian works in use in India the Arabic Nankhwah is given as a synonym of the Indian Ajwain, as it is also of the Greek Ammi." The Indian species has been referred by De Candolle to the genus *Ptychotis*, and called by him *P. Ajwan*, stating that it was very closely allied to *P. coptica*, which we have seen was considered to be one kind of Ammi—the two kinds described by Dioscorides being *Cuminum Æthiopicum* and *C regium*. The latter name is translated by the Persians 'Kamoon Mullooke,' or Royal Cumin, and given as a synonym of the Nankhwah. The Indian and Egyptian kinds of *Ptychotis*, as ascertained by modern botanists, are therefore most probably the two kinds of Ammi of Dioscorides. These afford interesting instances of the results to be obtained by closely examining the products of nature possessed of any remarkable properties, in the countries where they are produced, and continue to be used, and whence they were probably first obtained by the ancients. *Eng. Cyc.*

(6640) PTYCHOTIS AJOWAIN, *Roxb. Fl. Ind. ii.* 91. *Syn.* Ligusticum Ajwain, (Fleming. As. Res. xi. p. 170). Sison Ammi, of *Ainslie*.

Ajoumin, Jugnance, BENG. and HIND.	Nankhah, PERS.
	Amoos, ARAB.

Cultivated in India every where. This is one of the most useful of the Umbelliferæ, and an excellent remedy in flatulant colic; much used in India. (*Roxb.*)—*O'Shaughnessy, p.* 357-58.

(6641) PTYCHOTIS COPTICA. (Coptic ammi) Egypt and Candia. Used as a stimulant aromatic.—*O'Shaughnessy, page* 357.

(6642) PTYCHOTIS INVOLUCRATA. *Ameeson* of North India, *Chanoo* and *Radhooni* of Bengal, used as a substitute for parsley. *Royle.*—*O'Shaughnessy, page* 358.

(6643) PTYCHOTIS SYLVESTRIS, Arub Ajwain, *Royle*, found in the Khadir lands of the Saharunpore district. Used as a stomachic, aromatic, and remedy in flatulence.—*O'Shaughnessy, page* 358.

(6944) PULICARIA, a genus of Plants belonging to the natural order *Asteraceæ*. It has an involucre laxly imbricated in few rows. The pappus in two rows, the outer one short, cup-like, membranous, and toothed, the inner one pilose.—*Eng. Cyc.*

(6645) PUNICA, a genus of Plants belonging to the natural order *Myrtaceæ*, sometimes distinguished, in consequence of its having two verticels of capsules developed instead of one, from *Myrtaceæ* under the name of *Granataceæ*. The genus consists of only a single species, the celebrated Pomegranate, with a dwarf variety which is sometimes considered a distinct species. The pomegranate has from the earliest period formed an object of attraction in the countries

from Syria to the north of India, where it grows in perfection, as well as in the north of Africa; and this, as well from its shining dark-green foliage, as from its conspicuous flowers, of which the flower-cup and petals are both of a crimson colour, while its large red-coloured fruit, filled with juicy pleasant-flavoured pulp, which covers its numerous seeds, makes it an object of desire in hot countries. Thus we find it mentioned in the Bible under the name Rimmon (Numbers, ch. xiii.), and we hence learn that it was cultivated in Egypt and also in Palestine; by the Arab authors it is called Rooman, and by the Persians Anar, and it is probably indigenous all along the mountains from the Caucasus to the Himalayas, where it is described by Dr. Royle as being found in a wild state. Forster describes the Pomegranate as being delicious in most parts of Persia; and Burnes states that the famous Pomegranates without seeds are grown in gardens under the snowy hills near the Cabul River. The Pomegranate was well known to the Greeks, being the Poa of Theophrastus and the Poia of Dioscorides. Hippocrates mentions it by what is supposed to be its Phœnician name, Side. By the Romans it was called *Punica*, and *Punicum Malum*, from having been introduced from Carthage. Besides the fruit, the parts employed by the ancients were the double flowers, which were called balaustion, the pericarp, from its leatherly consistence, called malicorium, was used for its astringent properties; while the bark of the root was considered an efficient anthelmintic. In the East, where so much has remained stationary, the different parts continue to be employed for the same purposes; and Dr. Royle mentions that in India buloositon is given as the Greek name of the double flower. The rind of the wild fruit is much preferred for astringent purposes, and forms in the present day an article of commerce from the Himalayas to the plains of India. The bark of the root, being also still employed in India for the expulsion of intestinal worms, was made known as a recent discovery in India, in consequence of a Mohammedan practitioner having cured a European gentleman there of tape-worm with great ease. He had no doubt learned this property of the bark of the pomegranate from the translations of Dioscorides which are incorporated in most of the Mohammedan works on Materia Medica, affording a striking instance of facts, once well known being forgotten until they are rediscovered. It is remarkable that the African slaves in the West Indies are also acquainted with this property of the root of the pomegranate, which they must have learned in their own country, probably from the prevalence there of Mohammedan works on medicine, or of the practice which is inculcated in them.—*Eng. Cyc.*

(6646) PUERARIA TUBEROSA, (Hedysarum tuberosum of Roxburgh), Shimeeya batra-jee, *Beng.* a native of the Circar mountains, the bruised root is used as a poultice to swellings of the joints.—*O'Shaughnessy, page* 316.

(6647) PULLICATES. Cotton checked handkerchiefs, of various colours.—*Faulkner.*

(6648) PULPUL, *Hind.* MYRTUS PIMENTA. Allspice. This is imported.—*Riddell.*

(6649) PULQUE. The saccharine and mucilaginous sap of the Agave americana may be made to flow by incisions in the stem: it readily ferments, and in Mexico yields on distillation an agreeable ardent spirit, called vino mercal. The incisions are made just before the flower scape is ready to burst. The dried flowering stems of A. americana also afford an almost impenetrable thatch; the fresh green leaves are cut up and given to cattle, and the centre of the flowering stem, split longitudinally, is by no means a bad substitute for a European razor strop, owing to minute particles of silica forming one of its constituents. The two products most deserving attention however are the extract which forms a lather like soap, and the fibre known in Southern India as the pita. The Mexicans also make their paper of the fibres of Agave leaves laid in layers.

(6650) PULSES. The generic name in Malay and Javanese for all leguminous plants, is kaching, by adding an epithet to which we have the name of the species. Several species are regular objects of cultivation, as Phaseolus max, lunatus and radiatus; Dolichos kachang; Lablab vulgaris; Soja hispida; Cytisus cajan, and Arachis hypogæa.—*Crawfurd, Dict. p.* 361.

The following are the Pulses Cultivated in Madras as Food for Man or Beast.

Botanical Name.	English Name.	Hindoostanee Name.	Tamil Name.
Medicago sativa,.....	Lucern, ...		
Trigonella fœnum græcum,.....	Fenugreek, ...	Maitee or meetee bajee,	Vendium.
Psoralea corylifolia,.....	Hazel-leaved psoralea,...	Bawurcheen, ...	Karpooga Arisee.
Cicer arietinum, ...	Chick pea, Bengal gram,	Chenna, ...	Cadalei.
Ervum lens, ...	Lentil, ...	Moosoor, ...	Mussoor purpoo.

Botanical Name.	English Name.	Hindoostanee Name.	Tamil Name.
Pisum sativum, ...	Common pea,...	Butan,...	Puttani.
Phaseolus vulgaris, ...	French bean, ...	Bakla, ...	French beanoo.
Phaseolus lunatus, ...	Duffen bean, ...		
Phaseolus radiatus, ...	Green gram, ...	Haree moong, ...	Putchay payroo.
Phaseolus mungo, ...	Moong or moonsh, ...	Marh, ...	Oolandoo.
Dolichos uniflorus, ...	Madras gram, ...	Kooltee, ...	Kolloo.
Dolichos sinensis, ...	Chinese dolichos, ...	Suffeed lobea, ...	
Lablab vulgaris, ...	Bullar, ...	Sainkaputtee, ...	Mutchay cottay.
Psophocarpus tetragonolobus, ...	Winged pea, ...	Pank ke mutur, ...	
Canavalia gladiata, ...	Sword bean, ...	Lal kudsumbah, ...	Segapoo Thumbotten.
Cajanus indicus, ...	Pigeon pea,..	Toor dhal, ...	Thovaray purpoo.

M. E. of 1857.—Most of these may be referred to under their several heads.

(6651) PULWUL. Trichosanthes Dioica. Dioecous Snake Gourd. This is one of the snake gourd species, of a small description, the size of an egg: the seed is sown in the cold season and yields fruit from March to September.—*Riddell.*

(6652) PUMMICE STONE.

Poosa ray, Tel.	Pietra pomice, It.
Pierre ponce, Fr.	Pumex, Lat.
Brimstein, Ger.	Piedra pomez, Sp.

A light spongy, vitreous stone, found usually in the neighbourhood of volcanoes, and supposed to be a lava or volcanic glass. It is used for polishing metals and marble, and smoothing the surface of wood and pasteboard. Pumice is quarried and exported in large quantities from Lipari and the Isles Ponxa, in the Mediterranean.—*Faulkner.* Pummice stone in small pieces and very hard is found on the Sea Coast near Nezampatam.—*Rohde, M.S.S.*

(6653) PUMPKIN, Red and White.

Kuddoo, Hind.

This vegetable grows in great abundance in all parts of the Deccan. It is much esteemed both by the Europeans and natives. It is generally sown at the commencement of the rains, and requires no particular care; the soil should be light and good. When young, about the size of a goose egg; if cut and boiled, it will be found to resemble the artichoke-bottom dressed in the same way.—*Riddell.*

(6654) PUMPKIN, White, or White gourd, or pumpkin. *Benincasa cerifera.* The Karens and Burmese cultivate a species of pumpkin or gourd, never eaten by Europeans, which they esteem a valuable addition to their curries. —*Mason.*

(6655) PUNA or POON. This wood is commonly called Peon in England. It is used for masts, yards, &c.; is the wood so much spoken of by persons from Ceylon. It certainly is of a good quality, and superior to that of Malabar; but, from its small dimensions, its scarcity, and the trouble in obtaining it, is of little consideration. The largest said to have been found was eighteen inches in diameter, and sixty feet in height; but the largest Edye could discover was not more than nine inches in diameter, and thirty-five feet high. In quality it is much the same as the first sort in Malabar, which may be obtained at Mangalore from the native merchants at all times when the coast is open (viz. from November to April), of three feet in diameter, and one hundred and ten feet long for the sum of 150*l.* sterling.—*Edye. Ceylon.*

(6656) PUNDE CYANN, the Tamil name of a Ceylon tree which grows to about twenty inches in diameter, and twelve feet in height. It is a close grained wood and resembles the English pear tree. It is used by the natives for various purposes in making farming utensils.—*Edye, Ceylon.*

(6657) PUNGUL, the Tamil name of a tree which grows to about eighteen inches in diameter, and twelve feet in height. It is of little use. Its fruit, and also its juice, are used as applications to ulcers, &c. From the seed a fixed oil is prepared which is considered valuable in rheumatic pains, bruises, &c.—*Edye. Ceylon.*

(6658) PUNICA GRANATUM. (Pomegrante.)

Darimba, Sans.	*Parts used.*
Dalim, Darim, Beng	Fructus Cortex.
Anar, Gulnar, Hind. Pers. & Duk.	Baccæ tunica exterior, D.
Buloositoon, Rooman, Yunani.	Rind of the Fruit,
Madalum pullum. Tam.	Granati Radix, E.
Rana, Arab.	Radicis Cortex, D.
Dadima pundoo, Tel.	Flores, D.
Rumom paio, Mal.	Flowers of the Pomegranate. *Icosandria Monogynia*, Linn.
Delima, Malay.	

The Pomegranate, a native of the mountainous countries from Syria to the north of India, must always have been an object of attention. It is the *rimmon* of the Bible, and the *rooman* of the Arabs. It was well nown to the Greeks

and Romans.—*Royle.* A native of Cabul, Bokharra, Mezenderan and Asia Minor generally; common now in almost all warm climates; the best fruits are those of Balabagh, lying under the snowy hills, near the Cabul river. Very large quantities are annually imported into the north of India from Cabul, and Cashmere. In the Himalayas and the *plaines* the pomegranate also occurs, but of inferior quality; the fruit is small, and is sold in the Bazar under the name of *darmee*; the rind, *nas Pal*, is used in medicine and in dyeing, on account of its great astringency.—*O'Shaughnessy.*

Stem arborescent and irregular in arid situations rather thorny; the leaves usually opposite, often fascicled, oblong inclining to lanceolate, quite entire, not dotted, smooth, shining, and of a dark green; flowers commonly solitary, of a brilliant scarlet; calyx thick and fleshy, adhering to the ovary, turbinate, 5 to 7 cleft; petals 5 to 7, crumpled; stamens numerous, often double; style filiform; stigma capitate; fruit of the size of a large apple, with a thick leathery rind, and crowned by the tubular limb of the calyx; cells several, arranged in two strata, separated from each other by an irregular transverse diaphragm, lower division of 3 cells, the upper of from 5 to 9 cells; seeds numerous, involved in pellucid pulp, with foliaceous, spirally convolute cotyledons.—Nees von E. 301.

The parts of this plant which were employed by the ancients, still are so in the East, and are officinal in the D. P. Thus the Flores, D. are the *Balaustion* of the ancients. In India, *buloosi toon* is given as the Greek name of the double flower. They are devoid of odour, but have a bitterish and astringent taste, tinge the saliva of a reddish-colour, contain Tannin, strike a black with ferruginous salts. The Rind of the fruit (*Granatum*, L.; *Bacca Tunica exterior*, D.) especially of the *wild* plant, is extensively employed as an astringent and as a dye in the East. It is of a reddish brown colour and smooth externally, but yellow on the inside; usually in irregular fragments, dry, hard, and leathery, of a very astringent taste. It contains of Tannin 18.8 per cent, with 10.8 of Extractive, and 17.1 of Mucilage, and is used for tanning in some countries. The Bark of the Root (*Radicis Cortex*) was employed as an anthelmintic by Dioscorides and by Celsus, and still is so in India. It was reintroduced into practice by Drs. Buchanan and Anderson. The root itself is heavy, knotted, and of a yellow-colour; its bark often sold in strips, sometimes with parts of the root still adhering to it. On the outside of a greyish-yellow colour; on the inside, yellow, something like that of the barberry. It has little smell; when chewed, colours the saliva yellow; has an astringent taste, without any disagreeable bitterness. It has been analyzed by Metouart and Latour de Trie, and others; but the source of its peculiar anthelmintic powers has not been discovered, and the subject requires further investigation. It contains Tannin (about 20 per cent.), Gallic acid, Resins, Wax, Fatty matters, and Mannite. "An infusion yields a deep-blue precipitate with the salts of Iron, a yellowish-white one with solution of Isinglass, and a greyish-yellow one with Corrosive Sublimate, and Potash or Ammonia colours it yellow." (*c.*) It is apt to be adulterated with the barks both of box and of barberry. The former is white and bitter, but not astringent; the latter yellow, very bitter, and not thus affected by the above four reagents. All parts are astringent, the rind of the wild fruit especially so, and useful in Diarrhœa and advanced stages of Dysentery; the Flowers in infusion slightly astringent; the Bark of the Root astringent, but remarkably useful as an Anthelmintic against tænia. It may be given in doses of one scruple in powder; or a decoction may be formed by steeping for 12 hours *fresh Root-bark of Pomegranate.*—*Royle.* The *pericarp* is hard, smooth, a line in thickness, olive brown externally, yellowish within, inodorous, externally bitter and astringent, much used in tanning and in dyeing yellow; also as a medicinal astringent. The juice of the fruit is acidulous and sweet, and makes a pleasant sherbet for fever patients.—*O'Shaughnessy, pages* 338, 339. The Seeds, Dried, *Anardan*. *Naspal* of Punica granatum; the Pomegranate, with their fleshy envelopes are sold, and used in sherbets: all are plentiful at Ajmeer, considered cooling. Naspal is the bark of the fruit, and is only used in dying. The bark of the root though strongly purgative is not used in medicine. Large quantities of fine pomegranates are annually brought from Cabul to Ajmeer.—*Gen. Med Top. p.* 125. In the Dekhan there are two varieties of this tree, bearing white and red fruit—both sweet, but much inferior to the dried brought from Persia and Bussorah to the Bombay market. The tree grows easily from seed, and large fine juicy fruit, where the soil is good, is often produced. There is a variety which is generally sour, used by the Natives for sherbet. The dried bark of the root is made into a decoction and given for worms. By a continuation of layers from successive plants the fruit becomes almost seedless.—*Riddell.*

(6659) PUPA. In Entomology this term is applied to the third stage of existence of an insect, the egg being the first stage, and the larva or caterpillar, the second.—*Eng. Cyc.*

(6660) PUPIVORA. In Entomology this term is applied by Latreille to his second great section of hymenopterous Insects—a section the species of which are distinguished by their having the abdomen attached to the thorax, in most cases, by a slender stalk, and not, as in the first section (*Securifera*), forming as it were a continuation of the thorax. The females are

furnished with a slender bristle-like ovipositor, and in this respect they also differ from the greater portion of the *Securifera*. The larvæ of the *Pupivora* have no feet, and most of them are parasitical. Latreille divides this section into two groups, the *Evaniales* and the *Ichneumonides*, distinguished chiefly by the insertion of the stalk or basal portion of the abdomen. In the *Evaniales* the stalk is attached to the thorax, and in most cases immediately under the scutellum; they have distinct nervures to the wings, and those of the upper pair form cellules; the antennæ are filiform, or setaceous, and composed either of thirteen or fourteen joints; the mandibles are toothed on the inner side; the maxillary palpi have six joints, and the labial four; the ovipositor is generally exserted, and composed of three slender pieces. Dr. Leach regarded the present group as constituting a family, and applied to it the name *Evanidæ*; compared with the next section of the *Pupivora*, the present one is very limited in species. Mr. Stephens, in his 'Systematic Catalogue of British Insects,' only enumerates five species, and these constitute three genera, *Evania*, *Brachygaster*, and *Fœnus*. In the *Ichneumonides* the abdomen has its origin between the two posterior legs; the nervures of the upper wings form cellules; the antennæ are generally filiform or setaceous, and composed of many joints (sixteen at least); the mandibles are in most cases destitute of denticulations on the inner side, and are bifid at the apex; the maxillary palpi are always distinct, and seldom have more than six joints. Of this group the species are exceedingly numerous. Mr. Stephens states that he possesses 800 British species of this family. The *Pupivora* appear to be destined to prevent other tribes of insects (particularly the *Lepidoptera*) from becoming numerous. The *Ichneumonidæ* may be seen during the summer months in great numbers flying from plant to plant in search of the caterpillars which are suited to furnish the proper food and to rear their larvæ, each caterpillar apparently having its own peculiar parasite, or parasites, for sometimes several species of Ichneumon attack the same larvæ. The female Ichneumon, by means of her long bristle-like ovipositor, inserts her eggs in the body of the caterpillar in such a manner, and in such parts, that it does not destroy the life of the victim. In most cases these eggs are not hatched until the caterpillar has changed into a chrysalis; they then hatch, and the Ichneumon larvæ feed upon the contents of the pupa case, inclose themselves in silken cocoons, and undergo their final transformations, to come forth in proper season, eating their way through the chrysalis case. Instances are not uncommon in which the eggs of the Ichneumon hatch in the body of the living caterpillar, and, what is most remarkable, they do not destroy its life. It is not until the larvæ have quitted their abode in the caterpillar that it dies, having the cocoons of the Ichneumon larvæ attached to its skin. The caterpillar so abundant on cabbages, and which is that of the common white butterfly, affords a familiar example of this nature. At certain times of the year numbers of those caterpillars may be seen on walls adjoining gardens: on these they usually attach themselves (in some sheltered situation) to undergo the transformation into the pupa state. One of these caterpillars will appear healthy, select a convenient situation, attach itself (as usual before the change into the pupa state) by means of a silken thread around its body, but instead of undergoing the transformation, we shall find it after a short time covered with an immense number of small yellowish silken cocoons spun by the larvæ of the Ichneumons as they crawl from its body.—*Eng. Cyc.*

(6661) PUPLI CHUCKAY. The bark of the Pupli root yields an orange dye, and is treated with alum, Myrobolans, &c. This dye was exhibited from Bellary, Mysore and Salem, at the Madras Exhibition of 1855. It was noticed by Buchanan (Mysore 1. p. 168.) and was named by him somewhat doubtfully as Ventilago? a Rhamnaceous genus. Flowering or fruit bearing specimens of this scandent shrub have not been procured to settle the point in question.—*M. E. J. R.*

(6662) PUPUNHA TREE, Guilielma speciosa, Mart., is the Piritu or Pirijao of Venezuela, the Pupumha of the Amazon district, and the Paripou of Guiana. It is a palm, of an intensely hard wood, sharp needle like spines are thickly disposed in rings or bands, round its slender cylindrical trunk. The Indians subsist for months on its farinaceous fruit.—*Seeman.*

(6663) PUREE, a beautiful yellow Chinese pigment, in the composition of which the urine of the Elephant is said to be a chief ingredient. It is brought to China in round lumps of various sizes in colour like orpiment, with a strong urinous smell, and little or no taste.—*Morrison.*

(6664) PURSLANE. Portulaca Sativa and Oleracea.

Choolee, Hind.

Round stem, fleshy leaves, and slightly acid. It is used as an ingredient in salads. It is reared by seeds sown at the commencement of the rains, and will thrive in any soil.—*Riddell.* Leaves of a succulent nature harmless, tastless, and inodorous, many varieties are cultivated on the plains for their pretty flowers, raised from seed. —*Jaffrey.* Purslane is as common a weed in the Tenasserim Provinces as it is in America, and is used by the natives for a pot-herb.—*Mason.*

(6665) PUTCHAPAT. This is a well known article in Bengal. Its source was long doubtful. We extract the following notice regarding

it by Dr. Wallich, from the Transactions of the Medical and Physical Society of Calcutta for 1835. Dr. Wallich has also kindly favoured us with an additional note on the subject. "I shall now advert to another vegetable substance which, although most extensively used by the natives of this country, has hitherto continued one of the problems in our Indian Materia Medica. The drug to which I allude, is called in Bengallee as well as in Hindee, *Pucha Pat*, and is found in every bazar, almost throughout Hindustan. My esteemed friend Baboo Radhakant Deb informs me, that "there exists no Sanscrita name for this leaf, which is largely imported by Mogul merchants; that it is used as an ingredient in tobacco for smoking, and for scenting the hair of women, and that the essential oil is in common use for imparting the peculiar fragrance of the leaf to clothes among the superior classes of natives." I believe that the people of the peninsula are peculiarly fond of this perfume, as are also the Roman Catholic inhabitants of this country generally. *O'Shaughnessy, page* 493.

(6666) PUTCHUCK; PUTCHUK: AUCKLANDIA: COSTUS ARABICUS. ARABIAN COSTUS, OOPLATE, KOOT.

Kust, ARAB.	Sepuddy, MAL.
Koot, Ooplate, GUZ. HIND.	Kostum, Putchuck, TAM
Kushtam, SANS.	Changala, Kostom, TEL. *Faulkner.*
Putchuck, HIND	Koost i-Hindee and Koost i. ARABEE. PERS.
Goin mahanel, CYNG.	Pucha, MALAY.
Kooth, HIND.	
Koostus, GREEK.	
Kooshta, SYRIAC.	

Is the name by which a fragrant root is designated in the price-currents of Calcutta and Bombay, whence it is exported to Canton, being highly esteemed by the Chinese as an incense. From the places of export this would appear to be a product of India, but neither the plant which yields it nor the place where it grows were discovered until very recently. The discovery is interesting, as the Putchuk is a substance which was known to the ancients. Dr. Royle, while in the north-western provinces of India, obtained a root which formed a considerable article of commerce, and which was said to be brought from still farther north, that is, from Lahore. It was warm and aromatic in taste, fragrant in odour, and frequently called Orris-Root (Iris-Root) by Europeans in India, though by the natives in Northern India it is called Kooth. On comparing specimens of Kooth which he obtained in Northern India with what was called Putchuk in Calcutta, he found that they were identical, and he was subsequently informed by Mr. Beckett, who was long settled as a merchant in Northern India, that what the latter purchased from Umritseer under the name of Kooth he sold in Calcutta by that of Putchuk, so that there can be no doubt of the identity of the two substances; but all that had been ascertained with respect to the place where it was produced was, that it seemed to be to the north of the Sutlej. Kooth, being used in India as a medicine, as well as exported to China, is described in the Persian works on Materia Medica in use in that country, and has assigned to it Kust as the Arabic, Kooshta as the Syriac, and Koostus as the Greek name. Three kinds are described. Dr. Royle states that he was only able to meet with two kinds in India, one called Koost-Hindee, and the other Koost-Arabee. These evidently refer to two of the three kinds of Costus described by Dioscorides as the Arabian, Indian, and Syriac. ('Illust. Himal. Bot.,' p. 360.) There can be little doubt therefore that the Kooth or Putchuk is one of the kinds of Costus of the ancients, which was highly esteemed by them, and formed an ingredient in their most famous compound alexipharmic confections, such as the Theriaca and the Mithridatium. It was also highly esteemed by them as an incense, as, in the line of Propertius—"Ure puer costum Assyrium redolentibus aris"; and is mentioned by Horace as 'Achaemenium costum.' ('Od.,' iii. 1.) The identity of Kooth and Costus was however long ago ascertained, though not generally known, as is evident in the following passage from Garcias ab Horto, in Clusius ('Exot.,' lib. x.) "Est ergo Costus dictus Arabibus Cost aut Cast: in Malacca, ubi ejus plurimus est usus, Pucho, et inde vehitur in Sinarum regionem." In MacCulloch's 'Commercial Dictionary,' Putchook is described as "the root of a plant growing in Sinde. When burned it yields a fine smell. The Chinese beat it into a fine powder, which they burn as incense in the temples of their gods." Of the Putchuk, 6697½ bazar maunds, of the value of 99,903 rupees, were exported from Calcutta in the year 1837-38. On Dr. Falconer's proceeding on his journey to Cashmere, Dr. Royle requested him to make inquiries respecting this substance, and he discovered that it was exported from the valley in large quantities to the Punjab, whence it finds its way to Bombay and Calcutta; and that it is sold in China at an advance of about 300 per cent. on the price at which it is gathered in Cashmere. Dr. Falconer subsequently found it growing in great abundance all round the elevated summits of Cashmere. From the plants with which it is associated, and the circumstance under which the Koot grows, being one of the *Compositæ*, or Thistle tribe with feathered seed, of which when once established the dissemination becomes easy, Dr. Falconer has no hesitation in thinking that it could be produced to an unlimited extent, of the best quality, in the Himalayas at elevations of from 7500 to 9000 feet above the sea, and that the Choor Mountain alone

might be brought in a few years to produce thousands of maunds of it. Preparatory to diffusing the Koot, or Costus, he has introduced it into the Himalayan nursery attached to the Saharunpore Botanic Garden. Finding that it belongs to a new genus, he has named it *Aucklandia*, in honour of George, earl Auckland, governor-general of India, "as a distinction well merited by his lordship's services in the cause of Indian Botany."—(*Royle, on the Productive Resources of India.*) Costus Arabicus: is supposed to be the root of the Aucklandia costus, a genus of the thistle tribe. It is grown in the mountains of Cashmere, where it is called Koot, is a gregarious herb, six or seven feet high. Its roots are dug up in September or October, chopped up into pieces from two to six inches long and exported without further preparation. The greater portion being sent via the Punjab to Bombay, whence it finds its way to the Red Sea, Persian Gulf and China. Another portion being sent across the Sutlej and Jumna to Hindustan. In Cashmere the cost of its collection and transport to a mercantile depot, is about 2s. 4d per cwt., but at Jugadree on the Jumna, it has increased to about 16s. 9d. or 23s. 4d per cwt. and in the Chinese ports it fetches nearly double that price the cwt. The Chinese burn the roots as incense in the temples of their gods, and they also attach great efficacy to it as an aphrodisiac. The imports into Canton in 1850 were 854 piculs, valued at 5,150 dollars. In Cashmere it is chiefly used for the protection of bales of shawls against insects. The exports for Calcutta average about £1,500 annually.—*Simmonds*

(6667) PUTRANJIVA, an Indian genus of Plants, referred by Dr. Roxburgh to *Nageia*, but which has been separated by Dr. Wallich under the above name, which is a Sanscrit compound, consisting of the words, 'pootra,' a son, and 'jeeva,' life, in consequence of the seeds being strung by parents round the necks of children, under the supposition that they will preserve them in health. They are sold in bazars throughout India for this purpose. ***P. Roxburghii***, the only species known, forms a large timber-tree, with an erect straight trunk, and a white close-grained very hard wood. The head is large and shady, composed of numerous spreading branches, with shining dark green leaves arranged on two sides of the branchlets. The flowers are dioecious, the male ones crowded together; the perianth small, calyx-like, 4-5-leaved; corolla none; stamens three; filaments thread-like, all or only two united together, and the third free. The female flowers solitary in the axils of the leaves, with long foot-stalks; perianth 5-leaved; ovary ovate, oblong, 3-celled; cells 2-seeded; styles three, filiform; stigmas crescent-shaped and toothed; drupe 1-seeded. Young plants of this tree have been cultivated in moist stoves in Britain. The genus has been referred to the natural family of *Myricaceæ*, but is considered by Endlicher as more nearly allied to the *Antideæmeæ*.—*Eng. Cyc.*

(6668) PUTRANJIVA ROXBURGHII. Wall. Tentam. p. 61. Nageia Putranjiva, *Roxb. Fl. Ind.* iii. p. 766. Royle's Illust. 100.

Curroopallay marum, Tam.

Though generally diffused throughout India, Dr. Wight had not seen this tree, but Roxburgh describes it as a large timber tree with an erect straight trunk. The wood is white, close grained and very hard.—*Wight.* Coromandel, Patna, Monghir hills, and from Sylhet to the Kheree jungle. The Sanscrit name is compounded of *pootra*, a son; and *jeeva*, life. The Hindoostani name *jeeapootra*, is similarly derived. The nuts are strung by parents round the necks of their children, to keep them in health. *Roxb.*—*O'Shaughnessy, page* 611.

(6669) PUTTY. An ordinary name for the peroxide of tin, generally used for polishing mirrors and lenses, and for rendering glass white and opaque, converting it into enamel; and for other purposes in the arts.—*Waterston.*—*Faulkner.*

(6670) PUTTY GLAZIERS. Is prepared by kneading chalk with linseed oil.

(6671) PUTWA OF BHAGULPORE, a bast.

(6672) PYGATHRIX, M. Geoffroy's name for the Douc, or Cochin-China Monkey (*Lasiopyga*, Illiger). It has the following characters:—Head rounded; muzzle moderately prolonged; tail long; cheek pouches; hands longer than the fore arms and the legs; anterior thumbs very short and slender; no callosities; buttocks fringed with long hairs.

Dental Formula.—Incisors, $\frac{4}{4}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{5-5}{5-5} = 32$.

(6673) PYGATHRIX NEMŒUS, Geoff. (*Lasiopyga Nemæus*, Ill.; *Simia Nemæus*, Linn., Mant.). This very rare monkey is perhaps the most remarkable of the whole tribe for the variety and liveliness of the colours with which it is marked, and which are the more striking from being distributed in large masses. The upper part of the head is brown with a dark-reddish chestnut frontal band. The cheeks are clothed with very long and whitish or yellowish-white hairs. The back, the belly, the arms, and the sides are gray with a somewhat greenish cast; the tail is whitish, and so are the rump and the fore arms; the anterior fingers are blackish; the hips and thighs are blackish, and the legs of a brightish-red chestnut; the more exposed parts of the face are of a reddish tint. Length rather more than 2 feet when erect; length of tail about 1 foot 7 inches. It is a native of Cochin China.—*Eng. Cyc.*

(6674) PYGIUM ACUMINATA, Scarce, but found on the banks of streams in the Tounghoo district, attaining a girth of five or six feet, red wood, adapted to cabinet making.—*McClelland.*

(6675) PYLORIDIA, *Pyloridea*, M. De Blainville's name for his ninth family of *Lamellibranchiata*, which he thus characterises:—Body compressed, more and more cylindrical, the mantle more and more closed and prolonged backwards by two long tubes which are ordinarily distinct, with an anterior and inferior aperture for the passage of a very small and ordinary conical foot; branchiæ narrow, free, and prolonged in the tube.

(6676) *Pandora Obtusa*, is an abundant British species.

(6677) *Anatina*. Animal oblong, rather thick, having the mantle closed by a rather large membranous lamina with a small rounded aperture at the antero-inferior part for the passage of a linguiform foot; two elongated tubes separated deeply at their extremity, the lower being rather greater than the upper; branchiæ narrow, free, and pointed backwards. There are 20 living species known. They inhabit India, the Philippines, New Zealand, and Western America. There are 50 fossil from the Devonian and Oolitic Rocks. *Periploma*, *Cochlodesma*, and *Cercomya* are sub-genera.

(6678) *Anatina Subrostrata*, has the shell ovate, membranaceous, anterior side attenuated and subrostrated. It is a native of the seas of Australia. Lamarck adds, the Indian Ocean. The *Anatinæ* have hitherto been found for the most part in sands and shallow water.

Lutricola.—Body oval, very much compressed or subcylindrical, the mantle only closed in the half of its lower border; foot small, projecting but little beyond the abdominal mass; tubes long, distinct or united. There are 18 species of *Lutraria* found in the United States, Brazil, the Mediterranean, Senegal, Cape of Good Hope, India, New Zealand, Sitka, and the British Islands. There are 40 species of *Psammobia*. They are found in Norway, the British Islands, New Zealand, and the Pacific. *P. gari* is eaten in the Pacific.

(6679) *Soletellina.*—Shell oval oblong, compressed, with sharp edges, both curved; equivalve, subequilateral, much more wide and rounded at the cephalic extremity than at the other, which is more or less attenuated and sub-carinated.

(6680) *S. radiata* (*Solen rostratus*, Lam.). Shell transversely oblong, violaceous, with many obscure rays; anterior side attenuated and rostrated. It is found in Oriental seas.—*Eng. Cyc.*

(6681) PYRETHRUM (from πῦρ, fire, because of the hot taste of the root), a genus of Composite Plants belonging to the tribe *Asteraceæ*. It has a hemispherical involucre, the receptacle flat or convex. The fruit angular and not winged. The pappus an elevated membranous border.—*Eng. Cyc.*

(6682) PYRETHRUM, ANACYCLUS (*Anthemis*, *Linn.*) Pyrethrum, *Dec.* Pellitory of Spain.

Akerkurra, HIND. | Akerakarm, TEL. TAN

This root was known to Dioscorides (πυρεθρον), and is still employed in Eastern medicine by the name *akarkarha*. The plant is a native of the north of Africa, whence it has been introduced into the south of Europe. Hayne believes that the root is yielded by a nearly allied species, which he calls *A. officinarum*, ix. t. 46, and which he found cultivated in Thuringia.

Anacyclus Pyrethrum has a long fusiform root. Stems numerous, procumbent, branched, pubescent. Radical leaves spreading, petiolated, rather smooth, pinnatifid; the segments pinnated, with linear tubulate lobes; stem leaves sessile. Branches one-headed. Heads many-flowered. Involucre in few rows short, somewhat cup-shaped, scales lanceolate, pointed, brown at the edges. Receptacle convex, with oblong, obovate, obtuse paleæ. Florets of the ray female, sterile, white above and purplish beneath; of the disk, yellow, tubular, with 5 callous teeth. All the corols with an obcompressed, 2-winged tube without appendages. Style of the disk with exappendiculate branches. Achænium flat, obcompressed bordered with broad entire wings. Pappus short, irregular, tooth letted, somewhat continuous with the wings on the inner side. *Dec.*—Desf. Fl. A tl. ii. 287. Nees and Eberm. 244. St. and Ch. iii 97.

The root, as described by Desfontaines, in its fresh state is fusiform and fleshy, about the thickness of the finger, brownish-coloured externally and white within. When handled in this state, it produces first a sensation of cold, soon followed by heat. It is without odour, but has an acrid pungent taste, and causes a copious flow of saliva. It is said to be imported from the Levant. The French obtain it from Africa. It is cultivated in Thuringia and at Magdebourg. The active principle is soluble both in Alcohol and Ether, and appears to be a Volatile Oil, which adheres with tenacity to its Resin (*Pyrethrin*) and Fixed Oil. It also contains Inulin, Gum, a little Tannin, Colouring matter, various Salts, and Ligneous fibre. *Uses.* Irritant, Sialogogue. Sometimes used to relieve Toothache, or as a Masticatory in palsy of the Tongue and relaxation of the Uvula.—*Royle.*

(6683) PYRETHRUM INDICUM. FEVERFEW. Feverfew a gaudy flowered annual, usually denominated a Chrysanthemum, but which the botanists have removed to another genus, is often seen in gardens in Maulmain.—*Mason.*

(6684) PYRITES, FERRI SULPHURETUM. Sulphuret of Iron. Iron Pyrites.

Sulfure de Fer, FR. | Schwefeleisen, GER.

Iron combines with Sulphur in several proportions. It is common in the form of the

Bisulphuret, of a yellowish colour; hence has been thought to contain Copper. It was no doubt known to the ancients. *Prop.* The natural Bisulphuret ($Fe\ S_2 = 60$) or Iron Pyrites, called also Mundic, is of a colour like Brass, in hard cubical crystals, which are not acted upon by any of the acids, except the Nitric. Sp. Gr. 4·98. Often heated for the separation of the Sulphur by sublimation. If moistened and exposed to the air, Oxygen is absorbed, and the Sulphuret converted into Protosulphate of Iron. —*Royle.* Very abundant in the schistose rocks of Cuddapah, where it is manufactured into Sulphur.—*Ed.* Iron pyrites are very abundant in the Tenasserim Provinces. In some places they contain arsenic, and constitute arsenical sulphuret of Iron. The Burmese names though usually applied to iron, are generic, and might be applied to any pyrites.—*Mason.*

(6685) PYROLA. Herb of Chimaphila umbellata.—*Ben. Phar.*

(6686) PYROLIGNEOUS ACID, Acidum Pyroligneum, E. "Diluted Acetic Acid, obtained by the destructive distillation of Wood." Pyroligneous Acid is considered to be a discovery of Glauber; but it is probable, as stated by Berzelius, that it was known to the Egyptians, as may be inferred from a passage of Pliny, in which Pine wood, heated in a furnace, gives out "sudore, aquæ modo, fluit canali; hoc in Syria *cedrum* vocatur, ac tanta est vis, ut in Ægypto, corpora hominum defunctorum, eo perfusa, serventur." In the present day the distillation is usually conducted in iron cylinders, with condensers attached. The woody matter being decomposed by heat, its elements unite to form fresh compounds, and by distillation an acid liquor passes over with water, tarry matter, Empyreumatic Oil, and much inflammable gas, while a large proportion of excellent Charcoal is left in the retort. The Pyroligneous Acid is a brown, transparent liquid, consists essentially of Acetic Acid, diluted with water, holding in solution tar, with some Empyreumatic Oil, and has a smoky smell. It is distilled, and further purified, by the addition of Carbonate, of Soda. This is retained as Acetate of Soda (*v.* p. 100), or used for making a purer Acetic or Pyroligneous Acid. When the acetate of the above Alkali is formed, it is purified by crystallization and re-solution, afterwards decomposed with Sul. Acid the Acetic set free is again distilled, and the processes repeated until a nearly colourless acid, with the odour of the Acetic, is produced, but which is often Empyreumatic. Nearly or entirely colourless; Sp. Gr. at least 1.034; M. C. neutralize at least grs. liij. of Carb. of Soda; unaffected by Sulphuretted Hydrogen or sol. of Nitrate of Baryta.—*Royle.*

(6687) PYROLIGNEOUS ACID, is made from Cocoanut Shell in India.

(6688) PYROPE. Pali. A variety of the garnet, either identical or nearly resembling the pyrope garnet, is brought from Burmah. It is characterized by giving to transmitted light a yellow tinge, or as the natives say, the colour of the ox's gall; and hence the Burmese name, which in Pali signifies ox-gall.—*Mason.*

(6689) PYRUS, the Latin word for Pear-Tree, is the name of a genus of plants belonging to the natural order *Rosaceæ*. This genus is characterised by having a superior calyx with a 5-lobed limb; roundish petals; five styles; the fruit a closed 5-celled pome with a cartilaginous putamen called the core; two seeds in each cell; the testa cartilaginous. The species are trees or shrubs with simple or pinnate leaves, and the flowers placed on terminal many-flowered cymes. The species of this genus have obtained various names, as apples and pears, Crabs, Beam-Trees, and mountain-Ashes.

(6690) PYRUS AUCUPARIA, the Rowan-Tree, or Roan-Tree, known also under the names of the Fowler's Service-Tree and Mountain-Ash. Its Latin name, *P. aucuparia*, and its various modern designations, have been given to it on account of the general use made of its fruit for the purpose of decoying birds into traps. It is much cultivated, both on account of its valuable wood and rapid growth. It is known from the other species of *Pyrus* by its slightly glabrous serrated leaflets and its globose fruit. It is found in most parts of Europe, in the north-west of Asia, in Nova Scotia, and other regions of the northern parts of North America, and in the island of Japan. It does not however attain equal magnitude in all climates. In its most northern localities and alpine situations it is a low shrubby bush; whilst in southern districts it forms a handsome tree, growing to the height of 20 or 30 feet. The finest trees in Britain are found in the Western Highlands and on the west coast of Scotland. This tree has enjoyed from remote times a distinguished reputation. A belief in its power against witchcraft and evil spirits of all kinds seems to have been prevalent at a very early date; and, according to Lightfoot, in his 'Flora Scotica,' it was till a late period held in high reputation in Scotland as a charm against evil influence. It is through a hoop of this wood that sheep are made to pass night and morning as a preservative against evil spirits. The Rowan-Tree is a graceful tree, with an erect stem and orbicular head. It grows very rapidly for the first three or four years of its existence, and on this account it is well adapted for planting with young oaks, which it protects till they grow above it, when it is destroyed by their shade. It also forms excellent coppice-wood, the shoots being adapted for poles and for making hoops. The bark is used by tanners. The leaves, when dried, have been sometimes used in the north of Europe as a substitute for

wheat in times of scarcity. It is prized next to yew for making the bow. In Wales it is as religiously planted in churchyards as the yew is in England.—*Eng. Cyc.*

(6691) PYRUS COMMUNIS.

Amrud, Hind.

The Pear, has ovate serrated leaves, glabrous on both surfaces, with umbellate peduncles. It is a native of Europe in woods and hedges. In its wild state it is thorny, but always unarmed when cultivated. It is the pear Tree of English orchards. It is easily distinguished from the apple-Tree by the shape of its fruit.—*Eng. Cyc.* The Pear tree is not common in the Deccan gardens though some trees are to be found having been brought chiefly from Bangalore; the fruit is of a tolerable large size but coarse and hard, which only renders it fit for baking and stews. The same kind of fruit is found in the upper provinces of Bengal.—*Riddell.*

(6692) PYRUS CYDONIA. Pomaceæ.

Behee, Hind.

The quince. This tree has probably been introduced from China or Bengal, and is now to be met with in many gardens. It grows like the apple. The fruit is plentiful at Sattara, and Dr. Riddell met with it at Poonah. In other parts of the Deccan he has seen the tree in blossom, but the fruit did not set,—perhaps for want of proper treatment.—*Riddell.*

(6693) PYRUS MALUS. Pomaceæ.

Seb or Seo, Duck.

Pyrus Malus, the Apple, has acute serrate ovate-acute leaves; flowers in a sessile umbel; the fruit globose, and the styles combined below. This is the Crab-Tree of English hedges when wild, or the Apple-Tree of their orchards. Other species of *Pyrus* besides the above yield edible fruits. On Mount Sinai grows a species called *P. Sinaeia*, whose fruits is hard, gritty, and austere, and whose leaves are gray with down; in Germany a similar kind, the *P. nivalis*, is by no means uncommon, with a considerable resemblance to the last; Siberia and Persia produce another, called *P. salicifolia*, with very narrow hoary leaves; and in the former country are found the Siberian Crab, *P. prunifolia*, and the Berry-fruited Crab, *P. baccata*, whose fruit is too small for ordinary consumption, but is often seen in the form of a sweetment. Besides these, the Chinese Crab, *P. spectabilis*, and also *P. coronaria*, are cultivated for their flowers.—*Eng Cyc.*

The two sorts of apples commonly found in most Native gardens in the Deccan, are said to have been first introduced from Persia. They are of a small description; one sweet and luscious, grows in bunches; the other, which is larger, has a rough taste, and is better adapted for tarts. They may be propagated by layers, suckers, and even cuttings. The young plant should never be allowed to throw out branches at less than two or three feet from the ground; all the buds beneath must be rubbed off. Never plant them closer than from nine to twelve feet to each other, and if there is sufficient ground, keep them separate from other trees, so that they can either be wintered or watered as required. Remove all suckers round the stem of the tree, or from the roots, [unless required for stocks,] then cut them clean off with a sharp knife. The trees may be opened immediately after the rains, if not in blossom. Pluck off all the leaves carefully, and beware, in so doing, that the blossom buds are not injured, which native gardeners in the careless manner of stripping the leaves, are very apt to do;—then prune the tree. As soon as the blossom appears set, put plenty of old rich manure to them, and water well every third day until the fruit is nearly ripe. If you continue watering after this, it makes the fruit mealy and insipid. When the fruit is all gathered, cease to water the trees, and as soon as the leaves turn brown and dry, which will be in the course of a month, then open the roots for two or three days, cover with manure again, and water well as before, when you may probably get a second crop in April or May.—*Riddell.*

(6694) PYRUS: Pear Tree. Wallich found a species of pear tree growing on limestone mountains, near the Irrawaddy; and it may exist in the Tenasserim Provinces, though Mr. Mason has never met with it.—*Mason.*

Q.

(6695) QUADRUMANA, Cuvier's name for his second order of Mammiferous Animals, an order which must be always viewed by the zoolgis with great interest, inasmuch as it contains those forms among which will be found the nearest approach—though the distance is still great—to Man.

The order *Primates* of Linnæus consisted of the genera *Homo*, *Simia*, *Lemur*, and *Vespertilio*.

(6696) QUAIL, Mr. Gould recognises the common Quail of India as distinct from the European Quail.—*Eligh.*

(6697) QUAKING GRASS. Briza.

(6698) QUAMOCLIT, a genus of climbing Plants of the natural family of *Convolvulaceæ*, chiefly found in the hot parts of America, but species are indigenous both in India and China. The genus is characterised by having a 5-leaved calyx. Corolla somewhat salver-shaped, plicate, and 5-lobed. Stamens, 5, inserted into the base of the corolla. Ovary 4-celled. Cells with single ovules. Style simple. Stigma capitate and bilobed. Capsule 4-celled, 4-valved. Seeds 4, erect. Climbing plants with the leaves alternate, cordate, entire, lobed, or pinnatifid; pedunicles axillary; one or many flowers of a red colour. *Q. vulgaris* is common in every part of India, and, being a beautiful plant, has been cultivated in England as a tender annual. The name of the genus has been taken from that of this species, which was *Ipomœa Quamoclit*, the latter name signifying Dwarf-Bean, because, though smaller, it resembles the kidney-bean in its habit.—*Eng. Cyc.*

(6699) QUAMOCLIT ALBA. PURE WHITE.—Common, easily grown from seed.—*Jaffrey.*

(6700) QUAMOCLIT PENNATUM. *Syn.* IPOMÆA QUAMOCLIT. Jasmine rouge. This beautiful little creeper which the French and Burmese call red jasmine, the English China creeper, and the botanists quamoclit or dwarf bean, is quite naturalized throughout the Tenasserim Provinces, the French name is both more descriptive and euphonious than either of the others.—*Mason.*

(6701) QUAMOCLIT PHŒNICEA. This is a very handsome climber with flowers crimson, tube long and slender; grows readily from seed.—*Jaffrey.*

(6702) QUAMOCLIT VULGARIS. INDIAN FORGET-ME-NOT.—Sometimes called the star creeper, from the shape of the flower which is of a deep rosy red.—*Jaffrey.*

(6703) QUARTZ, the Mineralogical name of numerous varieties of Rock Crystal, the Native Oxide of Silicon [SILICON], called also Siliceous or Flint Earth, and Silicic Acid. It is remarked by Mr. Brooke ('Mineralogy') that the "differences of structure, hardness, specific gravity, mixture with foreign matter, and other characters belonging to this species, are so numerous as to render any single description inapplicable to all its varieties." Some of the varieties of quartz have been already described; these we shall presently refer to. Quartz occurs crystallised and massive, and in both states it is widely diffused throughout nature, and is especially one of the constituents of granitic and the older rocks. In India, the finest specimens of crystallised quartz occur in Madura and at Vellum &c.; they are found in Cornwall and near Bristol of great brilliancy, and are known by the name of Cornish and Bristol diamonds. To enumerate the different places in which this substance occurs would be most endless. Quartz is composed of one equivalent of silicon = 14, and one equivalent of oxygen = 8; its equivalent is therefore 22.

Hornstone and *Chert* are varieties of compact quartz. Cavernous quartz is termed Spongiform Quartz or Swimming Stone, and other scarlet varieties have also been described.

Quartz possessing different colours has received various names; some of these we shall briefly notice.

Brown or Smoky Quartz occurs in fine crystals near Cairngorm in Aberdeenshire. It is used for seals and ornaments when cut and polished. The nature of the colouring-matter is not known, but is probably carbonaceous matter.

Purple Quartz or *Amethyst*, is found both crystallised and massive. It is of every shade of purplish-violet, and the colour in the perfect amethyst is pretty equal throughout the crystal or mass; frequently however the summits of the crystals only are coloured. It is used for ornaments. According to Rose, amethyst consists of—

Silica	97·50
Alumina	0·25
Oxide of Iron	0·75
	98·5

Amethysts of the first quality are found in India, Ceylon, Persia, and Siberia. Amethystine Quartz of inferior quality is met with in most countries. In Cornwall it occurs in some tin-mines.

Blue Quartz (*Siderite*) occurs crystallised and massive. It is compact, of a grayish or greenish-blue colour. Lustre resinous, waxy. Translucent on the edges. It is found near Salzburg.

Green Quartz is found in Peru, in translucent hexagonal prisms. Opaque massive green quartz is called Prase; the colour appears to be owing to actinolite. It is found in Saxony. *Chrysoprase* is light green amorphous quartz; it is coloured by oxide of nickel. It is found in Silesia and North America

Yellow Quartz is transparent; of various shades of colour. It is found in Cornwall, Scotland, Bohemia, &c. It is probably coloured by oxide of iron It has been called Scottish and Bohemian Topaz.

Yellow Quartz is opaque. Ferruginous Quartz occurs of various shades of yellow and reddish-yellow. According to Bucholz, it contains 5 per cent of oxide of iron, to which its colour is owing. It is found near Bristol, in Scotland, &c.

Red Quartz (*Compostella*), Hyacinthine Quartz. Colour yellowish or reddish-brown. It is found in Spain and North America.

Amorphous Quartz. The following are varieties of quartz: AGATE, AVANTURINE, FLINT, FLINTY SLATE, OPAL, and BLOODSTONE.

In addition to these, which may be considered among the purer varieties of quartz, it occurs

mixed with variously-coloured clays and other extraneous matter, forming different kinds of Jasper. *Jasper* occurs opaque, which constitutes one of the most prominent differences between it and agate. Its colours are green, yellow, and red, of various shades, rarely blue: these colours are occasionally mixed in spots and irregular veins. Jasper is massive, has often a resinous lustre, but is sometimes dull. It is found on many parts of the continent, in Cornwall, and in Scotland. Striped or Riband Jasper presents green, yellow, and red colours of various shades, sometimes in spots; but the most beautiful variety is composed of equal and parallel stripes of these colours. It occurs in Siberia, the Hasz, and Saxony. Egyptian Jasper, or Egyptian Pebble, occurs in rough roundish masses, and is generally of a brown colour. Internally it is usually of a light colour. It is found on the surface to the eastward of Grand Cairo, and on the borders of the Red Sea. It is well known that siliceous earth assumes other forms besides that of quartz and the varieties of it which have now been described: one of the most useful of these is Common Sand.—*Eng. Cyc.* According to Tomlinson, quartz is the mineralogical name of a substance widely diffused throughout nature, as in the numerous varieties of rock crystal or native oxide of silicium, siliceous or flint earth, and silicic acid. Quartz is one of the constituents of granite and of the older rocks. It also occurs crystalized and massive. The primary form of the crystal is a rhomboid, but it is generally found in hexagonal prisms terminated by hexagonal pyramids, and when the prism is wanting and both pyramids are present, the crystal is a dodecahedron with triangular planes The cleavage is not usually traceable by ordinary means, but may often be detected by heating the crystal and plunging it in water. The cleavage is parallel to the planes and pyramids of the ordinary crystal. The fracture is conchoidal, hardness 7.0; it scratches glass readily, and gives fire when struck with steel. It becomes positively electrical when rubbed, and two pieces when rubbed together in the dark become luminous. It is transparent, translucent or opaque; the lustre is vitreous or resinous: the specific gravity 2.69 to 2.81. It is infusible, insoluble in most acids; but it combines with the fixed alkalies and produces silicates.

Pure quartz is colourless, but quartz usually exhibits a great variety of colours. Purple quartz or *amethyst* occurs both crystallized and massive: it is of every shade of purplish violet: it contains alumina and oxide of manganese. Magnificent crystals of this occur in the Hyderabad territory and in Central India. *Blue* quartz or *siderite* also occurs crystallized and massive. The *Cairngorm* or *smoky quartz* contains a small quantity of bitumen. *Green* quartz is found in Peru in translucent hexagonal prisms. Opaque massive green quartz is called *prase*: it is found in Saxony. *Chrysoprase* is an amorphous quartz of a light green colour, oxide of nickel being the colouring matter. *Yellow* quartz, called *Scotch*, and *Bohemian topaz* is of various shades of yellow. *Opaque yellow* or ferruginous quartz contains about 5 per cent. of oxide of iron: it occurs in various shades of yellow and reddish yellow. *Red* quartz, or *Compostella hyacinthine* quartz, is of a yellowish or reddish-brown.—*Tomlinson.*

(6704) QUASSIA.

Bois de quassie, Fr. | Leno de Quasia, Sr.
Quassienholz, Ger. |

An intensely bitter wood, obtained from the *Q. Excelsa* of Jamaica, which furnishes the greater part of the chips sold as quassia by European druggists. The *Q. Amara* is a native of Surian, Guiana, Colombia, Panama, and has been recently introduced into Bengal. Quassia wood is a very pure and simple bitter, and has been much employed in bilious and intermittent fevers, gout, &c. It is also supposed to be used by some brewers as a substitute for hops, although forbidden by law.—*Faulkner.*

(6705) QUASSIA AMARA. Bitter quassia. The wood.

This native of Surinam, Guiana, Colombia, and Panama, was introduced into Bengal by Lord Auckland. It thrives tolerably well in the Calcutta Garden. *Med. uses.* Quassia wood is a very pure and simple bitter, and has been much employed in bilious and intermittent fevers, dropsies from debility, atonic gout, and indeed in all cases in which bitter tonics are advisable. The English brewers use it freely as a substitute for hops, although it is thought to have some degree of narcotic power, a decoction of quassia being much used as a poison for flies. Quassia is with much difficulty reduced to powder, and is consequently given in the forms of extract, tincture, infusion, and decoction. —*O'Shaughnessy, page* 267.

(6706) QUASSIA SIMARUBA. Bitter, or mountain damson. *Syn.* Simaruba amara, *Lindley. Off.* The bark.—*Ibid* 267.

(6707) QUERCITRON, the bark of the *quercus nigra*, or *tinctoria*, or yellow oak, a native of North America. It is prepared for use by taking off the epidermis and pounding the inner bark in a mill. Its colouring principle, *quercitrine*, forms pale yellow spangles; it has a faint acid reaction, is soluble in alcohol, and to a certain extent in water. A decoction of the bark, deprived of its tannine by means of glue, produces a fine yellow upon fabrics mordanted with alum, and various shades of olive with iron mordants. It is much used in calico-printing.—*Tomlinson.* Quercitron bark is an important yellow dye, obtained from the bark

of a species of oak (*Quercus tinctoria*, or *nigra*), indigenous to North America.—*Faulkner.*

(6708) QUERCUS; OAK.

Baalut, Arab.	Quercus, Lat.
Eeg, Dan.	Dab. Pol.
Eik, Dut.	Roble, Carbalho, Port.
Chene, Fr.	Dub, Rus.
Eiche, Ger.	Roble, Sp.
Quercia, It.	Ek, Sw.

A genus of well-known timber trees (*Quercus*), embracing about 150 species. *Quercus*, the Latin word for an oak-tree, which is of frequent occurr ence in the Roman writers. It is now, as then, applied to the oak and all the other species associated with it by botanists in one common genus. *Quercus* differs essentially from *Castanea*, the Chestnut, in having short obtuse stigmata, and from both it and *Fagus*, the Beech, in the cells of its ovary containing two ovules instead of four. It is also distinguished by its acorn or nut being seated in a cup, and not in a close husk; but there are intermediate conditions of this part, technically called the cupule, which render it of less value as a mark of distinction than would at first sight appear. Many of the oaks of the hotter parts of Asia have the acorn completely inclosed within the cupule. Still however the prickly husk of the beech and the chestnut, splitting into valves, may in general be distinguished from the closed-up cup of the Indian oaks. Oaks, like roses, are scarcely known in a wild state in the southern hemisphere. In the Islands of the Indian Archipelago they reach their most southern limits, especially in Java; thence they pass upwards beyond the equinoctial line, and following the eastern parts of Asia, they spread to the westward along the Himalaya Mountains, and reaching Europe, are only arrested by the Atlantic Ocean. On the other hand they find their way to the eastward of their Asiatic origin, and overrun America from Canada and Oregon through California and Mexico, till their progress to the south is stopped by the Isthmus of Darien. While however the genus is thus extensively distributed, the species are confined within comparatively narrow territorial limits. Many of the Javanese kinds appear to be peculiar to the Indian Archipelago, or only occur near the south-eastern angle of Asia. Those of the Himalayas are perfectly distinct from the oaks of the Trans-Himalayan regions, and have not even been found on the mountains of Persia. Several of the Oriental kinds are known nowhere else, and the American species are quite peculiar to that country. The species are very numerous, and we propose to give some of the more remarkable according to their geographical distribution.—*Eng. Cyc.* All travellers in the Himalayas testify to the abundance of oaks. The people employed by Dr. Wallich gathered a considerable number of species, and Dr. Royle assures us that they are found from moderate elevations up to t limits of trees. Among these, all from t lower regions are no doubt, too tender f cultivation in Great Britain; but of t alpine species some may be expected to pro hardy.—*Eng. Cyc.* Several species are ind genous in the Tenasserim provinces. Mason sa Wallich found seven different species of oa Quercus fenestrata, turbinata, velutina, Que cus Amherstianus and Tirbbœ, growing in Bu mah and on the Tenasserim Coast. Three four are natives of these Provinces, and all affor useful timber, though inferior to the Englis oak.—*Mason.* No oak nor chesnut ascend above 9000 feet in the interior of Sikkim, wher they are replaced by a species of hazel (Corylus) in the North Himalaya, on the other hand, a oak (*Quercus semecarpifolia*; see vol. i. p. 187 is amongst the most alpine trees, and the mu is a different species, more resembling th European. On the outer Sikkim ranges oak (Q. annulata?) ascend to 10,000 feet, and ther is no hazel.—*Hooker Him Jour. Vol.* II, *p.* 144 It is not generally known that oaks are often very tropical plants; not only abounding at low elevations in the mountains, but descending in abundance to the level of the sea. Though almost unknown in Ceylon, the Peninsula of India, tropical Africa, or South America, they abound in the hot valleys of the Eastern Himalaya, East Bengal, Malay Peninsula, and India islands; where perhaps more species grow than in any other part of the world. Such facts as this disturb our preconceived notions of the geographical distribution of the most familiar tribes of plants, and throw great doubt on the conclusion which fossil plants are supposed to indicate.—*Hooker Him. Jour. Vol.* II. *page* 436. Two fine species of evergreen oaks were observed by Fortune in the Himalayas named *Quercus dilatata* and *Q. semicarpifolia*. Amongst herbaceous plants he noticed some pretty primroses, *Lilium giganteum* and *Wallichianum*, and *Fritillaria polyphylla*. Here also was the once famous Prangos in full bloom.—*Fortune*, *p.* 366. He observed also two specimens of evergreen oak (*Quercus sclerophylla* and *Q. inversa*), with large and glossy leaves, not unlike the Portugal laurel at a distance. Dr. Wight gives in Icones, Quercus acuminata, 221; armata, 770; castanicarpa, 769; fenestrata, 219; ferruginea, 938; lanceaefolia, 212; [illegible] 930; semiserrata, 211; squamata, 213; turbinata, 224.

(6709) QUERCUS ANNULATA, Ring-Cupped Oak. Leaves obovate, taper-pointed, serrated in their upper half; somewhat glaucous and silky beneath. Acorns axillary, sessile, ovate, with the cup furrowed concentrically. Found in the Himalayas.—*Eng. Cyc.*

(6710) QUERCUS BALLOTA. Probably that described in Persian works as *Shah bulloot*

nd *Bulloot ul mulk.* Hamps. *Theophr.* A native f Spain and Greece. The acorns of *Q. incana* re sold in the bazars as a medicine, under the ame of *Bulloot.*—*O'Shaughnessy, page* 607. oxburgh says that a species of oak, *Quercus mestra*, is a native of the mountains in the icinity of Silhet; on the Tenasserim Coast the ame species grows indigenous not fifty feet above e level of the sea.—*Mason.*

(6711) QUERCUS CASTANEÆFOLIA, the hestnut-Leaved Oak. Leaves oblong-lanceote, rather downy on the under side, coarsely rrated, with bristle-pointed lobes. Acorns near- sessile, oblong, with the cups, when old, overed by reversed scales. A tree from the rovince of Mazanderan, reported to be very eautiful. The leaves are often from 4 to 5 ches long. Mr. Barker Webb states that it is e same as what has been called *Q. Libani*, and at it is remarkable for having large depressed uit, with wide lozenge-shaped scales turned ack at the point.—*Eng. Cyc.*

(6712) QUERCUS CHINENSIS, the Chi- se Oak. Leaves ovate-lanceolate, taper-point- l, with bristly shallow serratures, and very long footstalks; slightly downy on the under side. Acorns globose, sessile, in pairs. Cups with hoary lanceolate scales, the exterior of which are reflexed, and longer than the acorn. A beautiful Chinese species, found (by the botanists attached to the Russian mission to Peking) in mountainous places. It is said to have exactly the habit and appearance of a Spanish chestnut. A figure of it has been given from specimens communicated by Dr. Bunge, its discoverer.—*Eng. Cyc.*

(6713) QUERCUS FAGINEA, Beech-Oak. Leaves on short stalks, obvate, with numerous uniform shallow lobes; downy beneath; when young somewhat heart-shaped and unequal at the base. Fruit sessile. Cup with downy close-pressed somewhat ciliated scales. Acorn conical or somewhat cylindrical. A native of Portugal, Spain, and Tangiers, and apparently unknown in our gardens. Mr. Barker Webb however, who has studied some of the European species with great care, regards it as identical with *Q. Turneri*, or *Q. Australis*, and if so, we possess it. The same learned botanist reduces to this the Aleppo Gall-Nut Oak, *Q. infectoria*, and he is probably right.—*Eng. Cyc.*

(6714) QUERCUS INCANA, the Himalayan Ilex. Leaves coriaceous, ovate-lanceolate shining and smooth on the upper side, densely downy beneath, with coarse serratures which are not bristle-pointed. Acorns solitary, sessile, acute, but little protruded beyond the hemispherical downy cup, the scales of which are small and closely pressed. A beautiful tree, very like the evergreen oak of Europe. Its leaves are much more woolly on the under side. Dr. Wallich found it in Kumaon, where the people called it 'Munroo;' Dr. Royle states it to be the 'Ban' of the hill people, where he saw it, and that it occurs at moderate elevations. It is therefore in all probability tender.—*Eng. Cyc.*

(6715) QUERCUS INFECTORIA, Gall-nut oak. Galls.

Majoophul, Hind.

Asia Minor, Armenia, and Kurdistan, a shrub 4 to 6 feet high. This tree when punctured by a *cyneps* allows an astringent juice to exude, which becomes the *gall nuts* of commerce.—*O'Shaughnessy, page* 608.

(6716) QUERCUS INFECTORIA, Oriental Gall-Oak. Leaves ovate-oblong, very smooth on both sides, deeply toothed, somewhat sinuated deciduous. Fruit sessile. Cup tesselated. Acorn elongated, nearly cylindrical. A very common plant in Asia Minor, where its branches are attacked by an insect, the *Cynips scriptorum*, which punctures them, and causes the formation of the oak-galls so well known in commerce. It forms a scrubby bush rather than tree, and is of no value except for its galls. Its branches occasionally produce large brownish-red tubercles, spongy within, which are by some supposed to be the apples of the Dead Sea, whose appearance was tempting, but which contained only dust and ashes.—*Eng. Cyc.*

(6717) QUERCUS LANATA, woolly-Leaved Nepaul Oak. Leaves elliptic-oblong, deep green, sharply serrated, coriaceous; densely woolly beneath. Fruit in very short axillary solitary spikes. Cup scaly, without prickles. This is one of the handsomest oaks yet discovered. It is found wild in the Himalayas.—*Eng. Cyc.*

(6718) QUERCUS MANNIFERA, the Manna Oak. Leaves stalked, oblong, somewhat heart-shaped, cut; the lobes blunt, smooth above, downy beneath. Young acorns oval, stalkless, smooth. An inhabitant of the Kurd Mountains, where it was discovered by Mr. Brant, the British consul at Erzerum, who found that the Kurds obtain a sweet mucilaginous substance from its branches and leaves by steeping them in boiling water at the hottest season of the year, and afterwards evaporating the water. This substance is made into cakes, and sold in the markets of the town of Van under the name of Ghiok-Helvashee, 'the Sweetmeat of Heaven.' The species is very near *Q. sessiliflora*, especially a form of it which has been named *Q. Monghol-lica.*—*Eng. Cyc.*

(6719) QUERCUS PEDUNCULATA: its bark is used in Medecine.—*Ben. Ph.* 217.

(6720) QUERCUS REGIA, the Royal Oak. Leaves stalked, ovate-lanceolate, heart-shaped, wavy, with coarse sharp unequal serratures, on each side green, shining, and smooth. The lobes of the leaves terminated by a conspicuous bristle. From Kurdistan. It is a noble species, with leaves as large as those of a Spanish chestnut, and very like them.—*Eng. Cyc.*

(6721) QUERCUS RIGIDA, Stiff-Leaved Oak. Leaves oblong, undivided, with spinous serratures, smooth, glaucous beneath, heart-shaped at the base. Footstalks bearded at the summit. Scales of the cup rigid, spreading. A native of Caramania, of Kurdistan, and, according to Sibthorpe, of the Morea, but the last is doubtful. It is a handsome-looking plant, so far as can be judged from dried specimens, but nothing is known of its uses.—*Eng. Cyc.*

(6722) QUERCUS SEMICARPIFOLIA, Marking-Nut-Leaved Oak. Khasrou of the Nepalese, is found in East Nepal, is common as far-west as Cashmere. It is not found in Sikkim, though it appears again in Bhotan. It ascends in the Himalaya to 12,000 feet, which is the highest limit of forest: but in Sikkim no oak attains a greater elevation than 0,000 feet.—*Hooker, Him. Jour. Vol* I *p.* 187. The quercus semicarpifolia, has Leaves obovate, obtuse, coriaceous, entire; heart-shaped at the base; downy beneath; the young ones with spinous teeth. Acorns solitary or in pairs, on short downy stalks, depressed at the point, about twice as long as the shallow scaly cups. As this species occurs in the Himalayas at the upper limits of the forests, at even greater elevations than the Pines, it would, no doubt, suit the climate of England; and if so, its introduction would be very desirable, for it is stated to form a magnificent tree, whose timber is much esteemed by the natives.—*Eng. Cyc.*

(6723) QUERCUS SERRATA. AMENTACEÆ.

Shingra, Duc.

These trees are only found in the hill stations, where they have been grown from seed by private individuals. At Mahabuleshwar, a few plants have been grown, more resembling a shrub than a tree.—*Riddell.*

(6724) QUERCUS SUBER Cork-Tree. Leaves ovate-oblong, bluntish, coriaceous, entire or sharply serrated, downy beneath. Bark cracked, fungous. The Cork-Tree is spread through all the warm parts of Spain, but is most abundant in Catalonia and Valencia, whence the principal exports have been made. In the property of forming a spongy soft substance on its bark, it surpasses all other European trees, and hence is of the greatest value for corks and for similar purposes. The form of the tree is said to be much more beautiful than that of the common evergreen oak, and in the districts suited to it, attains a great height. The species bears the climate of London, but acquires little of its natural beauty in that country.—*Eng. Cyc.*

(6725) QUICK LIME.

Ahuk, ARAB.	Capoor, MAL.
Hunnoo, CYNG.	Nurch, PERS.
Chaux, FR.	Iswet, RUS.
Walk, GER.	Churna, SANS.
Chunam, Chuna, GUZ. HIND.	Cal, SP.
Calcina, Calce, IT.	Chunamboo, TAM.
Calcium, LAT.	Sunnam, TEL.

The common method of obtaining quick lime is by the process of burning, in which limestone mixed with wood, coal, or charcoal, is exposed to a strong heat; in this way the carbonic acid is expelled, and the product called *quick-lime* is the result. It is white, of a pale gray tint, opaque, inodorous, and its taste acrid and alkaline. When water is poured upon quick lime it heats, crackles, swells, and a bulky white powder is obtained, called *slaked lime*. Lime is used as a manure, and as an ingredient in mortar. In several metallurgic processes, it is used as a cheap and powerful flux; it is also extensively employed in soap making, leather dressing, dyeing, and medicine, besides many other purposes in common life and the arts. In oriental commerce, the term *Chunam* is applied to quick lime made from calcined shells.—*Faulkner.*

(6726) QUILLS.

Plumes á ecrire, FR.	Penne de serivre, IT.
Posen, Feder kiel, GER.	Stivoli. RUS.
Kulm, Guz HIND.	Canones para escribir, SP.

The hard and strong feathers of the wings of geese, ostriches, turkeys, &c. used in writing.—*Faulkner.*

(6727) QUINCE. PYRUS CYDONIA.

(6728) QUINCE SEED.

Behdana, Hub-ul-suffurgul, ARAB.	Behdana Guz. HIND.
Semen de Coig.	Melacotogna, IT.
Quincunx, FR.	Behdana, PERS.
Quittenkorner, GER.	Behdana, TAM.

Are oval, acute seeds, plain at one side, convex at the other, often triangular, truncated at one end, of iron colour externally, and internally white. They abound in mucilage, and are an article of the materia medica. This seed constitutes an important article of commerce in India, being highly valued as a demulcent tonic, and restorative remedy by the Hindoos and Mahomedans all over the East. They are imported into Bombay and Calcutta from the Persian Gulf; and into Northern India they are brought from Cabul and Cashmere.—*Faulkner.*

(6729) QUININE, a vegeto-alkali obtained from yellow bark, as *cinchonia* is from pale bark. [See BARK.] The valuable medicinal properties of the Peruvian barks are due to these vegeto-alkalis. They are associated in the bark with sulphuric and *kinic* acids. Pale bark, or *cinchona condaminea*, contains most cinchona; and yellow bark, or *C. cordifolia*, most quinia. Both are contained in *C. oblongifolia*. There are various methods of preparing cinchonia and quinia. The simplest is to add a slight excess of hydrate of lime to a strong decoction of the ground bark in acidulated water; to wash the precipitate and

boil it in alcohol. The solution filtered while hot deposits vegeto-alkali on cooling. When both bases are present they may be separated by converting them into sulphates, the salt of quinia being the less soluble of the two crystallizes first and may be separated. Cinchonia $C_{20} H_{12} NO$, crystallizes in small, brilliant, transparent, four-sided prisms. It dissolves slightly in water, but readily in boiling alcohol; it has little taste, although its salts are excessively bitter. It acts as a powerful base, completely neutralizing acids and forming crystallizable salts. Quinia or quinine $C_{20} H_{12} NO_2$, resembles cinchonia in many particulars: but it does not crystallize so readily: it is more soluble in water and its taste is intensely bitter. Sulphate of quinine, as mentioned under BARK, is largely manufactured for medicinal use: it crystallizes in small white needles, and its solubility is increased by the addition of a small quantity of sulphuric acid. The refuse or mother liquor of the quinine manufacturers contains *amorphous quinine*, also called *chinoidine* or *quinoidine*. It is a yellow, or brown resinlike mass, insoluble in water, but freely soluble in alcohol and ether, as also in dilute acids. It is said to be indentical in composition with quinine; if so, it may bear to quinine the same relation that uncrystallizable syrup does to ordinary sugar, it being produced from Quinine by the heat employed in the preparation.—*Tomlinson.*

(6730) QUISQUALIS, a genus of Plants of the natural family of *Combretaceæ*, which is indigenous in Amboyna, Java, and the Malayan peninsula, and extends into India. The genus is characterised by having a very long slender tube of the calyx, which is 5-fid at the mouth. Petals 5, oval, oblong, larger than the teeth of the calyx. Stamens 10, inserted into the faux of the calyx; the alternate ones shorter. Ovary ovate, oblong, 4-valved Style filiform, obtuse. Drupe dry, 5-angled, 1-seeded. Shrubs with climbing branches. Leaves opposite, seldom alternate, entire, ovate. Spikes axillary and terminal. Flowers change in colour from white to red. The few plants of the genus are cultivated in England with great ease in moist stove-houses in a mixture of loam and peat.—*Eng. Cyc. Quisqualis Indica* is the most common species; its fruit is reckoned a vermifuge.

(6731) QUISQUALIS INDICA.—The Chinese Honey Suckle or Rangoon Creeper. A scandent shrub, with beautiful flowers of various colours, from white to orange and deep red; has a very powerful perfume towards night. It grows from layers, or seed, but the latter are very difficult to find.—*Jaffrey.* In Tenasserim, this elegant scandent shrub is seen trailing its long arms around our bowers and verandahs, buried in thick lively foliage, and gracefully flinging out its thousands of sweet-scented flowers which change their tint from white to rose, and with the clouds at sunset, deepen into richest crimson.—*Mason.* The flowers are scarlet outside and yellowish white within, and hang in large clusters, very useful in covering walls or trellis work, the scent at night is unpleasant to some persons. It is a very common plant in the gardens of the Deccan and may be raised from seed or layers.—*Riddell.*

(6732) QUITCH. [TRITICUM; AGROSTIS.]

R.

(6733) RADISH, RAPHANUS SATIVUS. Radicula, and oblongn. Lin.

Mooliughie, TAM.	Moolaka, SANS.
Mara, GUZ.	Labak, MALAY.
Moollie, HIND. and DUK.	

Used in salads, the seed pods when young make excellent pickles, raised from seed sown thinly on beds broad cast; require rain water. The red, white, pink and purple turnip varieties succeed best on the plains, the black spanish *R. niger* is of little value, used in salads.—*Jaffrey.* This vegetable may be sown at the commencement of the rains, either in beds broadcast, or on ridges of beds where other vegetables have been planted, prefer the ridges in the rainy season, as there they grow better. You may continue to sow them until February. The turnip-radishes are of various colours—white, red, spanish black, and purple: also long white, red, and purple. The seed should be trodden in, or beaten down, and then a good watering given to them. When about three inches high, they must be carefully thinned, leaving at least a space of five fingers' breadth between each plant. They take from three to five weeks to come to perfection, and require a good share of watering. The seed pods are often used for pickles when green—*Riddell.*

(6734) RADISH SEED OIL, from Raphanus sativus, was exhibited at the Madras Exhibition of 1855.—*M.E.J.R.*

(6735) RAGGEE. ELEUSINE CORACANA.

Ragooloo, TEL.	Ragee, HIND.
Kazh varkoo, TAM.	

(6736) RAGEU. Dr. Hooker's dogs caught a "Rageu," at Choongtam. It is a very remarkable animal, half goat and half deer; the flesh

was good and tender, dark-coloured, and lean. It is the "Ragoah," according to Hodgson; but it is not the *Procapra picticaudata* of Tibet.—*Hooker Him. Jour. Vol.* II. *page* 98.

(6737) RAGS.

Lompen, Dut.	Chiffes, Drapeaux, Drilles, Fr.
Lumpen, Ger.	Chendee, Guz. Hind.
Stracci, Strazze, It.	Farropos, Trapos, Port.
Trebje. Rus.	Trapos, Andrajos, Sp.

Shreds or fragments of old linen, woollen, or cotton cloth. They are of great importance in the arts, being used for various purposes, especially in the manufacture of paper, the greater portion of which is entirely prepared from rags. Rags are sometimes exported from Bombay to London and Liverpool.—*Faulkner.*

(6738) RAFFLESIA. The name of a genus of plants found in the hot damp jungle of Sumatra, growing parasitically on a kind of vine, and discovered by the late Sir T. S Raffles, whose name it bears. It consists of a number of scales investing a fleshy calyx measuring a yard in diameter and containing the organs of fructification within or beneath the rim of a huge fleshy central column. [Rafflesiageæ.]—*Eng. Cyc.*

(6739) RAFFLESIACEÆ, *Patma-Worts*, a natural order of stemless leafless Parasitical Plants, consisting of flowers growing immediately from the surface of branches, and immersed among scales. The perianth is superior, with a 5-parted limp, thickened processes or calli either distinct or united into a ring being attached to the throat of the tube. The essential organs are combined in a column which adheres to the tube of the perianth. Anthers 2-celled, either distinct and opening by vertical apertures, or combined together so as to become a multicellular mass opening by a common pore. Ovary 1-celled; placentas, parietal. Fruit indehiscent. The species are East Indian and South American plants, parasitic on the species of *Cissus* and on some *Leguminosæ*. There are 16 species. Some of them are said to be styptic. Their perianth has a fungoid appearance —*Eng. Cyc.*

(6740) RAFFLESIA ARNOLDI, a Sumatra parasite, is capable of containing 12 pints of fluid in its cup. The flower is said sometimes to have a weight of 14 lbs.—*Eng. Cyc.*

(9741) RAFFLESIA PATMA is employed as an astringent and styptic in Java. *R. Horsfieldi*, *R. Cumingi*, and *R. Rochussenii* have similar properties. The genera are *Rafflesia*, *Sapria*, *Brugmansia*, *Apodanthes*, and *Pilostyles*. (Balfour, *Class-book of Botany*; Lindley, *Vegetable Kingdom.*)

(6742) RAIANIA, a genus of Plants so-called in honour of the great naturalist John Ray, is known by the staminiferous flowers having a bell-shaped perianth in six deep oblong pointed segments, most spreading in their upper part.—*Eng. Cyc.*

(6743) RAIANIA HEXAPHYLLA. Six-Leaved Clustered Raiania. Leaves six, on a common stalk, oblong-acute. Flowers racemose. It is a native of the country of Fakonia, in Japan, among bushes, flowering in April. The stem is round, striated, smooth, climbing. The flowers in axillary racemes, clusters snow-white. It differs from *R. quinata* in having mostly six leaflets on a stalk, which are acute, reticulated, with veins at the back, and larger than in that species. The flowers moreover grow in clusters, not in umbels.—*Eng. Cyc.*

(6744) RAIANIA QUINATA, Five-Leaved Umbellate Raiania, has five leaves on a common stalk. It was observed by Thunberg about Nagasaki, and in Japan, flowering in April and May. The stem is twining, round, smooth, ash-coloured, and branched. Leaves several together, axillary, stalked, smooth. Flowers in umbels from the same buds as the leaves, on slender stalks, as long as the footstalks.

(6745) RAIIDÆ or RAINÆ, a sub-order, or family of Plagiostomous Cartilaginous Fishes, of which the Common Ray is the type. The body of these fishes is horizontally flattened, and more or less discous; the dorsal fins are mostly placed on the tail; a peculiar cartilage, called naso-pectoral, arises from the nasal part of the skull, and extends towards or meets the anterior part of the crest or pectoral fin; the branchial openings are inferior.—*Eng. Cyc.*

(6746) RAIKH-MAI. A fish (sort of eel) found in the sand of rivers, imported dried via Delhie: considered aphrodisiac.—*Irvine p.* 150.

(6747) RAIN. The climate of Khasia is remarable for the excessive rain-fall. Attention was first drawn to this by Mr. Yule, who stated, that in the month of August, 1841, 264 inches fell, or twenty-two feet, and that during five successive days, thirty inches fell in every twenty-fuur hours! Dr. Thomson and Dr. Hooker also recorded thirty inches in one day and night, and during the seven months of his stay, upwards of 500 inches fell, so that the total annual fall perhaps greatly exceeded 600 inches, or fifty feet, which has been registered in succeeding years! From April, 1849, to April, 1850, 502 inches (forty-two feet) fell. This unparallelled amount is attributable to the abruptness of the mountains which face the Bay of Bengal from which they are separated by 200 miles of Jheels and Sunderbunds.—*Hooker. Him. Jour. Vol.* II. *page* 282.

(6748) RAISINS.

Raisins secs ou passes, Fr.	Uve Passe, It.
Rosinen, Ger.	Passas, Port.
Darakh, Mowage, Guz and Hind.	Issum, Rus.
	Pasas, Sp.

Are dried grapes. They are distinguished by the places where produced or exported, as Malaga, Valencia, Persian, Smyrna, &c; or from the variety of grape or mode of preparation, as, muscatels, blooms, sultanas, &c.—*Waterton.* Raisins, (Monukka: Kishmis: Bedana,) N. W.

India, from Istaulik, &c. Vitis vinifera.—*Ben. Phar.* 222. In the south of Europe and in Egypt, &c. grapes are allowed to ripen and dry upon the vine so as to form raisins. The sweet fleshy grapes which grow upon the sunny sheltered slopes of hills are preferred. When the fruit is ripe, the grapes are thinned and the vine is stripped of its leaves. The sun then completes the saccharifications and drives off the superfluous water. When the bunches are plucked they are cleaned, dipped for a few seconds in a boiling lye of wood-ashes and quicklime; the wrinkled fruit is then drained and dried, exposed to the sun upon hurdles for 14 or 15 days. The finest *sun* raisins are the plumpest bunches left fully to ripen upon the vine, after their stalks have been cut half through. An inferior kind of raisins is prepared by drying the grapes in an oven. In the year ending 5th January 1853, 261,824 cwt. of raisins were imported into the United Kingdom, of which quantity 208,801 cwt. were retained for home consumption. The import duty is 15*s.* per cwt. from foreign countries, and 7*s.* 6*d.* per cwt. from British possessions.

(6749) RALLIDÆ, a family of Birds belonging to the *Grallæ* of Linnæus, *Grallatores* of Illiger. The species are commonly called Rails. The species are numerous in South America; some in India; and a few in Africa.

(6750) *Porphyrio.*—Bill short, strong, high; the base dilated into a flat plate on the front of the head; the culmen arched. Nostrils large, basal, covered by a membrane, naked; the aperture terminal and oval. Feet very large. Toes without any lateral membrane. Claws large, slightly curved. (Sw.) There was a quality which was supposed to reside in the *Porphyrio*, which made it both a highly prized and dangerous inmate. The bird was considered as a kind of guard over the women of the house in which it was domiciled: it was believed that it took notice of adultery, and that if the crime was committed, it would give notice to the master of the house by making signs as if it wished to strangle itself. It is to this that the old quatrain alludes in the 'Portraits d'Oyseaux':—

> "Porphyrion declare l'adultere.
> Fait au logis auquel on l'entretient:
> Car a ces fins tous les semblans ils tient
> De se vouloir estrangier et deffaire."—*Eng. Cyc.*

(6751) *Porphyrio Hyacinthinus.* (*Pollo Sultano*, Savi). Bill fine red; legs and feet fleshy red; irides lake-red; cheeks, throat, sides of the neck, and chest turquoise-blue; remainder of the plumage deep dull indigo blue, having the edges of the greater and lesser coverts of the wings lighter in colour and more brilliant; under tail-coverts white (Gould.)

"Independently of the southern and eastern parts of Europe, the marshes of which are the places of constant resort for this beautiful bird, its range is extended," says Mr. Gould, "over a great portion of Africa to the south, and as far as the mountains of the Himalaya to the east. In Europe it is especially abundant in the Grecian Archipelago, the Levant, and the Ionian Islands; it is less common in Dalmatia and Sardinia. The southern provinces of Hungary and Russia and the borders of the Caspian Sea may also be enumerated among its European localities." M. Temminck states that it is to be seen in many cities of Sicily (where, according to M. Cantraine, it is very common in the neighbourhood of Lentini), that it is not known in Dalmasia nor Calabria, and is rare in Sardinia; and that it is known in Catania under the name of Gallo-Fagiano.

(6752) *Fulica.*—Bill as in the *Porphyrio*, but more slender; the base straight; the gonys short and angulated. Feet very large; the toes margined with a lateral membrane, which is either narrow and of equal breadth or dilated into lobes. The natatorial type. (Sw.)

(6753) *F. atra.* It is the Foulque, Macroule, or Morrelle, of the French; Schwarzes Wasserhuhn of the Germans; Meir Koet of the Netherlanders; Folaga and Folacra of the Italians; Blas-Klacka of the Swedes; Vand-Hoene and Bles-Hoene of the Danes; Jar Ddwfr Foel of the Welsh; and Coot of the English. Some have though that it is the Κέπφος, of Aristotle. It is found throughout Europe, in marshes, lakes, and gulfs; very abundant in Holland and in the lakes of the interior of France, less numerous in Germany and Switzerland. Dr. Von Siebold and M. Burger saw it in Japan.

(6754) *Gallinula.*—Bill short, straight, the margins not inflexed; the cutting edges of the upper mandible folding over the lower. Gonys very short, angulated. Toes simple, without any marginal membrane. The rasorial type. (Sw.)

(6755) *G. chloropus* is the Poule d'Eau of the French; Gallinella of the Italians; Wasserhuhn Grunfassige Rohrhuhn, and Braune Meerhun, of the Germans; Common Gallinule, Water-Hen, or Moor-Hen of the English; and Dwfriar of the Welsh. This species appears to be not only dispersed over the whole of Europe, but extends its range over the greater portion of Africa and India; and, like the Peregrine Falcon and Barn-Owl, may be said to be universally distributed over the globe. "It is even questioned," says Mr. Gould, "whether those from tropical America, China, and the islands of the Pacific, which exhibit the most trifling marks of difference, should not be considered as identically one and the same species." It was seen by Dr. Von Siebold and M. Burger in Japan; and M. Temminck remarks that the African variety, which is also found in the isles of Sunda, has the anterior border of the wing reddish; the

lower tail-coverts, which in European, Asiatic, and Japanese individuals are of pure white or Isabella colour, have a reddish tinge in the variety from Africa and the Sunda Isles which is also somewhat less than European and Japanese birds, and has the frontal plate larger. The variety from the Sunda Isles is, according to M. Temminck, *Gallinula orientalis* of Horsefield, ('Linn. Trans.,' vol. xiii.) The only difference between the Japanese bird and that of Europe is the Isabella tint of the lateral under tail-coverts in the former: in the European variety those feathers are white.—*Eng. Cyc.*

(6756) RAMALINA FURFURACEA. LICHENS. Angola weed.—*Simmonds' Comml. Product. p.* 486.

(6757) RAMBEH, the Malay name of a fruit described by Mr. Jack as being common in the peninsula of Malacca, but unknown at Bencoolen, while the Choopa, which is nearly allied to it, is abundant at the latter, but is not found at the former place. The fruit is that of a tree called *Pierardia dulcis*, of the natural order of *Sapindaceæ*. Another species of the same genus is called *P. sapida*, from its also yielding an edible fruit. It is found in the district of Tippera, to the eastward of Calcutta, and also in China, where it is cultivated for its agreeable fruit, according to information obtained by Dr. Roxburgh from Chinese gardeners. It is remarkable that it should there be called Lutqua, as it is called Lutco by the Hindoos on the eastern frontier of Bengal.—*Eng. Cyc.*

(6758) RAMBOOTAN, a Malay fruit, [SAPINDACEÆ.]

(6759) RAMI TSJINA, *i. e.* "CHINESE RAMI," a name given by the Malays to the jute; the true hemp; and the urtica nivea.—*Royle.*

(6760) RAMONDIA PYRENAICA. GESNERACEÆ. This is an Alpine plant, growing in a common soil, not likely to thrive here.—*Riddell.*

(6761) RAMPHASTIDÆ, a family of Scansorial Birds known by the common name of Toucans.—*Eng. Cyc.*

(6762) RAMTILLA, a genus of Plants belonging to the natural order *Compositæ* and the sub-tribe *Helianthea*, so called from the Indian name Ram-Till, by which the oil of its seed is designated. The plant is remarkable for the number of names by which it has been described by botanists. Of these we need only mention the *Verbesina sativa* of Roxburgh, and the *Ramtilla oleifera* of De Candolle. Cassini had however previously formed it into a new genus, and, under the name of *Guizotia*, "dedicated it to the celebrated historian, then minister of public instruction." This name, being prior to that of *Ramtilla* by a year or two, is now retained as that of the genus. De Candolle, having obtained specimens and seeds from various countries, discovered that the Indian plant was identical with one from Abyssinia, which has been mentioned by Bruce under the name of *Polymnia frondosa*. The fact is interesting in a plant cultivated in both countries for the same purposes, and forming one of the links which indicate the connection which existed in early times between India and Upper Egypt. This plant is cultivated in different parts of India, from October to March, in fields, for the sake of the seed, from which an oil is expressed, and used as a substitute for that of the *Sesamum*, which is considered the best kind. It is used both in dressing food and as a lamp oil.—*Eng. Cyc.*

(6763) RANDIA (named after Isaac Rand, M D, once a demonstrator of botany at the Chelsea Botanic Gardens), a genus of plants belonging to the natural order *Rubiaceæ*.—*Eng. Cyc.* Randia dumetorum, 580; floribunda, 583; longispina, 582; nutans, 587; uliginosa, 397.

(6764) RANDIA DUMETORUM. GARDENIA DUMETORUM. *Retz.* Posoqueria dumetorum.—*Roxb. Fl. Ind. i. p.* 711.

Jooz ul-kuch, ARAB. | Mueiphul, HIND.

R. dumetorum, the Bush-Randia, is a thorny branching small shrub or tree, with oval leaves, rather blunt, cuneate at the base, and smooth. The flowers are very sweet-scented, sessile, solitary, mostly terminal; the calyx has oblong lobes, rather shorter than the villous corolla. The fruit is smooth, yellow, resembling a small crab-apple, firm and fleshy. The seeds are oval, numerous and lying in mucus. The fruit when bruised and thrown into water intoxicates and even kills fish, which are still however deemed fit for food. Powdered it is deemed a powerful emetic, but this seems an undeserved attribute. The bark of the root is given in infusion as a nauseating remedy. During search for an efficient substitute for ipecachuana, the fruit of this article underwent examination; for specimens the Bengal Committee were indebted to Drs. Wight and Wallich, and they found these identical with the *muen phul* of the Bazars. The results of our experiments shew that little or no dependence can be placed on the fruit as an emetic remedy.—*O'Shaughnessy.*

(6765) RANDIA ULIGINOSA, the Bog Randia, has almost terminal opposite thorns, tetragonal branches, oblong leaves somewhat cuneated, glabrous. The flowers solitary, sessile, almost terminal. It is a native of the East Indies, in moist places. The flowers are large, white, and fragrant, and in twos or threes at the top of the branchlets. The berry is about the size of a pullet's egg, ash-coloured or olive-gray, and 2-celled. The seeds are flattish, nestling in the pulp. The flowers of this species render it deserving of a conspicuous place in the hot-house.

(6766) RANINIDÆ, a tribe of the family *Apterura*, belonging to the section of Anomoureus Decapod Crustaceans. This tribe, in its general form and in the conformation of its feet, approaches very closely to the *Hippidæ*, and especially to the *Albuneæ*. [HIPPA.]

Raninа dentata may be taken as an example of the tribe. It inhabits the Indian Seas; Mauritius.

(6767). RANUNCULACEÆ, CROWFOOTS, a natural order of Exogenus Plants. There are about a thousand known species, of which 1-5th is found in Europe and 1-7th in North America. Ranunculaceæ, are chiefly natives of temperate climates, a few only being found in India within 25° north latitude; of these, all but eight or nine are, according to Dr. Wight, natives of the hilly districts. Nearly 100 species have been discovered in the Himalayas. The majority of the Ranunculaceæ contain an acrid principle, volatile at the temperature of boiling water, and capable of producing inflammation and vesication, if brought in contact with the skin. The taste is stimulating and acrid; if swallowed either in substance or solution, many of these plants occasion violent purging and vomiting, sinking of the pulse, cramps, collapse, and death. Some contain a powerful narcotic alkali named *Conitiana*, of much value in the treatment of rheumatism, and neuralgic diseases. Others are bitter tonics, devoid of poisonous properties, or slightly aperient. Lastly, the seeds of one species (Nigella) contain a somewhat aromatic essential oil, are valued as a spice, and much used as a popular stimulation.—*O'Shaughnessy, page* 159. The illustrative genera are—*Aconitum*, which furnishes Aconite, or Monk's Hood. [ACONITUM] *Clematis*. [CLEMATIS.] *Coptis* [COPTIS] *Delphinium*, the species of which are known as Larksspurs. [DELPHINIUM.] *Helleborus*, the Hellebore of the ancients, famed as a drastic purge. [HELLEBORUS; PÆONIA] *Nigella*. [NIGELLA.] *Ranunculus*, Crowfoot, or Buttercup, whence the order is named. [RANUNCULUS, (Lindley, *Vegetable Kingdom*; Balfour, *Class-book of Botany*.)—*Eng. Cyc.*

This term, *Ranunculus*, is derived from 'rana,' frog, because many of the species inhabit humid places frequented by that reptile. The genus is the type of the natural order *Ranunculaceæ*. It has 5 sepals, occasionally 10, with a nectariferous excavated scale at the base. The stamens and ovaries are numerous, the achenia ovate, somewhat compressed, mucronate, arranged on globose or cylindrical receptacles. The species are mostly acrid, and if applied when fresh to the skin will produce blisters; this quality is destroyed by drying or by heat.—*Eng. Cyc.* Wight gives Ranunculus reniformis, 75; subpinnatus, 49; and Wallichianus, 937.

(6768) RAPE.—BRASSICA NAPUS. This plant yields the Rape seed of commerce. Used as salad similar to mustard, the leaves are however eaten when the plant is in seed, of no great value as a vegetable, cultivated like Mustard.—*Jaffrey*. This plant is of the Cabbage Tribe, is cultivated like cole, or colza, for the sake of its seeds, from which oil is extracted by grinding and pressure. It is also extensively cultivated in England for the succulent food which its thick and fleshy stem and leaves supply to sheep when other fodder is scarce.—*Eng. Cyc.* For the products of this plant, we refer to the following articles:—

(6769) RAPE-OIL.

Sursee or surrus Teil. GUZ. HIND.

The oil expressed from rape seed, which is extensively consumed in France, and other parts of the Continent for illuminations, &c. This oil is exported from Bombay to England and France.—*Faulkner*. The seeds of *Brassica rapa* and *B. napus* are valuable for the large quantity of oil which they yield by expression. [See OILS and FATS.] *B. rapa* yields the largest quantity of oil. *B. campestris* yields a superior oil known in France as *Colza* oil. Rape oil is thick, of a yellow colour, and with a peculiar taste and smell; it concretes into a yellow mass at about 28°. Its specific gravity is 0·9167. It is used in the preparation of woollen goods and of some kinds of leather. It is much used in France for burning in lamps. Colza-oil may be used without purification, and it is largely employed in lighthouse lamps in Europe. The common kind of oil is purified by being agitated with a 200th part of sulphuric acid, left to repose for 24 hours, when two-thirds of its bulk of water at 165° are added, and the mixture stirred until it becomes milky. It is then kept for 2 or 3 weeks in a room heated to 80°, when it becomes clear by the deposition of a dark coloured sediment. It is lastly filtered by being drawn off into vats the bottoms of which are pierced with holes stuffed with filaments of carded wool or cotton. Having passed through this filter the oil is fit for use. The acid may be removed by the addition of powdered chalk.—*Tomlinson*.

(6770) RAPE SEED.

Roefero, DAN.	Sursee, Surrus, GUZ. HIND.
Graine denavette, FR.	Shershapa, SANS.
Rapsaat, GER.	

The produce of a hardy biennial plant, of the cabbage tribe (*Brassica rapa*), extensively cultivated in England and on the Continent, on account of its seeds, which are crushed for oil, and partly for its leaves, which are used as food for sheep. In India, it is also extensively cultivated, whence both the seeds and oil are largely exported to England and France.—*Faulkner*.

(6771) RAPE SEED CAKE. Is the adhering masses of the husks of rape seed, after the

oil has been expressed. It is employed, like linseed cake, to feed cattle and pigs on the Continent; and as manure in England.—*Faulkner.*

(6772) RAPHANUS, a genus of Plants belonging to the natural order *Cruciferæ*. It is mostly remarkable for containing the common radish, *Raphanus sativus*. This plant, a native of China, has been cultivated in Great Britain for upwards of 250 years, and has given rise to numerous varieties, which are divided into long-rooted or spindle-shaped, and round or turnip-rooted. They are also denominated spring, summer, autumn, or winter radishes, according to the season in which the respective sorts are found best adapted for use.—*Eng. Cyc.*

(6773) RAPHIS. Most of the coir used by the Chinese is made from the bark of the coir palm, (*Raphis flabelliformis*) called, *tsung*, which is stripped off in large sheets from the trunk of the tree; when steeped in water the fibres separate in short wiry threads, of a dark brown color, having all the properties of the cocoanut coir. It is the material from which the cordage in Chinese vessels, and sometimes the cables, is manufactured; brooms, rain cloaks, sandals, hats, brushes for block printing, twine, and other articles are also made from it. The Raphis grows all over southern China, attaining at times the height of 30 feet and upwards; the bark is stripped off every year. The price for the prepared coir is about $ 4 per pecul. Another kind of coir is also in extensive use in the Archipelago for rigging; it is called *gomuti* or *ejoo*, and the thread sells at $ 1.50 or $ 2 per pecul. The best comes from Amboyna.—*Morrison.*

The Ground ratans, the excellent walking-sticks known to the English under this name, are made from the Raphis flabelliformis, which grows in Liu-kiu in Southern China.—*Seeman.*

(6774) RAPHUS, Brisson's name for the Dodo. [DODO.]

(6775) RAPTATORES, the name assigned by Mr. Vigors to the Birds of Prey.

The *Raptores* of Mr. Vigors form his first order, and the following families are arranged by him under it.—VULTURIDÆ, FALCONIDÆ, STRIGIDÆ, *Gypogeranidæ* (?).

The *Raptores* of Mr. Swainson comprise the families of *Vulturidæ*, *Falconidæ* and *Strigidæ*.

Mr. G. R. Gray also makes the *Raptores* consist of the families *Vulturidæ*, *Falconidæ* and *Strigidæ*.

(6776) RAPTORES, Illiger's name for his third order of Birds, comprehending the Birds of Prey.

(6777) RASPBERRY.—Vide, RUBUS.

(6778) RATINARIA, a solitary specimen of Lichen, with a fragment of the black extractive matter, (in a mass) was forwarded from Nelson. Illustrations of the practical use of this new dye, and a chemical analysis of its constitution are required to enable the Jury to give an opinion of its value.—*M. E. J. R.*

(6779) RATAN (Calamus).

Rotan, MALAY.	Bed HIND.
Panjalin. JAVAN.	Betum, TEL.
Kowe, SUNDA.	Piramboo, TAM.

In Malay, rotan, an abbreviation of raotan from the verb raot, to pare or trim, that is, the object pared or trimmed. Of this universal product of the forest of the islands, the name, as might be expected, is different in all the different languages. Thus, in Javanese, it is pánjaliin and in Sunda Kowe. The plants which yield ratans are considered by botanists as a genus of the family of palms, which consists of many species, from the girth of a goose-quill to that of a stout walking stick. They are abundant in all the forests of the Malay and Philippine Archipelagos, and are every where extensively used as cordage or ligatures, or in the manufacture of mats and basket-work. These singular plants creep along the ground or climb trees, and, according to the species, to the length of from 100 to 1,200 feet. The principal places of production for the general market are Sumatra, Borneo, and the Peninsula. By far the most valuable, probably a distinct species, is brought from Banjarmassin on the southern coast of Borneo, for in the market they are worth about 150 per cent. more than any others. A vast quantity of ratans are exported from the Malay Archipelago to Europe, Hindustan, and China.—*Crawfurd Dict: page* 365. The Rattans of Commerce, though apparently insignificant, form a considerable article of trade; so many as four or five millions of them being in some years shipped from the territories under the Government of the East India Company. They are products of several genera of palms, which all contribute their quota to the general quantity required in the markets of the East and in Europe. Amongst the plants producing them may be named the genus, Calamosagus, of Griffith, with its four species; *C. lariniæfolius*, (*Wallichiæfolius*) termed "*Rotang Simote*"; C. ochriger, "Rotang Donam," with C. scapiger, and C. lacineosus. The Calamosagi are all climbing plants.—*Seeman.* Ratan or cane, is used extensively in Burmah and the Tenasserim Provinces, instead of Cordage. The stays of the masts in the native boats, are usually made of ratans, and they are split up into strings for innumerable purposes, to which cord and twine are usually applied. There are numerous species indigenous in the forests, and the Karens have different names for seventeen species or varieties. Rattans are manufactured by the Chinese into chairs, baskets, and other articles, but their bulk interferes with their exportation.—*Williams'*

Middle Kingdom, Vol. II. *page* 402. The best are the produce of Malacca and the Eastern isles. A coarse description is found in many parts of the Peninsula of India, and there, are used for ordinary purposes, as baskets &c., they also furnish material for the cables of Shakespearian bridges. A coarser description called country rattans, pedda piramboo, *Tam.* moty beyt, *Hind.* Pedda bettam, *Tel.* grows to a great length in most districts of the Peninsula. When green, it is formed into cables for drawing the cars, and in some parts for suspension bridges. It answers better than bamboo for baskets and for strong fences, when interwoven between stakes. The rattan when burnt, yields an ordinary black for paint.—*Rohde. M S.S.* See CALAMUS.

(6780) RAVENSARA. The article imported into China, from India under this denomination is a nut of a dark brown colour, the size of a nutmeg, in smell and taste resembling both cloves and Pimento: internally it is divided into cells, and contains a kernel extremely hot and biting to the taste, with a strong spicy smell.—Ravensara is, also, however, the name given to the bark of the Clove-Cinnamon tree, growing in the Brazils and Madagascar, of which the foregoing is probably the fruit.—*Comp. Descr.*

(6781) REAM. A ream of writing paper consists of 20 quires, of 24 sheets each; and a printer's ream of 21½ quires, or 516 sheets.

(6782) REAUMERIA HYPERICOIDES, has lanceolate flat rather remote leaves. It is a native of Syria and Persia. These plants are elegant little shrubs of easy culture, which thrive well in a mixture of sandy loam and peat; and young cuttings will grow freely in sand under a hand-glass.—*Eng. Cyc.*

(6783) REAUMERIA VERMICULATA, has subulate semi-terete imbricated leaves, crowded on the branches. It is a native of Sicily, Bombay, and Egypt. This plant resembles *Salsola fruticosa*. It is used at Alexandria as a remedy for the itch, being bruised and applied externally, and a decoction taken internally.

(6784) REAUMURIACEÆ. *Reaumuriads*, a natural order of Plants belonging to the Exogenous class. This little order consists of three genera, *Reaumuria*, *Hololachna*, and *Eichwaldia*, which were formerly referred to *Tamaricaceæ*; they have however but little affinity with that order. Their true affinities seem to be with *Hypericaceæ*, near to which Lindley has placed them. The species are generally natives of the coast of the Mediterranean, and of salt plains in the milder parts of Northern Asia.—*Eng. Cyc.*

(6785) RED LEAD (oxide of), MINIUM, CHROMATE OF LEAD

Isroob, ARAB.	Minio, IT.
Minium, FR.	Sindura, SANS.
Mining, GER.	Vermillion, SP.
Sindoor, GUZ. HIND.	Sigappoo Sindoorum, TAM
Temacared, MAL.	Sindoorum, TEL.

Is massicot finely ground and calcined. It is a red powder, but with a liability to become black, and is used in painting, in the manufacture of glass, in surgery, &c.—*Waterston.*

(6786) RED SAND. A specimen of the Cape Comorin red sand (a kind of small garnet) may be interesting, and probably useful, (if brought to notice) for polishing gold and silver, as it appears to be much used by the Natives of this country for that purpose. The other specimens of sand from the same locality, are objects of curiosity, the white being rather peculiar, resembling grains of rice. The whole beach to the westward of Cape Comorin, to the extent of several miles, is generally covered at different seasons with red sand; and immediately on the opposite side, to the eastward, almost entirely with black, which is rather remarkable.—*M. C. C.*

(6787) REED, (of which pens are made.)

Peroo nanal, TAM.	Pedda relloo, TEL.
Baroo, HIND.	

Reeds of the best quality are imported, but inferior descriptions abound on many hills and on the banks of rivers. Reeds for weaving are formed of these, though used also for pens. In Peninsular India, reeds for weavers are constructed by a class of persons, who also practice as oculists, the materials used for reeds are strips of several descriptions of reed: for silk weavers they are made of the fine teeth of the mango fish. —*Rohde M.S.S.*

(6788) REIDLEIA TILIÆFOLIA. BYTTNERIACEÆ. MATHOOREE, *Hind.* A small tree; the young leaves very soft and velvety; flowers small, rose coloured, in axillary and terminal corymbiform panicles, appear in November.—*Riddell.*

(6789) RENNET.

Wfeheh. ARAB.	Paneer Maya, GUZ. HIND. PERS.

The dried contents of the stomach of a calf, used for coagulating or curdling milk.—*Faulkner.*

(6790) REPTILIA, a class of Animals belonging to the sub-kingdom *Vertebrata*, and embracing the creatures usually known as Crocodiles, Lizards, Turtles, Tortoises, Frogs, Toads, and Serpents. These include the AMPHIBIA, CROCODILIDÆ, CHELONIA, OPHIDIA, and SAURIA, and we here propose to give a slight sketch of their history, and the attempts made at their general classificaton. The ancient monuments of the Egyptians prove that the great groups of the tortoises, the lizards, the serpents, and the frogs, as well as their habits, were well known to that people; and the sacred Scriptures abound in passages (the Old Testament especially) showing that a similar knowledge obtained when they were written. Indeed from the earliest times these forms must have attracted the attention of man; and a natural desire on his part to ascertain which of them were dangerous,

and which were innocuous, must have led him to particular inquiry in order to solve the doubt. In Herodotus and Athenæus there are not wanting passages indicative of precise notions respecting many species of reptiles.

The *Amphibia* form, in the last edition of the 'Systema Naturæ,' published by Linnæus himself, the third class of the animal kingdom. This class consists of three orders:—

1. *Reptiles*, which are described as 'pedati, spirantes ore.'

2. *Serpentes*, which are characterised as 'apodes, spirantes ore.'

3. *Nantes*, which are characterised as 'pinnati: spirantes etiam branchiis lateralibus'

The last order, which consists of cartilaginous and other fishes, forms no part of our present inquiry, which is confined to animals included in the two first.

The Count Lacépède (1788-90) divided the Reptiles into three great groups:—

1. Oviparous Quadrupeds, subdivided into (1) those which possess a tail, and (2) those which are tailless.

2. Biped Reptiles.

3. Serpents.

In 1799 the method of M. Alexandre Brongniart was read to the French Academy of Sciences, and it seems to have been first published in the 'Bulletin des Sciences,' in 1800; it was afterwards printed among the other Memoirs of the National Institute. His classification may be regarded as a considerable step in advance of those who had preceded him, and had principally confined themselves to external characters, well defined doubtless, but of little moment when compared with those based on organisation and habits. Whilst they carefully attend to the presence or absence of tail or feet, they neglected those essential points which spring from generation and development. Brongniart pointed out the approximation of the Tortoises to the Lizards, and even to the Serpents, and was the first to show that the Toads, Frogs, and Salamanders, ought to constitute a separate order.

M. Brongniart recognised the following orders:—

1. Chelonians (Tortoises).
2. Saurians (Lizards).
3. Ophidians (Serpents.)
4. Batrachians.

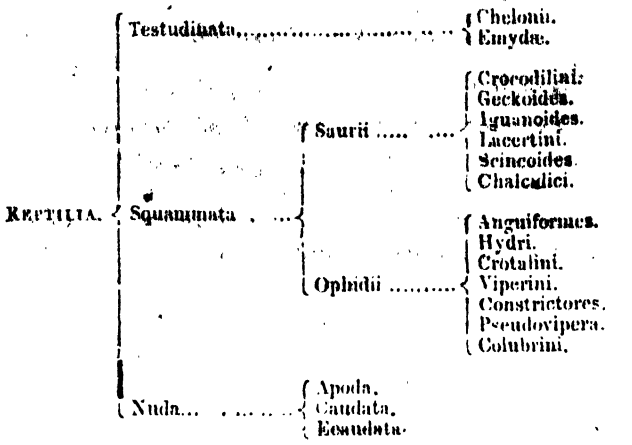
The method of Lacépède seems to have found more favour in the eyes of M. Latreille than that of M. Alex. Brongniart, which last must have been known to the former when he published his 'Natural History of Reptiles,' in 1801. He placed in his first division the Oviparous Quadrupeds, whose body is provided with feet, dividing them into two sections, according as they have unguiculated, or clawless toes, and a scaleless skin. His second division is formed by the Serpents; and in his third, designated by the name of Pneumobranchians, he places the genera *Proteus* and *Siren*, as well as another, which he names *Ichthyosaurus* which last is only a Tadpole.

In 1825, when the science had very much advanced, M. Latreille, in his 'Families of the Animal Kingdom,' published another arrangement, which Messrs. Dumeril and Bibron have digested into the following table:—

HEMACRYMES PULMONEES.

Classes.	Sections	Orders.	Families.
Reptiles.	Cuirassed.	Chelonians	Cryptopods (*Testudo*, &c.).
			Gymnopods (*Sourochelys, Trionyx*, &c.).
		Emydosaurians	Crocodilians (Crocodiles. &c.).
	Scaly. Saurians.	Lacertiform.	Lacertians (*Monitor* &c.).
			Iguanians (*Iguana*, &c.)
			Geckotians (*Gecko*, &c.).
			Chameleonians (*Chamæleo*, &c.).
		Anguiform.	Tetrapods (*Scincus, Seps Chalcides*).
			Dipods (*Bipes, Bimanus*)
			Apods (*Anguis, Ophisaurus*, &c.).
	Scaly. Ophidians.	Idiophids	Amphisbænians (*Amphisbæna*, &c.).
			Cylindrical (*Tortrix*)
			Coluberians (*Acrochordus, Boa, Python* &c.)
			Anguisipers (*Bongarus, Hydrophis, Pelamys* &c.).
			Vipers (*Crotalus, Berus, Naja*, &c.).
		Batrachophids..	Gymnophids (*Cæcilia*).
	Amphibia.	Caducibranchians	Anurous (*Pipa, Bufo, Rana*, &c.).
			Urodeles (*Salamandra, Triton, Axolotl*).
		Perennibranchians	Ichthyoids (*Proteus, Siren*).

In the short notice published by George Cuvier, in his 'Tableau Elémentaire de l'Histoire Naturelle' (1798), he divided the Reptiles, like Lacépède, into Oviparous Quadrupeds, Serpents, and Biped Reptiles. Oppel (who had been a diligent attendant M. Duméril's course of lectures in 1807 and 1808, and in whose works much of the lessons of the latter are to be traced, as Oppel himself acknowledges, after publishing the 19th volume of the 'Annales du Muséum,' a Memoir on the Ophidians, and another on the Batrachians, produced, in 1811 at Munich, his treatise 'Die Ordnungen, Familien, und Gattungen der Reptilien, als Prodrom einer Naturgeschichte derselben' (thin 4to.). The following synoptical table exhibits Oppel's method:—



In 1790 Merrem published a paper in German, with the title of 'Materials for a Natural History of Amphibia,' and in 1820 and 1821 two other papers followed. These papers treat of serpents and several genera of Saurians, and are illustrated with coloured plates. But his system appears to have been published (in 1800) at the suggestion of Bechstein, who had translated Lacepede's 'History of Reptiles' into German; and in 1820 a second edition of this system, which is shown in the following table, made its appearance:—

Classis	Ordines.	Tribus.	Subdivisions.
Phelidota.	*Testudinata*	with feet	Pinniform. Digitated.
	Loricata (Crocodiles).		
		Gradientia	*Ascalabotæ. Sauræ. Chalcidici.*
		Repentia (Anguis Ophisaurus, Acontias).	
	Squammata	*Serpentia*	Gulones. *Innocui. Venenati*
			Typhlini.
Batrachia.		*Incedentia* (Chirotes.) *Prendentia* (Chamæleon).	
		Apoda (Cæcilia). Salientia (Rana, &c.).	
		Gradientia with eyelids.	*Mutabilia (Salamandra, &c.).*
		Gradientia without eyelids.	*Amphipnœsta* (Hypochthon, or Proteus).

M. De Blainville, in 1816, published in the 'Nouveau Bulletin des Sciences de la Societe Philomatique,' the prodromus of his systematic distribution of the animal kingdom, which he produced, in 1822, in his 'Principes d' Anatomie Comparee.' Under the type *Osteozoaria*, and the sub-type *Ovipara* or *Anastozaria*, he places the Reptiles, which he divides into two classes, namely—1, Reptiles or Ornithoid Squammifers; 2, Amphibians or Nudipellifers, Naked Ichthyodians.

The First Class is separated into three orders,—

I. Chelonians, consisting of the genera *Testudo. Emys. Chelys. Trionyx, Chelonia*, and *Dermocheys* (Sphargis).

II. Emydosaurians, or Crocodiles, divided into three sub genera.

III. Saurophians, or Bihentians, which are separated into two sub orders:—

A. Surians, consisting of the families of Geckoidians, Agamoidians (the Norma, as *Agama* and *Basiliscus*, and the Anormal, as *Chamæleo* and *Draco*), the Iguanoidians, *Tupinambis*, and the Lacertoidians (divided into Tetrapods, Dipods, and Apods).

B. Ophidians, which are divided into—

1. The Dipods (Chirotes).
2. Apods:—*a* (with numerous teeth). *Pelamys, Hydrophis*, the Vipers, and the Lethifers: B (without venomous teeth), the Amphisbænas, the Climbers or Boas, and the Colubers.

The Second Class, Ichthyoid or Nudipelliferous Amphibians, is composed of four orders:—

1. The Batrachians, divided into two sub-orders—*a* (Aquiparous), *Rana*, &c.; B (Dorsigerous), *Pipa*.
2. The Pseudosaurians or Salamanders.
3. The Subichthyans, or True Amphibians (*Proteus, Siren*).
4. The Pseudophidians (*Cæcilia*).

Dr. John Edward Gray published in 1825 his 'Synopsis of the Genera of Reptiles and Amphibia, in the 'Annals of Philosophy.' He considers the Reptiles, or scaly-skinned group, and the *Amphibia*, or naked-skinned group, as distinct classes.

The class *Reptilia* are thus divided:—

§ 1. Body covered with imbedded hard plates; legs distinct, fit for walking. *Loricata*, Gray, not Merrem.

Order I. *Emydosauri*, De Blainville.

Families.—1, *Crocodolidæ*; 2, *Ichthyosauridæ*; 3, *Plesiosauridæ*.

Dr. Gray thinks that *Megalosaurus* of Buckland is perhaps allied to in this order.

Order II. *Sauri*, De Blainville.

Section 1. Tongue not extensile. *Ascalabota*, Merrem.

Families: 1, *Stellionidæ*; 2, *Geckotidæ*.

Section 2. Tongue extensile. *Saurœ*, Merrem.

Families: 3, *Tupinambidæ*; 4, *Lacertinidæ*; 5, *Chamæleonidæ*.

Order III. *Saurophidii*, Gray.

Section 1. Body covered with imbricate scales anus transverse, not terminal; tongue extensile.

Families: 1, *Scincidæ*, Gray; 2, *Anguidæ*.

Section 2. Body covered with intricate (imbricate?) scales; anus terminal.

Family: 3, *Typhlopidæ*, Gray.

Section 3. Body covered with rings of square scales.

Families: 4, *Amphisbænidæ*, Gray; 5, *Chalcididæ*.

Order IV. *Ophidii*, Brongn. (*Serpentes*, Linn.)

Section 1. Upper jaws with fangs only. *Venati*. (*Venenati* must be meant.)

Hypnale—Morrem. Scutæ 142, Scutellæ 39–17. rows of scales. Not uncommon in forests in Malabar. Dr. Jerdon has not seen it longer than 16 or 17 inches.

(6799) *Trigonocephalus Elliotti*, n. s. Form massive; 23 rows of scales on the body; Scutæ 151, Scutellæ 43. Olive-green above; pearl-white beneath; poison-fangs small; head covered with plates. Up to 2 feet and upwards long. Dr. Jerdon, only procured this on the Neelgherries, towards the lower portion of the plateau. Dr. Cantor tells him that "the shields of the crown of the head resemble those of Trig. blanchoffi, Schlegel.

(6800) *Trigonocephalus* (*cophias*) *viridis*. Merrem. Russ. 1, pl. 9. 21 rows of scales, 154 Scutæ, 60 Scutellæ. Rare, Dr. Jerdon only got it from the Eastern Ghats.

(6801) *Trigonocephalus* (*cophias*) *malabaricus*. n. s? Very closely allied to T. nigromarginatus. Has 21 rows of smooth scales. Scutæ 145 to 149. Scutellæ 48 to 53. Green above, with brown transverse and zigzag markings. Up to 2 feet long nearly. Not uncommon in all the forests of the West Coast.

(6802) *Trigonocephalus* (*Cophias*) *Neelgherriensis*. n. s ? Of small size, dark brown with black markings. 23 rows of carinated scales. Scutæ 142. Scutellæ 36. Not uncommon in woods on the Neilgherries.

(6803) *Trigonocephalus* (*Cophias*) *Wardii* — n. s.? Has 21 rows of carinated scales. Scutæ 154. Scutellæ 51. Greenish colour, with purplish-brown diamond spots on back and sides; 12 to 14 inches long. The scales of the head resemble those of T. sumatranus, Raffles, according to Cantor (*in literis.*)

(6804) *Vipera Russellii*—Gray. Russell 1, pl. 7. '*Kunnadi Vyrien*' of Tamools. This well known and justly dreaded snake grows to a large size. Dr. Jerdon is strongly inclined to believe that the far-famed *Cobra monil*, or *Cobra manilla* of some, is merely the young of this species. The old orthography is *manil*, which simply means a chain or necklace, and whoever looks at the markings of this snake, especially of the young one, must be struck with the resemblance thereof to a necklace: both *Cobra capella* and *Cobra monil* are Portuguese names, and little doubt, the latter name was given to our present species by the Portuguese. It has however been forgotten as applied to this viper, and may now be considered a fable; for every one you meet is able, on his own showing, to point you out the *real Cobra monil* as quite distinct, and what is more remarkable, no two observers describe it alike, they only agree in its being a very small and a very deadly snake. He here adds that the *carpet snake*, another household word in the Madras army, appears to him to be equally fabulous, as he has not been able to identify it among the venomous snakes, several prettily marked innocent species having been, at different times pointed out to him as the carpet snake. [Generally, Mr. Bligh thinks the little harmless Lycodon aulicus (as indeed mentioned afterwards by Mr. Jerdon), is known as the Carpet snake and this, perhaps, from its habit of entering houses as much as from its markings.—*Cur. As. Soc.*]

(6805) *Vipera echis*—Schlegel. V. noratta—Shaw. Russell 1, pl. 2. *Kutta vyrien* of the Tamools. This little snake is very common in the Carnatic. Dr. Jerdon does not think its bite would prove fatal to man. He has known a dog bitten by one to recover.

The above are all the venomous land snakes Dr. Jerdon had yet met with in Southern India. Of these the only ones at all common are the Cobra, the Chain Viper (Vipera Russellii), the *Bungarus candidus*, and the little *Vipera echis*. Most of the others are peculiar to the forests of India. The Trigonocephali are not usually fatal. He has known several cases of bites by *Trigonocephalus malabaricus*, and *Trig. nepa*; and none proved fatal. Great pain is experienced, and swelling usually follows, but the patient gradually recovers. He himself was bitten in the fore-finger by the *Trigonocephalus neelgherriensis*; He applied a ligature round the finger, and sucked the wound vigorously. In a minute or so the skin round the bite blackened, and in a minute or two more a perfectly circular bit of the skin came off in his mouth. He set off running immediately he was bitten, and felt no further ill effects. See Cantor's remarks on the bite of *Trig. sumatranus*, Journ. As. Soc., Calcutta, XVI, 1044-6; also Blyth, *ibid.* XX, 524.

PELAGIC.

Fam. HYDRIDÆ,—Bon,

(6806) *Hydrophis colubrina*—Schlegel, var. ? —n. s. He possesses what is apparently a variety of this species of sea-snake. It differs from the finished drawing of the species in Cuvier's Regne Animal (Edit. des Eleves), in the black markings meeting on the back and abdomen, thus forming a series of light-coloured oval spots on the sides; the abdominal scutæ commence nearer the mouth, having only 3 or 4 series of small scales between them and the elongated mentals; the scutæ are above 300 in number, and the rows of scales are from 35 to 45—whilst in H. colubrina the scutæ are only 246—and the rows of scales 25. My only specimen is a young one procured at Madras.

(6807) *Hydrus schistosus*, Daud.—Russel 2, pl. 10. Up to 4 feet long nearly. Very common at Madras.

(6808) *Hydrus pelamidoides*, Schlegel. Not common at Madras.

(6809) *Hydrus bicolor*, Schneider—Russell 1, pl. 41. Rare at Madras.

(6810) *Hydrus Striatus*, Lacep.—Russell 2, pl. 9? Not rare at Madras, up to 6 feet in length.

(6811) *Hydrus nigrocinctus*, Daudin.—Russell 2, pl. 6. Common at Madras.

(6812) *Hydrus Cantori, n. s.—H. Nigrocinctus*, var.—Cantor, J. A. S. C. XVI, 1050. Dr. Cantor described this as a variety of the last, in his valuable Catalogue of Malay Reptiles. Dr. Jerdon forwarded him a specimen in 1848, and he remarked as follows on it. "From the examination of this specimen, the second I have seen, I am induced to believe it a distinct species, and not a variety of nigrocinctus." It differs from this last species in the more robust make, larger scales, there being only 21 rows on the body, and larger abdominal scales, especially near the head; also in the shorter triangular head, &c. &c. Dr Jerdon never saw it at Madras, but it is not rare at Tellicherry on the Malabar Coast. Up to 2 feet in length.

(6813) *Hydrus Gracilis*, Shaw—Russell 2, pls. 7 and 8. The number of rows of scales vary from 26 to 35 on the neck, and from 44 to 51 on the trunk. Scutæ 350 to 450. Scutellæ 50 to 60. Very common at Madras. Very remarkable for the small circumference of head and neck compared to that of the body. Up to 4 feet long. All the above sea-snakes are venomous, and their bite to be dreaded.

Fam. BOIDÆ—Bon.

(6814) ACROCHORDUS GRANULATUS, (Schneider)—A. FASCIATUS, Shaw.

Rare—Found sometimes in back-waters.

(6815) *Python molurus*, (L.)—*P. Tristitatus*, Schl.—Russell 1, pl. 22. *Boa*, or Rock snake, of Europeans in Madras. Found all over the country. Dr Jerdon has not seen a specimen longer than 19 feet long. This was killed in Travancore, after having swallowed a doe spotted deer.

(6816) *Boa* (*Gongylophis*) *conica*, Schl.—Russell 1, pl. 4. Not rare in the Carnatic and Malabar. It is considered venomous by some of the natives. Has a very malignant aspect. Up to 18 inches long and upwards.

(6817) *Xenopeltis? trivirgatus*—n. s. Brown above, with a triple series of black marks—beneath white, black-banded; of a shining nacreous lustre throughout. Scutæ 137. Scutellæ 29. 13 rows scales. Dr Jerdon has only found this on the Neilgherries.

(6818) *Tortrix eryx*, Schlegel—var.? Two-headed snake of many: common. Scutæ 205. Scutellæ 36.

(6819) *Cylindrophis maculatus?* This, Dr. Kelaart has sent to the Society's Museum from Ceylon.—*Cur. As. Soc.*

(6820) *Cylindrophis curticeps*.—n. s. Differs from the last in its shorter, more triangular head, &c. &c.

(6821) *Cylindrophis macroscelis*—n. s.? Differs from both in the much larger scales. These last three small species are not very common. They are sometimes found on the surface of the ground in rainy weather, but are generally dug out of the earth. They are called earth snakes by the natives.

Fam. TYPHLOPHIDÆ

(6822) *Pilidion? montanum*—n. s.? Above bluish-black, yellow on the sides, with a black spot on each of the 3 lower scales; abdomen banded black and white. Scutæ? Scutellæ 15. 15 rows of scales. 15 inches long. Found only on the Neilgherries.

(6823) *Uropeltis ceylonicus*.

(6824) *Uropeltis affinis*—n. s. Differs from the last in its smaller scales, in the abdominal scutæ being larger, and commencing sooner. They are both rare. Dr. Jerdon procured them on the Western Coast.

(6825) *Onychocephalus acutus*—Dum. et Bibr. Dr. Jerdon possesses one example of this curious reptile, which he procured in the Carnatic at Nellore. Dr. Cantor remarks, "Described from an unique specimen, habitat unknown."

(6826) *Typhlops braminus*, (Daud.)—Russell 1, pl. 43. [This group, the Argyrophis of Mr. Gray, requires to be studied, as several species appear at present to be confounded. The Society's Museum has lately received Typhlops Russelli, Gray, from Chyebasa. *Cur. As. Soc.*] Common under stones in the rainy season, usually called earthworm.

(6827) *Calamaria sagittaria*—Cantor. A specimen sent to Dr. Cantor was so named by him; it had only 170 Scuta and 70 Scutella. It is not rare in forests in Malabar.

(6828) *Coronella tæniolata* 1, pl. 19? 15 rows of smooth scales; Scutæ 185. Scutellæ 41. This species is referred to *Tropidonotus stolatus* by Cantor, but a snake that Dr Jerdon possesses and which answers tolerably well to Russell's description and figure, appears to be a true Coronella. It is common at Madras.

(6829) *Xenodon venustum*, n. s.?—[*X. purpurascens*, Schlegel]. Above olive-brown with a triple series of irregular black spots, the central one edged with pale yellow; some transverse marks on head and neck. Has 17 rows of scales. Scuta 142. Scutellæ 31. Rare—found on the West Coast only; 1 foot long.

(6830) *Xenodon dubium*—n. s.? Of a pale earthy brown colour, lighter on the side; a series of darker marks, irregular in shape, and edged with black. Scutæ 181. Scutellæ 41. Has 15 rows of scales. Rare. Dr. Jerdon procured it in N. Canara.

(6831) *Lycodon Russellii*—Russell 1, pl. 35. Scutæ 193. Scutellæ 47. 17 rows of smooth scales. Rather common in Southern India.

(6832) *Lycodon aulicus*, (L.)—Russell 1, pls. 16 and 26. Has 17 rows of scales. Dr. Jerdon's

specimens have only from 165 to 174 scutæ and from 54 to 61 scutellæ, which correspond with Russell's nearly, viz. from 171 to 174 and 40 to 41, whilst Cantor gives from 208 to 257 and from 57 to 91. One specimen which resembles in colour Cantor's var. B, (Lycodon capucinus, Boie,) does not differ in number of the scutæ, &c. Very common all over the country, often called Carpet Snake and considered dangerous, though of course harmless.

(6833) *Lycodon platurinus*, (Shaw). Scutæ 183. Scutellæ 76. Rare in Southern India—17 rows of scales.

(6834) *Lycodon nympha*—Russell 1, pls. 36 and 37, bad figure. 13 rows of scales; Scutæ 234. Scutellæ 87—not rare at Madras.

(6835) *Lycodon assimilis*—n. s. Very similar in colour to the two last species, viz. black with white bands. It differs in having 23 rows of scales. Has 190 scutæ and 60 scutellæ. Dr. Jerdon has mislaid the locality of this species.

(6836) *Coluber Blumenbachii*, Schleg.—Russ. 1, pl. 34. *Dhamin* H.; *Sarray pamboo*, Tam. Perhaps the most common snake in India, grows to a large size, 7 feet and upwards; frequents chiefly marshy-land, paddy-fields, &c. Scutæ 200. Scutellæ 125—17 rows of scales.

(6837) *Coluber fasciolatus*, Shaw.—Russell 1, pl. 21. Scutæ 200. Scutellæ 58. Not uncommon at Madras and elsewhere in the Carnatic. Dr. Jerdon has seen it nearly 3 feet long.

(6838) *Coluber pictus*, Daud. Russell 1, pl. 29. scutæ 202. Scutellæ 91—Russ.

ARBOREAL.

(6839) *Dipsas trigonata*—Russell 1, pl. 15. *Tati katladay*, Tel.; *Peri Suruday*, Tam, Scuta 235. Scutella 83. Common in the Carnatic.

(6840) *Dipsas cynodon*? Dr. Jerdon's specimens correspond very well with the description in Schlegel. Scutæ 240, Scutellæ 110. Rows of scales 21. Up to — feet and upwards in length. Dr. Jerdon only found this snake in forests on the West Coast.

(6841) *Leptophis pictus*, (Gmel.)—Russ. 1, pl. *Kumberi mukar*, T.; *Chectooriki pambu*, Tam. 176 scutæ and 140 scutellæ—15 rows of scales. Very common in all parts of the country.

(6842) *Leptophis? Bellii*?—n. s. Scutæ 173. Scutellæ 64. Green above, with dark line on the sides bordered on each side by a pale stripe—17 rows of scales. This much resembles the drawing of Ahætula Bellii in Grey and Hardwicke. Dr. Jerdon procured one specimen in a grassy plain at Jalnah. It had killed and was swallowing a small *Vipera echis*.

(6843) *Leptophis ornatus*, Shaw.—Russ. 2, pl. 2 Scutæ 209. Scutellæ 129—17 rows of scales. Dr. Jerdon only procured this very handsome snake lately in Malabar.

(6844) *Leptophis*? *nilagiricus*?—n. s. Green above, yellow beneath. Scutæ 140. Scutellæ 73—13 rows of scales. Very common on the grassy hills of the Neilgherries.

(6845 *Leptophis*? *canarensis*? Green above, yellowish beneath with a streak on the sides. Scutæ 140. Scutellæ 57—15 rows of scales. Procured in North Canara. Perhaps these two last belong more properly to *Dryinus*. Of the last Dr. Cantor remarks—"Apparently *Dryinus prasinus*, var. A."—the number of the scutæ, &c. however differs very materially.

(6846) *Dryinus nautus*.—Russell 1, pl. 12. Green whip-snake. Scutæ 180; Scutellæ 158. Common all over the country. Dr. Jerdon lately saw one that had swallowed a Parroquet and became gorged.

(6847) *Herpetodryas malabaricus*,—n. s. Olive brown with a dark streak along the sides, most conspicuous on the posterior portion of body; a series of white spots on the anterior portion of the body, edged with black. Scutæ 222; Scutellæ 91—25 rows of scales. Dr. Jerdon says it is possible that this may be *H. helena*, as he possesses a young one in which the markings differ somewhat, and much resemble those on Russell's figure, which is evidently a very bad one. [Colubber helena is quite distinct.—*Cur. As Soc.*] He procured it in Malabar where it is not very rare.

(6848) *Tropidonotus stolatus*, (L.)—Russell 1, pl. 10 and 11. Scutæ 146; Scutellæ 61—19 rows of scales. Seldom exceeds 18 inches in length; one of the most common snakes in India.

(6849) *Tropidonotus Schistosus*, (Daud.)—Russell 2, pl. 4. Scutæ 140; Scutellæ 85—17 rows of scales.

(6850) *Tropidonotus Plumbicolor*, Cantor. The colour of the living snake is leek-green. Scutæ (in a young one) 143; Scutellæ 36?—21 rows of scales. Found in the Wynaad also in Bundelkund, and about Midnapore.

(6851) *Tropidonotus Monticolus*,—n. s.? Green, with a series of dark spots on the trunk, one on the centre of back and another on each side, the one on the right somewhat in front, the left one posterior, some white marks on the head; Scutæ 132; Scutellæ 85—19 rows of scales; eyes large; 3 feet and upwards in length. Common in the Wynaad, (2 anterior frontals, 3 posterior ditto, lowest scales rhombic).

(6852) *Tropidonotus Piscator*.—Russell, 28 and 33. 19 rows of scales; Scutæ 139; Scutellæ 83. Found in wells and tanks. Very common.

(6853) *Homalopsis rhynchops* (Schneider),—Russell 1, pl. 17. Scutæ 146; Scutellæ 65. Common in estuaries.

(6854) *Homalopsis Enhydris*, (Schneider.—Russell 1, pl. 30. Scutæ 150; Scutellæ 58. Found in the same localities as the last.

BATRAGHIDÆ.

(6855) *Cæcilia Oxyura*,—Dum. and Bibr. Found on the West Coast, but rare.

REPTILIA OF MADRAS.

(6856) *Epicrium Glutinosum*, (L.) Found in Malabar. 2 cirri quite distinct. Probably a distinct species from E. Glutinosum of Ceylon, as sent by Dr. Kelaart. The latter has a strongly marked pale lateral band, and the *cirri* are less developed than they are represented to be in Mr. Jerdon's drawing. Dr. Kelaart, however, obtained a second species, which may be that noticed by Mr. Jerdon; and either may be identical with the *Epicrium* from Assam and from Pinang.—*Cur. As. Soc.*

(6857) *Rana tigrina*. Bull frog. Found all over India.

(6858) *Rana cutipora*,—Dum. and Bibr. In tanks in the Carnatic. Of a beautiful grass green colour, with or without a central yellow stripe on the back.

(6859) *Rana Leschenaultii*,—Dum. and Bibr. The common frog of India.

(6860) *Rana crassa*,—n. s. Of a thick clumsy form, feet webbed to the extremity of the toes; limbs shorter than in R. Leschenaultii, head wider, greenish above with dusky markings. Length $3\frac{8}{10}$ ths; hind leg $5\frac{1}{2}$. Rare—found in a few tanks in the Carnatic.

(6861) *Rana Malabarica*. Found only on the West Coast, and chiefly during the monsoon when it enters houses, and makes a great gobbling, so much like a turkey that some people call it the 'Turkey frog.'

(6862) *Rana Flavescens*,—n. s. Of a buff colour on the back; yellow on the sides; limbs banded; feet webbed nearly to the extremities. Length of one $3\frac{2}{10}$ths; hind leg $5\frac{1}{2}$. Of slender make, pointed muzzle. Found frequenting mountain streams in the forest only.

(6863) *Rana curtipes*,—n. s. Head very wide; muzzle obtuse; limbs rather short; feet webbed to the ends of the toes, except the centre one. Head and back above bright buff; sides deep marroon; legs dark purple with a few white spots; abdomen white mottled. Length of one $2\frac{9}{10}$ths; hind leg $4\frac{1}{10}$th. Found in forest only. Has a very peculiar, rather pleasing call. Chiefly seen during the monson.

(6864) *Rana agricola*,—n. s. Feet not webbed quite to the extremity. Of a greenish colour, mottled with darker. Length of one $2\frac{1}{10}$th; hind leg $3\frac{2}{10}$ths; foot 1. Found in inundated paddy-fields and meadows.

(6865) *Rana Nilagirica*,—n. s. Very much allied to the last, differs in its much longer limbs. Length 2 inches; hind leg $3\frac{7}{10}$ths. Dr. Jerdon has only seen this frog in marshes in the Wynaad and Neilgherries.

(6866) *Polypedates Leucomystax*. 'Chunam frog' of Europeans. Very common all over India.

(6867) *Polypedates Variabilis*,—n. s. Green frog of the Neilgherries. Green, sometimes unspotted, at other times with gold spots or blackish spots; at times golden yellow with brown spots; at other times brown with darker spots. Length $2\frac{1}{2}$ inches; hind leg 4; foot $1\frac{2}{10}$ths. Found in the Neilgherries in the banks of streams and in shrubs.

(6868) *Ixalis? Glandulosa*,—n. s. A small tree frog, with very obtuse muzzle, feet slightly webbed; abdomen largely glandular, tympanum indistinct; green above, yellowish on the sides and limbs. Length $1\frac{2}{10}$ths; hind leg $\frac{7}{10}$ths; foot $9\frac{9}{20}$ths.

(6869) *Rhacophorus Reinwardtii*, Dum. and Bibr. Found in the Malabar Coast on trees, and in grass during the monsoon. Not very common.

(6870) *Limnodytes? Phyllophila*,—n. s. A small frog, with the subdigital disks very slightly dilated; toes not quite completely webbed; tympanum small; reddish yellow, with the sides of the face dark purple. Length $1\frac{1}{2}$; hind leg $1\frac{8}{10}$ths; foot $\frac{11}{20}$ths. Found in all the Western forests among decayed leaves.

(6871) *Phyllomedusa? tinniens*,—n. s. Tinkling frog of the Neilgherries. Fingers opposable; feet webbed at base only; yellowish red, or sometimes blackish above; side of head dark; inner fingers yellow; length $1\frac{1}{10}$th; hind leg $1\frac{3}{10}$ths. Found in grass and among bushes on the Neilgherries. Has a peculiar loud clear metallic tinkling call.

(6872) *Phyllomedusa? Wynaadensis*. Somewhat allied to the last, differs in its larger limbs; larger tympanum, &c. Length about 1 inch. In this when the hind leg is drawn forwards, the end of the tibia reaches the muzzle; in the last it only reaches the tympanum; reddish brown above, limbs barred.

(6873) *Polypedates? saxicola*,—n. s. A small frog with teeth, tympanum distinct, fingers webbed at the base; toes webbed to the extremities; pointed muzzle; dark olive green with dark marbling, and barred limbs. Length $1\frac{1}{10}$th; hind leg $1\frac{3}{4}$th; foot $\frac{5}{10}$th; femur and tibia reach beyond the muzzle. Found on rocks in shady mountain streams in Malabar and Wynaad.

(6874) *Hylaedactylus montanus*,—n. s. Mottled green and brown above, Length $1\frac{7}{10}$th; hind leg 2; foot $\frac{7}{10}$th. Hab. Mountain streams in Wynaad, rare. A very nearly affined species, if not the same, inhabits Mergui.

(6875) *Hylaedactylus carnaticus*,—n. s. Of small size; marbled green and brown; muzzle more acute than in the last species; length $1\frac{3}{10}$th; hind leg $1\frac{3}{10}$th; foot $5\frac{5}{10}$th. Found in the Carnatic during the monsoon, rare.

(6876) *Bufo scaber*, Daudin. Common toad of India. Very abundant.

(6877) *Hyperodon marmoratum*. Found in the Carnatic during the monsoon.

(6878) *Pyxicephalus fodiens*,—n. s. Greenish marbled with brown. Length 2 inches; hind leg $2\frac{8}{10}$ths; foot $\frac{8}{10}$ths. Found in the Carnatic, burrows in the ground for $1\frac{1}{2}$ feet or so—[Hab. also Ceylon].

(6879) *Pyxicephalus pluvialis*,—n. s. Nearly allied to the last; differs in its shorter thicker form, and shorter limbs; light greenish fawn, with dark marbling. Length of one $2\frac{3}{10}$ths; hind leg $2\frac{4}{10}$ths; feet $\frac{8}{10}$ths. Dr. Jerdon only procured this during the monsoon in the Carnatic. It is very different in appearance, though with so few essential distinctions, and the natives give a distinct name to each.

(6880) *Pyxicephalus rufescens*,—n. s. Of a rufous colour above, whitish beneath; body rough and granulose; limbs barred. Length $1\frac{1}{2}$ inch; hind leg $2\frac{1}{10}$th; foot $\frac{6}{10}$ths. Not rare in gardens on the Malabar Coast.

(6881) *Engystoma ornatum*. Some specimens of this very handsome frog were only once procured by Walter Elliot, Esq. on the Neilgherries. Length $1\frac{4}{10}$th inch.; hind leg $1\frac{6}{10}$ths; foot $\frac{11}{20}$th.

(6882) *Engystoma rubrum*,—n. s. Indian red above; some black marks on the legs. Length $1\frac{1}{10}$th inch; hind leg $1\frac{5}{10}$th; foot $\frac{5}{10}$th. Found in the Carnatic near rivers, in sandy banks. [Also Ceylon.—*Cur. As. Soc*].

(6883) *Engystoma malabaricum*,—n. s. Isabella colour above, varied with dark angular markings; sides dark purplish; throat ditto; limbs barred. Length $1\frac{1}{10}$th; hind leg $1\frac{6}{10}$th; foot $\frac{5}{10}$th. Found in Malabar, under stones.

(6884) *Engystoma carnaticum*,—n. s. Nearly allied to the last, differs in the shorter muzzle, shorter hind leg, &c. Length $\frac{8}{10}$ths of an inch: hind leg $1\frac{1}{10}$th; foot $\frac{4}{10}$ths. Found in the Carnatic during the monsoon.—*Jerdon.*

The following notices and descriptions, are by Mr. Blyth, of various Reptiles, new or little known.

(6885) *Calamaria Catenata*, Blyth *n. s.* (*C. monticola*? Cantor, P.Z.S. 1839, p. 50). [" *C. olivaceo fusca, collari, læte flavo, linea dorsali albicante, abdomine citrino. Scut. abd* 125; *scutel. subcaud.* 44. Hab. Naga Hills."] No anterior frontals: the vertical plate broad, pentagonal, and almost as large as the occipitals: 13 rows of scales: scutæ 187; scutellæ 41 pairs. Predominant colour dusky above, formed by minute black specks upon a pale ground-tint; below pale buff with an iridescent lustre, and marked with lateral series of square black spots chiefly upon alternate scutæ. Four black lines throughout above, the upper bordering a pale medial streak, which is simple upon the tail, but along the body forms a concatenation of elongated oval spots. An imperfect whitish-buff collar, and similar marks before and behind the eye. Length of specimen 17 in., of which tail $2\frac{1}{2}$ in. From Assam. Mr. Robinson. [This and other species sent by Mr. Robinson, we much suspect are from the Khasya hills, or other uplaud territory.]

(6886) *Calamaria reticulata*, Blyth *n. s.* Vertical plate hexagonal, angulated to the front, and not half so large as the occipitals: supra-orbital and subtriangular. Thirteen rows of scales: large scutæ 136, 138; scutellæ 27, 28 pairs. Colour shining dull black, brilliant and iridescent below: minute yellowish-white specks on the sides of the mouth, throat, and along the sides of the body. In spirit, the edges of the scales are seen to be of a deep black, imparting a reticulated appearance. The larger of two specimens measures 12 in., of which tail $2\frac{5}{8}$ in. From Assam. Mr. Robinson.

(6887) *Calamaria tenuiceps*, Blyth *n. s.* Colour iridescent. black above, yellowish-white below. Nearly affined to C. longiceps, Cantor, but the head anterior to the eyes much less elongated, and the posterior frontals consequently are about as broad as long: vertical plate elongate-hexangular, broadest anteriorly: head conical, narrow; the jaws of equal length. Thirteen rows of scales. Scutæ 138; scutellæ 37 pairs. Length of specimen 14 in., of which tail 2 in. From the vicinity of Darjiling. Capt. W. S. Sherwill. The two following species of this genus are remarkable for having the posterior frontals united.

(6888) *Calamaria fusca*, Blyth *n. s.* Of an iridescent dull black colour throughout, the ventrals slightly margined paler. Head small, narrow. Vertical plate pentangular with rounded anterior base, the posterior lateral angles so obtuse in some that the plate might then be described as triangular: occipitals very large, elongated. Thirteen rows of scales. Scutæ 155-7; scutellae 30-34 pairs. Length 15 in., of which tail 2 in. Young obscurely striated with longitudinal rows of pale dots. From Darjiling. Capt. W. S. Sherwell.

(7889) *Calamaria obscuro-striata*, Blyth *n. s.* Much affined to last: the muzzle less obtusely pointed, and the anterior frontals conspicuously smaller. Iridescent brown-black, the under-parts particularly lustrous: obscurely streaked throughout with a pale band occupying the adjoining portions of the fourth and fifth rows of scales on each side, a narrow pale line also along the middle of each of the first three rows, and three similar narrow pale lines along the back, all alternating with dusky lines. Thirteen rows of scales. Scutæ 153-163: scutellæ 40 pairs. Length of the large of two specimens $11\frac{1}{4}$ in., of which tail 2 in. From Rangoon. The next has both the anterior and the posterior frontals, respectively, united or undivided.

(6890) *Calamaria bicolor*, Blyth *n. s.* Dusky-plumbeous above, buffy-white below, throughout; these colours gradually blending, and not abruptly demarcated as in C. tenuiceps. Vertical plate pentangular, broader than long, or forming almost a triangle laterally truncated: nostral large and broad; the muzzle consequently obtuse; and the head broader and flatter than usual in this genus. Seventeen rows of scales. Scutæ 210;

scutellæ 75 pairs. Length of a specimen 19½ in., of which tail 4⅜ in. From Assam. Mr. Robinson.

(6891) *Coronella callicephalus*, Gray, *Ann. M. N. H.*, Dec. 1853, p. 390. [When the above description was taken, we had not seen that by Mr. Gray, which is less detailed.] A beautiful species, with form and scutation of head as in the European Coluber Esculapei (as figured by Schlegel); but the eye somewhat smaller. Nineteen rows of scales: scutæ 201, 211; scutellæ 56, 65 pairs. Colour a light brown, paler below. Head with a median black line over the vertical and occipital scutæ, and another continued from each eye to the first of a series of about 18 semi-annuli, which in the young consist of large and broad white-edged black spots, reaching down to the abdominal scutæ; but in adults the black of the interior of these spots disappears more or less completely, leaving only the pale-margined black edge, so that two narrow black transverse bands remain in place of the single broad black spot of the young: also at about the ninth or tenth of the latter from the head, two narrow black dorsal lines commence, which at first are broken and irregular, but gradually become continuous and well defined towards and upon the tail, where they cross its transverse bands and are continued to the extreme tip. Length of a specimen 27 in., of which tail 4 in. From Assam. Mr. Robinson.

(6892) *Xenodon Purpurascens*, Schlegel. The varieties of colouring of this Snake are extraordinary; even more so than those of Lycodon Aulicus. Two adults in spirit from Goalpara are entirely of a pale colour (evidently, however, much blanched), *without traces of markings*. Another, from Assam, is of a dull red-brown above, with narrow black transverse bands; lower-parts reddish-pearly, with two rows of somewhat indistinct black spots, mostly on alternate *scutæ*: head-markings indistinct. A third variety (*Coronella albocincta*, Cantor. *P. Z. S.* 1839, p. 50), also from Assam, is of a clay colour, the scales black-margined and sprinkled over with minute black spots, and the entire length marked with about 24 black-edged white semi-annuli; beneath, the black spots are more developed than in the last variety, and are more or less continuous towards the vent: the usual head markings distinct. Two others from Goalpara and Lower Assam, nearly resemble the last, but have no white semi-annuli, nor markings underneath the tail or anterior third of body. Others, again, from various parts, including central [Ammerkantak, towards source of Nerbudda; 3700 ft. elevation.] and S. India and Ceylon, also the Tenasserim provinces, have the upper-parts more or less dark, and variously freckled, often with imperfect semi-annuli placed near together, and alternately distinct and comparatively obscure: the under-parts commonly spotless; and sometimes the collar quite black. A single young specimen from Ceylon has 3 rows of black spots continued upon each scuta as far as the vent, where the medial row ceases, and the other two rows are continued to the tip of the tail: above, the black semi-annuli are divided, and the halves placed alternately to the right and left, becoming gradually indistinct upon the hinder half Upon a first view, this might be considered a distinct species; but we can perceive no structural variation from the rest, and intermediate varieties most probably occur. In all, save the first, the peculiar markings of the head readily indicate the species; as do the rostral and anterior frontal plates from other Indian serpents.

(6893) *Coluber nigromarginatus*, nobis, *n. s.* Nearly allied to C. radiatus, Schlegel, but attaining the size of C. mucosus, (L., v. *Blumenbachii*. Merrem): our largest specimen measuring 7¾ ft. long, of which the tail is 2. ft. 1 in. Colour a bright pea-green (changing in spirit to blue), paler below, each scale of the upper-parts margined with black. Upon the shields of the crown the black margins are extremely slight though present, and they gradually increase in breadth posteriorly until about the middle of the entire length, when the two colours resolve into four black alternating with three narrower blue streaks which are continued to the end of the tail. Eye larger than in C. mucosus, much larger than in C. radiatus. One large superior and one small inferior præ-ocular plate; and a single frænal, the latter as in C. radiatus, to which the present species bears a near approximation in the details of its structure. Sixteen rows of scales, the four median slightly carinated. Scutæ 192-4; scutellæ 126-132 pairs. Hab. Vicinity of Darjiling, where procured by Capt. W. S. Sherwill, who sent with it examples of C. radiates, C. korros, and C. fasciolatus. Dr. Kelaart has also favoured us with C. korros from Ceylon; but the species does not appear to have been hitherto observed in the Indian peninsula.

(6894) *Coluber Prasinus*, Blyth, *n. s.* Wholly green, becoming verditer in spirit; glaucous below and bordering the mouth: 19 rows of slightly carinated scales: scutæ 205, 6; scutellæ 107, 8 pairs Vertical shield triangular with rounded apex; rather larger than the supra-orbitals, and rather smaller than the occipitals: a single large præ-orbitals, and one elongate-oval frænal. Tail suddenly tapering. The larger of two specimens measures 37 in., of which tail 9 in. From Assam. Mr. Robinson.

(6895) *Coluber Hexagonotus* (?), Cantor, [*J. A. S.* XVI, 921.] var. adult. Length 4 ft., of which tail 15½ in.; the latter remarkably slender. Colour brown, paler below; the anterior fourth of the body marked with transverse dusky bands, which become gradually more obscure till they disappear. Seventeen rows of

(6879) *Pyxicephalus pluvialis*,—n. s. Nearly allied to the last; differs in its shorter thicker form, and shorter limbs; light greenish fawn, with dark marbling. Length of one 2 2/10ths; hind leg 2 4/10ths; feet 8/10ths. Dr. Jerdon only procured this during the monsoon in the Carnatic. It is very different in appearance, though with so few essential distinctions, and the natives give a distinct name to each.

(6880) *Pyxicephalus rufescens*,—n. s. Of a rufous colour above, whitish beneath; body rough and granulose; limbs barred. Length 1½ inch; hind leg 2 1/10th; foot 6/10ths. Not rare in gardens on the Malabar Coast.

(6881) *Engystoma ornatum*. Some specimens of this very handsome frog were only once procured by Walter Elliot, Esq. on the Neilgherries. Length 1 4/10th inch.; hind leg 1 6/10ths; foot 1/20th.

(6882) *Engystoma rubrum*,—n. s. Indian red above; some black marks on the legs. Length 1 1/10th inch; hind leg 1 4/10th; foot 1/10th. Found in the Carnatic near rivers, in sandy banks. [Also Ceylon.—*Cur. As. Soc*].

(6883) *Engystoma malabaricum*,—n. s. Isabella colour above, varied with dark angular markings; sides dark purplish; throat ditto; limbs barred. Length 1 1/10th; hind leg 1 6/10th; foot 5/10th. Found in Malabar, under stones.

(6884) *Engystoma carnaticum*,—n. s. Nearly allied to the last, differs in the shorter muzzle, shorter hind leg, &c. Length 6/10ths of an inch: hind leg 1 1/10th; foot 4/10ths. Found in the Carnatic during the monsoon.—*Jerdon.*

The following notices and descriptions, are by Mr. Blyth, of various Reptiles, new or little known.

(6885) *Calamaria Catenata*, Blyth *n. s.* (*C. monticola*? Cantor, P.Z.S. 1839, p. 50). [" *C. olivaceo fusca, collari, læte flavo, linea dorsali albicante, abdomine citrino. Scut. abd* 125; *scutel. subcaud.* 44. Hab. Naga Hills."] No anterior frontals: the vertical plate broad, pentagonal, and almost as large as the occipitals: 13 rows of scales: scutæ 187; scutellæ 41 pairs. Predominant colour dusky above, formed by minute black specks upon a pale ground-tint; below pale buff with an iridescent lustre, and marked with lateral series of square black spots chiefly upon alternate scutæ. Four black lines throughout above, the upper bordering a pale medial streak, which is simple upon the tail, but along the body forms a concatenation of elongated oval spots. An imperfect whitish-buff collar, and similar marks before and behind the eye. Length of specimen 17 in., of which tail 2½ in. From Assam. Mr. Robinson. [This and other species sent by Mr. Robinson, we much suspect are from the Khasya hills, or other upland territory.]

(6886) *Calamaria reticulata*, Blyth *n. s.* Vertical plate hexagonal, angulated to the front, and not half so large as the occipitals: supra-orbital and subtriangular. Thirteen rows of scales: large scutæ 136, 138; scutellæ 27, 28 pairs. Colour shining dull black, brilliant and iridescent below: minute yellowish-white specks on the sides of the mouth, throat, and along the sides of the body. In spirit, the edges of the scales are seen to be of a deep black, imparting a reticulated appearance. The larger of two specimens measures 12 in., of which tail 2⅝ in. From Assam. Mr. Robinson.

(6887) *Calamaria tenuiceps*, Blyth *n. s.* Colour iridescent. black above, yellowish-white below. Nearly affined to C. longiceps, Cantor, but the head anterior to the eyes much less elongated, and the posterior frontals consequently are about as broad as long: vertical plate elongate-hexangular, broadest anteriorly: head conical, narrow; the jaws of equal length. Thirteen rows of scales. Scutæ 138; scutellæ 37 pairs. Length of specimen 14 in., of which tail 2 in. From the vicinity of Darjiling. Capt. W. S. Sherwill. The two following species of this genus are remarkable for having the posterior frontals united.

(6888) *Calamaria fusca*, Blyth *n. s.* Of an iridescent dull black colour throughout, the ventrals slightly margined paler. Head small, narrow. Vertical plate pentangular with rounded anterior base, the posterior lateral angles so obtuse in some that the plate might then be described as triangular: occipitals very large, elongated. Thirteen rows of scales. Scutæ 155-7; scutellae 30-34 pairs. Length 15 in., of which tail 2 in. Young obscurely striated with longitudinal rows of pale dots. From Darjiling. Capt. W. S. Sherwell.

(6889) *Calamaria obscuro-striata*, Blyth *n. s.* Much affined to last: the muzzle less obtusely pointed, and the anterior frontals conspicuously smaller. Iridescent brown-black, the under-parts particularly lustrous: obscurely streaked throughout with a pale band occupying the adjoining portions of the fourth and fifth rows of scales on each side, a narrow pale line also along the middle of each of the first three rows, and three similar narrow pale lines along the back, all alternating with dusky lines. Thirteen rows of scales. Scutæ 153-163: scutellæ 40 pairs. Length of the large of two specimens 11¼ in., of which tail 2 in. From Rangoon. The next has both the anterior and the posterior frontals, respectively, united or undivided.

(6890) *Calamaria bicolor*, Blyth *n. s.* Dusky-plumbeous above, buffy-white below, throughout; these colours gradually blending, and not abruptly demarcated as in C. tenuiceps. Vertical plate pentangular, broader than long, or forming almost a triangle laterally truncated: nostral large and broad; the muzzle consequently obtuse; and the head broader and flatter than usual in this genus. Seventeen rows of scales. Scutæ 210;

scutellæ 75 pairs. Length of a specimen 19½ in., of which tail 4⅜ in. From Assam. Mr. Robinson.

(6891) *Coronella callicephalus*, Gray, *Ann. M. N. H.*, Dec. 1853, p. 390. [When the above description was taken, we had not seen that by Mr. Gray, which is less detailed.] A beautiful species, with form and scutation of head as in the European Coluber Esculapei (as figured by Schlegel); but the eye somewhat smaller. Nineteen rows of scales: scutæ 201, 211; scutellæ 56, 65 pairs. Colour a light brown, paler below. Head with a median black line over the vertical and occipital scutæ, and another continued from each eye to the first of a series of about 18 semi-annuli, which in the young consist of large and broad white-edged black spots, reaching down to the abdominal scutæ; but in adults the black of the interior of these spots disappears more or less completely, leaving only the pale-margined black edge, so that two narrow black transverse bands remain in place of the single broad black spot of the young: also at about the ninth or tenth of the latter from the head, two narrow black dorsal lines commence, which at first are broken and irregular, but gradually become continuous and well defined towards and upon the tail, where they cross its transverse bands and are continued to the extreme tip. Length of a specimen 27 in., of which tail 4 in. From Assam. Mr. Robinson.

(6892) *Xenodon Purpurascens*, Schlegel. The varieties of colouring of this Snake are extraordinary; even more so than those of Lycodon Aulicus. Two adults in spirit from Goalpara are entirely of a pale colour (evidently, however, much blanched), *without traces of markings*. Another, from Assam, is of a dull red-brown above, with narrow black transverse bands; lower-parts reddish-pearly, with two rows of somewhat indistinct black spots, mostly on alternate *scutæ*: head-markings indistinct. A third variety (*Coronella albocincta*, Cantor. *P. Z. S.* 1839, p. 50), also from Assam, is of a clay colour, the scales black-margined and sprinkled over with minute black spots, and the entire length marked with about 24 black-edged white semi-annuli; beneath, the black spots are more developed than in the last variety, and are more or less continuous towards the vent: the usual head markings distinct. Two others from Goalpara and Lower Assam, nearly resemble the last, but have no white semi-annuli, nor markings underneath the tail or anterior third of body. Others, again, from various parts, including central [Ammerkantak, towards source of Nerbudda; 3700 ft. elevation.] and S. India and Ceylon, also the Tenasserim provinces, have the upper-parts more or less dark, and variously freckled, often with imperfect semi-annuli placed near together, and alternately distinct and comparatively

obscure: the under-parts commonly spotless; and sometimes the collar quite black. A single young specimen from Ceylon has 3 rows of black spots continued upon each scuta as far as the vent, where the medial row ceases, and the other two rows are continued to the tip of the tail: above, the black semi-annuli are divided, and the halves placed alternately to the right and left, becoming gradually indistinct upon the hinder half. Upon a first view, this might be considered a distinct species; but we can perceive no structural variation from the rest, and intermediate varieties most probably occur. In all, save the first, the peculiar markings of the head readily indicate the species; as do the rostral and anterior frontal plates from other Indian serpents.

(6893) *Coluber nigromarginatus*, nobis, *n. s.* Nearly allied to C. radiatus, Schlegel, but attaining the size of C. mucosus, (L., v. *Blumenbachii*. Merrem): our largest specimen measuring 7¾ ft. long, of which the tail is 2. ft. 1 in. Colour a bright pea-green (changing in spirit to blue), paler below, each scale of the upper-parts margined with black. Upon the shields of the crown the black margins are extremely slight though present, and they gradually increase in breadth posteriorly until about the middle of the entire length, when the two colours resolve into four black alternating with three narrower blue streaks which are continued to the end of the tail. Eye larger than in C. mucosus, much larger than in C. radiatus. One large superior and one small inferior præ-ocular plate; and a single frænal, the latter as in C. radiatus, to which the present species bears a near approximation in the details of its structure. Sixteen rows of scales, the four median slightly carinated. Scutæ 192-4; scutellæ 126-132 pairs. Hab. Vicinity of Darjiling, where procured by Capt. W. S. Sherwill, who sent with it examples of C. radiates, C. korros, and C. fasciolatus. Dr. Kelaart has also favoured us with C. korros from Ceylon; but the species does not appear to have been hitherto observed in the Indian peninsula.

(6894) *Coluber Prasinus*, Blyth, *n. s.* Wholly green, becoming verditer in spirit; glaucous below and bordering the mouth: 19 rows of slightly carinated scales: scutæ 205, 6; scutellæ 107, 8 pairs. Vertical shield triangular with rounded apex; rather larger than the supra-orbitals, and rather smaller than the occipitals: a single large præ-orbitals, and one elongate-oval frænal. Tail suddenly tapering. The larger of two specimens measures 37 in., of which tail 9 in. From Assam. Mr. Robinson.

(6895) *Coluber Hexagonotus* (?), Cantor, [*J. A. S.* XVI, 921.] var. adult. Length 4 ft., of which tail 15½ in.; the latter remarkably slender. Colour brown, paler below; the anterior fourth of the body marked with transverse dusky bands, which become gradually more obscure till they disappear. Seventeen rows of

slightly imbricated scales, the median row hexagonal. Vertical plate large, pentagonal, broad to the front. Two præ-orbitals, the lower small and bordered by the third and fourth labials; the fourth labial bordering the eye, which is of moderate size; two post-orbitals, and a third or infra-orbital bordering on the fourth, fifth, and sixth labials: nasals large, elongate, the nostril opening in the middle, near the outer border of the anterior frontal; a single small subtriangular frænal. Scutæ 195; scutellæ 144 pairs. Hab. Arakan (Ramri)?

(6896) *Coluber diadema*, Schlegel; *C. Oppelii*, Wagler. This is a little known species; and two examples of it in Calcutta museum (origin uncertain) would not be readily recognised from Russell's plate (II, 30), which would appear to have been taken from an old and remarkably thick individual. One of the Society's specimens is of about equal length to that figured by Russell, but is much more slender; the other is smaller. The markings of the head are very peculiar, as the transverse black band from eye to eye and continued below the eye, and the four black specks on the two occipital plates. Upon the nape is a longitudinal black stripe, followed by a series of black spots along the spine, the first few of them being round, the rest gradually assuming the appearance of short transverse bands, much more regular and placed nearer together than as represented by Russell: towards the tail they diminish in size, and upon it are reduced to a series of minute black specks. Their number, from head to base of tail, amounts to 75. Alternating with the dorsal bands is, on each side, a series of smaller lateral transverse bands, which begin on the sides of the neck as large round black spots, following two oblique streaks behind the eye, and disappear altogether on the tail. They are placed with great regularity; and on the borders of the abdominal scutæ is a further series of black spots. Such as are the markings of our larger specimens, these being of an unmixed black. In our smaller example, all the dorsal black bands have the middle of each scale marked with the pale clay-colour which constitutes the general ground-tint, the lateral streaks are less decided, but the spots on the borders of the scutæ are more so, and every alternate scuta has an additional spot near each lateral margin. There are 19 rows of perfectly smooth (or not carinated imbricated scales. Eye rather large: a great upper and small lower præ-orbital; one large subquadrate frænal; two post-orbitals: and the fifth and sixth labials border the eye below. Scutæ 297-8; scutellæ 98 pairs. Length of our larger specimen 36½ in., of which tail 9¼ in.

(6897) *Coluber pictus*, Daudin; *C. Plinii*, Merrem (Russell, I, 29). Of this little known species, Mr. Jerdon has favoured us with a young example, from S. India. It is a true Coluber, and not a variety of Coronella baliodeira, Schlegel, as suspected by Dr. Cantor. [*J. A. S.* XVI, 913.]

(6898) *Herpetodryas helena*, (Daudin). In the Society's museum are two specimens of a Snake, from Darjiling and Rungpore respectively, which may represent a variety of this species. Colour nearly uniform brown above, yellowish-white below with two lateral rows of dusky specks, one speck on each side of every abdominal scuta; a slight dusky streak from behind the eye; a trace of a black V-like mark on the nape; and very obscure indications of body-markings analogous to those of Russell's figure (I, 32) Seventeen rows of carinated scales. The larger of two individuals measures 29½ in., of which the tail occupies 8 in., and head 1 in. Scutæ 189, 199; scutellæ 84, 90.

(6899) *Psammophis condanarius*, Gray (Russell, I, pl. 27; very bad.) Seventeen rows of smooth scales, of which the first row on each side is very broad, the second row less broad, and the rest narrow and lanceolate. General colour bright green above, pale yellow or yellowish white below; longitudinally striped, except more or less towards the head, with four pale bands: the upper occupying the fourth and half respectively of the third and fifth rows of scales, and bounded above and below with a more or less defined narrow black line; the lower occupying the lateral margins of the abdominal scutæ and subcaudal scutellæ, and defined above and below with narrow black lines which are very distinct. A pale superciliary streak bordered with black commences from the nostrils, and another below the eye, occupying the upper half of the labials. Some also shew an ill-defined pale dorsal streak. Hab. Lower Bengal?

(6900) *Leptophis rubescens; Dipsas rubescens*, Gray, Hardwicke's *Ill. Ind. Zool.* This seems affined to Dendrophis Rhodopleuron, Schlegel, from Amboyna. The areal apertures are remarkably minute and abruptly pierced in the centre of the nasals. Vertical plate narrow. Neck slender. Body much compressed. General aspect of colour reddish-brown, powdered over throughout, excepting on the chin and throat, with minute specks. A row of black spots along the spine. A brown central occipital stripe, and similar lateral stripe from nostril to ear. Seventeen rows of smooth scales. Scutæ 198; scutellæ 120. From Mergui. Capt. Berdmore.

(6901) *Leptophis ornatus*, (Shaw), var. Marked very like young specimens of Coronella Russellii, excepting on the head. Colour olive-grown, the upper-parts marked throughout with a regular series of transverse black bars, broader towards the head, narrower and becoming indistinct towards the end of the tail; these black bars set off by whitish edges. Head marked nearly as usual. From Ceylon. Dr. Kelaart.

(6902) *Dipsas ferruginea*, Cantor, *P. Z. S.* 1839, p. 53. Head smooth and flat above, remarkably Frog-like, with somewhat pointed muzzle; anterior frontals very small; the supra-orbitals larger than the vertical plate. Canines above and below well developed. Tail suddenly tapering. Colour a dull somewhat ferruginous brown above, a little marked with black and white shewing between the scales; a broad dark lateral band throughout, and above it an obscure pale band: lower-parts buffy yellowish-white, with a narrow dark lateral band on each side, and the rest thickly sprinkled over with minute black specks. Head with a narrow black median line over the frontal and vertical plates, and another over the supra-orbital, meeting its opposite on the occipital and continued to the nape: black lines also border the lips and pass through the eye. Seventeen rows of scales: scutæ 171, 175; scutellæ 56, 64 pairs. Length of one 18¾ in., of which tail 3¼ in. From Assam and the vicinity of Darjiling; Mr. Robinson and Capt. Sherwill.

(6903) *Dipsas Monticola*, Cantor, *P. Z. S.* 1839, p. 53. Affined to *D. Trigonota* in structure. Brown above, pearly-white below, separated by a broad black streak behind the eye: lowermost row of scales black-bordered for the anterior third of the body; and traces of other lines towards the head. Fifteen rows of scales: scutæ 158, 193; scutellæ 82, 106 pairs. Length of one 22 in., of which tail 7¼ in. Hab. Assam; Mr. Robinson.

(6904) *Dipsas Nigromarginata*, Blyth, *n. s.* Also affined to *D. Trigonota*, with median row of dorsal scales broad and hexagonal. No elongated teeth. Colour throughout green above, the distensible skin black between the scales; yellowish-white below. Twenty-one ranges of scales; scutæ 252; scutellæ 132 pairs. Length of one 42 in., of which tail 11 in. Hab. Assam. Mr. Robinson.

(6905) *Dipsas Trigonota*, the most common species of India proper, attains to about 6 ft. in length, but is rarely met with so large, and preys (at least those of medium size) chiefly on the Calotes versicolor in L. Bengal. Vertical shield as broad as in the Malayan D. Multimaculata, not less so as represented in Dr. Schlegel's plate. The markings are ill represented by Russell, who figures the young. The very young (about 9 in.) are of a pale ashy colour, with but slight traces of the markings of the adult; a faint lateral band consisting of three parallel somewhat darker lines is continued throughout the length, also a medial and two lateral abdominal lines, besides which the under-parts are very minutely speckled. There is a white median frontal streak bordered with black, continued into a black occipital streak. When 2 or 3 ft. long, the white frontal streak is retained, and at the occiput

are two diverging white lines, which converge and meet behind at the first of the series of imperfectly triangular white spots bordered and set off with black, which are continued throughout the body; becoming gradually more ill defined towards and upon the tail. The lower-parts are now pearly-white, a trace only of the lateral abdominal lines appearing as a row of small spots on each side, though not regularly upon every scuta. The full grown adults is altogether much darker, with the white markings tending to become obsolete; a conspicuous median black stripe is continued over the forehead and occiput, and another proceeds backwards from each eye. Abdomen more or less speckled, with the lines of lateral spots more or less apparent.

(6906) *Tropidonotus zebrinus*, Blyth, *n. s* (*Tr. chrysargos* Schlegel, var. ?) Vertical plate twice as broad as the superciliary, and of same length. One præ-orbital and three postorbitals. Upper-parts (in spirit) deep plumbeous, obscurely spotted with black; the sides and under-parts yellowish-white, the former throughout banded with black, and each band having a whitish spot (probably yellow in the recent specimen) above it. Head plumbeous above, the labial plates with a triangular black spot at the point of junction of each of them above and exhibiting thus two larger spots posterior and two smaller anterior to the eye. Two or three distinct black bands across the nape. Rows of scales 15: scutæ 137; scutellæ 96 pairs. Length of specimen (which is quite young) 10⅜ in., of which the tail measures 8½ in. From Mergui. Capt. Berdmore.

(6907) *Tropidonotus angusticeps*, Blyth, *n. s.* Head narrow, not broader than the neck, little depressed, the eye much larger than in *Tr. subminiatus*, and vertical shield broad. Colour (in spirit) plumbeous above, uniformly spotted with black throughout; below whitish, more or less variegated with black on the hinder half: head without markings; but a V-like mark on the nape with apex towards the occiput, becoming obsolete in adults. One specimen has 4 præ-orbital and 5 post-orbital plates; but in general these number 2 or 3 and 4: and same specimen is remarkable for having no dark markings above, but some indistinct pale spots, probably of a vivid colour on the recent Snake. In an adult the black spots on the upper parts are almost confined to the skin between the scales, and there is no blackish colour on the hinder half underneath. Seventeen rows of scales: scutæ 167, 72; scutellæ 57, 67 pairs. Length of an adult 41 in., of which tail 8½ in. Inhabits Assam and Arakan.

(6908) *Tropidonotus Subminiatus* (?), Schlegel. A mostvariable species, affined in structure to the preceding. One 16 in. long has the upper-parts speckled over with black and bright yellow on a greenish ground, under-parts whitish throughout. Head plumbeous above: a large black patch be-

hind the occiput, surrounded except in front by orange-yellow border, behind which again the nape is bright vermillion, chiefly between the scales. A conspicuous black streak below the eye, and two black spots posteriorly towards the gape: scutæ 147 ; scutellæ 94 pairs. Another rather larger, has the back almost plain dark plumbeous, paler and spotted with black towards the nape ; lower-parts freckled with minute black specks, and increasingly so to the tail-tip : occiput and nape green, crossed with two orange bands, becoming redder posteriorly. All the upper labials with a black stripe, where each adjoins the next. Scutæ 157 ; scutellæ 66 pairs. A third, 29 in. long, has the upper-parts dark olive brown, with bright yellow spots on the skin between the scales ; the lower dull pearly : nape green, followed by a vermillion space : a single broad black streak below the eye. Scutæ 155 ; scutellæ 83 pairs. The above three specimens are from Assam. Numerous others from Rungpore and Arakan, are mostly similar to the last, with generally a double black streak below the eye uniting beneath, rarely a single streak, and one large specimen has no streak below the eye : this would seem to disappear with age. Rows of scales 17, 19 : scutæ 150, 166 ; scutellæ 60 to 90 pairs, but generally intermediate. Tail in all suddenly tapering. Largest specimen, which is much thicker than the others (denoting maturity), 3 ft., of which tail 8½ in.

(6909) *Tropidonotus macrops*, Blyth *n. s.* Eye very large ; the vertical shield broad, and posterior frontals twice as large as the anterior. Prevailing hue of the upper-parts a dull vinaceous : many of the scales margined with black, and some with yellow : a series of yellow spots (about 50 in number) continued along the spine to the extremity of the tail, with a row of black spots on either side. Head and neck plumbeous diverging on the nape where the first of the series of yellow spots is placed ; a slight whitish V-like mark in occiput. Lower parts yellowish-white, with specks and powdering of dusky ; more prevalent towards and upon the tail. Seventeen ranges of scales : scutæ 164-6 ; scutellæ 130-46 pairs Length of largest specimen 31 in., of which tail 6¼ in. Two specimens closely resemble, but a third presents some differences of colour. The row of yellow spots is wanting along the spine, also the dark band on the nape, and the pale V-like occipital mark : the under-parts also are more uniformly whitish. Scutæ 168 ; scutellæ 124 pairs only. All are from near Darjiling. Capt W. S. Sherwill.

(6910) *Tropidonotus dipsas*, Blyth, *n. s.* Form as in *dipsas*, slender : the neck much compressed. Head oval, flattened above ; eyes large ; the muzzle anterior to the orbits short : nostrils small, opening quite laterally ; the nasal and rostral shields being vertical. General colour plumbeous above, obscurely spotted with black, and two barel traceble lines of whitish spots, more distinct to wards and upon the neck where they increase i size towards the head. Occiput black, with an elon gated white medial spot, and white V-like mar behind it, the apex of which is prolonged a littl backward. A narrow black line from eye to ey passing in front towards the muzzle ; and broade black streak posterior to the eye, continued as series of longish oval spots on the sides of th neck bordering the scutæ. Some black mark also on the upper labials. Under-parts whit throughout, with a row of minute black specks o either side. Rows of scales 17 : scutæ 169 scutellæ 99 pairs. Specimen (young) 21½ i long, of which tail 4¼ in. Vicinity of Darjiling Capt. W. S. Sherwill.

(6911) *Tropidonotus Platyceps*, Blyth, *n. s.* A beautiful species, with small and flat (but not broad head, having much the aspect of a Herpetodryas (Perhaps H. Frænatus, Gray, (*Ann. M. N. H.* Dec. 1853, p. 391,) may prove to be a variety. Young specimens generally shew the two whit dots on the occipital shields, seen also in Tr UMBRATUS. Frontal and nasal shields vertical Head and upper-parts deep green with slightl black-edged scales ; the lower-parts brigh yellow, with a coral-red stripe bordering th abdominal scutæ on each side, and strongl tinging the sides of the body : subcaudal scutella variegated with greenish-dusky, and traces o the same about the throat. A white streal bordered with black passes backward from be hind the eye and then upward to the occiput, bu this would seem to disappear with age. Suc is (or was) the colouring of two specimens re spectively 27 in. long (of which tail 8 in.), an 21½ in. (of which tail 6⅛ in.). But another 21½ in. long, is remarkable for having the chi and throat quite black, also the black marking of the dorsal scales more strongly developed tha in the others, and the black marblings of the sub caudal scutellæ are more intense : the latera coral-red band is merely indicated ; and th white streak behind the eye is more strongl developed and continued forward to the muzzle Number of rows of scales 19 : scutæ 174, 86 scutellæ 89, 99 pairs. Another, from Assam appears identical, but has 155 scutæ only ; an in spirit appears of a dull olive-green colour, wit two longitudinal pale ruddy dorsal stripes, muc as in Tr. stolatus, and the lower-parts ar marked throughout with a black lateral spo on each scuta, seen also in the black-throate specimen. A small young example from th Khasya hills is similar to that from Assam. Th three first described are from near Darjiling. Cap W. S. Sherwill.

(6912) *Elaps Personatus*, Blyth, *n. s.* Vertica plate about equal to the posterior frontals supra-orbitals large, subquadrangular, elongate Colour of upper-parts bright red in the adult

brown or reddish-brown in the young; marked throughout with from 22 to 38 narrow black semi-annuli, having slight whitish margins: under-parts dull yellowish-white, mottled throughout with black patches more or less developed; head black above, with whitish muzzle and broad cross band posterior to the eyes. Scales lustrous; 13 rows above: scutæ 196, 218; scutellæ 29, 34 pairs. Length of largest specimen 24¼ in., of which tail 2¾ in. From Assam.

(6913) *Rana Robusta*, Blyth, *n. s.* A moderately large Frog from Ceylon. Limbs exceedingly thick and massive; the third-digits fully webbed. Skin subgranulose, especially on the lower-parts. A slight transverse fold on the breast. Colour dusky above, with a large black patch on the back another on the croup, and smaller lateral patches. Lower parts yellowish-white, with a V-like mark on the lower surface of the thigh in one of two specimens, both males. The same individual has dusky spots or imperfect streaks on the lower surface of the thigh, and its posterior surface is marked with longitudinal streaks of alternating black and yellowish-white. Digital membrane speckled with black. Length from snout to vent 3 in., and of hind-limb 4 in., of which the foot is half. Presented by Dr. E. F. Kelaart.

(6914) *Lymnodytes maculatus*, Blyth, *n. s.* Differs from L. erythræus by the slightly but distinctly papillose skin of the back, and non-verrucose posterior surface of thighs; by its shorter and stouter limbs, and short anterior digits, the two outermost of which have their terminal disks smaller than in L. erythræus. There is a broad black band from nostril to loin, bordered above and below by narrow pale yellow streaks. Entire lower-parts spotless light yellow, as also the upper lip. A black spot at the shoulder, and line along the posterior surface of the four-limb. One or more similar lines on the hind-limbs; the thighs beautifully mottled with black; and a black medial line along the back, which becomes double over the loins. Length of male from muzzle to vent 2⅜ in.; of hind-limb 3¾ in.; of which the foot measures 1¾ in. Hab. Ceylon. Dr. E. F. Kelaart.

(6915) *Lymnodytes lividus*, Blyth, *n. s.* A large species with short and remarkably fleshy thighs. Colour dusky above, paler and tinged with ruddy on the sides which are spotted with black. Chin, throat and breast, minutely variegated pale and dusky. Belly and thighs underneath, sullied whitish. Above, the thighs and shanks are paler than the back and tinged with ruddy, having several dusky cross-bands. Posterior surface of thigh smooth or non-verrucose. Length from muzzle to vent 3¼ in., and hind-leg 4½ in., of which the foot is 2¼ in. From Colombo. Dr. E. F. Kelaart.

(6916) *Megalophrys gigas*, Blyth, *n. s.* (Edible Frog of Sikkim, vide *J. A. S.* XXII. 557.) Adult male 4½ in. from snout to vent; hind-foot 7¼ in., of which foot from heel 3⅜ in. Breadth of head 2 in. Interdigital membrane of the hind-foot well developed. Fore-limbs extremely thick, with the skin of their inner surface highly granulose. Upper-parts uniformly dull reddish or purplish black, a little marked with white on the posterior surface of the thigh: below whitish, much suffused with dusky, and some irregular white spots or marblings along the rami of the lower jaw, and also on the sides of the body and along the sides of the limbs. What appear to be the young have the head proportionally less broad than in the adult, and the upper-parts have more of an olive tinge, and the under-parts are ochreous-yellow, mottled with reddish brown. Hab. Sikkim Himalaya. Capt. W. S. Sherwill.

[Two other forms affined to Megalophrys, and like it and Bombinator, exhibiting no external *tympana*, also sent from the Sikkim Himalaya by Capt. Sherwill, we have at present no means of classifying, for want of books of reference.]

(6917) *Bombinator sikimmensis*, Blyth, *n. s.* Size and general character of the European B. igneus. (Laur.), but the hind toes free or slightly webbed only at their extreme base. Male with four large subquadrilateral papillose callosities on the breast, and corresponding callosities on the upper surface of the innermost digits of each fore-foot. The tubercles of the head, body, and limbs, much more developed in males than in females. On the back are four irregular rows of large porous tubercles, and numerous minute tubercles without pores stud the rest of the upper parts. On the hind-limbs small porous tubercles are very regularly disposed. Colour dull livid olive green above, a little banded on the limbs; flame-coloured below more or less marbled with dusky. Presented by Capt. W. S. Sherwill.

(6918) *Homolopsis*. In a collection of snakes from North Carolina presented to the Society by the Rev. F. Fitzerald, through the American Consul, are two fine species of Homolopsis, which do not appear to be described either by Dr. Schlegel, or among the "extralimitals" of New York by M. Dekay, or in other American lists to which we have access. They may, therefore, be here briefly characterized as probably new and undescribed.

(6919) *Homolopsis Reinwardtii*, Schlegel. Form thick and massive, with subtetragonal section; the head broad, subtrigonal, flat, much broader than the neck: body covered with 19 rows of broad, smooth and shining imbricated scales, which on the sides are much larger and broader than upon the back; eyes placed very forward: a single anterior frontal, and series of 7 upper and 9 lower labials. Teeth very minute. Colour black above, yellowish-white below; the sides transversely banded with about 75 bands in all, the black of the back descending and the yellowish-white of the lower parts ascending alternately, and the former continued irregularly across

the lower-parts where the two colours are about equally distributed. Head black, irregularly variegated with yellowish-white: the rostral and labials of the latter hue, and all except the last three inferior labials having a medial black spot. Most of the shields of the chin and throat are also thus spotted. Scutæ 200; scutellæ 37 pairs. Length of specimen 4 ft., of which tail 4 in. Head $1\frac{3}{5}$ in. in greatest breadth.

(6920) *Homolopsis Parviceps*, Blyth. Form moderately thick, attenuating towards the head, which is small and not broader than the neck; body covered with 19 rows of smooth shining imbricated scales, which on the sides are much broader than upon the back; tail with only 8 rows of hexagonal scales besides the scutellæ. Two anterior frontals, half the size of the posterior. Teeth minute. Colour black above, yellowish-white beneath, the latter extending over $2\frac{1}{2}$ rows of scales on either side. Three yellowish-white dorsal stripes, one median extending from the occiput to the middle of the tail, the others lateral and occupying part of the 5th and 6th rows of scales. On the lower parts, also, two lines are formed of broad black spots, one on either side of each scuta, and along the middle of the body is a third and median row. The shields of the head are margined and variegated with yellowish-white, and each labial except the posterior three lower are whitish having a large black spot. Scutæ 161; scutellæ 45. Length of specimen $2\frac{1}{2}$ ft., of which tail $5\frac{1}{2}$ in.

TORTOISES.

(6921) *Testudo Megalopus*. Since the former part of the foregoing paper was published, the author has had an opportunity of shewing the Society's specimens of Burmese Tortoises to the Rev. J. Mason of Maulmein, who has long devoted considerable attention to the zoology of the Tenasserim provinces. This gentleman immediately recognised the Testudo Megalopus (*J. A. S.* XXII, 640,) as the species with which he was most familiar in Burma: at once distinguishing it from the Indian T. Stellata: and as his judgment is worthy of confidence, we may pretty safely now rank T. Megalopus as a third Burmese species of the genus. At about the same date of publication, appeared a paper by Dr. Gray on some undescribed species of reptiles collected by Dr. Joseph Hooker in the Khasia mountains and Sikkim Himalaya. Among them, his genus

(6922) *Dopasia* approximates Blyth's Ophiseps (*J. A. S.* XXII, 655), but is evidently distinct; the position of the vent in Dopasia is not stated.

(6923) *Parias* maculata, Gray, is identical with Trigonocephalus nilgiriensis, Jerdon, *J. A. S.* XXII, 524, as we find upon comparison of a fine Assamese specimen with the description by Messrs. Jerdon and Gray, and with a coloured figure sent by Mr. Jerdon. Mr. Gray does not give the number of rows of scales or of abdominal or caudal plates. Mr. Jerdon writes—"23 rows of carinated scales. Scutæ 142; scutellæ 36." The Asamese specimen has 23 rows of the first; scutæ 143; scutellæ about 36 pairs. Length $14\frac{1}{2}$ in., of which tail barely 2 in. Colour pale, variegated with dark blackish-edged patches on the upper parts, forming irregular transverse bands, more or less divided and the halves alternating; below whitish, the plates speckled laterally with dusky; chin and sides of throat blackish; a whitish band proceeding backward from the eye, another from mouth, and between them a black space. This Asamese specimen has an elongated black occipital spot, succeeded by two lateral streaks which unite posteriorly; a somewhat different arrangement from that in Mr. Jerdon's drawing, and again different from that exhibited in an example from the vicinity of Darjiling, which also has the under-parts much more mottled with black; but all are evidently identical in species.

Further Notices and Descriptions of various Reptiles, new or little known.—By E. Blyth, Esq.

(6924) *Testudo Pkayrei*, Blyth. Great Burmese land Tortoise. Carapax smooth, as in T. RADIATA and T. ANGULATA, but much flatter; oblong; subquadrate, its free marginal plates reverted and moderately serrate. Nuchal plate broader than long. Caudal plate *double*. Gular plates longer than broad, moderately notched: anal broader than long, and deeply notched. Beak unemarginate. Fore-limbs covered with very long and thick imbricated scales, much as in a Pangolin; the claws elongate, strong and thick: similar great elongate scales at the heel; and a group of five principal obtuse spines on either side of the tail, the medial of them remarkably strong and thick. Two or more smaller spines or thick elongate scales above the tail. Colour wholly black, or mingled more or less with buff-yellow. In the young, the scales are probably of the latter hue, with gradually increasing black centres. Limbs deep brown; some of the claws yellow in some specimens; the head and neck paler brown, strongly tinged with yellow. Our largest specimen is 20 in. long in a straight line, or $22\frac{1}{2}$ in. measured over the curve of the carapax, from front of nuchal plate to middle of caudal notch: greatest breadth $14\frac{1}{2}$ in. or $20\frac{1}{2}$ in. following the curve, from one obtuse lateral angle to the other. Height $1\frac{1}{4}$ in. Head to occiput $4\frac{1}{2}$ in. The shell of this individual is wholly black, with merely a few slight indications of the ochreous-yellow colouring: all the claws deep brown. Another, rather smaller, has the appearance of great age, with most of the plates of its carapax more or less completely united so that the form of some cannot be traced. Colour irregularly mingled black and dull buff-yellow; the plastron chiefly black and

several of the claws are yellow wholly or in part. Hab. Arakan ; Tenasserim Provinces. Specimens presented by Capt Phayre.

(6925) *Testudo elongata*, Blyth. Small Burmese land Tortoise. Carapax elongate, becoming more so and quite smooth in adults, wherein it approaches to a semi-cylindrical form ; flattish, sub-even, the three medial vertebral plates lying almost in a plane, and the free marginals slightly reverted. Caudal broader than the last vertebral. Nuchal twice or thrice as long as broad, and even with the borders of the anterior marginals. Gulars not notched, or but very slightly so. Caudals divergent from base, and transversely elongate-triangular, broader than long, forming a slight lateral notch with the ventrals. Beak laterally notched or distinctly three-pointed. Scales of the limbs rather small, contrasting much with those of the preceding species. Colour of half grown specimen orange-yellow, each plate having a large black centre, which mostly disappears with age, leaving a few more or less radiating black spots on those of the carapax, and often a black spot on only the large medial plates of the pastron. Head and limbs brown, much tinged with yellow. Length of an adult 13 in. in a straight line, by 8 in. across, or rather more towards the hinder part of the body. Height 5¼ in. Head to occiput 2¾ in. Hab. Arakan. Specimens presented by Capt. Phayre.

According to Dr. Helfer, Tortoises abound in the Tenasserim Provinces, and are much eaten by the Peguers and Karens, who train dogs to search for them.

In India proper and also in Ceylon, only one species of land Tortoise occurs viz.

(6926) *Testudo stellata*, Schweigger, a figure and interesting notice of which are given by Capt. Hutton in *J. A. S.* VI, 689, under the supposition of its being T. geometrica. The latter is a S. African species, very similar to T. stellata, but having a distinct nuchal plate, which T. stellata does not possess, and exhibiting certain other distinctions. Among some Tortoises, however, presented to the Society by Capt. Shervill from S. Africa, are two small specimens of *geometrica*, and one full grown example which can in no way be distinguished from the Indian *stellata*. The latter does not inhabit Lower Bengal, and is rarely brought alive to Calcutta. One much more commonly brought there is the T. radiata, Shaw, a larger species remarkable for its very hemispherical form, and which is said to be indigenous to Madagascar, in which case it is probably brought to India from the Mauritius. The very large specimen referred by Blyth to stellata (v. *actinodes*) in a note to p. 462 *ante*, he now thinks, after much consideration, to be distinct, and indicates as,

(6927) *Testudo Megalopus*, Blyth, *n. s.* Similar to T. stellata, but attaining a much greater size, with proportionally much larger feet and claws. The colours duller and therefore less strongly contrasting, and the lines radiating from each boss of the carapax more numerous. Fore-feet with two large claw-like scales of equal size behind the palm, and no others approaching them in size. Claws of hind-feet fully twice as large as in adult *stellata*. Length of carapax, measured in a straight line, 12 in., by 7½ in. in diameter-breadth. Hab.— ?

(6928) *Testudo*. There are several living specimens about Calcutta, of the great Seychelle Tortoise, miscalled T. Indica by Gmelin, and under which Mr. Gray unites no fewer than seven of the supposed species admitted by M. M. Dumeril and Bibron. According to Dr. Schlegel, "The Indian Tortoise [so-called], probably indigenous to Madagascar and the neighbouring isles, has been acclimated in the Gallapagos Isles, in California, and on several other points on the western coast of South America :" but we have been assured, on good authority, that numerous specimens kept in gardens in the Mauritius, have all been brought from the Seychelle Islands in the first instance, that they are still commonly brought from those islands to the Mauritius, and thence we believe the few in India have been imported. It is most assuredly not an Indian reptile, nor have we heard of its ever propagating in this country. [Mr. Blyth adds :—In the Mauritius I am informed that it is eaten. The largest I have seen is in my own possession, alive, and measures 4 ft. 4 in. in length over the curve of the carapax, or 3 ft. 5 in. in a straight line ; transversely 4 ft. 2 in. over the high arch of the carapax, or in a diameter line 2 ft. 2 in. : height, when not raised upon the legs, *i. e.* height of shell, 20½ in. ; when walking, the shell is lifted fully 6 in. from the ground, if not more : circumference of hind-foot 17½ in. A scientific friend, recently from Jamaica, assures me, that this great Seychelle species is quite distinct from the great Gallapagos Tortoise, which has bred and multiplied in Jamaica and other W. India islands. Curious, that these gigantic land Tortoises (diminutive, however, in comparison with the extinct Indian Colossicheilis) should thus be indigenous to small oceanic groups of islands, in each case remarkable for the peculiarities of both their *fauna* and *flora*. We are reminded of the great wingless birds (Dodos and Solitaires) of the Mauritius, Bourbon, and Rodrigues ; those also of N. Zealand and of Madagascar ; the Megapodius of the Nicobars, and its congeners of other islands ; the singular and quite recently extinct great Parrot of Philip Islet near Norfolk island, with its sole congener in N. Zealand ; the Owl-like nocturnal Cockatoo of N. Zealand, also close upon extirpation, &c. The majority, if not all, of these islands appearing to be remnants of what may be comparatively

termed continents, each with its peculiar centre or centres of creation. In all these supposed reliques of ancient lands, with the chief exception of Madagascar, mammalia are rare, and are chiefly or wholly *Cheiroptera*, *Rodentia*, and *Marsupialia*; the two former orders comprising the only placental mammalia of Australia; and one species of each of these placental orders being the only known indigenous mammals of N. Zealand, though a large Badger-like animal has lately been reported in the latter country, in all probability a marsupial. Madagascar is very remarkable for the extraordinary development of the quadrumanous group of Lemurs, among the higher placental mammalia; and has even a rodent Lemur in Cheiromys, as Australia has a rodent marsupial in Phascalomys. Its other placental mammals are mostly of peculiar genera, unknown even on the neighbouring continent of Africa; and no marsupial has been discovered there.]

(6929) *Testudo Horsfieldi*. From Afghanistan Mr. Gray describes a T. Horsfieldi, which he suggests may be T. Iberia, Pallas, *Faun. Casp*, t. 5. The Society's museum possesses a land Tortoise from that country, which however belongs to the genus Homopus, having but four claws to each foot. It may be thus described, viz;

(6930) *Homopus Burnesii*, Blyth. Carapax squarish, depressed, broadest posteriorly, where the free marginals are a little reverted and distinctly serrate. Anterior border straight, the nuchal plate well developed. Caudal as broad as the last vertebral, and broader than the other vertebral plates. Nucleus of each lateral or dioscoidal plate near its inner or upper border. Gular plates longer than broad, the two forming a nearly equilateral triangle. Anals oblong, divergent, forming a rather deeply notched border. Scales of forelimbs rather large, and those to the front mostly uniform in size. Claws elongate, or not worn down by attrition. Beak three-pointed. Colour yellow above, with black nuclei to the plates: those of the plastron black with yellow border. The head and limbs appear to have been yellowish. Length of carapax 6 in., by 5¾ in., measuring straight. Height 2⅞ in. Head to occiput 1⅓ in. This large specimen was procured in Afghanistan by Sir A. Burnes. A very small Homopus in spirit, also from Afghanistan, is doubtless the young, though exhibiting some remarkable differences in the shape of the upper plates. In this the nuchal is roundish, or as broad as long; and all the vertebrals are about equally broad. Colour dull yellow throughout. Presented to the museum by Terrapus. Dr. Allan Webb.

Of the numerous true Terrapins (*Emys*) of the Gangetic rivers, only three species are common in the vicinity of Calcutta; and adults of all are rarely met with. These are.—

REPTILIA OF SOUTHERN ASIA.

(6931) *Emys Thurgii* Gray, which attains to a much larger size than has hitherto been described, adults measuring 20 to 22 in. (straight) in length of carapax.

(6932) *Emys Tectum*, Gray; the adults of which measure similarly 6 in.; and E. Hamiltonii, Gray, the adults of which measure similarly 5½ in.

(6933) *Emys Tentoria*. The only other species we have yet met with from this vicinity is E. Tentoria, Gray, one young specimen only. This Mr. Gray describes from the Bombay Dukun, where procured by Col. Sykes; and Sir Alexander Burnes obtained an adult from the Indus, which is now in the Society's museum. These two specimens differ in some respects from each other, also from Mr. Gray's description, and from Buchanan Hamilton's coloured figure, the two latter again presenting certain discrepancies one from the other. The species is nearly allied to E. Tectum, Bell, but at all ages has the median keels to the first three vertebral plates much less devolped, and the whole carapax is conspicuously flatter and broader. A peculiarity of both species consists in the peculiar decanter-shaped form of the fourth vertebral plate. Comparing the adult of E. Tentoria from the Indus (length of carapax, measured straight, 6¾ in.,) with an adult of E. Tectum from the Hughly (carapax, similarly measured, 6 in.), the first vertebral plate is proportionally much broader in the former, pentagonal, narrower to the front, with a broad straight transverse base posteriorly, and the keel little developed; whereas the first vertebral plate of E. Tectum is pentagonal, broader to the front, with a rounded posterior base, and much more developed keel. In the former, the first vertebral is considerably larger and somewhat broader than the second, whereas in the latter it is sub-equal or even rather smaller than the second: in adult E. Tentoria the second vertebral plate is hexagonal but almost square, and rather broader than long, with the keel nearly obsolete; in E. Tectum, somewhat pear-shaped, truncate to the front and narrowing and curving off posteriorly, with the keel strongly marked: the third vertebral plate of adult Tentoria is quadrangular, longer by half than broad, with the keel quite obsolete on the anterior half, and flat and but little raised posteriorly; in E. tectum it is hexagonal, with the keel strongly developed and prolonged backward. A narrow black line is continued along the spinal ridge of E. tentoria; whereas the middle of the ridge is broadly white in E. tectum, bordered by a black line on either side. The plastron of E. tentoria is blackish-brown, with a pale border to each plate; in E. tectum pale with two or three distinct blackish patches on each plate. Comparing the young of the two species, the first vertebral plate forms a much broader

pentagon in E. tentoria, being equal in breadth to the second; in young E. tectum the first vertebral plate is considerably narrower than the second: the second vertebral plate in young tentoria forms a heptagon with the base posteriorly; in young tectum a pentagon with rounded apex and anterior base: the third in young tentoria is subquadrilateral, somewhat longer than broad with the keel a little produced posteriorly; in young tectum a pentagon with its base to the front, and the keel much broader and more prominent. Yet, notwithstanding these great differences of detail, and also of the colouring of the head, neck and limbs, the two species are very liable to be confounded on a superficial glance.

(6934) *Emys Trijuga*, According to M.M. Dumeril and Bibron, Schweigger, was obtained by M. Duvaucel from the "salt-water lake" lying east of Calcutta; but of the numbers of Terrapins which we have seen from that locality, we have sought in vain for this species, which belongs to the peninsula of India, and is the only one which has been there observed, with the exception of Col. Sykes's specimen of E. Tentoria.

(6935) *Emys Dhongoka*. [Since the above was printed, we have obtained another Emys from the vicinity of Chaibasa, which appears to be the young of E. dhongoka; and Mr. Jerdon assures me that a large species abounds in the Nerbudda, 2 feet and upwards, which is probably the same: it is not referred to in Mr. Jerdon's paper, p. 463 *ante*.]

(6936) *Emys Sebæ*. In Ceyon E. Dhongoka is replaced by the very distinct E. sebæ, Gray.

(6937) *Emys Dhongoka*. On the Arakan coast, adults of Emys Dhongoka, Gray, approaching to 2 feet in length of carapax, would appear to be very common; but the only young specimen which we have seen of this species was sent down alive from Assam by Major Jenkins, and is now mounted in Calcutta museum. The adults have much the appearance of Tetraonyx Lessonii, D. and B., but are readily distinguished by having five instead of four claws to the fore-feet.

(6938) *Tetraonyx Lessonii* abounds at the mouth of the Hughly, and great numbers are brought to Calcutta, where they are eaten by particular castes of Hindus and are even kept for sale in tanks. Though the water-Tortoises generally are much used as food, the species chiefly consumed, or at least which are brought in greatest quantity for that purpose, are Tetraonyx Lessonii and Emyda punctata. The latter appears to be the most generally diffused species of Tortoise throughout the whole of India and Ceylon, and is very abundant in Lower Bengal, burrowing deep into the beds of tanks when the water dries up. A large one which escaped into the Bengal Asiatic Society's compound was found several months afterwards in a healthy state, buried among the roots of some guinea grass.

A small and evidently young Emys from Arakan or Tenasserim would seem to be

(6939) *Emys ocellata*, Dumeril and Bibron. The colouring agrees with the description; the details of structure less completely. Length of carapax 6 in. (measured straight). It is affined to *E. Thurgii*; and, as compared with a specimen of *E. Thurgii* of the same size, it is at once distinguished by having the whole under surface of the shell spotless yellowish-white, and each lateral or discoidal plate of the carapax is marked in the centre with a large round reddish-brown spot, surrounded by a pale areola; an interrupted black line along the spinal ridge, which is raised into keels on the first four vertebral plates. These are of equal breadth, whereas in *E. Thurgii* the first is much narrower than the others. Nuchal plate twice as long as broad and throughout equal; whereas in *E. Thurgii* it is triangular with posterior base. Hindmost vertebral plate much narrower than in *E. Thurgii*; and the posterior marginals and especially the caudals are much smaller than in that species. Colour of the upper parts greenish-olive-brown, with the ocelli before mentioned, which probably become obscured with age. Head brown above, with yellow superciliary line meeting its opposite over the nostrils, and another proceeding backward from the eye. Limbs and under parts apparently yellowish without markings. There is a species of Chamelon in the Society's old collection, the origin of which is unknown, but it would appear to be undescribed. It would seem to be most nearly affined to C. cucullatus, Gray, and has the occipital flaps of both that species and Ch. delepis, Leach.

(6940) *Chameleo verrucosus*, Blyth. Body minutely tuberculated, with larger tubercles regularly intrespersed throughout. The latter are smaller and contrast less strongly on the limbs and tail, and are more thickly set upon the limbs. Ridges of the back and throat serrated, the tubercles becoming smaller towards and upon the tail. Beneath, the tail is smooth, though tending to exhibit a slight serrature towards its base. Superciliary ridges not uniting together, either before or behind; and a small medial occipital ridge continued to the base of the two lateral flaps or lappets of skin. Colour of the specimen blanched; but there is a strongly marked black streak proceeding backward from the axilla, and surmounted by a white streak, the two occupying the space which may be concealed behind the humerus. Length 11¼ in., of which the tail is 6 in. Hab. unknown.

(6941) *Leiurus Berdmorei*, Blyth (*Geckoidæ*.) Agrees with Mr. Gray's definition of *Leiurus*, except that there is no appearance of the toes being webbed at base. Colour grey, with 4 longitudinal blackish streaks along the back and

sides, 3 or 4 interrupted crossbands of the same on the upper surface of the tail, a medial black streak on the nape, and others successively diverging on each side of it, and a black streak from before the eye continued to the shoulder. Some mottling also on the limbs. Hab. Mergui, where procured by Capt. Berdmore.

(6942) *Stellio.* The genus *Stellio* is new to the Indian fauna. A species from Upper Hindustan cannot be safely separated from the Arabian *St. Cyanogaster*, Rüppell, unless upon comparison of specimens. The tail, however, appears to be longer; and there is a slight gular *fanon*. Specimens vary much in colour. An adult from Mirzapore, presented by the late Major Wroughton, measures 12½ in. long, of which the tail is 8 in. Throat blue, spotted over with yellowish-white, deepening to purple on the *fanon* which is less spotted. The rest of the lower parts are yellowish-white, marbled on the transverse fold of the neck and immediately behind it with blackish, and spotted with the same on the breast and belly, the spots becoming less numerous on the latter. Upper parts dark olive-green the back and sides speckled over with whitish. Two smaller specimens were presented to the Society by L C Stewart, Esq. now of H. M. 61st Regt. from Wuzeerabad. Length of one 8¾ in., of which the tail measures 5½ in. In these the under parts are yellowish-white, suffused or marbled with bluish or pale dusky on the throat, and slightly spotted with the same on the breast. Upper parts paler olive-green than in the large specimen; the back and sides speckled with yellowish-white in one, as in the adult example, with traces of dusky marbling on the back; in the other, the back is much more marbled and blotched with dusky, and has only a few largish dull white spots on the back and sides, while the limbs and tail are banded, and there are three dark transverse lines over each eye. If new, it will be the St. indicus, Blyth.

(6943) Genus *Calotes*, Kaup. We have now nine well marked species of this genus in the calcutta museum. The first three are distinguished by a pit or fold before the shoulder, which is lined with minute scales.

(6944) *Calotes. emma*, Gray (vide "Proceedings of the Asiatic Society" for May, 1853, p. 413.) Inhabits Mergui, and probably other parts of Burma, ranging northward perhaps to the Khasya hills; but extremely doubtful as an inhabitant of Afghanistan. We have elsewhere expressed our suspicion (*loc. cit.*) that collections made by the late Dr. Griffith in Afghanistan and in the Khasya hills had become mixed and confounded, and hence that Mr. Gray had been led to assign his Calotes emma, C. maria, C. minor, and Salea Horsfieldi to Afghanistan, and two of the four to the Khasyas also; countries so extremely different, that it is most improbable that the same species would be found to inhabit both of them.

(6945) *Calotes mystaceus*, Dumeril and Bibron. (Described *J. A. S.* XXI, 754). Inhabits Burma, and also the mountainous parts of Ceylon. Hind-toe reaching to the ear.

(6946) *Calotes Rouxi* (?), Dumeril and Bibron. Three adult specimens and another half-grown forwarded by Dr. Kelaart from Newera Elia, in Ceylon, accord fully with the description as regards structure; but the colouring is remarkable, and different again from that of Mr. Jerdon's supposed C. Rouxi of S. India. Pit before the shoulder more developed than in C. Mystaceus, and partially black. Hind-toe reaching to the eye. A row of 3 or 4 raised spines above the tympanum; and nuchal crest moderate and gradually diminishing to the tail. The latter is tumid at base, and soon attenuates rather suddenly, the tumid portion exhibiting a median ridge of very broad keeled scales. Caudal scales towards the base of tail much larger than those of the body. Throat scales very broad and flat, with a median row of narrow compressed scales imparting the appearance of a small *fanon* or dewlap. A half grown specimen (in spirit) is blue, with the tail reddish-brown to near its base, and marked with an irregular double series of *ocelli* which are white, having a black border. A few similar *ocelli* are seen bordering the low spinal crest. There is a black mark between the eye and the ear, and another below the eye; and a tinge of ruddy on the throat, about the tympanum, and on the occipital and tympanic spines. Adults (in spirit) have the body and limbs blue, the tumid base of tail green, and the rest of the tail dull red-brown, with *ocelli* less bright than in the young. Borders of lips black, continued as a broad black band (more or less variegated with ruddy-white) to the shoulder-pit. Throat whitish tinged with ruddy and strongly contrasting, as also a white band from the tympanum continued over and passing the shoulder-pit. In some, the shoulder pit is also posteriorly margined with a white mark; and raising the fore-leg, two or three additional white stripes are seen, oblique and successively more inclining to the horizontal. The limbs are also banded with white; but these markings are often indistinct or obsolete. Tumid base of tail bright orange underneath in some specimens. C. Rouxi is described from Burma; but as we possess the preceding species both from Burmah and the mountains of Ceylon, it is the less improbable that the present may have the same habitat.

(6947) *Calotes Gigas*, Blyth, (Supposed C. ophiomachus, *J. A. S.* XI, 870). Resemble C. versicolor, except in being much larger, having no tract of gular *fanon*, and a *double* nuchal crest of spine-like scales, ½ in. long in the specimen under examination. Dorsal crest also propor-

tionally more developed than in C. versicolor, and terminating abruptly over base of tail. Length of head and body 5¾ in. Of tail—? Of hind-limb 3¾ in. Colour apparently uniform without markings, but the specimen is much blanched. Hab.—?.

(6948) *Calotes versicolor*, Daudin. The most common and generally diffused species, inhabiting all India and Ceylon, from the base of the Himalaya southward, and (according to Mr. Gray) also China and Afghanistan (vide, however, remarks on C. emma). It is the only species we have in Lower Bengal, where it is excessively abundant particularly in gardens. Sir A. Burnes sent a specimen from Sindh; and we have also one from Rangoon. In the last, however, the scales are somewhat smaller than in Indian specimens, and the two detached spines on the tympanic ridge are remarkably minute; but there is no other difference. Ceylon specimens, on the other hand, appear commonly to attain a greater size, with somewhat larger scales, the nuchal and dorsal crests and also the gular *fanon* being rather more developed (and they are then the supposed C Rouxi *apud* Blyth of *J. A. S.* XXI, 354); but smaller and younger specimens from Ceylon are quite undistinguishable from Bengal examples; and it may even be that the latter sometimes attain the size and general development of the Ceylon reptile. [Some *living* examples sent from Galle by Dr. Kelaart are quite undistinguishable from living Bengal specimens.] In S. India, again, the changes of colouring (as described by Mr. Jerdon) differ from those of C. versicolor of Bengal, and are perhaps the same as in the Ceylon animal. Here the colours are changeable, but no yellow is ever seen; and in the months of May and June, the males chiefly are often observed with the head and anterior third of the body, inclusive also of the fore-limbs, tolerably bright red, a large black patch before the shoulder, and all the rest plain greenish-brown. They are often altogether of the latter hue without markings; or the markings come out more or less strongly. The reptile is then commonly brown, lighter or darker, with a series of transverse dusky bands, broken on either side by a longitudinal whitish band which is evanescent appearing and disappearing and sometimes shewing very conspicuously. A dusky streak through the eye, and three others radiating below and two above it. Three or four oblique streaks on each side of the throat; and others on the limbs. Females are smaller and darker, generally of the hue of the ground on which they lie.

(6949) *Calotes viridis*, Gray. Nuchal crest extremely slight; and no decided spines above the tympanum, but three raised angular scales placed not on a ridge, but disposed triangularly and separated apart. In some specimens, probably the females, the latter are scarcely noticeable.

There is also a row of five flattened scales from below the eye to above the tympanum. Two longest hind-toes of subequal length and reaching only to the ear. Body scales acutely pointed, especially those of the lower parts. Colours green or brown, mottled with whitish and with dark brown; lips black. From S. India.

(6950) *Calotes ophiomachus*, (Merrem). Tympanic ridge with several short and two longer spines. Longest hind-toe reaching to front of eye. Tail extremely long, its terminal three-fourths commonly whitish. General colour green, paler below; with some irregular white transverse bands on the body in adults. Stripe through the eye red; and nuchal crest and throat the same in the breeding livery of the males. One Ceylon example (in spirit) is remarkable for having a longitudinal white lateral band, continued from the shoulder to the tail upon which it becomes broken and lost. Identical from S. India, Ceylon, and the Nicobar Islands.

(6951) *Calotes platyceps*, Blyth. *J. A. S.* XXI 354. Hab. Khasia hills.

(6952) *Calotes tricarinatus* Blyth. Founded ona young specimen of a well marked species, affined by the flat form of the head to the last, but particularly distinguished by having three low crests or keels along the nape and shoulders. An oblique row of six large triangular scales over each tympanum, but no spines (perhaps on account of youth). Longest hind-toe reaching to tip of muzzle. Colour (in spirit) blue above, white beneath. From near Darjiling, where procured by Capt. Sherwill.

(6953) *Aspris*, Blyth, *n. g.* (*Scincidæ*). Affined to Tropidophorus, *Dumeril* and *Bibron*, but differs much in the arrangement of shields upon the head, and the face anterior to the eyes is compressed and narrow, with subacute muzzle. Tongue very slightly notched. Teeth extremely minute. Frontal shield elongate-pentangular, attenuating much posteriorly: front-parietals triangular and contiguous; parietals large, subovate; interparietal smaller, elongate and obtusely pentangular; superciliaries five in number, broad, the two series separated apart by the narrow hinder part of the elongated frontal shield. Scales of the back and upper part of tail rhombic, strongly carinate, the keels running in parallel ridges; of the belly roundish, smooth. Præ-anal scales 2, large, triangular. Toes 5—5, simple, slender.

(6954) *Aspris Berdmorei*, Blyth, *n. s.* Colour dusky-brown or blackish, the throat and belly ruddy-white, with some cross-bands of the same upon the neck and body, broader and more distinct on the former, and white specks on the lips, chin, and on the under and laterial surface of the tail. Eight distinct rows of keeled scales along the back. Length of specimen 4⅝ in., of which the tail is 2⅜ in., and head $\frac{9}{16}$ in., fore-

limbs $\frac{9}{16}$ in.; hind-limbs $\frac{1}{16}$ in. Hab. Mergui, where procured by Capt. Berdmore.

(6955) *Mocoa formosa*, Blyth, *n. s.* Length of one 7 in., of which the tail measures half. Scales hexagonal, in six dorsal series. Præ-anal scales similar to the abdominal. Form robust. Frontal shield elongate-pentagonal, broadest to the front, and rounded posteriorly. Inter-nasal and fronti-nasals lozenge-shaped, or somewhat fan-shaped, broader than long. Fronti-parietals distinct, but unsymmetrically divided. Colour olive-green, with black lateral and pale superlateral bands as usual, the former much speckled with greenish-white, and the latter shewing a series of black spots. Between the pale superlateral streaks are five narrow black lines along the nape and body, variegated with angular greenish-white spots. A few such spots appear also on the upper surface of the tail, caused by a scale variegated with black and greenish-white here and there placed. Limbs minutely pencilled with black, and spots or streaks of the same upon the head. Under-parts greenish-plumbeous throughout. This large specimen was procured at Mirzapore by the late Major Wroughton; and others, from Wuzeerabad, presented by L. C. Stewart, Esq. now of H. M 61st Regt., are smaller and less marked with black, which does not form continuous lines along the back, but variegated scales (black, with pale medial portion,) are throughout scattered, and there are some black markings on the head..

(6956) *Mocoa Sikimmensis*, Blyth, *n. s.* A small species, about 4 in. long, the tail varying in length in different individuals. In one the head and body measure $1\frac{5}{8}$ in., the tail $2\frac{3}{8}$ in.; in another the head and body measure $1\frac{3}{4}$ in., the tail but 2 in. This difference is probably sexual, the former proportions denoting the male, and the latter the female. [The same variation occurs in the species of Riopa, Gray.] Closely affined to the preceding species, but much smaller, flatter, and more lustrous, with proportionally much more slender toes. Colour of the upper parts nacreous olive-green, with three irregular black lines or rows of specks along the back, not always very conspicuous. A broad black lateral band, becoming obsolete along the sides of the tail, is margined with a glistening pale greenish stripe above, and variegated with spots of the same along its lower half and on the outside of the limbs. Under-parts greenish-white, except the tail and below the limbs where the colour is rufous-white. Some have a few dark spots on the throat. Inhabits Sikim, where procured by Capt. W. S. Sherwill.

(6957) *Plestiodon Quadrilineatum*, Blyth, *n. s.* Proportions of Tiliqua; the head small, but its plates almost exactly as in Pl. Laticeps of N. America. Colour blackish above, pearly white below; two dorsal greenish-white streaks, commencing at the nostrils and gradually disappearing at about the middle of the tail; these streaks being exterior of the two alternating series of medial and hexagonal dorsal scales; also a lateral pale streak from fore to hind limb, which is more or less indicated on the neck and base of tail, close upon the whitish hue of the under-parts. Length $7\frac{1}{2}$ in., of which the tail mersures $4\frac{3}{4}$ in.; of hind-limb $\frac{15}{16}$ in. China (Hong Kong ?). J. C. Bowring, Esq.

(6958) *Euprepes macularius*, Blyth, *n. s.* Affined to Eu. cyanogaster. (Lesson, v. *Eu seichellensis*, D. & B.) Like Tiliqua rufescens, (Shaw), but the scales of the upper-parts 5-7 carinate, and colour bronzed olive-green above, pale below; the hinder half of back and base of tail above marked with irregular reddish-brown spots, and a broad reddish-brown lateral streak continued from the ear to the middle of the tail, marked throughout with white, which tends to form continuous lines posteriorly. Terminal half of tail whitish. Arms and hind-limbs speckled with white posteriorly. Length of specimen $5\frac{1}{4}$ in., of which the tail measures $3\frac{1}{2}$ in. Inhabits Rungpore ?

(6959) *Lissonota*, Blyth, *n. g.* Form of Euprepes, but more slender, covered with very smooth minute uncarinated scales. Head short, flat, subtriangular as viewed from above, broader than high, with obtusely pointed muzzle. Tympanum distinct, roundish. Lower eyelid scaly. Palatal incision slight, placed far back. Tongue scarcely notched. Teeth very minute. Frontal shield pentagonal, subtriangular, broad to the front, and elongated to an obtuse point posteriorly; the supra-orbitals nearly meeting across. Inter-nasal hexangular, somewhat fan-shaped. Fronti-nasals small. Fronti-parietals two, contiguous. Inter-parietal squarish or diamond-shaped. Limbs well developed. Toes 5-5, the palms and the heels (or exterior portion of soles) granular. Infra-caudal scales larger than those of the body; and two large triangular præ-anal scales.

(6960) *L. maculata*, [This species would seem affined to *Plestiodon sinensis*, Gray.] Blyth, *n. s.* Colour (in spirit) greyish olive-green, with a double row of irregular dark spots along the nape and back, and a median line of the same along the tail. On each side a dark band is continued throughout, commencing at the nostrils; and beneath this is a narrow pale streak, then a narrow dark one, and finally a few dark spots on the sides of the throat and belly. Upper surface of the limbs variegated throughout. Lower-parts albescent-greenish. Length of specimen,—head and body $1\frac{1}{8}$ in., and tail probably about the same, but the tip is wanting. Fore-limbs $\frac{5}{8}$ in.; hind limbs $\frac{13}{16}$ in.: distance apart of fore and hind limbs 1 in. From Assam, Col. Jenkins.

(6961) *Ophiops Jerdoni*, Blyth, *n. s.* A typical species, dark brown above, black-spotted, with two obscure broad dorsal streaks; below white throughout. Length of head and body $1\frac{1}{2}$

in. ; of tail 2¼ in. ; of hind-limb, to extremity of longest toe, ½ in. Femoral pores 7 or 8. Shields of head plaited longitudinally. "Procured at Mhow, in pasture land." T. C. Jerdon, Esq. [Since Mr. Jerdon's paper on the reptiles of S. Indian was ready for publication. With reference to that paper, p. 468 *ante*, he desires me to state that "the only specimen of Homonota fasciata was taken from the mouth of a snake, in grassy land, near Jaulnah."]

(6962) *Sphenocephalus*, Blyth, *n. s.* A *Sepsoid* form affined to Sphenops, Wagler, but with more slender and elongated shape, and the limbs placed more distantly apart; the anterior minute and fitting into a groove, the posterior as large as in Sphenops, and each having but three toes, of which the innermost and next are subequal and the outer much shorter. [It is still more nearly affined to the Australian form Ronia of Gray, figured in the Appendix to Grey's Journal; but this has still more rudimentary limbs, the anterior merely indicated externally, and the posterior shewing but two digits.] Form slender, ⅔ cylindrical, quite flat and laterally angulated beneath as far as the vent: the body and tail covered with small, smooth, lustrous, hexagonal scales, with a median row of broader scales along the under surface of the tail. Head much as in Sphenops, but the muzzle more pointed; the upper lip covering the mouth. Tongue broad, triangular, its cleft scarcely perceptible; the incision of the palate small. Teeth very minute. Eyes minute, with semi-transparent lower lid. No external trace of ear. Nostrils terminal, placed in the anterior margin of the nasals, contiguous to the front of each inter-nasal and the rostral; rostral equilaterally triangular: supra-nasal broad, heptangular, with apex to the front, fronti-nasals sub triangular, a little elongated; frontal obtusely subtriangular; parietal inequilaterally pentangular, with obtuse posterior base, single and as large as the frontal. A large subquadrilateral plate under the eye, and three small transversely narrow plates in front of it, and posterior to the nasal plate. A large diamond plate on centre of chin, emarginated anteriorly to admit a small roundish plate which is bordered by the anterior laterals. Tail shorter than the body, and sub-cylindrical, flattened below.

(6963) *Sphenocephalus tridactylus*, Blyth, *n. s.* Very pale brown, a little deeper on the upper-parts. The largest of six specimens, measures 6 in. in total length, of which the tail is 2 in, and distance apart of the fore and hind limbs ½ in. Length of fore-limb ⅛ in.; of hind $\frac{9}{16}$ in. From Afghanistan. Presented by Dr. Allan Webb. The habit of this curious reptile is indicated by its structure. It is evidently a burrower, probably into loose sandy soil, where it would work its way with its wedge-like muzzle, deriving considerable *appuis* from its hind-limbs; the minute forelegs remaining generally close within the grooves into which they fit; the head meanwhile being raised, and the long body arched,—an attitude which most of the specimens assumed when immersed in spirit.

The following is a remarkable limbless lizard from Rangoon, obtained by purchase.

(6964) *Ophiseps*, Blyth, *n. g.* Form anguine, of nearly uniform bulk throughout, tapering suddenly at the extremity of the tail; no exterior trace of limbs; and the vent placed in the middle of the entire length; the body above, and tail above and below, covered with parallel ranges of quadrilateral keeled scales, the throat and belly with hexagonal smooth scales, and the tapering extremity of the tail with imbricated and rounded scales. A groove on each side from shoulder to vent. Tongue obtusely forked: no palatal teeth; but a single row of small maxillary teeth, the triangular incision of the palate large. Eyes rather small, lacertine; the lids scaly. Tympanum small. Nostrils small, lateral, head conical, somewhat compressed in front, the cleft of the mouth extending to beyond the eye. Rostral plate small, broad, triangular; it and the nasals and anterior labials surmounted by numerous small plates and larger representatives respectively of a posterior nasal and united fronti-nasals. Frontal shield large, heptagonal with posterior base; and the parietal inequilaterally pentangular, with anterior base. Fronti-parietals quadrangular. The streaks of the chin are sub quadrangular and placed obliquely. Along the median ridge of the back the parallel ranges of scales alternate, but not upon the tail.

(6965) *Ophiseps Tessellatus*, Blyth, *n. s.* Length of specimen 12½ in., of which the tail measures 6½ in. Colour pale dingy buff-yellow, paler below, with numerous plumbeous spots on the anterior half of the body above, composed of scales of that colour, some detached, others placed contiguously to form transverse bands more or less imperfect; all the scales being highly lustrous. There are 14 parallel ranges of them above, from lateral groove to groove, and 8 such ranges below. From Rangoon.—*Blyth.*

REPTILIA OF TENASSERIM.—On these, Mr. Mason observes as follows:—

(6966) *Testudo radiata*, Small land tortoise. A small land tortoise is very common, and Dr. Gould, to whom I sent a specimen, said it was the above.—*Mason.*

(9967) *Testudo.* Large land tortoise. There is a large species, not uncommon in the interior.—*Mason.*

(6968) *Testudo geometrica.* Arracan land tortoise. A land tortoise in Arracan discovered by Capt. Phayre is the above.—*Mason.*

(6969) *Emys.* Marsh tortoise. A marsh tortoise, according to Dr. Cantor's classification, but according to Swainson and others, a river tortoise, is very common in Tenasserim streams

above tide-waters, where it deposits its eggs in the sand; and is sometimes found within the influence of the tides.—*Mason.*

(6970) *Cistudo amboinensis*, Daudin. Box terrapin.

Syn. Testudo amboinensis, Daudin.
Emys „ Schweigger.
Tortue a' boite d' Amboine, Bosc.
Terrapene amboinensis, Merrem.
Kinosternon amboinense, Bell.
Terrapene couro Fitzinger.
Emis couro, Wagler.
Terrapene bicolor, Bell.

This is a small marsh, or river tortoise, very abundant in the small mountain streams.—*Mason.*

(6971) *Emys dhongoka.* Arracan marsh tortoise. This river or marsh tortoise, Capt. Phayre found in Arracan. —*Mason.*

(6972) *Gymnopus*? Soft tortoise. A river, or soft tortoise, is not uncommon, but I have not examined it.—*Mason.*

(6973) *Chelonia virgata*, Cuvier. Green turtle.

Syn. Chelonia midas, Gray.
„ fasciata.

The sea turtle common on the Tenasserim coast is identical in species with the turtle found on the coasts of America, and in the Red Sea. This turtle burrows, and deposits its eggs in the sands near the sea-shore.—*Mason.*

(6974) *Chelonia imbricata*, Linne. Tortoise-shell turtle.

Syn. La tortue caret, Dutertre.
Scaled tortoise, Grew.
Testudo marina americana, Seba.
Hawksbill turtle, Brown, Catesby.
Testudo caretta, Knorr.
La tuilee, Daubenton.
Caretta imbricata, Merrem, apud Gray.
Chelonia multiscutala, Kuhl?
Cheloniee faux caret, Lesson.
Chelonia caretta, Temminck, and Schlegel.

Mergui is famous for its tortoise shell, but the specimens that have fallen beneath my observation have been, if I am not mistaken, the shell of the common green turtle. Still, it is probably found on Tenasserim coasts, for it is known to exist in the Malayan seas and the Indian ocean. —*Mason.*

(6975) *Crocodile.* Two species of crocodile inhabit Tenasserim rivers, and sea-shores, both of which are usually denominated alligators; but alligators are peculiar to America, and a glance at the scaly ridge on the back of the hind legs of the Tenasserim reptiles is sufficient to distinguish them from the alligators, which have the hind legs rounded.—*Mason.* Dean French, in his "Study of Words," *page* 125, says. "when the alligator, this ugly crocodile of the New World, was first seen by the Spanish discoverers, they called it, with a true insight into its species, 'el lagarto' or the lizard, as being the largest of that lizard species to which it belonged.

(6976) *Crocodilus vulgaris*, Cuvier. Common crocodile.

Syn Crocodilus palustris, Lesson.

The common crocodile of the Nile, the leviathan of the book of Job, is one of the species common in Tenasserim waters, and the other species is very slightly distinguished from it. Crocodiles are numerous in all its tide-water streams. During a two hours' pull up a small river, I once counted fourteen sunning themselves on the mud-banks. They often carry off the natives, and a single animal, emboldened by his successes, will usurp dominion over a particular portion of a river, where he becomes the terror of every boat's crew that passes. The steersman occupies the most dangerous position; for the crocodile's mode of attack is to glide up silently to the bow or stern of a boat, then turn suddenly, when with one stroke of his powerful tail, close to the top of the boat, he sweeps into the water whoever is within its reach, and the stunned victim becomes an easy prey. A Karen chief with whom I was acquainted, perished in this way two or three years ago, at a point in the river Gaing, which had previously been known as the desmesne of one of these river monarchs. Persons sleeping on their boats moored to the shore, have sometimes awaked in the jaws of these monsters; and one carried off a Burman a few years ago, from the back of a buffalo that he was riding across a small stream, under the very shadow of the walls of Tavoy.—*Mason.*

(6977) *Crocodilus porosus*, Schneider Seychelle crocodile.

Syn. Crocodilus biporcatus, Cuvier.

One species of crocodile that I examined had "the upper jaw surmounted by two rugged ridges, each commencing from the angle of the eye" This, then, is the species that tenants the Seychelle Islands.—*Mason.*

(6978) *Gecko.* The geckos, or house-lizards, are very numerous in the Provinces, and embrace three or four different species.—*Mason.*

(6979) *Platydactylus gecko*, Linne. Flat-toed gecko.

Syn. Salamandra indica, Bontius.
Gecko ceilonicus, Seba.
Lacerta cauda tereti mediocri, Linnemus. Adolph.
Lacerta gecko, Lin-linn.
Gecko teres, Lam[illegible] of Trenti.
Gecko verticillatus, Jen[illegible]orr.
Salamandre ou geck[illegible], Schneider.
Stellio gecko, Schneider.
Common gecko, Shaw.
Gecko guttatus, Daudin, apud Gray.
Lacerta guttata, Hermann.

Gecko verus, Merrem.
Gecko annulatus, Kuhl.
Gecko a gouttelettes, Cuvier.
Platydactylus guttatus, Cuv. apud Guerin.

The large gecko, which the Burmese call *touktay*, and the Malays *toke*, in imitation of the sound it makes, is very abundant. It disputes the possession of every cranny with the rats, and sometimes I think, devours their young. It has been seen making its repast on the small gecko. The natives think it noxious, and always avoid the reptile. According to Dr. Cantor, it is the Indian salamander of old writers; and new comers usually bottle up a few individuals to send to their friends as specimens of the rare, and unknown productions of the East, not aware that it was well described, and figured by the Catholic missionaries in Siam during the reign of Louis XIV.—*Mason.*

(6980) *Hemidactylus coctæi.* Common gecko. The small gecko, so abundant in Tenasserim houses, differs generically from Platydactylus Gecko, in having the "basal joint of four or five of the toes in each foot forming an oval disk." It is identical with the gecko seen in the houses in Calcutta. The spider of the English bible, Proverbs 30: 28, was undoubtedly a small gecko represented by this species, and the word was so rendered in the Syriac version made in the second century, and in the Vulgate Latin made in the fourth century. Jerome translated: "Stellio manibus nititur, Et moratur in ædibus regis," into.

"The gecko taketh hold with her hands
And dwelleth in king's palaces."

Robinson says: "The opinion of the celebrated Bochart, that the newt, a species of small lizard, is meant, seems in every respect entitled to the preference [i. e. to that of spider]. This reptile answers to the description which the royal preacher gives of her form and habits, and is, according to the testimony of ancient and modern writers, found to take up its abode in the dwelling houses of the east." There is an approximation to the truth in these remarks, yet they contain several errors. Passing over the fact that newts are not proper lizards, though supposed so to be in the days of Bochart, no newts are known to take up their abodes in dwelling houses in the east. It is the gecko that takes hold with her flat fingers, and odious as are her looks, dwells even in the palaces of kings. The word rendered "ferret" in our version, is supposed to be a different name for this same animal, and on good grounds too, for in the Samaritan Pentateuch the Hebrew word is the same in both passages.—*Mason.*

(6981) *Hemidactylus frenatus*, Schlegel. Small thumbed gecko.

Syn. Hemidactylus lateralis, Gray.
" quinquelineatus,

This species not usually distinguished from the preceding, with small thumbs without nails, is also common here as well as in Bengal.—*Mason.*

(6982) *Jungle gecko.* I have noticed a distinct species in the jungles, near Karen habitations, but never saw it in dwelling houses.—*Mason.*

(6983) *Ptychozoon homalocephalum*, Creveld, Wagler. Web-footed gecko.

Syn. Lacerta homalocephala. Creveld, Wagler.
Gecko homalocephalus Tilesius.
Pteropleura Horsfieldii Gray.
Platydactylus homalocephalus, Cuv.
Ptychozoon homalocephala, Kuhl.

Dr. Cantor describes a gecko from the island of Ramree, with the "toes webbed to the last compressed joint."—*Mason.*

MONITORS. The monitors or varans, commonly, but erroneously called guanas by Europeans, are represented by several species, both terrestrial and aquatic.—*Mason.*

(6984) *Hydrosaurus?* Swain. Monitor crocodile.

Syn. Monitor? Cuvier.

More than one hundred miles above tide-waters in the valley of the Tenasserim, the streams are inhabited by a large saurian, which the natives call a crocodile, of a different species from those that are found in tide-waters. The Burmese denominate it "the monitor-crocodile," and the Karens call it by the same name they do the crocodile, but it is probably a large species of varanus.—*Mason.*

(6985) *Hydrosaurus, ?* Swain. monitor.

Syn. Varanus.
Monitor, Cuvier.

A large water varan or monitor, inhabits the head-waters of the Tenasserim river. I have seen individuals five or six feet long dash into the stream from the river's bank, and lash the waters with their powerful tails in great glee, their active movements contrasting strongly with the sluggish motions of the crocodiles.—*Mason.*

(6986) *Varanus bengalensis.* Bengal Varan. One of the smallest aquatic varans, or monitors, of Tenasserim, about two feet long, I identified with a species found in the Museum of the Asiatic Society in Calcutta, which was, if I recollect right, the Bengal varan. It is the most abundant species in the Provinces, and may be often seen in the interior along the borders of streams, watching for its prey on the overhanging branches of trees. The Karens, who are extravagantly fond of their flesh, steal up the trees with a noose at the end of a bamboo, and often noose them while leaping for the water, or catch them on the boat which is brought under the tree. The head of this species, the natives say, is venomous, and they discard it altogether; but the flesh of the other parts, which smells most odiously, is deemed by the Karens much preferable to fowls. The Ka-

rens at Tavoy say there is a variety with a red head.—*Mason.*

(6987) *Varanus.* Terrestrial varan. A monitor or varan, of a yellowish colour, the Karens call the yellow varan. The specimens I have seen are a little larger than the preceding, and it differs from it in being a terrestrial, and not an aquatic species.—*Mason.*

(6688) *Varanus.* Black varan. According to the description of the natives, there is a distinct species of varan in the interior, which the Burmese call the black varan, but I have never seen it.—*Mason.*

(6989) *Varanus.* Maulmain varan. There is a terrestiral varan at Maulmain, which the natives describe as distinct from the preceding.—*Mason.*

(6990) *Varanus bicinctatus.* Large Arracan varan. A large varan is found in Arracan, which may or may not be one of these species.—*Mason.*

IGUANA TRIBE.

Of the family of the guanas, the principal members in the Tenasserim Provinces are called by Europeans, chamelions.—*Mason.*

(6991) *Calotes versicolor.* Blood-Suckers. This is the tree-lizard with a gular pouch, that possesses the power in a slight degree of changing its colours, and has been regarded as a chamelion. These lizards appear in very different costumes at different seasons, which has probably assisted them not a little to the name. Many of them are seen at the beginning of the rains, of a beautful azure of various degrees of intensity, according to the excitement of the reptile; but at the commencement of the dry season they are of an uniform ash colour. The karens say there are two species. This was the one I sent Mr. Blyth.—*Mason.*

(6992) *Calotes mystaceus.* Large Blood-Sucker. Mr. Blyth suggested that we probably had a large species, but I have never identified it.—*Mason.*

(6993) *Dilophyrus grandis.* Dilophyer. This is a reptile figured, and described by Dr. Cantor, said to be found at Rangoon. It resembles the blood-sucker, but has a large crest on the head and back, and differs in the colouring.—*Mason.*

(6994) *Dracunculus maculatus.* Flying lizard.

Syn. Draco Maculatus.

A species of flying lizard inhabits the Provinces, but it is rarely seen.—*Mason.*

(6995) *Draco lineatus.* Arracan flying lizard.

Syn. Dracunculus Lineatus.
Leiolepis guttatus.
„ Revesii. Gray.
Uromastix Revesii. „

The flying lizard of Arracan is a nearly related, but distinct species. It has been referred to two different genera, and there may possibly be two distinct species.—*Mason.*

(6996) *Lacerta, Linn. Sand lizard.* On sandy plains, and other arid situations a sand-lizard may be often seen, which, on being approached takes refuge in its burrow in the earth. Their cavities are not deep, and the Karens, who regard them as a delicacy, frequently dislodge them. It is a beautiful reptile, the body about six inches along, and the tail twice that length, remarkable for its powers of flight. It is of a grey colour, with shades of blue and green. It has a longitudinal band on each side from the head to the tail, of a greenish colour, sometimes inclining to blue. A row of black spots with a greenish centre down the upper parts and a few similar ones each side the marks of the back, between that and the lines on the sides The tail has four rows of similar points, and the sides of the body and legs are marked in a like manner, but the dots are larger. There are two long sharp teeth at the front of each jaw. It has five claws on each foot, and one on each hind foot is double the length of the others. There is no collar of broad scales round the neck. No shields in the head.—*Mason.*

(6997) *Euprepus rufescens.* Shaw. *Scink.*

Syn. Lacerta maritima maxima, Seba.
Lacerta rufescens, Shaw.
Scincus rufescens, Merrem.
Scincus multifasciatus, Kuhl.
Mabouya multifasciata, Fitzinger.
Euprepis multifasciatus, Wagler.
Tiliqua rufescens, Gray.
Eumecus rufescens Wiegmann.
Tiliqua carinata, Gray.
Tiliqua affinis Gray.
Euprepis sebæ, Dumeril et Bibron.

This smooth, snake-like reptile is sometimes called the grass-lizard, as it may be seen darting about in the grass. It frequently enters outhouses, but is rarely seen in the interior of dwellings. There is considerable variety of colouring in different individuals, from which the Karens distinguish three species, but they are probably all varieties of a single species, which is found from the Sandwich Islands to Hindustan. —*Mason.*

POISONOUS SERPENTS.

Venomous serpents are quite numerous, both terrestrial and aquatic; yet during a twenty years residence, not a single fatal case from the bite of a terrestrial serpent has come to my knowledge. —*Mason.*

(6998) *Elaps melanurus,* Elaps.

Syn. Coluber melanurus, Shaw.
Vipera trimaculata, Daudin.
Elaps trimaculatus, Merrem.

This is a small poisonous serpent described by Dr. Cantor as inhabiting the Provinces, but which I have not satisfactorily identified. It has a very small mouth, and rarely bites, but its venom is

said to be "as virulent as that of other venomous serpents."—*Mason.*

(6999) *Fire serpent.* The Elaps is perhaps the "fire serpent" of the Karens so called from the burning produced by its bite, which they say is poisonous, but not fatal. It is the smallest poisonous serpent in the Provinces. According to the Burmese it has a more wonderful power of reproducing itself than the hydra of antiquity. They say if one be killed, two or three others immediately arise in its place, and a Burman, who, I believe, intended to speak the truth, assured me that he once killed one, and immediately he saw two others, close by the dead one, without being able to conjecture whence they came. Its Burman name signifies the "father of many." I have repeatedly had small innocuous serpents brought me for this fire-snake; but when I showed the natives that there were no poisonous fangs, and that no others appeared at the funeral of my specimens, they coolly replied that they were mistaken; they had not brought me the true reptile. Some of the Karens think it a species of trigonocephalus.—*Mason.*

(7000) *Bungarus fasciatus*, Schneider. Yellow-banded bungarus.

Syn. Boa fasciatus Shaw.
Pseudoboa fasciatus, Schneider.
Bungarus annularis, Daudin, Schlegel.
Aspidoclonian.

The bright belted bungarus, a poisonous serpent, with alternate black and yellow bands, is a splendid reptile, often seen in the vicinity of Maulmain. It grows six or eight feet long, and five or six inches in circumference. Its bite is usually deemed fatal, but I knew a Karen woman to be bitten by one in the foot, and she recovered, though after much suffering. The tail terminates in a hard bony point, which the Karens think is a sting.—*Mason.*

(7001) *Bungarus candidus*, Linne. White-banded bungarus.

Syn. Bungarus cœruleus, Daudin.
„ semifasciatus, Kuhl, Schlegel.
Aspidoclanion semifasciatum, Wagler.
Boa lineata, Shaw.
Pseudo-boa cœrulea, Schneider.
Coluber candidus, Linne.

A specimen of another species with white bifurcated bands was killed in Maulmain after making a gallant defence. All the species of this genus are furious snakes when their anger is aroused, and at certain seasons the natives say pursue their antagonists a long distance; although Dr. Cantor confines this characteristic to the hamadryad.—*Mason.*

(7002) *Hamadryas?* Dusky Hamadryad. The natives describe a venomous serpent that grows ten or twelve feet long, with a short, blunt head, a dilatable neck, thick trunk, and short tail. It is of a darker colour than the common cobra, nearly black. I have never seen it, but the description given me accords so well with the generic character of hamadryas, that it must be a species of that genus. "The hamadryas," says Dr. Cantor, "is very fierce, and is always ready not only to attack, but to pursue, when opposed;" this, too, is a conspicuous trait in our Tenasserim serpent. An intelligent Burman told me that a friend of his one day stumbled upon a nest of these serpents, and immediately retreated, but the old female gave chase. The man fled with all speed over hill and dale, dingle and glade, and terror seemed to add wings to his flight, till reaching a small river he plunged in, hoping he had then escaped his fiery enemy, but lo! on reaching the opposite bank, up reared the furious hamadryad, its dilated eyes glistening with rage, ready to bury its fangs in his trembling body. In utter despair he bethought himself of his turban, and in a moment dashed it upon the serpent, which darted upon it like lightning and for some moments wreaked its vengeance in furious bites; after which it returned quietly to its former haunts.—*Mason.*

(7003) *Hamadryas ophiophagus*, Cantor. Belted hamadryad.

Syn. Naja elaps Schlegel.
„ bungarus, „
„ vittata, Elliot.

Karens from Pegue describe a species of hamadryad with black and whitish transverse bands. It is often seen twelve feet long, by a foot in circumference, and one of my informants tells me he has seen them nearly three fathoms long, and proportionately large. It does not appear to be known in these Provinces, but the Burmese and Karens have well established names for the species; and it must be, I think, the above, of Cantor's.—*Mason.*

(7004) *Naja lutescens*, Laurenti. Tenasserim cobra.

Syn. Coluber naja, Linne.

The Tenasserim cobra differs from the described species in the marking of the hood. In the common Indian species (*N. tripudans*) the hood is figured with "a double reversed horseshoe line of black or brown, with the two ends dilated so as to inclose an oval space, in the centre of which is a ring or spot of black." In the Tenasserim species there is only a single oval white ring, edged with black, in the centre of which is a ring or spot of olive-green, the general colour of the snake, but black on the margin. In other respects it does not differ from *N. tripudans*. Cantor has described a species which he calls *N. larvata*—"Brownish, with numerous faint transverse stripes; the hood marked with a white ring, not unlike the form of a mask, behind which there are from three to five white rings; —the anterior part of the lower surface with alternate white and bluish-black rings." This can-

not be our species, for it has none of the additional white rings behind the hood, nor on the lower surface any "transverse stripes." As these are the only Indian cobras described, is not ours a new species? The incantation of serpents has usually been attributed to the power of music, and a late writer remarks that "it is so strange that many have denied the fact, while others have asserted it to be a deception." "Our own conviction," he adds, "is, that serpents are extremely sensitive of impressions from musical notes, or modulations, under the influence of which they wreathe their bodies from feelings of pleasure, while to these graceful contortions and undulating movements, the charmer, who plays on a pipe or some simple instrument, adapts the time." This is the common theory,—that serpents are rendered docile by music. It must however, be abandoned; for with many others I have seen the cobra dance in imitation of its Burmese master, while he sat upon this haunches before it, making the motions with his body and hands that he wished the snake to imitate, and which it did perfectly without any music whatever, or any other sound except an occasional authoritative *hay!* Again, a pair of cobras kept perfect time with their master, while no sounds were uttered and allowed him to handle them as he wished. At his command they danced, and at his command they lay gracefully down as if asleep The Burmese usually put a wild one, which they secure when half or two thirds grown, with a practised tame one. These will dance and wreathe themselves at their master's pleasure. Sometimes darting at him but at that moment he straightens himself up, with his eyes fastened upon the snake's eyes, and in a gruff voice commands them to perform. Following his motions, they stand almost upright with their hoods dilated and their colours all in play as they dance; now swift—now slow—now approaching—now receding;—and I have seen the younger in his receding moments give unequivocal tokens of desiring to make his exit: but on hearing his master's call he turned again though evidently with more reluctance than the old actress. The power of effecting all this is certainly attributable neither to magic nor music. It must, I think, be ascribed to fear, and to a very simple principle—the power of imitation; a power possessed by different animals in different degrees. Serpents are by no means the least docile of the animal kingdom; nor are cobras the most intractable of serpents. Although quite abundant in the Provinces no case of a person's being bitten by one has ever come to my notice, but I have frequently known of individuals having been bitten by the green viper, a serpent which is much readier to bite than the cobra; and one which, it is worthy of remark the serpent charmers do not make use of; the cobra, and the bungarus, being their favourites. The largest cobra I have seen on the Coast measured five feet nine inches. It killed a good dog that attacked it, and was dispatched in the nocturnal melee by Mr. Ramsey, who supposed he had killed a common rat-snake, until he found his dog was mortally wounded.—*Mason.*

(7005) *Viper.* The natives describe a serpent whose poison they say is much more deadly than that of the cobra. It is very short and thick, without a hood, say some, but others state that it can dilate its neck, though not to the extent that the cobra can. The description accords best with a species of viper, but I have never seen it. It is thought to be rare in these Provinces, though abundant in Burmah; and not uncommon in the neighbourhood of Martaban.—*Mason.*

(7006) *Trigonocephalus gramineus*, Shaw. Green viper.

Syn. Trigonocephalus viridis Schlegel.
,, erothrurus. Cantor, (young.)
Coluber gramineus, Shaw.
Vipera viridis, Daudin.
Trimeresurus viridis, Lacepede.
Cophias viridis, Merrem.
Bothrops, Wagler.

This poisonous serpent may be readily distinguished from all the innocuous ones of a similar colour by the head being covered with scales and not with plates. The Karens describe two species, one with a red tail, and the other with a red line down each side, but Dr. Cantor regards them as varieties of the same species. They may be often seen in trees, and their colouring so much resembles the foliage that I have had my hand drawn back by a native when about to lay it on one that I was looking for among the branches, but with no intention of touching the reptile. They appear to bite more frequently than any other venomous terrestrial serpents in the Provinces, but although the limb that is bitten always swells up to a monstrous size and much pain ensues, yet I never heard of a case proving fatal. The natives have a saying to the effect that the part of the limb below the bite is destroyed, but this I very well know to be an error. After recovery, the limb, in the cases that have come to my knowledge remained uninjured.—*Mason.*

(7007) *Hydrus*, vel *Hydrophis*. A species of poisonous water snake abounds in our estuaries and rivers, as far as tide-water ascends. Their bite has proved fatal in every case that has come under my observation, and that too in a very short period after the wound was inflicted. The Burmese, however, tell me that persons do sometimes recover, and that bites in the rains usually prove more fatal than in the dry season. They are exceedingly numerous. At the fishing stakes, near the mouths of rivers, where I have watched the fishermen at their labours, scarcely a draught of fish was drawn up without one or two of these serpents being among them. There are several

species, but I have never examined their specific distinctions; and the Burmese call all One species, with a cylindrical body, the natives say never bites without producing death.—*Mason.*

(7008) *Laticauda scutata.* Flat hydrus. Another pelagic serpent, the Burmese say, has a flat body, and its bite, though poisonous, may be cured by medicine. It is probably this—*Mason.*

(7009) *Hydrus gracilis*, Shaw. Slender sea snake. In the delta of the Irrawady the Karens inform me, a water snake departs and returns with the tide, that is about two yards long, but not thicker than the thumb; and the anterior part of the body is much smaller than the posterior. It is said to coil itself around every object with which it comes in contact. It is probably this—*Mason.*

INNOCUOUS SERPENTS. Innocuous serpents are very numerous, from the diminutive blind-worm that hides itself in its burrow, to the gigantic python that displays its coat of many colours in the tree tops, ready to dart upon any animal that seeks the shade.—*Mason.*

(7010) *Typhlops braminus*, Daudin. Blind worm.

Syn. L'Orvet lombric, Lacepede.
Anguis, Russell.
Punctulated slow-worm, Shaw.
Eryx braminus, Daudin.
Typhlops rondoo talooloo. Cuvier.
Tortrix russelii. Merrem.
Typhlops. ,, Schlegel.
Argyrophis braminus Gray.

The blind worm, or slow worm, belonging to the class of burrowing serpents, is not uncommon but I have seen it dug out its hole in the earth as often as I have met with it on the surface. The popular idea of its being exceedingly poisonous, so common in England, is still more prevalent here, and the natives are much afraid of it. When they are shown its mouth, and its inability to do injury demonstrated, they turn to the pointed excrescence on the tail, and express their confident belief that it has a sting there like the scorpion. Dr Cantor, who appears to have had a specimen from these Provinces, identifies it with *Typhlops braminus*, and gives the synonyms which will be found above; but our reptile differs from any description or figure that I have seen. The upper jaw projects, in a specimen before me, the tenth of an inch beyond the lower, so that the mouth opens quite below the head. The eyes are beneath the skin, through which they are seen, and the scales have each a dark spot on them, so that the general appearance is that of lead coloured spots on a dull-white ground. Lacepede's figure of *Le Lombric* represents it the nearest of any figure I have seen, but there is a horny excrescence at the extremity of the tail, with a conspicuous sharp thorn, not seen in the figure. Dr. Cantor says that of a great number which he examined, the largest was not eight inches long; but a specimen before me measures more than twelve inches in length, and the body an inch and a quarter in circumference. —*Mason.*

(7011) *Python reticulatus.* Schneider. Python.

Syn. La jaune et bleue, Lacepede.
L'oularsawa, Bonnaterre.
Boa reticulata, Schneider, apud Duadin.
,, rhombeata, ,, (?)
,, constrictor. Var. e Latreille.
,, phrygia, Shaw.
Python amethystinus, Daudin.
,, des isles de la Sonde. Merrem.
,, schneiderii, Merrem.
Coluber javanensis, Fleming.
Python javanicus, Kuhl.

A large python, usually called a boa, is not uncommon. I have seen the head of one that was killed by a drove of hogs whose whole length measured eighteen feet, and the natives say they grow much larger. The Karens have an apothegm that the largest python can swallow a full grown buck-rusa or sambur deer, horns and all without inconvenience. They are often seen coiled up among the branches of trees, on the banks of streams in the interior, where they are frequently noosed by Karens, who regard them as valuable food. I have seen a Karen seize one nine feet long by the tail in the water, and with the aid of his associates succeed in capturing him. According to a Karen legend, all the poisonous serpents derive their virulence from the python, which, though innocuous now, was originally the only one that was venomous. In those days he was perfectly white, but having seduced away a man's wife, aunt Ee, [Eve?] he made her, while she was in his den, weave figures on his skin in the forms which are now seen. At that time, if he bit the footstep of a man in the road, such was the virulence of his poison that the man died, how far soever that man might have passed from the bitten track. The python had not, however, any ocular demonstration of the fact, so he said to the crow: "Crow, go and see whether people die or not when I bite the foot-track." The crow went to the neighbourhood of a Karen cabin, and found the people, as is their custom at funerals, laughing, singing, dancing, jumping, and beating drums. He therefore returned to the python and told him, that so far from his efforts producing death, on the contrary they produced joy. The python was so angry when he heard this, that he ascended a tree, and spit up all his venom; but other creeping things came and swallowed it, and people die of their malignancy to this day. The python made them promise, however, not to bite without provocation. The cobra said: "If there be transgression so as to dazzle my eyes, to make my tears fall seven times in one day, I will bite." So said the tiger. The Karens suppose the bite of a tiger

to be as virulent as a serpent's bite and others, and they were allowed to retain their poison. But the water-snake and frog said they would bite with or without cause, as they liked, so the python drove them into the water, where their poison melted away, and their bite became harmless. The tree, however, from which the python spit up his venom became deadly, and its juice is used to this day for the purpose of poisoning arrows. The gall bladder of the python is much sought after by natives for its medicinal virtues, which are in great repute, especially among Karens. The natives say there are two or three species, but all that I have examined belong to one.—*Mason.*

(7012) *Acrochordus javanicus.* Innocuous estuary-serpent. The Burmese describe a harmless snake, strongly resembling the venomous hydrus, and like that inhabiting the estuaries and tide-water streams. I have never seen it, but a Burman who had been bitten by one, said its bite was like the bite of a dog. He described it as about six feet long when full grown, and with a variegated skin. It must be a species of acrochordus, and probably this—*Mason.*

(7013) *Lycodon aulicus*, Linne. Lycodon.

Syn. Lycodon capucinus. Boie.
„ hebe, Schlegel.
„ atropurpureus. Cantor.
Coluber striatus, Shaw ?

A small harmless snake is common at Maulmain, with the head depressed, not very distinct, and lighter or darker chesnut, with numerous white transversal bands on the side forming a network composed of brown scales edged with white." It is of the genus lycodon, but the natives, to whom I have shown specimen, are not united in the name appropriated to it, either in Burman, or Karen.—*Mason.*

(7014) *Coluber radiatus*, Schlegel. Striped rat snake.

Syn. Coluber quadrificatus. Cantor.

A species of coluber, green-yellow on the back, with a broad black longitudinal band, interrupted at intervals, and a narrower one on each side, is often found where rats resort, on which it preys, and hence it is called a rat snake. One that dropt from the roof of my house into the dining-room on being attacked by a cat, defended itself furiously, and came off victorious. I have seen them in the act of swallowing rats twice the circumference of their own bodies.—*Mason.*

(7015) *Coluber korros*, Shaw. Brown-green rat snake. Another snake, with the habits of the preceding, but destitute of its stripes, and brown-green on the back, is common throughout the Provinces. Under certain circumstances the Burmans say the bite of this serpent is fatal. These are five: *gnang-soung, loo-soung, young-soung, lan-soung, ne-soung.* "Snake oblique, man oblique, turban oblique, road oblique, and sun oblique." That is, if the snake approaches a man with its head askance, as this snake is always said to do, and the man look at it askance, and if his turban be put askance, and he be moving on the road askance, and the sun be askance descending in the heavens; when these five circumstances meet, if the snake bite, which by the way is always very improbable, death will certainly ensue!—*Mason.*

(7016) *Coluber nasutus*, Shaw. Ribbon snake.

Syn. Dryinus nasutus, Bell.
„ prasinus, Reinwardt.
Dryophis „ „
Tragops, „ Wagler.
Passerita, „ Gray.
Dryiphis prasina, Schlegel.

This tree snake, is grass-green all over from the head to the tail, excepting the under lips and throat which are whitish, and a white line on each side which divides the upper from the under parts, or the scales from the scuta and scutella. The skin under the scales is black, alternating with light blue, and these colours play between the scales when the snake is struck. The head is long and attenuated, and the upper jaw, which is longer than the lower, is slighly recurved with a small snout of a curved plate. There are fifteen rows of imbricated rhomboidal scales on the body, the rhomboidal form of the scales appearing most distinct on the tail. It is probably *Dryinus nasutus*, of which I have no description, and although it differs in some respects from Cantor's description of *D. prasinus*, I presume it is a variety of the same species. The whole length of a specimen before me is four feet four inches, of which the tail is one foot six inches.—*Mason.*

(7017) *Dipsas cynodon.* Variegated tree snake. A tree snake, with a cordate head much wider than the neck and body, is not uncommon. It is covered with brownish black spots, but may be best recognized by "a dark, black-edged, arrow-shaped mark" on the head, and a black oblique streak from the eyes to the nape of the neck."—*Mason.*

(7018) *Dipsas multimaculatus.* Dr. Cantor describes a second, and nearly related species from the Provinces.—*Mason.*

(7019) *Tropidonotus stolatus*, Linne Buff-Striped Tropidonotus.

Syn. Coluber stolatus, Linne.
Le chaygne, Daubenton, Lacepede.
La vipere chapgne, Latreille.
Coluber tæniolatus, Daudin.
Natrix stolatus, Merrem.

This is a small aquatic snake, with black bars across the body, interrupted by a buff-coloured, longitudinal band on each side, common in the paddy fields around Maulmain.—*Mason.*

(7020) *Tropidonotus schistosus* Black-Striped Tropidonotus.

Syn. Tropidonotus mœstus, Cantor.
Coluber schistosus, Daudin.
„ surgens, Cantor.

This is a darker colored species than the preceding, and has an obscure black line down each side. When attacked it distends its neck like a cobra, but to a less extent, and they are sometimes mistaken for cobras. Half a dozen natives who had seen an individual display this power, would not be convinced, but the reptile was a cobra, although they saw the snake's mouth was destitute of fangs.—*Mason.*

(7021) *Homalopsis rhinchops*, Schneider. Water snake.

Syn. Hydrus rhinchops, Schneider.
Boa molaroides, „
Elaps boæformis, „
Enhydrus rhynchops, Latreille.
Hydrus cinereus, Shaw.
Hurria schneideriana. Daudin.
Coluber schneiderianus, Daudin.
„ cerberus, Daudin.
Python rhynchops, Merrem.
„ clapiformis, „
„ molarus. „
Coluber obtusatus, Reinwardt.
Cerberus (Homalopsis obtusatus) Cuvier.
Homalopsis schneiderii. Schlegel.
Cerberus cinereus, Cantor.

Innocuous water snakes of the genus homalopsis, are very abundant. viz.

Erpeton, Lacepede.
Rhinopirus, Merrem.
Pseuderyx, Fitzinger.
Cerberus, Cuvier.
Hypsirhina, Wagler.
Hydrops, „
Helicops, „
Potamophis, Cantor.

I have noticed three distinct species at Maulmain, all of which are called by the Burmese *yayhmwey*, or water snakes, while the poisonous aquatic serpents are called *gyat*. It becomes an inexperienced observer however, not to trust implicitly to the natives, for they often handle the venomous ones as carelessly as if they were harmless; and at other times they will stone an innocuous one as if its bite were fatal. One species is of a dark grey, or olive-green colour on the back, and white on the belly, with transversed black bands.—*Mason.*

(7022) *Homalopsis enhydris*, Schneider. Iridescent Water-Snake.

Syn. Hydrus enhydris, Schneider.
Enhydris cœrulea, Latreille,
Hydrus atrocœruleus, Shaw.
Coluber pythonissa, Daudin.
Hypsirhina, Wagler.
Potamophis lushingtonii, Cantor.
Homalopsis aer, Schlegel.
„ olivaceus, Cantor.

An allied species is not rare, which is "iridescent dark greenish, or brownish olive above, the scales edged with black; in some two parallel light grayish lines from between the eyes to the tip of the tail." It has the same native names as the preceding species.—*Mason.*

(7023) *Naked serpents.* According to Cuvier the cæcelia tribe of reptiles are naked serpents. —*Mason.*

(7024) *Cœcelia*? Cæcelia. The cæcelia can be easily distinguished from an earth-worm when it opens its serpent-like mouth, but in ordinary circumstances it will be considered an earth-worm. A species with a longitudinal band on each side is quite common.—*Mason.*

FROG TRIBE.

The Karens have distinctive names for fourteen different species of frogs and toads, but I have paid them very little attention.—*Mason.*

(7025) *Rana tigrina*, Daudin. Tiger Frog.

Syn. Rana mugiens. Latreille.
La grenouille taureau, Cuvier.
Rana limnocharis, Boie, MS.
„ cancrivora, Gravenhorst.
„ picta „
„ brama, Lesson.
„ rugulosa, Wiegmann.
„ vittegera, „

One of the largest species of frogs in the Provinces is—*Mason.*

(7026) *Polypedatus.* Tree frog. Of a tree frog that I sent Mr. Blyth he wrote: "The tree frog is a species of polypedatus, which I have previously received from Arracan and Assam."—*Mason.*

(7027) *Hyla bengalensis*, Gray. Bengal tree frog.

Syn. Polypedatus;

Another species that I sent him he said was this.—*Mason.*

(7028) *Bufo melanostictus.* Schneider. Toad.

Syn. Bufo bengalensis, Daudin,
„ scaber, Latreille.
„ dubia, Shaw.
„ carinatus, Gray.

A large toad which I have seen the Burmese doctors bringing into town, bound hand and foot, "for medicine," is not uncommon.—*Mason.*

(7029) RESEDA ODORATA is the common Mignonette. It has lanceolate bluntish entire or trifid leaves; a 6-parted calyx equal in length to the petals, which are finely cleft into many club-shaped divisions, the two lowest simple, the capsules 3-toothed. It is a native of the North of Africa and Egypt, but its delicious fragrance has caused it to be cultivated all over the world. It is naturally an herb, but when trained in the greenhouse it becomes shrubby. The arborescent form of this plant is called Tree-Mignonette.—*Eng. Cyc.* There are many species of

the genus, Reseda, most of which are natives of the South of Europe and Egypt. In India, this sweet-scented little plant may be cultivated throughout the year, only requiring moderate care in watering; and when the blossoms have passed their maturity, cut down the shoots, when fresh ones will spring up. If you require the seed, observe, as soon as the capsules are full, to pick off the branches and let them dry; otherwise if let remain on the plant, they drop out and are lost. It loses much of its fragrance, if grown in too rich a soil. Is propagated by seed, either in pots or beds; each plant should be about from four to five inches apart.—*Riddell.*

(7030) RESEDACEÆ, a natural order of Plants belonging to the class of Exogens. This order embraces the genera *Reseda, Ochradenus, Oligomeris, Holopetalum, Astrocarpus* and *Caylusea.—Eng. Cyc.*

7031) RESINS. Resinous substances are found in greater or less abundance in most plants. Many of them exude naturally from fissures in the bark or in the wood, or they are obtained from incisions made in certain trees and shrubs. As they exude they are commonly mixed with an essential oil, which either evaporates on coming in contact with the air, or is resinified by the action of oxygen. Such mixtures of volatile or essential oil with resins are sometimes called *balsams* [See BALSAM]. When gum is mixed with resins another class of substances is produced, called *gum-resins.* [See GUM-RESINS]. The resins when pure and free from essential oil have no odour except when rubbed or heated. Their colours are pale yellow or brown; they are good insulators, and become electric by friction. Most of them are heavier than water, insoluble in that fluid; they have little or no taste, but those which have distinctive flavor derive them from minute portions of some non resinous body. They are usually softened or even fused by being boiled in water, and some of them in such a case pass into hydrates. They are inflammable, burning in the air with a sooty flame, and yielding by dry distillation volatile liquids and inflammable gases. The natural resins are usually composed of two or more resinous substances which may be separated by the action of alcohol, in which most resins are soluble. They are also mostly soluble in ether in sulphuret of carbon and in the fat and volatile oils. Alcoholic solutions of many of the resins act the part of feeble acids, reddening litmus paper, and combining with and neutralizing acids. These compounds are termed *resinates* or *resin-soaps*, and are distinguished from *oil-soaps* by not forming a gelatinous emulsion when concentrated, and by not being separable from water by the addition of common salt: they are, however, detergent and form soap like common soap. [See SOAP.] Others are indifferent either as an acid or a base, but there are a few which are regarded as *basic*. The resins are thrown down from their alcoholic solutions by the addition of water, the white pulverulent or curdy precipitate forming the *magistery* of the old chemists. The alcoholic solution of the acid resins is not precipitated by ammonia; but the precipitate thrown down by the addition of water is soluble in solution of ammonia. The alcoholic solution of the indifferent resins is precipitated by ammonia. The acid resins may also be distinguished by the crystalline precipitate produced by the addition of their ammonio-chloride solutions to nitrate of silver. Some of the resins dissolve in sulphuric acid without decomposition in the cold, and they are precipitated by the addition of water; but if heat be applied sulphurous and carbonic acids are disengaged, and a carbonaceous mass is obtained mingled with another substance which has been improperly named *artificial tannine.* The action of nitric acid upon resins leads to the formation of various new products. Acetic acid dissolves many of the resins, as does also muriatic when concentrated. The resins have been considered as oxides of definite hydrocarbons but their analysis is very imperfect and will be further noticed under TURPENTINE.—*Tomlinson.* For the Madras Exhibition of 1855 a fragrant Resin from the Bababooden Hills Mysore, was forwarded by Mr. R. D. Meppen, the leaves sent appear to belong to one of the Dipterocarpeæ. A green semi-transparent hard resin from Coorg, was soluble in spirit, and promised to make excellent coach varnish, the tree is not known.—*M.E.J.R.* Resins are solid, brittle, of a certain degree of transparency, and colour common to yellow. When pure, they are

(7017) *Dipsas* [illegible] and in oils, but not in water. They differ from gums. The

A tree snake, with than the neck and body is covered with brownish black spots, and is best recognized by "a dark, black, arrow-shaped mark" on the head, and [illegible] streak from the [illegible] eye."—*Mason.*

Da[illegible]

818) *Dipsas multi*[illegible] ... *Shorea Robusta.*

Mast a second, an) ... *Pistacia lentiscus.*

Peynwinces.—*M.*) ... ... *Valeria indica.*

Theets) *Tro*[illegible] ... *Melanorrhœa usitatissima*

Wood oil, (gurjun,) ... *Dipterocarpus turbinatus, &c.*

Benzoin (loban,) ... *Styrax benzoin.*

Do. a kind of, ...

Liquid balsam of storax (rosa mallos,) ... *Liquidambar altingia.*

(7032) *Resins Gum-resins, Gutta percha and Gum-Elastics, of Eastern and Southern Asia.* Under this head are included the following:

1. Piney or Valeria.
2. Canarium: and.
3. Vatica or Shorea, all known as dammer.
4. Kino.
5. Lac.
6. Dikkamaly.

7. Benjamin.	11. Aloes.
8. Myrrh.	12. Gamboge, &c.
9. Poon-yet.	&c. &c.
10. Mutti-pal.	

The most important of all the solid resins produced in India are those which are included under the general name of "Dammer," and it will be the chief object of this report to clear up the doubts which have hitherto existed, as to what particular trees yield each of the crude products found in the bazars. It will therefore be advisable to quote the various authorities on the subject, before proceeding to show the result of the Jury's investigations.

Ainslie, speaking of "dammer or Indian resin" which he refers to the *Chloroxylon dupada* of Buchanan (the *Vateria indica* of Linnæus,) says:—"Of the substance usually termed dammer and improperly country rosin, there are three sorts to be met with in the bazars, called in Tamil "*vullay coonghilium*." "*curpoo coonghilium*" and "*noray coonghilium*," or white, black, and coarse dammer. It much resembles the resin obtained by distillation from the turpentine of the *Pinus sylvestris*, both in appearance and natural qualities, and would seem to be a common product of many asiatic countries. I perceive it is to be procured in great abundance in Sumatra from a tree called by the Malays "Canari." (*Dammara nigra legitima* of Rumphius.) The "Canari," we may observe is the *Canarium* of Roxburgh and yields the black dammer of the Western coast of India. In Java, Borneo, Joanna and several of the Sooloo islands, dammer is quite common, and a regular export to the continent of India. The coarse or stony kind, the Malays call "dammer batu" and the Javanese "dammer selo," the white or fine sort they term "dammer putch." * * * * * * Dr. Buchanan Hamilton in his interesting "Journey through Mysore" informs us that he found the tree which yields dammer growing in the woods of Malabar, and in the mountainous tracts which separate the Travancore country from the Madura district, and bestowed on it the scientific name of *Chloroxylon dupada*, though Ainslie then knew well that the greater part of the dammer met with in India, is an import from more Eastern countries. How far, he adds, the "*Chlorozylon dupada*" differs from the *Dammara nigra legitima* of Rumphius, I regret to say I am not now prepared to state," * * * * * * * The tree to which Dr. Buchanan gave this name of Chloroxylon dupada had been already described by Linnæus under the name of *Vateria Indica*, which it still retains. The specific name *dupada* was derived by Dr. Buchanan from the Canarese name "dupa," applied to this, and probably to other species of the Vateria growing in Mysore and the Western Coast. It may also be noted that the *Canarium strictum*, called by way of distinction the "black dammer tree" also grows in precisely the same locality and bears such a general resemblance in the color and shape of its leaves and growth to the Vateria, that it can only be distinguished on a somewhat close inspection. From this circumstance, no doubt, arose the belief that both the white and black dammers were produced from the same tree, and as the few which Dr. Buchanan saw were probably *Vaterias*, he naturally concluded that this tree alone yielded both species of dammer.

In short, omitting what refers to foreign products with which we have no immediate concern, the whole of Ainslie's remarks may be briefly summed up as follows—Ainslie's "Curpoo Coonghilium" is doubtless the product of the *Canarium* of Sumatra and the Western coast of India, whilst his other two sorts may be either the products of the *Vateria* or *Shorea*, probably both. The three varieties are *not* the produce of the *same* tree, as Ainslie seems to have supposed. His *vuelay* and *noray coonghilium* or white and coarse dammer, supposing them to be the products of the western coast and derived from this Chloroxylon dupda—the white dammers of the northern Circars which will be considered hereafter are derived from the Shoreas—are the products of the Vateria Indica of Linnæus (the *Chloroxylon dupada* of Buchanan), which is the *Dupa maram* of the Canarese, the *Chadacula* of the Tamools, and the *Payanee* or *Piney* of Malabar. His *curpoo coonghilium* or black dammer is the product of the *Canarium* of Roxb. and Wight, the *dammara nigra legitima* of Rumphius, and the *Canari* of the Malays. Roxburgh's description of the principal resiniferous trees of India is here given as extracted from O'Shaughnessy's Bengal Dispensatory.

(7033) *Vateria Indica*—*Linn.*

Chloroxylon Dupada, Ham.	Chadacula, Tam.
Piney marum Tam.	Tayanee, Malabar.
Dupa marum, Can.	

This is a very large and stately tree, a native of Malabar, and lately found also in Mysore. The young shoots and all tender parts except the leaves are covered with fine stellate pubescence, leaves alternate, petioled, oblong, entire, from emarginate to obtuse, pointed, smooth, coriaceous, from four to eight inches long and two to four broad, petioles round about an inch long; stipules oblong, panicles terminal, ramifications rather remote; flowers rather remote, pedicelled, pretty large; bractes oblong, one flowered; clayx five, cleft to the base, divisions oblong, obtuse, villous on the outside, corolla five petalled, petals oval, emarginate, broader but very little longer than divisions of the calyx, filaments from 40 to 50, short, broad inserted between the petals and the base of the germ, anthers linear with a single filiform beak; germ superior, conic, downy, three celled, cells con-

taining 3 ovules each, attached to the top of the axis, style longer than the stamens, stigma acute, pericarpium acoriaceous, fleshy, oblong, obtuse, one-celled, three-valved capsule, general size about 2½ inches long and 1½ in diameter, seed solitary of same shape as the capsule. (*Roxb. Fl. Ind. p* 601). The substance called "East Indian copal" and sold in England as gum *anime* exudes abundantly from this tree It occurs of all shades of color between pale green and deep yellow: the finest pieces are called *kahroba*, Arabic Amber, and sold as *amber* in the bazars of Bengal; the resin before it hardens is the Piney varnish of Malabar. Besides the uses already alluded to, candles are made of this resin in Malabar, which Dr. Wight informs us, diffuse in burning an agreeable fragrance, give a fine clear light, with little smoke, and consume the wick without snuffing. These candles were at one time introduced into England, but a very high duty having been imposed the trade ceased.

(7034) *Canarium commune.* (*Roxb. Fl. Ind. Vol.* iii *p.* 137.) A native of the continent of India, the Archipelago and Isle of France, where it is called "Bois de Colophane." It was brought from the Moluccas to the Calcutta Botanic garden, but in Roxburgh's time did not thrive, owing to the coldness of the winter months. The bark yields an abundance of limpid oil with a pungent turpentine smell, congealing into a buttery camphoraceous mass.

(7035) *Canarium Bengalense*, another species, yields a large quantity of very pure, clear amber-colored resin which soon becomes hard and brittle, and is not unlike copal; yet the natives of Northern India, set little or no value upon it. In the Calcutta bazar it sells at 2 to 3 Rs. per maund of 86 lbs. It is a native of Sylhet and the adjacent mountainous countries and flowers in May and June.

The dammer of the Northern Circars is chiefly produced by the varieties of the genus Shorea. The *Shoreas* are also found growing to a very limited extent on the Western coast, but do not appear to produce much, if indeed any, of the resin collected for sale.—O'Shaughnessy, gives the following description of the

(7036) *Shorea robusta or Saul tree.* This is a tree of great size, a native of Morung, the Paulghaut mountains &c. Sepals afterwards changing into 5 long wings, petals 5, stamens 15, filaments capillary below the anthers, anther cells short, obtuse, connectum filiform, produced beyond the cells into a more or less elongated colored, deciduous bristle, ovarium 3 celled, with two pendulous ovules in each cell. Seed solitary, cotyledons stalked, not crumbled, radicle superior, leaves coriaceous, oblong, obtuse, often emarginate at the base, panicles numerous from the axils of the fallen leaves, branches and pedicels glabrous.

The *Shorea robusta*, and indeed some othe species, yield abundance of the resin calle dammer, the superior kinds of which are ei ficient substitutes for the pine resin of th European Pharmacopœia. Captain Jenkins c Assam forwarded specimens of this re sin perfectly transparent and colorless; in th bazars the color ranges from pale amber t dark brown. It is devoid of taste and smell Sp. gr. 1.097 to 1.123, easily fusible, partiall soluble in alcohol (83.1 per 1000), almost en tirely in ether, perfectly in oil of turpentin and the fixed oils; sulphuric acid dissolves an gives it a red color. Two parts of colorles dammer and 2½ parts of oil of turpentine make the best varnish for lithographic draw ings.

(7037) *Dipterocarpeæ.* Dr. Wight gives des criptions of the resiniferous and balsamiferou trees of India. Under the head *Dipterocarpe* he observes:—The trees of this order growing i Madras are all natives of the hilly tracts of th Balaghaut. In Silhet, Chittagong and Peg where they abound, they occupy the plains. I Java one species (*Dipterocarpus littoralis*) i found on the sea shore. A *Hopea* and the *Vateri indica* also approach the coast in Malabar, but th latter, or perhaps a distinct species, is also plenti ful in Mysore. Two or three species are found i Goomsur, forming extensive forests, and affordin to the inhabitants incense, dammer and wood oil Judging from the imperfect specimens collecte by Dr. Maxwell and Capt. McPherson, one o them belongs to Roxburgh's genus *Shorea*, ap parently *S. robusta*. Both these Gentlemen men tion *Chloroxylon dupada* as being one of them, bu this, Dr. Wight thinks, must be a mistake, origi nating in a statement of Dr. Ainslie, that thi is the botanical name given to the Indian dammc tree by Dr. Buchanan, but which was an error o Buchanan's, arising from his not being awar that several trees produce dammer and that hi *Chloroxylon dupada* had already been describe by Linnæus under the generic name of *Vateria* The Shoreas (Roxb.) or Vaticas (Linn) an Vaterias yield the solid product called damme and Piney, whilst the produce of the Dipterocarpu retains its fluidity and is the "wood oil" of th bazars. The Camphor tree of Sumatra is a spe cies of *Vatica*. (*Shorea camphorifera. Roxb.*) Th Vateria Indica (*Chloroxylon dupada* of Buchana and Ainslie, and the Piney marum of the Hindoos produces a resin resembling Copal, much finer than that procured from other species, natives o India, the finer specimens of which are as trans parent as amber and nearly colorless. It is pro cured by the very simple process of cutting a notch in the tree sloping inwards and downwards. This is soon filled with the juice, which in a short time hardens by exposure to the air.

(7038) *Canarium.* Under the head of "*Canar ium*," Wight observes,—the resinous juice o

the *Canarium commune* has properties similar to Copaiva, while on the other hand the kernels of the seed afford by expression a bland edible oil. The *Canarium strictum* of Roxburgh is known in Malabar under the name of the "black dammer tree" in contradistinction to the *Vateria* which is the "white dammer tree." This tree is rather common in the Alpine forests about Courtallum in the Tinnevelly district, and is there regularly rented for the sake of its dammer. The dammer is transparent and of a deep brownish yellow or amber color, when held between the eye and the light, but when adhering to the tree has a bright shining black appearance. The flowers of the species I have not seen, the fruit is a very hard three celled oval nut tapering at each end."—*Wight, Ill.*

In the Madras Exhibition of 1857, the Jury endeavoured to identify the various products and to arrange them under their several heads.

E. J. Waring, Esq., remarks; that "the substances known as "*black dammer*," and "*white dammer*" are undoubtedly the produce of different trees. The *Black dammer* tree, he adds, appears to be the *Canarium strictum* (Roxb. Fl. Ind. Vol. iii. *p.*, 188). It does not grow on the low lands of Travancore, being only found in the mountainous regions between Travancore and Tinnevelly. General Cullen, who has paid much attention to this subject, has never heard of the true Saul tree (*V. robusta*) in the Travancore forests, but the *Vatica tumbugaia* is common in Travancore, it is called Tumbagum or "Cumbagum" and at Courtallum "Congo." The *white dammer*, or vullay coonghilium of Ainslie, is, he thinks, without doubt the produce of the *Vateria indica*. I send you two specimens of the resin very different in appearance, one dense with a vitreous fracture and of a pale green color, the other very porous or vesicular of a bright amber color. I am assured by those who have the best opportunities of knowing, that they are both obtained from the *Peyni marram* or *Vateria indica*, the denser one being the natural exudation which has spontaneously hardened on the tree, and its surface you will perceive bears witness to the fact, whilst the other has been obtained by incision and subsequent exposure to the sun or fire to hasten the hardening process. All kinds of *vellay coonghilium* or white dammers that I have met with on the Western coast are referable to one of these specimens, the difference arising from the mode of collection, and perhaps depending somewhat on the age of the tree. As far as I can learn, there are no other trees in Travancore which yield dammers of any kind."

In a subsequent letter the same gentleman observes, "When last I wrote, I spoke confidently of the white dammer being the exudation of the *Vateria indica*. From subsequent enquiries, this opinion must, I think, be slightly modified, as I am assured by one of the largest collectors of this article to the north (near Cochin) that much of the difference observed in different specimens arises from the *kind* of Piney marum from which they are obtained. The one kind he describes as having longer, narrower and thinner leaves than the common Pinney maram (*Vateria indica*). I have never seen the tree myself but probably it is the *Vateria lanceolata*. In speaking of the "white dammer tree" therefore, it would be perhaps advisable to say, "*Vateria Indica and allied species.*"

Subsequently to this, on the 18th May, in advising the committee of the transmission of specimens of the white and black dammer trees [collected personally by J. Brown, Esq., Astronomer in charge of the Trivandrum Observatory,] Dr. Waring says, "I regret that there are no flowers to the specimens of the black dammer tree, but the fruit and arrangement of the leaves at once prove that it is *not* a Dipterocarpus, and consequently *not* the *Vatica tumbugaia*, whilst at the same time it appears to me clearly to be a *Canarium*. [The specimen was identified by the Jury, as the *Canarium strictum*, Roxb.] I send you Mr. Brown's interesting letter which accompanied the specimens. Regarding these Mr. Brown writes, "It seemed to me that if there was still a doubt as to the black dammer tree," it must have been due to want of authority in the specimens produced, and thinking that I could not help you well by such proxy as I could have obtained, and as I expected to be near the base of the Ghauts and in the region of Dammer trees within a fortnight, I the more readily postponed the matter. The "black dammer tree" was in flower about the beginning of April, as far as I could guess from the seed vessels, and the white dammer tree in the beginning of May. Both trees grow in the forests here, about 1800 feet above the level of the sea, but the white dammer tree seems more common than the other, perhaps because the hill men, getting more dammer from the latter destroy it more readily. The best specimens of the *black dammer* tree which I examined* were above two yards in girth at the height of four feet above the spread of the roots. The trunk is round, straight and smooth, rising 22 to 30 feet before branching, the bark generally whitish, dotted with small papillæ, peels off in long flakes. The dammer that exudes from the cuts in the trunk seems to be a great favorite of several species of insects especially of one resembling a bee, called by the Hill men "kullada" (*earth hole*),* which live in pairs

* This curious circumstance will doubtless account for the mode of formation of the resin called in Burmah

in holes in the ground. I send you specimens of the bark as well as of the black dammer taken by me from one of the trees. The Hill men to get the dammer, make a great number of *vertical* cuts into the bark, all round near the base of the trunk; they then set fire to the tree below the cuts, and having thus killed it, they leave it for *two* years before they collect the dammer," they say that after one year only the quantity of dammer is *much* less than after two years. The tree is killed in the hot season and the dammer is collected in February or March. When on the ghats previously, as well as this year, we were struck on looking towards the forests on both the Eastern and Western slopes as high as 3900 feet above the level of the sea, by numbers of trees with bright red, often crimson foliage, contrasting strongly with the various greens around. These crimson trees, are black dammer trees, the color, due to the young leaves, disappears gradually in April. The leaves of the young plants are more sharply serrated than those of the old trees, and they have tufts of hairs all around the edges, which are not visible in the leaves taken from the old trees. The *white dammer* tree has much the same *tenue*, trunk round and straight, branching at 20 to 30 feet from the ground; its appearance is however sufficiently different. The trunk of the black dammer tree is smooth and whitish: that of the white dammer tree is (in all the specimens I saw) beautifully variegated by variously colored lichens, red, white, green, and black, the latter generally prevailing. The trunk also is *dimpled* all over by the scaling off of small patches of the bark. I am told that the young leaves are also reddish but not nearly so bright as those of the black dammer tree. The white dammer is obtained in the same manner as the black dammer, but the quantity obtained from one tree is generally little more than one third of that from a black dammer tree of the same size. The quantity obtained from a black dammer tree may be about 30 to 40 dungallies. A dungally is a measure of about 2½ seers. Kistniah, Assistant supervisor of the Coimbatore district writing from Suttymungalam says:—"Both the white and black dammer trees grow in these forests, but the black are by far the most numerous being in the proportion of ten to one white dammer tree. Both trees have the same appearance, growing to the height of 10 or 12 yards of one uniform thickness, and then branching like a jack tree. The dammer is extracted from the black dammer tree by piling firewood to the height of one yard around the base of the trunk and lighting it. The dammer subsequently exudes from the trunk as high as the flames reach. The operation is conducted at any season of the year, and the dammer continues to flow for ten years between the months of April and November and is collected in January. The tree after having yielded dammer for 10 or 12 years dies. The white dammer tree is not acted on by fire but the resin exudes spontaneously, and is found at the foot of the trunk, it is not much sought after by merchants."

The Jury remark that both the white and black dammer trees have been recognised (by the specimens) as the *Vateria* and *Canarium*, although the black dammer sent from the Travancore district to the Exhibition was erroneously attributed to the *Vatica tumbugaia* by the exhibitor. Mr. Pedre Proboo ascribes the different appearance of various specimens of this resin to the age of the tree. The most vesicular specimens, he says, are obtained from the young tree, the more compact ones from the mature plant, whilst the darkest colored kinds are obtained from the hearts of the tree when decayed and split with old age.

The Jury sum up in the following few words:—The whole of the substances commonly called "DAMMERS," produced in the Madras presidency are obtained from trees of the genera *Vateria, Canarium, and Shorea or Vatica*. The two former viz. Vateria and Canarium, yield by far the largest part (if not the whole) of the dammers produced on the Western coast of the Peninsula, whilst the Shoreas or Vaticas yield the greater part of that collected in the northern and eastern districts.

They may be briefly arranged as follows.—

(7039) *Dammers of the Western Coast. Black Dammer.* (*Canarium strictum*), the *carpoo coonghilium* of Ainslie, the *Dammara nigra legitima* of Rumphius and the *Canari* of the Malays. This occurs in large stalactytic-shaped masses, of a bright shining black color when viewed from a distance, but translucent and of a deep reddish brown when held in thin laminæ between the eye and the light. It is perfectly homogenous, and has a vitreous fracture. Its shape appears to be due to the fact of the balsam having exuded in a very fluid state and trickled down the trunk of the tree, where it gradually hardens by exposure to the sun the fresh resin continuing to flow over that already hardened, gives rise to the stalactytic appearance of the huge lumps of resin, the outside of which much resemble the guttering of wax caused by placing a lighted candle

"Poon-yet" and "Poey-ne-yet," specimens of which were exhibited at the Madras Exhibition of 1857, and are said to be found in the ground, and were supposed to be produced by some hymenopterous insect, it is also found in hollow trees. This substance, although composed chiefly of a yellow brittle resin mixed with more or less sand or earth, has an appearance precisely like that which would be looked for if used by an hymenopterous insect in the construction of its cells. (See classified Catalogue of the Madras Exhibition of 1857. class iv.) The Madras Exhibition of 1855 contained a substance from Malacca called "*Dammer klootee*" which had been evidently formed in the same manner, although the cells were larger and the resin blacker and harder than the Poonyet.

n a draught. It is insoluble in cold, but partially soluble in boiling alcohol on the addition of camphor: when powdered it is readily soluble in oil of turpentine. Powdered and burnt on the fire it emits a more resinous smell and burns with more smoke than white dammer. The size of the lumps of this resin, together with its color and the peculiarity of shape already mentioned, suffice to distinguish it from other Indian resins.

(7040) *White Dammer or Piney resin* (*Vateria indica and allied species*) of Linnæus and Wight. *Choloroxylon Dupada* of Buchanan and Ainslie, the *Doopada* resin of Mysore, and the *Payanee* or *Piney* of the Malabars.

Variety No. 1. *Compact Piney resin or first sort white dammer.*

This occurs in large lumps of all shapes and varying in color on the outside from a bright orange to a dull yellow, bearing evident marks of having adhered to the bark of the tree. It has a shining vitreous fracture, is very hard and bears a great resemblance to amber. Its color (internally) is of all shades, from a light green to a light yellow, the green tint predominating in the generality of specimens.—It is more soluble in alcohol than black dammer, and burns with less smoke and a more agreeable odour.

It is easily distinguishable from all other Indian resins by its superior hardness, its colour and amber like appearance.

Variety No. 2. *Cellular Piney resin, or second or white dammer.*

This occurs either in small lumps or in large masses, generally of a shining appearance and balsamic smell. Has a very cellular structure, which is attributable partly to the mode of collection, and partly to the age of the tree. Notches being cut in the trunk of the tree sloping inwards and downwards the resin collects in the cavity and is either permitted to dry on the spot, or is collected and dried by the application of heat. It is of all shades from light green to light yellow or white, and is usually translucent. Specimens are sometimes seen, in which, from the dessication having been improperly conducted, the resin is more opaque, of a dull green color and full of air bubbles, presenting the appearance of having undergone a partial fermentation. This resin may be recognised by its cellular appearance and balsamic smell—this latter however, (which is of course due to the volatile oil it contains,) is gradually lost by long keeping or constant exposure to the air. On splitting open old and decayed trees, portions of a dark colored resin, are often found having the solid consistence of first variety, but the inferior quality of the second.

(7041) *Dammers of the northern and eastern Distr icts.*

Variety No. 3. *Saul tree dammer.* (*Shorea robusta and other species*).*

This occurs in sticks much resembling in shape the black dammer; but differing widely in colour and consistency. In colour it varies from a light yellow to a dark brown, the two colours being very frequently blended in the same lump and giving it the appearance of having a regular "grain". It is friable and differs from the white dammer of the western coast in its inferior hardness, its opacity and its peculiar form, and from the black *dammer in its color.* An intelligent native correspondent writing from Gopalpore says, "There are extensive tracts of Googulam (*Vatica*) jungles in the Goomsur and Cuttack provinces. The Khoonds and Woodias living in and near these jungles wound trees in several places. The resin issues and is collected when sufficiently solid. The Dammer collected from the decayed parts of the tree is of a dark color, the tree is called "Guggilam" in Telugu and "tala gotso" in Urya. The Khoonds and Uryas make these leaves into the plates from which they eat their food, and also roll up tobacco in them to smoke like a cheroot. In time of famine the above tribes live on a soup made from the fruit of this tree.

(7042) *Lac.* The specimens exhibited, consisted of, *Lac*: Good *stick lacs* were shown from Malabar, Bellary, Mangalore and Pegu Also an excellent series of stick, seed, and shell lac, with the dye from Mirzapore, Kymoor and Hazarebaugh jungles, from Claud H. Brown Esq., for which honorable mention was awarded.

(7043) *Piney resin, or white Dammer* (*Vateria Indica*). Of the many specimens exhibited the best was that shown by E. B. Thomas, Esq. of Coimbatore. It had the amber like appearance of the best description of Vateria resin. Another specimen closely approaching to this in quality was exhibited by Pedre Proboo of Mangalore. He also exhibited a series of specimens of this resin of various qualities and a cake of the inspissated juice of the same tree, which is used for mixing with bees wax in making candles.

Mr. Bassano, tahsildar of Wynaad, exhibits a bottle of the fresh resin, or as it is called Pynie *varnish.* It is of a light grey colour, with a strong balsamic odour. The Tahsildar of Walloo-wynaud in Malabar forwarded another series, varying in color from white to black. The Exhibitor observes that the resin which first exudes is called "*Chengilium*" (this is white), that which flows subsequently is termed "*Coongilium*" (darker than the above), and when dried it is called *Dammer* (black.) He

* The Vatica tumbugaia grows also to a limited extent on the West coast, but yields little if any of the dammer collected there.

describes the three sorts as being the produce of the Payuee tree (*Valeria*).

(7044) *Doona*, Mr. Thwaites of the Government Botanical Gardens at Paradenia in Ceylon exhibited a fine specimen of *Doona dammer*, obtained from a Dipterocarpus tree discovered by the exhibitor and named by him *Doona Zeylanica*. This highly interesting product, in color and appearance much resembles pine resin.

(7045) *Poon-yet*. Specimens of this curious substance were exhibited by Dr. Cleghorn and the Honorable W. Elliot, Esq. They were brought from Burmah and are said to be produced by a species of hymenopterous insect in holes in the ground and hollow trees. Indeed the cellular structure of the specimens much resemble that of a wasp's nest. A circumstance so unusual rendered the Jury at first somewhat incredulous of the correctness of this statement, but in the course of the investigations into the origin of the dammers of the western coast, it was incidentally mentioned that a species of bee appeared exceedingly fond of the liquid dammer of the *Canarium*, this insect lives in holes in the ground and it will probably be found on inspection that its cells are composed of a similar substance to that now under consideration.

(7046) *Kino* (Pterocarpus marsupium.) The several specimens of kino at the Exhibition, said to be the produce of the Pterocarpus marsupium agreed in being but slightly astringent, of a vitreous fracture and very deep red color approaching to black. The finest specimen was that exhibited by Dr. Waring, run in a bamboo.

(7047) *Dragon's blood*, specimens of dragon's blood one in lump and one in reed, neither astringent.

(7048) *Palas or Dhak kino*. (*Butea frondosa*.) Shown by several exhibitors.

(7049) *Dikkamalay* (*Gardenia*). Gardenia resins.

(7050) *Benjamin*. Of two excellent specimens of Benjamin, that of Siam appears to be superior in fragrance to the Sumatra product, although both possess a delightful aroma, they are of the amygdaloid kind, the latter being almost entirely composed of agglutinated white tears.

(7051) *Gunda feroza* (*Boswellia thurifera*.) Is largely used in some parts of India as an application to indolent ulcers and wounds and is supposed to form the chief ingredient of "Wroughton's ointment." It has the odour, taste and consistence of a balsam.

(7052) *Theetsee*. (*Melanorrhœa usitata*). The celebrated *theetsee* dammer was exhibited by Dr. Brandis from Pegu and Capt. Benson from Moulmein. The latter exhibitor also forwarded a half log of the tree which is probably the first ever imported into Madras.

(7053) *Gamboge*.

(7054) *Xanthoxylon triphyllum*. A very small quantity of the resin obtained from this tree was exhibited by the Rev. Mr. Johnson of Cottyam. Judging from the specimen it appears to be produced in too small quantities to be useful in a commercial point of view, but the jury awarded honorable mention for the carefulness of the exhibitor in identifying the plant and supplying the correct botanical name of this new product.

(7055) *Googool*. This gum resin, is chiefly used as a medicine.

(7056) *Gum Elastis*.

(7057) *Moringa gum* much resembles tragacanth, although its partial elasticity has caused it to be classed amongst the elastics. No use is known for this abundant product.

(7058) *Gums properly so called*.

(7059) *Acacia gum*.

(7060) *Egle marmelos*.

(7061) *Cashew tree gum*.—(*Anacardium occidentale*).

(7062) *Azadirachta Indica*.

(7063) *Kuteera*.—The produce of the *Gossypium lospermum gossypium* much resembles tragacanth

(7064) *Wood apple gum*.—(*Feronia elephantum*.) This is one of the best gums included under the general name of *gum arabic*.—*Lieut Hawkes, Reporter on Sec. I, Class IV : M. E. of 1857*

(7065) RHAMNACEÆ, a natural order of Exogenous Plants, remarkable for having a valvate calyx, hooded petals, opposite to which their stamens are inserted into the tube of the calyx and a superior or half inferior fruit which is either dry or fleshy. The species are found nearly all over the world, except in the arctic zone. The chief number of species is said to be dispersed through the hottest parts of the United States, south of Europe, north of Africa, Cape of Good Hope, and Australia. They are all shrubs, with small greenish or inconspicuous flowers.

The species which are best known in Great Britain are the *Rhamnus frangula*, Alder ; *R. catharticus*, Buckthorn ; *Paliurus Australis*, Christ's Thorn ; and Buckthorn ; the evergreen *Rhamnus Alaternus*. The useful species are of some importance :—*R. catharticus* and several others have purgative berries ; *R. infectorius* yields the French berries of the shops employed for dyeing yellow ; the fruit of the Jujube, *Zizyphus Jujube* and *Z. vulgaris*, is sub-acid and eatable, and the species are cultivated for it in the south of Europe and the temperate parts of Asia ; *Z. Lotus* gave its name to the Lotophagi, or Lote-Eaters, of Africa ; and *Rhamnus frangula* is extensively cultivated for the manufacture of charcoal. *Ceanothus Americanus* yields the New Jersey Tea. [Ceanothus ; Hovinia ; Paliurus ; Rhamnus.]—*Eng. Cyc.*

(7066) RHAMNUS (the word is Greek, ῥάμνος), a widely diffused genus of Plants, the type of the natural family *Rhamnaceæ*. It is chiefly found in the temperate parts of Europe, in Siberia, and in the Himalayas at elevations of 6,500 feet; also in the New World, and at the Cape of Good Hope.

The genus is characterised by having an urceolate 4-5-cleft calyx; petals wanting, or emarginate; anthers ovate, 2-celled; disc thin, overspreading the tube of the calyx; ovary superior, 3-4-celled; styles 3 or 4, distinct or united; fruit fleshy, with 3 or 4, or in consequence of abortion, 2 fibrous indehiscent stones.—*Eng. Cyc.* The juice of the unripe fruit of *Rhamnus infectorius, catharticus* and *virgatus*, known as Turkey or French berries, is used for dyeing leather yellow. When mixed with lime and evaporated to dryness, it forms the color called sap-green. A great quantity of yellow berries are annually shipped from Constantinople: 115 tons were imported into Liverpool in 1853. The average annual imports into the United Kingdom are about 450 tons. They come from the Levant in hair bales weighing three and a quarter cwt., or in tierces of four to five cwt., and are used by calico printers for dyeing a yellow color. They are sometimes called Persian berries. It is a subject of surprise that the common betel-nut of the East has never been introduced for dyeing purposes.—*Simmonds.* Dr. Wight, in Icones, gives Rhamnus hirsutus, 978; Wightii, 159; *Zeylanica*, 1899.

(7067) RHAMNUS: *Species.* The GREEN DYE RHAMNUS. While upon the subject of Chinese dyes, says Fortune, I shall now give some account of the "green indigo," which has been attracting much notice lately both in India and in Europe. A portion of cotton cloth obtained in China by the French manufacturers being greatly admired on account of the peculiar green of its dye, was submitted to the celebrated chemist, M. Persoz, with a request that he would endeavour to ascertain the composition of the green colour. The following is a translation of his report upon this subject to the Academy of Sciences:—Every attempt that I made upon the specimen to detect evidence of the presence of a blue or yellow failed, and I was led to the conviction, by isolating the coloring principle, that the green was produced by a dyeing material of a peculiar nature and sui generis. It further was evident,

1st.—That the coloring matter was an organic product of vegetable origin.

2nd.—That the fabric on which it was fixed was charged with a strong dose of alum and a little oxide of iron and lime, bodies the presence of which necessarily implied that mordants had been used in dyeing the calico.

These results were so positive, and at the same time so opposed not only to everything known in Europe regarding the composition of green colour, but also to all that is recorded by writers regarding the dyeing processes employed in China for the production of green, that I was induced to go into a more detailed investigation of the subject; and about the end of last November I applied to Mr. Forbes, the American Consul at Canton, for some of this valuable material. I am indebted to his kindness for a specimen weighing about one gramme (15½ grains). The substance is met with in thin plates of a blue colour, having a strong analogy with that of Java indigo, but of a finer cake and differing besides from indigo both in its composition and in all its chemical properties. On infusing a small fragment of the substance in water, the liquid speedily became coloured of a deep blue with a shade of green. After the temperature had been raised to the boiling point, a piece of calico, prepared for printing with mordants of alum and oxide of iron, was dipped in it and a true dye was the result. The following appearances were observed. The portion of the fabric to which alum had been applied showed a deep green, of more or less intensity, according to the strength of the mordant. The portions charged with both alum and oxide of iron yielded a deep green, with a shade of olive. The portions charged with oxide of iron alone yielded a deep olive. The parts of the cloth where no mordant had been applied remained sensibly paler. The colours thus obtained were treated with all the re agents to which the Chinese calico had in the first instance been subjected, and they behaved in precisely the same manner. From these experiments it may be inferred,

1st. That the Chinese possess a dye-stuff presenting the physical aspect of indigo, which dyes green with mordants of alum and iron.

2nd. That this dye stuff contains neither indigo nor any thing derived from that dyeing principle. Mons. Legentil, President of the Chamber of Commerce of Paris, having perceived the importance of France being speedily put in possession of this valuable material, with a view to the interests of science and of industry, took the necessary steps several months ago for procuring a suitable quantity with the least possible delay, and at the same time to have inquiries made as to its origin and mode of preparation.

Mr. Fortune here adds, that the investigation of the green dye-plant exhibits as many amusing blunders as used to be made about the Chinese sicepaper plant in former days. By some, the flowers of the Whi-mei (Sophora japonica) were sent home as the "green indigo," but this plant yields a yellow dye and even when mixed with blue to make a green, the green is not that kind noticed by the French manufacturers. At another place he says, here I found fields under cultivation with a kind of Rhamnus apparently. The Chinese farmer called it "Loh-zah, or "Soh-loh-shoeo"

and showed me samples of the cloth which had been dyed with it. To my delight these samples corresponded exactly with those sent back from France, one of which was in my possession, but he told me that two kinds were necessary—namely the variety they cultivated in their fields and one which grew wild on the hills—in order to produce the dye in question. The former they called the yellow kind and the latter the white kind. The dye itself was not extracted by them they were merely the growers and therefore I could get no information as to its manufacture. I however secured a good supply of plants and seeds of both kinds, which were afterwards sent to India and England. My further inquiries on the subject of the manufacture of the "green indigo" were conducted in connexion with Dr. Lockhart and the Rev. J. Edkins, of Shanghae. We found that a considerable portion of this dye was made near a city called Kia-hing-foo, situated a few miles west from Shanghae and Mr. Edkins procured a bundle of chips there which exhibited the state in which the article is sold in the market. Since I left China I have received the following interesting letter from Dr. Lockhart, which throws much light on the subject. The information was procured by Mr. Edkins and may therefore be fully relied upon. "The bark of two kinds of the tree known as the 'green shrub' (Luk-char), one wild which is called the white and another cultivated, which is called the yellow, are used to obtain the dye. The white bark tree grows abundantly in the neighbourhoods of Kea-hing and Ningpo; the yellow is produced at Tsah-kou-pang, where the dye is manufactured. This place is two or three miles west from Wang-steen, a market-town situated a little to the south of Kea-hing. "The two kinds are placed together in iron pans and thoroughly boiled. The residuum is left undisturbed for three days, after which it is placed in larger eartheruware vessels, and cotton cloth, prepared with lime, is dyed with it several times. After five or six immersions the colouring matter is washed from the cloth with water, and placed in iron pans to be again boiled. It is then taken upon cotton yarn several times in succession and when absorbed in this way it is next washed off and sprinkled on thin paper. When half dry the paper is pasted on light screens and strongly exposed to the sun. The product is called Luk-kaou. In dyeing cotton cloth with it ten parts are mixed with three parts of subcarbonate of potash in boiling water. "The dye made at Tsah-kou-pang is not used to dye silk fabrics, because it is only a rough surface which takes it readily. To colour silk with it so much of the material must be used that it will not pay. All cotton fabrics, also grass cloths, take the colour readily. The dye does not fade with washing, which gives it a superiority over other greens. "It is sent from Kea-hing as far as Shan-ting. It is also made in the province of Hoonan and at Ningpo, but the dye at these places is said to be of an inferior quality. It has long been used by painters in water-colours, but the application of it to dye cloth was first made only about twenty years ago. If some method could be discovered of applying it to silk fabrics it would become still more useful." The information obtained by Mr. Edkins on this subject is, no doubt, perfectly correct. It agrees in the most important particulars with what I had gleaned from time to time amongst the Chinese in various parts of the country. The chips he brought with him from Kea-hing were identical with the "Soh-loh," or "Loh-zah" (Rhamnus sp.) which I have already mentioned, and his statement that two varieties of the plant are used to produce the dye agrees with my own observations. The mode of extracting the dye from the bark or wood (for both seem to be used), as practised by the Chinese, appears to be slow and tedious, but with our superior knowledge of chemistry this might possibly be improved. From these investigations it would appear that two colouring principles are necessary to the production of this dye. This however, will not affect the value of it as a rich and permanent green, a quality which has been appreciated by the French manufacturers, and which is also well known to the Chinese.—*Fortune's Res. among the Chinese*, p. 167. At another place he mentions that the *Rhamnus* producing the green indigo (so called) has been discovered and introduced both to England and to India,—*Fortune's Res. among the Chi. page* 146. The probability of this discovery proving correct, is supported by the fact that it is from one of this genus, the *Rhamnus catharticus* of Europe that the pigment called Sap green or Bladder-green is obtained. Voigt gives *Rhamnus* incanus and R. Virgatus.

(7068) RHAMNUS CATHARTICUS (called also *Spina cervina*, hence Buckthorn), indigenous shrub, with opposite branches, spreading, straight, round, smooth, hard, and rigid, each terminating in a strong spine after the first year. Leaves deciduous, bright green, smooth, ribbed, the young ones downy. Flowers yellowish green, on the last year's branches numerous; the fertile ones with narrow petals, rudiments of stamens, and a deeply 4-cleft style; barren ones with an abortive ovary, and broader petals. It flowers in May, ripening its berries in September, at which time they are collected. The berries are about the size of a peppercorn, black externally, but within of a deep violet, the pulp inclosing three or four seeds. The taste is nauseous and repulsive at last, though at first sweetish and only bitter. They contain a peculiar extractive, a colouring principle, acetic acid, and gum. The fresh and dried berries, the expressed juice,

ır a syrup prepared from them, all possess pur-
ative properties, exemplified in that form which
as led to the designation 'hydragogue.' Its action
s attended with much sickness, griping and
hirst. It should be restricted to the arts, in
hich it is serviceable, being the source of the
igment called Sap-Green or Bladder Green.
—*Eng. Cyc.*

(7069) RHAMNUS FRANGULA, Alder
Buckthorn, has alternate branches and elliptical.
t is a native of the British Islands.—*Eng. Cyc.*

(7070) RHATANY ROOT. Is derived from
ıe *Krameria triandra*, and consists of cylindri-
al ramifications, varying in size from that of
quill to a finger. It is obtained from Peru,
nd is used as an astringent medicine.—*Water-
on.—Faulkner.*

(7071) RHEUM, a genus of Plants belong-
ıg to the natural order *Polygonaceæ*, of which
ıe name is taken from the Ῥέον of Dioscori-
es, and which includes the different species of
lants which yield the stalks and root so well
nown by the name of Rhubarb. It is doubted
y some whether the root to which the name
rha' and 'rheon' was applied by the Greeks
as the same as that to which we now apply the
ıme of rhubarb, because the descriptions of the
ırmer given by Dioscorides and Pliny do not
ply to the latter. It is admitted however that
ır rhubarb was known to the later Greek phy-
cians, as Alexander of Tralles and Paulus of
Egina, and there is no doubt that the Arabs were
ell acquainted with it; and it is remarkable
ıat they quote 'rheon' as the Greek synonyme
their 'rawund,' which is rhubarb, and which
ıey describe as being of various kinds, as In-
an, Turkish, Chinese, and from Khorassan.
rom this it is probable that one kind may have
ecome substituted for another as the communi-
tion with the east increased. Long as the
hubarb root has been known, it is remarkable
at the species of *Rheum* yielding it is yet un-
ıown; this is in consequence of the best rhu-
ırb, Turkey rhubarb, being only obtained by
e Russians at Kiachta from the Chinese. That
lled Chinese may be the produce of the same,
of a different species, from the northern
ındaries of that country. Dr Royle, after
viewing the different accounts of the commerce
rhubarb, states:—"This would bring the
ubarb, country, within 95° of E. long. in 35
N. lat., that is, into the heart of Tibet.
s no naturalist has visited this part, and
ither seeds nor plants have been obtained
ence, it is as yet unknown what species yields
is rhubarb plant." Sievers had previously
ld that his travels had satisfied him that as yet
body, that is, no scientific person, has seen
e true rhubarb plant. The Himalayan and
ersian rhubarbs have alone been ascertained.
ıe different species of rhubarb are important
ınts, not only on account of the roots being
so extensively employed, and so valuable for their medicinal qualities, but also on account of the stalks of the leaves being now so much employed, from their agreeable acidity, in making tarts, &c. As the species are all indigenous in cold parts of the world, that is, from the southern parts of Russia, Siberia, Tibet, the north of China, and the Himalayas, so they may all be grown in the open air of Great Britain and several are cultivated on account of their stalks. Some also, both in England and France, are cultivated on account of their roots, often for the purpose of adulteration. The genus *Rheum* is characterised by having an inferior petaloid sexpartite calyx, into the bottom of which the stamens, about nine in number, are inserted; anthe s opening lengthwise; ovary superior, with a single erect ovule; styles 3, reflexed; stigmas peltate, entire; fruit (achenium) 3-cornered, winged, with the withered calyx at the base. The species which are known and cultivated are the following: (Royle, *Illustr. Himal. Bot.*; Lindley, *Flora Medica*; Pereira, *Elements of Materia Medica*) *Eng. Cyc.*

(7072) RHEUM, CASPICUM, Fischer (*R. rhaponticum*, Ledbour); in the Altai Mountains. Leaves ovate, acuminate, obtuse, cordate, inflexed at the base, thick, very wavy, glossy on the upper but slightly downy on the under side. Petiole pale green, minutely downy.—*Eng. Cyc.*

(7073) RHEUM COMPACTUM, Linn.; Tartary and China. Leaves heart-shaped, obtuse, very wavy, deep green, thick, quite smooth on both sides, glossy on the upper. Sinus nearly closed with parenchyma. Petiole green.—*Eng. Cyc.*

(7074) RHEUM CRASSIVERNIUM, Fischer. Leaves heart-shaped, acuminate, obtuse, wavy, bullate, deep-green, quite smooth, rather glossy above; ribs slightly coloured red, the centre ones above half an inch deep at the base. Petiole dull red, rounded, rather angular.—*Eng. Cyc.*

(7075) RHEUM EMODI, Wallich, *R. australe* of Don, is found in Kumaon. The root is a valuable medicine, though bearing hardly any resemblance to that of the shops. Stems much branched, six to ten feet high, very thick below, gradually diminishing, and spreading into large panicles, and these rough, with minute warts. Leaves very large, cordate, acute, dull-green, but little wavy, very rough, covered with little hairs. Petioles very rough, furrowed, and very much narrower at the upper than the lower end. Panicles terminal, very long. Flowers blood-red, very small.—*Eng. Cyc.* Honigberger mentions that *Rheum Australe* Don, *Rheum Emodi* Wall, vegetates in wild luxuriance on the Cashmerian mountains. It is considered as one of the best rhubarbs; notwithstanding the coarse appearance of its exterior.

The best of all is, it can be had fresh and cheap in any quantity, and at any time Besides, it must necessarily have its own peculiar properties, such as are not to be found in any other sort of rhubarb.—*Thirty-five years in the East, by Dr. Honigberger, p.* 335.

(7076) RHEUM LEUCORHIZUM, Pall (*R. nanum*, Sievers; *R. tataricum*, Linn.). A small plant though said to be equally efficacious with the best sorts. Radicle leaves about three, short stalked, from four to six inches long, and from five to nine inches broad; smooth on both sides, tooth-letted at the edge. Flowering stem about two inches high when in flower, afterwards becoming ten to twelve inches high.—*Eng. Cyc.*

(7077) RHEUM MOORCROFTIANUM, (Royle), Small-Stalked Rhubarb, leaves and stems covered with short pubescence; petioles deeply furrowed; the stipules as long as the petioles and very membranous; scales at the base yet longer, extremely thin, and towards the summits much torn. This species was found by Messrs. Moorcroft and Hearsay near the Niti Pass in the Himalayas, at an elevation of 12,000 feet.—*Eng. Cyc.*

(7078) RHEUM PALMATUM, Linn., generally thought to be the source of the true officinal rhubarb; near the great wall of China. Leaves roundish, cordate, half palmate; the lobes pinnatifid, acuminate, deep dullgreen, not wavy, but uneven and very much wrinkled on the upper side, hardly scabrous at the edge, downy on the under side. The flowering stems are taller than those of any other species.—*Eng. Cyc.*

(7079) RHEUM RHAPONTICUM, Linn; north of the Caspian. According to Guibour, cultivated largely near Lorient, in the department of Morbihan in France, at a place called from that circumstance Rheumpole. Leaves roundish, ovate, cordate, obtuse, but little wavy, very concave, even, very slightly downy on the under side. Panicles very compact and short, always rounded at the ends, and never lax. *R. rhaponticum*, *R. hybridum*, R. *compactum*, and hybrid varieties of them, are the common garden rhubarbs.—*Eng. Cyc.*

(7080) RHEUM RIBES seems to be so named from the Persian name Ribas, which is as frequently written Rewash, and which Elphinstone, Burnes, and other travellers notice as being highly esteemed by the Persians, and of which the stalks are prepared in a variety of ways, and considered a great delicacy.—*Eng. Cyc.*

(7081) RHEUM SPICIFORME, Royle, 'Illust.,' t 78, found on the northern face of the Himalayas. Leaves thick, leathery, cordate, blunt, red and netted beneath, and covered with stellate down on each side. Pedicels numerous, clustered, as long as the ripe fruit. The roots are lighter coloured and more compact than those of *R. Emodi.*—*Eng. Cyc.*

(7082) RHEUM UNDULATUM, Linn. (*R. rhubarbarum*, Linn.), China and Siberia. Leaves oval, obtuse, deep green, with veins purple at the base, often shorter than the petiole, downy on each side when young, looking as if frosted. Petiole downy, blood-red, semi-cylindrical.—*Eng. Cyc.*

(7083) RHEXIA VIRGINICA. *Melastomaceæ*. This is a genus of shrubby plants, handsome when in flower, they require a good soil, and may be propagated by seed or dividing the roots, colours are purple, pink and white.—*Riddell.*

(7084) RHEUM WEBBIANUM, Royle, 'Illust.,' t. 99.; *R. Emodi* of Meisner, found by Mr. Moorcroft at the height of 12,000 feet above the level of the sea, and by Dr. Royle on the Choor Mountain. Root leaves large, long-stalked, rather downy above, veiny beneath, margin hairy. Axillary racemes clustered, terminal, panicled; pedicels in threes, twice as short as the ripe fruit.—*Eng. Cyc.*

(7085) RHINACANTHUS (from ῥίν, a snout, and ἀκάνθα, a thorn), a genus of Plants belonging to the natural order *Acanthaceæ*. It has a regularly 5-parted calyx with small subulate bracts and bractlets; a hypocrateriform 2 lipped corolla, with a long slender tube, the upper lip narrow, the lower trifid, with equal segments; 2 stamens inserted in the throat of the corolla, the anthers 2-celled, awnless, with one cell placed above the others almost in a line; a clavate capsule much compressed at the base, with the commissure of the valves in contact and seedless; the upper part 4-seeded, or by abortion 2-seeded; the dissepiment complete, adnate; the seed ovate, bi-convex, augmented with hooks which are concave and obtuse.—*Eng. Cyc.*

(7086) RHINACANTHUS COMMUNIS. *Syn.* JUSTICIA NASUTA, WHITE-FLOWERING JUSTICIA. Linn. *Roxb. Flora Indica*, i. p. 120. *Rheede*, ix. t. 69.

Pulcolli, RHEEDE.	Naga mulli, TEL. and TAM.
Kabooter ke jur HIND.	
Jooi panee, BENG.	*O'Shaughnessy, p.* 8.

Rhinacanthus Communis, is a native of the continent of India, with opposite stalked broad-lanceolate obtuse leaves, above smooth, below a little downy, entire, from two to four inches long and from one to two inches broad, and a fleshy ring surrounding the base of the ovary. The roots of this plant are boiled in milk, and are reckoned by the natives of India as aphrodisiac. In conjunction with lime-juice and pepper they are used as an external application for ringworm. (Lindley, *Flora Medica.*)—*Eng. Cyc.* It is used also for the bites of venomous snakes, hence the Telinga and Tamul name Naga mulli, or jasmine of the cobra capella. "Naga," as

Roxburgh informs us, is prefixed to most of the native antidotes, and occurs very often in their writings,—" like the ancient physicians of Greece and Rome those of India at this day make poisons and their antidotes a very chief part of their studies, but from the seeming inactivity of a very large share of them, we may safely conclude that their practice is equally frivolous with that of the ancients, and ought to be discouraged as much as possible, because at least they prevent the application of more efficacious remedies."—*O'Shaughnessy, page* 481. R. Communis grows spreading along the ground (*Riddell*); and is found in the native gardens as a flower. The flowers are sold along with those of Jasmine and the root used in medicine as an excitant.—*Gen. Med. Top. p.* 173.

(7087) RHINOCEROS (the Greek Ρινοκέρως), the name of a genus of Pachydermatous Quadrupeds, placed by Linnæus in his order *Bruta*; and by Illiger in his order *Mullungla*, family *Nasicornia*. It has been a question whether one of the species, *Rhinoceros unicoris*, Linn. (R. *Indicus*, Cuv. and Desm) is not the ראם (Reem), or רים (Rem), of Scripture (Numb. xxiii. 22; xxiv. 8; Deut., xxxiii. 17; xxxix. 9 10; Psalms, xxii. 21; xxix 6; xcii 10; Isaiah xxxiv. 7). In the Septuagint the word is translated Μονοκέρως, or Unicorn, except in Isaiah, where it is rendered ' Αδροὶ (or the mighty or powerful ones). In the Trigurine and Vulgate versions the word is rendered (Numb., xxiii 22; Job xxxix. 9, 15) Rhinoceros, with a note to the former, that others read Monoceros; and in Scheuchzer's ' Physica Sacra' we have (Tab. 313) Numb., xxiii. 22. illustrated by a somewhat extravagant and exaggerated figure of a one horned Rhinocerous, with " Reem: Rhinoceros" below the plate. In the Bible " Imprinted at London by Robert Barker, Printer to the King's most excellent Majestie" (' Breeches Bible), the word used is ' Unicorn;' and ' Unicorn' is the expression in the version now in use in our churches. Some are of opinion that the Reem, or Reim, of Scripture were savage animals of the Bovine genus, and others that the word signified the Oryx, observing that Reem is the Arabian name for a species of wild-goat or gazelle. These allege that the Reem was two-horned. (Deut. xxxiii. 17; Psalms, xxii 21.) The better opinion seems to be that the animal or animals intended to be designated in most of the passages quoted, if not in all, was or were the *Rhinoceros unicornis*, or Great Asiatic one-horned Rhinoceros. M. Lesson expresses a decided opinion to this effect; and indeed the description in Job (chap. xxxix) would almost forbid the conclusion that any animal was in the writer's mind except one of surpassing bulk and indomitable strength. It has also been doubted whether accounts of the Indian Ονος ἄγριοι (Wild Asses) given by Ctesias (' Indic.,' ed Bahr) were not highly coloured and exaggerated descriptions of animals of this genus, and whether the Ονος Ινδικός (Indian Ass) of Aristotle was not a Rhinoceros.

The osteology of the various species of *Rhinoceros* differs very considerably. The following differences appear on examining the skull of the two-horned species of the Cape:—1. On its upper surface the horizontal contour of the bones of the nose is rounded in the Cape species, and almost extravagantly so in *R. simus*, whilst in the one horned species it is pointed. 2. The principal differences in the profile relate to the form of the incisive bones, which in *R. Indicus* advance as far as the bones of the nose, and have above a particular apophysis: in *R. Africanus* and *R. simus* the incisive bones are each reduced to a small oblong piece. 3. On the lower surface, besides the differences which result from the form of the zygomatic arches, the direction of the occipital crest, and that which the difference of the incisive bones produces on the front of the palate, it may be observed that the series of molars is longer in *R. Africanus* and *R. simus*, and that it converges anteriorly with that of the opposite side. 4. The posterior surface is demi-elliptical, and higher than it is wide in *R. Indicus*, and rather wider than it is high in *R. Africanus* and *R. simus*, in which last the occipital foramen is wider than it is high, whilst in *R. Indicus* those proportions are reversed. The principal differences of the lower jaws are (besides the length which precedes the molars, which is much less in *R. Africanus* and *R. simus* than in *R. Indicus*), 1st, that the series of molars is longer in the African species; 2nd, that the rising branches are much less high; 3rd, that the coronoid apophyses are much shorter, less pointed, and less directed forwards; 4th, that the dental branches are much more convex externally. The One-Horned Rhinoceros of Java (*R. Javanus*) resembles less, in the bones of the extremities, the *R. Indicus*, than does the *R. Africanus*; which, as Cuvier observes, is remarkable. But in the skull the resemblance to that of *R. Indicus* is striking, though there are still remarkable differences. The whole cranium, for instance, is less, and the zygomatic arches, the orbits, and the nasal bones, which terminate in a sharp point, are less developed. We now proceed to give some account of the species of *Rhinoceros*:—*Eng. Cyc.*

(7088) RHINOCEROS AFRICANUS. Cuv. (*R. bicornis*, Linn.), is of a pale yellow brown; horns unequal in length; neck surrounded with a furrow at the setting on of the head; eyes brown. Length 10 feet 11 inches. (Smith.) The hide is pale yellowish-brown, with tints of purple upon the sides of the head and muzzle; the groins flesh-coloured; eyes dark brown; the horns livid-brown clouded with green; the hairs on the tip of the tail and the margins of the ears deep black.—*Eng. Cyc.*

(7089) RHINOCEROS INDICUS (*R. unicornis*, Linn.) has a single horn on the nose. Skin naked, very thick, of a dull deep purplish-gray, marked with sub-elevated, rounded, and other inequalities, and remarkable for the deep folds which it forms behind and across the shoulders, and before and across the thighs, &c. There are a few stout, stiff, horny, and smooth hairs on the tail and on the ears. The species inhabits the East Indies, especially beyond the Ganges. It is recorded as having been found in Bengal, Siam, and Cochin-China. Shady forests, the neighbourhood of rivers, and marshy places are favourite localities. Their ordinary food consists of herbage and the branches of trees. The flesh is said to be not unpalatable. —*Eng. Cyc.*

(7090) RHINOCEROS JAVANUS (Cuvier) has one horn; folds of neck obsolete; scutules of the skin angled at the margin, concave in the middle, and furnished with a few short bristles; margin of the ears and under side of the tail hairy. The marks of distinction afforded by the folds of the external covering were less evident than those afforded by the form of the body and the attenuated head; but the folds on the whole appeared less rough or prominent than in *R. Indicus*. This animal is gregarious in many parts. Dr. Horsfield states that it is not limited to a particular region or climate but that its range extends from the level of the ocean to the summit of mountains of considerable elevation. Dr. Horsfield noticed it at Tangung, near the confines of the Southern Ocean, in the districts of the native princes, and on the summit of the high peaks of the Priangan regencies. It prefers high situations. This species is the Warak of the Javanese, the Badak of the Malays and of the inhabitants of the western parts of Java. (Horsfield, 'Zoological Researches in Java.')—*Eng. Cyc.*

(7091) RHINOCEROS KEITLOA (Smith) is of a pale brownish-yellow colour; the two horns subequal in length, the anterior one cylindrical, the posterior one compressed; anterior part of the upper lip produced and acuminate. Dr. Smith remarks that the only species yet known with which the present could be confounded is the *R. bicornis* of authors There are however, he observes, many and marked differences between them, of which the following are a few of the external and more palpable ones. In *R. Keitloa* the two horns are of equal or nearly equal length; in *R. Africanus* the posterior in neither sex is ever much beyond a third of the length of the anterior horn; the length of the head in proportion to the depth is very different in the two.

(7092) RHINOCEROS SUMATRENSIS, Cuv. (*R. Sumatranus*, Raffles), has four great incisors, as in the two preceding species, but hardly any fold on the skin, which is hairy; a second horn behind the ordinary one. The first satisfactory indication of the existence of this species occurs in Pennant, who imagined that the two-horned species of Sumatra was identical with *R. bicornis*, the only African species then known. He quotes the following remark of Mr. Charles Miller, who was long resident in Sumatra:—"I never saw but two of the two-horned Rhinoceros; but I believe they are not uncommon in the island, but are very shy, which is the reason they are but seldom seen. I was once within twenty yards of one. It had not any appearance of folds of plaits on the skin; and had a similar horn resembling the greater, and, like that, a little turned inward. The figure given by Dr. Sparrman is a faithful resemblance of that I saw

The hide is rugose, covered with scattered stiff brown hairs; folds on the shoulders and croup but slightly marked; the skin generally rather delicate, and nearly without folds; head rather elongated; eyes small and brown; upper lip pointed and curved downwards; ears small and pointed, fringed with black short hairs; first horn bent backwards, second smooth and pyramidal, placed a little in front of the eyes. It is a native of Sumatra.—*Eng. Cyc.*

(7093) RHINOCEROSES FOSSIL. The Fossil Rhinoceroses hitherto discovered may be divided into three groups—3, those with a true or bony septum narium; 2, those without a bony septum; and 4, those with incisor teeth. The greater portion of remains found in Northern and Central Europe and Asia belong to the first group; those found in Italy belong to the second. The skulls of the Rhinoceroses belonging to the first group exhibit an essential difference when compared with those of the living species. Those of the former are longer and narrower in proportion; the width between the orbits is less; the bones of the nose are more elongated; the disc on which the anterior horn was seated is an oblong ellipse, whilst in *R. bicornis* it is a hemisphere. An analogous elongation exists in the place where the second horn was situated, whence Cuvier concludes that the horns of the Rhinoceros with a bony septum narium were very much compressed laterally. The same great zoologist remarks that in *R. bicornis* or *R. Africanus* (Cape Rhinoceros) the occipital crest is nearly over the occipital condyles, and the posterior surface of the occiput is nearly perpendicular to the axis of the head. In *R. Javanus* this surface is inclined forwards, which renders the distance from the nose to the crest shorter than that from the nose to the condyle in a proportion of 19 to 25.—*Eng. Cyc.*

(7094) RHIZOPHORACEÆ, *Mangroves*, a natural order of Exogenous Plants, natives of the shores of the tropics, where they grow in the mud, and form a close thicket down to the verge of the ocean. They are trees or shrubs, with simple

opposite leaves, having deciduous interpetiolary stipules. The calyx is adherent, with 4-12 valvate lobes ; petals 4-12 : stamens twice or thrice as many ; ovary 2-4-celled, with two pendulous ovules in each cell. The fruit is monospermal, indehiscent, crowned by the calyx. Seed exalbuminous, embryo germinating in the pericarp. There are 21 species and 5 genera. The bark of the trees is usually astringent, and is employed in tanning and as a febrifuge. The wood of several is described as being hard and durable.—*Eng. Cyc.*

In the West Indies, cordage is made of the bark of a species of Mangrove, which is hence called Rope Mangrove. The coasts of the Bay of Bengal and of the Indian islands abound in the Mangrove, which is found also at the mouths of the Indus. Its bark has been used for tanning purposes, for which it is probably more suitable than for cordage.—*Royle. Ill. Pl. p.* 301. The bark of a small Mangrove tree *Kandelia Rheedii* from the mangrove swamps is used by the Tavoy women in dying red, but Mason thinks as a mordant.—*Mason* The following species of *Rhizophora* are the best known forms of the order :—

(7095) RHIZOPHORA GYMNORHIZA. Rheede.

Kayu-api-api, Malay.

Handeb kakora of the Delta of the Ganges. *Rhizophora gymnorhiza* grows to a considerable size where the spring-tides rise over it, as in the delta of the Ganges. The wood is yellow, hard, and durable ; has a sulphurous smell, and burns with a vivid light ; is chiefly used by the natives for fire-wood and making posts for constructing their houses. The pith of the wood, boiled in palm wine or with fish, is used as food.—*Eng. Cyc.* Trunk generally dividing before it reaches the ground like a parcel of hop poles piled up in form of a cone ; the seeds hang down : from the apex proceeds the root : attains a considerable magnitude in places over which the spring tides rise. The wood is of a yellowish colour, hard and durable ; its chief use is for burning and for posts with which to construct the houses of the natives.—*Rohde M. S. S.* It is used for fuel in the Archipilago.—*Crawfurd.*

(7096) RHIZOPHORA MANGLI. Common Black Mangrove, Rheed.

Pukandel, Tel. Tam.	Manggi,-Manggi, Malay.
Oopoopoma, Beng.	Bhora, Beng.

Rhizophora Mangle, Bhora of the Delta of the Ganges, the common or Black Mangrove, is found abundant on the shores of the ocean, and within the delta of the Ganges, where it grows to a considerable size. The seed of this species, which is from one to two feet long, very quickly gives rise to a young tree, and, as mentioned by Browne in his 'History of Jamaica,' if the apex from whence the root issues be stuck only a little way in the mud, the leaves quickly unfold at the opposite end. The wood is dark-red, hard, and durable, and the bark is used for tanning leather.—*Eng. Cyc.* This tree forms a striking feature in the physical geography of the archipelago as it does indeed of all tropical countries, for a belt of it as deep as the reach of the tide is always found wherever there is a shallow and muddy shore. The tree which rises to the height of forty or fifty feet is invariably found in such situations constituting a dense, and almost impenetrable forest. Each tree stands in a cradle of its own roots from five to six feet high, bare at low water but at high water covered so as to give the appearance of trees growing in the sea. The mangrove jungle is the favorite resort of musquitos and crocodiles, and affords a convenient and almost inacessble retreat to the pirate.—*Crawfurd, p.*266. The Mangrove Bark of *Rhizophora mangle*, is used to dye chocolate color in the East and West Indies. This was one of the colors introduced by Dr. Bancroft, and for the exclusive use of which he obtained an Act of Parliament. It is procured in plenty at Arracan, Malabar and Singapore in the East (*Simmonds*). Also, in the Indian Archipelago, it is used in tanning : its wood gives a red dye.—*Crawfurd, page* 266. The great length of the seed of this species gives in a very short time a young tree, for if the apex from which the root issues is only stuck a little way into wet soil or mud the leaves quickly unfold at the opposite end The wood is of a dark reddish colour, hard and durable. This species is valuable from its property of growing in salt marshes subject to the influence of the tide.—*Rohde, M.S.S.*

(7097) RHIZOPHORA MUCRONATA, is a species given by Dr. Wight.

(7098) RHODANTHE. Compositæ. This plant is a native of the Swan River, and is said to be as beautiful an annual as has been introduced into the English collections. It grows to a large size, and is covered with innumerable blossoms of rose and yellow colour ; when grown from seed, the plants require to be continually shifted into larger pots, and the blossom buds at first pinched off ; the shifting may be repeated five or six times until the plants have acquired a shrubby character, when the flowers will all expand, and continue in succession for some time.—*Riddell.*

(7099) RHODODENDRON, a genus of Plants belonging to the natural order *Ericaceæ*. The species are evergreen shrubs, very commonly cultivated in English gardens and shrubberies, and differing from *Azalea* principally in the stamens, being 10 instead of 5, in the corolla being campanulate, not tubular, and in the foliage being hard and evergreen. The species are nearly related to each other, and occur both in the New and Old Worlds. Thirty-two species of the genus *Rhododendron* have been distinguished by De Candolle in the seventh volume of his 'Prodromus,' in 1839 ; the maximum of known

species at the present time exists in Asia; for, commencing with Borneo and other Malayan islands in the tropics of the southern hemisphere, and proceeding north, we find them recorded in the mountain regions of all intervening countries that have been botanically investigated, even to northern and extreme arctic Siberia. As we proceed westward into Europe they gradually disappear, one only inhabiting Sweden and Norway, *R. lapponicum*, and that seems not to extend to the western coasts. No species grows in Mexico or near the coasts of Oregon or California, and none in the isthmus of Panama. Throughout the whole of Africa and Australia the genus is unknown, and it will be observed that it only enters the southern hemisphere through the medium of the Indian Archipelago. Mr. Griffith in an excursion to one mountain in Bootan detected eight species, and Dr. Hooker, during a very limited sojourn in Sikkim, and notwithstanding great difficulties, was able to collect and describe a far larger number. These facts would lead to the conclusion that if the maximum of Rhododendrons be in Asia, their head quarters are on the lofty ranges of the Eastern Himalayas, where the mild and moist atmosphere is eminently suited to their habits. (Lindley, *Vegetable Kingdom*; Dr. Hooker, *Rhododendrons of the Sikkim Himalaya*.) Within the last few years a number of species of these beautiful plants has been found in the Himalayan Mountains by Dr. Joseph Hooker, who has described them in his 'Monograph of the Rhododendrons of the Sikkim Himalaya.' The most beautiful of these forms are the R. Falconeri; Dalhousiæ; R. Barbatum R. Lancifolium; R. Wallichii, and R. Argentum.—*Eng. Cyc.* Dr. Wight gives in his Icones, Rhododendron arboreum, 1018-1201, formosum, 1202, grande, 1202, and Griffithianum, 1203. Numerous varieties are to be procured in Britain, those of *R. ponticum*, *R. maximum*, and *R catawbiense* are the most robust; *R. hybridum* obtained between the Indian and American species is less hardy; *R. ferrugineum* and *R. hirsutum*, dwarf alpine species; *R. campanulatum*, a North Indian species.—*Eng. Cyc.*

Rhododendrons are very numerous at Laghep, near Tumloong, and Dr. Hooker gathered, in two days, seeds, of twenty-four kinds. These occurred in the following order in ascending. Commencing at 6000 feet—1. R. Dalhousiæ; 2. R. vaccinioides; 3. R. camelliæflorum; 4. R. arboreum. Above 8000 feet:—5. R. argenteum; 6. R. Falconeri; 7. R. barbatum; 8. R. Campbelliæ; 9. R. Edgeworthii; 10. R. niveum; 11. R. Thomsoni; 12. R. cinnabarinum; 13, R. glaucum. Above 10,500 feet:—14. R. lanatum; 15. R. virgatum; 16. R. campylocarpum; 17. R. ciliatum; 18. R. Hodgsoni; 19. R, campanulatum. Above 12,000 feet:—20. R. lepidotum; 21. R. fulgens; 22: R. Wightianum; 23. R. anthropogon; 24. R. setosum.—*Hooker Him. Jour. Vol*: II. *page* 197. No rhododendron grows at Churra, but several species occur a little further north—*Hooker H J. Vol* II. *page* 282. On the hill above Choongtam village, in Sikkim, Dr. Hooker gathered, at 5000 to 6000 feet, *Rhododendron arboreum* and *Dalhousiæ*, which do not generally grow at Darjiling below 7,500 feet. Dr. Hooker collected here ten kinds of rhododendron, which, however, are not the social plants that they become at greater elevations. Still, in the delicacy and beauty of their flowers, four of them, perhaps, excel any other, they are *R. Aucklandii*, whose flowers are five inches and a half in diameter; *R. Maddeni*, *R. Dalhousiæ* and *R. Edgeworthii* all white-flowered bushes, of which the two first rise to the height of small trees.—*Hooker. Him. Jour. Vol.* II. *p.* 25. In the Tonglo mountains, in Sikkim in order of prevalence the trees were,—the scarlet *Rhododendron arboreum* and *barbatum*, the latter thirty to forty feet high as large bushy trees, both loaded with beautiful flowers and luxuriant foliage; *R. Falconeri*, in point of foliage the most superb of all the Himalayan species, with trunks thirty feet high, and branches bearing at their ends only, leaves eighteen inches long: these are deep green above, and covered beneath with a rich brown down. Next in abundance to these were shrubs of *Skimmia*, *Laureola*, *Symplocos*, and Hadrangea and there were still a few purple magnolias, very large *Pyri*, like mountain ash, and the Common English yew, eighteen feet in circumference the red bark of which is used in Nepal as a dye, and for staining the foreheads of Brahmins.—*Hooker. Him. Jour. Vol.* I. *p.* 167.

(7100) RHODODENDRON ANTHROPOGON AND R. SETOSUM, two dwarf species with strongly scented leaves occur at an elevation of 12,000 feet near Wallanchoon in East Nepaul.—*Hooker, Vol.* 1. *p.* 220

(7101) RHODODENDRON ARBOREUM, True Rhododendron, has lanceolate leaves, acute, silvery beneath, tapering to the base; pedunculs and calyxes woolly; segments of corolla 2-lobed, with crenulating curled margins, capsule 10-celled, tomentose. It is a native of the warmer parts of India, and is one of the most beautiful of all trees, but too delicate to bear the open air in England. A steep ascent, in the Ryott valley in Sikkim, led through large trees of *Rhododendron arboreum.–Hook. Him. Jour. Vol.*II. *p.* 190.

(7102) RHODODENDRON ARBOREUM, *Variety roseum*, this, a variety of *R. arboreum*, grows to the height of thirty and forty feet in Sikkim.—*Hooker. Him. Jour. Vol.* I. *p.* 167.

(7103) RHODODENDRON ARGENTEUM. WHITE FLOWERED RHODODENDRON TREES, are found in Sikkim, at an elevation of 8671 feet.—*Hooker.* Rhododendron argenteum is a tree 30 feet high, having leaves very beautiful in the

af-buds, erect and silky, at first enveloped in rge scales, so closely imbricated and so large s to resemble the cones of some species of pine, ie outer or lower scales broad and coriaceous, labrous, coloured (reddish-brown), the innermost nes oblong spathulate, *pubescent*. The flowers re 2 to 3 inches long, 2 to 2½ inches in diame-er, always white. —*Eng. Cyc*

(7104) RHODODENDRON AROMATICUM, Royle. Its leaves, "talesfur" are in India employ-d in medicine.—*Beng. Ph.* 222. The leaves of *Rhododendron aromaticum* (of Royle), are highly ragrant and stimulating; they are brought from Cabul, and called *Talesfur*. (*Royle's Illustrations*, . 259).—*O'Shaughnessy, page* 425.

(7105) RHODODENDRON BARBATUM, a tree from 40 to 60 feet high, branched from he base. Flowers of a moderate size, of a deep ance or blood-colour, collected into a compact globose head, from 4 to 5 inches in diameter. t is one of the most beautiful of the Himalayan pecies, and is readily distinguished by its hav ng bristly petioles and numerous branches flori-erous at their apices.—*Eng. Cyc.*

(7106) RHODODENDRON CAMPANULATUM is said to be Rhododendron anthropogon. Don. or Rhododendron aromaticum. Wall. t vegetates on the Cashmere mountains; its leaves are officinal in Cashmere and Lahore, where they are administered as errhine, to produce sneezing.—*Thirty-five years in the East by Honig. p* 335. The leaves are imported from Thibet and Cashmere, under the names *Burg-i-tibbut* and *Hoolas Cashmeree*, and are used by the natives as a snuff —*O'Shaughnessy, p.* 425.

(7107) RHODODENDRON CINNABARINUM. The leaves of ("Kema Kechoong," Lepcha: Kema signifying Rhododendron) this species alone is said to be poisonous; and when used as fuel, it causes the face to swell and the eyes to inflame; of which Dr. Hooker observed several instances —*Hooker.*

(7108) RHODODENDRON CHRYSANTHUM has acute leaves attenuated at the base, oblong, glabrous, reticulately veined, and of a rusty colour beneath; flowers and buds clothed with rusty tomentum; pedicels hairy; calyx hardly any; segments of the corolla rounded; ovarium tomentose. It is a native of Siberia on the highest mountains, and of the Caucasus. The plant and its effects were first described by Gmelin and Steller, who mention it as used in Siberia for the cure of rheumatism; with us it is used in decoction as a substitute for colchicum. —*Eng. Cyc.*

(7109) RHODODENDRON DALHOUSIÆ is parasitical on the trunks of large trees, especially oaks and magnolias. It has large flowers, three to seven, in a terminal umbellate head, the spread of which is greater than that of the leaves. The calyx large, deeply-divided almost to the base into five ovate elliptical very obtuse spreading foliaceous lobes; corolla very large, 3½ inches to 4½ inches long, and as broad at the mouth, campanulate, white, with an occasional tint of rose; in size and colour and general shape almost resembling that of the white Bourbon Lily, very frequently having the odour of the Lemon.—*Eng. Cyc.*

(7110) RHODODENDRON FALCONERI, a white flowered species, never occurring below 10,000 feet above the level of the sea, is one of the most striking and distinct of the genus.—*Eng. Cyc.* It occurs in East Nepal, where it grows to a height of forty feet with leaves nineteen inches long.—*Hooker. Vol.* I, *p.* 272. This species, in point of foliage, is the most superb of all the Himmalayan species, with trunks thirty feet high, and branches bearing at their ends only, leaves 18 inches long. These are deep green above and covered beneath with a rich brown down.—*Hooker.*

(7111) RHODODENDRON HODGSONI. Its foliage is of a beautiful bright green, with leaves sixteen inches long: Its bark is as delicate as tissue paper and of a pale flesh colour.—*Hooker. Vol.* I. *p.* 259.

(7112) RHODODENDRON LANCIFOLIUM is a shrub 6 or 8 feet high; the bark reddish, papery, easily separating and falling off. Branches spreading, tortuous, wrinkled, and knotted: flowers of a moderate size, collected into a rather dense head at the ends of the branches; corolla of a rich purple colour.—*Eng. Cyc.*

(7113) RHODODENDRON NIVALE This, the most alpine rhododendron, spreads its small rigid branches close to the ground.—*Hooker. Him. Jour. Vol.* II. *page* 135.

(7114) RHODODENDRON PONTICUM is the species to which most of the varieties of English gardens belong. The leaves are oblong-lanceolate, glabrous on both surfaces, attenuated towards the thick petioles, with a streak on the upper surface and of a wide lanceolate form, racemes short and corymbose. It is a native of Asia Minor in Pontus, and of Gibraltar, Spain, and the Caucasus, in wet places, in beech and alder coppices. The corolla is large, purplish, with ovate, acute, or lanceolate segments. The calyx minute, 5-toothed, somewhat cartilaginous. At one time it was supposed that it was this plant which rendered the honey of Asia Minor poisonous, but it has been ascertained that the effect is really produced by *Azalea Pontica.*—*Eng Cyc.*

(7115) RHODODENDRON PUNICEUM.
Kaephul Hind.

A common tree on the lower ranges of the Himalaya hill, the bark called Kaephul is brought to Ajmere, from Delhie and Mirzapoor, and is used as a rubefacient and sternutatory. Dr Irvine found Kaephul and pounded ginger, mixed, the best substance with which to rub cholera pati-

ents to promote reaction: one maund costs five Rupees. The fresh flowers are pleasantly acid, and are eaten by the hill men to quench their thirst during the ascent of the hills, the flowers are also made into a jelly.—*Gen. Med. Top. p.* 147.

(7116) RHODODENDRON WALLICHII is a very distinct and handsome species, with lilac-coloured flowers. Its leaves are quite unlike any Indian species, and the flowers in colour and size resemble those of the much cultivated *R. Ponticum*.—*Eng Cyc.*

(7117) RHODYMENIA, is an ill-defined genus of Algæ, of the order Rhodymeniaceæ, and will probably be divided into several distinct genera; many of the species, especially of the section *Calophyllis* are among the most splendidly coloured of crimson and carmine *Algæ*. Others, as *R. Hombroniana*, are clothed in royal purple; while others, like the sober dulse, of British coasts, *R. Palmata*, have often as much of brown as of purple in their attire.

(7118) RHODYMENIACEÆ, an order of *Algæ*, consisting of purplish or blood red Sea-Weeds, with an expanded or filiform inarticulate frond, composed of polygonal cells, occasionally traversed by a fibrous axis.—*Eng. Cyc.*

Many of the *Rhodymeniaceæ* are valuable in an economic sense.—*R. palmata*, the Dulse of English coasts, is collected largely in Scotland and Ireland, and forms an important article of diet. Many of the *Gracilariæ* are largely used in the East as ingredients in soups and jellies, and also as substitutes for glue.

(7119) *Gracilaria spinosa*. One of this order, *G. spinosa*, is the Agar Agar of the Chinese, and is largely collected both for culinary purposes, and as a component part of one of the strongest Chinese glues. It has recently been imported into England, and is occasionally used instead of carrageen moss in making jellies and blancmanges.—*Eng. Cyc.*

(7120) RHUBARB. RHEUM.

Rawund, ARAB.	Reobarbaro, IT.
Ta-hwang, CHIN.	Rheum, LAT.
Tahoan, COCH-CHIN.	Rawund, PERS.
Rhubarber, DUT.	Ruibarbo, PORT.
Rhubarbe, FR.	Reven, RUS.
Rhabarber, GER.	Ruibarbo, SP.
Rawunchenee, GUZ. HIND.	Variattoo kalang, TAM.

Rheum, Radix, Root, of an undetermined species of Rheum, *Linn.*, of R. palmatum, L. D. and of R. undulatum. The name Rheum is derived from the ῥῆον of Dioscorides; but his description does not well apply to modern Rhubarb. This was, however, known to Paulus Ægineta, &c. The Arabs were acquainted with several kinds, as Indian, Khorassanee, Chinese (their *rawund sini*). The Persians give *reon* as the Greek synonyme of their *rawund*, which is Rhubarb, and of which the plant they say is called *ribas*. Rhubarb is no doubt the rootstock of a species of Rheum, but the species is still unknown. Dr. Royle, after giving (Him. Bot. p. 314—318) an account of the commerce of Rhubarb, stated that "This would bring the Rhubarb country within 95° of E. long. and 35° of N. latitude, that is, into the heart of Tibet. As no naturalist has visited this part, and neither seeds nor plants have been obtained thence, it is as yet unknown what species yields the Rhubarb." This seems now the general opinion. Sievers, an apothecary sent in 1790 by the Russians to investigate the subject, had previously said, that "his travels had satisfied him that as yet nobody, that is, no scientific person, has yet seen the true Rhubarb plant." Dr. Fischer when in London, subsequent to the above publication, informed the author that all the information obtained of late years in Russia, only confirmed what was previously known, that *Rheum palmatum* is not the species, but that the genuine plant is a small one with roundish denticulate leaves. So, more recently, Calau, apothecary in the Rhubarb factory at Kiachta, says: "All that we yet know of the Rhubarb plant or its orgin is defective and wrong; every sacrifice to obtain a true plant, or the seed, has been in vain; nor has the author been enabled to obtain it." Dr. Falconer entered Tibet from the side of Cashmere, and proceeded as far as the Muztah range, or about long. 77° E. and lat. 36°, a region where Rhubarb is sent as a present to the Chief Ahmed Shah from the true Rhubarb country, but was unable to learn anything respecting commercial Rhubarb. He discovered new species of Rheum, and obtained specimens of genuine Extract of Rhubarb *ossareh-rewand*, or Rhubarb-juice, a name which he as well as Dr. Royle found applied in north-west India to Gamboge. He also found Rhubarb-root employed there as a yellow dye. Some information might probably be procured respecting Rhubarb from the traders to Upper Assam.

(7121) *Rheum*: *Linn. Enneandria Monog. Linn.* Flowers complete; perianth petaloid, 6-parted, with equal segments. Stamens usually 9, inserted in pairs into the base of the 3 outer segments, and singly into the 3 interior; filaments subulate; anthers versatile. Ovary triangular, 1-celled. Ovule single, basilary, orthotropous. Styles 3, short, reflexed. Stigmas 3 entire, subdiscoid, spreading. Achænium 3 cornered, broadly winged, supported by the withered perianth at the base. Seed erect, triangular. Embryo straight, antitropous, in the axis of farinaceous albumen. Cotyledons flat, radicle short, superior.

Herbaceous plants, with perennial and branching rootstocks, which are thick and succulent. Stem of most 4 to 10 feet high, except in No. 1 and 2. Leaves large, more or less cordate, wavy at the margin, sheathing at the base, either all radical, or where cauline, alternate. Inflorescence paniculate, or spicato-racemose. The species are valuable not only on account of their root-

stocks or Rhubarb, but also from the agreeable acidity of their leaf-stalks, employed for making sherbets, tarts, &c. They inhabit cold parts of the world, as the southern part of Russia, Siberia, Tibet, the north of China and the Himalayan mountains, also Affghanistan and Persia. Hence all may be grown in the open air in Europe, and several are so cultivated. As no species seems more entitled than another to be considered as yielding either the Russian or Chinese Rhubarb of commerce, we shall briefly enumerate all, without describing any.

With Spike-like Racemes.

(7122) *a. Rheum Spiciforme, Royle.* (Illustr. Himal. Bot. p. 318. t. 78.) Kherang Pass and other places in Kunawar. Found by Dr. Falconer in Tibet.

(7123) *b. R. Moorcroftianum, Royle,* (*l. c.* p. 318. Lindl. Med. Bot. p. 356.) Niti Pass in the Himalayas. Found by Dr. Falconer in Tibet. These two species differ in their inflorescence from the other described species. Their roots are more dense in texture and of a more yellow colour than those of *R. Emodi* and *R. Webbianum* The powder of both is of a light and bright yellow colour. Dr. Falconer met with both in Tibet, and discovered another species of this group. It is probable that the commercial species will be found to resemble these in habit, from being indigenous, like them in the elevated, arid, and cold regions of Tartary.

With Compound Racemes.

(7124) *c. R. emodi, Wall* Bot. Mag. t. 3508 *R. Australe*, Don. Sweet Fl. Gard. t. 269. Nees von E. Suppl. t. 31. A. and B. Lindl. Fl. Med. p. 354.

(7125) *d. R. Webbianum, Royle, l c.* p. 318. t. 78, a. Choor Mountain. Niti Pass. This yielded the Rhubarb submitted to experiment by Mr. Twining. Trans. Med. Soc. Calc. iii. p. 439.

(7126) *e. R. Ribes, Linn.* Dill. Elth. t 158. f. 192. An. Mus. 2. t. 49. *Ribas* and *rivash* of the Affghans and Persians. much celebrated among them, and much esteemed on account of the agreeable acid of its leafstalks The root is said to be *raeund*. It is the *Riwas* of Serapion, who mentions it as making a good sherbet. It is said also to be found on the mountains of Syria.

(7127) *f. R. Rhaponticum Linn.* Alpin Rhapont, i. t, 1. Nees von E. 113-14-15. Borders of the Euxine, and on the north of the Caspian Sea. Deserts near the Volga. and in Siberia, as it is known to yield Siberian Rhubarb. Supposed to have yielded the Rhabbarum of the ancients. Cultivated in Great Britain on account of its stalks, and extensively at Banbury on account of its roots, and also at Rheumpole near Lorient, in the department of Morbihan in France.

(7128) *g. R. crassinervium Fischer.* Sent from St. Petersburgh to the Apothecaries' Garden at Chelsea. Roots large, and said to have the colour and odour of Turkey Rhubarb.

(7129) *h. R. leucorrhizum Pallas* R. nanum, *Sievers.* Ledebour, Il. Pl. Ross. t. 492. Found in the deserts of the Kirghis, and South of Siberia, and Altai Mountains. Said to yield *White* or *Imperial Rhubarb.*

(7130) *i. R. Undulatum, Linn.* Amœn. Acad. iii. t. 4. Nees von E. 116, 117. St. and Ch. 177. Lindl. Fl. Med. p. 357. A native of Siberia, Tartary, and China? Seeds of what was called the genuine Rhubarb plant were given to Kauw Boerhaave by a Tartarain merchant, and these seeds produced this species and *R. palmatum*, both of which are admitted as officinal in the D. P. This is said to be cultivated in France as one of those yielding French Rhubarb.

(7131) *j. R. Caspicum, Fisch.* Caspian Shores and Altai Mountains Lindl. p. 557.

(7132) *k. R. Compactum, Linn.* Mill. Dict. 2 8. Nees von E. 121. A native of Chinese Tartary, said to yield some of the Rhubarb cultivated in France, which forms a fair imitation. Valued in Britain on account of its stalks.

(7133) *l. R. Palmatum Linn* L.D. This species easily distinguished from the others by its roundish, cordate, half palmate leaves, with the lobes also deeply cut. Root large, branched, brown externally, of deep yellow internally. Supposed to be a native of the mountains of Mongolia near the great wall of China. The seeds of this were received by K. Boerhaave with those of *R undulatum* as those of the genuine Rhubarb; and it is thought, when cultivated in Europe, to resemble Chinese-Russian Rhubarb more closely than any other kind. in taste, odour, internal structure, and the action of some chemical reagents.

(7134) *m. R. Hybridum. Murray*, is a doubtful species, but is remarkable for the great size of its roots as cultivated both on the Continent and in this country. This plant with R. Rhaponticum, compactum, and emodi, with hybrids from them, are those most commonly cultivated in great Britain on account of their stalks.

The greater part of the Rhubarb of commerce grows in Chinese Tartary, on the mountains and plains surrounding Lake Kokonor (*Pallas and Rehman*), especially in the province of Gan-su (or *Kansu? Calaw*) and is gathered in summer from plants of six years of age. When dug up, it is cleansed, peeled, cut into pieces bored through the centre, strung on a string, and dried in the sun. In the autumn it is brought to Sinin, where Bucharian traders reside, and from thence sent to the Russian frontier town of Kiachta, and to Pekin, Canton, Macao. Considerable care is bestowed at the Russian factory in examining and separating the good from the inferior pieces, also from impurities; and in paring the Rhubarb to remove remaining portions of the bark, also the upper part of the root, and in perforating all

pieces so as to examine their interior; because many, though sound externally, soon decay internally, from the rapid drying it is thought. Dr. Royle, however, found most old roots of R. Webbianum more or less decayed. It is collected in quantities of 4[illegible],000 pounds before it is imported into the European parts of Russia, and is packed in bags, and placed where there is a free current of air, afterwards in chests.

(7135) *Russian*, called also *Turkey Rhubarb*, but which in Russia is called *Chinese Rhubarb*, is imported into the frontier town of Kiachta, and thence sent to Moscow and St. Petersburgh, whence it is distributed to the rest of Europe. It varies in shape, being irregularly roundish, and angular, from the bark having been shaved off with a knife; some pieces are cylindrical, a few flattish, many of them pierced with holes. Externally smooth, of yellow colour; internally, the texture is rather dense; fracture uneven, irregularly marbled with white and red veins, having a strong and peculiar slightly aromatic odour, a bitter, rather astringent taste, feels gritty when chewed, tinges the saliva yellow, and produces a powder of a bright yellow colour. Mr. Queckett obtained from 35 to 40 per cent. of raphides, or conglomerated crystals of oxalate of lime, which are situated within the cells, and which are the cause of the grittiness experienced when Rhubarb is chewed.

(7136) *Bucharian Rhubarb*, which makes its way to Vienna by Brody and Nischny, seems, from specimens and information afforded by Mr. Faber to Dr. Pereira, to be the inferior kinds of the above Rhubarb, and which, as inferred by the latter, would be burnt, if presented to the Russian authorities; it therefore finds its way into Europe by other channels. It is intermediate between the Russian and the Chinese Rhubarb, and generally of inferior quality.

(7137) *Chinese*, sometimes called *East India Rhubarb*, consists of two or three varieties. 1. One called by Dr. Pereira *Dutch trimmed*, or *Batavian Rhubarb*, and, according to the shape, called *Flats* or *Rounds* in the trade, is closely allied to, and is derived, with very little doubt, from the same sources as the Russian Rhubarb; some of which, as mentioned above, finds its way to Canton, and is thence imported into Europe, or first into one of the Indian ports, and thence re-exported to Europe. It resembles the above in appearance, as the cortical portion appears to have been sliced off, and not scraped. The holes with which the pieces are perforated often contain within them pieces of the string by which they had been strung together. 2. Another variety which is more particularly called *Chinese Rhubarb*, also, *half trimmed*, is distinguished from that called Russian, as being irregular in shape, never angular, but the edges rounded, as if the bark, instead of being sliced, had been scraped off, often some of it still remains adherent the roots are, besides, of less uniform good quality than the Russian. Externally or a dull er yellow; many of the pieces heavier from being more compact, the reticulation less regular and of a yellowish-brown colour. 3. A third variety has lately been described by Dr. P. under the name of *Canton Stick Rhubarb*. This is in *cylindrical* pieces about two inches long, and from ½ to three quarters of an inch in diameter These are probably produced in the mountain which bound China, as those of the province o Sechuen, and perhaps of Kansu.

(7138) *Siberian Rhubarb*. Small quantities of this kind have been imported by Mr. Faber and have been proved to be those called by Grassman and others *Siberian Rhapontic Root* This occurs in long, thin, almost cylindrical o spindle shaped pieces, decorticated and perforated by a hole. Colour, externally pale yellow, internally brownish yellow, or reddish white. Odour and taste of good Rhubarb, but weaker; does not feel gritty. Dr. Pereira compares it with English *Stick Rhubarb* (v. P. J. iv. 448 and 500). It has since been proved (P. J. vi. p. 74) that the Rhuburb cultivated at Banbury is yielded by the same species, that is *Rheum Rhaponticum*

(7139) *Himalayan Rhubarb*. This is produced by different species, is of very different quality. That yielded probably by *R Moorcroftianum*, given to Dr. Royle by Major Hearsey, the companion of Mr. Moorcroft, was of a bright but light yellow colour, and, as stated by Dr. Royle in 1827, "appeared both in sensible qualities and medical virtues to equal the best Rhubarb that he had ever seen". (*Trans. Med. Soc of Calcutta*, iii. p. 439.) The Rhubarb of *R. Webbianum* was tried by Dr. Royle in both the Military and the Civil Hospital at Saharunpore, and found to be of very good quality. Some of it was subsequently submitted by the Medical Board to the late Mr. Twining, for experiment in the General Hospital at Calcutta. After trial in 43 cases, he reported that in doses of ℈j. or dr.½ it has a good purgative effect, operating nearly as freely as the best Turkey Rhubarb; and, further, that the effects of small doses of the remedy, as a tonic and astringent, are highly satisfactory; also, that it "is very efficacious in moderate doses for such cases as Rhubarb is generally used to purge." After a further trial in 4 other cases of Diarrhœa, he reports, "If further experiments should confirm the efficacy of the Himalaya Rhubarb in such cases, the acquisition of this remedy to the Materia Medica of this country will be of the utmost importance" (l. c. p. 445). This Rhubarb differs much in appearance from that of commerce. The bark, of a brownish colour, has not been taken off. The texture is radiated, rather spongy, the colour a yellowish brown, the powder of a dull brownish-yellow colour,

with little aroma (but when fresh dried, the the root was described as aromatic by Mr. Twining) with a bitter and rather astringent taste. Dr. Royle selected the branches of the roots, for he found the root-stock generally decayed in the centre. They were cut into short pieces, and slung upon a string for the facility of drying. Some of the Himalayan Rhubarb is probably yielded by R. Emodi, perhaps by other undiscovered species of Nepal, and of the passes towards Bootan. Their value must be decided by their medical effects in the cases for which they are suited, and not by their differing in appearance from the roots of other species.

(7140) *English Rhubarb.* This is cultivated at Banbury, in Oxfordshire, to the extent of twenty tons annually, and is the produce of *Rheum Rhaponticum* (*v.* P. J. vi p. 75). It is the kind frequently sold by men dressed up as Turks as Turkey Rhubarb. The species vary in shape, some being ovoid, others cylindrical (*English Stick Rhubarb*), smoothed externally, and rubbed with a yellow powder; light rather spongy, with a reddish hue. It is rather mucilaginous in taste and a little astringent. Its odour feeble, but unpleasant. It is supposed that much of this is employed for adulterating the Asiatic Rhubarb when in a powdered state (v. P. J. vi. p. 74 and 76.) A variety of analyses of Rhubarb have been made by different chemists, but with such varying results, that Dr. Schlosperger and Dapping say that "not one satisfactory analysis is to be met with."—*Royle.*

The extent of country from which rhubarb of one kind or another is actually collected, according to Christison, stretches from Ludall, in 77½ East longitude, to the Chinese province of Shensi, 29 degrees further East, and from the Suechan mountains, in north latitude 26 degrees, nearly to the frontiers of Siberia, 24 degrees northward. The best rhubarb is said to come from the very heart of Thibet, within 95 degrees east longitude and 35 degrees north latitude, 500 or 600 miles north of Assam. The price of Chinese rhubarb is inferior to that of Russia or Turkey. It varies in China from 38 dollars per picul upwards, and about 1,500 piculs are annually exported, on an average at 500 dollars per picul. In 1844, 2,077 piculs were shipped from Canton for Great Britain; and of 95,701 lbs. imported in 1841, 43,640 lbs. were brought from China, 8,249 lbs. from the Philippines, 7,294 lbs. from the East Indies, and 33,710 lbs. from the United States; only 1,462 lbs. were brought from Russia. The imports from the East Indies, have decreased more than 70 per cent. in the last twelve years, as compared with the preceding. The wholesale prices are, for round rhubarb, 8d. to 3s. per lb.; flat, 6d. to 3s. 3d. per lb.; Dutch trimmed, 6s. to 7s. per lb.; Russian, 13s. to 13s. 6d. per lb. In 1831, England imported 133,462 lbs. from the East India Company's possessions, and 6,901 lbs. Russia. In 1845, only 71,298 lbs. came from the East. From China we received, in 1843, 172,882 lbs.

The quantities of rhubarb on which duty of 1s. per lb. was paid in the six years ending 1840, were as follow: –

	East Indian. lbs.	Foreign. lbs.
1835	32,515	10,647
1836	36,836	7,752
1837	44,669	5,946
1838	37,026	7,402
1839	22,575	12,525
1840	16,745	22,203

The English imports and consumption of rhubarb are thus stated in the *Pharmaceutical Journal* :—

	Imports. lbs.	Consumption. lbs.
1826	102,624	32,936
1831	140,395	40,124
1836	122,142	44,468
1841	95,701	67,877
1846	427,694	0
1847	305,736	0
1848	116,005	0
1849	94,914	0

The rhubarb brought into Siberia grows wild in Chinese Tartary, especially in the province Gansun, on hills, heaths, and meadows, and is generally gathered in summer from plants of six years of age. When the root is dug up, it is washed to free it from earthy particles; peeled, bored through the centre, strung on a thread, and dried in the sun. In autumn all the dried rhubarb collected in the province is brought in horsehair sacks containing about 200 lbs., to Sinin (the residence of the dealers), loaded on camels, and sent over Mongalia to Kiachta, and the ports and capital of China.—*Simmonds.*

(7141) RHUS, the name of a genus of Plants belonging to the natural order *Anacardiaceæ*, and to the tribe *Sumachineæ*. One of the species, *R. cotinus*, appears to have been known to Pliny, who refers to its dyeing properties, and its place of growth, the Apennines, under the name of Cotinus. This genus has an extensive geographical range, from the south of Europe to the Cape of Good Hope. It is also found in Asia and North and South America. Most of the species are poisonous, but they are much cultivated as ornamental shrubs, especially on account of the beautiful red colour of their leaves in autumn. Many of them are used also for the purposes of dyeing and tanning; as an astringent principle, to which is frequently added an acid, is common to the whole genus. The genus *Rhus* has the following characters:— Flowers bisexual, or polygamous; calyx small; persistent, 5-partite; petals 5, inserted under

the margin of the disc, imbricate in æstivation; stamens 5, hypogynous; ovary 1-celled, sessile; fruit, a dry drupe; seed solitary, exalbuminous; radicle opposite the hilum, and bent downwards along the edge of the cotyledons. Leaves alternate, simple, or compound; panicles axillary or terminal. De Candolle enumerates about 90 species, to which other writers have made additions, but there is reason to believe that many of the new species are merely varieties. We shall here enumerate only a few of those which are of interest on account of being cultivated, or their uses in medicine and the arts. Dr. Wight gives *Rhus Bucki-Amela*, 561; *Roxburghii*, 561, *semialata*, var. β *Roxburghii*, 561; succedanea. 560.

(7142) RHUS COPALLINA, Gum-Copal or Mastich-Leaved Rhus. Leaf glabrous above, slightly pilose beneath, 5-7 pairs of leaflets and an odd one, lanceolate and entire; petiole winged and jointed; root creeping; flowers yellowish-green, diœceous. It is a native of North America from New Jersey to Carolina.

(7143) RHUS CORIARIA, Hide, or Elm-Leaved Sumach.

Shumak Pers. | Tumtum, Arab.

A native of Persia, Syria, Palestine, and the south of Europe, about 8 or 10 feet high, divided into numerous irregular branches. All parts of this plant are inodorous, but have a styptic taste; to the abundance of tannic acid it owes its properties and value in the arts; M. Tromsdorf has found in the berries a large quantity of bi malate of lime.—*O'Shaughnessy, page* 282. Leaf 5-7 pairs of villous leaflets, elliptical, bluntly and coarsely toothed, petioles naked. Flowers in large loose panicles of a whitish-green. Drupes villous. This plant is a native of the south of Europe. It is extensively used for the purpose of tanning, and it is said that all the leather made in Turkey is tanned with the bark of this species of *Rhus*. The fruit is acid and astringent, and the seeds are often used as tonics for exciting the appetite.—*Eng. Cyc.*

(7144) RHUS COTINUS. Venus-Sumach, or Wild Olive. Flowers hermaphrodite, arranged in loose panicles of a greenish-yellow colour; leaves simple, entire. This is a very ornamental shrub, and is one of the European species, growing wild in various districts of the south of Europe. It is made use of, like many other of the species, for tanning, in Italy, and is called Scotino. The wood is used by the modern Greeks for dyeing wool, which is said to be of a beautiful rich yellow. It is frequently cultivated on account of its beauty.

(7145) RHUS DECEPIENS. *Wight* Terebinthaceæ, Ill. 75.

Kat poovarasco marum, Tam.

A very fine close grained light coloured wood: judging from a branch specimen it must, if procurable of good size, be one of considerable value.—*Wight.*

(7146) RHUS GLABRA. Smooth-Leaved Sumach. Leaf like the last, but broader and glabrous. Branches also glabrous. Fruit red covered with silky hairs. This species, as well as another named *R. viridifolia* is considered by some botanists as only a variety of *R. typhina* Like the last, this species is abundant in North America, over-running sometimes a whole district, and forming a troublesome weed. Its fruit is very sour, but may be eaten with impunity Bees are very fond of the blossoms.

(7147) RHUS LUCIDA. Terebinthaceæ Shining leaved Sumach, introduced from the Cape. *Riddell.*

(7148) RHUS RADICANS, Rooting Poison-Oak, or Sumach.—Leaf one pair of leaflets and an odd one, odd one petiolated, glabrous entire. A native of America from Canada to Georgia. Its climbing habit, combined with the beautiful red colour of the leaf during decline of the year renders it one of the most picturesque of American plants. It frequently abounds in the forests, where it may be seen covering the tops of the highest trees. It climbs up walls and rocks, and runs upon the ground with equal facility, thus covering everything within the reach of its stems. De Candolle distinguishes three varieties: *R. vulgaris*, with a stem climbing by means of roots; *R. volubilis*, climbing without roots; and *R. microcarpa*, with fruit much smaller than the other two. Like R. Toxicodendron it emits a juice which indelibly stains linen. It is equally poisonous with *R. venenata*. A detailed account of the effects of the genus *Rhus* may be seen in Professor Kalm's 'Travels in North America.

(7149) RHUS TOXICODENDRON, common Poison-Tree, or Poison-Oak.—Leaf of one pair of leaflets and an odd one, with a petiole, inciso-angulate, pubescent; flowers greenish. It is found in woods, fields, and fences, in common with R. Radicans in North America, where they are both known by the same name. Many botanists consider the two only varieties of the same plant. This species is the type of the genus *Toxicoendron* of Tournefort. It was introduced into England in 1640, and first grown in the Bishop of London's garden at Fulham. This species is that which is most frequently used in medicine. The less common species of this genus cultivated in Britain are—*R. pumila* (Dwarf Sumach), *R. viridiflora* (Green-Flowered Sumach), *R. pentaphylla* (Five leaved sumach), *R. suaveolens* (Sweet-Scented Sumach), and *R. aromatica* (Aromatic Sumach).

(7150) RHUS TYPHINA, Fever-Rhus, or Stag's-Horn Sumach. Leaves with 8 10 pair of leaflets and an odd one, lanceolate-acuminate, serrated, pilose beneath. There are two forms of this plant: the one *R. t. arborescens*, in the form

of a tree, from 10 to 25 feet in height; the other *R. t. frutescens*, shrubby, and only from 2 to 10 feet high. The young shoots are covered with down, which, with their somewhat crooked and stunted branches, give them the appearance of young stags'-horns; hence their name. The flowers are in dense spikes, at the ends of the branches, the pistilliferous ones developing themselves into woolly drupes, which are very conspicuous when ripe. It is found in every part of North America, and its dark-red leaves add much to the beauties of an American autumn. The fruit of this plant is exceedingly sour, and on this account it is frequently called vinegar plant, and is even used in some parts as a substitute for vinegar.

(7151) RHUS VENENATA, Poison Sumach, or Swamp Sumach. Leaf 6-7 pair of leaflets, almost glabrous, entire, lanceolate-acuminate, reticulated beneath. Fruit white. It is a native of North America from Canada to Carolina, and also in swampy districts in Japan. This plant is exceedingly poisonous, so virulent that it is said to affect some persons by merely smelling it. A touch will sometimes produce violent inflammation. It is a beautiful shrub, and well worthy of cultivation, but great care should be taken to prevent its being carelessly handled.

(7152) RHUS VERNICIFERA, Varnish-Bearing Sumach, or Japan Varnish-Tree. Leaf with 5-6 pairs of leaflets, all ovate, long, acuminate, entire, glabrous above, velvety beneath. It is a native of Japan and Nepaul. Its leaves are very large and beautiful, rendering it one of the handsomest of shrubs. According to Thunberg, this is the plant which yields the celebrated Japan Varnish.

(7153) RHUS VERNIX, OR VERNICIA. Chinese Varnish Tree. When Mr. Fortune prepared to take up his late residence in China, his attention was directed by the Calcutta Agricultural Society, to the Chinese varnish tree, *Rhus* species, the wax-insect tree, *Fraxinus* species, and to the soap bean tree, *Cæsalpinia* species: to the various trees valuable for their fruit or timber and ornamental plants; but above all to the green indigo (so called), *Rhamnus* species, which yielded a dye that was at that time attracting much attention in France. He says, the tree which yields the Chinese varnish is a species of Rhus which although producing an article of great value is extremely dangerous to use. The varnish is largely used in the country for giving a fine polish to tables and chairs used in the houses of the wealthy. The beautiful lacquer ware so extensively exported from Canton to foreign countries and which is so well known and justly admired, is produced by this tree. It has the valuable property of being less liable than French polish to be injured by a heated vessel which may be placed upon it, but it is very poisonous and requires to be handled with great care by the workmen who use it. Indeed after furniture is dry it is very unsafe for certain constitutions until it has been in use for some time and the smell entirely gone. A friend of mine Mr Jones, American consul at Foochow-foo, used some furniture which had been laquered some time and was apparently quite dry and yet he was very ill for a long time from its effects, so ill that he thought he should be obliged to leave the country and go home. And this is no solitary instance, for I have known several persons suffer most severely from the same cause.—*Fortune's Residence, p.* 146. Williams says, the beautiful appearance of the lacquered-ware of China owes its lustrous coloring to a composition of lampblack and the clarified juice obtained from a species of sumach, called *Rhus Vernix* or *Vernicia*, Wood oils are obtained from other plants of the same family, and the different qualities of lacquered-ware are owing to the use of these inferior ingredients. The real varnish tree is described by De Guignes as resembling the ash in its foliage and bark, it is about fifteen feet in height, and furnishes the sap when seven years old, which is carefully collected from incisions in the trunk opened in the summer nights. The body of the ware is wood partially smoothed, or pasteboard, upon which two or three coats of a composition of lime, paper, and gum are first laid and thoroughly dried and rubbed. The surface of the wood is also hardened by rubbing coarse clay upon it, and afterwards scraping it off when dry. Two coatings of lamp black and wood oil, or in the finer articles, of lamp black and varnish, are laid upon the prepared wood, and after drying, the clear varnish is brushed on, one coating after another, with the utmost care, in close and darkened rooms, allowing it to dry well between the several coats. The articles are then laid by to be painted and gilded according to the fancy of customers, after which a last coating is given them. The varnish is brought to market in brownish cakes, and reduced to its proper fluidity by boiling; it is applied to many purposes of both a varnish and paint, when it is commonly mixed with a red or brown color. A beautiful fabric of lacquered-ware is made by inlaying the nacre of fresh and saltwater shells in a rough mosaic of flowers, animals &c. into the composition and then varnishing it. Another kind, highly prized by the Chinese, is made by covering the wood with a coating of red varnish three or four lines in thickness, and then carving figures upon it in relief. The great labor necessary to produce this ware renders it expensive. A common substitute for the true varnish is the oils of the Dryandra, Jatropha, Croton, and other members of the Euphorbiaceous family, expressed from their seeds by a variety of simple machines, consisting for the most part of different applications of

power to cylinders and pestles by which the seeds are pressed or pounded. The oil after pressing, according to Dr. Gaignes, is broiled with Spanish white in the proportion of one ounce to half a pound of oil; as it begins to thicken, it is taken off and poured into clean vessels. It dissolves in turpentine, and is used as a varnish, either clear or mixed with different colors; it defends woodwork from injury for a long time, and forms a good painter's oil. Boiled with iron rust, it forms a reddish brown varnish. In order to prevent its penetrating into the wood when used clear, and to increase the lustre, a priming of lime and hog's blood simmered together into a paste is previously laid on.—*Williams' Middle Kingdom, Vol.* I. *p.* 121.

(7134) RHUS: *Species.*

Coongilliya marum, Tam. | Bucki amela,

Dr. Wight says, this is the chloroxylon dupada of Buchanan and Ainslie. An undescribed name and judging from the leaves, one not requir d, which are clearly those of a rhus very nearly allied to Roxburgh's R. Buckiamela, but distinct. The qualities of the timber is unknown. The outer sap-wood is waite, fine grained and heavy, apparently very good.—*Wight.*

(7155) RHYNCHOPS ABLACUS, a Shear water occurs at Siligoree in the Terai.—*Hooker. Him. Jour. Vol.* I *p* 399.

(7156) RHYSICOSIA VESTITA, a beautiful purple-flowered leguminous plant with small tuberous roots, is cultivated to some extent in the Khasia Hills.—*Hooker, Him. Jour. Vol.* II. *p.* 287.

(7157) RHYZOMYS CHINENSIS. The Chinese bamboo rat or chuck shu is found in the western part of Kwangtung.—*Williams' Middle Kingdom, p.* 257.

(7158) RIBBON.

Ruben de Soie, Fr.	Nastro di seta, It.
Band, Ger.	Cinta de Seda, Sp.
Fheet, Guz. Hind.	

A name given to silken bands of various widths and colours, much used for trimming bonnets, caps, and other purposes. They are both plain and flowered, and are distinguished into sarecnet, satin, &c, according to the manner in which they are made.—*Faulkner.*

(7159) RICE.

Aruz, Arab.	Bras, Mal.
Lua, Cochin-China.	Tandool, Mar.
Ris, Dan.	Motsj, Gome, Ko, Jap.
Ryst, Dut.	Beruuge, Pers.
Riz, Fr.	Arroz, Port.
Reiss, Ger.	Vrihi, Sans.
Chookh, Guz.	Arroz, Spa.
Chawl, Hind.	Arisee, Tam.
Riso, It.	Beeum, Tel.

This is one of the most extensively diffused and useful of grain crops, and supports the greatest number of human race. The cultivation prevails in Eastern and Southern Asia, and it is also a common article of subsistence in various countries bordering on the Mediterranean. It is known in the Japan Islands, on all the sea coasts of China, the Philippine and other large Islands of the Indian Archipelago, partially in Ceylon, Siam, India, both shores of the Red Sea, Egypt, the shores of the Mozambique Channel, Madagascar, some parts of Western Africa, South Carolina, and Central America. Three species only are enumerated by Lindley:—*Oryza sativa*, the common rice, a native of the East; *O. latifolia*, a species having its habitat in South America; and *O. Nepalensis*, common in Nepaul. But there are a host of varieties known in the East; these, however, may for all practical purposes, be resolved into two kinds—the upland or mountain rice (*O. Nepalensis*, the *O. montica*, of Roxburgh), and the lowland or aquatic species (*O sativa*).

Rice, the chief food, perhaps, of one third of the human race, possesses the advantage attending wheat, maize, and other grains, of preserving plenty during the fluctuations of trade, and is also susceptible of cultivation on land too low and moist for the production of most other useful plants. Although cultivated principally within the tropics, it flourishes well beyond, producing even heavier and better filled grain. The chief variety of this cereal is cultivated throughout the torrid zone, wherever there is a plentiful supply of water, and it will mature, under favorable circumstances, in the Eastern continent, as high as the 45th parallel of north latitude, and as far south as the 38th. On the Atlantic side of the Western continent, it will flourish as far north as latitude 38 degrees, and to a corresponding parallel south. On the Western coast of America, it will grow so far north as 40 or more degrees. Its general culture is principally confined to India, China, Japan, Ceylon, Madagascar, Eastern Africa, the South of Europe, the Southern portions of the United States, the Spanish Main, Brazil, and the Valley of Parana and Uruguay. In 1834, 29,583 bags of rice were shipped from Maranham. At the Industrial Exhibition in London, in 1851, there were displayed many curious specimens and varieties of rice, grown without irrigation, at elevations of three thousand to six thousand feet on the Himalaya, where the dampness of the summer months compensates for the want of artificial moisture. Among these American rice received not only honorable mention for its very superior quality, but the Carolina rice, exhibited by E. I. Heriot, was pronounced by the jury "magnificent in size, color, and clearness," and it was awarded a prize medal. The jury also admitted that the American rice, though originally imported from the Old World, is now much the finest in quality.

United States.—The present culture of rice in the *United States* is chiefly confined to South Carolina, Georgia, Florida, Alabama, Mississippi,

nd Texas. The yield per acre varies from wenty to sixty bushels, weighing from forty- ive to forty-eight pounds when cleaned. Under avourable circumstances as many as ninety bush- ls to an acre have been raised. Judge Dun- herty, who resides near the borders of Hender- on county, Texas, has raised a crop of several hundred bushels of upland rice. The crop aver- ges thirty bushels to the acre. He thinks rice an be raised there as easily as Indian corn, and will be far more profitable. Another variety is ultivated in America to a limited extent, called Cochin China, dry, or mountain rice, from its daptation to a dry soil, without irrigation. It will grow several degrees farther north or south han the Carolina rice, and has been cultivated with success in the Northern provinces of Hun- gary, China, Westphalia, Virginia and Maryland; but the yield is much less than that already stat- ed, being only fifteen to twenty bushels to an acre. It was first introduced into Charleston, rom Canton, by John Brodly Blake, in 1772.

The *American* crop of rice in 1848, reach- ed 162,058 tierces in market, and of these 160,330 tierces were exported from South Caro- lina. The largest rice crop grown in South Caro- lina for the past thirty years, was in 1847, when 192,462 tierces were raised; 140,000 to 150,000 is about the average, and it has only exceeded 170,000 on four occasions.

Rice being an aquatic plant, is best grown in ow moist lands, that are easily inundated. The ground is ploughed superficially, and divided in- o squares of from twenty to thirty yards in the ides, separated from each other by dykes of earth about two feet in height, and sufficiently broad for a man to walk upon. These dykes are for retaining the water when it is required, and o permit of its being drawn off when the inun- dation is no longer necessary. The ground pre- pared, the water is let on, and kept at a certain eight in the several compartments of the rice field, and the seedsman goes to work. The rice that is to be used as seed must have been kept in the husk; it is put into a sack, which is im- mersed in the water until the grain swells and shows signs of germination; the seedsman, walk- ing through the inundated field, scatters the seed with his hand, as usual; the rice immediately sinks to the bottom, and many even penetrate to a certain depth in the mud.

Piedmont.—In Piedmont, where the sowing takes place at the beginning of April, they gene- rally use about fifty-five pounds of seed per acre.

In *Piedmont* the usual return of a rice field is reckoned at about fifty for one.

Mauritius.—In the *Isle of France* rice is culti- vated in very damp soils, upon which a great deal of rain falls, but which are not flooded, as in other tropical countries: but the process is not so certain nor the crop so great, as when inundation is employed.

At *Mocsa*, in New Granada, the paddy fields which are not inundated, under the in- fluence of a mean temperature of 26 deg. centri- grade (79·0 deg. Fahrenheit), yield 100 for 1.—(Simmonds's "Colonial Magazine," vol. xi. p. 99.)

The rice now grown about *New Orleans* is as sweet, if not sweeter, than that imported from South Carolina, but it is deficient in hardness and brightness when ready for market, a defect owing entirely to two causes, neither of which is beyond the control of the planter. The one cause is the mode of culture, it being generally grown without due attention to the seed—seed- ed at too late a period of the season, and allow- ed to become *rare-ripe* upon the stalk. The other cause is the very imperfect mode of its preparation for market; this being invariably ac- complished by the primitive pestle and mortar, or the old-fashioned "pecker mill." The same seed is planted in the same soil from year to year, a system which, it is generally conceded, will deteriorate the quality and production of any grain crop. A very large proportion of the rice grown in Carolina is prepared for market at the steam toll-mills, in the vicinity of Charleston; and a mill of this description near New Orleans, would remedy the greatest defect in the rice of the country, greatly increase the demand for the article, and undoubtedly yield a large re- turn for the investment. The toll mills at and around Charleston are, and always have been, prosperous. The mills of Mr. Lucas, in England, erected to clean "paddy," *i. e.* "rough rice," sent there in bulk from Carolina, have succeeded also, and have increased the consumption of the article in that country. The "rough rice," "paddy," or grain, as it comes from the ear, is composed, first, of a rough, silicious outer cover- ing, impervious to water, which is very useful in the neighbourhood of cities, for filling up low lots or pools, for horse beds, and for packing crock- ery and *ice*, being far better for the latter pur- pose than the saw-dust used; second, a brown flour or bran, lying directly under the outer co- vering; and third, of the clean or white rice. There is no question that, as a common diet, it is better adapted to the climate of Louisiana than Indian corn; and it can be grown on the hitherto *waste lands of the sugar plantations*; it is always substituted by the physi- cian, when practicable, as the food best adapted to the laborer, in season of diarrhœa and other similar diseases, is *perferred* before any other grain by the negro; and if the clean rice be ground and bolted, a meal is produced which can be made up into various forms of cake and other bread, of unrivalled sweetness and delicacy. The outer flour, or brown bran, which is separ- ated from the chaff at the toll mill, is known as "rice flour," and corresponds to the "bran" of wheat, it is a most excellent food for horses,

poultry, pigs and *milch cows*, and would always command a ready sale in New Orleans. It is used extensively for these purposes at and around Charleston, and is shipped thence, by the cargo, to Boston and other Northern ports. After other great impediments were removed, one formidable difficulty still remained in the way of the rice planters, and that was the threshing of the crop by flail. The labor requisite, to accomplish the threshing was so great, that we once heard a distinguished planter say, while having one large crop threshed out by flail, that he would regard another large crop as a calamity. Previous to 1830 threshing mills had been tried by various individuals, but with no apparent success. In that year the attempt was renewed, and the first trail of a thresher, constructed in New York, was tested on Savannah river, under the auspices of General Hamilton. The machinery was driven by apparatus similar to that employed for driving the cotton gin. The result was not very satisfactory, but there was ground for hope, and after an outlay of very large sums, and after many disappointments the happy expedient was thought of, of testing the mill with steam instead of animal power. The experiment was completely successful, and it was manifest at once that the difficulties had not been in the imperfect construction of the thresher, but in the insufficiency of the moving power. It is now twenty years since the first working of the small mill alluded to, and the rice threshing-mill, with steam engine attached, is now a splendid piece of operative machinery. The rice in sheaf is taken up to the thresher by a conveyor, it is threshed, the straw taken off, then thrice winnowed and twice screened, and the result in some cases exceeds a thousand bushels of clean rough rice, the work of a short winter day. We had the rare opportunity, a few years since, of seeing a Chinese book on rice planting, which contained many engravings. The language we could not read, but we comprehended a sufficient number of the engravings to institute a comparison between their system and our own, and the result was, in our method of irrigation we were their equals, while in economy of cultivation, and in the preparation of the grain for market and for use, we are greatly their superiors. Again, some six or seven years since the East India Company, of London, sent an agent to this country to procure American cotton seed, gins and overseers, for the purpose of testing the practicability of raising cotton by our method in India. This agent, Captain Bayles, when in Savannah, was heard to say that he had especial directions from the Company to inform himself minutely of our system of rice culture. Here, then, was an embassage from the banks of the Ganges, a spot where rice has been cultivated probably for twenty centuries, to inquire into the method of cultivation and preparation, of a people amongst whom the grain had no existenc one hundred and sixty years ago." The follow ing is the mode of culture for rice in Carolina:— It is sowed as soon as it conveniently can b after the vernal equinox, from which period un til the middle, and even the last of May, is th usual time of putting it in the ground. It grow best in low marshy land, and should be sowe in furrows twelve inches asunder; it requires t be flooded, and thrives best if six inches unde water; is occasionally drained off, and turned o again to overflow it, for three or four time When ripe the straw becomes yellow, and it i either reaped with a sickle, or cut down with scythe and cradle, some time in the month o September; after which it is raked and bound, c got up loose, and threshed or trodden out, an winnowed in the same manner as wheat o barley

Husking it requires a different and particula operation, in a mill made for that purpose. Thi mill is constructed of two large flat woode cylinders, formed like mill-stones, with channel or furrows cut therein, diverging in an obliqu direction from the centre to the circumference made of a heavy and exceedingly hard timber called lightwood, which is the knots of the pitc pine. This is turned with the hand, like th common hand-mills. After the rice is thu cleared of the husks, it is again winnowed, whe it is fit for exportation.

A bushel of rice will weigh about sixty-si pounds, and an acre of middling land will pro duce twenty-five bushels.

Various machines have been contrived fo cleaning rice, of which one secured by patent t Mr. M. Wilson, in 1826, and thus described b Dr. Ure, may be regarded as a fair specimen:— It consists of an oblong hollow cylinder, laid i an inclined position, having a great many teet stuck in its internal surface, and a central shaft also furnished with teeth. By the rapid revolu tion of the shaft, its teeth are carried across th intervals of those of the cylinder, with the effec of parting the grains of rice, and detaching whatever husks or impurities may adhere t them. A hopper is set above to receive the rice and conduct it down into the clear cylinder About eighty teeth are supposed to be set in th cylinder, projecting so as to reach very near the central shaft, in which there is a correspond ing number of teeth, that pass freely between th former.

The cylinder may also be placed upright, o horizontal if preferred, and mounted in any con venient framework. The central shaft should b put in rapid rotation, while the cylinder receive a slow motion in the opposite direction. Th rice, as cleaned by that action, is discharged a the lower end of the cylinder, where it falls int a shute, and is conducted to the ground. Th machine may be driven by hand, or by any othe

convenient motive power.—*Dict. of Arts and Manufactures.* The growth of rice in North America is almost wholly confined to two States nine-tenths of the whole product, indeed, being raised in the States Carolina and Georgia. A little is grown in North Carolina, Louisiana, and Mississippi. The aggregate crop, for 1848, amounted to 89,879,185 lbs.; while in 1847 it had risen to 103,000,000 lbs. Besides the *American* rice which is raised in the water, there is also the dry, or mountain rice, which is raised in some parts of Europe on the sides of the hills. It is said to thrive well in Cochin China, in dry light soils, not requiring more moisture than the usual rains or dews supply. By long culture the German rice, raised by the aid of water, is stated to have acquired a remarkable degree of hardness and adaptation to the climate. The upland rice of the United States is thought by some to be only a modified description of the swamp rice. It will grow on high and poor land, and produce more than Indian corn on the same land would do, even fifteen bushels, when the corn is but seven bushels. The swamp rice was originally cultivated on high land, and is not so now, because it is more productive in the swamp, in the proportion, as is said, of twenty to sixty bushels per acre; and the use of water likewise, it is stated, makes it easier of cultivation, by enabling the planter to kill the grasses. It is thought that on rich high land, rice may be made to produce twenty-five or thirty bushels to an acre in a good season. A new variety of rice is mentioned as having been discovered in South Carolina, in 1838, called the big-grained rice. It has been proved to be unusually productive. One gentleman, in 1840, planted not quite half an acre with this seed, which yielded forty-nine and a half bushels of clean winnowed rice. In 1842, he planted 400 acres, and in 1843, he sowed his whole crop with this seed. His first parcel when milled, was eighty barrels, and netted half a dollar per cwt. over the primest rice sold on the same day. Another gentleman also planted two fields in 1839, which yielded seventy-three bushels per acre. The average crop before from the same fields of fifteen and ten acres, had only been thirty-three bushels per acre. The experiment of cultivating rice in France appears to have succeeded perfectly. A piece of ground of 100 hectares in extent (250 acres) was sown with rice in 1851, in the lands of Arcachon, near Bordeaux, and the crop proved a highly satisfactory one. The seed is sown about the middle of April, and almost immediately appears above ground. Rice may be kept a very long period in the rough—I believe a lifetime. After being cleaned, if it be prime rice, and well milled, it will keep a long time in any climate; only when about to be used (if old) it requires more careful washing to get rid of the musty, which accumulates upon it. Some planters—the writer among the number—prefer for table use rice a year old to the new. The grain is superior to any other provisions in this respect. If a laborer in the gold diggings, or elsewhere, takes with him two days' or a week's provisions, in rice, and his wallet happens to get wet, he has only to open it to the sun and air, and he will find it soon dries, and is not at all injured for his purpose. Rough rice may remain under water twenty-four hours without injury, if dried soon after.

Passing eastward, rice begins to be found cultivated in Egypt, becomes more general in Northern India, and holds undisputed rule in the Sea Boards of peninsula of India, in China, Japan, and the Eastern isands—shares it in the west coasts of Africa with maize, which, on the other hand, is the exclusively cultivated corn plant of the greatest part of tropical America, with only some unimportant exceptions. On the coast of Africa rice ripens in three months; they put it under water when cut, where it keeps sound and good for some time.

Rice is now the staple commodity of Bourbon, and it produces about 26,000 quintals annually. It forms, together with maize and mandioc, the principal article of food amongst the negroes and colored people.

The Bhull rice lands of Lower Sind.—Like all large rivers which flow through an alluvial soil, for a very lengthened course, the Indus has a tendency to throw up patches of alluvial deposit at its mouth; and these are in Sind called *bhulls*, and are in general very valuable for the cultivation of the red rice of the country. These *bhulls* are large tracts of very muddy swampy land, almost on a level with the sea, and exposed equally to be flooded both by it and the fresh water; indeed on this depends much of the value of the soil, as a *bhull* which is not at certain times well covered with salt water, is unfit for cultivation. They exist on both sides of the principal mouths of the Indus, in the Gorabaree and Shahbunder pergunnas, which part of the province is called by the natives "Kukralla," and was in olden days, before the era of Goolam Shah Kalora, a small state almost independent of the Ameers of Sind. On the left bank of the mouths of the river these *bhulls* are very numerous and form by far the most fertile portion of the surrounding district. They bear a most dreary, desolate, and swampy appearance—are intersected in all directions by streams of salt and brackish water, and are generally surrounded by low dykes or embankments, in order to regulate the influx and reflux of the river and sea. Yet from these dreary swamps a very considerable portion of the rice consumed in Sinde is produced; and the Zemindars, who hold them, are esteemed amongst the most respectable and wealthy in Lower Sind To visit a *bhull* is no easy matter. Rout by land there is none, and the only way is to go by

boat, in which it is advisable to take at least one day's provisions and water, as the time occupied in the inspection will be regulated entirely by the state of the tide and weather. Very difficult is it too, to land on any of these places the mud being generally two or three feet deep, and it is only here and there that a footing can be secured, in the embankment surrounding the field. Let me now describe the mode of cultivating these anomalous islands, floating as it were in the ocean, and deriving benefit both from it and the mighty river itself, whose offspring they are. Should the river during the high season have thrown up a *bhull*, the Zemindar selecting it for cultivation, first surrounds it with a low bund of mud, which is generally about three feet in height. When the river has receded to its cold weather level, and the *bhull* is free of fresh water (for be it remembered, that these *bhulls* being formed during the inundation, are often considerably removed from the river branches during the low season), he takes advantage of the first high spring tide, opens the bund and allows the whole to be covered with the salt water. This is generally done in December. The sea water remains on the land for about nine weeks, or till the middle of February, which is the proper time for sowing the seed. The salt water is now let out, and as the ground cannot, on account of the mud, be ploughed, buffaloes are driven over every part of the field, and a few seeds of the rice thrown into every footmark; the men employed in sowing being obliged to crawl along the surface on their bellies, with the basket of seed on their backs; for were they to assume an upright position, they would inevitably be bogged in the deep swamp. The holes containing the seed are not covered up, but people are placed on the bunds to drive away birds, until the young grain has well sprung up. The land is not manured, the stagnant salt water remaining on it being sufficient to renovate the soil. The rice seed is steeped in water, and then in dung and earth for three or four days and is not sown until it begins to sprout. The farmer has now safely got over his sowing, and as this rice is not as in other cases trasplanted, his next anxiety is to get a supply of fresh water; and for this he watches for the freshes which usually come down the river about the middle and end of February, and if the river then reaches his *bhull*, he opens his bund, and fills the enclosure with the fresh water. The sooner he gets this supply the better, for the young rice will not grow in salt water, and soon withers if left entirely dry. The welfare of the crop now depends entirely on the supply of fresh water. A very high inundation does not injure the *bhull* cultivation, as here the water has free space to spread about. In fact the more fresh water the better. If, however, the river remains low in June, July, and August, and the south-west monsoon sets in heavily on the coast, the sea is frequently driven over the *bhulls* and destroys the crops. It is in fact a continual struggle between the salt water and the fresh. When the river runs out strong and full the *bhulls* prosper, and the sea is kept at a distance. On the other hand, the salt water obtains the supremacy when the river is low, and then the farmer suffers. In this manner much *bhull* crop was destroyed in the monsoons of 1851 and 1852, during the heavy gales which prevailed in those seasons. The rice is subject to attacks also of a small black sea crab, called by the natives *Kooknee*, and which, without any apparent object, cuts down the growing grain in large quantities, and often occasions much loss. The crop when ripe, which, if all goes well will be about the third week in September, is reaped in the water by men, either in boats, or on large masses of straw rudely shaped like a boat, and which being made very tight and close, will float for a considerable time. The rice is carried ashore to the high land, where it is dried, and put through the usual harvest process of division, &c.: and the *bhull* is then on the fall of the river again ready for its annual pickling.

Ceylon.—The process of preparing the field for rice culture, in the Kandian country, Ceylon, is very simple. When the paddy is to be cultivated in mud, a piece of ground is enclosed in a series of squares or terraces, by ridges raised with mud and turf; a quantity of water is directed into the field from an adjacent stream or tank, and is allowed to remain on it for fifteen days; at the expiration of this time the field is ploughed with a yoke of buffaloes, which operation is repeated at the end of fifteen days more, when, by the rotting of the woods and other matter, the field has become manured. After another interval of fifteen days the field is again ploughed and the broken ridges are repaired. Eight days after the field is harrowed, and subsequently rolled or levelled; and when the water has been let out the seed is sown, having in most instances been previously made to germinate, by being spread on platforms and kept wet. The water is turned in during night, to prevent crabs and insects from destroying the seedlings, and let out during the day; and this they continue to do till the plants attain the height of one foot. Water is only retained in the field until the ears are half ripe, otherwise they would ripen indifferently and be destroyed by vermin. A variety of coast paddy, called "moottoo samboo," was introduced into the Kandian province in 1832, which was found to produce a more abundant crop, by one third, than the native. It is of six months growth.

Kashmire.—In *Kashmire* rice is the staple of cultivation, and the practice adopted there is thus described by a writer in Simmonds "Colonial

Magazine," vol. x. p. 180. It is sown in the beginning of May, and is fit to cut about the end of August. The grain is either sown broadcast in the place where it is intended to stand till it is ripe, or thickly in beds, from which it is transplanted when the blade is about a foot high. As soon as the season will admit, after the 21st of March, the land is opened by one or more ploughings, according to its strength, and the clods are broken down by blows with wooden mattocks, managed in general by women, with great regularity and address; after which water is let in upon the soil, which for the most part of a reddish clay, or foxy earthy, is converted into a smooth soft mud. The seed grain, put into a sack of woven grass, is submerged in a running stream until it begins to sprout, which happens sooner or latter, according to the temperature of the water and of the atmosphere, but ordinarily takes place in three or four days. This precaution is adapted for the purpose of getting the young shoots as quickly as possible out of the way of a small snail, which abounds in some of the watered lands of Kashmir, but sometimes proves insufficient to defend it against the activity of this destructive enemy. When the former suspects, by the scanty appearance of the plants above the water in which the grain has been sown, and by the presence of the snail drawn up in the mud, that his hopes of a crop are likely to be disappointed, he repeats the sowing, throwing into the water some fresh leaves of the Prangos plant, which either poison the snails or cause them to descend out of the reach of its influence. The seed is for the most part thrown broadcast into about four or five inches of water, which depth is endeavoured to be maintained. Difference of practice exists as to watering, but it seems generally agreed that rice can scarcely have too much provided it be not submerged, except for a few days before it ripens, when a dried state is supposed to hasten and to perfect the maturity, whilst it improves the quality of the grain. In general the culture of rice is attended with little expense, although dearer in Kashmir than Hindostan, from its being customary in the former country to manure the rice-lands, which is never done in the latter. This manure, for the most part, consists of rice straw rejected by the cattle, and mixed with cowdung. It is conveyed from the homestead to the fields by women, in small wicker baskets, and is set on the land with more liberality than might have been expected from the distance it is carried. Many of the rice lands are situated much higher than might be thought convenient in Hindostan and are rather pressed into this species of culture than naturally inviting, but still yield good crops, through the facility with which water is brought upon them from the streams which fall down the face of the neighbouring hills. In common seasons the return of grain is from thirty to forty for one, on an average, besides the straw.—*Simmonds*

Himalaya.—A species of hill rice grows on the edge of the *Himalaya* mountains. The mountain rices of India are grown without irrigation, at elevations of 3,000 to 6,000 feet on Himalaya, where the dampness of the summer months compensates for the want of artificial moisture. The small reddish Assamese rices, which become gelatinous, in boiling, and the large, flat-grained, soft, purple-black Ketana rice, of Java and Malacca, shown at the Great Exhibition, were curious.—*Simmonds.*

Bengal.—The rice of *Bengal* by the exercise of some care and skill, has recently been so far improved as nearly to equal that of the Carolinas. Dr. Falconer has introduced into India the numerous and fine varieties of rice cultivated in the Himalayas; of these some of the best sort were at his suggestion distributed to cultivators along the Doab canal. On the cultivation of *rice*, the staple food of the lower provinces, and on the various crops sown after the early rice has been gathered in, as well as on the general appearance and condition of the successive umbrageous villages, wide plains, and deep or rapid rivers which make up lower Bengal, a good deal has been written in the Calcutta *Review;* and for a general description of the alluvial soil of lower Bengal we refer to Art. I. Vol. IX. The early, or *aous* rice is sown generally on high, light, and sandy soils from March to May, as showers may be favourable. It is cut variously from the end of July to the middle or end of September, and in six weeks' time, it is succeeded by what is known as 'cold weather' crop, which may be mustard, vetches, pulse, millet, *sola*, or gram, barley, oats, and the like. The *aumon* rice is sown in rich, deep, and loamy soils from April to June, and is reaped any time between the beginning of December and the end of January. It is a richer, stronger, and every way a better crop than the *aous*, but it is more exposed to inundation, and is not followed by any second crop within the year. Occasionally the early and the late crops are sown on the same land, and cut without injury to each other at different periods. A large part of the late rice is planted with the hand in rows, on land carefully ploughed, cleaned, and smoothed for the purpose. It is everywhere known as the *roa*, and yields an abundant harvest. A third kind of rice, unknown in high and dry tracts of country, but very common in extensive marshy districts, is called the *boru*, and, from its proximity to water, is sown and grown from the month of January to the end of May. It is cultivated in places where there is too great a depth of water during the heavy rains, and consequently abundance to keep the plant moist during the fierce heat of summer. The early rice, in the most favourable

season, from both grain and straw, cannot give more than five rupees per beegah. In bad seasons it may not yield more than one rupee. As much as ten or even fifteen rupees may be got from the *aumon* crop in good seasons; but when heavy rains, or unexpected inundations from large rivers, drown the young plants, as was the case during 1855 and 1856, and may be the case again at any time, the return is positively nothing. The *boro* rice may be expected to yield seven or eight rupees per beegah. And on these three crops, over some hundreds of miles, the hopes and anxieties of some millions hang for a large part of the year. About the crops, there can be little dispute. The condition of those who live by such crops, we have found to be as follows:—Take a large plain, a crowded bazar on market day, or a high road between two towns or villages of any importance, and it will generally be found that the men at work on the one, or buying and selling in the other, or sturdily strutting along the third, have some title, or right, or interest, or occupancy in the soil. Nearly every man has his *jumma*, which, in plain language, is his tenant-right of occupancy, or of proprietorship. The extent of this *jumma* is, in conversation, and for all practical purposes, indicated not by the acre-age, for few can tell the area of their possession, but by the rent demanded, for every man well knows how much he is expected to pay. A *jumma* or *jote* may then vary from five rupees to one hundred rupees. It will usually be found to be from about twelve to thirty. Obviously, the possibility of a man's paying such rent, and yet finding enough to support him, will depend, apart from all fluctuations of climate, on the rent, compared to the productiveness and extent of the tenure, on the number of mouths which he has to support in his own homestead, and on the number of sharers who have a joint hold on the land. The shareholders in a large *jumma* of eighty or one hundred rupees we have known to reach to ten, and there are often as many as four or five on a small holding of twenty rupees. This is an inevitable consequence of the law of subdivision; but it is remarkable, how constantly this terminates, after two or three generations, in a separation of cousins, and a division of the inheritance into two or more shares, no longer to be held in common: and it is still more remarkable how this universal custom is rudely set to rights by the progress of disease, by fever, cholera, small-pox, and other scourges, which clear off whole families, and cause the inheritance to revert to the hands of a single member. If on the one hand, numerous instances may be found of families branching out, till they seem to weigh down the minute holding,—on the other, cases as frequent will occur, where father, and uncles, with their offspring, have all been swept away, and the patrimonial inheritance has reverted to a single individual, with, it may be, the surviving female relations all dependent upon his exertion for bread. The *jumma* or holding will naturally be divided between a homestead, or *beeta*, with it may be, some garden land attached to it, and the outfield in the plain, with its early or late rice, or both. The main question relative to outfield and infield will, of course, be the average amount of rent. We have said that few ryots know the extent of their holdings in actual *beegahs*. This is the case, in many instances where the land has never been measured, when it will be loosely stated at twenty or thirty beegahs but where it has been measured, the ryot unluckily knows its extent but too well. There is in every pergunna a variable rate of assessment but one well understood. In pergunnah Insanuggur it is one thing; in pergunnah Zalimpore it is another. There is, we say, a general understanding, expectation, or regular consent given, or implied, that it shall not be enhanced without some very special reason. And the question to which we now come, and which is one of the last importance, is, what is the usual average, and is it a fair one? On this point, custom and opinions vary so much in different places, and according to the different views of payers and receivers, that it is with some difficulty, and after a great deal of research, that we have arrived at a definite conclusion. Even in villages, a higher rate on the homestead and the garden, is universal. It may be as low as Rs. 2, or as high as Rs. 3-8 or Rs. 4, but the average may be taken at Rs. 2-8 or Rs. 2-12. Such rate, in itself, is nothing intolerable. What is a fair rent for the land which yields one splendid crop, or two average crops in the year? We find that the rent of this land varies from as low as 8 annas a beegah to Rs. 2-13 and even Rs. 3, which is pretty much the same as saying that rent in England ranges from eighteen shillings or one pound an acre to fifty and fifty-five shillings. In Bengal the extremes are rare. The land may be too sandy, or too low, or too sterile, or impregnated with salt, or culturable only after a rest for a year or ten months, and in these cases, a rate of from ten to fourteen annas is quite as much as it can bear. If rich and loamy, it may well bear from eighteen annas to Rs. 1-4. But repeated investigation has satisfied us, that a ryot holding a *jote* of twenty beegahs, composed of homestead high land, and deep land, pays on the whole a higher rate than this. Were the whole of the twenty beegahs assessed at no more than a rupee per beegah, we should have little to say in favour of a reduction. But when the homestead pays Rs. 2-8 or Rs. 3, the deep rice land Rs. 1-8 Rs. 1-12 or Rs. 2, and the lighter soils from twelve annas to Rs. 1-2, as we have found that they do pay repeatedly, it is clear that the ryot has a burden laid on him, which it requires con-

stant exertion, without intermission from sickness, litigation, or any other cause, as well as a succession of favourable seasons, to enable him to support. In round numbers one rupee a beegah, or Rs. 1-2, and perhaps Rs. 1-4 in very favourable localities, would be a fair and equitable assessment. But we find in some *perguunahs*, that Rs. 1-4, and in others that Rs. 1-6, and Rs. 1-12, or Rs 2 are the regular rates. Add to this occasional cesses, with an increasing family, and the families of other shareholders increasing as well, and it is very conceiveable that the ryot has no easy task to perform. We have found *zemindaries* where the best soils were taxed at no more than Rs. 1-2 a beegah, and the worst as low as eight annas. We can point to others where the same soils are taxed respectively at Rs. 1-4 and Rs. 2-8. The difference between the condition of the cultivator, in each instance, is almost as easy to compute as the difference of the above sums.

To meet the rent as above described, the ryot or tenant proprietor cultivates his land in one of the three following ways: 1, by his own thews and sinews: 2, by the labour of hired servants: 3, by the system of *burga*. By far the greater part of the rice crop is sown and grown by those to whom the holding belongs. The ploughing, crushing, and harrowing, the casting of the seed, the weeding during the rainy season, the cutting and carting, are most frequently all done by the holders of the *jote*. Hired labour is, obviously, an indication of some advance in civilization, or of some substance and well-being. It is the frequent resource of men who have taken service under Government, or under Zemindars, or who have some other means of livelihood, or who with an under tenure, comprising one or more villages, retain in their own hands a small home farm. The third method of cultivation is very frequent. The proprietor having neither the skill, nor the time, nor the muscle, to sow and plough himself calls in a person whom he terms the *bargadar*. This person brings his own plough, bullocks, and seed, and his own person and goes through all the agricultural operations, which commence in April and end in December. Having done this without any advances from the proprietor,—who does not always give one-half the seed, as stated by Mr. Wilson in his glossary,—the bargadar, at harvest-time, gets for his pains, just one-half the crop. The arrangement suits the convenience of both parties. The tenant is saved the exertion of cultivating and can follow any other business. The bargadar, who may work in one village this year, and in another the next, is saved anxieties about leases, exactions, bonuses, and payments of rent, &c. In the very worst of seasons, he has lost nothing beyond his seed and his labour. But of the three methods of cultivation, the most frequent as well as the most successful, is the first. We have heard ryots admit that, if a man wanted careful ploughing, sowing, and planting, the young plant to be well weeded, and the surplus water to be regularly carried off, with a first-rate crop at the end of all, there was nothing for it but to do everything himself. We have heard from Englishmen many philanthropic complaints of indifferent agriculture, coarse implements, perfunctoriness in the manual operations, and bad crops. We are ready to admit that the tools are primitive, that the ryot is often lazy, and that there is little change in the system of cropping from one year to another; but the charge of bad results for *common*, and not *unusual* crops, we entirely deny: nay, we are fully prepared to go further, and show that not in any part of England itself, with all the elaborate ploughs of modern invention, are there to be shown such specimens of finished and successful husbandry. We have seen, this year soil crushed, smoothed, and weeded, till it more resembled a suburban garden on the South-western railway line, than a common piece of rice land in the plains of Bengal. There may be a field for improvement or experiment in the various crops, other than rice, which are sown and cut from the commencement to the close of the cold season. A knowledge of the best system of rotation, and of the best and simplest ways of manuring and irrigating such crops, is what the ryot has not got, and what it would be well to give him; fruit trees and vegetables, if properly looked to, would become more valuable. And there is little doubt that as railways are extended through eastern and northern Bengal, there will be many more inducements to the ryot to cultivate those productions, which find a ready sale only in large stations and prosperous cities. But, with all this a very large surface of ground will ever remain fitted for rice cultivation alone. This must be the case until scientific men shall discover some means of draining off the accumulation of water of the rainy seasons, which the thousand natural outlets of the country have yet failed to do; or some article of general consumption be found, which possesses the peculiar faculty of growing in from six inches to feet six of water, and which, with a fair chance given it will beat Neptune in a race for life or death. On the other hand, we are ready to admit that there may be several places, where by cutting a canal and letting the water run off into some deep river, having its exit in the Sunderbunds, a good many acres of land might be saved from annual inundation, and bear crops of rice, instead of jungle with a broad blade. But such places are suited to engineering and not to agricultural triumphs; and we must again repeat our conviction that persons intending to teach the ryot some parts of his trade, would be rather surprised to find how very much they had yet to learn. His knowledge of seed-time, and of har-

vest, and the general water-shed of his part of the country, is hardly susceptible of improvement; while the pains and labour, though unwilling, with which considerable patches of ground are cleaned and smoothed for the reception of rice plants, dibbled in by rows, with the hand, after being grown in a sort of nursery, as well as the results of these diverse operations, would be worthy of all praise in an agricultural show in England. We must now say a word or two on the implements, by which these gratifying results are attained. Most readers must have seen a Bengali plough at some time, or have seen its print. Looking like a rude sort of anchor, it might excite the contempt of a sturdy English yeoman, or the surprise of the classical student who remembered the unmanageable instrument described by Virgil in a well-known passage of the Georgics. But this rude implement is suited to the means and capacity of the ryot, and to the bullocks which are to draw it. The price of this and other necessary tools may not be unacceptable to some of our readers. A very common thing is for the ryot to find his wood, *baubul* or mangoe, the former being preferred for its hardness, as well as the piece of iron for the share, and then to go to the carpenter of the village, who for a remuneration of four annas, will "fix" him a plough! It is usual too, to give this functionary a general retainer for the year, in the shape of a maund of rice in the husk, in consideration of which he is to make and repair the plough and other agricultural weapons; or the ryot may buy his plough ready made. In any case the whole expense will not exceed Rs. 1-4 or 1-8 for wood, iron, and workmanship; and the article may last one, two, or even three years. The prices of bullocks, which draw the plough or the cart, if the ryot is lucky enough to possess one, vary according to the size and strength of this animal. A young and vigorous bullock will fetch from eight to ten, twelve, and even sixteen rupees. Twenty rupees for a good pair is not an uncommon price. Weak and puny animals, or those whose best days are past, will cost four, five, or six rupees each. Eight rupees is about an average price. After the plough comes naturally the harrow. But this implement is a very different affair from the iron-toothed harrow of Europe. It is nothing more or less than two bamboos tied parallel to each other by cross pieces of wood, so as to form a regular ladder about eight feet long. The bullocks being harnessed, a couple of men take their stand on the ladder, so as to increase its weight, when it is dragged repeatedly over the field on which the seed has been cast, till every clod is pulverised, and the whole surface is perfectly smooth. We might term this a clod-crusher; the natives call it a *bida* or *bichara*. It costs about two annas, and may be put together by the ryot himself, The instrument which resembles a harrow, i that it shows one single row of wooden teeth, not employed till the seed has shot up some ir ches above the ground, when it performs some what of the duty which the 'scuffler' performs i England, preventing the soil from caking an hardening, without tearing up the young an tender plant. This instrument may be purcha ed for about six annas. Add to this a sma hand-spud for weeding, which costs about thre pice; a fish basket to catch, rather than to carr fish, which costs about three annas; a triangul fish net, which is worth about five annas; *kodali* or mattock, which, however is not un versally needed, worth little more than a rupee; *doa* or bill-hook worth about eight or ten anna —and we have the complete stock in trade of very considerable portion of the labouring popula tion of Bengal. So much for the implements of th ryot. Take them altogether, we do not think it ur warantable to assert that of acute misery, helples indigence, and downright wretchedness, there i really very little in Bengal. Heat is at least a bearable as extreme cold. They have not had famine for three quarters of a century, and it i only this year 1857 that we had complaints fron some quarters that the ryot, owing to the scarcit and dearness of rice, has not had his two meals day. The poor man has in this country, like th poor man elsewhere, a certain amount of inevita ble hardship. Agricultural operations deman *considerable*, not to say severe, labour. A ryot we will say, gets up in the morning, when he eat his *pan* and *supari*, or betelnut and leaf, if he ca afford it, or takes a few whiffs of his hookah Going to the field about eight, nine, or ten o'clock, he comes home for his mid-day meal, ex cept at ploughing-time, when if delay be highly objectionable, his food is sent out to him by one of his sons or nephews. After eating, he returns to work again, often till past sunset. An active limbed man will plough one beegah a day, but will drive the clod-crusher or the harrow over eight or ten times that extent. It is a very good day's work, when weeds are plentiful, to clear one quarter of beegha of rice land, if so much. And to plant a whole beegah with rice stalks, sown elsewhere and transplanted at a favorable mo ment, is enough for three men in a day. This latter operation is especially fatiguing, as the workman is constantly in a stooping position. Weeding is comparatively easy, though the feet and ancles are soaked in mud and water for hours, because the ryot literally squats down with an umbrella of matting fixed tightly over his head, without a handle, and moves on gradually as he clears a little circle around him. A pleasing feature in these operations is the invariable custom of the ryots to help each other. Half the village turn out and weed the plot of Gopal one day, of Tin Kouri the next, and of Panchoo on the third. The rice gets thus a regu-

RICE.

lar clearing on one and the same date, and two or three clearings are enough for an ordinary crop.

Arracan.—The fertility of the province of *Arracan* is very great, its soil being fit for the culture of nearly all tropical productions; rice, however, is alone cultivated to any great extent; the low alluvial soil which extends over the whole country, from the foot of the mountains to the sea, being admirably suited for its growth. About 115 square miles are under culture with rice. The export trade in rice of the district, is seen by the following statistical return; and it gives employment to from 400 to 700 vessels, aggregating 60,000 to 80,000 tons.

QUANTITY OF PADDY AND RICE EXPORTED FROM AKYAB, THE PORT OF ARRACAN.

	Maunds of paddy.	Maunds of rice.	Total of Rupees.	Average price per 100 baskets of 12 seers, in Rupees. Rice.		Paddy.	
1831-32	380,600	28,870	130,591	15 1 to 16	0	8 to	9
1832-33	502,740	175,560	232,911	16	17	7 5	8
1833-34	555,540	418,950	430,856	19	20	9	10
1834-35	127,050	260,650	176,717	18	19	8	9
1835-36	783,870	548,400	354,791	10	11	5	5 8
1836-37	1,737,841	641,010	666,735	10 8	1	5	5
1837-38	1,621,569	248,783	650,381	21	23	9	10 8
1838-39	1,364,100	332,380	821,168	24	25 1	8 8	11 12
1339-40	2,033,698	529,961	1,121,318	21 8	23	9 8	10
1840-41	2,212,068	446,941	1,131,087	20	21 8	10	11
1841-42	1,265,388	270,000	553,014	19	20	8	9
1842-43	1,310,900	393,900	472,889	14	15	7 8	8
1843-44	848,929	707,780	633,710	17	18	7	8

—("Colonial Magazine," vol. vi., p. 348.)

TENASSERIM EXPORT OF RICE FROM MOULMEIN.

	Baskets.	Value.
1840	67,318	38,708
1841	11,175	6,900
1842	64,055	40,634
1843	35,635	45,289
1844	71,822	44,529
1845	149,815	73,034
1846	193,267	101,465

—(Simmonds' "Colonial Magazine," vol. xii., p. 462.)

From *Tavoy* and *Mergui*, rice was exported; equal in value to 41,000 rupees, in 1846; 100 baskets of 12 seers each, are equal to 30 Bengal maunds. The basket of rice named above, is equal to 55½ lbs. English Paddy means rice in the husk—rice, the grain when unhusked—a distinction to be kept in mind. The daily average consumption of rice in a family of five, is rated in the Straits' Settlements at three and a quarter chupahs.

The *Burmese* and *Siamese* are the grossest consumers of rice. A common laboring Malay requires monthly 30 chupahs, or 56 pounds of rice, value 3s. 9d. or 4s. The Burmese and Siamese about 34 chupahs, or 64 pounds.

Rice land in *Penang* yields a return which cannot be averaged higher than seventy-five fold—or nearly thirty guntangs of paddy for each orlong (1⅓ acres); but it has been considered advisable to rate it there at sixty fold only.

The rice land of *Province Wellesley* gives an average return of 117½ fold; the maximum degree of productiveness being 600 guntangs of paddy to an orlong of well flooded, alluvial land, or 150 fold, equal to 300 guntangs of clean rice, weighing nearly 4,520 English pounds. The present average produce has been very moderately estimated at 470 guntangs the orlong of paddy. The quantity of seed invariably allotted for an orlong of land is four guntangs. In Siam, forty fold is estimated a good average produce. At Tavoy, on the Tenasserim coast, the maximum rate of productiveness of the rice land was, in 1825, and is still believed to be, nearly the same as the average of Siam; while their *average* was only twenty-fold.—(Low, on "Straits Settlements.")

Rice in *Cochin-China* is the "staff of life," and forms the main article of culture. There are six different sorts grown: two on the uplands, used for confectionery, and yielding only one crop annually; the other sorts affording from two to five crops a year; but generally two, one in April and another in October; or three when the inundations have been profuse.

China.—The late Dr. Gutzlaff stated, at a meeting of the Statistical Society of London, that the population of *China* was about 367,000,000, and the returns of the land subject to tax as used in rice cultivation there, gave nearly half an acre to each living person; and he further stated that in the southern and well watered provinces, it is anything but uncommon to take two crops of rice, one of wheat, and one of pulse, from the same land in a single season. Rice is the only article the Chinese ever offer a bounty for; the price fluctuates according to the seasons, from one and three-quarter dollars to eight dollars per picul. Siam and the Indian Islands, particularly Bali and Lombok, supply the empire occasionally with large quantities. The price of rice in China varies according to the state of the canals leading to the interior; if they are full of water the prices rise; if on the contrary they are low, prices fall in proportion at the producing districts. The amount of consumption is controlled, in a considerable degree, by the cost of transit; when this is cheap prices rise from the general demand; but when land-carriage to any extent has to be resorted to, they fall; it raises prices so much at any great distance, that rice must be used very sparingly, from its enhanced price. It is obvious that if the waters are sufficiently high to allow a boat to pass fully loaded, she does so at an expense of nearly 50 per cent. less than she would do, if, from want of water, she could only take half the quantity; when transport is cheap every one obtains a full supply; when it is dear the

rice districts have more than they can consume. In England, people are so much accustomed to the facilities of transit offered by railroads, canal boats, &c., that we do not readily take into consideration, that in China, except by water, all articles are conveyed from one place to another on men's shoulders. Taking the population of Canton at the usual estimate of a million, and allowing to each a catty a day, the quantity of rice required for one day's consumption alone in that city would be 10,000 piculs, of 133 lbs. each= 1,340,000 lbs.—*Simmonds' Comml. Products.*

During the growth of the rice the fields are always kept flooded when water can be obtained. The terraces near the base of the hills are supplied by the mountain streams, and the fields which are above the level of any adjoining river or canal are flooded by the celebrated water wheel, which is in use all over the country. These machines are of three kinds. The principle in all of them is the same, the only difference being in the mode of applying the moving power, one is worked by the hand another by the feet and the third by an animal of some kind, generally a buffaloe or bullock. The rice lands are kept flooded in this way until the crops are nearly ripe, when the water is no longer necessary. It is also necessary or at least advantageous to go over the ground once or twice during the summer, and stir the soil up well amongst the roots, at the same time removing any weeds which may have sprung up. If the weather is wet, the fields retain the water for a considerable time, and then it is not an uncommon sight to see the natives wading nearly up to the knees in mud and water, when they are gathering in the harvest. In the Island of Chusan, and over all the rice country of Checking and keangsoo, there are two plants cultivated in the winter months, almost exclusively for manure; the one is a species of Coronilla; the other is Trefoil, or clover. Large ridges not unlike those on which gardeners grow celery, are thrown up on the wet rice-fields in the autumn, and the seeds of the plants are dropt in, in patches at five inches apart, on the surface of the ridges. In a few days germination commences, and long before the winter is past the tops of the ridges are covered with luxuriant herbage. This goes on growing until April, when it is necessary to prepare the ground for the rice. The ridges are then levelled and the manure plants are scattered in a fresh state over the surface of the ground. The fields are flooded, and the plough and harrow are employed to turn up and pulverise the soil. The manure thus scattered over the ground and half buried amongst the mud and water, begins to decay immediately, and gives out a most disagreeable putrid smell. This mode of manuring is generally adopted in all the rice lands in this part of China, and the young paddy doubtless derives strong nourishment from the ammonia given out in the decomposition of this fresh manure. Firewood is so scarce in the country that a great portion of the straw, cotton stalks, and grass which would go to manure the fields, is used for firing, and therefore, the plan of growing manure for the land is forced upon the farmers by necessity. The plan of using manure in a fresh state, instead of allowing it first to decay, has doubtless been found from long experience to be the best for the young paddy. The Chinese farmer is not a Chemist, he knows little or nothing of vegetable physiology, but his forefathers have hit accidentaly upon certain systems which are found in practice to succeed and to these he himself adheres and hands them down unchanged to his children.—*Fortune's Wanderings, page* 308.

Java is the granary of plenty for all the Eastern Archipelago; and the Dutch East India Company occupies itself in this culture with solicitude, well persuaded that a scarcity of rice might be fatal to its power. Ordinances to encourage and increase this branch of agriculture have been promulgated at different times by an authority called to watch over the physical well being of many millions of inhabitants.

As an evident proof that the culture of rice, of which it would be difficult to fix the quantity produced annually, increases considerably, I may mention that the exportation from Java, in 1841 was 1,488,350 piculs of 125 Dutch lbs.

Rice is cultivated in Java in three systems. The name of *sawah* is given to the rice fields which can be irrigated artificially; *tepar*, or *tagal* are elevated but level grounds; and *gagah*, or *ladang*, are cleared forest grounds. The two last only give one crop; a second crop may be obtained from the *sawah*, which then most commonly consists of *katjang*, from which oil is extracted in *kapus* or fine cotton, and in *ubie*, a kind of potato.

There are, says Mr. Crawfurd, two distinct descriptions of rice cultivated throughout the Indian islands, one which grows without the help of immersion in water, and another for which that immersion is indispensably requisite. In external character there is very little difference between them, and in intrinsic value not much. The marsh rice generally brings a somewhat higher price in the market. The great advantage of this latter consists in its superior fecundity. Two very important varieties of each are well known to the Javanese husbandman, one being a large, productive, but delicate grain, which requires about seven months to ripen, and the other a small, hardy, and less fruitful one, which takes little more than five months. The first we constantly find cultivated in rich lands, where one annual crop only is taken; and the last in well watered lands, but of inferior fertility, where two crops may be raised. Both of these, but particularly the

marsh rice, is divided into a great number of sub-varieties, characterised by being awned or otherwise, having a long or round grain, or being in color black, red, or white. The most singular variety is the *Oryza glutinosa*, of Rumphius. This is never used as bread, but commonly preserved as a sweetmeat. The rudest, and probably the earliest practised mode of cultivating rice, consists in taking from forest lands a fugitive crop, after burning the trees, grass, and underwood. The ground is turned up with the mattock, and the seed planted by dibbling between the stumps of trees. The period of sowing is the commencement of the rains, and of reaping that of the dry seasons. The rice is of course of that description which does not require immersion. The second description of tillage consists also in growing mountain or dry land rice. This mode is usually adopted on the common upland arable lands, which cannot conveniently be irrigated. The grain is sown in the middle of the dry season, either broadcast or by dibbling, and reaped in seven or five months, as the grain happens to be the larger or the smaller variety.

The culture of rice by the aid of the periodical rains forms the third mode. The grain being that kind which requires submersion, the process of sowing and reaping is determined with precision by the seasons. With the first fall of the rains the lands are ploughed and harrowed. The seed is sown in beds, usually by strewing very thickly the corn in the ear. From these beds the plants, when 12 or 14 days old, are removed into the fields and thinly set by the hand. They are then kept constantly immersed in water until within a fortnight of the harvest, when it is drawn off to facilitate the ripening of the grain.

The fourth mode of cultivating rice is by forcing a crop by artificial irrigation, at any time of the year; thus, in one field, in various plots, the operations of sowing, ploughing, transplanting, and reaping may be seen at the same period.

The fertile, populous, and industrious countries of the *Eastern Archipelago* export rice to their neighbours. The most remarkable of these are Java, Bali, some parts of Celebes, with the most fertile spots of Sumatra, and of the Malay Peninsula. Rice is generally imported to these western countries from those farther east, such as the Spice Islands. Java is the principal place of production for the consumption of the other islands, and the only island of the Archipelago that sends rice *abroad*. The rice of the eastern districts is generally superior to that of the western. The worst rice is that of Indramayu, which is usually discolored. The subdivision of the province of Cheribon, called Gabang, yields rice of fine white grain, equal to that of Carolina. The rice of Gressik preserves best. All Indian rice is classed, in commercial language, into the three descriptions of table rice, white rice, and cargo rice. From the limited demand for the first, it is only to be had in Java, in small quantity. For the same reason the second is not procurable in large quantity, unless bespoken some time beforehand; but the third may be had at the shortest notice in any quantity required. Java rice is inferior in estimation to that of Bengal or Carolina in the markets of Europe. The following statistics show the extent and progress of the culture in Java:—

	In 1840.	In 1841
No. of Residencies in which rice is cultivated	18	18
No. of Regencies	69	68
„ Districts	414	414
„ Desas or Villages	39,931	36,296
Amount of the population who take a part in it, without distinction of caste	6.704,797	6,857,372
Number of families &c.	1,466,845	1,475,675
„ „ families who devote themselves to the cultivation	1,150,406	1,146.083
Number of men bound to obligatory service	1,321.767	1,325,746
Cleared grounds in *bahus*. of 71 decametres	1,470,047	1,540,054
Upon this extent the population had cultivated for the government, in *bahus* of 71 decametres	78,182	74,277
Extent of fields which the population had cultivated on their own account, in *bahus*, &c.	1,286,139	1,361,216
Extent of land in fallow in *bahus*, &c.	105,726	84,561
Produce in piculs of fields cultivated by the population on its own account	21,273.278	23,810,573
Average Produce of a *bahu*.	16½	17
Gross amount of the land tax of 1840	8,502,402fl.	9,030,761fl.
Extent of rice fields newly cultivated in *bahus*	10,328	13,561

This comparative summary shows that the culture of rice increases yearly, and that the average produce of the fields is also continually increasing. These results have been obtained by the attention paid to the proper irrigation of the soil fit for this culture; and to the hydraulic works which the Government executes on its own account in the parts of the island where rice fields can be established, and where they are required to feed a population whose number is still increasing yearly. I have seen, continues Mr. Crawfurd, lands which have produced, from time beyond the memory of any living person, two yearly crops of rice. When this practice is pursued, it is always the five-months grain which is grown. The rapid growth of this variety, has, indeed, enabled the Javanese husbandman, in a few happy situations, to urge the culture to the amount of six crops in two years and a half. Rice cultivated in a virgin soil, where the wood has been burnt off, will, under favorable

circumstances, give a return of twenty-five and thirty fold. Of mountain rice, cultivated in ordinary upland arable lands, fifteen fold may be looked upon as a good return. In fertile soils, when one crop only is taken in the year, marsh rice will yield a return of twenty-five seeds. When a double crop is taken, not more than fifteen or sixteen can be expected. In the fine province of Kadu, an English acre of good land, yielding annually one green crop and a crop of rice, was found to produce of the latter 941 lbs. of clean grain. In the light sandy, but well watered lands of the province of Mataram, where it is the common practice to exact two crops of rice yearly without any fallow, an acre was found to yield no more than 285 lbs. of clean rice, or an annual produce of 560 lbs.—(*"History of the Indian Archipelago."* The low estimation of Java rice is not attributable to any real inferiority in the grain, but to the mode of preparing it for the market. In husking it, it is for the want of proper machinery, much broken, and, from carelessness in drying, subject to decay from the attack of insects and worms. When in the progress of improvement more intelligent methods are pursued in preparing the grain for the market, it will equal the grain of any other country. Machinery must be employed for husking the grain, and some degree of kiln drying will be necessary to ensure its preservation in a long voyage. I know nowhere that rice is so cheap as in Java, except in Siam, whence it is exported at one-third less cost. A great deal of rice is exported from Siam to China by the junks, and also occasionally a little from Java.

The quantity exported from Java in	1830	was	13,521 coyans
" " "	1835	"	25,577 "
" " "	1839	"	1,103,378 piculs.
" " "	1841	"	676,213 "
" " "	1843	"	1,708,774 "

Rice is grown to some extent in the Dutch portion of Celebes; it yields at a minimum one hundred and fifty fold. The average annual delivery of rice to the Government pays sixty cents for a measure of forty pounds. That which is sold for the consumption of the inhabitants may be procured at the public warehouse for a guilder the 35½ lbs.; and that which is sold for export may be had at public auction for 125 florins the coyan of 3,000 lbs.

Philippines.—The following description of some varieties of rice cultivated in the Philippine islands, is given by Mr. Rich, botanist to the United States Exploring Expedition. The varieties are very numerous; the natives distinguish them by the size and shape of their grain, viz:

a. Binambang.—Leaves slightly hairy; glumes whitish; grows to the height of about five feet; flowers in December: aquatic.

b. Lammyo greatly resembles the above; is more extensively cultivated, particularly in Bantamgas, where it forms the principal article of food of the inhabitants of the coast: aquatic.

c. Malagcquit.—This variety derives its name from its being very glutinous after boiling; it is much used by the natives in making sweet or fancy dishes; and also used in making a white-wash, mixed with lime, which is remarkable for its brilliancy, and for withstanding rain, &c.: aquatic.

d. Malagcquit.—With smooth leaves, and red glumes (all the preceding are whitish); possesses all the qualities of the aquatic variety of the same name—that of being very glutinous after boiling. This rice is said to be a remedy for worms in horses, soaked in water, with the hulls on; it is given with honey and water.

e. Bontot Cabayo.—Common in Ilocos, where it is cultivated both upland and lowland; it produces a large grain, and is therefore much esteemed, but has rather a rough taste.

f. Dumali, or early rice.—This rice is raised in the uplands exclusively, and derives its name from ripening its grain three months from planting; the seed is rather broader and shorter than the other varieties; it is not extensively cultivated, as birds and insects are very destructive to it.

g. Quinandu, with smooth leaves.—This variety is held in great estimation by the people of Batangas, as they say it swells more in boiling than any other variety; it is sown in May, and gathered in October: upland.

h. Bolohan.—This variety has very hairy glumes; it is not held in much esteem by the natives, but it is cultivated on account of its not being so liable to the attacks of insects and diseases as most of the other upland varieties.

i. Tangi.—Leaves slightly hairy, glumes light violet color. This upland variety is held in much esteem for its fine flavor.

Manilla. 435,067 arrobas of rice were exported from Manilla in 1847. A simple but rude mill is in use in Siam, and many parts of India, for hulling paddy, which is similar to those used 4,000 years ago. It consists of two circular stones, two feet in diameter, resting one on the other; a bamboo basket is wrought around the upper one, so as to form the hopper. A peg is firmly set into the face of the upper stone, half way between its periphery and centre, having tied to it by one end a stick three feet long, extended horizontally, and attached by the other to another stick pending from the roof of the shed under which the mill is placed. This forms a crank, by which the upper stone is made to revolve on the other set firmly on the ground. The motion throws the rice through the centre of the stone, and causes it to escape between the edges of the two.

More starch is contained in this grain than in wheat. Braconnet obtained from Carolina rice 85·07, and from Piedmont rice 83·8 per cent. of starch. Vogel procured from a dried rice no less than 98 per cent. of starch. There are several patent processes in existence for the manufacture of rice-starch, which are accomplished chiefly by digesting rice in solutions, more or less strong, of caustic alkali (soda), by which the gluten is dissolved and removed, leaving an insoluble matter composed of starch, and a white substance technically called fibre. Under Jones's patent, the alkaline solution employed contains 200 grains of real soda in every gallon of liquor, and 150 gallons of this liquor are requisite to convert 100 lbs. of rice into starch. In manufacturing rice-starch on a large scale, Patna rice yields 80 per cent. of mark table starch, and 8·2 per of fibre, remaining 11·8 per cent. cent. being made up of gluten, gruff, or bran, and a small quantity of light starch carried off in suspension by the solution. Jones's process may be thus described:—100 lbs. of rice are macerated for 24 hours in 50 gallons of the alkaline solution, and afterwards washed with cold water, drained, and ground. To 100 gallons of the alkaline solution are then to be added 100 lbs. of ground rice, and the mixture stirred repeatedly duing 24 hours, and then allowed to stand for about 70 hours to settle or deposit. The alkaline solution is to be drawn off, and to the deposit cold water is to be added, for the double purpose of washing out the alkali and for drawing off the starch from the other matters. The mixture is to be well stirred up and then allowed to rest about an hour for the fibre to fall down. The liquor holding the starch in suspension is to be drawn off and allowed to stand for about 70 hours for the starch to deposit. The waste liquor is now to be removed, and the starch stirred up, blued (if thought necessary), drained, dried and finished in the usual way.—*Pharmaceutical Journal, Vol.* III. *p.* 138.

Rice is imported into England in bags of 1¼ cwt., and tierces of 6 cwt., not only for edible purposes, but when ground into flour, for cotton manufactures, in aiding to form the weaver's dressings for warps. Rice-meal is commonly used for feeding pigs.

Imported.

	British Plantation.	Foreign.	Retained for home consumption of all kinds.
	Bags.	Bags.	Bags.
1843 ...	136,319 ...	35,125	 60,965
1844 ...	127 876 ...	69,112	..... 126.733
1845 ...	173,794 ...	5,713	 114,933
	Tons.	Tons.	Tons.
1847 ...	38.736 ...	3,033	 28,375
1848 ...	21,226 ...	4,631	 15,468
1849 ...	19,897 ...	1,410	 14,961

	Total imported.	Re-exported.
1849	976,196 cwts.	290,732 cwts.
,, in the husk	31,828 qrs.	
1850	785,451 cwts.	248,136 ,,
,, in the husk	37,150 qrs.	
1851	744,847 cwts.	345,677 ,,
,, in the husk	31,481 qrs.	
1852	989,316 cwts.	414,507 ,,
,, in the husk	23,646 qrs.	

The quantity of rice retained for British consumption, by the corrected returns, in 1850, was 401,018 cwts. and 35,119 quarters; in 1851, 399,170 cwts. and 31,481 quarters; in 1852, 574,819 cwts. and 23,946 quarters. The aggregate imports range from 40,000 to 80,000 tons annually, of which about 500 to 800 tons are in the husk.—*Simmonds, p.* 304.

Burmah and Tenasserim.—Rice is universally cultivated, and cultivation has produced many varieties. The Karens have distinctive names for more than forty, and Karen mountain rice is preferred by many to that which is raised by the Burmese on the low lands; yet it is said not to be so nutritious, and on this account bears a less price in the bazar. It is of all colors from ivory-white to coal-black. Of the black rice the Karens prepare a kind of bread, which to them supplies the place of gingerbread. A portion of seethed rice is poured into a large mortar with a prodigious quantity of sesamum seeds. Two women then take their strong ebony pestles and pound it, striking alternately until it becomes a light bounding mass. It is then thrown upon the eating stand, when the whole family seat themselves around it in oriental style, and dissever it with their sabres.

The Karens have another mode of preparing this kind of rice, which is particularly convenient for travellers. A quantity unboiled is thrust into joints of small bamboo, a little water added, and the orifice closed up. It is then roasted, and if eaten with a little butter and salt it is most delicious. The Karens select only two varieties of bamboo for this purpose, and these impart to the rice a sweet delicate flavor.—*Mason.*

India, generally.—The great staple of India, rice, is produced in every variety of soil, at every altitude and in every latitude. To name a tithe of the varieties grown would prove a tedious and useless task, for they vary with every district in which they grow. The finest of these, which is the Bengal table rice, is inferior to the Carolina kind, whilst the great bulk of them would be unmarketable in Europe, from their poverty of body and the slovenly manner in which they are prepared. The Arracan rice is a greyish opaque grain, used in England only for manufacturing starch. Copious irrigation is required for all these varieties; the Himalayan and other hill rices alone requiring no such aid, the cultivation, at times as much as 6000 feet, securing them from the great heat to which the other varieties are exposed. Within the pro-

vince of Bengal, as well as in the Madras low lying districts, the principal cultivation is that of rice. In most other districts this vegetable is comparatively rare. There is a great variety of the grain, differing widely in colour, shape, and weight; but the ordinary description grown does not extend beyond three or four varieties. The first sowing takes place between the end of March and the latter part of May; and as it matures and ripens within a period of about ninety days, it follows that the harvest takes place between the end of July and the middle of September. This crop is taken from sloping ground not subject to inundation, and is by far the safest, though not by any means the most abundant.

Another sowing takes place on low alluvial tracts between the middle of May and the end of June, and requiring five months to reach maturity, will be cut between November and January. This is usually the most profitable harvest, although, from the position of the land, liable at certain times to be seriously damaged by inundations; when, indeed, it is not an unsual thing for entire fields to be swept into the rivers. With some cultivators a practice prevails of *planting out* their rice from nurseries reared near their dwellings. In this case the corn is removed when about eight or nine inches high, carried carefully to its destination, which will be some spot that was, perhaps, not available at the proper sowing time; and there the young stalks will be planted in rows, and pressed down about the roots with an inclination towards the direction whence the prevailing wind blows These plants are said to thrive remarkably if properly placed, and to attain maturity in an incredibly short space of time. Sometimes a heavy flood will unexpectedly sweep away his first planting, in which case the ryot, nothing disheartened, sets to work, and repeats the task, knowing well that if it thrives it will amply repay him for his labour by its heavy crops. After the rice-harvest the ground will be sown with some of the innumerable grains met with in India; in some cases with barley, in others with gram, a kind of pulse admirably suited for the food of horses.—*Cappell's Three Presidencies.*

Rice of India, compared with American rice.—The only causes to be found for the falling off in America in the shipments and in price, (as it has not arisen from over production), are the imports of rice and paddy from Arracan, Patna, and Benares. In Arracan, taking the bulk, the Arracan rice is some 500 per-cent. cheaper than American rice in their different countries.

The Arracan sells in England for 10s or $ 2½ the cwt.
„ American. „ „ „ „ 18 or 4½

Therefore it is, although the American grain, brings 80 per cent. better prices, and freight must also be lower, that the Arracan rice is ousting the American. Why the East Indians are able to undersell the American planter, will be readily perceived from the following, which I have already stated in the Charleston Courier, &c., viz. the rice planter in India, with his wife and family, labor, in the field. The economy of the people is striking. The man's clothing consists of a strip of coarse cotton that passes between his legs, one end attached before, the other end behind, to a string that surrounds his waist. Two pieces of such clothing, of the best description, will last a couple of years; and all his year's clothing will not cost 50 cents. The diet of the people is rice, (which sometimes they use in a raw state, simply steeped in a little water), which when cooked, they eat with some few cooked vegetables mixed up with pepper, chillies turmeric, ginger, and clarified butter. Sometimes instead of vegetables they have fish, and if a goat be killed in the village, then there may be flesh instead of vegetables and fish. A man may support himself for 50 cents a month which is about the value of one rupee of their money.—*Bonynges America, page* 45.

(7160) RICE-BIRD, one of the names of the Paddy Bird, Paddee Bird, or Java Sparrow. It is the *Loxia oryzivora* of Linnæus. This well-known bird, whose plumage is well described by Buffon as being so well arranged that no one feather passes another, whilst all appear covered with that kind of bloom which is visible on plums, giving them a beautiful tint, has the bill very much developed; indeed, with the exception of *Pyrenestes* and perhaps *Coccothraustes*, this finch is the most remarkable of the race for the size and power of that organ. The colour of this bird is bloomy lead-coloured; head and tail black: bill red; belly obscurely rosy; cheeks in the male snowy; legs flesh-coloured. In Java, where it is called Glate, and the other parts of Asia where it is found, it has a very bad reputation on account of the ravages which it commits in the rice-fields with its powerful and sharp bill. In Sumatra the name of the bird is Boorong Peepee. It is often brought alive to England and confined in aviaries for the sake of its elegant shape and graceful colouring: its song, which is short and monotonous, does not much recommend it. This species must not be confounded with the Rice-Bird of America, *Emberiza oryzivora*, Linn.—*Eng. Cyc.*

(7161) RICE-FLOUR. Oryza Sativa; The seeds of rice contain a much less proportion of nitrogenised compounds than the other cereal grains, and particularly wheat: viz. about seven per cent:—The quantity of fatty matter is also less, and, though much difference of opinion has prevailed in reference to the value of rice as an article of diet, analysis clearly proves that it is the least nutritious of all the cereal grasses. This difference of opinion has probably arisen from the fact that rice is seldom eaten by itself, but is partaken of usually with milk, butter, or sugar,

the nutritious properties of which substances have been attributed to the rice itself.—*Hassell.*

(7162) RICE GLUE, or JAPANESE CEMENT, is made by mixing rice flour intimately with cold water, and boiling the mixture. It is white, and dries nearly transparent, hence its use in making many articles in paper. When made with a smaller quantity of water, models, busts, &c., may be formed of it.—*Tomlinson.*

(7163) RICE PAPER, ARALIA PAPYRIFERA, is brought from China in plain and dyed sheets and not unfrequently with various coloured designs on them.—*Faulkner.* The source of this product continued long a matter of doubt, but it is now equally certain that it is produced from the Aralia papyrifera. We refer to that article, as also to article Paper-Rice, for notices of this substance, but now confine attention to the true plant. The rice paper plant (Aralia papyrifera) presented to Mr. Fortune by J. C. Bowring, Esq., of Hongkong, was introduced to India, and is now a remarkable object of great interest in the Calcutta gardens —*A Res. among the Chi. p.* 197. About Yoksun in Sikkim, which occupies a very warm sheltered flat, many tropical genera occur, such as tall bamboos of two kinds, grasses allied to the sugar-cane, scarlet *Erythrinæ*, and various *Araliaceæ*, amongst which was one species whose pith was of so curious a structure, that Dr. Hooker had no hesitation in considering the then unknown Chinese substance called rice-paper to belong to a closely allied plant. The Chinese rice paper has long been known to be cut from cylinders of pith which has always a central hollow chamber, divided into compartments by septa or excessively thin plates. It is only within the last few years that the above supposition has been confirmed, by Sir William Hooker receiving from China, after many years of correspondence, specimens of the rice paper plant itself which very closely resembles, in botanical character as well as in outward appearance of size and habit, the above Sikkim plant.—*Hooker Jour. page* 359.

(7164) RICINUS, an apetalous genus of plants belonging to the natural order *Euphorbiaceæ*. This word is derived from 'ricinus,' the Latin name for a species of insect which the fruit of this plant was supposed to resemble. (Pliny. 'Nat. Hist,' xv. 7.) The common name of *Ricinus* is Palma Christi, a name applied to these plants by Brunfels, Matthiolus, and other older botanists, on account of the form of its elegant lobate leaves. It was originally a native of Asia, but is now naturalised in Africa, America, and the south of Europe. The characters of this genus are:—Flowers monœcious; calyx 3- 5-parted, valvate; no petals; filaments numerous, polyadelphous: style short; stigmas 3, bipartite feathery; ovary globose, 3 celled with an ovule in each cell; fruit capsular, tricoccous; leaves alternate, stipulate, palmate, glands at apex of petiole; flowers in terminal panicles; trees, shrubs, or herbs, becoming arborescent.—*Eng. Cyc.*

(7165) RICINUS COMMUNIS, CASTOR OIL PLANT. Fructibus minoribus. Palma Christi Plant.

The Oil.

Sitti-amunakei yennai, TAM.	Chittamudialoo noo-na, TEL.
Barcek erundie ka tael. HIND.	Tangan-tangan, PHILIPPINE.
Jarak, MALAY. & JAV.	
Kaliki, SUNDA & MAD	

Ricinus Communis or common Palma Christi, is best known as producing castor-oil. It has peltate palmate leaves, with lanceolated serrated lobes; an herbaceous glaucous stem, of a purplish red-colour upwards, and flowers in long green and glaucous spikes springing from the divisions of the branches, the males from the lower part of the spike, the females from the upper; the capsules are prickly. It varies in size; in Britain it is seen seldom more than three or four feet in height, but in India it is a tree; and Clusius mentions it as measuring from two to four feet round its stem in Spain. Lindley refers several species distinguished by Willdenow to this form, namely, *R. viridis*, *R. Africanus*, *R. lividus*, and *R. inermis*. ('Flora Medica.') *R. communis*, will grow freel in Great Britain, and when sown in pots or hotbeds early in the season, and transplanted in spring, it forms a very handsome border annual.—*Eng. Cyc.* Two varieties of the Ricinus communis, one bearing small and the other large seeds, are produced all over India. The small seeded variety yields the best product, and is employed in preparing the oil exported for medicinal purposes

Mode of Preparation.—The fresh seeds after having been sifted and cleaned from dust stones, and all extraneous matters, and slightly crushed between two rollers, freed by hand from husk and coloured grains, are enclosed in clean gunny. They then receive a slight pressure in an oblong mould which gives a uniform shape and density to the packets of seed. The "Bricks" as they are technically called, are then placed alternately with plates of sheet iron in water in the ordinary screw or hydraulic press. The oil thus procured is received in clean tin pans, and water, in the proportion of a pint to a gallon of oil, being added, the whole is boiled until the water has evaporated, the mucilage will be found to have subsided and encrusted the bottom of the pan, whilst the albumen solidified by the heat, forms a white layer between the oil and the water. Great care must be taken in removing the pan from the fire, the instant the whole of the water has evaporated, which may be known by the bubbles having ceased, for if allowed to remain longer the oil which has hitherto been of the temperature of boiling water or 212° *sudden-*

ly rises to that of oil or nearly 600° thereby heightening the color and communicating an empyreumatic taste and odour. The oil is then filtered through blanket, flannel, or American drill, and put into cans for exportation. It is usually of a light straw colour, sometimes approaching to a greenish tinge. The cleaned seeds yield from 47 to 50 per cent of oil worth in England from 4*d.* to 5*d.* per lb. The following is the result of experiments made at Madras and Calcutta to ascertain the per-centage of oil in the Castor seed. (January 27th, 1853.)

Calcutta.—1400 lbs of seed yield kernels and raw oil as follows :—

	Kernels.	Oil.
1st Sort.....	632lbs.....	324 lbs.
2nd Sort.....	184lbs.....	87½lbs.
3rd Sort.....	164lbs.....	76½lbs.

Making a total of 980lbs. of kernels and 488lbs. of raw oil from 1,800lbs. of seed.

Madras.—1400 lbs. of seed yield raw oil as follows :—

1st Sort.....	...318 lbs.	of oil.
2nd Sort	88 lbs.	do.
3rd Sort.....	74 lbs.	do.

Making a total of 480 lbs. of oil from 1400 lbs. of seed.

The Cost of the Madras oil is as follows :

1400 lbs. of seed at Rs. 3 3 per bag of 164lbs.....	27	3	4
Husking and selecting kernels and cooly hire	3	11	9
Crushing, moulding, pressing and boiling	2	7	1
Filtering and sundries.....	2	8	0
Overseer's pay, Godown Rent, &c. &c.	1	6	2
300 empty Quart bottles, corks &c. 34	4	8	
Cleaning and Packing charges.....	4	8	0
	Rs. 76	1	0

Or an average of Annas $4\frac{17}{300}$ per quart of First, Second and Third sort oil=4d per. lb.

Uses.—This oil is chiefly used as a mild Purgative. Soap of good quality may be made of it, but the cost and disagreeable smell which it communicates, preclude its general use.

Exports.—Average for the last 4 years 1849-50 to 1852-53, 11,325 galls. per annum. At the Madras Exhibition of 1851, the samples of this oil exhibited by Mr. Gay, Madras, Mr. Kohlhoff, Tanjore, and Monsieur Godefroy of Pondicherry were particularly fine. Mr. Gay's specimen was the clearest, and most limpid, and devoid of any offensive smell. These qualities however do not arise from any superiority of the seed, or care in extraction, but from repeated decolorization with animal charcoal which in the opinion of many eminent Medical men, considerably detracts from its strength and efficacy. Appavoo Pillay of Tinnevelly, the Nellore Local Committee, and Lieut. Hawkes also exhibited excellent specimens. When manufactured in the ordinary Native mill, this oil is sometimes used by the richer classes in Lamps.

Castor oil (extracted hot). This differs from the preceding only in the mode of preparation—The seeds are boiled for two hours in water, dried for three days in the sun, freed from the shells, pounded and then boiled in fresh water, until the whole of the oil has risen to the surface. Five seers of the seeds or $3\frac{1}{8}$ lb. should by this process yield a quart of oil. This is the sort generally used in medicine by native practitioners, it is straw colored, and free from any unpleasant taste or smell.—*M. E. J. R.*

(7166) RICINUS COMMUNIS. Castor or Lamp oil plant, Fructibus majoribus.

Vullak ennai, TAM. | Chirach ka tael, HIND.
Ped amidum, TEL.

This oil which is obtained from the large seeded variety of the "Ricinus communis" is sometimes drawn cold, and a straw-colored specimen scarcely distinguishable in quality from the oil of the small seeded variety was shown by Lieut. Hawkes. It is however more usually extracted by heat, and forms the common "Lamp oil" of the bazar.

Mode of preparation—The seeds having been partially roasted over a charcoal fire, both to coagulate the albumen and to liquify the oil, are then pounded and boiled in water until the oil rises to the surface. The roasting process, however gives it a deeper red colour and an empyreumatic odour.

Price.—The price of this oil varies in different parts of the country from Rs. 1 10 0 to Rs. 3 13 6 per maund of 25lbs. The average of nineteen large stations, in all parts of the Madras Presidency for the Quarter ending 31st October 1854 was Rs. 2 3 6 per maund.

Uses.—Chiefly for lamps.

Exports.—Average of the last six years Galls. 27,561 per annum.—*M. E. J. R.* See CASTOR OIL.

(7167) RICINUS. A wild species from Canara. Is burnt in lamps.

(7168) RICINUS DIOCOCA.

Tawthedinbin, BURM.

Scarce and found only on the banks of streams in the Pegu and Tounghoo districts. Very tall large timber; wood, red, adapted to cabinet making.—*McClelland.*

(7169) RICINUS MAPPA, 816.

(7170) RIVEA. Of this genus, Wight gives Rivea cuneata, 890; cymosa, 839; hirsuta, 891; ornata, 1356; pomacea, 888; speciosa, 851; and tiliœfolia, 1358.

(7171) RIVEA FRAGRANS.

Boodthee-keeray, TAM.

A beautiful variety of the convolvulus tribe; flowers transparent white, opening at sunset and perfuming the air with a very pleasant odour; leaves used as greens; found in hedges, called the clove scented creeper by Europeans.—*Jaffrey.*

(7172) ROCCELLA, a genus of Plants belonging to the family of Lichens. The species are used in dyeing, and are popularly called Orchil, or Archil. This name is derived from the Oricello of the Italians or the Spanish Orchella. It is often corrupted in commerce into Rochilla-Weed. Several species of Lichens are employed for the same purpose, which are distinguished according to the country whence they are imported, and also by manufacturers into weed and moss, the former name being applied to the Filiform Lichens of botanists belonging to the genus *Roccella* to be treated of here, whilst the terms Moss and Rock-Moss are applied to the Crustaceous Lichens belonging to the genus *Lecanora*, which include the Cudbere and Parell of dyers. [PARELLA.] The character of the genus *Roccella* is as follows:—Thallus coriacco-cartillaginous rounded or plane, branched or lacineated; apothecia orbicular, adgate with the thallus; the disc coloured, plano-convex, with a border at length thickened and elevated, formed of the thallus, and covering a sublentiform black compact pulverulent powder, concealed from within the substance of the thallus.—*Eng. Cyc.*

Various lichens, and *Roccella tinctoria*, from Tenasserim and other parts of India, have been introduced into Britain by the East India Company. In the Admiralty instructions given to Capt. Sir James C. Ross, on his Antarctic voyage, a few years ago, his attention was specially called to the search and enquiry for substitutes for the *Roccella*, which is now becoming scarce. A prize medal was awarded, in 1851, to an exhibitor from the Elbe for specimens of the weed, and an extract of red and violet orchil. Specimens of varieties of the lichens used in the manufacture of cudbear orchil and litmus, and of the substance obtained, were also shown in the British department, for which were awarded prize medals.—*Simmonds.*

(7173) ROCCELLA FUCIFORMIS, the Flat-Leaved Orchil. Thallus flat, branched, nearly upright grayish-white, bearing powdery warts; apothecia horny, bordered. Both kinds are found on maritime rocks, or on dry stone walls exposed to the influence of the sea-breeze, as well on the coast of England as on the shores of the Mediterranean and the East Indies. The more arid the situation, the better is the quality of the lichens. The presence of the colouring matter is ascertained by steeping the weed broken up in small pieces in diluted solution of ammonia, in a bottle half filled with liquid, which should be kept corked, but frequently opened in a temperature not exceeding 150° Fahr.

(7174) ROCCELLA TINCTORIA. Dyer's Roccella, or Orchil. Thallus suffrutieose, rounded, branched, somewhat erect, grayish-brown, bearing powdery warts; apothecia flat and horny, with a scarcely prominent border. A practical writer describes "the good kind as having a mealy white powder on its surface towards the centre; the under surface is of a gray colour; and is not hairy; if wetted, it does not turn of an orange colour: its edges are flat and thin."

(7175) ROCK OIL. PETROLEUM. The following account of the collection of Petroleum in the Island of Cheduba is given by Captain Halstead. Petroleum is found on the Island and might be extensively produced. Two wells sufficiently near each other to afford the conclusion of their possessing one common source, exist in the Kraerore circle, yielding annually about 60 pots each. A third is found in the "Mromee" circle, but it has been destroyed by fire and yields nothing, being the property, at present, of no one in particular, the soil around it, is however, full of the oil. The fourth and most extensive is in the Frangroa circle and yields near 200 pots in the year. The method of collecting it is simple: the earth is turned up to a depth of two feet, and a bank of soil raised round a square of about 20 yards, is distributed so as to form it during the rains into a shallow pond of about the above depth. The surface of this pond is in a constant state of ebullition from the escape of gas with which comes up the Petroleum. It collects on the surface in three different forms; a geen fluid oil first spreads itself over the spot where the gas is bubbling up. As it extends, its edges exhibit a brown curdled substance resembling half congealed dripping, and amongst this, as it becomes thicker is seen gathering in spots a dark brown substance of the color and consistency of molasses. This latter is used to preserve wood, to saturate paper for umbrellas, and is sometimes burned. But the fluid of a green color, is that mostly used to supply lamps. The curdled substance is used with the dark in the coarser purposes to which it is applied. This is the least valuable and sells at 5 pots for a rupee. The other two at 3 pots for 2 rupees. A bamboo is used to skim the surface of the ponds, and bring the substance to the bank, it is scooped up with a cocoanut shell and put into the pot. It floats so lightly on the water that this process is quickly and effectually performed. The break of the day is the time chosen for the operation as from the cooler temperature, it is then of harder consistence on the water and easier and cleaner skimmed. In the heat of the day it becomes so fluid as to make it difficult to collect without a large proportion of the water. In the months of March and April the pond gradually dries up, and the oil can then be no longer collected from out the soil. The pond is then dug, and the whole soil in it as much disturbed as possible: on this operation depends the quantity to be yielded during the next season, and the deeper it is dug, the larger will be the produce; while on the other hand, if it be neglected, which is most commonly the case, the quantity of oil to be collected will be very materially diminished. A

sort of superstitious fear is attached to these ponds, and on no account would a native dip his foot in its water, though he will not hesitate to dig the soil when dry, nor to handle its produce, to which no sort of dileterious property is attributed. The state of ebullition without apparent heat may occasion this feeling among them. The ponds are surrounded by a rough hedge of stout sticks, to preserve them from the intrusion of buffaloe or deer. Insects were seen in them. I had no means of collecting any of the escaping gas, which I should otherwise have done, but no heat perceptable at the surface is employed for its extensive development, the thermometer where the greatest ebullition was going forward showing but two degrees more than the atmosphere viz 74. No doubt this mineral product might with case, and little expense, be increased to a very larg amount, and the oil has yet perhaps to be bette known and better appreciated than now whe its value will in all probability be much increased —*Rohde, M,S.S.* See ASPHALTE. NAPHTHA and PETROLEUM.

(7176) RODENTIA, an order of Animal belonging to the class *Mammalia*, embracing th Rats and Mice, Hares, Rabbits, Guinea-Pigs and other well-known animals. The following i Mr. Waterhouse's arrangement of these ani mals :—

		Europe and North Asia.	North America.	Africa	India and Islands	South America and West India Islands
MURINA	SCIURIDÆ	5. Sciurus. 1. Pteromys. 1. Tamias. 3. Spermophilus. 2. Arctomys.	20. Sciurus. 3. Pteromys. 5. Tamias. 10. Spermophilus 8. Arctomys. 1. Aplodontia.	5. Sciurus. 3. Xerus. 2. Graphiurus.	25. Sciurus. 9. Pteromys.	6. Sciurus.
	MURIDÆ	3. Myoxus. 8. Dipus. 1. Mus. 6. Cricetus.	2. Meriones. 6 {Mus. Hesperomys 1 Sigmodon. 2. Neotoma.	3. Myoxus. 4 Dipus. 10. Mus 2. Dendromys. 6. Gerbillus. 1 Psammomys. 3. Euryotis.	12. Mus 2 Gerbillus 1 Phleomys. 2. Rhizomys.	30 {Mus. Hesperomys 3. Reithrodon.
	ARVICOLIDÆ	1 Castor. 20. Arvicola. 4. Lemmus. 2 Spalax.	1. Castor. 1. Ondatra. 8. Arvicola. 4. Lemmus. 10. Geomys.			
HYSTRICINA	HYSTRICIDÆ	1 Hystrix.	1. Erethison.	1. Hystrix.	1. Hystrix. 1. Atherura.	3. Cercolabes. 2 Synetheres.
	OCTODONTIDÆ			1. Aulacodus. 1. Orycterus. 1. Bathyergus. 1. Petromys.		3. Capromys. 1. Myopotamus. 10. Echimys 6. Nelomys. 1. Cercomys. 2. Dasyprocta. 1. Cœlogenys. 2. Ctenomys. 1. Pœphagomys. 1. Octodon. 2. Abrocoma.
	CHINCHILLIDÆ					1. Chinchilla 2. Lagotis. 1. Lagostomus.
	CAVIIDÆ					6. Cavia. 2. Kerodon. 1. Dolichotis. 1. Hydrochœrus.
LEPORINA	LEPORIDÆ	5. Lepus. 3. Lagomys.	15. Lepus. 1. Lagomys.	6. Lepus.	4. Lepus. 1, Lagomys.	1. Lepus.
		81 species. 16genera.	99 species. 19genera.	53 species. 16genera.	58 species. 10genera.	89 species. 25genera

These animals have two great incisor teeth in each jaw, separated from the molars by a wide space, with which they could hardly seize a living prey, or rend flesh; they could not even cut aliments, but they might serve for reducing them by continued labour into fine molecules—in word, for gnawing them; whence the term Rodents, or Gnawers, applied to this or

der. With these weapons they attack the hardest vegetable productions, and frequently feed on wood and bark.

The form of the body of the Rodents is in general such that their hinder parts exceed their anterior ones, so that they leap rather than walk; this disposition in some of them is as excessive as in the Kangaroos.—*Eng. Cyc.*

(7177) ROE: *Fish roes*, *Red Fish*, and *Sardines*, are Malay condiments and the species used in the preparation, are *Alausa toli*, (*Ikan truboh*,) *Engraulis Brownii*, (*Bunga ayer or badah*,) *Dussumieria acuta* (*Tamban-bulat*) and *Clupeonia perforata*,(*Tamban-nepes or batuh*)--*Cantor.*

(7178) ROHEPITTA, the gall of fishes.

(7179) ROHUN BARK. ROHUN-KE-CHILKEE. Rohunæ Cortex. Bark of Soymida febrifuga, is not spotted with rusty patches, and the inside is dark reddish brown, nitric acid does not stain it of a bright scarlet. These tests distinguish it from the poisonous bark of the nux vomica tree (Kuchila,) which is commonly sold for it in the bazars of Bengal.—*Beng. Phar.*

(7180) RONDELETIA, a genus of Plants belonging to the natural order *Rubiaceæ*, named after Rondelet, a French botanist of the 16th century. It is characterised by having a calyx with a subglobular tube. Corolla superior, funnel-shaped, ventricose at the throat; segments 4-5, ovate-obtuse, spreading; anthers 4-5, sessile within the corolla; ovary-2-celled; style filiform; stigma bifid; capsule round, crowned with the limb of the calyx. Seeds minute, numerous, or few when abortive. The genus, as formerly constituted, included many shrubby trees which occur in India (Roxb., 'Fl. Indica'), but these have been referred by modern botanists to *Adenosacme*, *Greenia*, and *Wendlandia*. The present genus *Rondeletia* occurs chiefly in America and the West Indies.—*Eng. Cyc.*

(7181) RONDELETIA TINCTORIA.

Tomayoke, BURM.; Tooralodh, HIND.

Small timber, adapted, from the fineness of the grain and elegance of colour, for ornamental work: wood dark-brown.—*McClelland.* The tree grows also in the Kotah and Mewar jungles the bark is used in dyeing red.—*Genl. Med. Top. p.* 182.

(7182) ROOSA OIL: GRASS OIL, ANDROPOGON CALAMUS AROMATICUS.

Roosa Teil, GUZ. HIND.

A valuable oil, obtained from a grass a native of the low hills at the base of the Himalayas; also found at Asseerghur, Malwa, and Guzerat. It is chiefly imported into Bombay from Surat, and is re-exported in considerable quantities to England, China, and the Arabian and Persian Gulfs. It is highly esteemed by the natives of India as a cure for rheumatism, colds, and as an internal stimulant. *Faulkner.* This oil differs but little either in appearance or quality from the Lemon Grass Oil and is used for the same purposes. Roosa grass oil, the produce of "*Andropogon Calamus aromaticus*" was exhibited from the Nizam's territories by Dr. Riddell at the Madras Exhibition of 1855, but is found to be a good substitute for the more expensive Cajeput oil, and is a useful rubefacient. —*M. E. J. R.*

(7183) ROPE.

Doodah, GUZ.; Russee, HIND.

Consists of hemp, coir, cotton, straw, and other fibrous materials, spun into thick yarn, of which several strings are twisted together by means of a wheel. All the different kinds of this manufacture, from a fishing line or whip-cord, to a cable, go by the general name of cordage.—*Faulkner.* There is not in Southern Asia any large Rope walk, but for the materials for Rope making we refer to the articles FIBRES: CORDAGE.

(7184) ROSE ATTAR AND ROSE WATER. In India the perfumed oils are obtained in the following manner: The layers of the jasmine, or other flowers, four inches thick and two inches square, are laid on the ground and covered with layers of sesamum or any other oil yielding seed. These are laid about the same thickness as the flowers, over which a second layer of flowers like the first is placed. The seed is wetted with water, and the whole mass covered with a sheet, held down at the end and sides by weights, and allowed to remain for eighteen hours in this form. It is now fit for the mill, unless the perfume is desired to be very strong, when the faded flowers are removed and fresh ones put in their place. The seed thus impregnated is ground in the usual way in the mill and the oil expressed, having the scent of the flower. At Ghazipoor the jasmine and bela are chiefly employed; the oil is kept in the dubbers, and sold for about 4s. a seer. The newest oils afford the finest perfume. In Europe a fixed oil, usually that of the bean or moringa nut, is employed. Cotton is soaked in this, and laid over layers of flowers, the oil being squeezed out so soon as impregnated with perfume. Dr. Jackson thus describes the culture and manufacture:—

(7185) *Roses, Cultivation of,*—Around the station of Ghazipoor, there are about 300 biggahs (or about 150 acres) of ground laid out in small detached fields as rose gardens, most carefully protected on all sides by high mud walls and prickly pear fences, to keep out the cattle. These lands, which belong to Zemindars, are planted with rose trees, and are annually let out at so much per biggah for the ground, and so much additional for the rose plants—generally five rupees per biggah and twenty-five rupees for the rose trees, of which there are 1,000 in each biggah. The additional expense for cultivation would be about eight Rupees eight annas; so that for thirty-eight

rupees eight annas you have for the season one biggah of 1,000 rose trees. If the season be good, this biggah of 1,000 rose trees should yield one lac of roses. Purchases for roses are always made at so much per lac. The price of course varies according to the year, and will average from 40 to 70 rupees.

Manufacture of rose-water.—The rose trees come into flower at the beginning of March, and continue so through April. Early in the morning the flowers are plucked by numbers of men, women, and children, and are conveyed in large bags to the several contracting parties for distillation. The cultivators themselves very rarely manufacture. The native apparatus for distilling the rose-water is of the simplest construction; it consists of a large copper or iron boiler well tinned, capable of holding from eight to twelve gallons, having a large body with a rather narrow neck, and a mouth about eight inches in diameter; on the top of this is fixed an old degh-chee, or cooking vessel, with a hole in the centre to receive the tube or worm. This tube is composed of two pieces of bamboo, fastened at an acute angle, and it is covered the whole length with a strong binding of corded string, over which is a luting of earth to prevent the vapour from escaping. The small end, about two feet long, is fixed into the hole in the centre of the head, where it is well luted with flower and water. The lower arm or end of the tube is carried down into a long-necked vessel or receiver, called a bhulka. This is placed in a pot of water, which, as it gets hot, is changed The head of the still is luted on to the body, and the long arm of the tube in the bhulka is also well provided with a cushion of cloth, so as to keep in all vapour. The boiler is let into an earthen furnace, and the whole is ready for operation. There is such a variety of rose water manufactured in the bazar, and so much that bears the name, which is nothing more than a mixture of sandal oil, that it is impossible to lay down the plan which is adopted. The best rose-water, however, in the bazar, may be computed as bearing the proportion of one thousand roses to a seer of water; this, perhaps, may be considered as the best procurable. From one thousand roses most generally a seer and a half of rose-water is distilled, and perhaps from this even the attar has been removed. The boiler of the still will hold from eight to twelve or sixteen thousand roses. On eight thousand roses from ten to eleven seers of water will be placed, and eight seers of rose-water will be distilled. This after distillation is placed in a carboy of glass, and is exposed to the sun for several days to become pucka (ripe); it is then stopped with cotton, and has a covering of moist clay put over it: this becoming hard, effectually prevents the scent from escaping. The price of this will be from

twelve to sixteen rupees. This is the best that can be procured.

(7186) *Roses, Attar of.*—To procure the attar, the roses are put into the still, and the water passes over gradually, as in the case of the rose-water process; after the whole has come over, the rose-water is placed in a large metal basin, which is covered with wetted muslin, tied over to prevent insects or dust getting into it; this vessel is let into the ground about two feet, which has been previously wetted with water, and it is allowed to remain quiet during the whole night. The attar is always made at the beginning of the season, when the nights are cool; in the morning the little film of attar which is formed upon the surface of the rose-water during the night is removed by means of a feather, and it is then carefully placed in a small phial; and, day after day, as the collection is made, it is placed for a short period in the sun, and after a sufficient quantity has been procured, it is poured off clear, and of the color of amber, into small phials. Pure attar, when it has been removed only three or four days, has a pale greenish hue; by keeping it loses this, and in a few weeks' time it becomes of a pale yellow. The first few days distillation does not produce such fine attar as comes off afterwards, in consequence of the dust or little particles of dirt in the still and the tube being mixed with it. This is readily separated, from its sinking to the bottom of the attar, which melts at a temperature of 84 degrees. From one lac of roses it is generally calculated that 180 grains, or one tolah, of attar can be procured; more than this can be obtained if the roses are full sized, and the nights cold to allow of the congelation. The attar purchased in the bazar is generally adulterated, mixed with sandal oil or sweet oil; not even the richest native will give the price at which the purest attar alone can be obtained, and the purest attar that is made is sold only to Europeans. During the past year it has been selling from 80 to 90 rupees the tolah; the year before it might have been purchased for 50 rupees.

(7187) *General Remarks.* Native stills are let out at so much per day or week, and it frequently occurs that the residents prepare some rose-water for their own use as a present to their friends, to secure their being provided with that which is the best. The natives never remove the calices of the rose-flowers, but place the whole into the still as it comes from the garden. The best plan appears to be to have these removed, as by this means the rose-water may be preserved a longer time, and is not spoiled by the acid smell occasionally met with in the native rose-water. It is usual to calculate 100 bottles to one lac of roses. The rose-water should always be twice distilled; over ten thousand roses water may be put to allow of sixteen or twenty bottles coming out; the following day these twenty bottles are placed over eight thou-

sand more roses; and about eighteen bottles of rose-water are distilled. This may be considered the best to be met with. The attar is so much lighter than the rose-water, that, previous to use, it is better to expose the rose-water to the sun for a few days, to allow of its being well mixed; and rose-water that has been kept six months is always better than that which has recently been made. At the commencement of the rose season, people from all parts come to make their purchases, and very large quantities are prepared and sold. There are about thirty-six places in the city of Ghazeepore where rose-water is distilled. These people generally put a large quantity of sandal oil into the receiver, the oil is afterwards carefully removed and sold as sandal attar, and the water put into carboys and disposed of as rose-water. At the time of sale a few drops of sandal oil are placed on the neck of the carboy to give it fresh scent, and to many of the natives it appears perfectly immaterial whether the scent arises solely from the sandal oil or from the roses. Large quantities of sandal oil are every year brought up from the south and expended in this way.

The chief use the natives appear to make of the rose water, or the sandal attar as they term it, is at the period of their festivals and weddings. It is then distributed largely to the guests as they arrive, and sprinkled with profusion in the apartments. A large quantity of rose water is sold at Benares, and many of the native Rajahs send over to Ghazipoor for its purchase. Most of the rose water, as soon as distilled, is taken away, and after six months from the termination of the manufacture there are not more than four or five places where it is to be met with. I should consider that the value of the roses sold for the manufacture of rose water may be estimated at 15,000 to 20,000 rupees a year; and from the usual price asked for the rose water, and for which it is sold, I should consider there is a profit of 40,000 rupees. The natives are very fond of using the rose water as medicine, or as a vehicle for other mixtures, and they consume a good deal of the petals for the conserve of roses, or goolcond as they call it.—*O'Shaughnessy, p.* 326. In addition to the above, we observe the following in Simmonds. The roses of Ghazipoor on the river Ganges, are cultivated in enormous fields of hundreds of acres. The delightful odor from these fields can be scented at seven miles distance on the river. The valuable article of commerce known as attar of roses is made here in the following manner:—On 40 pounds of roses are poured 60 pounds of water, and they are then distilled over a slow fire, and 30 pounds of rose water obtained. This rose water is then poured over 40 pounds of fresh roses, and from that is distilled at most 20 pounds of rose water; this is then exposed to the cold night air, and in the morning a small quantity of oil is found on the surface. From 80 pounds of roses, about 200,000, at the utmost an ounce and a-half of oil is obtained; and even at Ghazipoor it costs 40 rupees (4*l.*) an ounce. Five guineas have been often paid for one ounce of attar of roses. The most approved mode of ascertaining its quality is to drop it on a piece of paper; its strength is ascertained by the quickness with which it evaporates, and its worth by its leaving no stains on the paper. The best otto is manufactured at Constantinople.—*Simmonds.*

(7188) ROSA: *Species.* CHINA YELLOW ROSE. On this and another rose, Fortune says, the gardens of the mandarins were extremely gay, particularly during the early months of the year, and, what was of more importance to me, contained a number of new plants of great beauty and interest. On entering one of the gardens on a fine morning in May, I was struck with a mass of yellow flowers which completely covered a distant part of the wall. The colour was not a common yellow, but had something of buff in it which gave the flowers a striking and uncommon appearance. I immediately ran up to the place and, to my surprise and delight, found that it was a most beautiful new double yellow climbing rose. I have no doubt, from what I afterwards learned, that this rose is from the more northern districts of the empire, and will prove perfectly hardy in Europe. Another rose, which the Chinese call the "five coloured" was also found in one of these gardens at this time. It belongs to the section commonly called China roses in Great Britain, but grows in a very strange and beautiful manner. Sometimes it produces self colored blooms being either red or French white and frequently having flowers of both on one plant at the same time while at other times the flowers are striped with the two colours. This will also be as hardy as our common China Rose. Glycine sinensis is often grown on a flat trellis in front of the summer house or forms a kind of portico, which affords a pleasing shade. Entwined with one of these trees, I found another variety, having very long racemes of pure white flowers, which contrasted well with the light blue of the other. I obtained permission from the old Chinese gentleman to whom it belonged (my old friend Dr. Chang) to make some layers of this fine plant, and I am happy to say that one of these is now alive in the garden at Chiswick.—*Fortune's Wanderings, page* 311.

(7189) ROSE. Rosa.

Wurd, Arab.	Gul, Guz.
Gul, Beng.	Gul, Gul-ab-ka-phool, H.
Hoa-houng-tan, Coch-chin.	Rosa, It.
Mei-kwe hwa, Chin.	Mawar, Mal.
Rose a cent feuilles, Fr.	Gul, Pers.
Blassen-rose, Ger.	Gulaba-poo, Tam.

Rosa (from the Latin *Rosa*, through the medium of the French Rose; the Latin *Rosa* and the Greek *Ῥόδον* are evidently the same)

the name of the most universally admired and cultivated genus of plants, forming the type of the natural order *Rosaceæ*. The Rose was known in early times, and was as great a favourite among the nations of antiquity as it is in modern times. The Rose is found generally in almost every country of the northern hemisphere, both in the Old and New World; from Sweden to the north of Africa; from Kamtchatka to Bengal, and from Hudson's Bay to the mountains of Mexico. It is not found in South America or in Australia. All the species are included between 70° & 19° N. lat. It is found more generally on dry and free soils than on those which are wet and tenacious. In the north of Europe it occurs with single flowers, but in Italy, Greece, and Spain more frequently double. The characters of the genus *Rosa* are—calyx 5-parted, tube fleshy, urceolate; petals five; stamens numerous, attached to the calyx and corolla; ovaries attached to the inner surface of the tube of the calyx; style long, stigma projecting beyond the mouth of the calyx; achenia numerous, hard. The species are mostly shrubs with alternate pinnate leaves and beautiful odoriferous flowers. There are few better marked genera amongst plants than this, but as of all plants it has been the greatest favourite, and thus surrounded by the greatest variety of external influences, its species and varieties are the most difficult to distinguish.—*Eng. Cyc.* Regarding the cultivation, in India, of this favorite plant, bearing such a variety of coloured flowers, —from the deep red to the pale yellow and white, with all their intermediate shades—we may point out that the easiest mode of propagation is by layers at almost all seasons, or by cuttings at the commencement of the rains. The Persian varieties, red and white, require to have their roots opened, and the plants cut during the early part of the cold season, after which they must be watered well every second or third day. The roots must then be covered up with manure, when they will throw out flowers, which are generally used for rose water. The Rose Edward, which blossoms great part of the year, requires pruning about a month after it ceases to blossom, and should be allowed to rest a short time without watering, when a fresh supply of water and manure round the roots will cause it to bear flowering shoots immediately. This rose, and the Egyptian, are amongst the few that give seed-hips being perfectly formed on both.—*Riddell.*

Dr. Lindley, in his 'Rosarum Monographia,' arranges the species under eleven divisions, the first of which, including but one species, has since been made into the genus *Lowea*. We shall here give the remaining divisions, and point out the species which, on account of their ornamental flowers or uses, are most frequently cultivated.

1. *Feroces*, with branches permanently tomentose and naked fruit. They are generally low shrubs, remarkable for thick hoary branches clothed with numerous prickles, and hence their name. There are only three species belonging to this division, of which *Rosa ferox*, the Hedgehog-Rose, is most common.

2. *Bracteatæ*.—The species of this division have not only their branches, but also their fruit clothed with a persistent tomentum. They have mostly bright-green leaves, and their organs of fructification are in the highest state of development of any of the genus. They belong to the class of evergreen roses. *R. bracteata*, the Macartney Rose, is a native of China, and was introduced into Great Britain by Lord Macartney. It has upright branches, 5-9-leaflets, stout prickles, with large white terminal solitary flowers, and large globose orange red fruit. It is a handsome plant, flowering abundantly late in the season. *R. microphylla*. Small-Leaved Rose, resembles *R. bracteata*, but differs in being smaller, and having prickly fruit and ovate-obtuse leaves.

3. *Cinnamomeæ*, distinguished by their long lanceolate leaflets, without glands, bracteated flowers, and delicate but little thickened. The shoots are either with or without setæ. There are several species in this division, but comparatively few are known out of the herbarium. *R. lucida*, the Right-Leaved Rose; *R. laxa*, Loose or Spreading Carolina Rose; and *R. Carolina*, the True Carolina Rose, belong to this division.

4. *Pimpinellifoliæ*.—Branches either crowded with nearly equal prickles or unarmed; leaflets ovate or oblong: bracts absent; sepals connivent and persistent. Although this division approaches the last in artificial characters; it is essentially different in habit. *R. spinosissima*, the Scotch Rose, is a dwarf, compact, green bush, with creeping roots; it has unequal prickles, flat, glabrous, simple serrated leaflets, and small, solitary, white, or bluish-coloured flowers. It is found native in the mountainous districts and sea-coasts of all Europe, and also in the Caucasus. It was the only rose found by Sir W. Hooker in Iceland. A great number of varieties are found in the gardens of Britain, produced from the wild plant found in the North of England and Scotland, *R. sulphurea*, the Double-Yellow Rose, and *R. alpina*, the Boursalt Rose, are also examples.

5. *Centifoliæ*, clothed with bristles and prickles; flowers bracteate; leaflets oblong or ovate, rugous, disc thickened, closing the throat; sepals compound. This division comprehends those species which have ever been most interesting to the florist, as also probably those that were earliest known. Although the garden varieties of this division would probably amount to several hundred, there are only three species.—*Eng. Cyc.*

(7190) ROSA CANINA, the Dog-Rose, is one of the most common species of the division in this country, and from its varying characters

has given origin to a great number of names supposed to represent species. This is the species used for making conserve of roses.

9. *Systylæ.*—Styles cohering in an elongated column; stipules adnate. The habit of the plants of this division is nearly the same as that of the last. *R. arvensis*, the Field or White Dog-Rose, belongs to this group. It is a very common plant in many parts of England, adorning the hedges with its elegant snowy blossoms. It has cord-like shoots, unequal falcated prickles, leaflets glaucous beneath; diverging stipules, and ovate crimson fruit. The varieties of this and allied species, as *R. multiflora* and *R. sempervirens*, produce the climbing roses of the garden, of which there a great number now to be had.

(7191) ROSA CENTIFOLIA. (HUNDRED-LEAVED ROSE.

Goolab Sudburg. PERS. | Wurd, ARAB.

A native of Syria, cultivated in Europe. The odour of this species is but partially destroyed by desiccation, and according to M. Chereau is remarkably augmented by iodine. It is less astringent than the Provence rose, and more laxative. It furnishes essential oil in small quantities, and is much employed for distillation of rose water, and in the preparation of the essential oil, or *Utr.* The petals of this as well as of the R. gallica are preserved with salt by the European apothecaries for the preparation of the distilled water.—*O'Shaughnessy.* *R. centifolia*, the Hundred-Leaved Cabbage, or Provence Rose, is known by its large unequal prickles, glandulous leaflets, pendulous flowers, and oblong fruit. This rose has been said to be a native of France, but this is doubtful. It has been found wild in thickets on the eastern side of the Caucasus. It is the same plant as the *R. provincialis* of Miller. A botanical variety of this species, the *R. centifolia muscosa*, is the parent of the beautiful family of moss-roses.—*Eng. Cyc.*

(7192) ROSA DAMASCENA, the Damask Rose, has unequal prickles; the larger ones falcate, sepals reflexed, fruit elongated. This plant is supposed to have been originally brought from Damascus, and to be a native of Syria. It is much cultivated in gardens, and has not fewer varieties than the two last.

6. *Villosæ.*—Root-shoots erect; prickles nearly straight; leaflets ovate or oblong, with diverging serratures, sepals persistent, connivent; disc thickened, closing the fauces. The best known species of this division is the *R. alba*, White Rose; it has rugose glaucous leaves, with simple serratures and acicular unequal prickles, by which it may be distinguished from both R. *tomentosa* and *R. canina*, with which it is liable to be confounded. It is a native of Piedmont, Cochin-China, Denmark, France, and Saxony. Its flowers are very large, exhaling a delicious fragrance. *R. Hibernica*, the Irish Rose, belongs to this division, and is interesting to the botanists as being entirely confined to Ireland.

7. *Rubiginosæ.*—Unequal and sometimes bristly prickles, ovate or oblong leaflets, with glands and diverging serratures, persistent sepals, thickened disc, and arched root shoots. To this division belongs the *R. rubiginosæ*, Eglantine, or Sweet Briar. It is common in Britain in bushy places on a dry gravelly soil. *R. lutea*, the Austrian Briar, is nearly allied to the latter.

8. *Caninæ.*—With equal hooked prickles; oval eglandulose leaflets, with connivent serratures, deciduous sepals, and thickened disc closing the throat. To this division belong many of the varieties called Autumnal or Perpetual Roses, on account of their blooming late in the season and continuing in flower a long time. Of the roses in this group that have afforded varieties for the garden, the *R. Indica*, Chinese Rose, stands first. There is a hybrid variety between this species and the *R. odorata*, which is well known in gardens under the name of *R. Indica odorata*, Tea-Scented China Rose. This rose is the parent of a great number of sorts in gardens. The Bourbon Rose (*R. Bourboniana*) is a natural hybrid between *R. Indica* and a variety called Red Four-Seasons. This hybrid was found amongst a number of the latter plants in a hedge in the Isle of Bourbon. It was brought to Paris, and has since produced many beautiful varieties. The Noisette Rose was grown from seeds produced from *R. moschata* impregnated with *R. Indica*. It was first reared in America.

(7193) ROSA GALLICA (FRENCH, OR PROVENCE RED ROSE.)

Gul. HIND.

This is a native of Persia, the petals contain tannic and gallic acid, essential oil, oxide of iron, and other unimportant principles. The petals are gathered before becoming quite ripe, they are deprived of the calyx and central attachments, and dried before the sun or in a stove. When dried they are sifted in order to separate the stamina and pistil. They are then gently compressed and kept in a dry place. From a variety of this species, the cabbage rose, a very fragrant distilled water is prepared in England. —*O'Shaughnessy, page* 326. *R. Gallica*, the French Rose, has equal small prickles, erect flowers, ovate sepals, and globose fruit. It is found wild about Montalbanum, Walzenberg, and Geneva, also in Austria, Piedmont, and the Caucasus. This is supposed to be the species to which Pliny refers ('Hist. Nat.,' xxi. 18, 25, 72. 73). *R. pumila* of Jacquin is a variety of this species. Hundreds of varieties of this rose are found cultivated in gardens. A great number of varieties of roses found in gardens are hybrids between *R. Gallica* and *R. centifolia.* They mostly combine the long graceful shoots of the last with the rich crimson hues of the first. Hybrids are also produced

between *R. Gallica* and *R. Indica*, but differ from the last in not being perpetual. They have a pleasing glossy sub-evergreen foliage.—*Eng. Cyc.*

(7194) ROSA LAWRANCEANA, the Minature or Lawrance Rose, named after Miss Lawrance, who published a collection of drawings of roses, belongs to this division. It was first brought from China, and is probably only a dwarf variety of *R. Indica* or *R. semperflorens*. which it closely resembles in structure.—*Eng. Cyc.*

(7195) ROSA MACROPHYLLA. The great red rose is one of the most beautiful Himalayan plants, whose single flowers are as large as the palm of the hand.—*Hooker Him. Jour. Vol.* II, *p.* 43.

(7196) ROSA MOSCHATA, the Musk-Rose, is one of the oldest inhabitants of our gardens. It is found native in the North of Africa, and in the temperate and warm provinces of Spain.

10. *Banksianæ*.—Nearly free subulate stipules, usually deciduous; ternate shining leaflets and climbing stems. This is the last division of the species of roses. The most remarkable species in this group is the *R. Banksiæ*, Banksian Rose, named after Lady Banks. It is a native of China, and has very numerous double sweet-scented nodding flowers, which are arranged in umbel-like corymbs. The roses are used in the arts for obtaining their delicious perfume, which is called Attar of Roses. The petals are also used in medicine.—*Eng. Cyc.*

(7197) ROSA RUBIGINOSA. SWEET-BRIAR. Native name, gul nusreen. This species of rose which was once scarce in the Deccan is now to be met with in many gardens—it sometimes blossoms, if budded on the Persian rose stock. The general mode of propagation is by layers, but a much quicker and easier method is to bud it on the stock of a rose.—*Riddell.* Tenasserim residences are often filled with sweet odours from the grateful eglantine, or sweet briar, but the plant is kept alive with difficulty when exposed to the southwest monsoon.—*Mason.*

(7198) ROSA SERICEA. Is an erect white flowered rose, and the only species occurring in Southern Sikkim. It is very abundant: its numerous inodorous flowers are pendent, apparent as a protection from the rain, and it is remarkable as being the only species having four petals, instead of five.—*Hooker, Him. Jour. Vol.* I, *p.* 168.

(7199) ROSACEÆ, a natural order of Polypetalous Exogenous Plants, with 4-5-lobed calyx; 4 or 5 regular petals; indefinite perigynous stamens; exalbuminous seed; and alternate stipulate leaves. The plants of this order are allied to *Chrysobalanaceæ*, from which they may be distinguished by their styles proceeding from the side of the ovarium near the apex, and not from the base, and by their regular petals and stamens. They are distinguished from *Fabacea* (*Leguminosæ*) by their regular petals and stamens, and especially by the odd segment of the calyx being posterior, and not anterior, and in that order. The genera of this order may be arranged under four groups or sub-orders, the principal distinctions of which will be seen in the following analysis:—

Carpels numerous.	
Ovaries superior.	*Rosaceæ* (proper).
Ovaries inferior.	*Pomeæ*.
Carpels solitary.	
Fruit a drupe.	*Amygdaleæ*.
Fruit a nut.	*Sanguisorbeæ*.

Rosaceæ proper, include the true Roses (*Roseæ*), the Cinquefoils (*Potentilleæ*), the Spiræas (*Spirææ*), and the Neuradas (*Neuradeæ*). They are herbaceous plants or shrubs. This family includes about 570 species and 20 genera, principally inhabitants of the temperate and cold zones of the northern hemisphere of the New and Old World; a very few are found on high land within the tropics, and a small number in the southern hemisphere. None of the plants of this section of the order are unwholesome; they are characterised by the presence of an astringent principle, which has led to the use of many of them in medicine, viz; ROSA; POTENTILLA; SPIRÆA; FRAGARIA; GEUM: DRYAS.—*Eng. Cyc.*

Pomeæ are known by the adhesion of their ovaries to the sides of the calyx, forming the fruit called a Pome. Their ovula are always in pairs. The tendency of the flowers of this family to revert to their normal state frequently affords instructive examples of morphological changes. The fruit of many of the species contains a considerable quantity of malic acid, which gives to the fruit its peculiar flavour. The Apple, Pear, Medlar, Quince, Service-Tree, and Mountain-Ash belong to this family. They are inhabitants of Europe, Northern Asia, the mountains of India, and North America. The genera are PYRUS; CYDONIA; AMELANCHIER; CRATÆGUS; COTONEASTER; MESPILUS.—*Eng. Cyc.*

Amygdaleæ have but a single carpel, which when ripe is a drupe, but they are also distinguished amongst *Rosaceæ* by their leaves containing hydrocyanic acid, and their bark yielding gum. They are natives exclusively of the northern hemisphere, where they are found in cold or temperate climates. Many of the species are poisonous, on account of the hydrocyanic acid they contain. They yield, however, some of our most valued fruits, as the Peach, Nectarine, Plum, Apricot, Cherry, and Almond, which last is the seed of the *Amygdalus communis*. The genera are AMYGDALEÆ; AMYGDALUS: PRUNUS.—*Eng. Cyc.*

Sanguisorbeæ are not only known by their solitary carpels but they are destitute of petals and have a hard thickened calyx. They are found wild in heaths, hedges, and exposed places in Europe, North and South America beyond the

tropics, and the Cape of Good Hope. Their principal property is astringency, and some of the species may be used as fodder. The genera are Sanguisorba; Poterium; Agrimonia.—*Eng. Cyc.*

(7200) ROSCOEA, a genus of Plants belonging to the natural order *Scitamineæ* or *Zingiberaceæ*, which was named by Sir J. E. Smith, in honour of the historian of the Medici, who elucidated the plants and remodelled the genera of the *Scitamineæ* in his beautiful work on that family. The species have been figured by Smith, Wallich, and Royle. The genus consists of only a few species, which are confined to the Himalaya Mountains, and is characterised by having spathaceous flowers, a single-leafed tubular calyx, corolla ringent, limb double, the outer tripartite, with the upper segment erect and arched. Inner limb two-lipped, ovary inferior, style inclosed in the furrow of the anther, which is two-lobed, incurved, surrounding the style with an appendage split at the base. The species of *Roscoea*, belonging to so tropical a family as the *Scitamineæ*, are generally accounted showy stove plants; but they are found only on the slopes of the Himalayas during the rainy seasons, when there is moisture with uniformity of temperature. *R. alpina* is found at as great an elevation as 9000 feet above the level of the sea, and on places whence the snow had just melted, like the snowdrop in early spring in European countries. —*Eng. Cyc.* Wight gives Roscoea alpina, 2013; lutea, 2013.2.

(7201) ROSELLE. Hibiscus Sabdariffa.

Yerra googoo. Tel.	Poolchay keeray, Tam.
Kaserica, Hind.	

The roselle plant, the red sorrel of the West Indies, is very widely diffused and its red sour calyx makes a fine flavored jelly, and preserve, which is a good substitute for cranberries.—*Faulkner.* This plant grows readily all over India, and is cultivated in most gardens, because its ripe, fleshy calyxes, have a pleasantly acid taste, and make excellent tarts and jelly: and in the West Indies, refreshing drinks. The stems cut when in flower, and the bark stripped off, and steeped immediately, a mass of fibres is displayed, the minute fibres of which are of a fine silky nature.

(7202) ROSE MALOES: Rosa Mallos: Liquid Storax. Liquidamber Altingaa? This is a thick scented gummous oil of the consistence of tar; it is brought from Persia via India to China; and when good has a pearly appearance. The price has declined much of late years; it used to sell for $ 30 per pecul.—*Morrison.* It is used for medicinal purposes.—*Williams' Middle Kingdom, Vol.* II. *page* 406.

(7203) ROSE WATER.

Gul-ab-ka-panee, Guz Hind,	Ab-i-gul. Pers.

The water distilled from roses, and put into carboys (large glass bottles of about three Imperial gallons capacity each) for sale. A large quantity is annually exported from the Persian Gulf to Bombay; that sold in Benares is obtained from Gazeepore, where it is largely distilled. Rose water is much esteemed on account of its great fragrance, and is chiefly used by the natives at the periods of their festivals and weddings.

(7204) ROSE WOOD.

Bois du rose, Fr.	Leno de rosa, Sp.
Rosen-holz, Ger.	Yerra goodda-chava curra, Tel.
Legno rodie, It.	
Pao de rosada, Por.	

Like to Iron-wood; Blackwood &c., this is a term given to the timber of several trees. One is a beautiful fancy wood, produced by a large tree found in Brazil, the Canary Islands; in Siam, whence it is largely exported by the Chinese; and other places. It is of a reddish colour, has an agreeable odour, and is esteemed according to the degree in which the darker parts are distinct from the purple red, which forms the ground. It is used for cabinet work, either whole or cut into veneer.—*Faulkner.*

Another Rose-wood is the *Lignum Rhodium*, or *Aspalathus*, (whence the Oleum Rhodii is obtained). It is heavy, oleaginous, somewhat sharp and bitter to the taste of a strong smell, and purple colour.

The *Chinese Rose-wood*, called by the natives Tze-tau, is odorous, of a reddish black colour, streaked, and full of fine veins, which appear to be painted. The manufactures of this wood are more valued in China than the varnished or japanned. There are baser kinds of Rose-wood of inferior value.—*Morrison.*

East Indian Blackwood or Rosewood, is an excellent heavy wood, suited for the best furniture. It can be procured in large quantities, and of considerable size; the wood contains much oil, which was exhibited in Cl. IV (by the Ganjam Local Committee). In large panels it is liable to split.—*M. E. J. R.*

Rosewood, used in Britain, is produced in the Brazils, the Canary Isles, the East Indies, and Africa. It is imported in very large slabs, or the halves of trees that average 18 inches wide. The best is from Rio de Janeiro, the second quality from Bahia, and the commonest from the East Indies: the latter is called East India Black-wood, although it happens to be the lightest and most red of the three; it is devoid of the powerful smell of the true rose-wood, which latter Dr. Lindley considers to be a species of Mimosa. The pores of the East India Rose-wood appear to contain less or none of the resinous matter, in which the odour like that of the flower Acacia armata, arises. Rose-wood contains so much gum and oil, that small splinters make excellent matches. The colours of rose-wood are from light hazel to deep purple, or nearly black: the tints are sometimes abruptly contrasted at other times striped or nearly uniform. The wood is very heavy; some specimens are close and fine

in the grain, whereas others are as open as coarse mahogany, or rather are more abundant in veins: the black streaks are sometimes particularly hard, and very destructive to the tools.

Next to mahogany, it is the most abundant of the furniture woods; a large quantity is cut into veneers for upholstery and cabinet work, and solid pieces are used for the same purposes, and for a great variety of turned articles of ordinary consumption.—*Tredgold.*

(7205) ROSES, OTTO OF.

Uttur, Guz. | Uttur-i-Gul, Pers.
Gulab-ka-Uttur. Hind.

This far-famed, highly valuable, and delightful perfume, is prepared in Persia, Upper Egypt, Tunis, Cashmere, and Ghazipore in Bengal. It is estimated that one hundred thousand roses, yield 180 grains or one tola of the Uttur. The otto of roses purchased in the bazars is generally adulterated with sandalwood and sweet oil; the genuine article being only procurable at a high price.—*Faulkner.* See Rose Attar.

(7206) ROSETTA-WOOD, is a good sized, East India wood, imported in logs 9 to 14 in diameter; it is handsomely veined; the general colour is a lively red-orange, (like the skin of the Malta orange,) with darker marks, which are sometimes nearly black; the wood is close, hard, and very beautiful when first cut, but soon gets darker.—*Holtz.*

(7207) ROSIN.

Rall, Guz. Hind.

A commercial name for the residium of the distillation of turpentine: it is light, hard, brittle, inflammable, transparent, dark, coloured substance. Several kinds are distinguished, as black or common, amber rosin, &c. It is used in the manufacture of soap, varnishes, and for other purposes.—*Faulkner.* See Resin and Dammer.

(7208) ROSMARINUS, a genus of Plants belonging to the natural order *Lamiaceæ*. The genera belonging to this order are perennial and possess the character of shrubs.—*Eng. Cyc.*

(7209) ROSMARINUS OFFICINALIS.

Rosemary, Europe, Asia Minor.
Ukleel ul jibbal, Hind. | Hasalban achsir, Arab.

Rosmarinus officinalis, the Common Rosemary, is an inhabitant of the southern parts of France, Spain, and Italy, the basin of the Mediterranean, and some parts of Asia Minor.—*Eng. Cyc.* The essential ingredient in the well known *Eau de la reine d' Hongrie* is the essential oil of this plant. It is a shrub three to four feet high, densely leafy. The oil is stated most positively to possess the power of encouraging the growth of hair and of curing baldness. It is the colouring ingredient of green pomatums.—*O'Shaughnessy, page* 488.

(7210) ROTHIA TRIFOLIATA.

Nurrey-pithen-keeray, Tam.

A small procumbent weed, with trifoliate leaves, used by the natives as greens, abundant every where.—*Jaffrey.*

(7211) ROTIFERA, Wheel-Animalcules, a class of animals placed by Ehrenberg among the *Infusoria*, under the name of *Rotatoria*. They have acquired these names on account of the apparent rotation of the disc-like organs which surround their mouths and which are covered by cilia. These creatures are very minute, and although some of the larger forms may be detected by the naked eye, their organisation can only be seen by the aid of the microscope. We are indebted to Leeuwenhoek for the discovery of their existence and the first account of their structure and habits. In the 'Philosophical Transactions' for 1702, he gave an account of the discovery of what is now called *Rotifer vulgaris*, one of the most common forms of these animals. He afterwards described another form, *Melicerta ringens*. The *Rotifera* are very widely diffused on the surface of the earth. They inhabit both fresh-waters and the ocean, and are found in the cold, temperate, and tropical parts of the earth. Although capable of swimming freely they are generally found near or attached to the leaves of plants. They are found constantly present in ponds and streams in which *Ceratophyllum*, *Callitriche*, *Valisneria*, and other fresh-water plants abound.

(7212) ROTTEN-STONE, a Mineral, occurring massive. Fracture uneven. Colour grayish, reddish, or blackish brown. Dull earthy and opaque. Soft, soils the fingers, and is fetid when rubbed or scraped. It is found near Bakewell, Derbyshire; and at Albany, in the state of New York. It is employed in polishing metals, &c. The analysis by R. Phillips gives—

Alumina	86
Silica	4
Carbonaceous matter . . .	10
Eng. Cyc.	—100

(7213) ROTTLERA, a genus of Plants named in honour of Dr. Rottler, belonging to the natural family *Euphorbiaceæ*. It is characterised by having male and female flowers upon different plants. Male: Calyx 3-5-partite; corolla none; stamens 30 to 40 [illegible] to the convex receptacle; fila[illegible] *rosaceæ* by their [illegible] at the base. Female: Ovary 2-[illegible]cid, and their [illegible]; style deeply 2-3-4-partite, [illegible]natives exclusively of the [illegible]cous, each 1-seeded. [illegible]where they are found [illegible] in the tropical parts [illegible]es. Many of the species [illegible] India, contains handsom[illegible] of the hydrocyanic [illegible] trees. *R. tetracocca* grows in Si[illegible]however, [illegible]s a hard and valuable timber. The [illegible] Pears of *R. tinctoria*, a native of the Coromandel coast, and extending to the forests of Northern India, are covered with short stiff hairs, which when rubbed off have the appearance of a powder of a fine red colour, which is employed in India in dyeing silk of a scarlet colour, and therefore forms an article of commerce in this country. Dr. Royle states that this strigose pubescence is also employed in India as an anthelmintic in the same

way that cowage is and, like it, probably acts mechanically in expelling intestinal worms.—*Eng. Cyc.* Dr. Wight in Icones, gives Rottlera dicocca, 1915; Indica, 1870-71; peltata, 1878-86; and tinctoria, 1915.

(7214) ROTTLERA TINCTORIA.

Cupela, also Poonag, also Tukla, HIND.	Shendree or Toong, DUK.
Sarnakassary mara, CAN.	Corunga Munje-mara, CAN.
Chendurapa chettoo, TEL.	
Capilapodie, TAM.	

Monkey faced tree, from these animals rubbing their faces with the fruit. A large tree with alternate, ovate oblong leaves, of a ferruginous colour beneath; flowers in the cold weather. Fruit size of a pea, covered with a red mealy powder, used as a dye.—*Riddell.* The tree is common in the Deccan and the Northern Circars,—*M. E. J. R.* also in the Kotah jungles and in Mewar.—*Gen. Med. Top. page* 211. It grows also in the Sikkim Himalaya, and yields a brown-dye.—*Hooker, Vol.* I. *page* 14. The red mealy powder which covers the capsules is used in Mysore to dye silk. Wood soft and inferior. Mysore. 16; 26.—*M. E. J. R.* These somewhat varied statements, are all, perhaps, reconciled in the following remarks, by Dr. Cleghorn, one of India's most accurate writers. He says "the stellate pubescence covering the 3-coccous capsule of this large tree, is collected for sale in Mysore, where it is used for dyeing silk an orange colour. In the Edinburgh Philosophical Journal, April 1855, Professor Anderson of Glasgow gives a very satisfactory report on the colouring matter of this dye, and the trials which he has made with it are sufficient "to show that it really merits the attention of silk dyers." The tree is widely spread over the Madras Presidency, and large supplies of the dye might be easily obtained. The colouring matter does not require a mordant, all that is necessary being to mix it, with water containing about half its weight of carbonate of soda. "On silk, the colour is a rich flame or orange tint of great beauty and extreme stability;" and "the fact that the material supplied by commerce, contains between 70 and 80 per cent. of real colouring matter, ought to induce the silk dyers of this country to turn their attention to it."—*M. E. J. R.* Ainslie describes it as a fine, reddish brown, light powder, which the Natives employ for dyeing a beautiful pale orange colour: he was for some time, a good deal at a loss to know from what exact plant it was obtained, till he discovered, in Dr. Buchanan's Journey through the countries of Mysore, Canara and Malabar, "that it is the red dust shaken from the dry fruit of the Rottlera tinctoria, and is an export from Malabar, where the tree is called Corunga Munje-marum. —*Ains. Mat. Med. p.* 146. Dr. Honigberger mentions that the *Kamila* or *Kamud* of the Lahore bazaars what Dr. Royle, in the Illustrated Catalogue of the Great Exhibition, nominates *Rerov.* It is taken to Lahore from the hills, in the form of coarse red powder; is reported to be the hairs of a pod from a tree, and is chiefly used as a purple dye. The Indian name of this article, *Kamila*, is probably a derivation from the Sanscrit "Kamila," signifying Jaundice, as the color of it is a yellowish-red.—*Thirty five years in the East by Dr. Honigberger, p.* 337. Dr. Irvine tells us that the kupila, the dust from the capsule of the fruit, is used to dye silk yellow, alum being used as the mordant: also that it is considered in medicine as of a warm nature, also anthelmintic; and given to children in "dai." Three or four massee are a dose: also used in ointments for herpetic eruptions, price two and a half seers for one rupee.—*Gen. Med. Top. p.* 142. Simmonds merely remarks that, a coloring matter is prepared from the dried fruit of the *Rottlera tinctoria*, by the natives of the East, to dye orange, which is a brilliant and tolerably permanent dye: and adds, it is apparently of a resinous nature.

(7215) ROUGE, a pigment of a beautiful rose colour, procured from the red colouring matter of safflower. It is brought from China spread on small papers, or in pots. See CARMINE.

(7216) ROUREA SOOKURTHOONTEE. CNESTIS MONADELPHA. The rourea abounds in the environs of Tavoy, where the air is often filled with fragrance from its thick snow-white flowers.—*Mason.*

(7217) ROXBURGHIACEÆ, *Roxburgh-Worts*, a natural order of Plants belonging to the class Dictyogens. The species are twining shrubs with tuberous roots; reticulated leaves, coriaceous, and with parallel secondary veins connecting several primary ribs; flowers large and showy, solitary, fœtid; perianth of four large petaloid divisions; stamens 4, hypogynous; anthers adnate, opening inwards, pointed, with connectives projecting far beyond the cells, which separate from the latter as far as their bases; pericarp 1-celled, 2-valved, with two clusters of seeds at the base. Seeds attached to long cords covered with loose hairs just below the seeds; embryo taper, in the axis of fleshy albumen, with the plumule lying within a slit. The plants of this small order are natives of the hot parts of India. There is but one genus—*Roxburghia*, the roots of a species of which are prepared with lime water, candied with sugar, and taken with tea. The flavour is insipid. (Lindley, *Vegetable Kingdom.*) *Eng Cyc.* Dr Wight gives Roxburghia gloriosoides, 2061.

(7218) ROYDSIA, an Indian genus of Plants allied to the natural order *Capparidaceæ*, named by Dr. Roxburgh in compliment to Sir. J. Royds. The genus consists of a single species indigenous in the forests of Silhet, where, with a stout stem and numerous branches, it climbs over the trees to a great extent, and flowers in the month of

March, diffusing a strong but pleasant odour from its numerous blossoms arranged in axillary racemes or terminal panicles. The leaves are alternate, oblong, coriaceous, smooth on both sides, and without stipules. The calyx is 6-partite and of a pale-yellow colour; corolla none; stamens numerous, with the filaments inserted on the apex of a short column; ovary pedicelled 3-celled, with two rows of ovules in each, attached to the axis; drupe berried, of the size of a large olive, orange-coloured; pulp abundant and yellow; nut oblong, single-celled and 3-valved; seed solitary, conformable to the nut. The plant is figured in Roxburgh's 'Coromandel Plants,' p. 289, and is well-suited to the hothouses of England.—*Eng. Cyc.*

(7219) ROYLEA, a Himalayan genus of Plants belonging to the natural order *Lamiaceæ* and tribe *Ballotæ*, named by Dr. Wallich in compliment to Dr. Royle, author of the 'Illustrations of the Botany of the Himalayan Mountains and of Cashmere,' who first found it on the Sirmore Mountains. The plant forms a handsome shrub, with many branches and an abundance of pale-green glaucous leaves. It is characterised by having the calyx ovate, tubular, 10 nerved, and semi-quinquefid; corolla shorter than the calyx, 2-lipped, lips unequal; stamens 4, didynamous, ascending under the upper lip; anthers biloculer; style bifid.—*Eng. Cyc.*

(7220) ROYLEA ELEGANS.
Patkuroo, Hind.

The only species known, is called Putkuroo by the natives of the mountains where it is indigenous. It is suited to the shrubberies of England.—*Eng. Cyc.* Is deemed a febrifuge, by the people at the Himalayas, like some species of Teucrium in Europe.—*O'Shaughnessy, p.* 492.

(7221) RUBIA, a genus of Plants belonging to the natural order *Galiaceæ*, containing about 40 species, found both in Europe and Asia. This genus is characterised by flowers monopetalous, superior; tube of the calyx ovate-globose limb scarcely any; corolla sub-campanulate, rotate, 5-partite; stamens 4-5, styles 2, short; berries 3, 1-seeded.—*Eng. Cyc.*

(7222) RUBIA CORDIFOLIA. DeCandolle. Manjith. Bengal Madder. Roxb. Rubia Manjista. Roxb. Indian Madder.

Manjista, Sans.	Manjistha; Munjeet
Manjtittie vayr, Tam.	Cho. munjeet, Hind.

The Munjeet of India, a native of Nepaul, &c., possesses very similar properties, to *R. Tinctorum* and is imported into England from Calcutta. The root is used as a substitute for that of *R. tinctorum*: it is known in commerce under the name of East Indian Madder, and is also employed in medicine. Like Madder, Munjeet was probably known from very early times, as Rodeen is given as the Greek name in Persian works on Materia Medica. R. *Chilensis* and *R. Relbun*, both natives of South America, are also esteemed there as dyes. Lindley, *Vegetable Kingdom*).—*Eng. Cyc.* Rubia cordifolia. Indian madder, though not seen in the Tenasserim Provinces, is found in Burmah.—*Mason.* It is much cultivated in Boondee, Kotah, and Mewar, in black loam, the root is largely exported. A beautiful crimson lake colour is dyed with it in Rajpootanah.—*Irvine.* The Hakeems are in the habit of prescribing an infusion of it, as a grateful and strengthening drink, to weakly women after lying in. Manjeittie is also called in Tamools Sawil codie.—*Ains. Mat. Med. p.* 82. *Rubia Munjista* is substituted in Lahore and Hindostan for the Rubia tinctorum used in Europe. I believe this article (important in a commercial view at Lahore) is now also cultivated in Europe. Camel loads of madder are brought from Banu and Tonk (on the west side of the Indus) to Lahore. On the Cashmerean mountains this plant is met with growing wild, but is not used.—*Thirty-five years in the East, by Dr. Honig. p.* 337. See Madder.

(7223) RUBIA TINCTORUM. Madder.
Menjithe. Hind.

R. tinctorum, Madder, has been long known, and was employed in medicine even in the time of Hippocrates, but is valued chiefly as a dye. It has a diffuse brittle-branched stem, angular, very rough, with sharp hooks; leaves 4 or 6 in a whorl, lanceolate or oblong-lanceolate, mucronate, somewhat membranous with pinnated veins; flowers small and white; lobes of the corolla ovate-lanceolate, apiculate; anthers ovate-oblong; stigmas conical. It is a native of Europe and Asia Minor, but is now extensively cultivated in Holland and France; the culture has likewise been attempted, and successfully, in Great Britain but the English madder could not be sold so cheap as the foreign; it is therefore still largely imported, chiefly from Holland, France, Italy, and Turkey, though since cochineal has become cheaper, it is much used for the same purposes. It is employed by dyers and calico-printers as a red and scarlet dye. It has also the singular property of turning red the bones and secretions of fowls and other animals fed on it. The two species, R. tinctorum and R. manjista, are natives of the south of Europe, the Levant, and Asia Minor, cultivated in India, and in many parts of Europe. The roots are creeping, the thickness of the little finger, very long and branching, provided with numerous articulations, and tough fibrils, epidermis thin, pale brown, bark and meditullium intensely red. The odour is weak and peculiar, taste bitter and styptic. According to Kuhlman's analysis the roots contain red colouring matter, (*Alizarin*, Robiquet,) yellow do, (*Xanthine*, Kuhl.) woody fibre, mucilage, gum, sugar, bitter matter, resin, salts albumen, &c; *Alizarin* occurs in orange red crystals, tasteless, inodorous, little soluble in cold, but soluble in boiling water also in alcohol, ether,

the fixed oils, and alkalies. The alcoholic solution is rose coloured, the etherial golden, the alkaline violet or blue. A solution of alum added to a solution of alizarin, and precipitated by potash, gives a rose lake of the most charming tint. *Xanthine* is yellow, very soluble in water and alcohol, slightly in ether; the solution passes to orange-red by contact with alkalies, to lemon-yellow by acids. It is devoid of odour, but has a sweetish bitter taste. The red colouring matter of madder tinges the bones, milk, and urine of animals if fed on the roots. The great consumption of madder is as a dye stuff for giving a red colour to wool, silk and cotton. In pharmacy the roots are sometimes used for colouring ointments.—*O'Shaughnessy, page* 378.

(7224) RUBUS (the Latin *Rubus*, a Bramble) a genus of Plants belonging to the natural order *Rosaceæ*, and to the section *Potentilleæ* of the sub order *Rosaceæ* proper. This genus, like that of *Rosa*, has proved a source of difficulty and difference amongst botanists. Some writers on the British Flora have described upwards of twenty-five species, whilst others have reduced them to four or five, or even two.—*Eng. Cyc.* Dr. Wight gives Rubus Gowreephul, 230; lasiocarpus, 232; rugosus, 225; Wallichianus, 231.

(7225) RUBUS CONCOLOR is found in the Himalayas, as also in Cashmere.—*Honig, p.* 337.

(7226) RUBUS FRUTICOSUS, Shrubby Bramble, or Common Blackberry, is one of the most common species of the genus. It has a 4-angled erect stem, rather tomentose, bearing recurved prickles, 3-5 leaflets, each on a secondary petiole; rose coloured or white flowers arranged on a panicle; reflexed sepals, almost without prickles; purplish black fruit. It is a native of almost all Europe, in hedges, thickets, and woods. There are no less than ten generally admitted varieties of this species and some botanists make many more. The fruit of this species and its varieties are well known as blackberries, or bumblekites, and also scald-berries, from their supposed power of giving scald-head to children.—*Eng. Cyc.*

(7227) RUBUS GOWREEPHUL, WILD RASPBERRY. Griffith says there is a species of rubus in the Tenasserim Provinces, and Wallich found one on the Irrawaddy; but whether either produces an edible fruit or not, I am unable to say. The existence of an indigenous species, though worthless itself, is however, interesting; as it indicates that the true raspberry might be propagated with success.—*Mason.*

(7228) RUBUS IDÆUS. Common Raspberry, or Mount Ida Bramble. The whole plant is villose, stem round, with slender recurved prickles; leaves pinnate, with 3 or 5 ovate serrated leaflets, tomentose beneath; flowers drooping; petals obovate, wedge-shaped, entire conniving, shorter than the calyx; carpels numerous, tomentose. It is a native of woods in Europe from Norway and Sweden to Spain and Greece. It is found also in Asia on the Himalayas, in the north Africa, and in America from Canada to Pennsylvania. It is found abundantly in almost every part of Great Britain and Ireland.—*Eng. Cyc. Rubus Idæus*, does not grow in Hindostan: a nearly allied species viz.

(7229) RUBUS INDICUS, ROTTL. BRAMBLE BERRY (Spec. of).

Gowry pull, HIND.

Gowry pull is the Hindoostanee name of a species of Bramble berry common amongst the woods betwixt Hurdwar and Sirinagar: it also grows plentifully in Mysore and Wynaad, but I know not the Canarese name of it.—*Ainslie, page* 225.

(7230) RUBUS LASIOCARPUS. ROSACEÆ. Blackberry.

Gowreephul. DUCK.

Now cultivated generally in the Deccan, and believed to have been first brought from the Mysore Hills. It grows easily from seed; a few of the ripe fruit rubbed on a sheet of paper, and dried in the sun, will enable you to forward the seed to friends at any distance. (The same with the strawberry.) The plants should never be nearer than four or five feet, and may be cut down at the commencement of the rains, when they will throw out fresh shoots, and bear fruit in abundance. As it requires little care, and only an occasional supply of water, this bramble forms a very perfect and secure hedge to a kitchen garden. The finest fruit is very inferior to a common raspberry.—*Riddell.*

(7231) RUBUS MICRANTHUS, Small-Flowered Bramble, has an upright, round, branched stem, pinnate leaves, with 5-7 oblong, ovate, doubly serrate, tomentose beneath, and green above leaflets, with small reddish-purple flowers arranged in corymbs, and black fruit. It is a native of Nepaul, and one of the most gigantic of the genus, attaining a height of 8 or 9 feet. It is easily distinguished by its nearly erect, smooth, dark mahogany-coloured shoots, and very long pinnate leaves. The shoots sometimes attain a length of 20 feet. There are two other species, *R. distans* and *R. asper*, found with this in Nepaul, which have been grown in England.—*Eng. Cyc.*

(7232) RUBUS RUGOSUS. The Raspberry. This plant never grows in the Deccan; a wild species is described by Graham as found in Mahabaleshwar.—*Riddell.*

(7233) RUBUS VULGARIS. RUBUS FRUTICOSUS like *R. Idæus*, grows at Cashmere.—*Thirty-five years in the East by Dr. Honig. p.* 337.

(7234) RUBY.

Kemboo also Segapoo kulloo, TAM.	Yacout, ARAB.
Lal, HIND.	Lankaratti, CYNG.
	Manekam, MALAY.

Colour blood-red or rose-red, sometimes a

tinge of violet; primary form as above, and generally occurs in 6-sided prisms. It is not so hard as the Sapphire, and is more readily cleaved. Like the Sapphire, it consists of pure alumina. "The largest oriental ruby known was brought from China to Prince Gargarin, vernor of Siberia; it afterwards came into the possession of Prince Menzikoff and now constitutes a jewel in the Imperial Crown of Russia." (Dana)—*Eng. Cyc. page* 151. This beautiful gem can be procured in Ceylon, but Rubies are still more abundant and of a much finer kind in the Dominions of Ava, whence they are brought to India.—*Ains. Mat. Med p.* 166.

(7235) *Spinelle Ruby.* Mr. Mason says, "By far the larger proportion of the rubies offered for sale, are, it is believed, spinelle rubies. I have a small a specimen which every native, who has seen it, regards as one of the best kind of rubies, or red sapphire, but its natural crystalline form is easily recognised, as a regular octahedron; while that of the oriental ruby is a six sided figure, or some of its modifications. They are seen of all shades. Blood red, the proper spinelle ruby; rose red, the balas ruby; orange red or rubicelle; and violet colored or almandine ruby. It is not an easy task to distinguish, accurately, the true character of the different stones offered for sale as rubies. Both Europeans and natives often make great mistakes. An English officer bought a "ruby" in Maulmain a few years ago for fifteen rupees, his friend bought one for five rupees: and the rubies were thought to be of nearly equal value; but on walking into a jeweler's shop in Calcutta, a year or two afterwards, the jeweler offered *four hundred* and *fifty* rupees for the one, but refused to give two rupees for the other, characterizing it as "a worthless garnet."—*Mason.*

(7236) *Rubies.* Captain Newbold mentions that fine rubies have from time to time been discovered in many of the corundum localities he enumerated, associated with this gem, particularly in the gneiss at Viralimodos and Sholasirasmany, and the natives informed him that it occurs in the Trichingode talook and at Mallapollaye, though comparatively speaking rare.—*M. J. L. & S.*

(7237) RUDBECKIA FULGIDA. This is a showy genus of plants, and will grow in any common soil, they attain a large size, and are therefore more adapted for a shrubbery; the colours chiefly yellow, and orange; propagated by seed or by dividing the roots.—*Riddell.* The name was given by Linnæus, to honor the memory of his predecessors the Rudbecks, father and son, in the botanical chair at Upsal. It belongs to the natural order *Compositæ*, and possesses many species. Some of these are well known in gardens. They are herbaceous, biennial and perennial.—*Eng. Cyc.*

(7238) RUDRA KUDAPA.

Rudra cuddapah, Tel. | Roodra kurpah, Hind.

(7239) RUE. In *India*, this name is given to the herb of *Ruta angustifolia*; of *R. Graveolens*; and of *R. Indica.*

Arooda, Tam. | Sadsah, Malay.
Suddap, Arab. & Duck. | Ruta Graveolens.
Saturee, Hinder.

Ruta graveolens. An evergreen shrub, grows freely in any good soil, used for fowls in the Roup, propagated by cuttings in damp weather.—*Jaffrey.* The leaves of Rue dried and burnt are much used in Southern India for the purpose of fumagating young children suffering from catarrh. They also used fresh bruised and mixed with Arrack as an external remedy in the first stages of paralytic affections. When dried in the shade and powdered the vytians prescribe this article in conjunction with certain aromatics in cases of Dyspepsia they likewise entertain the same notion regarding it that Dioscorides did of old, viz. that it is inimical to the fœtus in utero when given together with camphor and the sugar of the palmyra toddy.—*Ains. Materia Med: p.* 38. In making confection of Rue, the herb of dried rue the sudab of the bazars of N. W. India, may be substituted.—*Beng. Phar. p.* 273

(7240) RUELLIA, a genus of Plants belonging to the natural order *Acanthaceæ*, which was so named by Linnæus in compliment to J. Ruelle, physician of Francis I., who wrote commentaries on Dioscorides, as well as some other botanical works. The genus, as formerly constituted, embraced a great many Indian species, which are now distributed among some other genera. The species are distributed through the tropical and subtropical parts of Australia. It includes many highly ornamental plants, as are also those which have now been excluded from it: all are easily cultivated, and often to be seen in English hot-houses. Some of the species which have now been removed to other genera are found at considerable elevations on the sides of the Himalaya Mountains; of these the most remarkable is *Æchmanthera* formerly *Ruellia gossypina*, Which has its stems covered with a thick coating of white tomentum, which probably enables it to withstand a greater degree of cold than most others of the family. The leaves of *R. strepens* are subacid. A valuable dye, called Room, is obtained in Assam from a species of *Ruellia*. Wight gives Ruellia *litoralis*, 447; and punctata, 1563. Voigt and Roxburgh name and describe the following species viz.; balsamica; bracteata; cernua; comosa; dependens; fasciculata; flagelliformis; flava; hirsuta; hirta; imbricata; infundibuliformis; latebrosa; longifolia; maculata; obovata; patula; Pavala; racemosa; ringens; salicifolia; Sarmentosa; suffruticosa; triflora; uliginosa, and zeylanica.—*Voigt: Roxburgh.*

(7241) RUELLIA. *Species.* A species of Ruellia, under the name of "roum," is employed

in its raw state by the Khamptis and Lingphos to dye their clothes of a deep blue. It is described by the late Dr. Griffiths as "a valuable dye and highly worthy of attention." It might perhaps be usefully employed as the ground for black dye. —*Hooker.*

(7242) RUELLIA INDIGOFERA The Burmese cultivate a low Ruellia plant as a substitute for indigo which is the *room* of Assam, from which country it has probably been introduced. It forms a blue dye not inferior to that produced by the true indigo plant.—*Mason.*

(7243) RUELLIA INDIGOTICA. In China, says Fortune, in one part of the Chekiang province, and also amongst the Fung hwa mountains to the westward of Ningpo, there are large quantities of a blue dye produced, which is in fact the indigo of that part of the country. Those who have read my 'Wanderings in China,' published in 1846, may remember the account given there of a valuable kind of Indigo, made from a species of woad (Isatis indigotica) which is cultivated extensively in the level country a few miles to the westward of Shanghæ. The kind which attracted Mr. Fortune's attention in Chekiang is equally valuable, if not more so. It is made from a species of Ruellia, which until it gets a better name, may be called Ruellia indigotica. It is a curious circumstance that the same plant, apparently, has lately been discovered in the Assam country in India, where it is also cultivated for the blue dye it affords. I had an opportunity of examining it in the garden of the Agricultural and Horticultural Society at Calcutta, where it was standing alongside of the Chinese kind, to which it certainly bears a most striking resemblance: the point of identity will easily be determined when the plants come into flower. Strange it will be if it is ultimately found that this species, which produces a dye unknown to commerce, is in cultivation all the way across from the eastern shores of China to the borders of Bengal, and this is far from being improbable. This Ruellia seem to be easily cultivated, it grows most luxuriantly, and is no doubt very productive. Having evidently been found indigenous a little further to the south, in a warmer latitude, it is not hardy in the province of Chekiang any more than cotton is about Shanghae; but nevertheless it succeeds admirably as a summer crop. It is planted in the end of April or beginning of May, after the spring frosts are over, and is cleared from the ground in October before those of autumn make their appearance. During this period it attains a height of a foot or a foot and a half, becomes very bushy, and is densely covered with large green leaves. The Chinese method of preserving plants for next year's crop is most ingenious and well worth notice. Being somewhat tender, as I have already remarked, the roots which are left in the ground after the gathering season are all destroyed by the first frosts of winter. But the Chinese cultivator does not depend upon these for the crop of the following year, nor does he take them up or cover them in any way. They have done their duty for one year, and are now left to their fate. Cuttings are found to be much more vigorous and preductive than the old roots and to the formation and preservation of these cuttings the Chinese cultivator directs his attention. When the stems are cut down for the manufacture of indigo, a sufficient quantity have their leaves stripped off, and are afterwards taken into a house or shed to be properly prepared. The leaves thus stripped from the cuttings are thrown into the tanks with the other stems and leaves so that nothing is lost except what is actually required for the purposes of propagation. The stems are now tied up firmly in large bundles, each containing upwards of 100, and the ends of each bundle are cut across, so as to leave them perfectly neat and even both at top and bottom. These bundles are each about a foot long, and, of course, nearly round. Having been thus prepared they are carried to a dry shed or outhouse, where, in some snug corner, they are packed closely and firmly together, and banked round with very dry loam. A portion of the dry soil is also shaken in between the bundles, and this being done the operation is complete. Should the winter prove unusally severe, a little dry straw or litter is thrown over the surface of the cuttings, but nothing else is required. During the winter months the cuttings remain green and plump; and although no leaves are produced, a few roots are generally found formed, or in the act of forming, when the winter has passed and the season for planting has come round. In this state they are taken to the fields and planted The weather during the planting season is generally showery, as this happens about the change of the monsoon, when the air is charged with moisture. A few days of this warm showery weather is sufficient to establish the new crop, which now goes on growing with luxuriance, and requires little attention during the summer; indeed none, except keeping the land free from weeds. In the country where this dye is grown, there are numerous pits or tanks on the edges of the fields. These are usually circular in form; and one which I measured was eleven feet in diameter, and two feet in depth. About 400 catties of stems and leaves are thrown into a tank of this size, which is then filled to the brim with clear water. In five days the plants are partially decomposed, and the water has become lightish-green in colour. At this period the whole of the stems and leaves are removed from the tank with a flat-headed broom made of bamboo twigs, and an admirable instrument for the purpose. When every particle has been removed, the workmen employed give the water a circular and rapid motion with the brooms just noticed, which is continued for some time. Dur-

ing this part of the operation another man has employed himself in mixing about thirty catties of lime with water, which water has been taken out of the tank for the purpose. This is now thrown into the tank, and the rapid circular motion of the water is kept up for a few minutes longer. When the lime and water have been well mixed in this way the circular motion is allowed to cease. Four men now station themselves round the tank and commence beating the water with bamboo rakes made for this purpose. The beating process is a very gentle one; as it goes on the water gradually changes from a greenish hue to a dingy yellow, while the froth becomes of a beautiful bright blue. During the process the head workman takes a paleful of the liquid out of the tank and beats rapidly with his hand. Under this operation it changes colour at once, and its value is judged of by the hue it presents. The beating process generally lasts for about half an hour. At the end of this time the whole of the surface of the tank is covered with a thick coating of froth of the most brilliant colours, in which blue predominates, particularly near the edges. At this stage it being desirable to incorporate the froth with the liquid below it, I witnessed a most beautiful chemical operation which took me completely by surprise, and showed how universally must be the knowledge of the effect of throwing "oil upon the waters." A very small portion of cabbage oil—only a few drops—was thrown on the surface of the froth, the workmen then stirred and beat it gently with their flat brooms for a second or two, and the whole disappeared as if by some enchanter's wand. And so small a quantity of oil was necessary for this purpose that even when the cup had been emptied, and had only the oil that was necessarily adhering to its edges, it was thrown into another tank, and produced the desired effect. The liquid, which is now darker in colour is allowed to stand quiet for some hours, until the coloring matter has sunk to the lower stratum, when about two-thirds of the surface is drawn off and thrown away. The remaining third part is then drawn into a small square tank on a lower level, which is thatched over with straw and here it remains for three or four days. By this time the colouring matter has separated itself from the water, which is now entirely drained off—the dye occupying three or four inches of the bottom in the form of a thick paste, and of a beautiful blue colour. In this state it is packed in baskets, and exposed for sale in all the country towns in this part of China. What its intrinsic value may be when compared with the indigo of commerce, I have no means of ascertaining but it is largely used in this part of the world, where blue is the most fashionable colour, judging from the dresses of the people, and it is possible that with our knowledge of chemistry a colour of this kind might be greatly improved. After being grown and manufactured, as I have described, it is sold at rates varying from 50 to 100 cash a catty, say from 2*d* to 4*d* per lb. Some is sold as low as 30 cash, but this is very inferior, the greater part produced is sold at from 60 to 80 cash a catty, and it must be of a very superior quality if 100 cash is paid. Like the Shanghae indigo made from Isatis indigotica, it is called "Tien-ching" by the Chinese.—*Fortune.* Amongst other productions of the highland valleys, the ruellia, formerly noticed, is cultivated extensively for the blue dye which it affords. During the season of its preparation every mountain stream is colored and polluted with the refuse liquid drawn off from the tanks and the stench which fills the air is almost unendurable.—*A Res. among the Chi. page* 189.

(7244) RUELLIA RINGENS. Lin.

Upu-dala, Hort: Mal.

The juice of the leaves of this plant, boiled with a little salt, Rheede says, is supposed, on the Malabar coast, to correct a depraved state of the humours. See Hortus Malabaricus. Part 9th *p.* 125.

(7245) RUELLIA STREPENS. Whorl Flowered Ruellia.

Kirendinyagum, Tam. | Grendie Tagarum Sans.

The small purple coloured leaves and berries of this low growing plant are sub-acrid and bitterish to the taste. When bruised and mixed with castor oil they form a valuable application in cases of children's carpangs.—*Ains. Mat. Med. p.* 83.

(7246) RUFFICKEE, a plant from the fibres of the bark of which the Lepchas near Darjeling make remarkably light and strong fishing nets.

(7247) RUGS, Woollen. The principal site of the manufacture of these rugs was long the town of Ellore, in the Northern Circars of the Madras Presidency, but they are now made in Mysore and although of any size, to order, they are usually three feet broad and six feet long, and are much employed as sleeping rugs, and rugs for the drawing room. They have latterly been exported largely to England where they are employed as hearth rugs: they are of various colours, prettily arranged, sell for four Rupees there, to rupees fourteen, according to size.

(7248) RUM.

Rum, Guz. Hind.

A spirit procured by distilling a fermented fluid prepared from the refuse in the operation for making sugar the peculiar flavour being derived from an essential oil existing in the juice of the cane. The best is made from molasses, and it is preferred when well kept, of good age, considerable body, smooth oily taste, and a brownish transparent colour. Bengal, the West India Islands, and Guiana, are the countries chiefly distinguished for the produce of rum.—*Faulkner.*

(7249) RUMEX ACETOSA. SORREL.

Chuka ke Bing. Hind.

The seed is considered cooling and astringent: It is cultivated in Ajmeer.—*Gen. Med. Top. p.* 130.

(7250) RUMEX ALPINUS, or Monk's rhubarb, is found on the European Alps, the Crimea, and Mount Caucasus. The roots are large and purgative like rhubarb, and the whole plant so resembles the Rheum that Linnæus himself mistook one for the other.—*O'Shaughnessy, p.* 522.

(7251) RUMEX OBTUSIFOLIUS vegetates in Cashmere, and is eaten by the natives. Its root, under the name of Radix Spathiacuti, was formerly used as a purifier of the blood in chronic cutaneous diseases, but is now obsolete, both in India and in Europe, its active principle, Lapatin, must, however, have peculiar properties. From the decoctions of the dried roots of various sorts of sorrel, by the addition of alum, can be obtained a fine red color, at a low price and valuable to painters. Rumex undulatus (Royle) is *Hímaz* or *Pulkee.—Thirty five years in the East, by Dr. Honig. p.* 338.

(7252) RUMEX VESICARIUS. Lin. Country Sorrel.

Sookan keeray, Tam. | Chuckka ke baujee, Duk.

Cultivated for greens, &c., grows plentifully about Madras in the field during the rains. This plant has obtained the name of Sorrel from the English in India, owing to its great resemblance to the Rumex acetosa in taste and other natural qualities. It is an article of diet and is considered by the Natives as cooling and aperient.—*Ains. Mat. Med. p.* 257. This is of common native growth, and where water is abundant may be had for eight months in the year; it is sown in drills or on the edges around other beds; the leaves are sold in bundles from one to two pice a seer. There is also another species called the Indian Red Sorrel. —*Riddell.*

(7253) RUMINANTIA, Cuvier's name for his eighth order of Mammiferes. They constitute the *pecora* of Linnæus. Cuvier remarks that this is perhaps the most natural and the best defined of the class; for these animals have the air of being nearly all constructed on the same model; and the camels alone present some small exceptions to the common character. Cuvier makes the Ruminants consist of two divisions;—first, those without horns; secondly, those with horns. The first division embraces the Camels (*Camelus* Linn.), or the Camels properly so called, and the Llamas; and the Chevrotains (*Moschus*, Linn.). Secondly, all the rest of the Ruminants, of the male sex at least, have two horns or prominences, more or less long, projecting from the frontal bones, which is not found in any other family of mammals. In some, these prominences are covered with a case of elastic substance composed, as it were, of agglutinated hairs, which grows in layers, and during the whole life of the animal. The name horn (corne) is particularly applied. The bony prominence or core which this case envelops, grows, like it, during the whole life of the animal, and is never shed. Such are the horns of oxen, sheep, goats, and antelopes. In others the prominences are invested only with a hairy skin, which is continued from that of the head, and is never destroyed during life. These prominences are never shed. Finally, in the great genus *Cervus*, Linn., the prominences covered during a certain period with a hairy or velvety skin resembling that of the rest of the head, have at their base a ring of bony tubercles, which, as it increases, compresses and obliterates the nutrient vessels of that skin, which, when the horn is complete, dries and is removed. The naked bony prominence separates in due time from the skull, to which it grew, falls, and the animal becomes defenceless. But new horns soon begin to bud, ordinarily, and while the animal is in the vigour of life, larger than the preceding ones, and destined to fall in their turn. These horns, purely osseous and subjected to periodical changes, are termed by the French Bois, and are known in England by the name of Antlers. Mr. Swainson divides the *Ungulata* into the following five tribes—*Ruminantes*, *Pachydermes*, *Anoplotheres*, *Edentates*, and *Solipedes*. The *Ruminantes*, are thus arranged:—

1. Sub-typical group.—Horns sheathing; form gracile, slender.

Family *Antilopidæ*. ANTILOPEÆ. (Sw.——*Capridæ*, Smith).

Genera.- *Dicranocerus*, Sm.; *Aigocerus*, Sm.; *Oryx*, Sm.; *Gazella* Sm.; *Antilope*, Sm.; *Redunca*, Sm.; *Tragulus*, Sm.; *Raphicerus*, Sm.; *Tetraceros*, Leach; *Cephalophus*, Sm.; *Neotragus*, Sm.; *Tragelaphus*, Sm.; *Nemorhædus*, Sm., *Rupicapra*, *Ant*, Sm.; *Aplocerus*, Sm.; *Capra*, Auct. *Ovis*, Auct; *Damalis*, Sm.; *Aeronotus*, Sm.; *Boselaphus*, Sm.; *Strepsiceros*, Sm.; *Portax*, Sm.

2. Typical.—Horns sheathing; form heavy, robust. Family *Bovidæ*, Sm. [BOVIDÆ.]

		Genera and Subgenera
		1. *Alce*, Sm (Subgenera *Rangifer* Sm., *Dama*, Sm.)
		2. *Cervus*, Linn., Sw. (Subgenera *Rusa*, Sm; *Axis*, Sm.)
		3. *Capreolus*, Sm (Subgenus, *Mazama*, Sm.)
		4. *Subulo*, Sm.
		5. *Stylocerus*, Sm.
3. Aberrant. Horns solid, deciduous. (*Cervida*, Sm; *Cervus*, Linn.) [CERVIDÆ]	Horns wanting, fore legs shorter than the hinder. (*Moschidæ*, Sw.) [MOSCHIDÆ]	1. *Moschus*, Linn
	Horns very short, covered with a skin. (*Camelopardæ* Sw.) [GIRAFFA]	1. *Camelopardalis*, Antiq.

The tribe *Solipedes*, which immediately follows

the Camelopards, consists of the genera *Camelus*, *Auchenia*, and *Equus*. Thus the Camels and Llamas, with which Colonel Smith, following Cuvier, commences the Ruminants, are placed by Mr. Swainson at the conclusion. With the exception of this and a few other modifications, the two arrangements are similar.—*Eng. Cyc.*

(7254) RUMPHIA, a genus of Plants named by Linnæus in honour of George Eberhard Rumph, is only known from a figure of Rheede published in his 'Hortus Malabaricus,' vol., iv., t. 11. who describes it as being found in Parabaroo and other provinces of Malabar. It has not been seen by any modern botanist. It is usually referred to the natural family of *Terebinthaceæ*, and to the sub-order *Burseræe*. It has a tubular trifid calyx, 3 oblong petals of the corolla ; stamens 3, equal to the petals, and exserted. The ovary is single, 3-cornered ; style one ; drupe coriaceous, turbinate, 3-furrowed, with the nut 3-celled, 3-seeded. But Messrs. Wight and Arnott remark, that as each apparent stamen may be composed of several filaments, this doubtful genus would be brought near *Byttneriaceæ*.

(7255) RUNGPORE, produces silk corahs. Megilli cloths made of pat (Corchorus olitorius), ginger (the best in Bengal), and tobacco of an excellent quality : and from the neighbouring country of Bhotan, specimens of the beautful long glossy hair of the tail of the Yak of which chowrees are made.—*M. C. C.*

(7256) RUPICOLINÆ, a sub-family of Insessorial Birds allied to the Manakins and generally arranged under the family *Pipridæ*.

(7257) *Calyptomena* (Raffles ; *Rupicola* (Temminck).—This very singular and beautiful bird is about 6½ inches in length. Its colour is a brilliant green, like that of the parrots, It is the Tampo Pinang of the Malays. It is a native of Singapore and the interior of Sumatra. Sir Stamford Raffles states that this species is found in the retired parts of forests, and as it is of the colour of the leaves, and perches high, it is not easily procured. He further tells us that the stomach contained nothing but vegetable substances, chiefly wild grains. Dr. Horsfield observes that the bill greatly resembles that of the genera *Rupicola*, *Pipra*, *Phibalura*, *Pardalotus*, *Platyrhynchus*, and *Procnias*.—*Eng. Cyc.*

(7258) RUPPELLIA (Milns-Edward), a genus of *Crustacea* belonging to the family *Cancerida* (Canceriens Arques), established on the *Cancer tenax* of the German zoologist and traveller Ruppell, and considered by M. Milne-Edwards as the type of the small group which leads to the genera *Ozius* and *Eriphia*. The form of the carapace approximates closely to that of *Xantho* and *Ozius* ; dorsal buckler slightly curved, and about one and a half as wide as it is long : the orbits are nearly circular, and are directed upwards and forwards. The interal antennæ bend back directly outwards, as in *Xantho*, &c.

(7259) RUPPELLIA TENAX, Cancer Tenax, Ruppell, has the upper border of the orbit marked by two fissures separated by a smal tooth ; there is a fissure at its external angle and two teeth at its lower borders. Lengtl about two inches. It is a native of the Red Sea.

(7260) RUSHES, GRASSES AND SEDGES. Although these substances are extensively used in India for the manufacture of mats ropes, baskets, and thatching, there was but a poo display of them in the Exhibition. The Travancore Local Committee and the Canara Local Committee exhibit the *Cyperus textilis*, and a finer kind of grass called kooray or koaray both used for making mats. The celebrated mats o Paulghaut and Cochin are noticed in anothe class. Several species of Typha, Juncus, and Saccharum are known to abound in this Presidency, and to be applied to useful purposes. The *Phrynium dichotomum* of Bengal is used fo making the sital patee mat.—*M. E. J. R.*

(7261) RUSOT. Extract of Barberry.—Berberidis Extractum.—Extract of bark and wood of the Barberry, (Berberis) several species ; deep yellow colour, totally soluble in water —*Beng. Phar.*

(7262) RUSSELIA. *Scrophulariaceæ*. This plant with rush like branches bears a deep scarlet trumpet-shaped flower, hanging in long axillary peduncles down the stalk : it blossoms during the greater part of the year, and is highly ornamental, growing luxuriantly in a rich soil It is propagated by layers or cuttings.

(7263) RUSSIA LEATHER.

Cuir de Russie, Fr.	Jachta, Por.
Juften, Ger.	Juft, Rus.
Cuojo di Russia, It.	Moscovia, Sp.

The tanned hides of oxen, manufactured in manner peculiar to that country. The leather i soft, has a strongly prominent grain, a grea deal of lustre, and a powerful and peculiar odour The colours are principally red or black ; th former is much esteemed for binding books, an making articles where a fine durable leather i required the latter is chiefly in demand in Rus sia for shoe and boot making.—*Faulkner.*

(7264) RUST, RED RAG, Red Robin, Red Gum. Uredo rubigo and U. linearis are fung which attack wheat in England.—*Hassell.*

(7265) RUTA, a genus of plants belongin to the natural order *Rutaceæ*. The following is description of this genus :—Calyx 4-partite, deciduous, shorter than the petals, which are fou and unguiculate, with the limb vaulted. Stamens eight, longer than the petals, filament subulate, glabrous ; anthers ovate, obtuse. Receptacle broader than the ovary, marked roun with eight nectariferous pores, bearing the peta and stamens at the base. Carpels 4, partly con bined by means of the central axis (gynobas

into one 4-lobed ovary, ovules 6-12 in each cell. Styles 4, distinct at the base, united upwards into a single pistil which is attenuated towards the apex. Stigmas 4. Capsules 4, partly united dehiscing internally at the apex. Seeds dotted. The species of this genus are suffrutescent, herbaceous, or perennial plants, with alternate exstipulate pinnated or decompound leaves covered with pellucid dots. The flowers are yellow rarely white, and disposed in terminal corymbs or racemes. De Candolle enumerates 24 species of *Ruta*, of which comparatively few are generally known or cultivated.—*Eng. Cyc.*

(7266) RUTA ALBIFLORA, (white-flowered rue) is common on the Himalayas, at an elevation of 5000 to 8000 feet.

(7267) RUTA ANGUSTIFOLIA, (narrow-leaved rue.) (Sudab) is met with in gardens in India, and used medicinally,—*O'Sh. page* 260.

(7268) RUTA GRAVEOLENS. RUE

The herb.

Ruta graveolens, Common Rue, is a glaucous hairless erect herb or half-shrubby plant, with a strong heavy unpleasant smell, growing to the height of about two feet. The leaves are supradecompound, alternate, their lateral lobes linear or nearly so; the terminal ones obovate; they and all other parts of the plant are covered with transparent dots. Carpels terminal, leafless, trichotomous cymose; petals four, wavy concave, a little irregularly toothed. Fruit roundish, warted, four-lobed, each lobe opening into two valves. Rue is sometimes called Herb-Grace, or the Herb of Grace and in some parts of England Ave-Grace. This name is said to have been given to it on account of its use in exorcisms. In company with rosemary it has been used from time immemorial as an emblem of remembrance and grace on account of its evergreen foliage. The stamens are remarkable for their presenting an instance of vegetable irritability. When the time is come for the pollen to be introduced into the stigma, and thus presented to the ovules, the stamens, which are hard and rigid, and almost at right angles with the style, approach the stigma one by one, and after remaining in contact with it long enough to discharge their pollen, they return back to their original position parallel with the petals.—*Eng. Cyc.*

(7269) RUTACEÆ, a natural order of Polypetalous Exogenous Plants, characterised by the possession of hypogynous stamens, two or three times as many as the petals cohering carpels with from 3 to 5 valves, an entire ovarium with several cells, imbricate calyx with four or five divisions, symmetrical hermaphrodite flowers with petals either wanting or as many as the lobes of the calyx, mostly twisted in æstivation. Fruit capsular, the sarcocarp mostly separating from the endocarp. Leaves without stipules, opposite or alternate, simple, deeply lobed or pinnate, and covered commonly with pellucid resinous dots. They are trees, small shrubs, or herbaceous plants.—*Eng. Cyc.*

This order embraces the *Rutæ* and *Diosmeæ* of A. de Jussieu, which are now made the principal sections of *Rutaceæ*. *Rutæ* are known by their seeds containing albumen, and by the sarcocarp of the fruit not being separable from the endocarp. In *Diosmeæ* the seeds have no albumen, and the sarcocarp and endocarp are separable into distinct bodies when the fruit is ripe. A. St. Hilare says that the observation of the adhesion of the sarcocarp and endocarp in *Rutæ* has been made on unripe specimens of the plants, and that when ripe they are as separable as in *Diosmeæ*. Whatever may be the real state of the case, the two sections are too obviously related in structure and general properties to permit of so slight differences elevating them into the importance of distinct natural orders. *Rutaceæ* agree with *Aurantiaceæ* in their dotted leaves, definite stamens, and fleshy disc. With *Xanthoxylaceæ*, *Simarubaceæ*, and *Humiriaceæ* they have also many points of analogy. They are closely allied to *Zygophyllaceæ* through *Peganum*, which Jussieu and other writers place amongst *Rutaceæ*. They are found in the south of Europe, and in our hemisphere extend as far as the limits of the Old World. *Diosma* and allied genera are found at the Cape of Good Hope. Australia possesses Boronias, Phebaliums, Correas, &c.; and great numbers are found in the equinoctial regions of America. Many of the plants of this order emit a powerful and usually offensive odour from the glands that cover their whole surface. These glands are sometimes so full of a volatile oil, that in hot weather the atmosphere surrounding the plant becomes charged with it, so that a lighted taper brought near the plant will cause the air to inflame. This is especially the case with *Dictamnus*. The Diosmas, or Bucku Plants, are used in medicine as antispasmodics. The celebrated Angostura Bark is produced by a plant (*Galipea officinalis*) belonging to this order.—*Royle.*

(7270) RYE.

Rug, Dan.	Secale Lat.
Rog, Dut.	Rosch, Sd, Jar, Rus.
Seigle, Fr.	Centeno, Sp.
Roken; Ger.	

A species of grain (*Secale Cereale*), coming nearer in its properties to wheat, than any other grain. It is the bread corn of Germany and Russia; and being of less value to the English farmer than barley, oats, or pease, is, in consequence, very little cultivated in Great Britain.—*Faulkner.*

(7271) RYE FLOUR, is obtained from the Secale cereale, and the seeds are met with in the market, derived of husk. Rye flower is said to be somewhat laxative. The roasted grains are not unfrequently employed in the adulteration of coffee.—*Hassell. Rye Flour*, or meal does not form a paste like wheat flower.—*Hassell.*

S.

(7272) SABADILLA. Fruit of Veratrum Sabadilla, and several other Melanthaceæ.—*Ben. Phar.*

(7273) SABLE.

Zibelline, Fr.	Zibellino, It.
Zobel, Ger.	Sohol, Rus.

A species of weasel (*Mustela Zibellina*), celebrated for the fine quality of its fur, the hairs of which turn with equal ease in very direction. Its colour is generally of a deep glossy brown or black, and sometimes, though very rarely, yellow and white. This animal is a native of Northern Europe and Siberia.—*Faulkner.*

(7274) SABLE FISH : Clupea, Spec.

Willum, Meen, Tam. | Willum mutchie, Duk.

(7275) SACCHARUM, a genus of Indian grasses, and species of which in addition to the *Moonja* and *Shur*, q : v. are used for thatching and for screens, and some for making writing pens and for arrows.— *Royle.* This genus of Plants belongs to the natural order *Graminaceæ.* One of the species yields the well-known product sugar, and is called the Sugar-Cane. The Sugar-Cane was introduced by the Saracens into the south of Europe, but the period is not well ascertained. Gibbon says they introduced it into Sicily soon after they got possession of the island. About the year 1420 sugar was much cultivated by the Portugese in Madeira. In 1503 we read of sugar being imported from the Canaries, and in 1506 sugar-canes were carried thence to Hispaniola in the West Indies. But, besides the Indian cane, another, and a much more prolific kind, that of Otaheite, was introduced into the West Indies about 1794, and about the same time, or in 1796, the China sugar-cane was introduced into India. The Chinese and Indian seem both therefore to have had independent means, that is, distinct plants from which they could extract sugar ; and, as history shews, they did so at very early periods. The genus *Saccharum* contains numerous species, which are usually easily distinguished by their highly ornamental nature,by the light or feathery or rather silk like inflorescence. The species are widely distributed through the tropical parts of the world. The genus is distinguished by the spikelets being all fertile and in pairs, one sessile, the other stalked, articulated at the base, 2-flowered, the lower floret neuter with one palea, the upper hermaphrodite with two paleæ. Glumes 2, membranous. Paleæ transparent, awnless ; those of the hermaphrodite flowers minute, unequal. Stamens 3. Ovary smooth ; styles 2, long; stigmas feathered with simple hairs. Scales 2, distinct, obscurely 2 or 3-lobed at the point. Caryopsis smooth. Some of the species of *Saccharum*, owing to the silex in their cuticle, are so durable that they are employed in India for thatching. such as *S. canaliculatum* and *S. cylindricum.* This is the case with *S. spontaneum*, which also makes good mats. The natives of Bengal make their pens of the narrow stems of *S. semidecumbens* and of *S. fuscum.* The latter, as well as the culms of *S. procerum*, are also used for screens and other economical purposes.—*Eng. Cyc.*

(7276) SACCHARUM CYLINDRICUM. *Syn.* Saguerus Cylindrica. Horses tail grass. Oola, Hind.

Grows on the Ajmere plains and flowers early in the rains.—*Genl. Med. Top. p.* 174.

(7277) SACCHARUM MOONJA. Surpar. Surpata, Hind.—*Gen. Med. Top. page* 174.

The Moonja is indigenous to India, it is collected after the rainy season. It is possessed of great tenacity it is used as rigging in all the vessels above Sukkur. It would form an ample supply of half-stuff for paper makers.—*Royle.* It is common at Ajmeer, in the valleys, and very abundant, along with the saccharum procerum, near Jaepoor. The best moonj is made from the floral leaves of this plant, and the best sirkee from the culms. The plant is distinguished from saccharum procerum by the height, which is inferior, the fineness of the culm and narrowness of the leaves.—*Irvine, p.* 175. The Saccharum Munja is used in Bengal for making strong ropes for tying up cattle and drawing water.—*M. E. J. R.* This, the *Moonja* of the natives (*Saccharum Munja*), is collected after the rainy season and kept for use, as it is employed in tying up their cattle at night and for ropes for their Persian wheels. It is said also to be one of the grasses employed for making tow ropes by the boatmen about Benares.—*Royle.* Mr. Burns, of the Indus Flotilla, has mentioned that the boatmen of the Indus universally employed the Moonj (probably the above *Saccharum Munja*) as a towing rope and for the rigging of their vessels, in all places above Sukkur. But below that place coir rope is very generally employed, being better able, it is believed, to stand the action of salt water. The Moonja, however, is possessed of great tenacity, as is evident from two-inch ropes, often fifty fathoms in length, made of its fibres, being sufficient for dragging their largest or 1200-maund boats up the Indus, and consequently against the full force of the

stream, even round projecting points. The rope is also possessed of lightness, so advantageous for rigging, and is capable, also, of bearing, without injury, alternate exposure to wet and to subsequent drying. Both qualities being essential for a tow-rope. Mr. Burns has also informed him that plants growing beyond the range of the overflowings of the river, or of the influence of the tides -that is, in the interior of the country, where, indeed, it grows in vast abundance -are possessed of the greatest strength. The upper leaves, about a foot or so in length, are preferred and collected. Having been made up into bundles, they are kept for use. When required for twisting into rope, they are first moistened in water, two men then, sitting opposite on each other, take one of these moist bundles and beat it alternately with mallets, until the loose cellular are separated from the fibrous parts. These are then ready for twisting into the ropes which are so extensively employed on the Indus. It is evident that a continuation of the same process, or the employment of the *Dhenkee* of India, would afford a very ample supply of half-stuff for paper makers, and at a cheap rate. -*Royle, Ind. Fibres, page* 30. Griffith collected nearly one hundred different grasses in the Tenasserim provinces,but Mr Mason was not aware that the description of a single species has ever been published. —*Mason.*

(7278) SACCHARUM OFFICINARUM. SUGAR CANE. Lin.

Karumboo, TAM.	Tebu, MALAY.
Gunna, DUCK.	Itchootunda, SANS
Cherooka, TEL.	*Ains. Mat. Med. p.* 264.

Saccharum officinarum, the best known species, or that yielding sugar in India, is cultivated in all parts of that country, and several varieties are known. It was introduced into the south of Europe and the Canaries, and thence into the West Indies. Another species introduced from China, was named *S. Sinense* by Dr. Roxburgh. It was extensively distributed throughout India, and still is so to some extent, as the canes are large, rich in juice, and hard enough to resist the attacks of the white ants. Within the last few years, the Otaheite sugar-cane has been introduced from the Mauritius into India, and rapidly spread through the country. It is no doubt the same species that was many years since introduced into the West Indies. It is probably the Canne de Haite of Tussac, or *S. violaceum.—Eng. Cyc.* See SUGAR.

(7279) SACCHARUM PROCERUM. Lofty Saccharum, Sirkunda; Sarkara. HIND, Very abundant every where on the sandy ridges and plains,of Ajmere where water is not very far from the surface. The lower parts of the culms, called "*sirkunda,*" are made into outside checks for door ways, &c.; the upper parts of the culms, called "*sirkee,*" are made into excellent neat and cheap mats, much used in thatching, &c. the floral leaves are made into "*moonj,*" by separating the fibres, by beating the leaves; this is very much used to make string and rope. -*Gen. Med. Top. p.* 175.

(7280) SACCHARUM SARA.

Shura Goondra, SUR. HIND.

Common in the plains of India. The culms are finer and stronger than surkunda, and are used to make arrows of, in preference to the other species when obtainable. The species of saccharum are often confounded by the natives — *Gen. Med. Top. page* 175. Saccharum Sara, yields the common "kulm" or *Reed Pen* with which in India, the Arabic and Persian characters are written. The *Shar* or *Sara* of Bengal (*Saccharum Sara*), or the Pen reed grass, Mr. Henly informs Dr. Royle is employed by the boatmen about Allahabad and Mirzapore, and esteemed as a tow-line for its strength and durability even when exposed to the action of water. It is said to be beaten into a rude fibre and then twisted into a rope. -*Royle.*

(7281) SACCHARUM SPONTANEUM: THATCHING GRASS.

Kus; Kush; Kagara, HIND.

Very abundant in the plains, of Ajmere where the blossom in the rains has a beautiful silvery appearance. Brooms are made of the culms,string of the leaves, and the whole is used to thatch with.—*Genl. Med. Top. page* 175. The Karens in Amherst Province cover their houses with the tall grasses which are so abundant on the Coast, and a few Europeans prefer this thatch to that made from the nipa. Two different species of grass Imperata cylindrica, SYN. Saccharum cylindricum, and Saccharum spontaneum,are used for this purpose,both of which were formerly referred to the genus which produces sugar cane. But the sugar grass seen in Maulmain, which flowers two or three feet high, has been removed since Roxburgh wrote, into the genus Imperata. This is one of the grasses used for thatch, and is often mistaken for *Saccharum spontaneum*, which is the other.—*Mason.*

(7282) SACCOLABIUM, a genus of Plants belonging to the tribe *Vandeæ* and the natural order *Orchidaceæ*, now extensively cultivated in hot-houses especially dedicated to their cultivation. This Asiatic genus, is found in the Indian Archipelago, the Malay Peninsula, and thence extending north along the Himalayan Mountains to 30° 4 N. lat., where *S. guttatum* is found on trees, as well as in more southern latitudes. The genus consists of caulescent epiphytes, with 2-rowed coriaceous leaves, which are often oblique at the apex. The flowers are axillary, and either racemose or solitary.—*Eng. Cyc.* Dr. Wight gives Saccolabium guttatum, 1745-6; niveum, 1676; paniculatum, 1676; papillosum, 1672; Rheedii, 1745-6; rubrum,1673; speciosum,1674-75; and Wightianum, 917.

(7283) SACCOLABIUM RETUSUM AND S. GUTTATUM: SPOTTED SACCOLABIUM.

Syn. Acrides guttatum.

One of the noblest orchids in the Tenasserim Provinces belongs to the saccolabium, or bag-lip-genus; the lip forming a bag or spur. The flowers are numerous, white, spotted with rose-violet, and stand on little pedicels all around the stalk so as to form an elegant plume sometimes a foot long, which give the trees on which they grow a most princely appearance. They are profusely multiplied in the neighborhood of Maulmain, and are highly valued in England.—*Mason.*

(7284) SADACHOO OR MADASOO WOOD.

Sadaichee marum, Tam.

(7285) SADDLES.

Selles. Fr.	Selle, It.
Sattel. Ger.	Sadla, Rus.
Zeen, Guz. Hind.	Selles, Sp.

Are seats adapted to the horse's back, formed of wooden frames, covered with leather, cloth, &c. English saddles are reckoned the best. Sherborne and Lynn, are particularly remarkable for this manufacture.—*Faulkner.* Though not coming exactly under the head of embroidery we may yet mention here from the articles at the Exhibition of 1851, the saddle-cloths and matchlock accoutrements from the Rajah of Kotah, a pattern was produced with gold headed nails, fixed into green velvet. The effect of this was so good as to be greatly admired by some of the best judges.—*Royle Arts &c. of India, p.* 508.

(7286) SAFFLOWER, Bastard Saffron. Carthamus tinctorius.

Usfar, Arab.	Kussumba, Guz. Hind.
Koosum, Kajeerah, Beng.	Zaffrone, It.
Cossumba, Can.	Kussumba, Mal.
Safflocr Bastered Saffran. Dut.	Polerroi, Prostoi schafran, Rus.
Kurtin, Egypt.	Kussumba Kum, lottora Sans.
Cartame Saffran batard, Fr.	Azafron bastardo, Sp.
Safflor, Ger.	Sendorkum, Tam.
	Kussumba chetto, Tel.

This annual plant grows in India Egypt, America, and some of the warmer parts of Europe. It is chiefly used for dyeing, producing different tints of red and orange, according to the alterative employed in combination. It also forms the basis of rouge. Safflower is produced in some parts of the Concans, and is extensively cultivated in Guzerat; that obtained from Bengal is considered superior to all the other Indian varieties.—*Faulkner.* Safflower was shown in the Great Exhibition from Celebes, Assam, the vicinity of Calcutta, Dacca, the states of Rajpootana and other places. There are two species: *Carthamus tinctorius*, which has small leaves and an orange flower; and *C. oxyacantha*, with larger leaves and a yellow flower, a native of Caucasus. The former is cultivated in Egypt, the Levant, &c., where it forms a considerable article of commerce. 6,633 cwts. of safflower were imported into the United Kingdom in 1835, of which about one-half was retained for home consumption. Of 5,352 cwts. imported in 1840, nearly the whole came from British possessions in the East. In 1847, about 4 '5 tons were imported; in 1848, 506 tons; in 1849, 407 tons; in 1850, 522 tons. The price of safflower varies from £1 to £8 per cwt., according to quality. That from Bombay is least esteemed, fetching only 20s. to 30s. The annual quantity of safflower, according to Dr. Taylor, exported from the district of Dacca for eight years ending with 1839, amounted to 4,000 maunds, or about 149 tons. The exports through the Calcutta Custom House are occasionally large: in 1824-25 there were about 316 tons; 8,500 Indian maunds were shipped from Calcutta in each of the years 1841 and 1842. The prices in the Liverpool market, in January 1853, were for Bengal, good and fine, £6 to £7 10s. per cwt.; middling, £4 to £4 10s.; inferior and ordinary, £2 10s. to £3.—*Simmonds.*

At the Madras Exhibition of 1855, four specimens of the powder were exhibited from Cuddapah, Chittledroog and Madura, and several packets of the seeds were sent from other districts. The dried florets of "*Carthamus tinctorius*" yield a very beautiful colouring matter, which attaches itself without a mordant. In Madras it is chiefly used for colouring cotton, and produces various shades of pink, rose, crimson, scarlet, &c. In Bangalore, silk is dyed with it, but the dye is very fugitive, and will not bear washing. An alkaline extract precipitated by an acid (Lime juice is commonly used) will give a fine rose colour either to silk or cotton. The colouring matter is not suitable to wool. The coosum is cultivated extensively throughout the Ceded Districts, &c, the seed yielding an oil, and the flower a dye. The flower is gathered and rubbed down into a powder, and sold in this state. When used for dyeing it is put in a cloth and washed in cold water for a long time, to remove a yellow colouring matter; it is then boiled and yields the Pink dyeing liquid. The Chinese safflower is worth four times the amount of the Indian article (Professor Solly), and the loss from careless drying and preparation has too often been set down to the "nature of the article."—*M. E. J. R.* According to Tomlinson, *Safflower* is the dried flowers of *Carthamus tinctorius*, the chemical principles of which are given under Carthamus. It is an annual composite plant, cultivated in India, Egypt, Spain, and the Levant, &c. on account of its dyeing properties. The flowers are the only parts used in dyeing: these yield two sorts of colouring matter; the first yellow, and of little value; the second, a pink of great delicacy and

beauty, but not very permanent. The yellow colour of safflower is soluble in water, the pink is resinous in its nature, and is best dissolved by the fixed alkalies. The flowers of the carthamus are gathered, placed in a bag, and trodden under water to get rid of the yellow colour. They are then placed in a trough with soda, in the proportion of 6 lbs. to 120 lbs. of carthamus. After soaking for a time, the contents of the trough are transferred to another, having a perforated bottom, but lined with a finely-woven cloth. This perforated trough is placed over an unperforated empty one, and water is poured through the upper one. This carries with it a large amount of the colouring matter released by the alkali. When the lower trough is full the bath is placed over another trough. A little more alkali is added and fresh water, until the latter runs through without carrying any more colouring matter. Lemon juice is added to the dye stuff in the troughs, and raises the colour to a bright cherry-red. silk, in hanks, is then immersed and turned round skein-sticks in the bath as long as it will take up any colour. It is then dried, and if the colour be not deep enough, it is passed through another bath of similar strength A final brightening is given by turning the silk round the skein-sticks 7 or 8 times in warm water with lemon-juice, in the proportion of half a pint to each pailful of water. This colour will not bear the action of soap, nor will it long withstand exposure to the sun and air; it is chiefly employed on silk for imitating the fine dye of the French called *ponceau*. For *ponceau*, or flame-colour, the silk is first boiled, and then receives a slight foundation of annotto; but it must not be alumed. Safflower is a costly dye: it is chosen in flakes of a bright pink colour; that in powder, dark-coloured, or oily, is of inferior quality. The beauty of the colour, in its purest form, has caused it to be employed in the manufacture of *rouge*. The preparation of rouge from cochineal is described under CARMINE. The delicate and beautful rouge, known as *rouge vegetale*, is nothing more than the colour of safflower which has been extracted by means of crystallized soda, precipitated by citric acid, then slowly dried, and ground up with the purest talc. Dr. Ure's account of the process of rouge-making from safflower is as follows: "The flowers, after being washed with pure water till it comes off colourless, are dried, pulverized, and digested with a weak solution of crystals of soda, which assumes thereby a yellow colour. Into this liquor a quantity of finely carded white cotton wool is plunged, and then so much lemon-juice or pure vinegar is added as to supersaturate the soda. The colouring matter is disengaged, and falls down in an impalpable powder upon the cotton filaments. The cotton, after being washed in cold water, to remove some yellow colouring particles, is to be treated with a fresh solution of carbonate of soda, which takes up the red colouring matter in a state of purity. Before precipitating this pigment a second time by the acid of lemons, some soft powdered talc should be laid in the bottom of the vessel for the purpose of absorbing the fine rouge, in proportion as it is separated from the carbonate of soda, which now holds it dissolved. The coloured mixture must be finally triturated with a few drops of olive-oil in order to make it smooth and marrowy. Upon the fineness of the talc, and the proportion of the safflower precipitate which it contains, depends the beauty and value of the cosmetic. The rouge of the above second precipitation is received sometimes upon bits of fine-twisted woollen stuff, called *crepons*, which ladies rub upon their cheeks"—*Tomlinson*. See CARTHAMUS.

(7287) SAFFLOWER OIL. CARTHAMUS TINCTORIUS.

Chendoorookoo yennai, TAM.	Kurrur or Coosum ka tael, HIND.
Koosumba, noonay, TEL.	

A light yellow clear oil is obtained from the seeds of the plant, yielding the well known dye. It grows plentifully in Mysore and Tinnevelly. In Mysore and Bellary, it costs about Rs 2-8-0 per maund, and is used for lamps, culinary and other purposes.—*M. E. J. R.*

(7288) SAFFLOWER SEED.

Kurdeh, GUZ. and HIND.

The seed of the *Carthamus tinctorius* is triangular shaped, of a whitish yellow colour, and affords an oil used by the natives of India for culinary purposes. Kurdeh has of late been exported from Bombay to England and France as an "oil seed."—*Faulkner*.

(7289) SAFFRON. CROCUS SATIVUS.

Zaifran, ARAB.	Abeer, Kurkam, Kurkoom, Zaifran, PERS.
Khohoon, CYNG.	
Safran, DUT.	Acafrao, PORT.
Safran, FR.	Schafran RUS.
Saffran GER.	Kasmira-janma Kunkama SANS.
Saffron, SP.	
Keysur, Zaifran GUZ. HIND.	Safaroon, MALAY.
	Keysur, DUK.
Zafferano, IT.	Khoon-gooma poo, TAM.
Crocus, LAT.	Khoonkoomapoohoo- TEL.
Safaron, MAL.	

Crocus sativus, saffron, is a native of Asia Minor, naturalized in England, France, and many other parts of Europe, and cultivated in Persia and Cashmere. The saffron of commerce consists of the dried stigmata of the flower. These are picked out, dried on paper either in a kiln or by the sun. If compressed into cakes it is accordingly called *cake* saffron; *hay* saffron is what is usually met with. The *hay* saffron consists of the stigmas, each

about an inch and a half long, brown-red, the upper part flattened, widened, and cleft; the lower, hair-like and yellowish. The odour is fragrant, taste bitter but agreeable. Saffron tinges the saliva yellow. Mr. Pereira informs us that one grain of good saffron contains the stigmata and styles of nine flowers, so that one ounce of saffron, is equal to 4,320 flowers. *Cake* saffron as now met with, contains none of the real article, being prepared from the florets of the safflower (see CARTHAMUS) made into a paste with gum water.—*O'Shaughnessy, p.* 654. Dr. Honigberger, p. 263, mentions that Crocus sativus is monopolized by the Cashmerean government and that the Hakims of the Punjab use saffron in melancholy, typhus fever, enlargement of the liver, and retention of urine. It is now imported into India both from Persia and Cashmere, but into the North western parts of India from the latter only. Dr. Falconer, who visited Cashmere is of opinion that Saffron could be successfully cultivated in the Himalayas, at heights varying from six thousand to six thousand five hundred feet above the sea, and that if it were once brought into the market, the demand for it would be almost unlimited.—*Rhode M.S.S.* Saffron consists of the pistils of the *Crocus sativus*, a bulbous plant, found in various parts of the South of Europe and Asia, and cultivated to a small extent in Cambridgeshire. The pistils are generally dried, and compressed into firm cakes or masses, termed in India *Rootla saffron*; but the finest called *Hay saffron*, consists of the pistils merely dried. When good, saffron has a sweetish, penetrating, diffusive odour; a warm, pungent, bitterish taste; and a rich deep orange colour. It is used in medicine, as a colouring substance, and in domestic cookery. Saffron is brought to India from England, the sea ports of the Red Sea, Persia, and Cashmere.—*Faulkner*. Ainslie tells us that the vytians prescribe this article in nervous affections attended with vertigo, and where there appears to be an approach to apoplexy, by accumulation of blood in the head. They also believe it to possess considerable virtue in Melancholia, Hysteric depressions, and Kistnah Dashum (Typhus Fever), in which last they suppose it to act as a cordial and restorative. To women, soon after the pains of childbirth are over, an infusion of saffron is frequently administered by the Tamool midwives to prevent fever, to support the animal spirits; and gently to assist in carrying off the lochia. This medicine is besides used by the Indian Practitioners as an external application in Ophthalmia when mixed with a small quantity of ponnded Kadukai (Chebulic Myrobolan) and lime juice and applied round the eye, but close to it. The Arabians class it amongst their Mosebetal (Hypnotica) Mokewyatdit (Cardiaca) and Mufettehat (Deobstruentia).—*Ainslies' Mat. Med. page* 38. According to Tomlinson, *Saffron* consists of the stigmata of the flowers of a perennial bulbous plant (*Crocus sativus.*),once extensively cultivated at Saffron Walden in Essex, and still fostered in some parts of Cambridgeshire. From this small portion of the flower is obtained a rich yellow-red colour, which, when dried and pure, is of a scarlet hue. Saffron is imported into Britain, from Sicily, France, and Spain, but the foreign product is not so much esteemed as the English. The use of saffron is, however, diminishing. It is employed as a seasoning in cookery: also to colour confectionary, liqueurs, varnishes, and sometimes cheese and butter. It is used to a small extent by painters and dyers. It was formerly much used in medicine as a carminative, antispasmodic and emmenagogue, and it is still occasionally employed to promote the eruption of certain diseases of the skin. On the same principle it is given to birds to assist their moulting. Dr. Lindley describes the colouring ingredient of this plant as "a peculiar principle to which the name of Polychroite has been given; it possesses the properties of being totally destroyed by the action of the solar rays, colouring in small quantity a large body of water, and of forming blue or green tints when treated with sulphuric and nitric acid, or with sulphate of iron. In moderate doses, this substance stimulates the stomach, and in large quantities, excites the vascular system. Moreover it seems to have a specific influence on the cerebro-spinal system, as it affects, it is said, the mental faculties, a result which De Candolle considers analogous to that produced by the petals of certain odorous flowers." Saffron is known in commerce as a kind of fibrous cake. This should be moderately moist, close, tough, and compact, the smell sweet and penetrating, the taste warm, pungent, and somewhat bitter.—*Tomlinson.*

(7290) SAGAPENUM.

Sukbennj, ARAB.	Sagapeno, IT.
Sagapenum, FR.	Sagafioon, PERS.
Sagapenummi, GER.	Kundel, SANS.
Sugbennj, GUZ. HIND.	

A concrete gum resin, supposed to be a kind of assafœtida (*Ferula Persica*). It is found in masses formed of soft, adhesive fragments, the size of the thumb or more, somewhat transparent, reddish yellow exterually, pale within, of a waxy or brittle consistence, often mixed with impurities and seeds. Its odour resembles that of garlic and assafœtida, its taste is hot, nauseous, and rather bitter. It is sometimes adulterated with B'dellium (*Vern*,Googul), and other similar gums. Its medicinal uses are the same as those of assafœtida, but it is considered less energetic, and is but little employed. It is obtained from Smyrna, Alexandria, &c.—*O'Shaughnessy.*

(7291) SAGE. A perennial, native of the South of Europe; it grows in all the gardens,

and is propagated by seeds, layers, and slips, without any difficulty. It is used for seasoning.

(7292) SAGE, BENGAL.

Murtoo, BENG.

Leaves and herb of Meriandra Bengalensis.—*Ben. p.* 223.

(7293) SAGERETIA, a genus of Plants belonging to the natural order of *Rhamnaceæ*, formed, by M. A. Brongniart, of old species of *Zizyphus* and of *Rhamnus*, and named after M. Sageret, a French vegetable physiologist. The species are found in both South and North America, Java, China, and in India along the foot of the Himalayas. The only species which requires particular notice is *S. ageretia thee'sans* which is remarkable as being employed as a substitute for tea, even in China, where the poor are described by Osbeck as making use of the leaves in the same manner as those of the true tea, and for which it makes a good substitute from its astringency and fragrance.—*Eng. Cyc.*

(7294) SAGIG. The name given by the Bisayas, to a variety of the Manilla Hemp.—*Royle, Fib. Plants.*

(7295) SAGITTARIA SAGITTIFOLIA. The arrowhead, is one of the handsomest of British aquatic plants, whether as regards the elegant spear leaved canes of glossiest green, or the flower spikes rising in pyramidal form from the surface of the water. This plant is extensively cultivated among the Chinese not for its beauty but for the sake of its bulb, which fixes itself in the solid earth below the mud and constitutes an article of food.—*Art Jour. page* 108, *April* 1857.

(7296) SAGO.

Sagu, BALI.	Sagu, JAV.
Sagoodana, BENG.	Sagu, MAL.
Sekuhme, CHIN.	Showarisee, TAM.
Sagoo, Sagoo-chawl, GUZ. HIND.	Zowbeeum. TEL.

General Remarks—Sago, and starchy matter allied to it, is obtained from many palms. It is contained in the cellular tissue of the stem, and is separated by bruising and elutriation. From the soft stem of *Cycas circinalis*, a kind of sago is produced in the East and West Indies. The finest is, however, procured from the stems of *Sagus laevis* (*S inermis*, of Roxburgh), a native of Borneo and Sumatra; and *Arenga saccharifera*, or *Gomutus saccharifera*, of Rumphius. The *Saguerus Rumphii*, or *Metroxylon sagus*, which is found in the Eastern Islands of the Indian Ocean, yields a feculent matter. After the starchy substance is washed out of the stems of these palms, it is then granulated so as to form sago. The last-mentioned palm also furnishes a large supply of sugar. Sago as well as sugar, and a kind of palm wine, are procured from *Caryota urens*. In China, sago is obtained from *Raphis flabelliformis*, a dwarfish palm; and some sago is made from it for native use in Travancore, Mysore, and Wynaad, in the East Indies.

The trunk of the sago palm, *Metroxylon sagus*. is five or six feet round, and it grows to the height of about 20 feet. It can only be propagated by seed It flourishes best in bogs and swampy marshes; a good plantation being often a bog, knee deep. The pith producing the sago is seldom of use till the tree is fourteen or fifteen years old; and the tree does not live longer than thirty years. Mr. Crawfurd says there are four varieties of this palm; the cultivated, the wild, one distinguished by long spines on the branches, and a fourth destitute of these spines, and called by the natives female sago. This and the cultivated species afford the best farina; the spiny variety, which has a slender trunk, and the wild tree, yield but an inferior quality of sago.

The farinaceous matter afforded by each plant is very considerable, 500 lbs being a frequent quantity, while 300 lbs. may be taken as the common average produce of each tree. Supposing the plants set at a distance of ten feet apart, an acre would contain 435 trees, which, on coming to maturity in fifteen years, would yield at the before-mentioned rate 120,500 lbs. annually of farinaceous matter. The sago meal, in its raw state, will keep good about a month. The Malays and natives of the Eastern Islands, with whom it forms the chief article of sustenance, partially bake it in earthenware moulds into small hard cakes, which will keep for a considerable time. In Java the word "saga" signifies bread.

The sago palm (*Metroxylon sagus*) is one of the smallest of its tribe, seldom reaching to more than 30 feet in height, and grows only in a region extending west to Celebes and Borneo, north to Mindanao, south to Timor, and east to Papua. Ceram is its chief seat, and there large forests of it are found. The edible farina is the central pith, which varies considerably in different trees, and as to the time required for its attaining proper maturity. It is eaten by the natives in the form of porridge. A farina of an inferior kind is supplied by the Gomuti palm, another tree peculiar to the Eastern Archipelago growing in the valleys of hilly tracts. Perhaps all of these trees contribute to produce the ordinary sagos of commerce, for there are several kinds. Planche, in an excellent memoir on the sagos, has described six species, which he distinguishes by the names of the places from which they come. Preferring to classify them according to their characters, M. Mayet distinguishes only three species. The *first* he denominates.

Uncut sago, which comes from different parts, and varies much in color. It comprehends—1*st*, *Maldivian sago* of Planche, in sphe-

rical globules, of two or three millimetres in diameter, translucid, of an unequal pinkish white color, very hard and insipid. *2nd. New Guinea* sago, of Planche, in rather smaller globules, of a bright red color on one side, and white on the other. *3rd. Grey sago of* the Moluccas or brown sago of the English, of unequal globules, from one to three millimetres in diameter, opaque, of a dull grey color on one side, and whitish on the other. This grey color probably raises from long keeping and humidity. *4th. Large grey sago* of the Moluccas, exactly resembling No. 3, only that the globules are from four to eight millimetres in diameter. *5th. Fine white sago* of the Moluccas; entirely resembling No. 3, only that it is purely white, owing to the complete edulcoration of the fecula of which it is made. Whatever may be the places of origin of these sagos, they all possess the following characters—Rounded globules, generally spherical, all isolated, very hard, elastic, and difficult to break or powder. The globules put into water, generally swell to twice their original size, but do not adhere together.

Second sago.—This species corresponds with the pinkish sago of the Moluccas of Planche. It is in very small globules, less regular than those of the "first sago," and sometimes stuck together to the number of two or three. Soaked in water, it swells to double its volume.

Third Sago.—Tapioca sago.—This name has been applied to a species of sago now abundant in commerce, because it bears the same relation to the ancient or first sago, and even to the preceding sago, that tapioca bears to "Moussache," which is the fecula of the manioc, *Janipha manihot* (*Manihot utilissima*). Whilst the two preceding species of sago, whatever may have been stated to the contrary, have been neither baked nor submitted to any heating process, as is proved by the perfect state of nearly all their grains of fecula, their species has been subjected to the action of heat while in a state of a moist paste. This sago is not in spherical globules, like the two preceding species, or at least there are but few of the globules of that form; it is rather in the form of very small irregular tubercular masses, formed by the adherence of different numbers of primary globules. The facility with which this sago swells and is divided by water, has occasioned it to be preferred as an article of food to the ancient sago. It has been described by Planche under the name of the white sago of the Moluccas, and by Dr. Pereira under the name of pearl sago.

Bennet, in his work on "Ceylon and its Capabilities," (1843), states that sago is procured from the granulated pith of the talipot palm, *Corypha umbraculifera.*

The *Sagus Rumphii*, Wildenow, and *S. farinifera*, Gaertner.—Before maturity, and previous to the formation of the fruit, the stem consists of a thin hard wall, about two inches thick, and of an enormous volume of tissue (commonly termed the *medulla* or *pith*), from which the farina or sago is obtained. As the fruit forms, the farinaceous medulla disappears, and when the tree attains full maturity, the stem is no more than a hollow shell. Sago occurs in commerce in two states, pulverulent and granulated. 1. The meal or flour is imported in the form of a fine amylaceous powder. It is whitish, with a buffy or reddish tint. Its odor is faint, but somewhat unpleasant and musty. 2. Granulated sago is of two kinds, pearl and common brown. The former occurs in small hard grains, not exceeding in size that of a pin's head, inodorous, and having little taste. They have a brownish or pinkish yellow tint, and are somewhat translucent. By the aid of a solution of chloride of lime they can be bleached, and rendered perfectly white. The dealers, it is said, pay £7 per ton for bleaching it. Common sago occurs in larger grains, about the size of pearl barley, which are brownish white.

Sago is an article of exportation to Europe, and is also shipped to India, principally Bengal, and to China. It is in its granulated form that it is usually sent abroad. The best sago is the produce of Siak, on the north coast of Sumatra. This is of a light brown color, the grains large, and not easily broken. The sago of Borneo is the next in value; it is whiter, but more friable. The produce of the Moluccas, though greatest in quantity, is of the smallest estimation. The cost of granulated sago, from the hands of the grower or producer, was, according to Mr. Crawfurd, only a dollar a picul. It fetches in the London market—common pearl, 20s. to 26s. the cwt., sago flour, 20s. the cwt. The Chinese of Malacca and Singapore have invented a process by which they refine sago, so as to give it a fine pearly lustre, and it is from thence we now principally derive our supplies of this article. The exports from Singapore in 1847 exceeded 6½ million pounds, but are now much larger.

Manufacture.—The following is a description of the manufacture of this important article of commerce—The tree being cut down, the exterior bark is removed, and the heart, or pith of the palm, a soft, white, spongy and mealy substance is gathered; and for the purposes of distant transportation, it is put into conical bags, made of plantain leaves, and neatly tied up. In that state it is called by the Malays *Saugoo tampin*, or bundles of sago; each bundle weighs about 30 lbs. On its arrival at Singapore it is purchased by the Chinese manufacturers of sago, and is thus treated:—Upon being carried to the manufactory, the plantain-leaf covering is removed, and the raw sago, imparting a strong acid odour, is bruised, and is put into large tubs of cold spring water, where

it undergoes a process of purification by being stirred, suffered to repose, and again re-stirred in newly-introduced water. When well purified thus, it is taken out of the tubs by means of small vessels; and being mixed with a great deal of water, the liquid is gently poured upon a large and slightly inclined trough, about ten inches in height and width; and in the descent towards the depressed end, the sago is deposited in the bottom of the trough, whilst the water flows into another large tub, where what may remain of sago is finally deposited. As the strata of deposited sago increases in the trough, small pieces of slates are adjusted to its lower end to prevent the escape of the substance. When by this pouring process the trough becomes quite full of sago, it is then removed to make room for a fresh one, whilst the former one is put out into the air, under cover, for a short time; and on its being well dried, the sago within is cut into square pieces and taken out to be thoroughly dried, under cover, to protect it from the sun. It has then lost the acid smell already noticed, and has become quite white. After one day's drying thus, it is taken into what may be called the manufactory, a long shed, open in front and on one side, and closed at the other and in the rear. Here the lumps of sago are broken up, and are reduced into an impalpable flour, which is passed through a sieve. The lumps which are retained by the sieve are put back to be re-bruised, whilst that portion which has passed is collected, and is placed in a long cloth bag, the gathered ends of which, like those of a hammock, are attached to a pole, which pole being suspended to a beam of the building by a rope, one end of it is sharply thrown forward with a particular jerk, by means of which the sago within is shortly granulated very fine, and becomes what is technically termed "pearled." It is then taken out and put into iron vessels, called *quallies*, for the purpose of being dried. These quallies are small elliptical pans, and resemble in form the sugar coppers of the West Indies, and would each hold about five gallons of fluid. They are set a little inclining, and in a range, over a line of furnaces, each one having its own fire. Before putting in the sago to be dried, a cloth, which contains a small quantity of hog's-lard, or some oily substance, is hastily passed into the qually, and the sago is equally quickly put into it, and a Chinese laborer who attends it, commences stirring it with a *pallit*, and thus continues his labour during the few minutes necessary to expel the moisture contained in the substance. Thus each qually, containing about ten pounds of sago, requires the attendance of a man. The sago, on being taken off the fire, is spread out to cool on large tables, after which it is fit to be packed in boxes, or put into bags for shipment; and is known in commerce under the name of "pearl sago." Thus the labor of fifteen or twenty men is required to do that which, with the aid of simple machinery, might be done much better by three or four laborers. A water-wheel would both work a stirring machine and cause an inclined cylinder to revolve over a fire, for the purpose of drying the sago, in the manner used for corn, meal, and flour in America, or for roasting coffee and chicory in England. But the Chinese have no idea of substituting artificial means, when manual ones are obtainable.

Singapore.—A considerable quantity of sago is exported from Singapore in the state of flour. The whole quantity made and exported there exceeds, on the average, 2,500 tons annually. The quantity shipped from this entrepot is shown by the annexed returns, nearly all of which was grown and manufactured in the settlement. The estimated value for export is set down at 14s. per picul of 1¼ cwt.

EXPORTS FROM SINGAPORE.

		Piculs.
1840-41	Pearl sago	41,146
,,	Sago flour	33,552
1841-42	Pearl sago	46,225
,,	Sago flour	7,447
1842-43	Pearl sago	25,306
,,	Sago flour	4,838
1843-44	Pearl sago	14,266
,,	Sago flour	14,067
1844-45	Pearl sago	18,472
,,	Sago flour	36,141
1845-46	Pearl sago	19,333
,,	Sago flour	26,925
1846-47	Pearl sago	40,765
,,	Sago flour	9,025

Imports of sago, into the United Kingdom, and quantity retained for home consumption:—

	Imports.	Home consumption.
	Cwts.	Cwts.
1826	9,644	2,565
1830	2,677	3,385
1834	25,763	13,827
1838	18,627	28 396
1842	45,646	50,994
1846	58,595	45,671
1848	65,000	
1849	83,711	72,741
1850	89,884	83,954

—*Simmonds.*

From the above, it will be observed that sago, and the allied starches which receive its name, is now an extensive article of diet, contributing largely to the food of the nursery, the diets of the invalid and the delicacies of the tables of the rich. It is contained in the cellular tissue of the stem of many trees, principally palms, from which it is separated by bruising and washing. In the language of the Papua Islands, Sago signifies bread, and in many countries, this vegetable product consti-

tutes a large part of the food of the people. And the extent to which it has latterly been brought into general use, may be judged of by mentioning that the imports into England have increased from 9,644 cwts. in 1826 to 100,000 cwts. on the average of the four years ending 1852. In commerce, sago is met with in the form of sago meal, and as pearl sago, the latter being the usual form it is seen in Europe from the meal not keeping. In the process of manufacture, the wood is split into billets, the soft interior extracted pounded and thrown into water, the water is then drained off the pulpy mass, when the starch comes away with it, and being allowed to settle, is afterwards prepared and purified by successive washings. This is the "crude" or "raw" "sago," or "sago meal," of commerce. The *Process* employed in manufacturing the pearl Sago, is supposed to have been invented by the Chinese. When the raw Sago has been several times washed and strained through cloth, the masses which collect at the bottom of the vessels are collected, broken into pieces, and placed upon platforms in the sun to dry, being broken into still smaller pieces as the drying proceeds. When sufficiently dry, they are powdered and sifted through sieves made of the midrib of the cocoa nut palm, it is then put into a bag suspended from the roof and granulated by frequent shaking. After this it is dried in iron pans over the fire.

Sources of Sago.—The time for collecting the Sago, is just before the tree flowers, which it generally does when seven or eight years old. The best sago of commerce is obtained from two species of Metroxylon, viz. M. Rumphii, Mart: and M. læve, Mart: which inhabit the islands of the Indian Archipelago, and form extensive forests almost exclusively composed of their own kind, these two trees both grow in marshy spots. This is known as the true sago palm. A sago is also produced abundantly from one of the date species, the *Phœnix farinifera*, q. v. The Calamusagus laciniosus, of Griffiths, is supposed also to yield it, but that known as "Mergui sago" is manufactured from the *Tacca pennatifida*. A sago was also exhibited in the Madras Exhibition of 1855, made from the Cycas circinalis. The pith of Caryota urens is much used as *Sago meal*, in Canara when fresh, and deserves attention.—*M. E. J. R.* Sago is obtained in Cochin from a palm called koota pana, and sells there for 2 annas a pound, and in Cochin, the date palm flour and seed is called Eenthalkurroo. Assistant Surgeon J. Pringle, M. D., Civil Surgeon, Cochin, in a letter to the Editor, Cochin, 19th October 1850, sent specimens of Sago manufactured in the immediate neighbourhood of Cochin, the shipping port, as also throughout the country in the vicinity of the backwater, on which there is excellent water carriage to the sea coast. The best sago is made, there, from October to June, as in its preparation bright sunshine is required to mature the operation. The 1st sort may be delivered on the sea coast at Rs. 4½ per maund (25 lbs.), the 2d sort at Rs. 2¼ per maund.—*M. C. C.* Sago is made in Malabar from the pith of the Taliput palm. As with the true Sago palm, a farina is prepared from the medullary matter of the Gomuti, *the Arctenga saccharifera*: in Java, indeed, this palm is the only source of Sago, which is used in considerable quantity in the western and poorer districts of the island and is offered for sale in all the markets. It is smaller in quantity than in the pith of the true Sago-tree, more difficult to extract and inferior in quality: possessing a certain peculiar flavour from which the farina of the true Sago is free. Some trees will produce five or six female spadices, before yielding a single male one, such trees are considered unprofitable by the toddy collectors, but in this case, it is said that they yield Sago equal in quality, though not in quantity, to the Cycas circinalis, from which, both in the East and West Indies a kind of Sago is procured. One tree yielded about 150 lbs. of good Sago meal. The pith or farinaceous part of the trunk of old trees, of the Caryota urens or kittul palm is manufactured into Sago, equal to the best farina, being highly nutritious: It is said, indeed, to be equal to that of the true Sago palm. In China, Sago is obtained from Raphis flabelliformis, one of dwarfish genus of palms, a native of the island of Liu-kiu and Southern China, and, also, on the authority of Simmonds p. 314, in Travancore, Mysore, and the Wynaad. A farina is prepared in Brazil from the inside of the trunk of the "Carnauba," *Copernica cerifera*, of the Brazilians. The pithy portion of the trunk of the Gebang palm, *Corypha Gebanga*, Blume, yields a sort of Sago, as also that of the Sabal Adansonii, and the Sago palm of New Ireland.

The Cycas circinalis before alluded to, belongs to the *Cycadaceæ*, a tribe of plants possessing nearly equal affinity with palms and tree ferns. Its genera are natives of the tropics and the temperate parts of America and Asia, all of them contain a starch and it is separated from the pith of many and employed as an article of diet. *The Encephalartos* is called "Caffir Bread." The seeds of *Dion edule*, in Mexico, yield starch and in the Bahamas and other West Indian Islands, a Sago is obtained from a species of Zamia. In the Moluccas, from *Cycas Circinalis*, and in Japan from C. revoluta.—*Seeman.*

"*Ipuruma*," is the Guiana name given to a Sago like flour formed from the medullary portion of the trunk of the *Mauritia flexuosa*. It was tried by Humboldt, who described it as very agreeable to the taste, resembling rather Cassava Bread, than the sago of India. It is said to yield its sago in most abundance if the male

tree be cut down just before the flowers appear. The "red" or netted hammock of the native tribes of the Amazon, are made from string manufactured from the dried leaves of this plant.

The "Papunha," *Guilielma* species, of Brazil produces a farinaceous fruit. In various countries of Europe, millet, *Panicum muliaceum* and *P. frumentaceum* is used as a substitute for sago and is considered excellent.—*Seeman. Simmonds.*

Sago of Mergui, Sago may be seen in every bazar in the Tenasserim Provinces, but it is not generally known what plant produces it, many having the erroneous impression that it is made from manihot. It is the produce of an indigenous plant abounding along the sea shores, the islands, and especially at Mergui—a species of tacea, the same plant that is common in the South Sea Islands, whose tubers there supply to the inhabitants the place of bread. Considerable quantities of sago are made at Mergui, yet Lindley in his Medical Botany, makes no reference to tacca as yielding sago.—*Mason.*

Archipelago.—Crawfurd tells us that in the *Eastern Archipelago*, there are supposed to be five palms producing this article, of which the most frequently cultivated are the *Metroxylon sago*, Syn. *Sagus konigii*, *Rambaya* Malay: and the *Sagus lævis*, *Bamban*, Malay. Sago trees are found in every part of the Malayan Archipelago and Philippines, as far as Mindano, wherever there is a genial soil for them, and this soil consists of a marsh or bog, composed of decayed land and vegetables, near the sea but excluding tidal action. They are most abundant in the eastern parts of the Malay Archipelago at the Moluccas and neighbouring islands, with New Guinea and Borneo, and, in the Philippines, Mindano. All these palms yield an immense quantity of farina, the wood being a mere shell containing a mass of medulla, and the Sago from them is more or less the food of the inhabitants of the Archipelago. The Sagos propagate by lateral shoots, as well as by seeds, and only produce fruit once, after which they die. From the first of their properties, a sago plantation once formed is perpetual. The trees are cultivated in small patches, and a man and his family can manage a plantation of about 400 trees, in a space of 100 square fathoms. The trees are cut down immediately before bearing fruit, which is usual about the age of 15 years. When a plantation has once arrived at maturity there will be a constant harvest. The sago tree when cut down and the top severed from it, is a cylinder about 20 inches in diameter and from 15 to 20 feet in height. Assuming this to be the average, the contents will be nearly 26 bushels, and allowing one half for woody fibre, there will remain 13 bushels of starch, which will give about 700 pounds for each tree, or 12½ bushels. It may give some idea of the enormous rate of this produce, if it be considered that three trees yield more nutritive matter than an acre of wheat and six trees yield more than an acre of potatoes. An acre of sago, if cut down at one harvest, will yield 5220 bushels, or as much as 163 acres of wheat, so that according as we allow 7 or 15 years for the growth of a tree, an acre of sago is equal in annual produce to 23 or to 10 acres of wheat. Up till 1814 the Archipelago used to export small quantities of the granulated form of Sago, of a dirty brown colour, but about the time when the trade with Europe was first thrown open, the Chinese of Malacca began to prepare a much superior article known in commerce under the name of pearl sago. Of this and sago flour, or the ungranulated starch, Singapore is at present the chief place of manufacture and principal mart, the Chinese being the sole manufacturers, and the raw material being brought from various neighbouring countries, but chiefly from the north-western coast of Borneo and the north Eastern of Sumatra, with its adjacent islands from Siak to Jurdagiri In the year 1847-48, the quantity of Sago exported from Singapore was about 80,000 cwt, worth on the spot about £45,000.—*Crawfurd, p.* 372.

China.—Sago is brought to China to some extent in native vessels and is said to be the produce of the *Metroxylon sagus*, a species of palm, about 30 feet high and 18 inches in diameter. But it is not fit to make sago from until it has attained maturity, at which time the trunk is hollow. This tree grows in Sumatra and on the western side of Borneo. When cut down, the medullary part of the trunk is scraped out and reduced to powder, and the filaments separated by washing. The meal is cooked by baking. It is made ready for sale by the natives by sewing the leaves of the tree into a sort of bag, seven of which are about equal to a pecul; all the sago tamping, as these bags are called, is brought to Singapore, where the Chinese have manufactories for refining and granulating it. This is done by mixing it with pure water, and rubbing the paste into little grains. When well cured, it has a pearly lustre, is slightly reddish and dissolves in hot water into a fine jelly. There are numerous manufactories in Singapore for making sago, from whence many thousands of peculs are annually exported, principally to England. Its price in China is $ 3 to $ 4 per pecul —*Morrison.*

(7297) SAGUS, OR SAGUERUS, a genus of Plants belonging to the family of Palms. The leaves are pinnated; the flowers monœcious; the spadix branched, without any common spathe, but with numerous partial ones; the fruit hard, shining, its surface divided into numerous rhomboidal spaces. The species are natives of the islands of the Indian Archipelago, and yield sago.—*Eng. Cyc.*

(7298) SAGUS LÆVIS. Sago Tree.
Rambiya, Malay.

This is a native of Sumatra and the Moluccas. The stem is as thick as that of the cocoa-nut tree, which is from 15 to 20 years in attaining maturity.—*O'Shaughnessy, page* 640. Sagus, lævis, the True Sago-Palm, has the petioles and spathes unarmed. This palm furnishes most of the sago sent to Europe.—*Eng. Cyc.*

(7299) SAGUS RUMPHII. Sagus Rumphii, *Willd.* E. the *Sagus spinosus* of Rumph. Herb. Amb. i. p. 75, has the petioles and spathes guarded by strong prickles. According to Martin, the sago yielded by this plant is used principally in India, and seldom exported.—*Eng. Cyc.* It is made officinal in the London Pharmacopœia as the plant yielding Sago, which is described as *Medullæ Fœcula*; but Endogens have no proper pith. In that of Edinburgh it is said to be the Farina from the interior of the trunk of various Palms and species of Cycas. The Malays are said to prefer the Sago of this tree(*Sagus Rumphii*). Dr. Roxburgh states that the granulated Sago is made from sagus (*inermis* Roxb.) *lævis*, Jack. Blume states it to be produced by *Sagus lævis* and *S. genuina*. The *Saguerus saccharifer* also, (called likewise *S. Rumphii* and *Arenga saccharifera*,) when exhausted of its saccharine sap, yields Sago of good quality. *Caryotaurens* and *Phœnix farinifera* also yield a Sagolike farina in India. It is, therefore, difficult to select one as the sole officinal species. Sago is also said to be produced by species of Cycas, but the statement has never been properly confirmed. Some *Zamias* are said to yield one kind of Arrowroot in the West Indies. M. Planche has arranged the Sagos of commerce under six different heads, according to the places whence they are procured. M. Guibourt arranges them all under three heads. 1. Uncut Sago. 2. Seed Sago. 3. Tapioca Sago, which is the same as Pearl Sago. The unbroken grains of Sago, are more or less of an ovoid form, but most appear as if truncated or muller-shaped. An imitation of Sago is made with Potato-Starch near Paris. *Royle.* Sago is insoluble in cold water, but by long boiling becomes soft. *Saguerus* saccharifer, (Syn. Arenga saccharifera), is scarce, and only found in some of the gardens in Bombay, where it has been introduced from the Sumatra Islands. It is only grown as an exotic, and is a very beautiful species of palm, from its pinnate leaves. It is propagated by suckers from the roots of the old tree.—*Riddell.*

(7300) SAHCOTTAY OIL. From Canara, used for cutaneous diseases.—*M. E. J. R.* 1857.

(7301) SAILING FISH. Inquiries were made about two remarkable inhabitants of the waters about Malacca and Sumatra, described by Raffles; the sailing fish, called by the natives ikan layer, and the dugong, mentioned by Valentien, and so long talked of as the mermaid, but the Commodore was told by the inhabitants of Singapore that these fish had become very scarce, if not entirely extinct.—*American Expedition to Japan, p.* 155.

(7302) SAIL-LEAF. Pandanus.—On many of the Burmese boats, sails are seen made of large narrow leaves, sewed together. They are the leaves of a species of screw pine, that has a trunk like a palm, which usually grows near the sea, and is very abundant. The fruit is used by the Karens, to hackle their thread.—*Mason.*

(7303) SAKI. A pair of chop sticks was placed at each corner of every table, in the centre was an earthern pot filled with *saki* (the intoxicating drink made by the Lew Chewans) surrounded with four acorn cups, four large-coarse China cups with clumsy spoons of the same material and four tea cups of tea. Cups of tea were first handed round, these were followed by very small cups of saki, which had the taste of French liqueur.—*American Expedition to Japan, p.* 218.

(7304) SAL, or SAUL, an East Indian timber-tree, the Shorea robusta; (See 377, Dr. Wallich's Catalogue): this wood is in very general use in India for beams, rafters, and various building purposes; Saul is close-grained and heavy, of a light brown colour, not so durable but stronger and tougher than teak, and is one of the best timber-trees of India. Captain Baker considers saul to resist strains, howsoever applied, better than any other Indian timber: he says the Morung Saul is the best. The Sissoo appears to be the next in esteem, and then the teak, in respect to strength.—*Tred.*

(7305) SAL AMMONIAC, Muriate of Ammonia, Hydrochlorate of Ammonia.

Urmena, Arab.	Sale Ammoniaco. It.
Vayvagarra loonoo, Cyng.	Sal Ammoniac, Lat.
Sel Ammoniac, Fr.	Nowshadur, Pers.
Salmaik, Ger.	Naschatur, Rus.
Nowsagur Nowsadur, Guz. Hind.	Nowsadur, Sans.
	Navacharum, Tam.

Is prepared by the decomposition of the ammoniacal fluid given off during the preparation of coal gas; also, by a complicated process from bones, camel's dung, and other refuse of animal substances containing its ingredients. It is likewise found native at Etna and Vesuvius, in some of the Tuscan lakes, and in Persia, Bokhara, &c. It is met with in large cakes of a semicircular form, translucent, and colourless, with a sharp, saline, cool taste, but no smell. It is extensively employed in the arts, in the preparation of aqua-regia, in soldering some of the metals, in tinning iron and copper, in the preparation of dyes, liquid ammonia, and in various chemical manufactures. It is brought to Bombay from Calcutta, and is re-exported to the Persian and Arabian Gulfs.—*Faulkner.* Sal ammoniac, is collected in Mongolia and Ile from lakes and the vicinity of extinct volcanoes, and

blue and white vitriol, which are obtained by roasting pyrites.—*Williams' Mid. King. p.* 248. *Sal Ammoniac* is a compound of ammonia and hydrochloric acid, NH_3, H. $C._1$, now called *hydrochlora te of ammonia*, although the older term, *muriate of ammonia*, is also used. The substance from which this salt was first obtained, was the soot of camel's dung; and it was formerly produced therefrom by sublimation in large quantities, in Egypt, near the temple of Jupiter Ammon, whence the name *sal ammoniac*. It is now manufactured largely in Europe. by combining hydrochloric acid either directly or indirectly with ammonia obtained from the decomposition of animal matter. In France, bones and other animal matters are distilled in large iron retorts, for the manufacture both of animal charcoal and of sal ammoniac. Coal soot was formerly used in Great Britain as a source of this salt; but since the establishment of gas works, it has been chiefly derived from the liquor obtained during the preparation of coal gas. (See GAS.) The impure carbonate of ammonia contained in this liquor is either at once saturated with hydrochloric acid, or it is first converted into sulphate of ammonia and afterwards by decomposing it with common salt into hydrochlorate; the products being sulphate of soda and hydrochlorate of ammonia; the latter is separated by crystallization and sublimation. This salt, as obtained by sublimation. is amorphous, somewhat elastic, translucent, and colourless; and of the sp. gr. 7·45 to 1·50, but when obtained by crystalization, its form is octohedral and cubic. Its taste is sharp and saline: it has no smell; it dissolved readily in water; it does not change in dry air,and volatilizes by heat, without undergoing decomposition. It is decomposed by lime, and the fixed alkalies, with the evolution of ammoniacal gas: sulphuric acid expels hydrochloric acid gas from it. Sal ammoniac is used in the arts for a variety of purposes; as in pharmacy for making ammoniacal preparations: in tinning, to prevent the oxidation of the surface of the copper: when dissolved in nitric acid it forms the *aqua regia* of commerce, used for dissolving gold instead of nitro-hydrochloric acid. It is also used in small quantities in steam boilers, to prevent the formation of calcareous deposits.—*Tomlinson.*

(7306) SAL PRUNELLA, a term applied to nitrate of potash, fused and cast into balls resembling prunes or plums, and sometimes coloured to resemble them.—*Tomlinson.*

(7307) SALACIA, a genus of Plants belonging to the natural order *Hippocrateaceæ*, which has been so differently defined by different botanists, that it sometimes includes species found in Asia, Africa, and America. At other times, American species are referred to the genus *Tonsella*, and the African species to the genus *Calypso*, and those of India to the genus *Johnia*, the last named in compliment to Dr. John, a Danish missionary, who was one of the founders of the Botanic Garden at Tranquebar, and sent many new plants to Dr. Roxburgh. The whole are formed of species which have little beauty, but the fruit of both the species of *Johnia* is eatable.—*Eng. Cyc.* Wight gives Salacia macrosperma, 962; multiflora, 962; oblonga.; pomifera, 55; prinoides, 321; and verrucosa, 662.

(7308) SALEP. ORCHIS MASCULA. Lin.

Salib misri, ARAB & DUK.	Salamisrie, TAM.
Salep, FR.	Salep Misree, GUZ.
Salem Misree, TAM.	HIND. PERS.

The tubers of the *Orchis mascula* receive this name in works on pharmacy. They are compressed, ovoid, rather transparent, and composed chiefly of bassorine, soluble gum, and starch. Royle states that one drachm of the powdered root requires 60 drachms of boiling water to affect its solution; two drachms afford a sufficient meal for an invalid; good salep carefully prepared is in truth one of the best articles of diet a convalescent can use. In India the salep of Cashmere is reckoned the best, and is obtained chiefly at the Hurdwar fair from the Cashmere merchants. Lindley and Royle consider the plant which produces this salep to be an *Eulophia* not an *Orchis*. This substance, from the peculiar shape of the tubera, has gained immense, but most unmerited celebrity as an aphrodisiac remedy. The same circumstance has given the plant its name both in the Greek and Arabic language.—*O'Shaughnessy, page* 653. At the Madras Exhibition of 1855, there were three samples of "Salep misree" contributed by Dr. Riddell—"one" and "two", labelled "Salep misree" from the Kunner Hills near Aurungabad—sold when green, and fresh dug up, at 2 pice per seer: "three" was from Booldanah Hills in Berar—when fresh dug is sold by the bheels at 12 seers for the Rupee. These small dried tubers of terrestrial orchids were hard, and had a horny appearance, the two first were dirty green and the third of a yellowish white color. The Salep contains a gummy principle (Bassorine) beside the large proportion of amylaceous matter, which renders it highly nutritious as a diet for invalids. Dr. Riddell's price is considerably lower than that in the bazar of Madras.—*M. E. J. R.* Although that imported from the Persian Gulf is also much esteemed, and is the sort generally met with, salep is indigenous in some parts of the Western Presidency, but for want of cultivation, the tubers are scarcely worth the trouble of procuring.—*Faulkner.* Native practitioners consider Salep as a powerful strengthener of the body, and prescribe it in conjunction with mastich and some other ingredients, in such cases as require tonics.—*Ains. Mat. Med. p.* 40. This nutritive mucilagin-

ous substance is obtained from the subterraneous succulent roots of several species of orchis, especially *Orchis mascula*, thus forming one of the few exceptions to the general rule, that orchidaceous plants, which charm and astonish by their elegant, varied, or grotesque forms are without known utility to man. Salep is a powder prepared from their dried roots ; in some cases, as in that imported from India, it is in hard clear pellucid inodorous pieces. There is not much demand for this substance, although it is considered a bland and nutritious article of diet, taken with milk, in the same way as arrowroot. The orchis which yields it thrives well in England, but is not cultivated to any extent.—*Tomlinson.*

(7309) SALICINE, a peculiar, crystallizable, bitter principle, obtained from the leaves and young bark of the poplar, willow, aspen, &c. It forms small white silky needles, and in some respects, resembles the vegeta-alkalis, cinchona, and quina, having febrifuge properties ; but it differs from them in containing no nitrogen, and not forming salts with acids. Its formula is said to be $C_{26}H_{18}O_{14}$.—*Tomlinson.*

(7310) SALICORNIA. Of this genus, Wight gives, in Icones, Salicornia brachiata, 738; *fruticosa*, 738 ; *herbacea*, 738 ; and Indica, 737.

(7311) SALICORNIA INDICA.

Jidoo Paluug, Beng.

A plant very common on such salt grounds as are inundated by the spring tides. It is especially plentiful on the coast of Coromandel, and would doubtless yield a fine and cheap carbonate of soda. But the probable value of this article as an Indian export has been much depreciated by the progress of chemical science in Europe. The purest alkali is now manufactured in England by decomposing common salt by sulphuric acid, and at the low rate of 10*l.* the ton of 30 maunds.—*Eng. Cyc.*

(7312) SALISBURIA, a genus of Plants belonging to the natural order *Taxaceæ*, named in honour of R. A. Salisbury, a modern botanist of distinction. The tree, which is the only one of the genus, has long been known by the Japanese name Gingko. The genus is characterised by having monœcious flowers. The male flowers disposed in a filiform naked catkin, without calyx or corolla ; stamens numerous ; the anthers composed of 2 cells, which are pendulous, and united only at the apex. Female flowers solitary and terminal; calyx 4-fid, or rather a cup-shaped disc, from the thickened apex of the peduncle, surrounds the base of the solitary ovule ; fruit forming a drupe, which has its base supported by a fleshy cup, with a juicy white pulp ; seed nut-like, with an osseous shell ; kernel white ; embryo axillary, dicotyledonous, radicle above.—*Eng. Cyc.*

(7313) SALISBURIA ADIANTIFOLIA, the Gingko, grows naturally in Japan, is much cultivated in China, and is found in many gardens in Europe. Fine old specimens may be seen at Kew and in the Apothecaries' Garden at Chelsea. In congenial climates it attains the size of the walnut. It is remarkable for the form of its leaves, which are wedge or fan-shaped, deeply cut in the centre or bilobed, and finely striated with veins, having some resemblance to the leaves of some species of *Adiantum*, whence it is commonly called Maiden-Hair Tree in England. The pulp of the fruit is austere tasted, but the kernel is sweet, with some degree of bitterness when raw, but agreeable as a dessert when roasted like chestnuts. They are much eaten in China. Dr. Abel says he saw the fruit exposed in the markets in China, but could not find out to what purpose it was applied.—*Eng. Cyc.* In one of his journey's, here and there, on his way Mr. Fortune met with large trees of the *Salisburia adiantifolia*, which are the largest and most striking trees in some parts of the country, —*Fortune's Wanderings, page* 248 ; In the following page, he says that the only tree which he met with of very large size in this district is the Salisburia adiantifolia, commonly called the Maiden-hair tree from the resemblance its leaves bear to a fern of that name. This is one of the plants which the Chinese are fond of dwarfing, and it is, consequently, often seen in that state in their gardens. Its fruit is sold in the markets in all Chinese towns by the name of "Pa-Hwo", and is not unlike dried almonds, only whiter, fuller, and more round. The natives seem very fond of it, although it is rarely eaten by Europeans. The weeping willow, apparently the same species as we possess in England, is also common on the sides of all the rivers and canals, as well as in the gardens of the Chinese ; and there is also a species of elm but it never attains any great size and can therefore be of little value.—*Fortune's Wandering, page* 129.

(7314) SALIX. Of this genus, Wight, in Icones, gives Salix ichnostachya, 1963; and tetrasperma, 1954. Dr. O'Shaughnessy carefully examined Salix Tetrasperma, the only willow found in lower Bengal, but could not detect in it any trace of salicine. *Salix babylonica* and *Ægyptiaca*, (Khilaf bhulkee, *Arab.* Bed mooshk, *Pers.*) occur in gardens in Upper India. Salix Lindleyana, or dwarf willow, occurs at 12,000 to 13,000 feet on the Himalayas—S. chita and rotundifolia in Kunawur ; a kind of manna, *bed-kisht*, is said to be collected from the willows in Khorasan.—(*Royle.*)—*O'Shaughnessy, page* 606.

(7315) SALIX ÆGYPTIACA.

Bed-e-mnsk. Pers.

Is cultivated at Lahore for the distillation of an aromatic water, prepared from the palms of this kind of willow, which is much used in

the hot season.—*Thirty-five years in the East by Dr. Honig. See. Vol.* I. *p.* 165. *p.* 339.

(7316) SALIX BABYLONICA. WEEPING WILLOW.

Bet Mujnee Khilaf bhulkee, Seilee Mujnoo, HIND.

Mujnoo is cultivated in gardens at Ajmeer.—*Genl. Med. Top. p.* 210.

(7317) SALIX TETRASPERMA. A peculiar species of willow is common at Rangamally in the Terai which is a singular fact, as the genus is characteristic of cold and arctic latitudes, and no species is found below 8000 feet elevation on the Sikkim mountains, where it grows on the inner Himalaya only, some kinds ascending to 16,000 feet.—*Hooker. Him. Jour. Vol.* I. *page* 400.

(7318) SALMALIA MALABARICA. SYN. BOMBAX MALABARICUM: also SALMALIA INSIGNIS. Red Cotton tree.

Poola marum, TAM. | Booraga, TEL.
Moollelavoo, CAN. |

A large common tree, flowers of a beautiful red colour, the wood light, and spongy used by Moochees in their work, but very inferior.—*M. E, J. R.* Salmalia Malabarica is common about Nelambore where it is used for building.—*McIvor.* In Tenasserim, the red cotton tree is one of the most abundant forest trees, and the silky down that envelopes the seed is used to stuff mattresses and pillows and has occasionally been made into cloth. There appear to be two species, but I can refer to the description of one only.—*Mason.*

(7319) SALPIGLOSSIS. SCROPULARINEÆ. This genus of showy plants require much care in their cultivation, the situation in which they are grown should be sheltered and partially shaded, for if exposed to the sun they become withered and die suddenly, the colours are purple, red, white, and variegated. When grown in pots, it should be frequently shifted into pots, only a little larger than the previous ones, so as to make the plants bushy, the soil should be loam mixed with sand.—*Riddell*

(7320) SAL PRUNELLA. A term applied to cakes or balls composed of fused saltpetre.

(7321) SALSOLA, a genus of plants belonging to the natural order *Chenopdiaceæ*, so named from 'salsus,' salt, in consequence of many of the species yielding kelp and barilla. The species are chiefly found on the sea-shore in temperate parts of the world, and also in hot parts of the world where the soil is saline, or where there is salt water in the vicinity. The genus is characterised by having perfect flowers; the perianth 5-cleft, persistent, enveloping the fruit with its base, and crowning it with its enlarged scariose limb; stamens 5; styles 2; embryo spiral; herbs or small shrubs, smooth or pubescent; leaves alternate or opposite, roundish seldom flat; flowers axillary and sessile.—*Eng. Cyc.*

(7322) SALSOLA INDICA.

Ella-kura, TEL.; Oomarie-keeray, TAM.

This with Salicorneæ, and others, are natives of the salt marshes and grounds near the sea, flowering the greater part of the year. The green leaves are universally eaten by all classes of natives who live near the sea, and are reckoned very wholesome. The leaves of this plant alone saved many thousand lives during the famine of 1791-2-3. *Roxb.* vol. ii. p, 63.—*O'Shaughnessy, page* 525. A small procumbent weed, with linear shaped leaves used as greens, a very pleasant vegetable.—*Jaffrey.*

(7323) SALSOLA KALI, Saltwort, so named from yielding barilla or kali, that is, alkali, is found on the coasts of Europe, and of many parts of the world, and is one of the species which is burnt for the purpose of yielding kelp and barilla.—*Eng. Cyc.* The *Salsola Kali* of Europe, and the colder parts of Asia, is mostly found on sandy shores, or arid deserts; an annual bushy plant, with stiff thorny channelled leaves. The dried plant, when reduced to ashes, yields 25 to 30 per cent. of carbonate of soda.—*O'Shaughnessy, page* 526.

(7324) SALSOLA NUDIFLORA.

Rawacada, TEL.

Is a native of salt barren lands near the sea, and flowers during the greater part of the year. The stems are perennial, many-spreading, close upon the ground, and often striking root, ramous, extremities of the branches ascending. The plant is only used for fuel, but Roxburgh believes it would doubtless yield excellent soda.—*O'Shaughnessy, page* 525. Dr. Roxburgh describes *Salsola nudiflora* as a native of salt barren lands near the sea in India, where it is gathered for fuel only; but as the taste is strongly saline, it would no doubt yield good fossil alkali; and he gave it as his opinion that this plant, with two Indian species of *Salicornia*, might be made to yield barilla sufficient to make soap and glass for the whole world.—*Eng. Cyc.*

(7325) SALSOLA SATIVA is a species found on the southern coast of Spain, where some pains are taken to extend both it and the following species by cultivation, for the purpose of yielding barilla when burnt. The crop is cut in September, and laid in small heaps to dry. These heaps are collected and burnt, forty or fifty of them, in a hole in the ground. The *Salsola sativa* of Spain is equal to last species.

(7326) SALSOLA SODA is found on the southern coast of Europe, and in the north of Africa. Merat and Delens conceive that the species which yields the soda of Alicant is a new

species, and not yet described, which they propose calling *S. Beril.* Other species are described by Forskal as yielding soda on the coasts of the Red Sea.

(7327) SALSOLA SPINESCENS. —*Wight* 1795.

(7328) SALT, MURIATE OF SODA, CHLORIDE OF SODIUM.

Melh, ARAB.	Sal, LAT.
Uyah, BALI.	Gharam, MAL.
Yen, CHIN.	Meet, MAH.
Loonoo, CYNG.	Nun, Shora, PERS.
Zout, DUT.	Sal, PORT.
Sel, FR.	Sol, RUS.
Salz, GER.	Lavana, SANS.
Nemuk, GUZ. HIND.	Sal, SP.
Sale, IT.	Ooppoo, TAM.
Uyah, JAV.	Lawanum, TEL.

Well known as a seasoner and preserver of food from the earliest ages. Two kinds are distinguished, *Rock* and *Sea* salt. When found native in immense masses, which only requires to be dug and reduced to powder, it is termed rock salt; and when obtained by the evaporation of sea-water, common or sea-salt. Sea-salt is extensively manufactured on the Sea-Coast of Madras and is exported in great quantities to the Malabar Coast, Calcutta, Penang, &c.—*Faulkner.* It is manufactured on account of the Indian Government at many places along the coast: the process is not everywhere exactly the same, but generally the sea water being raised by means of packottas is run into shallow beds or pans and evaporated: additional water being added as the evaporation goes on. The salt is raked to the side and conveyed to platforms or raised places where the salt is heaped in quantities of ten or more garce. In some places, a proportion of the salt water is obtained from wells dug near salt creaks; in others the salt water is dammed up in the mouths of rivers, where it is partially evaporated for sometime before being run into the pans. In Bengal the sea water is generally evaporated by boiling.—*Rohde M. S. S.* At the Madras Exhibition of 1855, there were fourteen specimens of common *Salt* exhibited. In one locality, the Salt formed on an extensive plain to the South after the evaporation of the water driven on by the South winds, is very white, the crystals remarkably perfect and of a large size. The Salt of the Vizagapatam coast is particularly fine. That of Vizagapatam is inferior, but at Nowpada the crystals are large and pure, and so hard do they become when stored, that, according to the officers of the Salt department, sparks of fire are elicited from the old heaps, when they are broken up for sale with a crowbar.—*M. C. C.*

(7329) SALTPETRE, NITRATE OF POTASH. NITRE. *Prismatic nitre.*

Ubkir, ARAB.	Sandawa, Mesiumentah, MAL.
Wedie Loonoo, CYNG.	Salpeter, DUT.
Nitre, FR.	Salpeter, GER.
Sooriakhar GUZ. II.	Nitro, IT.
Nitrum. Potasse Nitras, Sal Petræ, LAT.	Shora, PERS.
Nitro, PORT.	Senitra, RUS.
Yava kshra, SANS.	Nitro Salitre, SP.
Potti-loopoo, TAM. & TEL.	

A salt composed of nitric acid and potash. It may be regarded both as a natural and artificial product; being found on the surface of the soil in many parts of India, Egypt, Italy, &c. But in these and other places, all that is known in commerce is obtained by an artificial process, or by lixiviating earth that has been formed into nitre beds. From Bengal and Madras, saltpetre has been largely shipped to England; and of late years it has also formed an article of export from Bombay to England and the Continent. It is used for making gunpowder, signal-lights, nitric and sulphuric acids, in metallurgy, dyeing, and medicine. *Faulkner.*—At the Madras Exhibition of 1855, eight good samples were exhibited, the jury considered that exhibited by Mr. Ouchterlony to be the best, and awarded to him a 2d Class Medal —the next and almost equally good, being that of Mr. J. Rundall, Razole, Rajahmundry—to whom the jury awarded honorable mention. The specimens of commercial Saltpetre examined in Madras have, generally speaking, been very pure, and especially free from "*Sulphates.*" Saltpetre in Southern India, is made at Moganore and Errode. Saltpetre of a very fine quality is made at Ellore. The native name of the town is *Oopoo Ellore*, shewing that it has long been famous for this mineral at 1 Rupee the maund, very good, but they produce a twice boiled Saltpetre at 2 Rupees which is very superior. Saltpetre is found in some of the caves of Tenasserim and is imported from Rangoon.—*Mason.* Marsden referring to the saltpetre caverns in the country of *Caltoun* near the land of the *Davi* river, in Sumatra Researches, states that these caves are filled with nests of innumerable birds of the swallow kind which abound the more the further one advanced into the cave and that it was their dung forming the soil (in many places from four to six and even from fifteen to twenty feet deep) which affords the nitre. A cubic foot of this earth produced on boiling 7 pounds 14 ounces of Saltpetre and a further experiment gave one ninth more.—*Rohde M. S. S.* See POTASH, NITRATE OF.

(7330) SALVADORA INDICA. Royle, p. 319.

Jal, HIND. | Irak, also Miswak, PER.

Mahomedan tooth brush tree; leaves, *Rasuna.* Found on the banks of the Jumna, and from Delhi to Saharunpore. The leaves resemble the lanceolate senna, and are also purgative; the fruit is called *Peel* and *Pinjood*, and is said to be eatable. It is not known whether the root bark possesses the same acrid properties as in the

succeeding species. We deem both the plants highly deserving of further investigation.—*O'Shaughnessy, page* 527. *Salvadora Indica*—the tooth brush tree, grows also in the Punjab. The leaves, *Rasuna* resemble the lanceolate senna, and are purgative; the fruit is called *Peel* and *Pinjood*. The twigs of this tree are used as tooth-brushes.—*Thirty five years in the East, by Dr. Honig. p.* 339.

(7331) SALVADORA PERSICA. *Syn.* CISSUS ARBOREA, *Forskal.* Persian Salvadora.

Piloo-Kurjal, HIND.

Salvadora Persica, the Mustard-Tree of Scripture, has a succulent fruit with an aromatic smell, and tastes like garden cress. The bark of the root is extremely acrid; bruised and applied to the skin, it soon raises blisters, for which the natives of India often use it.—*Eng. Cyc.* It grows in most parts of the Circars of India, also in Arabia, and the Persian Gulf. Thrives well in every soil, and is in flower and fruit all the year round. Trunk generally crooked, from eight to ten feet high to the branches, and one foot in diameter. The bark of the root is very acrid, and if applied to the skin soon raises blisters; it promises to be a stimulant of very great power.—(*Roxb.*) It is supposed to be the mustard tree of Scripture (*Lind.*); a decoction of the bark of the stem is said to be tonic, and the red berries eatable. —*O'Shaughnessy, page* 526. It is a very common tree in Ajmeer and Marwar. The bright green of the leaves is very refreshing to the eye, as the tree grows in very barren places; it is generally semi recumbent on the ground, and affords little shade. The leaves and bark are very acrid, smelling very strongly of cresses; the freshly pounded bark of the root is an active epispastic and though not known as such to the natives of Ajmeer, Dr. Irvine employed it successfully.—*Irvine.* An excellent solid oil, of a bright green color, is obtained from Bombay, having a consistence intermediate between that of tallow and wax, fusible at about 95 degrees, and easily bleached. It has a peculiar and somewhat aromatic odour. There is some uncertainty as to the plant from which it is obtained. It was referred to the Salvadora persica, and to the Vernonia Anthelmintica, a plant common in Guzerat and the Concan Ghats.—*Simmonds.*

(7332) SALVADORACEÆ, a natural order of Monopetalous Exogenous Plants, comprising only one genus, *Salvadora.* It is characterised by possessing a superior ovary, regular flowers, single carpel, single style with a simple stigma, and a 1-celled fruit with a single seed. The position of the genus *Salvadora* has always been doubtful: by one author it has been referred to *Chenopodiaceæ*, although it has a monopetalous corolla; by others it is referred to *Myrsinaceæ*, from which it differs in the position of its stamens and the structure of the ovary and seeds. It is most nearly allied to *Plumbaginaceæ* and *Plantaginaceæ*; with the former it agrees in habit, and with the latter in the number of the parts of the flower, its membranous corolla, and simple style. They are Indian and north African plants, with eatable fruit.—*Eng. Cyc.*

(7333) SALVIA. There are very numerous species of this genus, which correspond very closely in their properties; one, the *S. amarissima* is excessively bitter.—*O'Shaughnessy, page* 488.

(7334) SALVIA BENGALENSIS. BENGAL. SAGE. Roxb. Fl. Ind. i, p. 146.

(Murtoo) BENG *Meriandra bengalensis* (Bentham). Common in Bengal and Coromandel, much stronger than the officinal sage,—a straggling shrub with a trunk often as thick as a man's arm.—*O'Sh. p.* 488. It is cultivated in European gardens at Ajmeer: the Hindoos think this a very impure plant.

(7335) SALVIA BENGALENSIS. ROTTLER.

Saya cliey, TAM.; | Yelaitie Cafoor ka paat DUK.

(7336) SALVIA COCCINEA. This, as with all this very extensive genus chiefly of extremely showy flowering plants of every variety of color, is well worthy of cultivation; the plants may all be grown from seed in any good garden soil at the commencement, or after the rains.—*Riddell.*

(7337) SALVIA GLUTINOSA, vegetates on the mountains of Cashmere, but is not used.—*Honigberger.*

(7338) SALVIA MOORCROFTIANA, is found plentifully growing in the valley of Cashmere; its seeds are officinal, both at Cashmere and Lahore.—*Thirty five years in the East by Dr. Honig. p.* 339.

(7339) SALVIA OFFICINALIS. SAGE.

Salbia HIND.

A slightly aromatic, shrubby, but dwarfish plant, of somewhat bitter and very hot, aromatic, and slightly astringent flavour. These qualities are retained on drying. It affords on distillation with water a large quantity of essential oil, containing 26 per cent, of camphor.—*O'Shaughnessy, page* 487. *Sage* is used for stuffings and flavouring various dishes: culture difficult to manage, but some of the Indian varieties might be more useful.—*Jaffrey.*

(7340) SALVINIA CUCULLATA. This curious little floating plant, related to the ferns, of the genus Salvinia is often seen on the surface of old tanks and stagnate waters in Tenasserim, —*Mason.*

(7341) SAMADERA, a genus of plants belonging to the natural order *Simarubaceæ*, which was named by Gærtner, though the origin of the name is unknown. The genus, though containing but few species, includes *Vittmannia* of Vahl and *Niota* of Lamarck. The genus is characterised by having bisexual flowers; calyx 4-5-partite: petals 4 5, much longer than the calyx;

stamens 8-10; ovaries 5-seeded, on a short stalk-like gynophore; styles. Fruit of one or more carpels, usually drupaceous. The genus is composed of trees or shrubs, with simple alternate and reticulately-veined leaves. Peduncles are axillary or terminal, pendulous when in fruit and divided at the apex into a 5-12-flowered umbel. *S. tetrapetala* is a shrub, 10 feet in height, a native of Madagascar. *S. lucida* (*Niota lucida*) is another shrub, figured by Dr. Wallich ('Pl. As. Rar.,' t. 168), from Amherst, on the coast of Martaban. *S. Indica* (*S. pentapetala* of authors) is a large tree, a native of Southern India, especially on the Malabar coast; the fruit and bark are intensely bitter, like that of the other plants of the Quassia family. Nicpa Bark, an Indian febrifuge, is obtained from this species.—*Eng. Cyc.*

(7342) SAMADERA INDICA. This tree is common throughout the Southern Concan.—*Eng. Cyc.*

(7343) SAMADERA LUCIDA. Samadera. The low grounds near the sea coast of Tenasserim are ornamented with a handsome shrub which is a species of Samadera, and bears a rather curious flower. Like the quassia of the same tribe, its leaves are most intensely bitter, and may perhaps possess the virtues of quassia. Wight says it is cultivated in the gardens about Batavia; Mr Mason has never seen it out of its native jungles on this Coast.—*Mason.*

(7344) SAMBUCUS NIGER, is unknown to the Lahore native doctors. But Sambucus adnata and S. Ebulus (Dwarf elder) are found growing in the Himalayas as well as in Cashmere. The roots of the latter, it is said, have purgative properties, and, as also the berries, are used in dropsy.—*Thirty five years in the East by Dr. Honig. p.* 340.

(7345) SAND. This name is popularly applied to any comminuted minerals, but, properly belongs to granular quartz, silica, or flint, the chief ingredient in the sands of the deserts, sea-shores, river banks and soil. Sand is produced by the disintegration of rocks, and its colour, which is generally imparted by oxide of iron, may be red, white, grey, or black. The pure colourless sands are much in request for the manufacture of glass. Sand is also used for making mortars, and for filters, and in the operation of *Casting* and *Founding*. Sand is also used in sawing and smoothing building stones and marbles, and in many other grinding and polishing operations. River and pit sand are usually sharper than sea sand, for this has been rounded by attrition. The washed scrapings of roads which have been repaired with flints furnish the sand used by stone masons *Grindstone dust* is a form of sand useful for some puposes; it cuts deeper than *Flanders brick*, which is another form in which sand is used. Grindstone dust is formed during the turning of the grindstone into form.—*Tomlinson.*

(7346) SAND BINDING PLANTS.

(7347) *Spinifex Squarrosus.* Linn. The species known to Europeans by the designation of "Ground Rattan" also called "Sea Pink," Ground Rattan. These names are both popular misnomers, the correct designation is "Spinifex" of Botanists. The Tamil name, *Ravnen mise*, i. e. Whiskers of Ravanah, is a descriptive epithet, This comes nearest to the *Sand Carex* of England in its habit of growth, creeping along horizontally, sometimes above, sometimes below the surface of the earth, emitting roots and shoots at short intervals of a few inches. It likewise possesses the advantage of being extremely tenacious of life; the shoot at every node is capable of renewing the existence of the individual as fast as destroyed, and the whole plant offers a resistance to the effects of a storm which is rarely overcome. This species would be nearly as indestructible from natural causes as Couch grass, and would speedily colonize the sand tracts spontaneously, if it were only left unmolested for a year or two.

(7348) *Ipomœa pes-caprœ*, Sweet.
Mosul Tayhe, Tam.

Goat's foot leaved *Ipomœa*, (also known as "Rabbit weed"). Perennial, creeping to a very great extent. Stems rooting at distant intervals. Leaves smooth, long petioled, two lobed, like those of *Bauhinia*, tipped with a *mucro*. Flowers large, reddish purple, very handsome. Common on the sandy beach north and south of Madras, where it is of great use in binding the loose sand, and in time rendering it sufficiently stable to bear grass. This fine creeper is equally abundant in both peninsulas, and is also a native of Mauritius, Macao, &c., occupying the place of *C. Soldanella* of the British coast, and a more striking and beautiful species of the Tropical Bind weeds is rarely seen. Rabbits, goats, and horses eat it, so do cows, but their milk is tainted. Great difficulty occurs in raising this plant in the vicinity of houses as the inhabitants tread it down, and cattle nibble the tender shoots. It naturally takes a higher position on the sand-bank than the Spinifex, and suffers less injury during a storm, but they often grow together and conjointly effect much benefit. The Spinifex arrests the drifting sand, and the Ipomœa secures what the former collects. Mr. Caddell has planted it most extensively along the Canal banks near Tranquebar.

(7349) *Canavalia obtusifolia* D. C.
Koyli avaree, Tam.

Common on the sea-shore, frequently entwined with the last named binder, is also a very useful plant, and is very abundant at the Adyar, Ennore, the mouth of the Godavery, and between Quilon and Anjengo.

(7350) *Hydrophylax maritima*, Linn. Seaside *Hydrophylax*. A straggling herbaceous plant, native of the shore of Coromandel, where it shows its pale lilac blossoms great part of the year. The branches run over the sand, sometimes under the surface, and strike root at the joints. It answers well when the sand is moist.

(7351) *Microrhynchus sarmentosus*. Wight. A widely diffused humble plant, common along the sea beach, with long flagelliform runners; but may not possess sufficient strength to effect the object in view. It is well figured in Wight's Illustrations, Vol. II., t. 133. (Plate No. 5).

(7352) *Pupalia orbiculata*, Wight. *Achyranthes orbiculate*, Heyne, Wallich, *Cyathula orbiculata*, Moquin.

Adai Yotti, TAM.

Occurs on sandy soils near the sea beach, abundant at St. Thome, and near the mouth of the Adyar River. It is an extensively spreading procumbent plant, the branches being often several feet long; bristles attaching themselves to the clothes of passengers, cling to them with tenacity.

(7353) *Pandanus odoratissimus*, Linn. (Kaldera bush.)

Taylic Marm, TAM.

A large spreading ramous shrub, often planted in belts, but takes up much room, forms dense thickets, and harbours venomous reptiles. The lands in which Chay Root is cultivated are often protected from drift sand by means of this shrub. It is a *very strong binder*, but is objectionable from its raising sand-hills.

(7354) *Ehretia arenaria*, Sand Ehretia Griffith, which is found between 12° and 28° N. L. binds together loose sand, in a minor degree. It may be the same as Ehretia (X) cuneata? Wight Icon. Vol. IV. t. 1385 which grows on sand banks in the beds of all our rivers.

The above are the sand-binding plants most frequently noticed along the Coromandel beach. There are others as *Pedalium murex*, *Ipomœa pes tigridis* and *Sesamum prostratum*, &c., which co-operate in the work of conservation to a minor extent, but are less widely diffused along the coast; also Fagrœa Coromandellia. Trees such as the Cashew (*Anacardium occidentale*) the Alexandrian Laurel (*Calophyllum Inophyllum*) and the wild Date (*Phœnix sylvestris*) grow well, and render a double service by preventing a further encroachment of sand, and rendering the land useful.—*Cleghorn.*

(7355) SANDA. A sort of Lizard. It is distilled in Ajmeer and the product applied by Mohammedans, to the penis: the reptile is also eaten as an aphrodisiac.—*Gen. Med. Top. p.* 151.

(7356) SANDAL WOOD. SANTALUM ALBUM. SANDAL WOOD TREE. and its WOOD.

Chandana, HIND BENG.	Kat chundan, HIND.
Aikamenil, TIMOR.	Tan Muh, CHIN.
Ayasra, AMBOIN.	Cayhundahu, COCH-CHIN

Sundel Abiez, ARAB.	Sundul, DUK.
Chandana, BENG.	Sandalo, IT.
Srigunda, CAN.	Tsjendana, MAL.
Tan-muh CHIN.	Sundult Suffaid, PERS.
Cayhu-ynhdau, COCHIN-CHIN	Chündron chandana, Malayaja, SANS.
Sandoon, CYNG.	Chandanum. Shandana-Cuttay, TAM.
Sandale, FR.	Chendanum, TEL.
Sundul, Sookur, GUZ. & HIND.	*Faulkner.*

Sandal wood is much used among the Chinese in cabinet work, and in the manufacture of fans and other ornamentnl works. One kind is the produce of a small tree (*Santalum album*) growing in India and Ceylon, which gives its title to the natural order of plants called *Santalaceæ* or Sandalworts. The sandal-wood of the Sandwich islands is from two other species of the same family, *S. Freycinetianum* and *S. paniculatum*. In the native medical practice of India, Sandal-wood furnishes a sedative cooling medicine: it is also largely employed as a perfume in the funeral ceremonies of the Hindoos. By the Chinese it is ground into powder and used as a cosmetic. The bark affords a beautiful red dye, but so fugitive as to be useless. The tree grows freely among the mountains of Malabar, near the sea coast, whence Calcutta obtains her supply of sandal wood, and in Timor and the Feejee islands, from which China derives her chief supply. The tree is cut down when about 9 inches diameter at the root; it is then cleared of its bark, and cut into logs, which are buried for six weeks or two months in order that the white ants may clear off the outer wood; this they do most effectually, without touching the heart of the tree, which is the only valuable part. Sandal-wood should be of a fine deep yellow brown, and highly perfumed. The average importation of this wood into Calcutta is 200 tons per annum. The Chinese imported an amount of sandal-wood in 1838 worth about one hundred and fifty-thousand dollars, but this is said to be doubled in some years. The supply to Europe is very small and chiefly derived from that which has been brought over by individuals without a view to commerce.—*Tomlinson.*

An aromatic wood obtained from a small tree (*Santalum album*); resembling the myrtle, found in Malabar, Timor, and in the Sandwich and Feejee Islands. It is much used in India and China for burning in temples, for cabinet-work, toys, fans, and perfumes. Sandal wood is imported into Bombay from the Malabar Coast, and is re-exported to China, England and Calcutta. A description of white sandal wood, termed (*Vern*) Lava or Lawa, is imported into Bombay from Zanzibar, and is applied to the same purposes as Malabar sandal wood. The wood is extensively employed as a perfume in the funeral ceremonies of the Hindus. The deeper the colour, which is of a yellow-brown, and the nearer the root, the better is the perfume. Malabar produces the finest sandal

wood but it is also found in Ceylon, and the South Sea Islands. It is imported into England in trimmed logs from 3 to 8 and rarely 14 inches diameter, the wood is in general softer than box-wood, and easy to cut. It is used for parts of cabinets, necklaces, ornaments, and fans. The bark of the sandal-wood gives a most beautiful red or light claret coloured dye, but it fades almost immediately when used as a simple infusion, in the hands of the experienced dyer it might, it is supposed, be very useful—*Tredgold.*

Two species of this wood are however known in commerce—the *white* and the *yellow*. Ainslie states, and his opinion is generally received, that both are from the same tree, the former being the outer layers of the wood.

The *white sandal-wood* is coated with thick, compact bark, having a grey and brownish epidermis; the wood is very hard, heavy, susceptible of a fine polish. It occurs in billets of middling size, is nearly inodorous, its taste being slightly bitter.

The *yellow*, or *citron sandal-wood*, is straight or twisted, lighter than water when taken from the trunk, heavier if from the roots in yellow, fawn-coloured, or reddish billets, slightly shining, of middling hardness, taking a fine polish, and being very easily cleft.

The odour of this wood is very strong, rose like, and enduring, its taste slightly bitter. The wood of the *Plumelia alba* is occasionally substituted for the true sandal. The odour is due to the presence of an essential oil, heavier than water, readily congealed, and having a peculiar sweet smell. Sandal-wood is extensively used by cabinet-makers for the fabrication of various articles of ornamental furniture. The oil is employed by the European perfumers, and in India is very extensively used for the adulteration of attar of roses. The wood in powder is given by the native physicians in ardent remitting fevers, and supposed to be sedative and cooling; with milk it is also prescribed in gonorrhœa. (*Ainslie.*) The powder is rubbed on the skin to ally the irritation of musquito bites, of prickly heat, and other cutaneous disorders.—*O'Sh. page* 532. Sandal wood grows in the islands of the Malay Archipelago but more especially in Timor and in the island which takes its European name from it. From these it extends to the South sea islands, having been found in the Fijie, Marquesas and Sandwich group. The Chinese consume it largely as an incense, perfume and fancy wood.—*Crawfurd, p.* 375. It is often elegantly carved. At the Madras Exhibition of 1855, a box exhibited by Mrs. Wilkieson, was undoubtedly the best specimen of the sandal wood carving. The figures and ornaments were taken from the sculptures in the celebrated temple of Hullabede in Mysore, they were boldly and deeply cut and well finished. The work was executed under the direction of Captain Cunningham of the Mysore Commission and was carved by a native of Soorub, from careful drawings prepared expressly for the purpose. Some very creditable specimens of carved sandal wood were exhibited by the Bangalore Local Committee, of these the most deserving of notice are two large and two small boxes carefully finished and varied in the design; but not so bold in relief as the box from Soorub. The Bangalore Local Committee also exhibited two rosewood carved boxes, very similar in design to those made of sandal wood. The ornaments were all floriated without figures and clearly cut, but the general effect of the work was spoilt by the deep ground work being dotted instead of being left flat. The Canara Local Committee contributed a well carved sandal wood chess table, a model of a Hindoo car, and some neatly finished boxes, one of which was inlaid with ivory and metal. Mrs. James Fraser exhibited two card cases and a work box carved at Ganjam, a district where the manufacture has been recently introduced. Well carved sandal wood chowries were exhibited by Lady Montgomery, and the Madras Local Committee. Mr. Meppen contributed sandal wood bracelets and crochet needle holders made near Cuddoor in Mysore, and Mrs. Bourdillon a box containing sandal wood knitting pins and silk winders. The art of carving in sandal wood though creditable to the Natives of India, as evincing care and laborious industry, owes its chief value to the quaintness of the designs and the elaborate nature of the work. As a branch of the fine arts it can hardly be ranked under the head of carving, as many of the specimens are little more than ornamental surface, showing much of the plain rectangle in the leading forms and little originality of invention.

The art in India, is still susceptible of great improvement. Some neatly finished writing books, card cases and inkstands of sandal wood, inlaid with Ivory, Ebony, and Metal, were contributed by Mr. G. Leonard of Chicacole, were interesting specimens of an Indian manufacture, for which there is an increasing demand. Bombay had hitherto been the chief market for this manufacture, but it is now carried on at Chicacole, Hyderabad, and Vizagapatam. Some creditable specimens of inlaid fancy woods were exhibited by the Travancore Local Committee; the best of these were a lady's workstand with silk winders, and a backgammon board. A carved cocoanut cup mounted in silver exhibited, was deserving of notice.—*M. E. J. R.*

(7357) SANDALWOOD OIL. SANTALUM ALBUM.

Chundana yennai, TAM.; Sundal-ka-Teil, HIND.

The oil of sandal wood is highly valued as a perfume by the natives of India; and is employed in the adulteration of otto of roses. It is chiefly made on the Malabar Coast, whence it is brought to Bombay, and re-exported to England,

China, and the Arabian and Persian Gulfs. The exports from Madras, amount annually to about 100 cwt. Sandalwood oil and the large variety of utturs, &c., which form the principal part of native perfumery are included in this class.—*M. E. J. R.*

(7358) SANDARACH.

Sandroos, Arab, Zoos, Arab.

A resinous substance met with in round or elongated tears, of a whitish or pale-citron yellow brilliant, transparent and limpid, brittle under the teeth, burns with a clear flame, and emits a pleasant odour; taste resinous, and slightly balsamic. It is used as an ingredient in varnishes, and incense; when reduced to a powder, it forms the article termed *pounce*. Sandarach is obtained from Morocco.—*Faulkner.*

Sandarach is said by some writers to exude in hot climates from the bark of the common juniper-tree (*Juniperis communis*). Others state it to be produced by another tree of the pine tribe called *Thuja articulata*, but according to Brongniart and Schousboe, it is the tears of *Callitris quadrivalvis*, also a coniferous tree. Dr. Lindley says, "I have seen a plank two feet wide of this sandarach tree, which is called the "arar" tree in Barbary. The wood is considered by the Turks indestructable, and they use it for the ceilings and floors of their mosques." The resin is received in the form of loose granules or tears, whitish yellow, brittle, and having a faint resinous smell, and acrid taste. It is used dissolved in spirits, as a varnish; it is also employed as incense, and as a pounce-powder.—*Tomlinson.*

(7359) SANDORICUM INDICUM.

Theit-to, Burm.

The only species of this genus is an elegant tree of considerable size, which is found in the Molucca and Philippine Islands, as well as in the Southern parts of India. The leaves are alternate and trifoliate; leaflets entire; panicles axillary with the flowers crowded on the short partial peduncles. The fruit is acid, and sufficiently agreeable to be mixed with syrups to make cooling drinka. Its root is bitter and used in medicine in bowel complaints. It is sometimes called False Mangosteen from some resemblance to its fruit and also Indian Sandal-Wood.—*English Cyclopedia, page* 660. This timber tree is large and plentiful, both in the Rangoon and Tunghoo districts. It is one of those trees which are cultivated by the Burmese for their fruit. It is found near all large villages, but it is scarce in the forests. Wood white colored, adapted to every purpose of house-building.—*McClelland.* The Sandoricum indicum tree bears a fruit the size of an orange, occasionally called the wild mangosteen, to which it bears some resemblance. It has a fleshy acid pulp and makes a very good jelly, but has a peculiar odour. The natives of Tenasserim eat the fruit raw, and esteem it excellent.—*Mason.*

(7360) SANDSTONE, an aggregation of sands by a sort of semifusion as in quartz rock, and in common gritstone, adjoining trap dykes or great faults. In many of the white sandstones the grains merely cohere together. In the sandstones of coal tracks the finer particles of carbonate of lime, clay, oxide of iron, &c., are interposed between the grains: in other cases, as in the Hastings sandstones, an infiltration of carbonate of lime has taken place. Some sandstones are in the laminæ, plane, waved, or slightly concentric: these admit of being readily split. The freestones are not distinctly laminated, the grains being so arranged as to present equal resistance in every direction. They work *freely* under the stone saw and the ordinary picks and chisels. They can also be turned into balustrades, pedestals and vases —*Tomlinson.*

(7361) SANSEVIERA is a genus of Liliaceous plants, of which individuals are very abundant on the coast of Guinea and of other parts of Africa; also around Ceylon and other Eastern Islands, all along the Bay of Bengal, and extending thence to Java and to the coast of China. The leaves are succulent, and abound in fibre remarkable for fineness and tenacity. Dr. Roxburgh proposed that the fibres might be called *Bowstring hemp* in England, because the natives of the Circars make their best bowstings of them.—*Royle.* This genus, indeed, is remarkable for the strength and fineness of the fibres of their leaves. The genus is characterised by having a corol-like funnel-shaped perianth, which has a long rather straight tube, a sexifid limb, of which the divisions are either spreading or revolute. Stamens 6, inserted into the throat; filaments filiform; ovary 3-celled; ovules solitary; style filiform; stigmas obtuse, obscurely 3-lobed. Berry 3-celled, 3-seeded, or, from becoming abortive, 1-celled and single-seeded. The plants have a thick creeping root-stock, with radical equitant leaves, which are fleshy and often spotted; the stem-leaves are scale-like, and the flowers in racemes or thyrsi. In Britain they are easily cultivated and propagated in sandy loam in bark stoves. —*Eng. Cyc.*

(7362) SANSEVIERA LANUGINOSA, is a species, found on the sands of Malabar, while *S. Guineensis* is a species found along a great extent of the west coast of Africa, and which, from affording fibres which, like those of the Indian species, are fine and strong, has been called African Bow-String Hemp. This has been proposed as a substitute for and considered even superior to New Zealand flax. *S. Guineensis* is distinguished by having uniform lanceolate leaves, the style twice as long as the stamens; the

bracts only a third of the length of the tube of the corolla ; the flowers sessile.—*Eng. Cyc.*

(7363) SANSEVIERA ROXBURGHIANA, is a species, according to Mr. Haworth, which was confounded with S. Zeylanica, by Dr. Roxburgh, and which the latter has figured in his 'Coromandel Plants.' It has linear ensiform leaves, which are channelled, keeled, subulate at the apex, green, and longer than the scape ; style as long as the stamens ; the bracts minute. Dr. Roxburgh describes this plant, and says it is called Moorva in Sanscrit, and in Bengalee Moorba, that in English it may be called Bow-String Hemp, and that it grows very commonly under bushes in the jungles in almost every soil in the southern parts of India. It flowers from January to May. In a good soil, and where the plants are regularly watered, the leaves become three or four feet long, and contain a number of fine remarkably strong white fibres, which run their whole length. The natives make their best bow-strings of these fibres, which are separated by the leaves being placed upon a flat strong table, when one end is pressed down with the foot, and the rest scraped with a piece of hard wood held in both hands. Forty pounds of leaves thus scraped yield about one pound of clean dry fibres. The fibres may be applied to a great variety of uses. As the plant grows readily from the slips which issue in great abundance from the roots, and as they require little or no care, Dr. Roxburgh recommended their cultivation in sandy soils. It has lately been proposed in Calcutta to try the fibre on a large scale for rope-making.—*Eng. Cyc.*

(7364) SANSEVIERA ZEYLANICA. THUMB.

The Tree.

Marool,	Moorghabee,
Murle,	Dant Saga or Sago Nar.
Moorva,	

The Root

Marool Kalung, TAM.	Changa gudda TEL.
Moorgabie ka gudda, DUK.	Muroova SANS.

The Fibre.

Marool,	Moorghabee,
Murle.	Dant Saga or Sago Nar,
Moorva,	Murva, SANS.
Moorva Fibre, Marool of Madras, Bowstring Hemp, ENG	Moorga and Moorgavee, BENG.
	Marul, TAM.

Sanseviera Zeylanica, is found in Ceylon, and along the coasts of Southern Asia ; has smooth oblong-acute, flat, and linear lanceolate, channelled, glaucous leaves, which are shorter than the scape ; the style as long as the stamens, the bracts equalling the peduncle in length. This, like some of the other species, is remarkable for the tenacity and fineness of the fibres of its leaves.—*Eng. Cyc.* This plant appears to abound in most parts of the Madras Presidency, it has narrow striped leaves and resembles the Agave in some of its characters, but produces finer fibres, which are easily separated from the pulp. At the Madras Exhibition of 1855, they were contributed by the Travancore and Tanjore Local Committees, the Madras School of Arts, Mr. Jaffrey and Mr. Thorpe : several of the contributions from other localities were discolored from steeping, and one or two were dirty grey and brittle. This fibre has long been known as a useful material for cordage and it is soft, silky and pliant when well prepared It is about equal to the Agave fibre in point of strength, but as it is a finer material it might be applied to a better description of manufactures. The plant is easily propagated and yields a good crop under cultivation. It was tried against Russian Hemp, on board the *Thalia* East Indiaman, when commanded by Captain Biden, and was highly approved of : it has also been made into fine cloth. Some good thread, twine, rope and cord made from this fibre in the Madras Justice's jail, and house of correction were exhibited by Dr. Hunter, along with ropes made from the Agave, Musa, Yucca, and Calotropis fibres.—*M. E. J. R.* *Sanseviera zeylanica* is the best-known species of the genus and has been so called as being common on the Ceylon coast. From it, as above, has been distinguished *S. Roxburghiana*, common on the coasts of the Bay of Bengal, but apparently on insufficient grounds. It is figured by Dr. Roxburgh himself under its former name in his 'Coromandel Plants,' ii, tab. 184. *S. lanuginosa* is probably a distinct species, the *katu-kapel* of Rheede ('Hort. Mal,' vol xi, tab. 42), which grows on the sands of the Malabar coast. All are closely allied to each other, and to the African *S. guineensis*. Of this, the fibres have been occasionally introduced into the markets of Europe, and by some thought superior to New Zealand Flax. They have been called African Bowstring Hemp. (Royle's 'Himal. Bot.,' p. 391.) The Indian species of Sanseviera was first described by Sir William Jones, in the 'Asiatic Researches,' vol. iv, p. 271, under its ancient Sanscrit name of *Moorva*, and he says, that—"From the leaves of this plant the ancient Hindoos extracted a very tough elastic thread called Maurvi, of which they made bowstrings ; and which, for that reason, was ordained by Menu to form the sacrificial zone of the military class." Dr. Roxburgh describes the plant as common on the jungly salt soils along the coasts, growing under the bushes, and easily propagated on almost every soil, from the slips which issue in great abundance from the roots, requiring little or no care, and not requiring to be renewed often, if at all, as the plant is perennial. The leaves, when thus cultivated, are from three to four feet long. The fibre, which extends their whole length, is separated from the pulpy part of the leaves. The natives place them on a smooth board ; then press one end of the leaf

down with one of their great toes, and with a thin bit of hard stick held between the two hands, they scrape the leaf from them, and very quickly remove every part of the pulp. This can also be removed by steeping the leaves in water till the pulpy parts rot, &c. Dr. Buchanan found apparently the same plant, but which he calls *Aletris nervosa*, employed for making cordage near Bangalore. Before the leaves are beaten to separate the fibres, they are steeped in water fifteen (others say five) days, in order to rot the useless parts; but with Dr. Roxburgh the fibres became discoloured by this process. Dr. Roxburgh sent drawings of the plant and specimens of the fibre (*v.* 'Obs.,' p. 18) as early as the year 1790 to the Court of Directors, and again in 1800 by Mr. Bebb; after he had cultivated a begah (*i. e.*, third of an acre of ground) with this plant. As full grown leaves of three to three and a half feet long yielded about one pound of the clean fibre for every forty pounds of the fresh leaves, Dr. Roxburgh concluded that this plant might be cultivated with advantage. By another calculation he found that one acre would yield 1613 pounds of clean fibre and at a gathering, two of which may be reckoned on yearly, in a good soil a favorable season, after the plants are of a proper age. He also ascertained that a line four feet long, made of *moorva* fibre, bore a weight of 120 lb, when a cord of the same size, made of Russian hemp, bore only 105. The former, moreover, after 116 days' maceration, bore a weight of 30 lb., when the latter was completely rotten. Dr. Roxburgh further observes: "Should it ever become an object of culture, a less expensive and more expeditious method of clearing the fibres from the pulpy parts of the leaves, than that of the natives above mentioned, must be contrived." This seems to have been since done. For the Rev. J. Garrow, as quoted by Mr. Murray, states that, in the year 1831, during his residence in Cuttack, in the province of Orissa, he first by mere accident discovered that the leaf of the *Aloe angustifolia*. [It is not easy to ascertain what plant is here meant, but it is probably only a variety of Agave, as no species of Aloe is known to be indigenous on that coast] of Linnæus, contained a quantity of long white fibres. Perceiving that this material possessed great strength, clearness, and tenacity, he caused some quantities of the leaf to be beaten out with mallets, and the fibres to be withdrawn and in this way collected about three hundredweight of fine grass, the fibres severally running about three feet long. On taking this to Calcutta, Mr. Tapley, chief officer of the Thalia East Indiaman, then lying off that port, had some of it manufactured into ropes. On a fair trail of a three-stranded rope of this material with a similar one of Russian hemp, in raising two and a half hundred-weight of spelter from the hold, the grass faithfully brought it up on three successive occasions; whereas, in applying the hempen rope, twice out of three times it gave way, and in the third trial lost one strand. Both Mr. Tapley and Capt. Biden, the commander, highly approved of the article, as did many commanders of ships of other nations then frequenting the port of Calcutta. "On the writer's return to Cuttack he laid waste the whole of the aloe plant he could discover, without respect to species; and to save time and labour, passed the leaves through a *pressing mill* similar to that used for expressing the juice from the sugar cane. He then caused them to be laid in heaps under water for some days, till the fleshy portion of the leaf was decomposed, by which means the fibres were more easily collected; they were then hackled and baled. In the course of a short time afterwards he discovered a short species of aloe, growing widely and profusely in all the moist woods of the neighbourhood, which the natives called *Moorgubbee*. On experiment, this plant produced a most beautiful fibre, as soft and as fine as human hair, but possessing, notwithstanding, extraordinary strength and tenacity. He derived a great quantity of flax from this plant, which, when portioned off in hanks, bore a strict resemblance to raw silk; indeed, side by side, the difference could not be distinguished. It was this article that first induced the writer to turn his attention to the manufacture of cloth. He engaged two native 'Tantees,' or weavers, to construct a narrow loom for this purpose. They at first found some difficulty in the undertaking, but in the course of four or five days they produced as fine a piece of cloth as was ever beheld: one portion of it the writer presented to Sir Charles (afterwards Lord) Metcalfe." The fibres of the Sanseviera may, from their fineness, combined with tenacity, be applied to a variety of purposes. Dr. Roxburgh at one time supposed, though as we now know, erroneously, that they were identical with China grass. They are usually about two feet in length, but may easily be obtained longer, if plants are cultivated. The fibres are firm, hair-like, and silky, and resemble those of the pine-apple most closely. The tow is excellent for paper making. The natives of Bengal twist the fibres into a fine thread, upon which they string ornaments to be hung round the neck; those of the coast employ them for making browstrings; and the Rajpoot thread is sometimes made of its fibres. They readily take dyes, as was some years ago shown by Miss Davy, and specimens dyed red, orange, maroon, and green, were sent to the Exhibition of 1851 by Dr. Hunter. Miss Davy, moreover, had some cloth woven with the fibres, after some difficulty, but the fibre was still too wiry, from imperfect preparation. The weaver, moreover, having neglected to separate the coarse from the fine fibres,

gave the cloth an uneven and irregular appearance. But if the necessary care was taken with this, as with all other fibres, there seems no reason to doubt that it might be applied to the fabrication of fine cloths, in the same way as pine apple fibre The fibre has been proposed for the packing of steam-engines, and its tow used to be, and perhaps still is, converted into very good paper at Trichinopoly. As the Moorva fibre is employed by the natives for their bowstrings, there can be no doubt of its possessing sufficient strength for rope-making. In some recent experiments, this fibre, in its untwisted state, bore 280 lb., when Agave fibre broke with 270 lb. Dr. Wight found some string made of the latter, broke with 362 lb., while the Sanseviera broke with 316 lb., so that these two may be considered as nearly equal to each other in strength. Attention was called to the fibre of Moorgavie by Mr. A. Bond, Master-Attendant at Balasore, who sent to the Marine Board of Calcutta some of the fibres prepared from the leaves of plants growing in the jungly salt soils along the coast from Kedgeree southward, informing the Board that he had found the fibre useful on board the Hon. Company's schooner Orissa, as it answered excellently for running gear. On the receipt of the samples, the Board having desired the Master-Attendant at Calcutta to submit them to trial, the latter reported that it was "not equal in strength to the Europe or Manilla hemp, but that it seemed to take hot tar as well as the latter, and would answer generally for the same purposes as those to which the Europe and Manilla cordage is applied." The following were the results obtained:

Europe hemp, made of sewing twine (untarred)	broke at	212 lb.
Harris's patent colonial bolt rope (tarred)...	„	204 „
Manilla hemp (untarred).....	„	188 „
Europe bolt rope (tarred)...	„	168 „
Balasore fibre (untarred), at Calcutta	„	137 „
Ditto, spun by Capt. Bond (thumb line).....	„	135½ „
Europe rope (tarred).....	„	88 „

In a further report, Capt. Bond stated, that forty maunds of the fresh plant produced one maund of fibre. The expenses of the experiment were high as the plant had to be brought to him from some distance (four miles) to the place where it was dressed, and the best methods of separating the fibre had not been followed. The natives being averse to a work which their forefathers had never taken in hand. The plants having been steeped for eight days, were beaten out on a stone or plank, and then taken to another tank of water to be washed, and then dried and combed. All these processes necessarily increased the expenses. Mr. Bond further ascertained that the steeping spoiled the colour of the fibre, at the same time that it diminished its strength. With some fresh specimens of the fibre he also sent two pieces of cloth, which had been woven from threads spun by fishermen, which were irregular in thickness and so, consequently, was also the cloth. From the abundance of this plant in many situations, from the ease which it may be cultivated, and the facility with which the fibre may be separated and cleaned, there is no doubt that it could be produced as cheaply as any of the other fibres; and it has been shown that it is capable of being used for a variety of purposes, as for textile fabrics, and for string and cordage, as well as for paper-making. It is abundantly diffused, especially along the coasts, and its fibre was sent to the Exhibition of 1851, from Assam and Cuttack, as well as from Madras, Coimbatore, and the Malabar coast—*Royle. Fib. Pl.* At the Madras Exhibition of 1855, of the *Marool or Munjee Nar, Sanseviera zeylanica*, Hurry Row exhibited the best specimen. Those from Kurnool in larger quantities were good samples and deserved notice. The Jury observed that the Marool or Sanseviera is a plant that has not long attracted notice but is unquestionably deserving attention. In some parts of India very large quantities are found, growing wild. On the Pulicat Hills it is to be met with in some abundance, and in the Kurnool District it is most plentiful. It is of the same natural order as the aloe (not agave) and capable of cultivation. From its strength and the softness of its fibre, it might be brought more into use, and become a valuable product, possessing as it does the property of resisting the usual effects of damp.—*M. E. J. R.* The root is in a slight degree warm to the taste, and of a not unpleasant odour; is prescribed by the native Practitioners, in the form of electuary, in consumptive cases and coughs of long standing. The juice of the tender shoots of the plant (which is the Katukapel of the Hort. Mal.) they give to young children for the purpose of clearing their throats of viscid phlegm.—*Ains. Mat. Med. p.* 88.

(7365) SANTALACEÆ, a natural order of Plants belonging to the class of Exogens and and sub-class *Incompletæ*. They are trees, shrubs, or herbaceous plants, with round or irregularly-angled branches; alternate or nearly-opposite undivided leaves, sometimes minute, and resembling stipules. The flowers are small, in spikes, racemes, umbels, or solitary. The calyx superior, 4- or 5-cleft. Stamens 4 or 5, opposite the segments of the calyx. Ovary 1-celled, with from 1 to 4 ovules. Fruit 1-seeded, hard, dry, and drupaceous. Albumen fleshy. This order is closely allied to *Loranthaceæ* and *Aris-*

tolochiaceæ. One of its most remarkable characters is that its unilocular ovary contains always more ovules than one, which are pendulous and attached to the apex of a central receptacle. In the form of weeds the genera of *Santalaceæ* are found in Europe and North America; in Australia the East Indies, and the South Sea Islands, they exist as large shrubs or small trees. *Osyris* belongs to this order, although it differs in having dicœcious flowers and a trifid calyx. This is however a different plant from the *Osyris* of Pliny, which possessed in former times a reputation for curing every disease. The modern genus possesses no sensible properties as a medicine, and is principally employed for the manufacture of besoms, for which its long slender branches well fit it. The Ogeehee Lime, which is used on the Mississippi instead of olives, is the fruit of *Nyssa candicans* The *Nyssæ* form trees of great beauty, and their wood is white, soft, compact, and light. The most valuable genus in this order is its type the *Santalum*, of which the species *S. album* forms the true sandal-wood of commerce.—*Eng. Cyc.*

(7366) SANTALUM, a genus of Plants which gives its name to the natural order *Santalaceæ*, to which it belongs. It has hermaphrodite flowers, the perianth united at the base with the ovary, the limb superior, tubelar, and ventricose, quadrifid, deciduous; glands four, compressed, inserted into the throat, alternating with the lobes of the limb. Stamens 4, inserted into the throat opposite to the lobes of the limb; filaments awl-shaped, loaded with a pencil of hairs behind; anthers 2-celled; ovary half inferior, 1-celled; ovules 2 antropous pendulous from the apex of a free central placenta, style filiform, simple; stigma obscurely 2-3-lobed; drupe berried, 1 seeded; margined at the apex. Seed inverse. Embryo straight at the apex of a fleshy albumen. Radicle above.—*Eng. Cyc.*

(7367) SANTALUM. *Species*. WILD SANDAL WOOD. An inferior kind of sandal wood is produced by a tree in the southern part of Mergui province, and forms an article of commerce.—*Mason*.

(7368) SANTALUM ALBUM. SANDAL WOOD. *Santalaceæ*, Roxb. C.

Chunduna or Ghunda-saru, DUK.	Shandanum, TA[illegible] Gandaga mara, C[illegible]

S. album, or the White Sandal-Wood Tree, [illegible] native of the mountainous parts of the coast of Malabar, and also of Timor and the islands of the Indian Archipelago, and it is probable that the same species extends to great distances. It forms a tree of moderate or rather of small size, but much branched, and in general appearance has been often compared to the myrtle, and in inflorescence to the privet. The leaves are opposite, with short petioles, oblong, entire, smooth, glaucous underneath; length from one and a half to three inches. The inflorescence is in axillary and terminal thyrsi. Flowers numerous, small, straw-coloured, when they first expand, but change to a deep ferruginous purple; they are inodorous, as are all the exterior parts of the growing plant even when bruised. The tree when felled is about nine inches or a foot in diameter; it is then barked, cut into billets, and said to be buried in a dry place for about a couple of months. The deeper the colour and the nearer the root, the more fragrant it is. As seen in commerce it is in compact pieces of a white colour and agreeable odour, but with little taste. It is usually described as being the young and outer wood, and that the inner parts, as they become older, become coloured towards the centre, and that this is the source of the yellow, while the white sandal-wood consists of the outer and younger wood of the same tree. This is the general opinion respecting the origin of yellow sandal-wood, but Garcias thought it in his time to be the produce of a different tree. M. Gaudichaud is of the same opinion, and has moreover figured the plant in plate 45 of the botanical parts of the 'Voyage de l'Uranie.' This he saw in the Sandwich Islands, and has named it *S. freycinetianum*; stating it to produce the sandal-wood which is so much valued by the Chinese, which they also obtain from the Feejie and Marquesa Islands, Moluccas, &c. They manufacture various articles with the yellow sandal-wood, which is the most fragrant. They also burn it both in their temples and private houses as an incense, and especially in the form of long slender candles, which are formed by covering the ends of sticks with the sawdust of sandal-wood mixed with rice paste.—*Eng. Cyc.* In the Dekhan, this tree grows both in gardens and the jungles. It bears a small black berry, which if planted grows without any trouble. The wood is generally brought for sale in small logs seldom exceeding eighteen inches in length. —*Riddell.*

This very valuable tree is found in abundance on the Hills which separate the Coimbatore district from Mysore, whence it is brought to Coimbatore for sale.—*Wight.* Also, in abundance in Coorg and Mysore, and sparingly in Canara. It is usually cut into billets, and disposed of by weight. The scent is believed to be much modified by peculiarities of soil and elevation. (*Wight* No. 94, *Travancore* 263, *Mysore* 1, *Coorg* 3. *Masulipatam, Madras, Hort, Garden* 75, *Cleghorn, Mysore.*) *M. E. J. R.* It is chiefly remarkable for its agreeable fragrance, and as a preservative against insects. It is much used in making work boxes, walking sticks, penholders, and other small articles of fine ornament but cannot be procured of a large size.—*M. E. J. R.* Sandal wood is imported into Tenasserim from Hindustan, and

is constantly for sale in the bazars, being a favorite cosmetic with Burmese ladies.—*Mason.*

(7369) SANTALUM ALBUM.

The oil.

Chendana nuna, Tel.; Chundana yennai, Tam.

Specimens of this oil were exhibited by the Salem and Canara Local Committees, the Madras Tariff, and Lieut. Hawkes. The exports amount annually to about 100 cwt.—*M. A. J. R.*

Santalum album Oil of the Seed. Sandal seed Oil. The seeds of the sandal wood tree yield by expression a thick and viscid oil which is burnt by the poorer classes in lamps.—*M. E. J. R.*

(7370) SANTALUM MYRTIFOLIUM is another species, or a strongly marked variety of *S. album*, found by Dr. Roxburgh in the mountains of the Rajamundry Circar, and which was figured by him in plate 2 of his 'Coromandel Plants:' it is distinguished by its opposite lanceolate leaves. The wood is of little value, according to Dr. Roxburgh, but Dr. Wallich says it is 'certe odoratissimum'. About 200 tons are annually imported into Calcutta from the Malabar coast, and about twice as much into Canton from the islands of the Indian Archipelago—*Eng. Cyc.* Dr. O'Shaughnessy says *Santalum myrtifolium* is synonymous with the S. album of Roxburgh's Coromandel plants, a native of the continent of India, Timor, &c. That it is a small tree, with yellow flowers in stalked, trifid, axillary cymes, leaves narrow and oval, and affords the sandal wood of Malabar. He adds that Roxburgh makes the Santalum album and S. myrtifolium two distinct species. His S. album thrives luxriantly in the Calcutta Garden, and is in flower and seed nearly the whole year.—*O'Shaughnessy, page* 532.

(7371) SANVITALIA PROCUMBENS. A pretty compact plant, and from its nature adapted to cover a small patch or bed, in the flower garden, colour yellow, and raised from seed.—*Riddell.*

(7372) SAPAN WOOD. CÆSALPINIA SAPAN.

Puttung, Guz. Hind.	Sapang, Malay.
Patonga, Sans.	Sachaug, Jav.
Bukkum, Hind.	Samya, Mol.
Isiapungum also Vuttunghy, Tam.	Lolan, Amb.
	Sibukas, Tagala.

The product of a thorny tree (*Cæsalpinia sapan*), indigenous to Siam, Pegu, the Philippine Islands, and the South of India. This wood is similar to Brazil wood, but contains less colouring matter, and is extensively used in India by native dyers. Sapan wood is imported into Bombay from Siam, and Singapore; and an inferior description, in small quantities, from the Malabar Coast. The former kinds are occasionally re-exported to London.—*Faulkner.*

Sappan Wood is an article of considerable commerce in the East. It is the bukkum wood of Scinde, and is procured in Mergui, Bengal, the Tenasserim Provinces, Malabar and Ceylon. In 1842 as much as 78,000 cwts. were shipped from Ceylon, but the export from thence has decreased. This island however, ships dyewoods annually to the amount of £2,000. A large quantity is exported from Siam and the Philippine Islands; as much as 200,000 piculs annually from the former, and 23,000 piculs from Manila. 3,524 piculs were shipped from Singapore in 1851, and 4,074 piculs in 1852. The picul is about one cwt. and a quarter. Sappan wood yields a yellowish colour, like that of Brazil wood (*C. brasiliensis*) but it does not afford of dye matter so much in quantity or so good in quality. It forms a large export from Ceylon: the shipments from thence were, in 1842, 77,694 cwt.; in 1843, 1,692; in 1844, 2,592; in 1845, 2,854. In 1837, 23,615 piculs of sappan wood, and 2,266 piculs of roots of ditto were shipped, and in the first six months of 1843, 22,326 piculs were exported from Manila; a large portion of this comes to Europe, but some goes to China, the United States, Singapore, &c. 15,500 picul were shipped from Manila in 1844, 5,250 ditto in 1845; and 1,210 tons in 1850. About 3,000 piculs of sappan wood and the same quantity of other dyestuffs are annually imported into Shanghae. The price of straight sappan wood at Shanghae in July last year, was thirty dollars per picul. In Calcutta, in June 1850, 4,000 piculs of the root of Manila sappan wood sold freely at about 7s. 6d. per factory maund, Siam ditto 6s. 75 tons were imported into Liverpool in 1849: and 120 tons in 1850, from Calcutta. The imports of sappan wood into the United Kingdom, in 1850 amounted to 3,670 tons, worth £8 to £12 the ton, and this continued the price in January 1853. Camwood, red sanders wood, barwood, and other dye woods, are found in great quantities in many parts of Africa. The dyes of Africa are found to resist both acids and light, properties which no other dyes seem to possess in the same degree. About thirty miles east of Bassia Cove, in the republic of Liberia, is the commencement of a region of unknown extent, where scarcely any tree is seen except the camwood. This boundless forest of wealth, as yet untouched, is easily accessible from that settlement; roads can be opened to it with little expense, and the neighbouring kings would probably give their co-operation to a measure so vastly beneficial to themselves. It is impossible to ascertain the exact amount of export of these commodities to Europe and the United States, but it is very great, and employs a large amount of vessels. One Liverpool house imported 600 tons in a single year, worth £9,000.

Dyewoods imported in 1850.	Tons.	Re-exported. Tons.
Logwood,.....	32,930	4,332
Fustic,.....	9,808	1,774
Nicaragua,.....	7,909	112
Barwood,.....	1,896	1,[illegible]
Sappan,.....	3,670	—
Green Ebony, and Cocuswood, ...	1,457	—
Red Sanders,.....	656	—
Camwood,.....	416	—
Brazil and Brazillito.....	309	—
	59,051	7,444

Thus we perceive the annual consumption of heavy dyewoods in Britain in dyeing cotton, linen, woollen and silk goods, &c., exceeds in weight 51,000 tons.—*Simmonds.* Sapan-wood, or Buckum wood, (Casalpinia sapan,) is obtained from a species of the same genus that yields the Brazil-wood. It is a middle sized tree, indigenous to Siam, Pegu, the coast of Coromandel, the Eastern Islands, &c. It is imported in pieces like Brazil-wood, to which, for the purposes of dyeing, it is greatly inferior, it is generally too unsound to be useful for turning.—*Tredgold.* At the Madras Exhibition of 1855, specimens were exhibited in billets and chips from Tanjore, Travancore, Goa and Cuddapah. A red dye is made from an aqueous extract of the chips of this wood, but it is not reported to be a fast colour, and is principally used for common and cheap cloths. It is precipitated dark brown with iron, and red with alum.—*M. E. of* 1855. In the valley of the Tenasserim, between the latitudes of Tavoy city and the mouth of Tavoy river, the hills that border the valley on the eastern side abound in sappan wood, which is used extensively as a red dye. Considerable quantities are exported every year from Mergui, and that province is usually supposed to contain the tree, though it is really within the province of Tavoy; but the facility of water communication from the interior to Mergui, makes that the only port to which the wood is conveyed. It is rather singular that this narrow locality is the only one in the Provinces so far as I am aware, in which the tree is found. The tree has a much wider range, the Karens inform me, on the Meinam side of the mountain in Siam. More than five hundred thousand pounds have been exported from Mergui during some years between 1830 and 1840; but latterly the forests have not been so productive.—*Mason.* Sappan-wood. (Cæsalpinia sapan.) This dyeing material, the wood of a lowly tree, is found in many parts of the Malay and Philippine Archipelogos, but is most abundant in the island of Sumbawa, and in the provinces of Iloilo in Panay and Pangasinan in the great island of Luzon. In 1850, there were exported, chiefly to Europe and America, no less than 11,000 tons of this article from the port of Manilla. The Sappan-wood is the wild produce of the forests, and that it is indigenous wherever it grows there can be little question. It has, like many indigenous products a distinct name in the different languages, the only agreement, and this not perfect, being between the Malay and the Javanese, in the first of which it is called sapang, the origin of the European commercial and scientific names, and in Javanese sachang. In one language of the true Moluccas we have it as samya, and in another as roro, while in Amboynese it is lolan, and in the Tagala of the Philippines sibukas. It seems probable, however that the Cæsalpinias which produce the dyewood of countries which extend from the 9th degree of South to the 19th of North latitude, may be distinct species. The sappan-wood of Luzon is by from 40 to 50 per cent more valuable than that of Siam, that is, yields by so much more of colouring matter. In this respect all the Asiatic Cæsalpinias rank far below those of Brazil.—*Crawfurd, Dictionary, page* 376.

(7373) SAPINDACEÆ, *Soap-Worts*, a natural order of plants belonging to the calycose group of Polypetalous Exogens. It consists of trees or shrubs, rarely herbaceous plants, with erect or climbing stems, with alternate often compound leaves, rarely simple, with or without stipules, and often marked with lines or pellucid dots. Their inflorescence is racemose or paniculate, with small white or rose-coloured rarely yellow flowers, which are seldom barren or hermaphrodite. The calyx consists of 4-5 sepals, slightly cohering at the base. The petals are the same in number as the sepals, one being occasionally abortive. They are in general furnished with a petal-like scale, but are sometimes naked. They have a fleshy glandular disc occasionally occupying the base of the calyx. The stamens are definite, about twice the number of the sepals. The filaments are free or slightly connate, the anthers 2-celled. The ovary 3-celled, rarely 2-4 celled the cells containing 1-2-3 ovules. Style undivided, or more or less deeply 2- or 3-cleft. The seeds have usually an aril, are without albumen, and have a curved or spirally twisted embryo. They are inhabitants of most parts of the tropics, more especially of South America and India. They are not found in Europe or the United States of America. One genus is found in Australia, *Dodonea.*

This order is closely allied to *Aceraceæ*, from which they only differ in their alternate leaves and petals. The number of their stamens 8, with 5 unequal sepals, point out a relation with *Polygalaceæ*. Their climbing habit and tendency to produce tendrils give them a remote relation to *Vitaceæ*. In this order, although the leaves,

anches, and other organs act in a deleterious anner, yet their fruit and seeds are eatable and holesome. The Litchi and the Longan, favoute fruits in China, are produced by the genus *uphoria*. These fruits are sweet, with a sub-acid ıvour, and when dried are sometimes brought to is country. They are considered a great luxury China, and are sent at a great expence from e provinces of Fokien and Quan-Tong, where ey grow, to Peking, for the consumption of e emperor. Several other genera bear fruits ich are very delicious, and are eaten in Japan d Brazil. *Sapindus* is remarkable for bearing pulpy fruit, the outer part of which has been ed, on account of its detergent properties, a soap. Some of the species of this nus also produce eatable fruits. *Paullinia* another genus which has poisonous proper-s residing in the leaves and other parts of the ant, whilst the fruits are eatable. The whole of e order partakes more or less of these prorties.—*Eng. Cyc.* In China, The seeds of a pindus, besides their value in cleansing, are ɔrn as beads "because," says the Budhists, "all mons are afraid of the wood," one native me means preventative of evil. *Williams' iddle Kingdom, p.* 286.

(7374) SAPINDUS (contracted from *Sapo dicus*, or Indian Soap), a genus of Plants beıging to the natural order *Sapindaceæ*, which s been so called in consequence of the berries many of the species being employed for the ne purposes as soap. The genus is tropical, ntaining between 20 and 30 species, which e found in the tropical parts both of the Old d New World. It is characterised by having e calyx 4-5-partite; petals as many as the als, a little longer, naked or hairy, or with a le above the claw; torus or disc occupying the ttom of the calyx; stamens 8 to 10, inserted tween the margin of the disc and ovary; ovary rarely 2-celled; ovule 1, erect at the base of ch cell; style with a 3-, rarely 2- lobed stigma, uit fleshy, 1- 2-, rarely 3-lobed, each lobe, 1-, rarely 3- seeded, with the seeds furnished th an aril. The species consists of trees hav-g leaves without stipules, with the inflores-ce in racemes or terminal panicles. Flow-small, white, or greenish-white. Berries red and saponaceous, on which account they ve been employed for washing woollens and ths of various kinds in different countries. For tance, in the West Indies and the continent of nerica, *S. saponaria* yields the so-called soapрries, and in Java, *S. Rarak*; so in India, veral species, as *S. acuminatus*, *S. laurifolius*, *emarginatus*, and *S. detergens*, yield berries ich are called Reetha, and in their dried state ıy be bought in every bazar, as they are erywhere employed as a substitute for soap. e fleshy part of these berries is viscid, and in ying assumes a shining semi-transparent appearance; when rubbed with water they form a lather like soap. The bark and root have similar properties, and have been employed for the same purposes, as well as medicinally, in the countries where they are indigenous. The berries, which are about the size of cherries, inclose black shining nuts, which used formerly to be much imported into England and employed as buttons for waistcoats, after having been tipped with gold, silver, or other metal. The kernel of these nuts contains an edible oil, which is sometimes employed for burning. The fruit of *S. Senegalensis* and of *S. esculentus* are eaten, and the wood of some species, as of *S. rubiginosus*, is close-grained and hard, and forms valuable timber.—*Eng. Cyc.*

(7375) SAPINDUS EMARGINATUS.

The Tree.

Rete ka jhar, HIND.	Koonkoodoo chettoo, TEL.
Poocha cotta marum, TAM.	Thaly marathoo, CAN.

The Wood.

Soap nut or koonkoodoo wood, ENG.	Koonkoodoo kurra, TEL.

The Nut.

Soap nut, ENG.	Rishta, DUK.
Koonkuda kaya. TEL.	Bindake. HINDEE.
Rete kee binj. HIND.	Arishta, Phemla, SANS.
Ponnaung cottai. TAM.	Rarak, MALAY.
Ritah, DUK.	

When this substance is mixed with water it froths like soap, and is used instead of that substance for many important purposes, Dr. Sherwood has mentioned that the seeds pounded with water often put an end to the epileptic paroxysm a small quantity being introduced into the patient's mouth. Another species, the *S. Saponaria*, has been used in medicine in the treatment of chlorosis, in the form of the tincture or extract of the soapy matter of the capsule. The nuts themselves are exceedingly hard and tough, and as they take a fine polish are employed for necklaces and beads. The kernels of the small black nuts of the S. Saponaria are eaten in the West Indies, and deemed as palatable as the hazel nut or almond. The roots as well as the capsules are used in washing, but it is stated that the fabric washed is rapidly corroded; this however requires confirmation. (Fee, vol. ii. p. 48.)—*O'Shaughnessy, page* 241. Wight suspects the Poochay Cottay marum, to be the same as Roxb. S. detergens. The fruit is used for the same purposes as indicated by the characterestic native name. His S. emarginatus may be a different plant as the fruit does not correspond. He does not know the wood further than that is white, said to be only fit for fuel.—*Wight.* Under the Canarese name of *Thaly Marathoo*, Mr. McIvor says that the Sapindus emarginatus is a small tree, wood elastic,

strong and durable, common in Wynaad.—*McIvor, M. E. of* 1857.

(7376) SAPINDUS EMARGINATUS.

The oil

Poonga & Soapnut oil, ENG.	Koocoodie noona, TEL.
Poovandie cottay or Poongum-kai yennai, TAM.	Reethay ka tael, HIND.

This semi-solid oil is used medicinally by the natives, and is extracted from the kernel of the Soap-nut. Its cost prevents its general use.—*M. E. J. R.*

(7377) SAPINDUS FRUTICOSUS. Introduced into the Dekhan from the Moluccas, flowers in racemes.—*Riddell.*

(7378) SAPINDUS INDICUS.

Hoorooa, DUK.

A small tree, flowers irregularly, fruit round and hard; three celled with a seed in each and which are used by the natives for intoxicating fish, the taste of the fruit is nauseous and the juice of the tree is considered poisonous.—*Riddell.* See SAPIUM INDICUM.

(7379) SAPINDUS RUBIGINOSUS, Lin Rusty Soap-nut tree.

Rusty soap nut, ENG.	Hseik-kyee, BURM.
Kookoodoo, TEL.	Reetee ka jhar, HIND.
Ishy rashy, TEL.	Manee poongum, TAM

A large timber tree which grows in the mountainous tracts of the Circars. The wood is very useful for a great variety of purposes being straight, strong and durable.—*Ain's. Mat. Med. p.* 213. The Ishki rashy yields a useful timber but so full of sand, particularly near the bark, that it injures tools employed on it.—*Rohde.* The wood of this tree is useful for a great variety of purposes, being large, straight, strong, and durable, towards the centre, it is chocolate colored, its name is derived from the quantity of silex or sand it contains particularly near the bark and which injures tools used in working it: when dry it has something the appearance of Teak.—*Rohde M. S. S.* In Pegu, this tree is not very plentiful. It is found in the Pegu district, where it attains a girth of three or four feet, growing tall in proportion and straight. Wood, white-colored, adapted to every purpose of housebuilding.—*McClelland.*

7380) SAPINDUS SAPONARIA. ARITHA, RITHA, SOAPNUT. The dried berries are brought to Ajmere from Kotah, Malwa, and Mewar, they are not used in medicine; but are much employed in dyeing, and as a detergent: eight seers are sold for the rupee.—*Gen. Med. Top. p.* 122.

(7381) SAPIUM, a genus of Plants belonging to the natural order *Euphorbiaceæ.* The flowers are monœcious, the calyx bifid and 3-toothed, the style trifid, and the capsule 3-coccous.—*Eng. Cyc.* Wight gives Sapium baccatum, 1950-2; Indicum, 1950.

(7382) SAPIUM INDICUM, Roxb. iii. p. 692.

Hoorooa, BENG.

Grows in the Delta of the Ganges. *S. Indicum* has alternate stalked leaves somewhat pendulous, broad, lanceolate, serrate, smooth, and of a deep shining green, from 2 to 4 inches long, and broad in proportion; the stipules small and deciduous; the calyx is 3-parted, the divisions somewhat cordate and expanding; the filaments longer than the calyx, the anthers ovate; the female flowers at the base of the catkins often solitary; the capsule or nut is globular, of the size of a nutmeg, 3 celled, 6-valved, thick, and exceedingly hard; the seed is solitary, affixed by the apex, oval, and smooth. The juice of this species, like the former, is highly poisonous. (Lindley. *Flora Medica*; Burnett, *Outlines of Botany*) —*Eng. Cyc.* Capsule or nut globular, size of a nutmeg, 3 celled, 6-valved, thick and exceedingly hard, seed solitary, fixed by apex, smooth, juice very poisonous, taste exceedingly nauseous, seeds used for intoxicating fish. *Roxb—O'Shaughnessy, page* 562.

(7383) SAPIUM SEBIFERUM. TALLOW TREE. This tree is not very common in the Dekhan, and is only to be met with in a few gardens. It is an ornamental tree, and bears flowers and fruit for the great part of the year together. The fruit is of a pear shape, yellow and red, which when ripe opens and displays two or three black seeds enveloped partially with a fatty-looking substance. It is from this the Chinese extract the tallow and make into candles.—*Riddell.*

(7384) SAPODILLA PLUM. ACHRAS SAPOTA. In Tenasserim, in a few European gardens may be found the tree which produces the Sapodilla plum: whose "fruit, in appearance like an old decayed potato, is yet the most luscious in the West Indies."—*Mason.*

(7385) SAPONACEOUS PLANTS. Many tropical plants furnish useful substitutes for common soap. The aril which surrounds the seed and the roots of *Sapindus Saponaria,* an evergreen tree, is used as soap in South America and the West Indies under the name of soap berries. The seed vessels are very acrid, they lather freely in water and will cleanse more linen than thirty times their weight of soap, but in time they corrode or burn the linen. Humboldt says that proceeding along the river Carenicuar, in the Gulf of Cariaco, he saw the Indian women washing their linen with the fruit of this tree, there called the parapara. Some other species of *Sapindus* and of *Gypsophila* have similar properties. The bruised leaves and roots of *Saponaria officinalis,* a British species, form a lather which much resembles that of soap, and is similarly efficacious in removing grease spots. The bark of many species of

uillaia, as *Q. saponaria*, when beaten between ones, makes a lather which can be used as a ubstitute for soap, in washing woollens and lk clothes, and to clean colors in dyeing, in hili and Brazil, but it turns linen yellow. The uit of *Bromelia Pinguin* is equally useful. A egetable soap was prepared some years ago in amaica from the leaves of the American loe (*Agave Americana*) which was found s detergent as Castile soap for washing nen, and had the superior quality of mix- ng and forming a lather with salt water s well as fresh. Dr. Robinson, the naturalist, thus describes the process he adopted in 767, and for which he was awarded a grant by ie House of Assembly :—"The lower leaves of ie Curaca or Coratoe (*Agave karatu*) were passd between heavy rollers to express the juice, hich, after being strained through a hair cloth, as merely inspissated by the action of the sun, r a slow fire, and cast into balls or casks. The nly precaution necessary was to allow no mixare of any unctuous materials, which destroyed ie efficacy of the soap. A vegetable soap, which as been found excellent for washing silk, &c, ay be thus obtained. To one part of the skin f the Ackee add one and a half part of the *Agave aratu*, macerated in one part of boiling water or twenty-four hours, and with the extract from his decoction mix four per cent. of rosin. In Brazil, soap is made from the ashes of the assura or broom plant (*Sida lanceolata*) hich abounds with alkali. There are also ome Soap barks and pods of native plants sed in China as substitutes for Soap. The ark of Quillaia Saponaria renders water frothy, nd is used as a detergent by wool dyers. aponaria vaccana is common in India. The ericarp of Sapindus emarginatus mixed with ater, froths like soap. Saponaceous berries are ound in Java. The Sapindus is used as a ubstitute for soap, as Sapindus acuminata, lauriolius emarginatus, and detergens, all of them. East Indian plants are similarly used.—*Simonds, p.* 575.

(7386) SAPONARIA (from the Latin 'sapo,' oap,) so called because the bruised leaves are aid to produce a lather like soap when agitated n water), a genus of Plants belonging to the atural order *Caryophyllaceæ*. It has a 5-toothd calyx naked at the base, 5 clawed petals, 10 tamens, and 2 styles ; the capsules are 1-celled, pening at the top with 4 valves ; the seeds are lobular or reniform. The genus SAPONARIA ncludes an article well known in India, the *Saponaria vaccaria*. The properties of this plant re identical in every respect with those of the *officinalis*, or soap wort, the Στρουθιον of Dioscorides. The taste of the entire plant is bitter, the oots are cylindrical, two to three feet long, the hickness of a swan quill, branching above, pidermis ruddy, thick, and easily separable ; parenchyma white and solid. The taste of the root is bitter and mucilaginous ; the infusion is blackened by salts of iron, and the decoction froths like a solution of soap. According to Bucholz' analysis, these properties are due to the presence of a mucilaginous extractive called *saponine*, regarding which an additional notice will be found under the head of *Sapindus emarginatus.—O'Shaughnessy, page* 212. All the species of this genus are very ornamental. *S. ocymoides* is one of the most elegant plants we have in our gardens, and is well adapted for rock-work. (Don, *Dichlamedeous Plants* ; Babington, *Manual of British Botany* ; Burnett, *Outlines of Botany.*)—*Eng. Cyc.*

(7387) SAPONARIA PROCUMBENS. This is a pretty genus of rose coloured, pink or yellow flowers, and from its trailing habit, best suited for covering rock work, cultivated from seed.—*Riddell.*

(7388) SAPOO. A soft, firm, but rather open though even grained, light Ceylon wood.

(7389) SAPOOMIDILE. A soft rather coarse, open grained light Ceylon wood.

(7390) SAPOTACEÆ, OR SAPOTEÆ. Sapotads, a natural order of Plants belonging to the polycarpous group of Monopetalous Exogens. It consists of trees and shrubs, which abound with a milky juice ; the branches are round ; the leaves alternate, simple, entire, coriaceous, destitute of stipules, their under sides being covered by a silky or downy pubescence. The flowers are axillary, regular, and united ; the calyx is 4-8-cleft, imbricate in æstivation ; the corolla is hypogynous, regular, and cleft ; the lobes are equal in number to the sepals and alternate with them ; the stamens are definite and distinct, some are barren and some fertile, the former being alternate with the sepals, the latter opposite ; the ovary is superior, with several cells, in each of which is one erect ovule ; style simple ; stigma undivided ; seeds nut-like, sometimes cohering, unto a several-celled putamen ; embryo large erect, and inclosed in fleshy albumen. This family of plants is most nearly allied to that of *Ebenaceæ*, with which it agrees in habit, its monopetalous regular hypogynous corolla, the absence of a hypogynous disc, its several-celled ovary, and definite ovules and stamens. It differs however in the possession of milky juice, soft wood, hermaphrodite flowers, undivided stigma, and one seeded ovary with erect ovules. The plants of this family are chiefly natives of India, Africa, and America. Some of the species produce fruits which are much prized as articles of diet. Amongst these is the Sapodilla Plum, or Naseberry, which is the produce of *Achras sapota*. The Star-Apple (*Chrysophyllum*); Marmalade (*Achras mammosa*), the Medlar of Surinam, and other eatable fruits, are derived from plants belonging to this order. Most of the species yield large quantities of a milky juice

which, unlike the secretions of most lactescent families of plants, may be used for alimentary purposes. The fruit and seeds abound in oil, which is solid like butter, and has a mild pleasant flavour. The bark of some species of *Achras* is astringent and tonic, and has been recommended as a substitute for quinine. [ACHRAS.]—*Eng. Cyc.*

(7391) SAPOTA ELENGOIDES. A large tree common on the Neilgherries; wood strong and elastic, and like the hawthorn, burns well when green.—*McIvor M. E. J. R.*

(7392) SAPOTEÆ, is a natural order of Trees or shrubs, with simple and alternate leaves, flowers solitary, or in fascicles at the axillæ of the leaves, gorged with a milky white juice. No individual of this order is really dangerous, the juice being devoid of acrid or irritating properties. The barks of many species are astringent, the fruits pulpy, acidulous, and edible. The seeds contain an oil rich in stearine. The butter tree of India, and of Mungo Park. *Bassia butyracea*, is one of this family. It also contains the *Sideroxylon*, or iron wood. The *Achras Sapota*, Sapodilla plum, has delicious fruit with very bitter seeds, believed in Martinique to be powerfully diuretic. The bark is deemed a substitute for cinchona, (Lindley Fl. Med. p 388.)—*O'Shaughnessy, page* 427.

(7393) SAPPHIRE.

Saffiersteen, DUTS.	Safiro, Safir, SP.
Saphir, FR.	Neelum, TAM. and HIND. DUK.
Sapphir, GER.	Sufeer, ARAB.
Zafiro, IT.	Nilam, MALAY.
Sapphirus, LAT.	Neel, CYNG.
Jachant, RUS.	

A beautiful precious stone, and, after the diamond, the most valuable of gems. The colours are blue, red, gray, white, green, and yellow; the most highly prized varieties however, are the crimson and carmine red. Localities, Pegu, France, Germany, and Ceylon.—*Faulkner.* There are several varieties, the names of which are dependant chiefly upon their colour: the *White Sapphire*, which is transparent or translucent; the Oriental Sapphire, which is blue; *Oriental Amethyst* which is purple; the *Oriental Topaz*, yellow; the *Oriental Emerald*, green: and some other varieties occur, as the *Chatoyant* and the *Opalescent Sapphire.—Eng. Cyc. page* 151. Speaking of one of the minerals to which the term Sapphire is applied, Ainslie remarks, this is no other than the Patje Padian or Green Sapphire, in fact the green Sapphire of Werner, and is a stone altogether different from the occidental Emerald, which is known only to exist in South America. The oriental gem is however harder than the American, though inferior in the richness and purity of its green colour. Emeralds are by Mr. Franklin's account found in the dominions of Ava; though Mr. Symes in his Embassy to Ava, tells us that they absolutely never are met with in any part of that country.—*Ainslie.* At another place, he says the best sapphires to be met with in India are brought from the Burman dominions, those found in Ceylon, though genuine, are much less beautiful. On that Island the green Sapphire (Patje Padian) (Cyng) is common —*Ains. Mat. Med. page* 166. According to Tomlinson, *Sapphire* is a gem of a blue colour consisting of pure alumina; it occurs in six-sided prisms often with uneven surfaces. It also occurs granular. When the surface is polished, a star of six rays corresponding with the hexagonal form, is in some specimens seen within the crystal. The sapphire ranks next to the diamond in hardness. When it occurs in *dull dingy-coloured* crystals and masses, the term *corundum* is applied to it, and the granular variety of bluish grey and blackish is called *emery*. [See CORUNDUM; EMERY.] When the sapphire occurs of other *bright* tints, other names are applied to it. The application of the sapphire to the jewelling of watches is well known. Some of the varieties of the sapphire rank next to the diamond in value. Indeed the oriental ruby, of fine colour and free from flaws, is more valuable than a diamond of equal weight. In Mr. Hope's collection is a blue sapphire which cost 8,000*l.*—*Tomlinson.*

(7394) SAPPHIRE, BLUE. Blue sapphires are brought from Burmah, and Dr. Helfer writing from Mergui says: "A Karen informed me, there are precious blue stones to be had, which the Shans collect and carry to Bangkok. He described the place as eight days' distant, and did not know whether it was British or Siamese."—*Mason.* See SCHORL, also TOURMALINE.

(7395) SAPPHIRE, GREEN, or ORIENTAL EMERALD. The green gem is often seen for sale among the Burmese, brought from Burmah, which Europeans usually call emerald; but it is probably a blue sapphire. The true emerald may however be among them.—*Mason.*

(7396) SAPPHIRE, RED, or ORIENTAL RUBY. The red sapphire, or ruby, is brought from Burmah, where it is found with the common blue sapphire, probably in the valley of the Salwen. The Burmese call it by the same name that they do the precious garnet, and do not appear to be always able to distinguish them.—*Mason.*

(7397) SAPPHIRE, VIOLET. The violet sapphire, or Oriental amethyst, is found in the same localities as the common sapphire.—*Mason.*

(7398) SAPPHIRE, YELLOW. The most valuable topaz in Burmah, is the yellow sapphire, or Oriental topaz.—*Mason.*

(7399) SARAPUPPOO NUT. BUCHANANIA LATIFOLIA.

(7400) SARCOCOCCA TRINERVIA; or Neilgherry Box Wood. Tree very common on

the Neilgherries ; wood hard durable, might be used as common Box wood in the Arts.—*McIvor. M. E. J. R.* 1857.

(7401) SARCOCOLLA. Lin. Now of the *Natural order* PENÆALEÆ., Sarcocolla (Unge-root, *Arab,* Runjudéb, *Pers*, Dioscor. lib. iii.)

Unzeeroot, ARAB. | Runjudeb, PERS.

A subacid, sweetish, and somewhat nauseous, gum resin, produced in North Africa, Persia, and Arabia, by a shrub, the *Penaea sarcocolla.* It is met with in small whitish-yellow grains, and is celebrated for agglutinating wounds. It is rarely met with in India.—*Faulkner.* It is yellow, or reddish, like gum arabic, in oblong globules, the size of a pea or of grains of sand, friable, opaque or semitransparent, softening but not melting by heat; sp. gr. 1268. Sarcocolline is half transparent, crystalline, brittle, like gum, soluble in 40 parts of cold water and 25 of boiling water, soluble also in alcohol. Odour weak and peculiar, taste saccharine and slightly bitter; composition, carb. 22, hyd. 19, oxy. 10, atoms. Sarcocolla was once deemed a powerful healer of wounds σαυξ fleshy, and κολλα glue), but this idea has been long abandoned. It is rarely met with in India, and then only brought from Persia and Arabia. Mesure regarded it as cathartic.—*O' Shaughnessy, page* 427.

(7402) SARCOSTEMMA (from σάρξ, flesh, and στέμμα, a crown, in reference to the leaflets of the inner corolla being fleshy), a genus of plants belonging to the natural order *Asclepiadaceæ.* It has a rotate corolla a coronet of double stamens : the outer one cup-shaped or annular crenated, the inner one 5-leaved, higher than the outer one, with fleshy segments ; the stigma is nearly blunt ; the follicles slender and smooth and the seeds comose. The species of the genus are natives of Australia and the East Indies, as well as of South America.—*Eng. Cyc.* Wight gives Sarcostemma brevistigma, ? 595 ; Brunonianum, 1282 ; intermedium, 1281 ; and viminale, 545.

(7403) SARCOSTEMMA GLAUCUM, Glaucous-Leaved Scarostemma, is a lactescent smooth twining herbaceous plant. The leaves are lanceolate, short-stalked slightly revolute, membranous, being with the midrib prominent or the under side, which is glaucous ; the umbels are many-flowerd between the petioles, on very long peduncles ; the segments of the calyx lanceolate, ciliated, and acuminate ; the corolla white, with a large fleshy annular wavy coronet ; the segments of the corolla fringed and spreading. —*Eng. Cyc.*

(7404) SARCOSTEMMA VIMINALE. APOCYNACEÆ.

Soom, DUCK.

A valuable leafless plant, resembling the Euphorbia Tirucalli ; flowers white in the rains, the natives tie the stems up into a bundle and place them in the watercourse of their wells for the purpose of preventing the attack of white ants.—*Riddell.*

(7405) SARCOSTIGMA KLEINII. Poovana Oil was exhibited by the Tinnevelly and Travancore Local Committees, and by the Rev. E. Johnston, Cottayam, and is reported to be useful in Rheumatism. *M. E. J. R.*—The Revd. E. Johnstone of Cottayam forwarded a specimen of the oil of *Sarcostigma Kleinii.* This substance has been long known under the name of Poovana and Poovengah, but this exhibitor was the first to ascertain its correct Botanical name. This medicinal oil is used largely on the Western Coast, and seems especially to merit further investigation.—*M. E. J. R.*

(7406) SARD, SARDONYX.

(7407) SARDINES.

Sardines, FR.	Sardine, IT.
Sasdellen, GER.	Sardinas, SP.

A species of anchovy common in the Mediterranean. They are met with in commerce in a preserved state.—*Faulkner.*

(7408) SARDINE : ENGRAULIS MELETTA ? There is a small fish of the herring family at Tavoy and Mergui, which I have not examined, but Dr. Morton thinks it is identical, or nearly related to the common sardine, a fish of the same genus as the anchovy.—*Mason.*

(7409) SARDONYX. A species of agate, being a variety of onyx, in which the opaque white alternates with a rich deep orange brown, of considerable transparency. The finest are brought from the East. (*Waterston.*)—*Faulkner.* Sardonyx is a variety of onyx which is supposed by some to have received its name from having been brought from Sardes, in Lydia By others it has been said that the name comes from Sardo, the Greek name of Sardinia, there being some reason for thinking that the Carthaginians brought the stones from that island, and exported them during their occupation of it. In this the opaque white alternates with a rich deep orange brown of considerable translucency, and as this is of rare occurrence the sardonyx is of greater value. The finest are brought from the east, and some antique gems are formed of them.—*Eng. Cyc.*

(7410) SARSAPARILLA.

Muckwy, ARAB.	Salsapariglia, IT.
Erramasoomul, Irimusa, CYNG.	Sarza, LAT.
	Shariva, SANS.
Salsepareille, FR.	Zarzaprilla, SP.
Sarsaparille, GER.	Nunnarivayr, TAM.

Sarza, L. E. Sarsaparilla, D. Radix, L. D. Root of Smilax officinalis, *Humb.* and *Bonpl.* L. E., and probably of other species E. of Smilax Sarsaparilla, *Linn.* D. Sarsaparilla.

(7411) *Sarsaparilla,* the roots of several

species of climbing evergreen plants found mostly in warm and tropical climates, and belonging to the genus *Smilax*. The name sarsaparilla is derived from the Spanish word *zarza*, a bramble, and *parilla*, a vine. The original species, *Smilax officinalis*, is a native of South America, but there are several other kinds which also contribute to furnish the roots known in commerce as genuine sarsaparilla, and whose properties are scarcely inferior to it. Of the South American sarsaparilla some reaches us by way of Jamiaca and has the name of that island, while a large quantity is shipped at the Brazils and is called Lisbon sarsaparilla. Varieties of this root are also found in the South of Europe and in India. East Indian Sarsaparilla, long thought to be the root of *Smilax aspera*, but now said to belong to *Hemidesmus Indicus*, is abundant and cheap, and as it appears to partake largely of the qualities of the true sarsaparilla, there is no doubt of its being extensively employed as a substitute. The Smilax China is also largely employed. Sarsaparilla is valued as a restorative to debilitated constitutions. According to Brande there is as yet no good analysis of this root, and the extraordinary medical qualities which it is said to possess are to be attributed rather to its general composition than to any distinct principle.—*Tomlinson.*

The word *Smilax* occurs in Greek authors, and the plant *Smilax aspera*, continues to be employed in medicine. The name Sarsaparilla (from the Spanish *Sarsa*, a bramble, and *Parilla*, a vine) is applied to species of the same genus, and to their roots, first introduced into Europe from the New World in the 16th cenutry. Several kinds, as Jamaica, Honduras, Brazilian, &c., are known in commerce; but it is extremely difficult, if not impossible, at present to determine the species of *Smilax* which yield the several varieties of drug, because much of it is brought over by the Indians from the little known Mosquito coast to Jamaica, and thence imported into England. the greater portion of the remainder is imported from Mexico, Guatimala, Brazil, and Peru.—*Royle.*

(7412) *Smilax officinalis*, *H. B.* and *K.*, was discovered by Humboldt and Bonpland in New Granada on the banks of the Magdalena, in Columbia. As its roots are collected by the natives, called *Zarzaparilla*, and taken to Cartagena, and thence exported to Jamaica, it is more than probable that this yields some of the Sarsaparilla of commerce; hence it is adopted in the L. and the E. P. Dr. Pereira concludes it to be probably the source of Jamaica Sarsaparilla. Martius states that, according to Pohl, the roots are collected in the western parts of the province of Minas Geraes.—*Royle.*

(7413) *Smilax Sarsaparilla*, *Linn.* D., a native of the United States of America; but it does not, according to the evidence of American authors (v. Wood and Bache), yield any of the Sarsaparilla of commerce.

(7414) *Smilax Papyracea*, *Poir.* (S. syphilitica, *Mart.* non Humb.) is a native of Brazil. Martius ascertained that its roots were collected by the Indians on the Rio Negro and other places in the vicinity of the Amazon river, and that they form the *Salsa*, *Salsaparilla*, *Sarza*, or *Zarza*, which is named the Sarsa of Maranhao, of Para, and of Lisbon, and that it abounds more than the other in Parigline. Ejus radices præ cæterarum Smilacum pollent materia illa extractiva, saporis amaricantis, fauces vellicantis, *Parillinum* dicta, cui efficacia medicaminis præcipue debetur."—*Royle.*

(7415) *Smilax Syphilitica. Willd.*, is a distinct species, found by H. and B. on the Rio Cassiquiare, in Brazilian Guiana.—*Royle.*

(7416) *Smilax Medica*, *Schlecht*, was found by Schiede on the eastern slope of the Mexican Andes. The roots are dried and exported from Vera Cruz, but are little known here. Dr. Hancock states that there is but one species that yields genuine Sarsaparilla which manifests to the taste any of the sensible properties of Sarsaparilla; and this grows chiefly on the elevated lands of the Rio Imiquem, at Unturana and Caraburi; also that the Sarsa of the Rio Negro, which comes by way of Angostura or Para, is the best. This is probably yielded by the above *S. papyracea*. Several other species are, however, enumerated by Martius, as *S. Japicanga*, *brasiliensis* and also *Herreria Salsaparilha* as employed for the same purposes, and says "Recentes multo efficaciores, quam exsiccatæ, vetustæ." So *S. Cumanensis* the *Azacoreto* of the natives, *S. Cardato-ovata* of Poppig, *S. Purhampuy*, referred doubtfully to *S. officinalis* by Dr. Lindley, *S. China* yielding the *China-root* of the shops, long famed in the East. It is probable that some of the Indian species are possessed of similar virtues. (*v. Himal. Bot. p.* 383.) —*Royle.* It will have been seen from the foregoing observations that the root of various species of *Smilax* constitutes the sarasparilla of the shops. Sarsaparilla is used in decoction and infusion as a tonic and alterative. The following are enumerated as sources whence sarsaparilla of various kinds is derived.—*Simmonds.*

(7417) *Smilax China* and *sagittæfolia*, yielding the Chinese root, are said to come from the province of Onansi in China.

(7418) *Smilax pseudo China*, *S. Sarsaparilla*, *S. rubens*, and *S. Watsoni*, furnish the drug of North America. The sarsaparilla distinguished in commerce as the Lisbon or Brazilian is the root of *S. papyracea* of Poiret. It is an undershrub, the stem of which is compressed and angular below, and armed with prickles at the angles. The leaves are elliptic, acuminate, and marked with three longitudinal nerves. This species grows principally in

the regions bordering the river Amazon, and on the banks of most of its tributary streams. It is generally brought from the provinces of Para and Maranham. It is in large cylindrical bundles, long and straight, and the flexible stem of the plant is bound round the bundles, so as to entirely cover them. Its fibres are very long cylindrical, wrinkled longitudinally, and furnished with some lateral fibrils. Its color is of a fawn brown, or sometimes of a dark grey, approaching to black. The color internally is nearly white. Besides this species there are others indigenous, such as *S. officinalis*, which grows in the province of Mina ; *S. syphilitica*, which grows in the northern regions, and three new species, *S. sapicanga*, *S Brasiliensis*, and *S. Sarsaparilla* of India.—*Simmonds.* The roots of *Hemidesmus Indicus* were sent to the Madras Exhibition of 1855 from almost every district, but they varied considerably in aroma, the bundle from Trichinopoly being the best. A Syrup and extract from the indigenous plant, growing at the foot of Courtallum hills by 1st Dresser C. Appavoo Pillay, Tinnevelly. Dr. A. J. Scott forwarded a crystallized principle called "Hemidesmine," which was found on examination to be an entirely new substance, exhibiting a remarkable indifference both to acids and alkalies, crystallizing in a peculiar manner in hexagonal plates, which are subject to rapid efflorescence. The only ascertained solvents are alcohol and ether ; it is perfectly insoluble in water, both cold and hot. These facts show that it is a substance of a very peculiar nature. The jury recommended that this preparation be fully tested in hospital practice, along with the extract and syrup prepared from the same plant, and forwarded by 1st Dresser C. Appavoo Pillay. In consideration of Hemidesmine being a new product, the jury awarded a 1st class medal to Dr. Scott, and to C. Appavoo Pillay, Honorable Mention—*M. E. J. R.*

(7419) SARSAPARILLA. Two plants used as such, are common on the slopes of the Neilgherries, the *Hemidesmus Indicus*, and *Ichnocarpus frutescens*, both used as Sarsaparilla.

(7420) SARSAPARILLA. Simple and Compound Decoction of Sarsaparilla, In preparing these decoctions when Sarsaparilla is not obtainable, the China root, (Smilax China,) may be employed.—*Beng Phar, page* 279. An infusion of the Hemidesmus Indicus, (Ununtamul,) is a still better substitute for sarsaparilla. But as much of the virtues of the Ununtamul depend on a volatile principle, it should not be used in decoction, as the long boiling dissipates the active ingredient. For the Mezereon of the London Pharmacopeia, (Daphne mezereon) the dried bark of the Nepal paper plant, Daphne cannabina, may be substituted. The bazar mezereon is almost always inert from age.—*Beng Phar, page* 279. The Assam Sassafras perhaps the bark of Camphora glandulifera is fully equal to the American kind, and may be introduced accordingly, although its source is as yet not perfectly ascertained. Lastly, for liquorice, the goonch, root of Abrus precatorus, may be substituted in this as in many other preparations. —*Phar. p.* 279.

(7421) SARSAPARILLA, SYRUP OF SARSAPARILLA ; SYRUPUS SARZÆ. According to the same formula with which it is prepared may be made syrup of Hemidesmus.—(Ununtamul.) Syrup of China Root,—(Chob China.) These three preparations are alterative and diuretic, and are used to sweeten the decoctions and infusions of the same articles.—*Beng. Phar. page* 409.

(7422) SASSAFRAS. Root of Laurus sassafras, or Sassafras officinale.

Sasafras, ARAB.	Sassafraso, IT.
Cay-Vang-dee, COCH-CHIN.	Sassafras LAT.
Sassafras, FR.	Sassafras, SP.
Sassafras, GER.	

Sassafras, a genus of Plants belonging to the natural order *Lauraceæ*. This is one of the genera into which the old genus *Laurus* of Linnæus has been divided by Nees von Esenbeck and other botanists. It is known by its decœcious flowers, 6-parted membranous calyx, with equal segments permanent at the base. The barren flowers have 9 stamens in 3 rows, the 3 inner with double-stalked glands at the base ; the anthers linear, 4-celled, with their faces turned inwards. The fertile flowers have sterile stamens, which are fewer than, or as many as in, the barren flowers. The fruit is succulent, placed on the thick fleshy apex of the peduncle, and seated on the torn unchanged calyx. The leaves are deciduous. Flowers yellow. The species of this genus most known is the *S. officinale*, the Sassafras Laurel, on account of its medicinal virtues. It is an inhabitant of the woods of North America, from Canada to Florida. It is mostly a small tree or bush, but sometimes attains the height of 40 or 50 feet. Its flowers are arranged in naked downy racemes, which open before the leaves appear, and are furnished with subulate deciduous bracts. The leaves are membranous, bright green, smooth above, finely downy beneath, very variable in form, and tapering in a wedge-like manner into the petiole. The fruit is of a bright blue colour, as large as a small cherry, and seated upon red clavate peduncles. In America, the Sassafras is divided into two varieties, the red and white. Its great use is for medicinal purposes. It is however employed in America for making bedsteads and other articles of furniture, which are not liable to the attacks of insects, and give out a very agreeable odour.—*Eng. Cyc.*

(7423) SASSAFRAS. A species of Sassafras abounds in the Tenasserim jungles, which seems to possess all the properties of the sassafras of America. Mason never met with

the tree in fruit or flower, but the leaf shows that it is not the *Sassafras officinarum.—Mason.*

(7424) SASSAFRAS. LAURUS (SASSAFRAS.?) A species of laurus with the odour of sassafras, is in Tenasserim, often used in house carpentry. —*Mason.*

(7425) SASSAFRAS OF ASSAM, is perhaps the bark of the Camphora glandulifera. It is fully equal to the American kind, and may be introduced accordingly, although its source is as yet not perfectly ascertained.—*Beng. Phar. p.* 279.

(7426) SASSAFRAS PARTHENOXYLON, is a lofty timber-tree growing in the forests of Sumatra The bark is rough and brown. Leaves alternate, rather long, petioled, ovate, acute, often acuminate and varying in breadth, about 3 inches long, entire, with somewhat revolute edges, smooth, glaucous beneath; nerves lateral and irregularly alternate. The fruit has a strong balsamic smell, and yields an oil, considered useful in rheumatic affections. An infusion of the root is used in medicine.—*Eng. Cyc.*

(7427) SASSAFRAS-WOOD, is a species of laurel (sassafras officinalis;) the root is used in medicine. The small wood is of a light brown, the large is darker; both are plain, soft, and close. Sassafras-wood measures from 4 to 12 in. diameter; it is sometimes chosen for cabinet work and turning, on account of its scent.—*Tredgold.* At the Madras Exhibition of 1855, the Jury remarked two specimens of a somewhat rare wood, "Sassafras" both from Mergui. The wood is very fragrant, and contains an essential oil of value in medicine.—*M. E. J. R.*

(7428) SATIN.

Satin, FR.	Raso, IT.
Atlass. GER.	Setim, PORT.

A term applied to a soft, closely woven, twilled, silken fabric, with a glossy surface. Satins are either plain or figured, and are made of all colours.—*Faulkner.*

(7429) SATIN WOOD. SWIETENIA CHLOROXYLON. A cabinet wood, well known for its glossy yellow shades. *Satin wood* is hard in its character, and when polished it is very beautiful and has a satiny lustre, it is much used for picture frames, rivalling the birds eye maple of America. It is occasionally used by cabinet makers for general furniture, but it is liable to split.—*M. E. J. R.* The best variety is the West Indian, imported from St. Domingo, in square logs and planks from 9 to 20 inches wide; the next in quality is the East Indian, shipped from Singapore and Bombay in round logs from 9 to 30 in. diameter; and the most inferior is from New Providence, in sticks from 3½ to 10 in. square; the wood is close, not so hard as box-wood, but somewhat like it in colour or rather more orange; some pieces are very beautifully mottled and curled. It was much in vogue a few years back for internal decoration and furniture, it is now principally used for brushes, and somewhat for turning; the finest kinds are cut into veneers, which are then expensive, the Nassau wood is generally used for brushes. Satin-wood of handsome figure was formerly imported in large quantities from the Island of Dominica. The wood has an agreeable scent, and is sometimes called Yellow Saunders.—*Tred.*

(7430) SATURNIA, a genus of Insects belonging to the order *Lepidoptera* and the family *Bombycidæ*. The antennæ are fringed in the male; the head is small; the wings are very broad and entire; the palpi and trunk are wanting.—*Eng. Cyc.* To the genus *Saturnia* some of the largest of the *Lepidoptera* belong. *S. Atlas*, the Giant Atlas Moth, has wings measuring 7 or 8 inches across. This species also, with *S. Cecropia* and *S. Luna*, have their wings produced into a tail. The cocoons of *S. Cynthia* and *S. Mylitta* are used in India for the production of silk. Latreille states that these are the wild species of silk-worm of China. *S. Cynthia* is the Arrindi Silk-Worm of India. (Roxburgh, 'Linn. Trans.,' vol. vii.) *S. Promethea*, a North American species, forms its cocoon within the leaf of a sassafras-tree, having previously fastened the stalk of the leaf to the stem by a strong silken web, whereby it is prevented from falling with the other leaves. (Westwood.)

(7431) SATURNIA PAVONIA MINOR, the Emperor Moth, is one of the handsomest of the British species of Moths It is about 3 inches wide. The colour is grayish-brown, faintly tinged with purple; the hinder margin of all the wings has a band of pale brown and purple, the hinder band being much waved. The centre of each wing has a large spot or ocellus, which is placed on a light ground; it consists of a black pupil, with a yellow or gray iris, and partially surrounded by a light blue crescent. The larva is of a green colour, having a black band on each segment, adorned with pink tubercles, bearing a whorl of six hairs diverging like a star. It constructs a curious cocoon, the extremity not being close, but terminated by a converging circle of very stiff hairs, which enables the insect to make its escape from within, but completely prevents all ingress.—*Eng. Cyc.*

(0432) SAUCE. Out of eighteen red sauces submitted by Dr. Hassell to examination in 1852, no less than sixteen contained Bole Armenian, and this usually in immense quantites.—*Hassell.*

(7433) SAUSSUREA GOSSYPINA, In East Nepaul at the summit of the Wallan Choon pass, at an elevation of 16,748 feet, above the sea, the plants gathered by Dr. Hooker near the top of the pass were species of *Compositæ*, grass, and *Arenaria*; the most curious was Saussurea Gossypina, which forms great clubs of the softest white wool, six inches to a foot high, its flowers and leaves seeming uniformly clothed

with the warmest fur that nature can devise. Generally speaking, the alpine plants of the Himalaya are quite unprovided with any special protection of this kind; it is the prevalence and conspicuous nature of the exceptions that mislead, and induce the careless observer to generalise hastily from solitary instances; for the prevailing alpine genera of the Himalaya, *Arenarias*, primroses, saxifrages, fumitories, *Ranunculi*, gentians, grasses, sedges, &c. have almost uniformly naked foliage.—*Hooker, Him. Jour. Vol.* 1. *p.* 225.

(7434) SAUNDERS WOOD: RED WOOD: RUBY WOOD: RED SANDERS WOOD. Pterocarpus santalinus.

Undun Sundul-Ahmer ARAB.	Sundul i-surkh BUCKUM, PERS.
Rachta-chandana, BENG.	Rakta-Chandana:
Honnay, CAN.	Ranjana SANS.
Ructchandoon CYNG.	Sigapoo Shandanum, TAM.
Lalchundun, DUK.	Kuchandanum TEL.
Sandel-hout DAN.	RuttunjeeGUZ.HIND
Santale rouge, FR.	Sandalo roso, IT.
Sandal-holz, GER.	
Ruckta-chundun,	

A heavy, insipid, and nearly inodorous wood, the product of a useful timber tree (*Pterocarpus santalinus*), found in Malabar, Mysore, Timor, and Ceylon. The wood is extremely hard, of a fine grain, and a bright garnet red colour, which brightens on exposure to the air It is employed to dye lasting reddish-brown colours; it communicates a deep red to alcohol, but gives no tinge to water—*Faulkner*. Red saunders wood is principally shipped to England from Calcutta in logs from 2 to 10 inches diameter, generally without sap, and sometimes in roots and split pieces, it is very hard and heavy, it is very much used as a red dye wood, and often for turning. The logs are often notched at both ends, or cut with a hole as for a rope, and much worn externally from being dragged along the ground; other woods as also indeed Ivory tusks, are sometimes perforated for the like purpose.—*Tredgold* (Pterocarpus santalinus) a large tree, growing on the Pulicat and Tripaty mountains. The wood is usually seen in billets of 2 to 3 feet in length, of a deep red colour, the concentric circles being divided by dark lines. With different mordants, it yields various shades of red, these are said not to be permanent. This wood is largely exported from but little used in Madras. The Madras exports for 1854 amounted to 47,431 cwts. value 59,570 Rupees.—*M. E. J R.*

(7435) SAVARY KEERAY.

Savary keeray, TAM.

This green, says Ainslie, I have never seen, nor do I believe that the Botanical name of the plant has been ascertained. It grows in the southern parts of the peninsula and is eaten by the common people.—*Ainslies' Mat. Med.* v. 256.

(7436) SAVE, *Canarese.*

Samulu, TEL.

There are two sorts of this grain, viz. Hari Save and Hejjane. Poor people use them in food. It sells in Bangalore? seers for a Rupee.—*M. E. of* 1857.

(7437) SAVORY. Satureja hortensis, and montana. Aromatic herbs, now fallen into disuse, used to flavour soups, &c.

(7438) SAWS.

Scies, FR.	Seghe, IT.
Sagen, GER.	Serras, PORT.
Kurwuttee, GUZ. and HIND.	Pili, RUS.
	Sierras. SP.

Are well-known instruments of various sizes, for cutting wood, iron, and other hard substances. They are manufactured on a large scale at Sheffield.—*Faulkner*.

(7439) SAXICOLA, a genus of Insessorial Dentirostral Birds belonging to the family *Sylviadæ*. Three British species belong to this genus as now constituted, the Stonechat, the Wheatear, and the Whinchat. This genus has the following characters:—Beak straight, slender, the base rather broader than high, surrounded with a few stiff hairs; the superior ridge of the upper mandible prominent, the sides towards the point compressed; the point itself curved and indented. Nostrils basal, lateral, oval, half closed by a membrane. Wings; the first quill-feather about half as long as the second; the second shorter than the third or fourth, which are the longest in the wing. Feet; the tarsus rather long, three toes in front, one behind; the outer toe connected by a membrane to the middle toe; claw of the hind toe short, strong, and curved. (Yarrell.)—*Eng. Cyc.*

(7440) SAXICOLA RUBICOLA, the Stonechat. This is the Traquet Rubicole and Moteux Traquet of the French; Saltabastone, Zompacardi, and Saltinpalo of the Italians; Schwarzkehliger Steincehmatzer of the Germans; Clochdery Cerrig of the Welsh; and Stonechatter, Stonesmith, Stonesmich, Stoneclink, and Moor-Titling of the English. It is found in Russia, Germany, France, Provence, Italy, Smyrna, Japan, the Deccan, the banks of the Ganges, the mountains of Upper Hindustan, Senegal, and South Africa (Cape), England, Ireland, and Scotland.—*English Cyclopedia, page* 687.

(7441) SAXIFRAGA. SAXIFRAGEÆ. These well known plants are mostly native of Britain with white, yellow, or pink flowers, the S. umbrosa, the London pride, is a pretty flower, the species are easily cultivated from seed in any garden soil.—*Riddell.*

(7442) SCABIOSA ELEGANS DIPSACEÆ. These plants with the sent of honey are well adapted for ornamenting the flower garden, they are propagated by seed, and grow readily in any good soil, the seed may be sown in

pots at the close of the rains, and the plants removed when a few inches high.—*Riddell.*

(7443) SCAMMONY. CONVOLVULUS SCAMMONIA.

Sukmoonia, ARAB.	Sakmoonia, GUZ HIND.
Scammonee, FR.	Scammonea, IT.
Skammonien, GER.	Escamonea, SP.

A native of Syria and the Levant, recently discovered by Dr. Burn at Kaira in Guzerat. The proper juice of the plant when dried is called *Scammony*. The Scammony of Aleppo occurs in fragments, voluminous, dry, light, spongy, friable, pulverulent, with dull fracture of blackish grey, but covered with grey powder resulting from the reciprocal friction of the pieces, slightly transparent in small flakes, which become white and rather adherent when rubbed with a wet finger; odour disagreeable, taste weak, acrid, bitter, and repulsive, powder greyish white. The species of scammony is often adulterated with concrete juices of a similar kind, with flour, chalk, sand, and earth. According to the analysis of Bourtron La Grange and Vogel, good scammony consists of resin 60, gum 3, extract 2, and earthy and vegetable impurities 25 per 100. The most abundant harvest of scammony is in Smyrna and Aleppo. There are several modes of collection, which give rise to corresponding commercial varieties. The neck of the root being laid bare is divided transversely, and shells placed around the edges to receive the juice as it exudes. This subsequently thickens in the air. The drug collected in this mode, is called shell scammony. This occurs in small porous masses, sometimes smooth, of reddish or whitish grey colour; of waxy fracture, yellowish and half transparent, in thin layers, of disagreeable taste and smell; on drying it becomes adhesive. Instead of shells the leaves of the chesnut tree are sometimes used, and a flattened scammony of good quality collected. If the roots be cut in successive layers, the scammony is inferior, but still esteemed. It is dried either over a slow fire or before the sun, and then moulded into stamped pastiles, of whitish colour. This variety is very rare in commerce. Lastly, an extract is prepared from the expressed juice of the roots and stalks, this is moulded into round masses, of black, vitreous, and resinous fracture. The Arab name of this drug, Ul Sugmoonia, signifies the *purgative*. Several old preparations called "diagredium" (διακρηδιον.) are mixtures of scammony with sulphur and liquorice, and are now no longer used.—*O'Shaughnessy, page* 500, 501.

(7444) SCARITIDÆ, a family of Coleopterous Insects belonging to the section *Geodephaga*, which section corresponds to the genera *Carabus* and *Cicindela* of Linnæus. The *Scaritidæ* have the prothorax separated from the elytra by a narrow cylindrical neck the mandibles are usually large, and armed with strong teeth on the inner side; the labrum is small; the mentum is furnished with a tooth: the antennæ are usually short, and have the basal joint long; the legs are short; the anterior tibiæ are broad, and strongly notched on the outer side, and fitted for burrowing; and the anterior tarsi in the males are not dilated. The body is usually elongated, and straight at the sides; head, thorax, and elytra, are nearly equal in width. The principal genera contained in this family are *Scarites*, *Pasimachus*, *Camptodontus*, *Acanthoceles*, *Clivina*, and *Dischirius*.

In *Scarites* (Fabricius) the mandibles are strongly toothed on the inner side, the second and third joints of the antennæ are obconic, and the following joints are shorter, compressed, and subquadrate. Dejean separates from *Scarites*, under the generic name *Oxygnathus*, the *S. elongatus* of Wiedemann, which differs in having the mandibles more slender and elongated, and destitute of teeth on the inner side. The only known species is found in the East Indies; it is of a very narrow form.—*Eng. Cyc.*

(7445) SCHIZANTHUS GRAHAMI, SCROPHULARINEÆ. This is a genus of pretty showy annuals, colours of the flowers are crimson, white and variegated, and should be grown, and treated as the Scabius.—*Riddell.*

(7446) SCHIZOPETALON WALKERI. CRUCIFERÆ. This is a singular plant with curiously cut petals, and a strong tapering root, and should be grown and potted like the Eschscholtzia.—*Riddell.*

(7447) SCHLEICHE'RA, a genus of Plants belonging to the natural order *Sapindaceæ*. It has a 5-toothed calyx. Petals absent; the disc occupying the bottom of the calyx. The stamens 6-10, inserted between the margin of the disc and the ovary. The ovary is 3-celled, with one erect ovule in each cell. The stigma 3-cleft. The fruit is an indehiscent drupe, with 1, 2, or rarely 3 cells. The seeds are solitary in each cell, and covered with a pulpy arillus; the embryo much curved. The species are trees; the leaves abruptly pinnate, the leaflets nearly opposite. The flowers are small, disposed in spike-like racemes.—*Eng. Cyc.*

(7448) SCHLEICHERA. *Species*, in Tenasserim, the fruit of this tree resembles the wild ramboutan in every thing except that it is covered with prickles half an inch long. It is rarely seen in market but would be a valuable addition to the dessert. The tree grows among the hills of Tavoy.—*Mason.*

(7449) SCHLEICHERA TRIJUGA. SAPINDACEÆ, Roxb. Fl. Ind. ii. p. 277.

Poovoo or poo marum, TAMUL.	Roatangha, TEL.

Grows in various parts of India. Has abruptly pinnate leaves from 8 to 16 inches long, the leaflets 2-4, opposite, sessile, broad, lanceolate or oblong-entire, rather smooth on both sides;

the lower pairs, the smallest, from 3 to 5 inches long. The petioles are a little downy, the stipules wanting. The racemes are axillary, or below the leaves round the base of the young shoots, solitary, in the male simple, in the hermaphrodite often compound, from 2 to 3 inches long. In the male flowers the calyx is cup-like, and 5-toothed. The corolla wanting, the filaments 6 10, erect, and many times longer than the calyx. The anthers oval and erect; the pistil a mere rudiment. The hermaphrodite flowers on a separate tree. The calyx, corolla, and stamens as in the male flower. The disc a fleshy yellow ring, surrounding the insertions of the filaments. The ovary superior, ovate, 3-celled, with one ascending ovule in each cell. The style short, stigma 3-cleft, recurved, slender, and downy The drupe about the size of a nutmeg, a little pointed, covered with a tender gray dry pericarp. The seeds are oblong, and surrounded with a whitish pulpy aril, which is of a pleasant acid taste, and most grateful during dry weather. It is a native of insular and continental India, where the astringent bark, mixed with oil, is used as a remedy for the itch. (Lindley, *Flora Medica*; Lindley, *Vegetable Kingdom*)—*Eng. Cyc.* The wood is very hard. The pulpy sub acid oil is edible and palatable. (*Lindley.*)—*O'Sh page* 242. Wight says (No. 80) that it furnishes a red, strong, hard wood, generally rather small, used to make pestles, spokes for bandy wheels and such purposes, where much strength in small space is required.—*Wight.*

(7450) SCHMIEDELIA (in honour of Casimer Christopher Schmiedel, once a professor at Erlangen), a genus of Plants belonging to the natural order *Sapindaceæ*. It has a 4-parted unequal calyx, 4 petals, the 5th or superior one wanting. The disc incomplete, with 4 glands opposite the petals, 8 stamens inserted in the receptacle, and connate around the ovary at the base. The fruit is indehiscent, 1, 2, or rarely 3-lobed. The lobes roundish, fleshy, or dry, and 1-seeded. The seeds with or without an arillus. The species are trees or shrubs usually with trifoliate, rarely with simple existipulate leaves and racemose white flowers. The racemes are axillary.—*Eng. Cyc.* Wight gives Schmiedelia Cobbe, 964; Rheedii 964; and villosa, 401.

(7451) SCHMIEDELIA COCHINCHINENSIS has its leaves on long petioles, with serrated leaflets, terminal racemes, pilose small petals. The flower is small and white. It is a native of Cochin China on the banks of rivers. The leaves are used as cataplasms in contusions. (Don, *Dichlamydeous Plants*; Lindley, *Flora Medica*).—*Eng. Cyc.*

(7452) SCHMIEDELIA SERRATA. *Syn.* Ornitrophe serrata. Roxb. Fl. Ind. ii. p. 266. Bengal, Coromandel.

Rakhal phul, HIND. | Tautika, TEL.

Schmiedelia serrata has ternate leaves, the leaflets ovate, pointed, serrate, generally blistered, smooth on the back, and from 2 to 3 inches long. The racemes axillary, single, and erect. The flowers small, white, and polygamous. In the hermaphrodite flower, the calyx 4 leaved, and the petals 4, unilateral. The filaments very woolly near the base. The fruit is small, red, and succulent, and is eaten by the natives of Coromandel. The root is astringent, and is employed by the native practitioners in diarrhœa.—*Eng. Cyc.* The Ripe berries are eaten. Root astringent, and employed to check diarrhœa.—*O'Shaughnessy, p.* 242. Schmiedelia serrata, is only a straggling shrub, with very small timber, *Hort. Garden* 43.—*M. E. J. R.*

(7453) SCHORL. Schorl, or black tourmaline, is found in Madura, in great abundance, also in quartz near the mouth of Tavoy river on the east side, and also at the foot of the eastern mountains, near the head waters of the Dahgyaine, north east of Maulmain. These are the only localities in Tenasserim, where Mr. Mason met with this mineral. In both, the crystals are numerous, and in Tavoy they are large, but not so handsome as seen in foreign specimens.—*Mason.*

(7454) *Green Tourmaline.*—A green gem that cannot be distinguished by the eye from beryl, is brought with the Ceylon diamonds; it is however, green tourmaline; as may be ascertained by a very simple test, for beryl scratches quartz, but tourmaline is scratched by quartz.

(7455) *Ceylon Diamonds.*—White jewels of an inferior quality are often offered for sale in Maulmain under the name of Ceylon diamonds, but they are usually made from green tourmaline. White tourmaline, is a rare mineral, but the green variety being common, the jewelers by exposing it to heat expel its colour and it becomes white.—*Mason.*

(7456) SCHREBERA SWIETENOIDES. WEAVERS BEAM TREE.

Mamalinga maram, also Mogalinga maram, TAM. | Makade Chettoo, TEL.

A large timber tree, a native of vallies of the mountainous parts of the Rajahmundry Circars, Balaghat mountains &c. The wood is of a grey colour, very close grained, heavy and durable. It is reckoned less likely than others found thereabout to warp or bind, and is much used for weavers beams and for many other purposes. Dr. Roxburgh proposes its use for scales to mathematical intruments instead of box.—*Rohde M.S.S.*

(7457) SCILLA, OR SQUILLA, a genus of Plants belonging to the natural order *Liliaceæ*. It has 3 sepals coloured and spreading; petals very like them, and scarcely broader; stamens 6, shorter than the perianth, filaments smooth, somewhat dilated at the base, acuminate, entire ovary 3 parted, glandular, and melliferous at the apex; style smooth, simple; stigma obscurely 3

lobed, papillose ; capsule rounded 3-cornered 3-celled ; seeds numerous in two rows flattened with a membranous testa.—*Eng. Cyc.* Scilla is readily increased like others of the Lily tribe ; a light soil is most suitable.—*Riddell.*

(7458) SCILLA INDICA. Called *Iskeel*, by the native gardeners.—*O'Shaughnessy.* Scilla Indica is found on the sandy shores of various parts of India. It has a round white perennial bulb tunicated, about the size of a large apple ; leaves numerous, radical, sub bifarious, ensiform nearly flat, smooth on both sides from 6 to 18 inches long. When in blossom the plant is perfectly destitute of leaves, scape erect, round smooth, naked, including the raceme from 2 to 3 feet long ; raceme very long erect ; flowers remote ; long, pedicelled, drooping. This species is supposed by Dr. Roxburgh to possess the same qualities as S. maritima (Lindley, Flora Medica.)—*Eng. Cyc. p.* 699. This plant occurs on the sea-shores of the Indian Peninsula ; leaves numerous, radical, sub bifarious, ensiform, nearly flat, smooth on both sides, six to eighteen inches long. When in blossom, the plant is entirely destitute of leaves : the bulbs are round, white, the size of an orange ; inodorous, nearly tasteless, and devoid of any medicinal properties but possibly this may have proceeded from their having been collected from an unfavourable locality, or at the improper season, as few plants are so much influenced by climate and circumstances as the squill, instances being known on the Spanish coast of its being quite inert in one locality, while as active as usual at the distance of but a few miles.—*O'Shaughnessy, page* 663.

(7459) SCINCIDÆ, SCINCOLDIANS, OR LEPIDOSAURS, the names given by Gray, Oppel, Fitzinger, and Messrs. Dumeril and Bibron to a family of Saurians.—*English Cyclopædia, page* 699.

(7460) SCINDAPSUS, Of this genus, Wight gives, Scindapsus decursivus, 779 ; officinalis, 778 ; peepla, 780 ; pertusus, 781.

(7461) SCINDAPSUS OFFICINALIS. *Syn.* POTHOS OFFICINALIS ; Officinal Pothos : This creeper, as I judge, says Mason, is not uncommon on the forest trees, of Tenasserim, but I have never seen the plant in flower. This also enters into the native Materia Medica, but it is not used in European practice, although it has a place in Lindley's Flora Medica.—*Mason.*

(7462) SCITAMINACEÆ, a natural order of plants embracing the *Marantaceæ*, with 1 anther-valve, and the *Zingiberaceæ* with 2 anther-valves. The separation of these orders is now generally recognised. [MARANTACEÆ ; ZINGIBERACEÆ.]—*Eng. Cyc. Scitamineæ*, are abundant on the Khassia hills and extremely beautiful ; Dr. Hooker collected thirty seven kinds.—*Hooker Him. Jour. Vol.* II. *page* 281. The hat of the Lepcha in Sikkim is made of leaves of Scitamineæ, between two thin plates of Bamboo work —*Hooker Vol.* I. *page* 131.

(7463) SCIURIDÆ, a family of Animals belonging to the order *Rodentia* [RODENTIA] and embracing the various forms of Squirrels It has the following characters :—Molar teeth simple, with tuberculous crowns ; five above, four below, on each side ; the lower incisors very much compressed. Toes long, armed with sharp claws, four on the anterior and five on the posterior feet : thumb very short. Tail long and tufted Cheek-pouches in some. In others the skin of the sides extended between the anterior and posterior limbs. The geographic range of the Squirrels is very wide both in the Old and New World. None appear to have been discovered in Australia. The *Sciuridæ* have been divided into two principal groups :

A. Squirrels with free limbs.

Genera,—*Tamias, Sciurus, Macroxus* and *Anisonyx.*

B. Squirrels with their limbs invested in the skin of the sides.

Genera.—*Pteromys* and *Sciuropterus.*

(7464) *Tamias* (Ground Squirrels). The species are found in Europe, Asia, and North America.

Tamias Palmarum is the *Mustela Africana* of Clusius ; *Sciurus Palmarum* of Linnæus ; and Le Palmiste of Buffon.

(7465) *Sciurus* (True Squirrels). A slight depression of the frontal bones, and a very slight posterior projection of the same ; profile of the face very nearly straight ; cranial cavity as long as two thirds of the face. No cheek-pouches. Tail distichous.

The species are found in Europe, Asia, India and Indian Islands, Africa, North America South America, and West Indian Islands.

(7466) SCIURUS BARBEI, *Blyth*, a small striped squirrel of Burmah.

(7467) SCIURUS BERDMOREI, *Blyth*, a small striped squirrel of Burmah.

(7468) SCIURUS BICOLOR, a gigantic squirrell abounds throughout the Burmese countries and Malayan Peninsula and northward to the Assam Hills and those of Sikkim, and Nepal, it is the Sc. Macrouroides of Hodgson It has a pale variety in the Malayan Peninsula

(7469) SCIURUS INSIGNIS, *Hors*, a small striped squirrel of the Malayan Peninsula.

(7470) SCIURUS KERANDRENII, is common in Arracan.

(7471) SCIURUS PHAYREI, *Blyth* : a Burmese squirrel.

(7472) SCIURUS PYGERYTHRUS, a Burmese sqnirrel : a supposed variety of Sc. Lokroides.

(7473) SCIURUS RAFFLESII, Vig and Horsf Sc. Prevostii, Desmarest, is a larger squirrel than

Sc. hippurus. It inhabits the Malayan peninsula. It is black above, deep rufo-ferruginous below and on the feet: a very broad white lateral band from mouth to haunch, extending over the outside of the thigh, and more or less greyish from cheek to shoulder: tail of a somewhat duller black than the back, and a little rufescent at tip.

(7474) SCIURUS REDIMITUS, Vander Boon. Sc. rufogularis Gray, a squirrel of Borneo.

(7475) SCIURUS RUFONIGER, Gray, probably a variety of Sc. redimitus.

(7476) *Sciurus maximus*, the Malabar Squirrel. Upper parts and external surface of the limbs bright chocolate-brown, which colour terminates abruptly, and is joined by the pale yellowish-brown on the under parts, forearms, and internal surface, of the limbs. Front of the fore-legs, neck, throat, face, and head between the ears, lighter in colour: a broad darker patch on the rest of the upper part of the head extends from the forehead to the middle of the nose. Back and shoulders sometimes deepening into black. Ears short, covered with long tufted hairs, and brush-like; from the longer part of each ear a narrow line of deep-brown passes downwards and backwards in an oblique direction. Whiskers scanty, long, and black. Claws incurved and strong, those of the anterior thumbs broad, short, and flattened. Tail distichous, the hairs expanding widely towards the extremity, bright chocolate-brown at the base, black in the middle, and chestnut in the extreme third part. Length about 33 inches, of which the tail measures rather more than one-half. It is a native of the Malabar coast.

Sonnerat appears to have been the first zoologist who observed this richly coloured species, the largest of the true Squirrels. It haunts among palm-trees, and is stated to be very fond of the milky juice of the cocoa-nut, as well as of the solid part of the nut. In captivity, it is tame and familiar; but it tries its teeth upon most substances that come within its power and should be guarded against accordingly.

(7477) *Macroxus*. Frontal bones very much depressed: nasal bones but little elongated; a deep depression between the cranium and the face. Tail round. No cheek-pouches. The species are natives of Sumatra, India, Africa, and South America.

(7478) *Pteromys*. Posterior part of the nasal bones a little convex; the frontal bones strongly depressed in their middle and rising slightly afterwards; the posterior parts of the head do not begin sensibly to curve downwards before the middle of the parietal bones; cerebral cavity small, only half the length of the head. The species are natives of Asia, the Moluccas, the Philippine Islands and Java.

(7479) *Sciuropterus*. Differing from *Pteromys* in having the anterior part of the profile line of the head straight to the middle of the frontal bones, where it takes a curved direction, very much arched, without any intermediate depression. Occiput projecting; frontal bones elongated; and the capacity of the cranium comprising three-fifths of the length of the head. The species are found in Northern Asia and North America.

(7480) *Sciuropterus Sagitta* (*Sciurus Sagitta*, Linn.; *Pteromys Sagitta*, Geoff.). This seems to be the *Sciurus maximus volans*, seu *Felis volans*, of Brisson; Le Taguan ou Grand Ecureuil Volant of Buffon. This squirrel has a small rounded head; cloven upper lip; small blunt ears; two warts at the utmost corner of each eye, with hairs growing out of them; neck short. Four toes on the fore feet; and instead of a thumb, a slender bone, 2½ inches long, lodged under the lateral membrane, serving to stretch it out; thence to the hind legs extends the membrane, which is broad, and a continuation of the skin of the sides and belly; the membrane extends along the fore legs, and stretches out near the joint in a winged form: five toes on the hind feet, and on all the toes sharp compressed bent claws. Tail covered with long hairs disposed horizontally. Colour of the head, body, and tail a bright bay, in some parts inclining to orange; breast and belly of yellowish-white. Length, from nose to tail, 18 inches; tail, 15 inches. (Pennant.) This species inhabits Java and others of the Indian Islands. It leaps from tree to tree as if it flew; and will catch hold of the boughs with its tail. It differs in size; that described by Linnæus was the size of our squirrel, whilst that killed by Sir Edward Michelbourne in one of the Indian islands was greater than a hare. Nieuhoff describes this species under the name of the Flying Cat, and says the back is black. He has given two very good figures of it—one in his frontispiece, the other in the page he describes it in. (Pennant.) In the description of Pennant, above given, there are two points which deserve consideration; that which describes the animal as catching hold of boughs with its tail, and that which states its difference in size. The first is given on the authority of Sir Edward Michelbourne's voyage, in Purchas's 'Pilgrims,' and should be received with caution. The second would lead to the conclusion that more than one species had been included under the name of the animal now under discussion. We accordingly find that Dr. Horsfield, in his valuable 'Zoological Researches in Java,' describes two Flying Squirrels (*Pteromys genibarbis* and *P. lepidus*), both nocturnal in their habits, nearly approaching to *S. Sagitta*. He describes the first as living on fruits; the second as found in the closest Javanese forests, where the height of the trees and the luxuriance of the foliage effectually conceal it. In the work last above referred to, Dr. Horsfield has given a 'General Enumeration of Indian Sciuri,' well worthy of the attention of

the Zoologist. He enumerates 16 species of *Sciuri*, 4 of which were first described by himself. These do not include the Flying Squirrels. —*Eng. Cyc.*

(7481) SCLERIA, A very long sedge, grows by the water in the river Soormah near Silhet and is used for thatching: boat-loads of it are collected for the Calcutta market, for which also were destined many immense rafts of bamboo 100 feet long.—*Hooker Him. Jour. Vol.* II. *page* 327.

(7482) SCOLOPACIDÆ, a family of Birds belonging to the order *Grallatores*. The genus *Scolopax* of Linnæus consisted of the following species: *Guarauna, Madagascariensis arquata, Phæopus, fusca, rusticola, Gallinago, Gallinula, Fedoa, Glottis, Calidris, Totanus, limosa, capensis, Lapponica, Ægocephala, alba,* and *candida*. ('Sys. Nat., ed. xii. According to Cuvier, this genus comprehends the following subgenera:—*Scolopax, Ibis, Numenius, Rhynchæa, Limosa, Calidris* (Cuv., *Tringa*, Temm.), *Arenaria*, (Bechst. *Calidris*, Vig.), *Pelidna, Falcinellus, Machetes, Eurynorhgnchus, Phalaropus, Strepsilas Totanus, Lobipes*, and *Himantopus*. (Regne Animal, ed. 1829.)

Mr. G. R. Gray divides the *Scolopacidæ* into the following subfamilies and genera:—

I. *Numeninæ.—Numenius*, Ray; *Limosa*, Briss.; *Terekia*, Bonap.; *Erolia*, Vieill.; *Ibidorhyncha*, Vig.

II. *Totaninæ.—Totanus*, Ray; *Glottis*, Nils.; *Guinetta*, Briss.; *Actiturus*, Bonap.; *Catoptrophorus*, Bonap.

III. *Recurvirostrinæ.—Recurbirostra*, Linn.; *Cladorhynchus*, Gray; *Himantopus*, Briss.

IV. *Tringinæ.—Hemipalama*, Bonap.; *Heteropoda*, Bonap.; *Tringa*, Linn.; *Machetes*, Cuv,; *Pelidna*, Cuv.; (?) *Cocorli*, Cuv.; *Eurynorhynchus*, Nils.; *Ereunetes*, Ill.; *Calidris*, Ill.

V. *Scolopacinæ.—Macroramphus*, Leach; *Rhynchæa*, Cuv.; *Scolopax*, Linn.; *Rusticola*, Vieill.; *Homoptilura*, Gray; *Telmatias*, Boie; *Gallinago*, Ray.

VI. *Strepsilinæ.—Strepsilas*, Ill.

VII. *Phalaropodinæ.—Steganopus*, Vieill.; *Phalaropus*, Briss.; *Lobipes*, Cuv. We now proceed to illustrate the principal Asiatic genera of this family:—

(7483) *Scolopax.*—Bill long, straight compressed, soft, the point enlarged; the two mandibles furrowed for half their length; point of the upper mandible longer than the lower, the enlarged end forming a blunt hook; arête elevated at the base, projecting. Nostrils lateral, basal, slit longitudinally near the borders of the mandible, and covered by a membrane. Feet moderate, slender, naked space above the knee very small; three toes before entirely divided, the external and middle toe united; a hind toe. Wings moderate, first quill rather shorter than, or of the same length as, the second, which is the longest (Temminck.)

(7484) *Scolopax rusticola*, the Woodcock, i the Becasse of the French; Beccaccia of the Italians; Waldschnepfe of the Germans; Holt Snepp of the Danes, Morkuna of the Swedes; Blom Rokke, Rutte, and Krogquist, of the Norwegians and Cyffylog of the Welsh. It is most probabl the Σκολόπαξ of Aristotle. The male has the upper parts varied with ruddy, yellowish, and ash and marked by great black spots; lower part yellowish-red, with brown zigzags; quills striped with red and black on their external barbs; tail feathers terminated above with gray and below with white; feet livid. Length about 13 inches The female is rather stouter and larger, but he colours are less vivid, and the wing-coverts hav many spots. The distribution of this bird is very wide. The species is found in Western Laplan beyond the article circle, in Finland, Russia, Siberia, rarely in Germany, and more rarely in France. A few have been known to breed in Switzerland. It is very common in Italy and a Maderia, Barbary, Athens, Smyrna, Aleppo Egypt, Cashmere, and Japan, are other localities It feeds on worms, snails or slugs, and (accord ing to Temminck) small beetles; but earthworm appear to be its favourite nourishment. Fo these, it bores with its long and sensitive bil with unerring certainty. The Woodcock breed occasionally, not to say frequently, in grea Britain, in Scotland especially. The nest is placed on the ground in a dry warm spot among herbage, and is loosely fabricated of dead leaves, of the common fern principally, and unlined. The eggs, three or four in number, are pale yellowish-white, blotched, and spotted at the larger end with ash-gray, and two shades of reddish-yellow brown, according to Yarrell; of a dirty yellow sprinkled with small spots of pale brown, according to Temminck. When surprised, the old birds have been known to carry off their young in their bills and claws.—*Eng. Cyc.* They are found on the Neilgherries, and in 1842, one wae shot at Kuladghee. We need hardly add that the bird, served with its trail in, is a delicious dish. The Snipes belong to this section. Those most familiar to the English sportsman and ornithologist are the common Snipe, the Jack Snipe, and the Solitary Snipe: Sabine's Snipe (*S. Sabini*) is of very rare occurrence, and indeed the Solitary Snipe is far from common.

(7485) *Scolopax Gallinago*, Linn, *Gallinago, scolopacinus*, Bonap., the Common Snipe. It is the Beccacino and Pizzarda of the Italians; Becassine, or Becasseau, and Chevre Volant, of the French; Heer Schnepfe and Himels Ziege of the Dutch; Watersnep of the Netherlanders; Myr Snippe of the Icelanders; Horsgjok of the Swedes; Hossegioeg of the Danes; and Ysnittan y Fyniar of the Welsh. The

normal number of tail-feathers is 14, varying to 16 (Brehm's Snipe) and 12 (Delamotte's Snipe). Upper parts variegated very nearly as in the Solitary Snipe; neck and breast striped longitudinally; sides striped transversely with white and blackish; middle of the belly and abdomen spotless, pure white; base of the bill ash-colour; the rest brown; feet pale-greenish; length about 10½ inches, of which the bill measures about 2¾ inches. The colours of the plumage, after the spring moult, are brighter and more brilliant with bronze reflections than after the autumnal moult: in winter the hue becomes more ashy.

Varieties.—Pure white; reddish-white; the feathers sprinkled or blotched with white, or some part of the plumage white.

Mr. Gould ('Birds of Europe') states that, although the contrary has been long stated by naturalists, he conceives that the natural range of the Common Snipe is comparatively limited; and that the Snipes from India, Africa, and North America, which have been regarded as identical with our bird, will be found, on examination, to be specifically distinct.

The following localities have been given as the range of the Common Snipe in Europe and Asia:—Russia and Siberia, from Scona to Lapland, Norway, Sweden, Denmark, Faroe Islands, Iceland and Greenland, Germany, Holland, British Islands, France, Spain, Provence, Switzerland, Italy, Hungary, and Illyria.

Marshes, moist meadows, and, in frosty weather, the edges of rushy rills, are the haunts of the snipe. In such situations they have been seen pushing their bills by means of repeated thrusts, quite up to the base in the mud, drawing them back with great quickness, and shifting their ground every now and then. Their food consists of such worms, insects, and small molluscs as haunt such miry places, and they have been shot in the act of feeding on leeches.

Few birds are better eating than a fresh Snipe. The old quatrain says:—

"Le becasseau est de fort bon manger,
Duquel la chair resueille l'appetit.
Il est oyseau passager et petit.
Et par son goust fait des vins been juger.,

Snypes were among the birds admitted to the Earl of Northumberland's table ('Household,' 1512), and were then charged at threepence a dozen.

(7486) *Scolopax major* (*Gallinago major*, Bonap.), the Solitary, Double, or Great Snipe, is the Grand or Double Becassine of the French; Beccacino Maggiore, Pizzordone, and Croccolone, of the Italians, Mittelschnepfe and Doppelschnepfe of the Germans; Poelsnep of the Netherlanders; Great Snipe, Double Snipe, and Solitary Snipe, of the English; and Ysnid of the Welsh. The tail is composed of 16 feathers; midrib of the first quill whitish: the black of the top of the head divided by a band of yellowish-white; eyebrows of that colour; upper parts variegated with black and bright rusty, the last-named colour disposed longitudinally; lower parts whitish-rusty; belly and sides striped with black bands; bill inclining to reddish, brown at the point; feet greenish ash.—(*Temm.*)

(7487) *Numenius*. Bill long, slender, curved, compressed, hard at the point, and subobtuse; upper mandible exceeding the lower, rounded towards the end, canaliculated for three-fourths of its length; nostrils lateral, linear, pierced in the canaliculation; face feathered, space between the eye and the bill covered with feathers. Feet slender, naked above the knee; three toes before and one behind, which last is articulated on the tarsus and touches the ground, the anterior toes united up to the first joint by a membrane. Wings moderate; first quill longest.

(7488) *Numenius arquatus*, the Curlew. It is the Courlis of the French; Ciarlotto Spadone, and Chiurle Maggiore of the Italians; Heel-Spove of the Danes; Der Groose Krumschnoblichte Schnepfe and Kelihacke of the Germans; and Gylfinhr of the Welsh. It is equally diffused from the sultry portion of the torrid zone to the frozen countries of the north: the islands of the Pacific Ocean, particularly Australia, are not devoid of its presence, and we also possess examples from China, Nepaul, &c. (Gould, 'Birds of Europe.') Dr. Andrew Smith brought individuals from South Africa.

(7489) *Numenius phæopus*, Auct., *Scolopax phæopus*, Linn.; genus *Phæopus*, Cuv. This is Le PetitCourlis, or Courlieu, of the French; Chiurlo Piccolo, Chiurlo Minore, and Mengotto, of the Italians; Regen Brachvogel, Kleine Art Brachvogel, Regen vogel and Kleiner Gossier, of the Germans; De Kleine of Regenwulp, of the Netherlanders; Mellum-Spove of the Danes; Smaae Spue of the Norwegians; Whimbrel, Curlew-Knot, Curlew Jack, Jack-Curlew, Half-Curlew, Titterel, Chikerel, and Tang-Whaup of the English; and Goeg Ylfinhir of the Welsh. All the plumage bright ash-colour; longitudinal brown spots on the neck and breast; on the middle of the head a longitudinal band of yellowish-white, with another twice as wide and brown on each side; belly and abdomen white; feathers of the back and scapulars very deep-brown in the middle, and bordered with brighter brown; tail ashy-brown, streaked with brown bands disposed obliquely; bill blackish, but reddish at its base; iris brown; feet lead colour. Length of male 16 inches, bill 3 inches; of female 18 inches, bill 3½ inches.

It is very widely distributed. Denmark, Sweden, Norway, Lapland, Faroe Islands, Iceland, Germany, Holland, France (but more common in Holland than in France or Germany), Italy, Spain, Provence, Madeira, and the central part of North Africa. Asia—Caucasus, Himalaya Mountains, Bengal, and Japan.

(7490) *Limosa.*—Bill very long, more or less curved upwards, soft and flexible throughout its length, depressed, and flattened towards the point; the two mandibles furrowed throughout their length, the point flat, dilated, and obtuse.

(7491) *Limosa melanura*, the Godwit. Bill straight; tail uniform black, with a base of pure white; claw of the middle toe long and dentilated; a white beauty-spot (miroir) on the wings.

Mr. Gould says that this bird inhabits the whole of the European continent, and that examples are found in most collections from Africa and India. With us they are most frequently seen in spring and autumn. They breed mostly in high northern latitudes, but occasionally in England. In Ireland the species is but seldom seen. The food consists of insects and their larvæ, worms, &c. The nest is formed of dry grass and herbage, and the four eggs are light olive-brown, blotched and spotted with darker brown.

(7492) *Tantalus*, Linnæus.—This genus stands between the genera *Ardea* and *Scolopax*, in the twelfth edition of the 'Systema Nature.'

Cuvier places the genus *Tantalus* between the Open-Beaks (*Hians*, Lacep.' *Anastomus*, Ill.) and the Spoonbills (*Platalea*, Linn.). He characterises the genus as having the feet, the nostrils, and the bill of a stork: but the back of the bill is, he observes, rounded, and its point curved downwards and slightly notched on each side; a portion of the head, and sometimes of the neck is, he adds, denuded of feathers. He notices the following species:—The American Tantalus, *T. loculator*, Linn.; the African Tantalus, *T. Ibis* Linn.; and the Ceylonese Ibis, *T. leucocephalus*, the largest of all.

(7493) *Tantalus religiosa*, the sacred Ibis. Abou-Hannes, Bruce; *Tantalus Æthiopicus* of Latham; L'Ibis Sacre, Cuv.

"This," says Cuvier, "is the most celebrated species; it was reared in the temples of ancient Egypt with veneration, which approached to worship; and it was embalmed after its death, as some said, because it devoured the serpents which would otherwise have become dangerous to the country; according to others, because there was a resemblance between its plumage and some of the phases of the moon; finally, according to some, because its advent announced the rising of the Nile. For a long time it was thought that this Ibis of the Egyptians was the *Tantalus* of Africa: we now know that it belongs to the genus of which we are treating. It is as large as a hen, with white plumage, except the end of the wing-feathers, which is black; the last coverts have their barbs elongated, loose, black, with violet reflections, and thus covering the end of the wings and tail. The bill and the feet are black, as well as all the naked part of the head and neck: this part is covered in youth, at least on its upper surface, with small blackish feathers. The species is found throughout the extent of Africa." [Abou-Hannes.]

The other species noticed by Cuvier are—L'Ibis Rouge (*Scolopax ruber*, Linn.; *Tantalus ruber*, Gm.) and L'Ibis Vert, vulg. Courlis Vert (*Sclolopax falcinellus*, Linn). ('Regne Animal.') —*Eng. Cyc.*

(7494) SCOLOPENDRIUM: Filices; Ferns. Mr. Royle informs us that many of these are still used in medicine in India. The rhizomes, or dried leaves of *Scolopendrium*, are sold under the altered name, *Iskoolikundrioon. Those* of Polypodium are called *bulookunboon.* The Asplenium radiatum, *mohrpunkhee*, or peacock's fan, is employed by the natives probably as an anthelmintic.—*O'Shaughnessy.*

(7495) SCOMBRIDÆ, a family of Fishes of the section *Acanthopterygii*, of which the Common Mackerel may be regarded as a type: the Tunny, Sword-Fish, Dory, and Boar-Fish, also belong to this group, which contains a multitude of species and many genera. The body is generally covered with small scales; the tail is usually very powerful and deeply cleft: in most of the species the pectoral fins are long, narrow, and pointed; the dorsal fins are two in number, the foremost of them being composed of bony rays; the hinder dorsal is chiefly supported by soft rays, and is often divided into numerous small false fins. They are provided with numerous cæca, and these are often united in clusters.

(2496) *Xiphias* has the upper jaw elongated, forming a sword.

(7497) *Xiphias gladius*, Linnæus, the Sword-Fish, is an inhabitant of the Mediterranean and Atlantic, occasionally visiting the British coast. It measures from 10 to 15 feet in length. Its body is lengthy and covered with minute scales, the sword forming three-tenths of its length. On its back it bears a single long elevated dorsal fin; there are no central fins. The tail is keeled. The lower jaw is sharp; the mouth without teeth. The upper part of the fish is bluish-black merging into silver below. The Sword-Fish is said to attack the whale, wounding it with its beak. There are many well-authenticated instances of the planks of ships being perforated by the upper jaw of this powerful creature, which, it has been supposed, occasionally attacks the hulls of ships in mistake for the whale. Specimens of ships' timber penetrated by its sword are preserved in many museums. The *Xiphias* is mentioned by Aristotle ('Hist Anim,' viii. 19), who notices the fact of its striking vessels. The young fish is said to be good eating. When very young the body is covered with small tubercles, which disappear before it attains the length of three feet. —*Eng. Cyc.*

(7498) SCOPOLIA ACULEATA, Smith.

Molakarunnay, Tam.

This is a small white root, about the third par

of an inch in diameter, the bark of which is bitter and subaromatic and is considered as stomachic and tonic. It is given in a weak infusion to the quantity of half a tea cup full in the course of the day.—*Ains. Mat. Med. p.* 89.

(7499) SCORPIONIDÆ, a family of the class *Arachnida* order *Pulmonaria*, and section *Pedipalpi*. The animals of this family, commonly called Scorpions, are distinguished from other groups of spiders by their having the abdomen articulated and terminated by a curved spur at the extremity; the palpi are very large, and the terminal segment assumes the form of the lobster's claw, being in like manner provided with pincers; the stigmata are eight in number, and situated along the inferior and lateral part of the abdomen; on the under side of the thorax are two comb-like appendages. The number of the eyes varies from eight to twelve in different species, and some sub-genera have been established upon this character. Those to which the term *Scorpio* is used in its most restricted sense have only six eyes; those Scorpions which have eight eyes constitute the subgenus *Bathus;* and those which have twelve eyes, *Androctonus*. "These Arachnides," says Latreille, "inhabit the hot countries of both hemispheres, live on the ground, conceal themselves under stones and other bodies, most commonly in ruins, dark and cool places, and even in houses. They run with considerable swiftness, curving the tail over the back—this they can turn in every direction, and use for the purposes of attack and defence. With their forceps they seize various insects, on which they feed after having pierced them with their sting. They are particularly fond of the eggs of spiders and insects. The wound occasioned by the species found in the southern parts of Europe (*Scorpio Europæus*), is not usually dangerous; but according to the experiments of Dr. Maccary, made upon himself, the sting of some other and larger species produces serious and alarming symptoms, and the older the animal the more active seems to be the poison. The remedies employed are the volatile alkali, and chloroform used externally and internally, and externally ipecacuan in form of a paste. The young Scorpions are produced at various intervals, and are carried by the parent for several days upon her back, during which time she never leaves her retreat. The pain suffered from the scorpion's sting seems to depend more upon the temperament of the sufferer than any other cause; some suffering much agony, occasionally terminating in death, while others become only slightly agitated.—*Eng. Cyc.*

(7500) SCORZONERA AND SALSAFY. This is a long milky-juiced root. Grows without any difficulty after the rains. It is an annual from the South of Europe. It should be sown either in beds, broad-cast, or planted out in rows at a distance of a foot apart. The root when boiled and dressed is rather a delicate vegetable. It comes to perfection in three or four months. Salsafy—is the black Scorzonera, and requires the same treatment.—*Jaffrey.*

(7501) SCREW PINE OR VACOA. PANDANUS ODORATISSIMUS.

Keora or Kaldera bush.	Seethay Nar and Umbrella Tree.
Thaium, Thaulay Mazalie.	

It grows along the Coasts of the Peninsula of India, and its leaves are extensively manufactured into mats, baskets and hats, at Pulicat, and other localities. The fibre of the leaf is white, soft, glossy, but possessed of little strength, and though but ill suited for cordage, it has been found well adapted for the preparation of a good quality of paper, also for mats, and sacks. It appears to be the same as the P. Sativus of Du Petit Thouars, and the P. Vacoa of Mr. Henley which is described as growing to the height of 30 feet and good sacking is made from its leaves. Its fibrous aerial roots are much employed as paint-brushes. The leaves are cut every second year, beginning when the plant is two years old. Immediately on its removal from the trees, they must be split into fillets, three to four feet long from three fourths to one inch broad at the base, tapering into a point. The Pandanaceæ or Screw-pines abound in the Mauritius or Bourbon but are found also in India, the Straits and Burmah. —*Royle &c.* The number of names by which plants are known in different districts of India is very confusing. The screw pine is a good instance of this. At the Madras Exhibition of 1855, the only clean specimens of this fibre were exhibited by Mr. Underwood, and the Madras School of Industrial Arts. All the others were discolored by rotting. The leaves of the plant are used by the natives for making mats—baskets and hats. There are extensive manufactories of these articles at Pulicat, Cuddalore and several other localities. The fibre of the leaf is white, soft, and pulpy, but possessed of little strength. It appears to be a good material for the preparation of paper, but ill suited for cordage. The aerial roots are much used as coarse brushes for white washing houses, when beaten with a mallet, they open out like a soft brush.—*M. E. J. R.*

(7502) SCROPHULARIACEÆ, *Figworts*, a natural order of Plants belonging to the dicarpous group of Monopetalous Exogens.

The *Scrophulariaceæ* are very widely diffused over the surface of the earth, being found in the whole range of climate between the poles and tropics. Achimenes Cochin-chinensis when pickled, is much esteemed, in the country where it grows, as an article of diet.—*Eng. Cyc.*

(7503) SCYLLARIDÆ, OR SCYLLARIANS, a tribe of Macrurous Decapods, established by M. Milne-Edwards on the genus *Scyllarus* of Fabricius, and forming one of the most remark-

able groups, distinguished at the first glance by the singular conformation of the external antennæ. The antennæ are inserted on the same line below the eyes; the first pair slender, and present nothing remarkable; their first joint is nearly cylindrical and much stouter than the two following ones; finally, they terminate by two very short multi-articulate filaments. The external antennæ are foliaceous and extremely wide; the piece which carries the auditory tubercle is confounded with the epistome, and followed by four joints, the second and fourth of which are lamellar and extremely large. The buccal frame is small, and the jaw-feet are moderate and nearly pediform. M. Milne Edwards divides the tribe iuto three genera *Siyllarus*, *Thenus*, and *Ibacus*.

(7504) *Thenus* (*Scyllarus*, Fabr.; *Thenus* (*?*), Leach). Body very much depressed, and much narrowed from before backwards. Ocular peduncles very long. Eyes going beyond the carapace laterally; the orbits, directed outwards, occupy the external angle. Sternum much wider than in *Scyllarus*. Abdomen with nearly the same proportional length as in those crustaceans.

(7505) *Thenus orientalis*. Length about eight inches.—*Eng. Cyc.*

(7506) SCYPHANTHUS. LOASACEÆ.—These are pretty little yellow flowers, and require the same treatment as the Loasa.—*Riddell.*

(7507) SCUTELLARIA. LABIATÆ.—These plants are handsome when in flower, and are adapted for the front of borders, the colours are purple, yellow, red or blue, the flowers resembling the Antirrhinum, and may be grown from seed in any good garden soil.—*Riddell.* Wight gives Scutellaria rivularis, 1450, and violacea, 1449.

(7508) SEA COCOANUT OF SEYCHELLES: LODOICEA.

Zee-Calappers, CYNG.	Kuddil Tayngai, TAM.
Cocotier de Maldives, FR.	Samatrapoo tainkaya, TEL.
Durya-ka-Nareel, DUK.	Ubdie Narikaylum, SANS.
Guz. HIND.	

This species of cocoanut is convex on one side, and almost flat on the other, oblong, and somewhat pointed at both ends. The shell is dark coloured, and contains a kernel, not unlike that of the ordinary cocoanut, but drier, harder, and more insipid. They are often seen floating in the sea off the coasts of Arabia and Africa, whence they are brought to Bombay; and also from the Laccadive and Maldive Islands. The shells are made into drinking cups, which are used by the Indian devotees. The kernel is used medicinally by native practitioners, in cases of typhus fever, &c.—*Faulkner.* See COCOANUT, DOUBLE; also LODOICEA.

(7509) SEA-COCOANUT OF TENASSERIM: XYLOCARPUS GRANATUM. This is not the famous *Cocos des mer* of the Seychelles, so long the wonder of the world; but a tree very common in the mangrove swamps; and growing near the shore, its fruit falls into the water and floats out upon the sea, which gives rise to its name. The fruit is not edible, but is exceedingly astringent, and regarded by the natives as a specific in cholera.—*Mason.*

(7510) SEAFORTHIA, a genus of plants belonging to the natural order *Palmaceæ*, indigenous to the eastern coast of tropical Australia, and found also in the nearest Asiatic islands, named by Mr. Brown in honour of Francis, lord Seaforth, a patron of botany. The species are elegant in appearance, with pinnate fronds, the genus is described by Labillardiere under the name of *Ptychosparma.*—*Eng. Cyc.*

(7511) SEAHORSE TEETH, are imported into China, chiefly through Macao; they are brought from California and other parts of western America, and are used by the Chinese in the same manner as ivory; they are the teeth and tusks of the walrus, and other cetaceous animals.—*Morrison.* See IVORY.

(7512) SEA KALE. CRAMBE MARITIMA. Cultivation at Madras unknown and it is a vegetable not worth experimenting upon.—*Jaffrey.*

(7513) SEA SHELLS, *insects*, &c. The shores of the islands of the Indian ocean afford a great variety of beautiful and rare shells, the ducal mantle, &c. They are brought hither in junks from the Archipelago, and from the islands along the coast. The assortment of shells for sale here is not so great as might be inferred from the quantities exposed, but by a little search and selection, one can collect many tons, mostly salt water shells. Few or no fresh water shells are collected. Both sorts are sometimes injured by scraping and varnishing them.—Beside shells, as objects of natural history, insects are also procurable at Canton, tolerably well preserved: they are mostly coleopterous insects, as beetles; butterflies and other classes are also gathered, especially those which are gay. Precious stones are seen in small quantities, but rather inferior; chrysolite, malachite, cornelians, agates and jade, are the most common: other minerals, especially limestone and quartz, are cut into fantastic shapes; but these specimens being always lackered, are spoiled for natural objects. [illegible]ds or fishes are seldom seen preserved.—*Mo*[illegible]

(7514) SEAL. The na[illegible] family of amphibious animals, valued for [illegible] obtained from the fat or blubber, and also [illegible] its skin, which is used for a variety of purposes.—*Faulkner.*

(7515) SEALING WAX.

Cire d Espagne, FIR.	Cera Lacca, Cera di Spagna, IT.
Cire a Cacheter, GER.	Surgutsch, RUS.
Seigellack, GUZ.	Lacre. SP.
Chap-ka-Momom, HIND.	

Is a composition of gum lac, melted and incorporated with resin, and afterwards coloured

with some such pigment as vermilion, ixory-black &c. It is used for sealing letters, legal instruments, &c.—*Faulkner. Sealing-wax* is also made from lac, and several varieties have been sent from different parts of India. Garcias ab Orto described it as made from lac in the year 1563. Tavernier mentions the same fact. The Spaniards have obtained credit for the invention; but they, no doubt, learned it from the Arabs. A Frenchman who travelled much in Persia and different parts of the East Indies is also thought to have been the discoverer; and by Beckmann it is considered to be a German invention. This is hardly a chemical art, but it is probably better placed here than elsewhere.—*Royle, Arts &c. of India, page* 486. The Sealing wax made at Guntoor is very good, and, for a hot climate, better than the English wax, as it does not soften with the heat of the atmosphere.—*M. C. C.*

(7516) SEALS.

Cachets, Fr.	Petchafte, Ger.
Moohur, Guz. Hind.	Sigilli, It.
Sigillum, Lat.	Mohur, Pers.
Sellos, Port. Sp.	

Are stamps for impressing letter-wax, and other soft substances. They are usually formed of stone or metal, on which some device, &c. is engraved.—*Faulkner.*

(7517) SEASONS AT MADRAS.

Horticultural Division of the Seasons in Madras, &c.

Madras.		England.
Spring.		*Spring.*
August.		February.
September.	Sow seeds, plant trees and shrubs.	March.
October.		April.
Summer.		*Summer.*
November.		May.
December.	Vegetables should be plentiful.	June.
January.		July.
Autumn.		*Autumn.*
February.		August.
March.		September.
April.		October.
Winter.		*Winter.*
May.		November.
June.	Protect tender plants from the hot winds.	December.
July.		January.

Jaffrey.

(7518) SEBESTENS, Lindley's name for the order [illegible]ce.—*Eng. Cyc.*

(7519) SEBESTENS. Cordia Myxa.

Le[illegible] Hind.; Buhooari, Beng.

Sebestena, fruit and pulp of Cordia Myxa.—*Ben. Ph.* 294. These were formerly used in Europe but now by the native practitioners of the East only. The dried fruits are very glutinous, and are esteemed expectorant. The seeds of Cordia Myxa, are called Chakoon kee beenge, and deemed an infallible remedy in ringworm, the powder mixed with oil being applied to the eruption (Beng.—Dis.)—*Thirty five years in the East by Dr. Honig. p.* 343.

(7520) SECALE, a genus of Grasses, to which the cultivated Rye belongs. The flowers are arranged on a spike; the spikelets are 2-flowered, with a long stalked rudiment of a third floret, the glumes are subulate. In other respects this genus strongly resembles *Triticum*, to which the Common Wheat and Couch-Grass belong.—*Eng. Cyc.*

(7521) SECALE CEREALE, Rye, has the glumes 1-nerved and shorter than the spikelet; the rachis is very tough. This plant is extensively cultivated in Europe, and nowhere has been observed in a truly wild state, away from the possibility of escape from cultivation, being sown by the agency of man.—*Eng Cyc.*

(7522) SECAMONE, a genus of Plants belonging to the natural order *Asclepiadaceæ*, found in the warm parts of India, Africa, Australia, and in the West Indies. The name is probably derived from the Arabic Sukmoonya, as this is the proper name in Prosper Alpinus of the *Secamone Alpinii*, or *Periploca Secamone* of Linnæus. The genus *Secamone* is characterised by having a quinquifed calyx and corolla, the latter being rotate; stamineous crown 5-leaved, with the leaflets compressed laterally; pollen masses 20, erect; stigma coarctate at top; follicles smooth; seeds numerous, hairy at the umbilicus. The species form erect or climbing smooth shrubs with opposite leaves; the flowers are small, and the inflorescence in cymes, which are dichotomous, arising from between the petioles. Some of the species of *Secamone* secrete a considerable quantity of an acrid principle, which makes them useful as medicines. Thus the roots of S. *emetica*, being emetic in action, are employed as a substitute for Ipecacuanha; whilst the substance called Smyrna Scammony is said to be obtained from the Egyptian species, *S. Alpinii* of Rœmer and Schultes, the S. *Ægyptiaca* of Brown.—*Eng. Cyc.*

(7523) SECAMONE EMETICA. *Syn.* Periploca Emetica, Retz.

Grows common in the southern parts of the peninsula of India at the foot of mountains; a smooth twining shrub, leaves short stalked, veinless, smooth, varying from elliptical to narrow lanceolate, cymes interaxillary, shorter than the leaves. Roots acrid and emetic.—*O' Shaughnessy, page* 461.

(7524) SEDGES. Cyperaceæ. The *Cyperaceæ* may be called the Grasses of moist situations, and very closely resemble them in appearance; but they may readily be distinguished by their stems being solid often triangular, and their leaves with entire, not split sheaths. Though a few do secrete fecula in their tuberous rootstocks, as the Water Chesnut of the Chinese, &c., others secrete a little Volatile Oil, as *Cyperus*

longus and *rotundus*. They are mentioned here because the creeping rhizomes of *Carex arenaria*, and of a few allied species, are sometimes used medicinally, under the name of German Sarsaparilla —*Royle*. Sedges nearly resemble grasses in appearance, but grow usually in moist situations, and are distinguished from them by their angular stems. There are few of them useful for any purpose—not even for fodder. One of them, however, is famous as having yielded the Papyrus of the Egyptians, employed by them for making paper, ropes, and even boats; and of which the plant is so frequently represented in their Sculpture and paintings An Indian species of Cyperus (*C. tegetum*, Roxb.; *called Papyrus Pangorei* by Nees von Esenbeck), the *Madoorkati* of the Bengalees, which is extremely common about Calcutta and in Bengal, is very extensively employed for making the elegant, shining and useful mats for which the capital of India is famous, and which are frequently imported into Europe. Dr. Roxburgh states that the culms or stalks of the plant when green are split into three or four pieces, which in drying, contract so much as to bring the margins in contact, in which state they are woven into mats, and thus show a nearly similar surface on both sides. Specimens of the strips of this sedge were sent to the Exhibition of 1851, as well as mats made of them. These strips are tied up in bundles about four inches in diameter and four feet in length; and seem, besides their extensive use for mat-making to be well adapted for platting. The cotton-grass (*Eriophorum*) of Europe is a conspicuous ornament of turf-bogs and marshy moors, from having its seeds clothed at the base with a silky or cotton-like substance. With this, pillows are sometimes stuffed, and wicks of candles as well as paper, made. There is a species of the genus very common in the Himalayas, both in low valleys and at considerable elevations. This, Dr. Royle named *Eriophorum cannabinum*, in consequence of his finding it everywhere employed in making ropes for all ordinary purposes by the mountaineers. Its name, *bhabhur* and *bhabhuree*, has a considerable resemblance to that of the papyrus, considering that the *b* and *p* are letters so frequently interchanged for each other. All who have scrambled up the steeps of the Himalayas will remember the great support they have received from the toughness of the tufts of the bhabhur. Specimens of the dried leaves, made up into bundles about three feet in length, were sent to the Exhibition of 1851, from Beerbhoom. Also twine made from it: this, though rough, is strong and well fitted for ordinary purposes. Capt. Huddleston, in a paper on the Hemp and other fibres of Gurhwal, in the Himalayas ('Trans. Agric. Soc. of India,' viii, p. 272), mentions the Bhabhur as holding a conspicuous place, "from its extensive use and most abundant supply throughout the whole of the hills, affording a most economical substitute as an article of cordage, in lieu of others of a more costly and durable nature. All the jhoolas or rope bridges, which are erected over the large rivers where sanghas or wooden planked bridges cannot be made, on all the principal thoroughfares of that district, are constructed of this silky species of grass, the cables of which are of a considerable thickness. These rope bridges are a very safe means of communication over the large and rapid rivers intersecting different parts of the country, both for travellers and men with loads; and, where the footway and sides are properly laced with brushwood, afford an easy enough roadway for loaded sheep—but neither ponies nor cattle can travel over them. This grass grows abundantly in all the ravines of the sides of the mountains, and is to be had only for the cutting—but it is not of a very durable nature, though pretty strong when fresh made into ropes. It lasts about a twelvemonth only, or a little more, and the people in charge of the rope bridges are constantly employed in repairing and annually renewing the ropes and stays. The 'chinkas,' or temporary bridges of a single cable, upon which traverses a seat in the shape of an ox-yoke, are also sometimes made of this grass"—*Royle Ind. Fib. p.* 35.

(7525) The *papyrus* of the Egyptians belongs to this genus, and is still called *babier* in Syria. It is about 15 feet high; the exterior tunic of the stems cut in bands, and pressed, formed the paper of ancient Egypt and Europe; the leaves, which are several feet long, served for the same purpose, but were of inferior quality. This paper is but little liable to decay. Pliny, for instance, relates that the book of the laws of Numa Pompilius was found in Rome in a high state of preservation, after having been buried nearly six centuries in the earth.—*O'Shaughnessy, page.* 628.

(7526) SEDUM CÆRULEUM: Crassulaceæ. A species of succulent plants, with various coloured flowers, all of which should be grown separately in pots, in a light sandy soil mixed with brick rubbish, they are propagated by seed, these plants are well adapted for rock work.—*Riddell.*

(7527) SEED.

Beenge, Guz. Hind. | Vittooloo, Tel.
Tukhm, Pers.

In commerce, the grains of several species of gramina. Those of most importance, in a commercial point of view, are clover seed, flax or linseed, rape seed, mustard seed, hemp seed, and jingelly or sesamum seed.—*Faulkner.* In China, in the packing of seeds, they first gather the seeds from the plants, then put each kind, separately, into a small bottle, and then pack the whole with a little box, ready for being shipped to Europe or America.—*Fortune, page* 131.

(7528) SEKAKOY.

Sekakoy, Guz. Guz. Hind. Tam. Tel.

The name given in India to a long, flat pod, or legume, containing separate, small, oval, dark coloured seeds, considered by native practitioners a most valuable medicine. In taste it somewhat resembles the soap-nut, but is more acrid, less bitter, and has a singular pungency. It is extensively used in India for washing the head.—*Faulkner.*

(7529) SEMAL KA PHOOL. Flowers of the Bombax heptaphyllum, considered refrigerant. —*Genl. Med. Top. p.* 152.

(7530) SEMECARPUS, a very small and entirely Indian genus of Plants belonging to the natural order *Terebinthaceæ*, of which the name is derived from *σημεῖον*, a mark, and *καρπός*, fruit, from the remarkable property possessed by the juice of the fruit, whence it is commonly called Marking-Nut. The genus is characterised by having polygamous flowers; calyx 5-cleft; petals 5 oblong, sessile; stamens 5; disc urceolar; ovary free, sessile, girded by a tumid ring; styles 3; stigmas obtuse, emarginate. Nut compressed, heart-shaped, seated on a depressed thickened torus. Pericarp hard and thick, containing between the inner and outer layers cells full of a corrosive resinous juice.—*Eng. Cyc.*

(7531) SEMECARPUS ANACARDIUM. Marking Nut Tree.

Shayng cottay, Tam.	Jadi Chettoo, Chai bin,
Bhela, Hind	Burm.

S. Anacardium has long been known for the corrosive resinous juice contained in the nut. This juice is at first of a pale milk-colour, but when the fruit is perfectly ripe it is of a pure black colour and very acrid, and in both respects resembles that of several other plants of the same family, as in the Cashew-Nut, species of *Rhus*, and some of the varnish-trees. The juice is employed in medicine by the natives of India, and to mark all kinds of cotton cloth. The colour is improved and fixed by a mixture of quicklime and water.—*Eng. Cyc.* This common tree is of no value as timber. A considerable quantity of the nuts are exported from the Deckan, and Mysore, as a mordant. The juice is so acrid that wood cutters are unwilling to cut the tree until after it has been killed by ringing the bark.—*Rohde. Semecarpus anacardium* in Pegu is a middle-sized tree, common in the Pegu and Tounghoo Forests. Wood white coloured, adapted for fancy work and cabinet making.—*McClelland.*

(7532) SEMECARPUS ANACARDIUM.

The Oil.

Shayng cotty yennai, Tam.	Bhillawan ka tael, Hind.
Nellajiedie noona, Tel.	

The acrid and vesicating oil which is found between the two laminæ of the pericarp of the marking nut is collected and used, as a preventive against the attacks of white ants, and by native practitioners in rheumatic and leprous affections. By boiling the whole nut not divested of its pericarp, an oil is also obtained which acts as a blister, The preparation or collection either of the oil or acrid juice is liable to cause much irritation and inflammation of the hands, face, &c, of those engaged in the work.—*M. E. J. R.*

(7533) SEMECARPUS ANACARDIUM. Marking Nut, Malacca Bean.

The Nut.

Beladur, Arab.	Bellama, Bhecla, Hind.
Gheru, Can.	Shayng Cottay, Shayr-
Bellawane, Bhela, Duk.	aing cottay, Tam.
Bellama, Guz.	Nellajiedie, Jeedighen-
Bhallataka, Arushkara, Sans.	zaloo, Tel.

The tree bearing this nut (*Semecarpus Anacardium*), is a native of all the mountainous parts of India. The nuts are black, smooth, shining, and flattened on both sides. The acrid black-juice of the nut is employed by the natives externally to remove rheumatic pains, aches, and sprains, by rubbing a little over the affected part. It is also universally used for marking cotton cloth, whence its name of marking nut, the colour being improved, and prevented from running, by being mixed with lime water.—*Faulkner.*

(7534) SEMEN CONTRA, INDIAN.—Saheba—Undeveloped calices of Artemisa judaica.—*Ben. Phar. Semen-contra* is a well known and much esteemed anthelmintic, especially in the round and long worm of children, (*lumbricus teres.*) The action is heating and stimulant, dose 10 grs. to ½ a drachm finely powdered, in electuary with honey, or diffused through milk, and taken when the stomach is empty. In infusion or decoction the bitterness is quite disgusting; cathartics should either follow or accompany its use. The use of moxa, or of actual fire, to the surface of the body is a favourite practice in all savage and even half civilized nations. In China the down of the Artemisia Chinensis is set on fire, and the burning end applied directly to the part. In India a red hot *gool*, or hooka pastille, is usually employed. In Italy a small flame of hydrogen has been lately tried, and in Germany it is a common practice to place a particle of phosphorus on the skin, and then ignite it. The object in all is to effect counter-irritation, and the usual cases in which it is applied are chronic rheumatism, sciatica, neuralgia, deep seated diseases of the bones, cartilages or ligaments. In India *gools* are used by the native empirics for almost all diseases, especially for enlargements of the spleen and liver.—*O'Shaughnessy, page* 417.

(7535) SEMNOPITHECUS, F. Cuvier's name for a genus of Monkeys. The canines are much longer than the incisors; head round; facial angle more open than that of the Orang's; face

flat. Limbs very long in proportion to the body; anterior thumbs very short. Cheekpouches small or null. Callosities. Tail very long and slender.

Dental Formula;—Incisors, $\frac{4}{4}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{5-5}{5-5}$ = 32.

F. Cuvier observes that the canines are often much larger than the rest of the teeth, and consequently than they are here represented. This is exemplified in the case of *S. Maurus*. Mr. Ogilby, in his 'Natural History of Monkeys,' alludes to the bezoars reported by many travellers to exist in the stomachs and intestines of the Asiatic monkeys, as confirmatory of Professor Owen's views; and adds that the bezoars produced by the monkeys of the Malay peninsula, and which can scarcely belong to a genus different from the *Semnopitheci*, are described as being smaller, rounder, and more powerful in their qualities than those obtained from ruminating animals.

(7536) SEMNOPITHECUS ENTELLUS, the Hoonuman (Houlman of M. Duvaucel) of the Hindoos, Lunger of the Hill Tribes. The young are remarkable for the disproportionate length of the extremities, the deliberate air of their movements and the tranquillity of their eyes and physiognomy generally. Face and hands black; body and limbs light gray or straw-colour; hair surrounding the face, and forming a projecting bandeau over the eyebrows; a peaked beard directed outwards beneath the chin. The colour always darker on the loins and along the spine, and becoming deeper as the animal advances in age, till finally the fur, becoming mixed with numerous black hairs, is of a rusty brown. The body at the same time becomes more developed and muscular, and the animal, when at its full size, is 4½ feet from the extremity of the muzzle to the origin of the tail, which is considerably longer than the body, of the same colour, and ends in a tuft of hair rather longer and darker than the general hue. It is a native of Bengal, the Himalayan Mountains, Nepaul, and Bootan. This monkey is remarkably interwoven with the religion of the country where it is found. M. Duvaucel has given an interesting account of the careful watch which the Bengalees kept over him to prevent his killing this sacred animal, holding a high place among the thirty millions of Indian gods, and to save himself from dying within the year, which, according to popular belief, is sure to be the fate of one who puts an Entellus Monkey to death. He was harangued by the Hindoos upon the danger of injuring animals which were no other than princes and heroes under the operation of the metempsychosis. Unmoved by their eloquence, and eager to possess a specimen, he levelled and brought down a 'princess.' But the acquisition was dearly bought. The ill-fated creature had a young one on her back, and, though shot through the heart, the mother exhausted her remains of life in throwing it into the branches of a neighbouring tree; then fell and expired at the feet of M. Duvaucel. It is but just to add that he mourned over the deed he had done. The remains of a species of quadrumanous animal allied to *Semnopithecus* were found by Captain Cautley and Dr. Falconer amongst the fossils discovered by them in the tertiary strata of the Sewalik Hills in the north of Hindoostan. ('Geol. Proc.,' 1838.)

(7537) SEMNOPITHECUS MAURUS, the Buding of the Javanese, Lutung utau Maure of the Malays and Europeans, Lotong of the natives of Sumatra. Dr. Horsfield describes this species as being on the whole of a stouter make than *S. melalophos*, and as having more robust extremities. One of the specimens in the Museum at the India House measures 2 feet 3 inches from the tip of the nose to the root of the tail. The face is regularly circumscribed by hairs, which are long, and closely applied to the head; the forehead, which is gradually sloping, is entirely concealed by them. The general facial character is a flatness above, and a protrusion of the maxillæ; but the appearance of the face differs greatly in old and young subjects. Dr. Horsfield states that the Budeng, or black species, is much more abundant than the red species, or Lutung of the Javanese (*S. Pyrrhus*); but the latter, both on account of its variety and comparative beauty, is a favourite among the natives. "The *Semnopithecus Maurus*," he continues, "is found in abundance in the extensive forests of Java; it forms its dwellings on trees, and associates in numerous societies. Troops, consisting of more than fifty individuals, are often found together. In meeting them in the forests it is prudent to observe them at a distance.

(7538) SEMNOPITHECUS MELALOPHOS. Brilliant yellow-red above, whitish below; a tuft of black hairs on the forehead in form of a bandeau; face blue. This is the Simpai of the Malays; and in this species the great length of body and slenderness of the extremities, so characteristic of the *Semnopitheci*, are manifested in the highest degree. It is found in the forests of Sumatra.

(7539) SENNA.

Suna, Arab.	Bootallapotaka, Amshun-atydivain-diva, Sans.
Sana-pat. Beng.	Nilaverei, Nilavaghei, Tam.
Nilaverie, Cyng.	Nayla tungadoo, Nila ponna, Tel.
Sene, Fr.	
Sennablater, Ger.	
Soonamukee, Guz. Hind.	
Senna, It.	
Cassia, Senna, Lat.	

The leaves of certain species of cassia, C. elongata; C. acutifolia; C. lanceolata; and C. obovata; all agree in certain properties; the odour of the leaves is heavy and peculiar, taste bitter, nauseous, and glutinous, powder yellowish green. At least eight varieties of senna leaf are known

in commerce in Europe; 1. The Senna palthe; 2. Senna of Sennaar, or Alexandria; 3. of Tripoli; 4. of Aleppo 5. of Moka; 6. of Senegambia; 7. the false or Arguel; 8. the Tinnevelly. The Senna palthe is prepared at Boullac, and is known to contain 5 parts of the Cassia acutifolia, 3 of C. obovata, and 2 of the Cynanchum oleæfolium. It is in this variety of the drug that the poisonous leaves of Coriaria myrtifolia have been found by M. Dublanc. The *Moka* senna is chiefly cultivated for exportation to India, where it is common in all the bazars. The other foreign varieties do not require particular notice. The Tinnevelly drug is in species identical with the Moka. In Egypt the senna harvest takes place twice annually, in April and September; the stalks are cut off with the leaves, dried before the sun, and then packed with date leaves. From all parts of Upper Egypt these packages arrive at the entrepot near Boullac, called *la Palthe*. The Palteers are tax agents of the Pasha, who has of course a monopoly of this trade; they sort, mix, and adulterate the drug, and pass it into commerce through Alexandria. —*O'Shaughnessy, p.* 307. Simmonds says that several varieties of Cassia, natives of the East are grown for the production of this drug. The dried leaves of *C. lanceolata* or *orientalis*, grown in Egypt, Syria, and Arabia, the true Mecca senna, are considered the best. In Egypt the leaves of *Cynanchum Arghel* are used for adulterating senna, *Cassia obovata* or *C. senna*, also a native of Egypt, cultivated in the East Indies, as well as in Spain, Italy, and Jamaica. It is a perennial herb, one or two feet high. In the East Indies there is a variety (*C. elongata*) common about Tinnevelly, Coimbatore, Bombay, and Agra, &c. Several of this species are common in the West India islands. The plants, which are for the most part evergreens, grow from two to fifteen feet high; they delight in a loamy soil, or mixture of loam or peat. The seed is drilled in the ground, and the only attention required by the plant is loosening the ground and weeding two or three times when it is young. The senna leaves imported from India are not generally so clean and free from rubbish as those from Alexandria. They are worth from 20s. to 27s. per cwt. in the Bombay market. The prices are—Alexandria, 1½d. to 6d. per lb.; East Indian, 2d. to 3d. per lb.; Tinnevelly, 7d. to 9½d. per lb. Senna is collected in various parts of Africa by the Arabs, who make two crops annually; one, the most productive, after the rains in August and September, the other about the middle of March. It is brought to Boulack, the port of Cairo, by the caravans, &c., from Abyssinia, Nubia, and Sennaar, also by the way of Cossier, the Red Sea, and Suez. The different leaves are mixed, and adulterated with arghel leaves. The whole shipments from Boulac to Alexandria, whence it finds its way to Europe, is 14,000 to 15,500 quintals. The quantities imported for home consumption were—

	From the East Indies.	Other places.	Total.
	lbs.	lbs.	lbs.
1838	72,576	69 88.....	142,114
1839	110,409	6,566.....	174,275

In 1840, 211,400 lbs. paid duty, which is now only 1d. per lb. In 1848, we imported 800,000 lbs. from India; in 1849, the total imports were 541,143 lbs. The imports into the United Kingdom were, in 1847, 246 tons; 1848 402 tons; 1849, 240 tons. Alexandrian senna (*Cassia acutifolia*). This species is said by some to constitute the bulk of the senna consumed for medical purposes in Europe. It is much adulterated with the leaves of *Cynanchum Arghel*, *Tiphrosia apollinea*, and *Coriaria myrtifolia*.

C. lanceolata and C. ethiopica furnish other species of the same article, the greater part of the produce of which finds its way to India through the Red Sea, Surat, Bombay and Calcutta, the imports into Calcutta, in 1849, having been 79,212 lbs. *C. obovata* furnishes the Aleppo and Italian drug. At least eight varieties of senna leaf are known in commerce in Europe—1. the Senna palthe; 2. Senna of Sennaar or Alexandria; 3. of Tripoli; 4. of Aleppo; 5. of Moka; 6. of Senegambia; 7. the false or Arghel; 8. the Tinnevelly. In Egypt the Senna harvest takes place twice annually, in April and September; the stalks are cut off with the leaves, dried before the sun, and then packed with date leaves. At Boulac, the drug is sorted, mixed, and adulterated, and passed into commerce through Alexandria. Alexandrian senna, according to Mr. Jacob Bell ("Pharmaceutical Journal," vol. 2, p. 63), contains a mixture of two or more species of true senna. It consists principally of *Cassia obovata* and *C. obtusata*, and according to some authorities it occasionally contains *C. acutifolia*. This mixture is unimportant, but the *Cynanchum Arghel*, which generally constitutes a fifth of the weight on an average, possesses properties differing in some respects from true senna, and which render it particularly objectionable. The Tinnevelly senna, that most esteemed by the profession, is known by the size of the leaflets, which are much larger than those of any other variety; they are also less brittle, thinner and larger, and are generally found in a very perfect state, while the other varieties, especially the Alexandrian, are more or less broken. The leaves of the Cynanchum are similar in form to those of the lanceolate senna, but they are thicker and stiffer, the veins are scarcely visible, they are not oblique at the base, their surface is rugose, and the colour grey or greenish drab; their taste is bitter and disagreeable, and they are often spotted with a yellow, intensely bitter gummo-resinous incrustation. Being less fragile

than the leaflets of the true senna, they are more often found entire, and are very easily distinguishable from the varieties which constitute true Alexandrian senna. In their botanical character they are essentially different, being distinct leaves, not leaflets, which is the case with true senna.—*Simmonds.*

(7540) *Senna.* A fine specimen of "Tinnevelly senna" cultivated near Cape Comorin, was noticed as of a superior quality. It is satisfactory to remark, that senna grown in the Southern provinces of the Madras presidency is highly esteemed in Britain, and preferred by many to all other sorts, as being both cheaper and purer.

(7541) *Senna, Indian,* LEAVES OF CASSIA ELONGATA. *Ben. Ph.* 224.

(7542) *Senna leaves,* raised at Dapooree from Tinnevelly Seed, has been found equal to the best Arabian Senna.—*Spry's Suggestions p.* 36. Senna leaves, the picking in Guzerat of sowings in August, is made in September: and Dr. Burn states that the virtues of the leaf, depend greatly on the time of the picking.—*Spry's Suggestions, p.* 43.

Senna has been distinctly known only since the time of the Arabs; but they refer to the legumes only, though the leaves have long been employed in the East. There is, however, great uncertainty respecting the species of Cassia which yield the diffrent commercial varieties. This is owing partly to all the Senna countries not having been thoroughly explored, and partly to species having been formed from imperfect specimens, and others from leaves collected out of different samples of the Sennas of commerce. The following species seem to be clearly distinct. Dr. Royle has changed the name of Forskal's *C, lanceolata,* in consequence of the great confusion which has arisen from this name having been applied by so many authors to the sharp-leaved Senna, which is imported in such large quantities both from Arabia and Egypt, and to which he restricts it.

1. C. FORSKALII (C. lanceolata, *Forsk.* and *Lindley,* Fl. Med. p. 259). Leaflets in 4 or 5 pairs, never more: oblong and either acute or obtuse, not at all ovate or lanceolate, and free from downiness even when young; the petioles have *constantly* a small round brown gland a little above the base. The pods are erect, oblong, tapering to the base, obtuse, turgid, mucronate rather falcate, especially when young, at which time they are sparingly covered with coarse scattered hairs. (Lindl. *l. c.*) Collected by Dr. S. Fischer in palm-grounds in the valley of Fatme, flowering at the end of February. Forskal describes this as being distinguished "glandula supra basin petioli." It was found by him at Surdud and about Mor. It is called *Suna* by the Arabs, and probably yields some of the Arabian Senna of commerce.

2. CASSIA LANCEOLATA (taken from Dr Royle's "Illustrations of Himalayan Botany." t. 37.) This is a bushy annual, of about 2 to 3 feet in height, extremely leafy, and of most luxuriant inflorescence in a cultivated state. The stems are erect, round, smooth, a little flexuose towards the apex. The leaves alternate abruptly pinnate. The leaflets 5 to 8 pairs, with short petioles, ovato-acute in the lower and lanceolate-acute in the upper parts of the plant, "slightly mucronulate, smooth above, rather downy beneath (especially in young leaves) with the veins turning inwards and forming a flexuose intramarginal line; petioles without glands; stipules softly spinescent, semihastate, spreading, minute." Racemes axillary and terminal, erect, rather longer than the leaves. Ovary linear, downy, falcate, with a smooth recurved style. Legumes (3) pendulous, membranous, flat, only slightly protuberant over the seeds, oblong, sometimes elliptical, nearly straight, with the upper margin a little curved, tapering abruptly towards the base, and rounded at the apex, of a brown colour containing from 5 to 8 white rugose seeds (2). These are figured by Gærtner, ii. t. 146. It is probably the *Cassia medica* of Forsk. p. cxi., and agrees with his specimen of "Senna Meccæ Lohajæ invenieba-tur foliis 5—7 jugis, lineari-lanceolatis," p. 85 of which Forskal states large quantities are yearly exported from the district of Abu-atiseh to Jidda. This species includes:

a. Tinnevelly Senna, cultivated by Mr. Hughes in the south of India; also that cultivated by Dr Royle at Saharunpore. *C. lanceolata,* Royle, Illus. Bot. t. 37. and by Dr. Wight near Madras v. fig. 60, B. and spec. in Brit. Mus. It is the *Cassia officinalis,* of Gært. and Roxburgh, Fl. Ind. ii. p. 346, which name ought to have been retained or the above *C. medica* Forsk. instead of *C. elongata* being coined, especially as this was formed from the leaves of a cultivated Indian Senna found in commercial samples. It is cultivated by Dr. Gibson, near Poona.

Dr. Burns writes that he has found the lanceolate Senna wild near Kaira in Guzerat. His cultivated specimens, if picked, would form good Senna.

b. C. lanceolata of most authors. *C. acutifolia* Hayne, ix. t. 41, Nees and Eberm. t. 345. St. and Church. Pl. 30 as C. Senna. These best represent the form of Alexandrian Senna (v. 60. A. a small leaf), and specimen in Brit. Mus. from Senaar. (*Kotschy.*) It is found in the valleys of the desert to the south and east of Syene or Assouan. and collected for the trade to Cairo forming 3-5ths of Alexandrian Senna.

c. C. acutifolia, called of Delile, Esenbeck and Eberm. t. 346. (fig. 60. c) The leaflets are narrower and more tapering towards the apex than the foregoing as might be expected in poorer soil and drier climate. Some of the Indian

specimens in Dr. Rottler's Herbarium closely resemble this variety; also African specimens from Tajowra to the south of the Straits of Bab-el-Mandeb.

Dr. Royle is unable to distinguish these by any permanent characters, nor dried Senna-leaves cultivated at Saharunpore from good specimens of *Bombay Senna* (that is, ordinary Indian Senna) imported into England from India: nor these from *Suna Mukki*, sent him by Dr. Malcolmson from Aden, and which he states are "the produce of Africa, but in appearance exactly resemble the Arabian Suna. In the market both are sold as one kind, and bring the same price."

3. C. OVATA of Merat, Dict. de Mat. Med. b. 613. *C. æthiopica*, Guibourt. Is probably a distinct species, as it is said to have a gland at the base of the petiole and another between each pair of leaflets. The leaflets are in 3 to 5 pairs, exactly oval acute, slightly pubescent below; the follicles are thin, pale yellow-coloured, 1-3rd smaller than those of *C. obovata*. It is said to be found both in Nubia and Fezzan, and to furnish exclusively the Senna of Tripoli, Sene de Tripoli. It is extremely like a variety of *C. lanceolata*. The figure of C. Senna in Stevenson and Churchil, Med. Bot. t. 30, quoted by Dr. Pereira as representing this plant, is referred to by Dr. Lindley as a good representation of C. acutifolia of Delile. But Merat and De Lens say of it: "Nous ne le connaissons que par les fruits qu'on en voit dans la commerce." M. Guibourt calls it *C. ætheopica*; but instead of referring to *C. lanceolata* of Calladon, Pl. xv. f. c as representing this species, he says that it is exactly represented by the Sene de Nubie of Nectoux, pl. 2

4. C. OBOVATA *Colladon*. Hayne, ix. 42. Nees and Eberm. 347. Diffuse herbaceous plant. Leaves equally pinnate, glandless. Leaflets 4-6 pairs (somewhat villous, Roxb.) obovate, obtuse, but slightly mucronate, unequal at the base, the terminal pair more cuneate and larger. Stipules triangular, narrow, and tapering, rather stiff and spreading. Flowers yellow, in racemes. Bracts ovate, cordate, acuminate, concave, single-flowered. Legumes broad, membranous, smooth, lunate in shape, rounded at each end, with an elevated crest over each side on both valves, so as to form an interrupted ridge along the middle of each valve. Seeds 6 to 8, wedge-shaped, rugose as in C. lanceolata.—A native of Africa, from Senegal (*Fl. de Senegambie*) to the Nile; found in Fezzan by Dr. Oudney (*R. Brown*), in Egypt from Cairo to Assouan, Nubia: found in the Adel country near Sultalli (*Mission to Abyssinia*); Desert of Suez; Syria; dry parts of India, as Kaira (*Burns*); Guzerat, Dekkan (*Col., Sykes*), near Delhi, and Valley of Rungush, near, Peshawar (*Falconer*); high dry uncultivated lands of Mysore (*Roxburgh. Wight*). It has been cultivated in Italy (*Sene d' Italie*), and forms 3-10ths of Alexandrian Senna.

This species is very distinct, in its obtuse obovate leaves and crested legumes, from the preceding acute-leaved species. *C. obtusa* Roxb: was probably described from young legumes, as Dr. Royle, like Dr. Lindley, has compared good specimens from Mysore with others from Africa. The *obtusata* (fig 60 H.) of Hayne does not seem to differ sufficiently from his *C. obovata* (fig 60, G.) It is possible, however, that there are two very similar species in Africa. Mr H. Grant, late of the India House, has favoured Dr. Royle with a specimen in flower, collected by him in February at Philæ, which has upon it *both* obovate (H.) leaflets and some which are ovate and acute (G)! Lieut. Wellsted's collection contains a specimen from the coast of Arabia, of which the leaflets are obtuse, elliptic, and hairy.

The Sennas of commerce may be arranged as follows.

1. TINNEVELLY SENNA, first cultivated in the district of that name, in 12° of N. lat. by the late Mr. Hughes, from seed probably obtained from Arabia or picked out of *Suna Mukki*, as was done by Dr. Royle when he cultivated Senna at Saharunpore. (*v.* Himal. Bot. p. 186, t. 37, and Trans Med. Soc. of Calcutta, v. p. 433). That author also grew Senna from Tinnivelly seed sent to him by Sir C. since Lord Metcalfe; but he did not find the smallest difference between the two when grown in the same situation. The Tinnevelly Senna is well-grown and carefully picked; the leaflets are of a fine, rather lively green colour; thin, but large, being from one to two inches in length, truly lanceolate. This kind is "highly esteemed in Britain, and is quickly displacing all the other sorts in Edinburgh, and many other cities in Britain." (Christison.) Dr. A. T. Thomson says of it, it is mild in operation, certain as a purgative, and operates without griping. It is now cultivated by Mr. Hughes' successor.

Saharunpore Senna, the same kind of Senna cultivated at Saharunpore, differed only in the leaflets being smaller, as might be expected from the more northern latitude (30°). These Dr. Royle prescribed in the hospitals at Saharunpore, and found them effective as a purge, and operating without producing inconvenient nausea or griping, Mr. Twining, after trying them in forty-five cases in the General Hospital at Calcutta, says, in his report to the Medical Board: "From these trials, I am disposed to consider the Senna now under trial equal to the best I have ever seen."

Madras Senna. Senna is now imported also from Madras, the produce of that Presidency. In 1843-44, I find 11,536 lbs. were exported to this country, having been previously imported into Madras from Tinnevelly, where it is cultivated by the natives, and is of the same nature as Mr.

Hughes' Senna, though not so well grown nor so carefully picked. Dr. Christison says of it the leaflets are longer than those of Bombay Senna, and not so taper-pointed, but otherwise differ only in being better preserved, and being more active, are more esteemed.

Dr. Searle, in a communication to the India House, says of this Senna, that "now furnished to the profession of the Madras Government is in my experience quite as good as the Alexandrian," "every leaf of the Indian being of the genuine spear-shaped species."

2. BOMBAY or Common Indian SENNA, *Suna Mukki* of the natives, is first imported into Bombay from the Arabian Gulf:

319,728 lbs. in 1837-39.	570,426 lbs. in 1838-39.
Re-exported to Great Britain,	262,284 lbs. in 1838-39.

That this Senna, forms a large, if not the largest proportion of what is consumed in this country, is not only evident from the above importation, but also from a comparison with the whole quantity of the other Senna imported, as given by Dr. Pereira.

	1838.	1839.
From East Indies	72,576 lbs.	110,409 lbs.
From other places	69,538 ,,	63,766 ,,

Some of this Senna is no doubt produced in Africa, as stated above by Dr. Malcolmson; a good deal of it in Arabia, probably by *Cassia lanceolata*, and some perhaps by *C. Forskalii*. The leaflets are thin, lanceolate, usually entire, about an inch or an inch and a half in length, narrower than either the Tinnevelly or Saharunpore Senna, probably from growing in a poorer soil and drier climate. They are of a pale green colour, often with dark brown-coloured leaflets intermixed, also some pods, and many leafstalks, with occasionally other impurities. The good specimens of this Senna are, however, of excellent quality, and its commercial and medical value would be much increased, if the finest leaflets were picked out. It is in constant use in hospital practice in India, and generally highly approved of. Dr. Royle prefers them for all purposes to the following kind as found in commerce.

3, ALEXANDRIAN SENNA is an excellent kind, when the genuine lance-shaped leaflets have been picked out; but that commonly employed in England is a mixed and very impure kind, being made up of the leaflets, much broken, of *C. lanceolata* and of *C. obovata*, with some pods and broken leaf-stacks, and also with leaves of other plants. It should be used only after having been carefully picked, as directed in the E. P. Picked Alexandrian Senna is of a pale green colour, with a faint smell. The leaflets are broad-lanceolate, the two sides unequal; they are thicker and shorter than the Indian Sennas.

The lanceolate Senna of Upper Egypt, Nubia, and Senaar, yields two crops annually, the plants being cut down in spring and autumn, dried in the sun, when the leaves are stripped off, packed in bales, and sent to several *entrepots*, and finally to Boulac in the vicinity of Cairo. Of the lanceolate Senna *five* parts are here mixed with *three* parts of the leaflets of *C. obovata*, brought from other parts of Egypt and even from Syria, and also with leaves (*two* parts) of *Cynanchum Argel*. This mixed Senna is that exported from Alexandria. On the Continent a further addition is made of the leaves of *Colutea arborescens* and of *Coriaria myrtifolia*.

Dr. Pereira states that, "under the name of *heavy senna* he has met with *argel* leaves, which were sold at a higher price than ordinary senna," and Dr. Christison mentions what indeed may often be seen, that is, Argel leaves left intermixed even in what is called Picked Alexandrian Senna. This Senna is often called "Sene de la Palthe."

4. TRIPOLI SENNA, is brought from Fezzan to Tripoli. This has the general appearance of Alexandrian Senna, but is less esteemed, though it is a more pure Senna, probably because the leaflets are more broken down, and all the leaf-stalks have not been removed. The leaflets are shorter and less pointed than in lanceolate Senna —indeed, more ovate; hence this Senna is said to be produced by *C. ovata* (æthiopica); but it also contains leaflets of *C. obovata*, which species was found in Fezzan by Dr. Oudney.

5. ALEPPO SENNA is now seldom imported into Great Britain. It consists of the leaflets of *C. obovata*, as do some other kinds, such as ITALIAN SENNA. Dr. Ainslie says that the *obovate* was the only kind of Senna met with in India, meaning the Peninsula of India; for it is not met with in the Bengal Presidency; nor, according to Dr. Searle, is it used in that of Madras at the present day. It is less effective as a purgative, and apt to create nausea and griping.

Adulteration. Commercial Senna is prepared for use by picking out the leaflets, and rejecting the leaf-stalks, also extraneous matter, as dust, date-stones, &c., as well as the leaves of the other plants. The legumes, however, possess the cathartic properties of the leaves to a considerable extent, and were alone used by the original Arabs; and there is no reason to believe that the stalks are inert. The most important adulterations are, however, the leaves of other plants. Those of the *Argel* (D.) may be distinguished by being lanceolate, equal on the two sides of the midrib, thick, leathery, and paler. They operate very dubiously as a cathartic, but occasion griping and protracted sickness. (*c.*) Those of *Tephrosia Apollinea* (F.) are obovate downy, and the veins proceed transversely from the midrib to each margin of the leaf without forming a marginal vein. The leaves of *Colutea arborescens*, or Bladder Senna, are ovate, but equal at the base. Those of *Coriaria myrtifolia* (E.) are astringent, usually broken down, and

marked on each side of the midrib with a strong lateral nerve. As the systematic adulteration of Senna in Egypt with the leaves of other plants is objectionable, and has been so noticed by the Pharmaceutical Society, the most efficient method of stopping it would be to purchase only the pure African and Arabian Sennas which come to us by Bombay, instead of (unless it has been picked) that which is called Alexandrian from its place of export (*v.* P. J, ii. p. 63.) In India a good substitute for Senna is afforded by *Rae Suna*. (*v.* COMPOSITÆ.)—*Royle, p.* 361.

(7543) SENSITIVE PLANTS is a term commonly applied to those species of plants that possess the property of visibly moving their leaves when they are touched or otherwise stimulated. This term is not applied generally to plants in which any movements can be observed; for the power of moving under the influence of certain external stimulants is a very general property of the tissues of plants, and especially of the flowers. There are a great number of species of plants of various families, that possess the power of moving their leaves under the influence of a slight touch; that which is best known is a plant belonging to the order *Leguminosæ*, called *Mimosa pudica*. It is a native of tropical climates in moist districts, where it is exposed to a temperature of between 70° and 80° Fahr. It is in its native districts where its excitability is seen to the greatest perfection. A knock upon the ground at a short distance from the plant is sufficient to produce an influence on the leaves; and Von Martius says, that at Rio Janeiro the falling of horses' feet by the way is sufficient to set whole masses of Mimosas in motion. When in England, the motions of the plant are always best displayed in high temperatures. The movements are not alone produced by mechanical irritants, for if various corrosive substances, as bichloride of mercury, sulphuric acid, caustic potash, &c., are applied to the knots of the joints, the same phenomena are observed. The removal of the plant to a higher temperature will produce the same result, as well as exposing it to a lower temperature or a draught of cold air. They are destroyed by the application of chloroform and other anæsthetic agents. Besides the *Mimosa pudica* there are several other species belonging to this genus that possess the same property, though not in so remarkable a degree. Amongst them may be named *M. Sensitiva, M. viva, M. casta, M. asperata, M. quadrivalvis, M. pernambucana, M. pigra, M. humilis, M. peltata, M. dormiens.* Species of other genera of the same natural order *Leguminosæ* exhibiting these movements are *Smithia sensitiva, Æschynomene Indica, Æ. pumila*, and *Desmanthus stolonifer*. The locust tree when its branches are roughly shaken closes up its leaves, and the same has been observed of *Gleditschia triacantha*, and it is probable that close observation during hot weather would prove that other leguminous plants possess this property. Another family of plants that exhibit sensation when touched or stimulated is *Oxalidaceæ*. The *Oxalis sensitiva*, called by De Candolle on account of its sensitive properties *Biophytum*, has long been known to possess this property. *Averrhoa bilimbi* and *A. carambola* are both plants belonging to *Oxalidaceæ*, and have been described by travellers as possessing the property of folding their leaves on the application of a stimulus. But it is not only in these species that this property resides, for Professor Morren of Liege has observed it to occur more or less in all the species of the genus *Oxalis*. His observations were first made on the *Oxalis stricta*, which, if hit smartly on a warm day, will contract its leaves and assume a position as in the ordinary sleep of the leaves of these plants. He has also observed the same movements in *O. Acetosella* and *O. corniculata*, and many extra-European species. The movements in these plants consist in the folding up of their leaves, so that the two halves of the leaf approach each other by their superior surface. The midrib is also slightly bent, so that its inferior surface presents a convexity; and the petioles of the leaflets bend downwards, so that the leaf, when irritated, becomes dependent. (Morren, 'Notes sur l'Excitabilité et le Mouvement des Feuilles chez les Oxalis,' in the 6th volume of the 'Bulletins de l'Académie Royale de Bruxelles.') In the family *Droseraceæ*, or Sun-Dews, are some plants which exhibit a considerable amount of irritability. The leaves of *Dionæa muscipula*, or Venus' Fly-Trap have the remarkable property of contracting upon insects that may happen to alight upon their surface. None of the Sun-Dews inclose insects in their leaves in this manner, but the surface of their leaves is covered with long hairs, which secrete a viscous matter. When any insect settles upon the leaf, it is entangled with the viscous secretions; and before it has time to escape, the hairs exhibit a considerable degree of irritability, and curving round, pin the animal down on the surface of the leaf. Other instances of vegetable irritability occur in the *Berberis vulgaris, Mimulus*, and *Stylidium.—Eng. Cyc.*

(7544) SEPIADÆ (Σηπία), a family of Cephalopodous *Mollusca*, including the forms which are ordinarily known under the name of Cuttle-Fishes. Dr. Leach divided the group of Cuttles into two families, the Octopods and the Decapods. The forms belonging to the first division are described under the article OCTOPODA.

(7545) The *Decapoda* are thus defined. Under this division are placed the *Teuthidæ*, or Calamaries, and the true *Sepiadæ*, or Cuttle-Fishes, properly so called.

(7546) *Sepioteuthis* (De Blainville).

(7547) *S. Sepiacea.* This species is figured in the article CEPHALOPODA under the name of *Sepia officinalis*, to which however it bears a very close external resemblance, so close indeed that authors generally place it immediately before that species. Thirteen species of the genus *Sepioteuthis* have been described. They are inhabitants of the West Indies, the Cape, the Red Sea, Java, and Australia.

(7548) *Loligopsis* (Lam.) There are eight species of this genus found in the North Sea, Atlantic, Mediterranean, India, Japan, and the South Seas.

(7549) *Onychoteuthis* (Lichtenstein).

There are about six species of *Onychoteuthis* found in the Atlantic, Indian, and Pacific oceans.

(7550) *Sepia* (Lam.)—Animal with an oblong depressed body, with two narrow lateral fins extending its whole length; mantle free at its anterior margin; the acetabula supported by horny hoops with the margin entire or very minutely denticulated.

(7551) *Sepia officinalis.* This is the Common Cuttle-Fish, so well known on our coasts, and whose shell is so often thrown up by the waves on the beach. The ink (nigræ succus loliginis) is common to this and other species of cephalopods. This fluid is not only ejected as a defence to colour the water in order to favour the escape of the animal, as was well known to the ancients (Oppian, 'Halieut.,' iii.; Pliny, 'Nat. Hist.,' ix. 29), but as a direct means of annoyance. That the juice was used by the ancients as ink is evident from many passages: we content ourselves with a reference to that above given, and to the lines in the graphic description of the idler by Persius. ('Sat.' iii., lin. 10, et seq.) The flesh of the naked cephalopods was rather esteemed of old, as it is indeed now in Italy and other countries. Aristotle declares that these animals are in the highest season when pregnant, and those who wish to taste a cuttle-fish sausage, will find a receipt for making that savoury viand in Athenæus. Mr. F. D. Bennett states that the Fe, or Cuttle-Fish, is considered a luxury by all classes of the Sandwich Islanders and that when fresh and well cooked it is an excellent food, and in consistence and flavour not unlike the flesh of a lobster's claw. ('Narrative of a Whaling Voyage round the Globe,' London, 1840.)

(7552) SERENGE, a Dyeing Seed.

(7553) SERGE. A quilted woollen cloth, made in Devonshire and other parts of England. —*Faulkner.*

(7554) SERISSA. ACACIA SERISSA. In China, the Serissa is cultivated around flower beds and parterres like the box.—*Fortune.*

(7555) SERON. A kind of package, formed of pieces of wood, fastened with hides.—*Faulkner*

(7556) SEROONAVALPOO. A drug.

(7557) SERPENTINE, a rock regarding whose origin geologists have differed. It is described as an irregularly over lying mass in the Lizard district of Cornwall, as a dyke at Portsoy, and as nodular aggregations in the granite of Aberdeenshire. The relation in which it stands to Diallage Rock (a compound of diallage and felspar) is very intimate, both in the Alps, in the Shetland Isles, and in Cornwall. In fact the composition of these rocks is scarcely more different than may be seen between largely crystallised and fine-grained greenstone. Serpentine is a very handsome stone when polished. Beautiful specimens from Cornwall, and other parts of England and Ireland, may be seen in the Museum of Economic Geology, London. When mixed with limestone it constitutes the Verd-Antique Marble. It does not wear well, although at first it receives a fine polish. Chromic iron is usually found disseminated through it. Dr. Jackson of America has shown that Epsom salts or sulphate of magnesia may be profitably manufactured from Serpentine. —*Tomlinson.* One species called noble serpentine, green and translucent, is valued as an ornamental stone. (*Waterston*)—*Faulkner.* Precious serpentine exists in the Hookhoong valley, north-west of Ava, whence it is exported to China, and brought into the southern parts of the empire, but it has not yet been discovered in the Tenasserim provinces.—*Mason.*

(7558) SERRANUS, a genus of Fishes belonging to the family *Percidæ.* It has a single elongated dorsal fin, the rays of the anterior portion spinous, the other flexible; branchiostegous rays 7; small teeth in both jaws on the palatine bones and the vomer, some elongated teeth among the smaller ones; cheeks and operculum covered with small scales; preoperculum serrated; operculum ending in two or three flattened points projecting backwards.—*Eng. Cyc.*

(7559) SERRATULA ANTHELMINTICA.
Worm Saw-wort Somraj, HIND.

Somraj Grows wild in Kotah.—*Genl. Med. Top. p.* 206.

(7560) SERRURIA. PROTEACEÆ. This genus of plants require the same treatment as the Protea. —*Riddell.*

(7561) SESAMUM (Σησαμον), a genus of Plants belonging to the natural order *Sesamaceæ* sometimes called *Pedalineæ*, containing only few genera and species. It is distinguished by having a 5-parted calyx; corolla with a short tube; bell-shaped throat; and the limb quinquifid, somewhat bilabiate. Stamens 4, didynamous, with the rudiments of a fifth stamen; stigma bilamellate; capsule oblong, 4-celled, 2-valved; seeds numerous. The species, though now cultivated in many countries, are supposed to have been originally natives of India. They form

annual plants, with opposite and alternate leaves, and axillary solitary flowers. The species are by some considered to be five in number, that is, *S. orientale, S. Indicum, S. luteum, S. laciniatum,* with *S. radiatum,* said to be a native of Guinea. Others consider them all to be varieties of one species. These are cultivated in various countries, but especially in India, Egypt, and Syria. They have also been taken to the West Indies, where the plant is called Banglo and Oil-Plant. Sesamum seeds are sometimes added to broths, frequently to cakes by the Jews, and likewise in the East.—*Eng. Cyc.* Dr. Wight gives Sesamum laciniatum and prostratum and Voigt gives S. Orientale with a variety. There seems, however, to have been considerable confusion arising from various names having been given to varieties of the same plant, viz: the S. Orientale of Roxburgh, to which we adhere, taking Voigt's Botanical names and Roxburgh's description.

(7562) SESAMUM ORIENTALE, Roxb. *Fl. Ind. Vol.* III. *p.* 100. Sesamum indicum, Linnæus. S. Trifoliatum, Mill. dict. No. 3. S. Luteum, Retz. S. Laciniatum, Willd.

Schitelu, RHEEDE.
Σησαμον, GREEK.
Black seeds, Kala til, white seeds, Suffed til, HIND.
Duhu, ARAB.
Roghen, PERS.
Tila, SANS.
Novu, TELIN
Gingellie, ENGLISH.

The Oil.

Nal ennai, TAM.
Munchie Noonay, TEL.
Meetha Til ka tel, HIND.
Jiritch, ARAB.
Meeta tel: Til-ka-tel, GUZ HIND.
Kurit Schuk, PERS.

The Seed.

Sumsum, ,,
Bareek Til, DUK.
Wull ellu, also, Ellu, CAN.
Teel, Jingelly, Guz. HIND
Kunjed, PERS.
Taila, SANS.
Benjam, SUMATRA.
Yellow, TAM.
Kooryelloo, TAM.
Nowoolo, TEL.

An annual plant growing all over India, but cultivated in Egypt, the Levant, West Indies and South America.—*Voigt.* This species or variety is by far the most generally cultivated in the warmer parts of Asia. It is annual and in a good soil grows generally to be about three or four feet high. Roxburgh never found it in a wild state, (*Roxb.*), but Dr. Riddell tells us that in the Dekhan, the Sesamum Orientale or Gingelie Plant is a common plant springing up in waste places, and flowering towards the close of the rains.—*Riddell.* Roxburgh states that his figure of this plant, called Sesamum indicum by Linnœus, is the *Krishna til* of the Hindoos, which Roxburgh regards a variety of his S. Orientale. It is larger, more ramous, the stem and branches tinged with a rusty reddish colour, the leaves a darker green but in form and structure the same. The flowers are deep tinged with red and seed of a darker colour. Great difference, however, appears, in the seed and harvest time, Sesamum Orientale being sown in Bengal in February, and the crop got in three months afterwards, so that the dues and the little remaining moisture of the earth, are the only sources of humidity by which it can benefit, as this is generally a period of drought. *Sesamum indicum* is sown on high places, about the beginning of the rains, June, and the crop cut down in September.—*Roxburgh.* It will be seen from the above that there are two spiecies or strongly marked varieties of this plant, under cultivation. It may be said indeed, that the Sesamum is extensively cultivated in Southern Asia, for the oil, which is expressed from the seeds which are slightly oval, small, tasteless and inodorous, and that there are two kinds distinguished, *black* and *white* or *yellow*, which possess the same properties, and in commerce are met with both in a mixed and separate state. Gingelly seed is largely exported to England and France, but in India, this oil is perhaps consumed by the natives of India to a greater extent than any other and is second only to cocoanut oil in its importance as an article of commerce. It is extensively cultivated throughout the whole of the Madras Presidency, and has been exported from Madras as follows.

Gingelly Seed.

Years 1847-48.	Year 1848-49.
Qr. 17,518...Rs 160,134	Qr. 8,594.....Rs. 1,02,726
Years 1849 50.	Years 1850 51.
Cwt. 1,44,125 Rs. 299,412	Cwt. 2,27,779...Rs 4,37,185
Years 1851-52.	Years 1852-53.
Cwt. 1,09,414 Rs 302,559	Cwt. 2.51 613...Rs. 5,31,664

Gingelly Oil.

Year 1847-48.	Year 1848-49.
Gl. 19,520.....Rs. 14,766	Gl. 14 686. .....Rs. 11,535
Year 1849-50.	Year 1850-51.
Gl. 52,721.....Rs. 36 294	Ge. 77,232.....Rs. 48,605
Year 1851-52.	Year 1852-53.
Gl. 46,196.....Rs. 26,722	Gl. 72,607.....Rs. 43 608

Of the gingelly seed exported from Madras in 1852-53, the United Kingdom received cwt. 12.713—Ceylon, cwt. 590—France, cwt. 2,87,225—Pegue, cwt. 741—Bombay, cwt, 113—Malacca, cwt. 33 and Travancore, cwt: 148. Of the quantity of oil (72,607 gals.) exported in the same year—gals. 42,043 were shipped to the United Kingdom—gals. 2,963 to Ceylon—gals. 4,232 to Mauritius and Bourbon—gals. 19,698 to Pegue—gals. 46 to Bengal—gals. 27 to the French (Indian) ports, and gals. 3,593 to Malacca.

Mode of preparation.—The great disparity of color observed in the specimens of this oil is to be attributed to the mode of preparation. The method sometimes adopted is that of throwing the fresh seeds, without any cleansing process, into the common mill, and expressing in the usual way. The oil thus becomes mixed with a large portion of the coloring matter of the epidermis of the seed, and is neither so pleasant to the eye, nor so agreeable to the taste, as that obtained by first repeatedly washing the seeds in cold

water, or by boiling them for a short time, until the whole of the reddish brown coloring matter is removed, and the seeeds have become perfectly white. They are then dried in the sun, and the oil expressed as usual. This process yields 40 to 44 per cent. of a very pale straw colored sweet smelling oil, an excellent substitute for olive oil.

Uses.—In India, it is chiefly used in cookery, in anointing the person, for making soap, and for burning in lamps. In England, it is chiefly used for the manufacture of soap, and for burning in table-lamps, for which it is better suited than cocoanut oil, owing to the lower temperature at which it congeals. *Price.*—Value in England (January 1855) £47.10 per ton. In different parts of the Madras Presidency the price of this oil varies from Rs. 1 5 0 to Rs. 6 0 0 per maund of 25lbs In S. Arcot it is procurable at Rs. 27 12 5 per candy. The prices per maund of this oil, at the undermentioned stations, for the quarter ending 31st October 1854, were as follows.

Arcot	Rs.	3	8	0	Madura, ...	Rs.	5	8	3
Bangalore, ...	„	3	7	3	Mangalore, ...	„	4	1	8
Bellary, ...	„	3	2	0	Nagpore, ...	„	1	12	0
Berhampore, ...	„	2	8	0	Palamcotta, ...	„	4	12	0
Cannanore, ...	„	6	0	0	Paulghaut, ...	„	3	7	0
Cuddapah, ...	„	2	13	0	Samulcotta, ...	„	2	10	8
Jaulnah, ...	„	2	6	0	Secunderabad, ...	„	2	3	11
Jubbulpore, ...	„	1	5	0	Trichinopoly, ...	„	4	1	8
Madras	„	3	14	0	Vellore, ...	„	3	14	0
Masulipatam, ...	„	3	9	0	Vizagapatam, ...	„	3	2	0

Second sort Gingelly Oil, erroneously called "Rape," (Kharasance yelloo), is obtained from the red seeded variety.—This oil differs but little from the one above mentioned. In Tanjore, it is procurable at Rupees 3 0 0 per maund.

The following particulars concerning the two varieties of plant, yielding this important oil have been furnished by F. Copleston, Esq., Rajahmundry.

First sort Gingelly. The gingelly seed *par excellence* is the produce of the plant, which is sown in the month of March, after the rice crop, and is irrigated twice, once at sowing, and once afterwards. The seed which is *black*, and is called 1st sort gingelly, from the fact of its yielding the largest per centage of oil, ripens in May, and sells at the rate of Rs. 60 per candy of 500 lbs. The oil obtained from both varieties, sells at the same price, viz. Rs. 2 14 6 to 3 per maund of 25 lbs. according to quality.

Second sort Gingelly is sown in June, and produces a red seed. The plant although a little larger resembles in most respects the former, it has, however, a somewhat longer leaf, and the flower differs a shade or two in color. A candy of 500 lbs. of this seed sells at Rs. 57 8 0. The price of the oil is the same as that of gingelly. This seed has of late been exported to France, in consequence of which the present price is double what it was three years ago.—*M. E. of* 1855.

It will have been seen that of this small annual plant there are two varieties or according to some, species. Sesamum orientale, the common sort; and S. indicum, a less robust kind, cultivated at a different season, both natives of Southern Asia. S. indicum bears a pale purple flower, and S. orientale has a deep red blossom. It is the latter which is chiefly grown in the Peninsula, and the seeds afford the Gingelly oil or til ka tael already extensively known in commerce in the East. The expressed oil is as clear and sweet as that from almonds, and probably the Behens oil used in varnish, is no other. It is called by the Arabs "Siriteth," and the seed, "bennie" seed, in Africa.

S. orientale is grown in the *West Indies* under the name of "wanglo." It is said to have been first brought to Jamaica by the Jews as an article of food. 1,050 bags of gingelly, *til*, or sesame seed, were imported into Liverpool, in 1849, from the East, South America, and Africa, for expressing oil and 3,700 bags in 1850. There are two kinds of seed, light and dark, and it is about the same size as mustard seed, only not round.

A hectare of land in Algeria yields 1475 kilogrammes of seed, which, estimated at 50 cents the kilogramme, amounts to 737 francs, whilst the cost of production is only 259 francs, leaving a profit of 478 francs (nearly £20). The oil obtained from this seed is inferior to good olive oil, but is better adapted for the manufacture of soap. This plant is not unlike hemp, but the stalk is cleaner and semitransparent. The flower also is so gaudy, that a field in blossom looks like a bed of florist's flowers, and its aromatic fragrance does not aid to dispel such delusion. It flourishes most upon land which is light and fertile. The fragrance of the oil is perceptibly weaker when obtained from seed produced on wet, tenacious soils. A gallon of seed seems to be the usual quantity sown upon an acre.

In *Bengal, S. orientale* is sown during February and the crop harvested at the end of May; but *S. indicum* is sown on high, dry soil, in the early part of the rains of June, and the harvest occurs in September.

About *Poonah* it is sown in June and harvested in November.

In *Nepaul* two crops are obtained annually; one is sown as a first crop in April and May, and reaped in October and November; the other as an autumn crop, after the upland rise in August and September, and reaped in November and December. In Mysore, after being cut it is stacked a week, then exposed to the sun for three days, but gathered into heaps at night; and between every two days of such drying, it is kept a day

in the heap. By this process, the pods burst and shed their seeds without thrashing. The seeds contain an abundance of oil, which might be substituted for olive oil; it is procured from them in great quantities, in Egypt, India, Kashmir, China, and Japan, where it is used both for cooking and burning. It will keep for many years and not acquire any rancid smell or taste, but in the course of a year or two becomes quite mild, so that when the warm taste of the seed, which is in the oil when first expressed, is worn off, it is used for all the purposes of salad oil. It possesses such qualities as fairly entitle it to introduction into Europe; and if divested of its mucilage, it might perhaps compete with oil of olives, at least for medicinal purposes, and could be raised in any quantity in the British Indian Presidencies. It is sufficiently free from smell to admit of being made the medium for extracting the perfume of the jasmine, the tuberose, narcissus, camomile, and of the yellow rose. The process is managed by adding one weight of flowers to three weights of oil in a bottle, which being corked is exposed to the rays of the sun for forty days, when the oil is supposed to be sufficiently impregnated for use. Gingelly oil, is used in India to adulterate oil of almonds. The flour of the seed, after the oil is expressed, is used in making cakes, and the straw serves for fuel and manure. The oil is much used in Mysore for dressing food, and as a common lamp oil. From 200 to 400 quarters under the name of Niger seed are imported annually into Liverpool for expressing oil. Three varieties of Til are extensively cultivated throughout India, for the sake of the fine oil expressed from their seeds, the white seeded variety, the parti-colored, and the black. It is from the latter that the sesamum or gingelly oil of commerce is obtained. Sesamum seed contains about 45 per cent. of oil. Good samples of the oil were shown at the Great Exhibition from Vizianagram, Ganjam, Hyderabad, Tanjore, the district of Moorshedabad, and Gwalior The gingelly seed is stated to be worth about £4 per ton in the Northern Circars.—*Simmonds' Comml. Products, page* 535. Dr. O'Shaughnessy says that the sesamum plant is universally cultivated in the East for the oil expressed from the seeds a very sweet oil (siritch, *Arab.*) which is much used as an article of diet, for frictions, and lighting. The oil-cake mixed with honey and preserved citron is esteemed an oriental luxury. The leaves of the plant are used as poultices.

Nine pounds of the seed yield two quarts of perfectly sweet oil, which will keep many years without becoming rancid; the oil made in Persia, and thence largely exported, is called *Kurit schuk.* Sesamum oil is of the sp. gr. 911, insoluble in alcohol, readily saponifies with alkalies, and combines with the oxide of lead. For all purposes of medicine and pharmacy it is when well prepared quite equal to the best olive oil.—*O'Shaughnessy, p.* 479. Both the white and dark seeded varieties are cultivated in Ajmere but do not thrive well.—*Genl. Med. Top. p.* 200. Ainslie tells us it is much used by the Natives of India, in preparing their victuals and when fresh made is by no means unpleasant, and that it is highly esteemed amongst the Japanese who cultivate the plant from which the seeds are obtained that yield it in great abundance.—*Ainslie's Mat. Med. p.* 266.

Tenasserim. The sesamum plant is largely cultivated in Tenasserim by the Karens, who bring the seeds to market and sell them to the Burmese, and they express the oil. The seeds are said to have the same property as linseed, and the oil to be a good substitute for olive oil. The natives use it in curries, and also burn it for lights.—*Mason.* Sesamum indicum, has been lately introduced into the United States where it yields about 2½ gallons of oil to the bushel: the produce being about 20 bushels to the acre. Flax seed yields a gallon to the bushel. The leaf of the plant has been found an excellent remedy in the bowel complaints of children and adults, and for this purpose put or dip three or four leaves in water which they render micilaginous, but do not impart any unpleasant taste. The negroes cultivate it for food using the parched seeds with their meats.—*Ag. Rep. for* 1854 *of Com. Patents p.* 226. See GINGELLY OIL.

(7563) SESBANIA, a genus of plants belonging to the natural order *Leguminosæ*, which is so named from theArabic name of the species which is indigenous in Egypt. The rest are found in the equinoctial parts of the world, but the most remarkable in India. The genus is characterised by having a 5-cleft or 5-toothed calyx: the standard of the corolla roundish, larger than the keel, which is obtuse, 2.edged at the base; stamens diadelphous (9 and 1), with the sheath auricled at the base; legume elongated, slender, torulose, many.seeded. The species form shrubs or herbs with abruptly pinnate leaves, many pairs of leaflets, cauline stipules lanceolate, and the petiole ending in a bristle point. Flowers axillary, racemose, usually yellow.—*Eng. Cyc.*

(7564) SESBANIA ACULEATA. *Syn.* ÆSCHYNOMENE CANNABINA, Roxb, 'Fl Ind.,' iii, p. 335, and Æ. SPINULOSA, do., p. 333; LEGUMINOSÆ).

Dhunchee, HIND.

Sesbania aculeata, herbaceous, annual, erect, sparingly branched, glabrous; stem and petioles usually sprinkled with minute cartilaginous points; leaves eight to ten times longer than broad; leaflets twenty to forty pairs, linear, obtuse, mucronate; racemes axillary, peduncled, erect, lax, often about half the length of the leaves; few-flowered; flowers pretty large (more than half an inch long), on slender pedicels;

corolla about four times the length of the calyx; legumes erect, nearly terete, sharp-pointed. The natives of Bengal familiarly employ and highly esteem a fibre which is known to them by the name of *Dhunchee*, *Dhunicha*, and *Dhunsha*. It is produced by a plant which Dr. Roxburgh thought was the same as the *Æschynomene cannabina* of Konig. This was described by Retz, and stated to be a native of the Malabar coast, and that its stems yielded a strong and useful fibre, as a substitute for Hemp. Messrs. Wight and Arnott, in their 'Flora of the India Peninsula,' consider it to be identical which *Sesbania cochinchinensis*, which they have from China. Dr. Roxburgh states that he had not found his plant in a wild state, but that, in various parts of Bengal, it was cultivated for the fibres of its bark, which form a coarse substitute for Hemp. Messrs. Wight and Arnott (l. c.) unite the plant described by Dr. Roxburgh with one which is very common in all parts of India in the rainy season, the *Sesbania aculeata* of Persoon, and which is called Juyunti in Bengal, and *dhundain* in North-West India. It springs up in rice-fields, and other wet cultivation, during the rainy season. These two varieties are thus described by Messrs. Wight and Arnott, under the name of *S. aculeata*. Dr. Roxburgh gives the following general directions for its culture. The soil is generally low and wet, and not requiring much preparation, as the plant is hardy, growing from six to ten feet, and rapid in growth. This renders it advantageous to cultivate, especially as it is considered a meliorating crop. The time of sowing is when the soil has been moistened by the first showers of April or May. About thirty pounds of seed are allowed to the acre, and less weeding is required than for *Jute*. The crop is ready to cut in September and October, though the fibre does not suffer if left standing till the seed is ripe, in November. The process of steeping and cleaning the fibre is similar to that required for *Sunn*, that is, *Crotalaria juncea*. The general produce of an acre is from one hundred to one thousand pounds of ill-cleaned fibre, the current price somewhat less than that of *Paut*, viz., *Corchorus olitorius* and *capsularis*. The expense of cultivation, including land rent, is about nine rupees. This plant, generally cultivated about Calcutta during the rains, grows to the height of from six to ten feet, the fibres are long (six to seven feet), but coarser and more harsh than those of Hemp, unless cut at a very early period. From its great strength it is well calculated for the manufacture of cordage and cables. In Bengal, the fishermen make drag-ropes to their nets of this substance, on account of its strength, and durability in water. Indeed by the Bengalese it is considered more durable in water than either *Sunn* or *Paut*. It has been observed to Dr. Royle by one gentleman well acquainted with this fibre in India, that he was at a loss to know why the Dhunchee remained so much neglected in Great Britain, as it is really a very excellent fibre for common cord and twine purposes, and certainly very much superior in strength and durability to Jute. It is also a much hardier plant than Jute; the latter, indeed, being rather an uncertain crop, for the production of the fine, long, silky fibre, so much called for in England. Another gentleman observed, that though rather wiry it was strong, and chiefly remarkable for its contraction when wetted, so much so, that it would even carry away the mainmast of a ship by mere contraction. Mr. Deneef, the Belgian farmer employed in India, presented samples of the Bengal Hemp, called *Dhuncha*, to the Agri-Horticultural Society, in November, 1840, and stated that they had been dressed after the Belgian mode. A begah, he says, will yield 173 lb. of cleaned fibre, and 92 lb. of seed. A woman can dress about 4 lb. a day. In April, 1581, Captain Thompson presented a dressed sample of the fibre of the Dhuncha of Bengal, and a piece of rope made of it. This rope, he stated, had been used in various way for nearly two years, and from various reports upon it, he thought it likely to come into extensive use. Specimens of the fibre and rope were also sent to the Exhibition of 1851, and we have already given (see FIBRES) the result of the trial made with this rope in the Arsenal of Fort William, whence it appears that a three and a half inch rope of Dhunchee broke with not less than 75 cwt., though the Government Proof, required for such rope, was only 49 cwt. The price of the Dhunchee, in the interior, has long been about R. 1 8 per maund. The following are reports upon this fibre: "The Dhunchee is very suitable for ropes, and if it will take in tar, is of considerable value. It would probably fetch from £30 to £35 a ton, and after being introduced and known, perhaps £5 more." It was also valued by others at £35 in 1853. These fibres, in fact all the fibres from the East, would be much more valuable if properly scutched; and if scutching mills were sent out, these fibres could be brought in a greatly improved state to market.—*Royle Fib. Pl. p.* 293.

(7565) SESBANIA ÆGYPTIACA, the Egyptian species, found also in India, forms a small and very elegant tree; its wood is employed in making the best charcoal for gunpowder.—*Eng. Cyc.* This species of sesbania may be seen in culture for the sake of its leaves, which the Burmese use for poultices to promote suppuration. Owing to this characteristic they call the tree, water chief.—*Mason.*

(7566) SESBANIA CANNABINA, the Dhanchi of Bengal, is not found wild. It is cultivated on account of the fibres of its bark, which are coarse, but more durable than some other substitutes of hemp, especially when exposed to wet,

and are therefore generally employed for the drag-ropes and other cordage about fishing-nets.—*Eng. Cyc.*

(7567) SETARIA, a genus of Grasses containing a few species cultivated as corn-grains in some countries. The genus is named from 'seta,' a bristle, on account of the bristly nature of the involucrum. The species are found in both the hot and temperate parts of the world. The genus nearly corresponds in character with *Panicum*, under which it is sometimes included, but it is also combined with *Pennisetum*. It is characterised by having the spikelets 2-flowered, supported by two or more bristles; the lower valve is the smallest; the lower flower is neuter or male, with the valves of the corolla coriaceous and indurated, awnless, the lower one embracing the other; petaloid scales very obtuse and subfalcate; germen emarginate; seed included within the persistent glumes. The species are found both in the hot and temperate parts of the world.

(7568) SETARIA GLAUCA. Glaucous Bristle Grass, has a panicle spiked, continuous; bristles of the involucre round, with erect teeth; outer glumella of the fruit conspicuously wavy, wrinkled transversely; lower floret triandrous with two glumellas. It is found in Hertfordshire and other parts of England. The first twospecies are found in America and India. *S. Germanica* and *S. Italica* are cultivated as articles of diet in Europe and India.—*Eng. Cyc.*

(7569) SETARIA ITALICA, ITALIAN PANICLE. Panicum Italicum. Lin.

Tennay, TAM.	Caraloo, TEL.
Kang, GUZ.	Dokhn, ARAB.
Raulaw, DUK.	Tenna, HORT. MAL.
Cungnie, HINDOOIE.	Arzun, PERS.
Navanay, CAN.	Prayingoo, SANS.
Navaria, MAL.	

This grain is prized by the natives of India, who make cakes of it and also prepare it as porridge. For the purposes of pastry it is very little inferior to wheat, and when boiled with milk, forms a light and pleasant meal for invalids. This article grows in abundance in the southern parts of Europe, particularly in Portugal, where it is termed Mitho Painco.—*Ainslie, page* 220.

(7570) SETARIA: *Species.* A species of setaria, which the Karens call "horsetail grass" is scattered all over the Tenasserim Provinces.—*Mason.*

(7571) SETARIA VERTICELLATA. Bristle-Grass, has a panicle spiked, lobed below; branches whorled; bristles of the involucre rough, with reversed teeth, outer glumella of the fruit nearly even; lower floret united with one glumella. It is found in cultivated fields in England. Also in India.

(7572) SETARIA VIRIDIS, Green Bristle-Grass, has a panicle spiked, continuous; bristles of the involucre rough, with erect teeth; outer glumella of the fruit nearly even; lower floret neuter, with one glumella. This species is also British and Indian.

(7573) SETHIA INDICA. *Erythroxyleæ*, Ill. 48. Roxb. c. 88.

Semboolinja marum, Thavadarum, TAM.

When fully grown, it is still a small tree, the fruit yields an oil, and the wood is esteemed as a substitute for sandal wood.—*M.E.J.R.* This, Dr. Wight believes, is the *erythroxylon areolatum* of Ainslie, when largest it is still but a small tree, Ainsiie states that the wood is so fragrant, that it is used in Mysore as a substitute for sandal wood.—*Wight.*

(7574) SEWING. The art of *Sewing* is now practised in India chiefly by men, who are Mahomedans. They form the class of tailors (durzees), who make the dresses of their Mahomedan brethren. One is usually kept in the service of most Europeans.—*Royle Arts &c. of India, page* 505

(7575) SEYCHELLE COCOA-NUT is the fruit of one of the Palms (*Lodoicea Sechellarum*), respecting which many fabulous accounts were formerly related, such as, that it was produced at the bottom of the sea, the nuts being only found thrown up on the coasts of the Maldive Islands. They were called Coco de Maldivia, or Coco de Salomon, by the early Portuguese navigators. Many marvellous medical virtues were ascribed to these nuts by the physicians of the age, both Asiatic and European, and they were consequently sold at a high price. At present they form only objects of curiosity, and are well known under the name of Double Cocoa-Nuts. The tree yielding them was first discovered by Barré, a French officer of engineers, in 1769, then described by Sonnerat, but for the first time accurately described by Labillardiere, 'Ann. Mus.' Paris, ix. p. 140, t. 13. A very full description and illustrative plates have been given by Dr. Hooker, in the 'Botanical Magazine,' N. S., Nos. iv., v., and vi., 1827; and a paper on the subject was read at the Royal Asiatic Society by a resident of the Seychelle Islands. To the inhabitants the tree is useful for its timber, which is hard externally, and employed in building their huts and for posts; the leaves and their footstalks are used for the roof, walls, and partitions, and for many other domestic purposes. The nuts weigh from 23 to 25 pounds each, and when fresh contain a white, transparent, and jelly-like substance, which is edible. The shells are employed in making vessels and dishes of various kinds, and the entire nuts form articles of commerce, as they are esteemed in other countries both for their fabled virtues and as curiosities.—*Eng. Cyc.* See LODOICEA, also SEA-COCOANUT.

(7576) SHADDOCK. A large species of Citrus, commonly cultivated in the East and West Indies, for the sake of the delicate, subacid,

juicy pulp, with which they abound. When at their greatest size, they are called Pompoleons; the smallest, form the forbidden fruit of the English markets —*Faulkner.*

(7577) SHAGREEN.

Chagrin. Fr. | Schagrim, Rus.
Schagrin, Ger. |

A sort of hard grained leather, prepared in a peculiar manner from the skin of horses and other animals, and employed in the manufacture of small cases and boxes. The leather is prepared in Poland, Astracan in Russia, and various parts of the Levant.—*Faulkner. Shagreen* differs from leather in not being tanned or tawed. It bears some resemblance to parchment, but the grain or hair side is granulated or covered with small round rough specks. It is an oriental manufacture, and the method of preparing it was long kept secret. It is said to be prepared from the skins of horses, wild asses and camels, those portions being preferred which cover the chine. The fillets of skin are steeped in water until the hair is sufficiently loosened to be scraped off; the skins are then stretched upon a board, and are unhaired and fleshed with a knife. Each fillet is then stretched in a frame, as in the preparation of parchment, and is moistened from time to time and gradually distended. While still moist, the grain or hair side is sprinkled over with the seeds of a kind of *Chenopodium*; they are hard, of a shining black colour, and about the size of poppy seed. These seeds are forced into the surface of the skin by the pressure of the feet or by means of a simple press, a piece of felt or thick stuff being laid over the seeds. In this state the skin is left to dry in the shade, and when the seeds are shaken out by beating the skin, the surface of the latter is pitted with small hollows corresponding with the forms of the seeds. The skin is now stretched on an inclined plane, by attaching its upper end to hooks and fastening weights to its lower end, it is thinned off with a half-moon knife, care being taken not to cut so far as the bottom of the little pits occasioned by the seeds. On macerating the skins in water they swell, and they become prominent over the shaven surface. The process is completed by steeping the strips in a warm solution of soda; salt brine is then used, and the skins are ready for the dyer.—*Tomlinson.*

(7578) SHALE, a term applied to any argillaceous deposit naturally divisible into laminæ parallel to the plane of deposition. Thus there are *sandy, calcareous*, purely *argillaceous*, and *carbonaceous* shales; there is also a *black* and a *brown bituminous* shale;.—*Tomlinson. Shales or fire Clays*, occur at Streepermatoor, Tripasoor, Chingleput, Mettapollium, and Cuddapah.

(7579) SHALLOT. Allium Ascalonicum. Gundhund, Hind.

Propagated in the same way as the chive.—*Riddell.* Shallots are the mildest of the onion tribe, seeds seldom; propagated by the young bulbs, used in sauces, salads, &c.—*Jaffrey.*

(7580) SHA-NEE, a bast of Arracan, of a reddish brown colour, rough and coarse.

(7581) SHARK'S FINS.

Soora meen sepputtay, Tam. | Iyu or Yu, Malay
Paak, Duk. Guz. and Hind. | and Javanese.

Sharks are numerous, and of great size in the seas of the Eastern Archipelago, and their fins are a regular article of trade for the market of China, where they are prized for their real or imaginary stimulating and restorative qualities. The name for the shark in Malay and Javanese is Iyu, or, abbreviated, Yu, and this name has a very extensive currency, for it is even found in some dialects of the islands of the Pacific.—*Crawfurd Dict. page* 378.

Sharks fins are largely exported from Bombay and Madras to China, where they are much esteemed as a strengthening food. They are chiefly collected in the Persian and Arabian Gulfs, on the Coasts of Mekran and Malabar, and other places along the sea coasts.—*Faulkner.*

The Chinese fishmongers of the Straits Settlements, also, obtain Shark's fins from the same localities which supply them with Fish maws. These fins are not exclusively selected from Sharks (Squali,) but equally from (Raiæ). Quantities examined at Pinang were composed of Fins of the following Genera: *Stegostoma, Carcharias, Sphyrna, Pristis, Rhinobatus, Trygon, and Myliobatis.* Of all fishes Sharks and Rays are the most valuable to the Chinese. The flesh and entrails of all, not even the electric Rays (*Torpedinideæ*) excepted, are eaten either fresh or dried, the skin is used for polishing or converted into Shagreen; gelatine is obtained from the larger fins, glue from the smaller. All, except the caudal fins, are cut at the root so as to leave as little flesh as possible. The root is dipped in wetted lime (Chunam) in the erroneous belief of preventing attacks of insects, and then the fins are dried in the sun. Those imported in the Straits Settlements are packed promiscuously in gunny bags, each containing from one half to one Pikul. According to the value in the Chinese market, the fishmongers assort the fins in two kinds, "white" and "black" The *white* consist exclusively of the dorsal fins, which are on both sides of a uniform light colour and reputed to yield more gelatine than the other fins. In China, the lovers of gelatinous soups pay from 30 to 40 Spanish Dollars per Pikul of white fins. The pectoral, ventral and anal fins pass under the denomination of *black* fins. The colour, however, varies according to the species from buff to grey or brown, and most of them are of two different colours, the upper surface being dark, the lower light. The black fins, for obvious reasons the most numerous, are supposed to yield a comparatively small quantity of gelatine and

sell in China from 15 to 20 Spanish Dollars per Pikul. Mr. W. T. Lewis has communicated the annexed table, shewing the quantity of Shark's fins imported into, and exported during 10 years from Penang to China. The total quantities of Shark's Fins imported into and exported from Prince of Wales Island, from 1832 to 1842, were

IMPORTS.			EXPORTS.		
1832—33 TO 1841—42	Quantity in Pikuls.	Value in Spanish Dollars	1832 33 TO 1841—42	Quantity in Pikuls.	Value in Spanish Dollars.
Total,...	1,350	19,216	Total,...	3 177	48,036

Cantor.

Shark's fins are sought for from the Indian ocean to the Sandwich islands to supply the Chinese market. The chief supply is from Bombay and the Persian Gulf. They are fat, cartilaginous, and when cooked, esteemed by the Chinese as a stimulant and tonic. They should be thoroughly dried and kept from any moisture. About five hundred pieces are contained in a pecul. The price is from $6 to $60 per pecul. There seems to be little or no choice as to what species of shark the fins are from, but those of a whitish color are valued much higher than the black sort. Sharks and rays of all kinds form a common article of food on the Chinese sea coast. The trade in shark's fins is likely to extend at the north —*Morrison.* Travancore sends Shark's Fins which is a favorite article of diet with the Chinese, and is largely exported.—*M. E. J. R.*

(7582) SHA-PHYOO, a bast of Arracan, long, thin, smooth layers, light-colored, tough and flexible.

(7583) SHAWLS.

Chals, Chales, Fr.	Shawl, Pers.
Schalen, Ger.	Chales, Port.
Shawl, Guz. Hind.	Schavalos, Sp.
Shavali, Ir.	

Are well-known articles of dress, made of wool, silk, or more commonly of silk and wool mixed. The finest shawls are those made at Cashmere, which are largely exported from Bombay to London. The chief seats of the shawl manufacture in Britain are, Paisley and Norwich; the French shawls are, however, much more esteemed than the English.—*Faulkner.*

Although in many branches of textile manufacture, England has outstripped her oriental teacher, we still find among the workmen of the East, a degree of taste in the adjustment of their designs, an amount of skill applied to the getting-up of the fabric and the blending of patterns and colours so aptly combined, as to leave nothing to be desired, but rather to shew that what we are now arriving at in arts-design by the aid of scientific teachings, has been practised amongst that ancient race during the last thousand years. The correct principle which science has laid down in the schools of the West, that the patterns and colours of woven goods should diversify plain surfaces without disturbing the impression of flatness, has evidently been known to them from the earliest times. Nor is it in this alone that the workmen of the East excel: they are equally celebrated for the rich and varied beauty of their patterns, and the strict appropriateness of these to the colours employed. Foremost amongst the woven fabrics of India are the world-famed shawls of Cashmere, the finest of which, in spite of many imitations in Europe, are still produced in the "Vale of Cashmere," whence continues to come the supply of the most valuable wool employed in the manufacture. The Cashmere goat thrives no where so well as amidst the grassy ravines and shady clefts of the Cashmerian hills; and from the neck and under part of the body of the animal is taken the fine, flossy, silk-like hair, which is worked up into these beautiful shawls with an exquisite taste and skill which all the mechanical ingenuity of Europe has never been able to imitate with more than partial success. Mention may be found of these shawls in the *Mahabharat* and other ancient works of the East. The people of the countries adjacent to Cashmere are there spoken of as bringing skins and cloths of wool embroidered with gold as tribute to the sovereign. From the *Ayeen Akberry*, written in the sixteenth century, we gather that the Emperor Akbar encouraged the manufacture of these shawls by every means in his power, even designing some himself, and introducing a greater and richer variety of colours in their patterns. The same work informs us of the extension of this manufacture to the state of Lahore, where it is said there were then a thousand manufactories employed on them. A mixture of wool and silk for turbans is also spoken of; and some space is occupied with an enumeration of the various qualities of the shawls and turbans, and the mode of classifying them for value. Since the above period, the many troubles and political changes in the position of country have materially affected this branch of industry; and we accordingly find that from 30,000 looms, which was at one time the number at work in Lahore, there were, some years since, but 16,000. Doubtless the more settled state of the country, and the increasing demand for the article in various parts of the world, will now help to revive this manufacture. In all eastern countries the shawl is ever considered the most essential and graceful part of ornamental dress; and even in Europe, with their many beautiful imitations, the true Cashmere shawl is still sought and paid for at enormous prices. Even in India it is by no means unusual for a rajah to pay ten thousand rupees (1000*l.*) for one of the finest of those productions; and which, in all probability, will have cost the labour of a whole family for a

life-time. The annual value of these shawls imported into Great Britain does not exceed six or seven thousand pounds, and forms no sort of criterion as to the yearly produce of the Cashmerian looms, since by far the most valuable are taken by native kings and rajahs, and large quantities are also dispatched to Russia, Turkey, Greece, America, and continental Europe. Previous to the imitation of these goods at Paisley, the imports had amounted to as much as 16,000*l.* annually. In embroidered shawls, scarfs, handkerchiefs, &c., in silk, cotton, and mixed fabrics, India stands preemenent. Here also as in the make of Cashmere shawls, the Hindoos, by their skilful and delicate manipulation, are able to produce fabrics of such exquisite fineness, as to defy the more scientific labours of European nations. Their scarfs of brocaded gold and silver, laid upon red, white, and green grounds, and worked in and interspersed with beetle's wings, and other ornaments, are at once the wonder and admiration of the world.—*Capper's Three Presidencies.*

Bangalore Silk Shawls. At the Madras Exhibition of 1855, two Bangalore *Silk Bed Quilts* exhibited by Moonshee Nunjapah (CLXXIV 147) Dondala Esmursan (CLXXIV 158) were good specimens of this description of native manufacture, and the jury would have assigned a prize to the first as being the superior article of the two, had not both been priced so much above their real value as to prevent their being brought into general use.

A Bangalore Silk Shawl by Moonshee Nunjapah (CLXXIV 153) weighing 2 lbs. 3 oz. 5⅔ dr. price 125 Rs. was the best woven fabric of this description, and the jury awarded him a 2nd Class Medal.

(7584) SHAWL WOOL GOATS. In Thibet, there are two varieties; one is a large animal, with great horns, called Rappoo; the other smaller, and with slender horns, is called "Tilloo." The latter yields the finest wool, but they are mixed for ordinary purposes. Dr Hooker was assured that the sheep, of which large flocks were grazing near, afford the finest wool of any. The animals were caught by the tail, their legs tied, the long winter's hair pulled out, and the remainder cut away with a broad flat knife, which was sharpened with a scythe stone. The operation was clumsily performed, and the skin much cut.—*Hooker, Him. Jour. Vol.* II. *page* 88.

(7585) SHELL, The protective covering of a class of animals widely distributed throughout the earth, the fresh water, and the ocean. This covering is in most cases exterior, and large enough to enclose the whole body; but in some cases it is interior, and only of sufficient size to protect the heart and lungs. Shell is a secretion from the skin which covers the back of the animal, and which is of a peculiar thickness and fleshy consistence, and is called the *mantle.* This fleshy mantle is very evident on the back of the common grey slug, in which it covers only a portion of the body, and contains in general, within the substance, an internal shell, small, flat, transparent, and oval. The snail affords a familiar instance of an external shell. Shells are called *univalve* or *bivalve* according as they consist of one part, or of two parts joined together by a hinge. The snail is univalve, the oyster is bivalve. Bivalves are inferior in the scale of existence to univalves, both as it respects powers of motion and organs of sense. The generality of the bivalve shells, including various oysters, muscles, &c., are termed *nacreous* shells, from *nacre*, the French for mother-of-pearl. Their structure and uses in the arts have been already treated of Molluscous animals were chiefly represented in the Exhibition of 1851, by the ingenious arrangement of their shelly coverings in the form of vases, baskets, &c. An elegant epergne was exhibited, composed entirely of shells gathered from the shores of the Bahamas, arranged as cornucopias filled with flowers, in great variety of colour and beauty. Also a large vase from the same islands with a group of flowers composed entirely of pure white shells. Shell bracelets from Dacca, with a half moon saw, and complete set of apparatus used by the bracelet-makers, were curious. There were also interesting specimens of the conchology of Jersey, among which was the *Oreille de Mer*, a shell-fish abundantly found in that island, and used in a variety of ways for food, while the shell is preserved, and exported to England, where its pearly iridescence causes it to be valued in ornamental papier mache works. There were also vases and table-tops, from the Channel Islands, richly ornamented with wreaths of shells. The little island of Herm affords an immense collection of interesting shells, in which the greater part of the devices were executed. Bouquets in shell-work from the Mauritius, specimens from the Eastern Archipelago, and leaves, baskets and flowers, in the same material, from France, completed the large amount of shell-work displayed in the Exhibition. The so-called *Shell* of the tortoise, which is merely a bony covering, and different in structure from true shell, was displayed in its natural state, and in a variety of beautiful fancy articles, from Ceylon, the Eastern Archipelago, France, Trinidad, &c. The beautiful lining of oyster-shells, known as mother-of-pearl, was manufactured into articles of great beauty, while a profuse display of the pearls themselves, the produce of the pearl-oyster, or rather mussel, were very interesting to look upon, though they are, in fact, a proof of disease in the animal which secretes them. Pearls are produced when the transparent envelope of the animal, called the mantle, is wounded or irritated. There are small, boring worms, which pierce the shell

and penetrate to the body of the animal. The mantle then sends forth a quantity of pearly matter over the wounded spot, and this becomes a little knob or pearl. Grains of sand, or other minute substances entering the shell, are in the same way coated over with pearly matter. *Tomlinson*, p. cxxix. It remains therefore to speak of the univalve shells, and their employment in the arts. Most of the univalve shells are of the character called *porcelanous* from their brittleness, translucence, and the resemblance of their fracture to that of porcelain. But this fracture when examined by the miscroscope reveals a structure of thick parallel layers, usually of a finely fibrous nature, at right angles to the external surface. Dr. Aikin says that these fibres are often nothing more than the transverse section of thin transparent parallel lamellæ, which when viewed on their broad surfaces often exhibit the usual natural joints of calcareous spar. The soluble part of these shells is carbonate of lime, the particles of which are cemented together with a very minute proportion of animal mucus. The hard and compact nature of such shells, and their generally smooth surface, prevent their being cut by the ordinary tools, which are available for the less hard and frangible nacreous shells: it is therefore necessary to treat them after the manner of the lapidary, with emery, rottenstone, and other substances harder than the shells themselves. Such shells generally require rather to be polished than cut, but where it is necessary to divide them in order to exhibit their sections, they are operated upon by means of the slicer with diamond powder. Certain descriptions of these shells are well adapted for cameo-cutting, on account of their substance being made up of differently coloured layers, and also on account of a difference of hardness and texture in the different layers, some approaching more nearly to the nature of nacreous than of porcelanous material. Specimens of cameo-shells, and of the rude but efficient instruments for cutting them, were shown in the Indian collection of the Great Exhibition. The shells were dense, thick, and consisted of three layers of differently coloured shell material. "In the *Cassia rufa* each layer is composed of many very thin plates, in other words is laminated, the laminæ, being perpendicular to the plane of the main layer: each lamina consists of a series of elongated prismatic cells, adherent by their long sides. The laminæ of the outer and inner layers are parallel to the lines of growth, while those of the middle layer are at right angles to them." Several varieties of the genus *Strombus* or conch, supply suitable shells for cameo cutting. The outer layer is nearly colourless, can be operated upon with steel tools, and may be carved into smooth and finished forms. Experience has taught the cameo-cutter to choose the kinds known as the *Bull's Mouth*, the *Black Helmet*, the *Horned Helmet*, and the *Queen Conch*, of which the first two are the best. The art of cameo cutting was confined to Rome for upwards of forty years, and to Italy until the last twenty-six years, at which time an Italian began cutting cameos in Paris, and now upwards of 300 persons are employed in the trade in that city. About thirty years ago, the total annual number of shells used in the trade was about 300: the whole of them were sent from England, and they were worth 30 shillings each in Rome. But so rapid was the progress of the manufacture when it became more widely diffused, that the following numbers were given a few years ago, (1847,) by Mr. Gray, as the consumption of shells in France for this purpose.

Bull's Mouth	80,000	average price 1*s.* 8*d.*	value 6,400*l.*
Black Helmet	8,000	5*s.* 0*d.*	1,800*l.*
Horned Helmet	500	2*s.* 6*d.*	60*l.*
Queen Conch	12,000	1*s.* 2½*d.*	700*l.*
	100,500 shells.		£8,960

The average value of the large cameos made in Paris, as stated by the same authority, is 6 francs each, giving a sterling value of 32,000*l.*, and the value of the small cameos is about 8,000*l.*, giving a total value of the cameos produced in Paris, in one year, (1846,) at 40,000l.; while at the same time in England, not more than six persons were employed at the trade. The Black Helmet, on account of the advantageous contrast of colour in the layers, produces very effective cameos, the carved figure of the white upper layer being strongly relieved by the dark, almost black ground, supplied by the second layer. The shell is first cut into pieces the size of the required cameos, by means of diamond dust and the slitting mill, or by a blade of iron or steel fed with emery and water. It is then carefully shaped into a square, oval or other shape on the grindstone, and the edges are finished with oilstone. It is next cemented to a block of wood, which serves as a handle to be grasped by the artist while tracing out with a pencil the figure to be cut on the shell. The pencil mark is followed by a sharp point, which scratches the desired outline, and this again by delicate tools of steel wire flattened at the end and hardened, and by files and gravers, for the removal of the superfluous portions of the white enamel. A common darning-needle, fixed in a wooden handle, forms a useful tool in this very minute and delicate species of carving. The careful manipulation necessary in this work can only be acquired by experience, but there are general rules thus sensibly given which the learner would do well to remember:—"As in all other processes of producing form by reduction, the general shape should be first wrought, with care to leave every projection rather in excess, to be gradually reduced as the details and finish of the work are approached. To render the high parts more distinct during the process of carving, it

will be found convenient to mark them slightly with black-lead pencil. Throughout the cutting, great caution should be observed, that in removing the white thickness the dark ground is not damaged, as the natural surface of the dark layer is far superior to any that can be given artificially; indeed, should the ground be broken up at one part, it would be requisite from its lamellar structure to remove the entire scale or lamina from the whole surface, a process that will be found very tedious, and much more difficult than the separation of the white from the black thickness. In order that the finished cameo may possess a distinct outline at all points of view, it is desirable to adopt the system followed in antique cameos, namely to leave all the edges of the figure quite square from the ground, and not gradually rounded down to the dark surface; should this latter method be followed, it will be found that the outline is in many place undefined owing to the colour of the white raised figure of the cameo gradually emerging into that of the dark ground: this evil is entirely avoided by leaving the edge of the figure quite square, for the thickness of about $\frac{1}{50}$th of an inch. The surface of the cameo should be finished as nearly as possible with the cutting tools, as all polishing with abrasive powders is liable to remove the sharp angles of the figures, and deteriorate the cameo by leaving the form undefined. When, however, the work has been finished as smooth as possible with the cutting tools, the final polish may be given by a little putty-powder used dry, upon a moderately stiff tooth-brush, applied with care, and rather to the dark ground than to the carved surface; this is the concluding process, after which the cameo is ready for removing from the black prior to mounting." The covering of the tortoise does not properly come under the denomination *shell*, partaking as it does of the nature of *horn*.—*Tomlinson*. *Shell* then is the hard calcareous substance, which protects either partially or entirely the Testaceous Molluscs externally, or supports certain of them internally. This substance, when external, may be considered as the exo-skeleton of the animal; when internal, as its endo-skeleton. What is called the Nacre in shell, and which is more especially observed in their interior, and which is distinguished by the iridescence produced by the action of light, is found to consist of layers or folds of membranous shell-substance. When examined under the microscope, this substance exhibits a series of layers, and it has been supposed that these are alternately layers of membranous and calcareous matter; but Dr. Carpenter has shown that when these layers are decalcified they exhibit the iridescence, but that when the corrugations are removed by stretching, the membrane no longer exhibits its beautiful hues. The Pearls found in the interior of the shell of many species of *Mollusca* seem to result from the deposit of the nacreous substance around some nucleus mostly of foreign origin. They are probably always formed between the mantle and the shell, although sometimes found in the muscles or viscera of the animal. The *Avicula margaritifera* is called the Pearl Oyster, on account of the frequency with which pearls are found in its interior. Pearls are not unfrequently found in the common oyster, and most fishmongers possess specimens which they have obtained from oysters they have opened. Many of the fresh-water *Conchifera* of European rivers contain them. The *Unio margaritiferus* yields them. It is said that the reputation of British pearls excited the cupidity of Julius Cæsar, and that he presented a buckler covered with them to Venus Genetrix, which was suspended in her temple. Pliny speaks of British pearls disparagingly. Those obtained from the *Unio* are generally very good; but many are procured from the *Mytilus edulis*, and these are not so valuable.(Forbes and Hanely, 'British Mollusca.') —*Eng. Cyc.*

(7586) SHELLAC.

Chapta-Lac, Duk. Guz. & Hind.

The most common form in which lac is generally known, is the substance liquified, strained, and formed into thin transparent laminæ.—*Faulkner*. See Lac.

(7587) SHERBET. A favourite, cooling, and refreshing beverage used in the East; and made of the juice of limes, pomegranates, pine-apples, and other fruit, mixed with water aud sugar, with the addition of rose-water, or some other fragrant ingredient. The Persian sherbets are most esteemed.—*Faulkner*.

(7588) SHERRY. A well known wine, of a deep or light amber colour. When good, it has a fine aromatic odour; its taste is warm, with some degree of the agreeable bitterness of the peach kernel. It is principally produced in the vicinity of Xeres in Spain. It is extensively used as a dinner wine.—*Faulkner*.

(7589) SHIELDS.

Daraq, Arabic.	——, Tel.
Dhal Hind.	Siphar, Pers.
——, Tam.	

The use of the *Shield* or *Buckler* seems to have been universal over the Malay and Philippine Archipelagos before the introduction of fire-arms, and is still continued by all the ruder tribes. In Malay there are no fewer than seven different names for it, four of which are native, —two taken from the Javanese, and one from the Telugu. These names, however, refer to the different forms of it, rather than constitute synonyms.—*Crawfurd Dict. p.* 379

(7590) SHIMBEAMS, in Madras, are planks 20-to 30 feet long; ½-to 2-feet in breadth, and from 4-to 8-inches thick.

(7591) SHOES.

Schoenen, Dut,	Baschmaki, Rus.
Soulies, Fr.	Zapatos, Sp.
Schuhe, Ger.	Cheroopoo also
Joora, Guz.	chupatoo, Tam.
Jootie, Hind.	Chuppoo, Tel.

Are articles of covering for the feet, generally made of leather, and too well-known to need any description.—*Faulkner.* The Shoes, or rather slippers worn by the natives of Southern India, are generally of red leather if for men: they are made for the Madras market at Trichinopoly or Arcot, the patterns are called Appashahee; Chanddooroo; Chuppul; and Nok-dar: The rich natives use a buff coloured cloth. The slippers of females are ornamented with spangles. Their price is from 4 annas to a rupee.—*Herklots.* Thunberg says the shoes of Japan are always the shabbiest part of the dress of the Japanese. As they are of straw, they consequently last but a little time. But they are made in immense numbers, cost but a trifle, and may be bought in every town and village in the Empire. The pedestrian, therefore, throws away the old pair by the road side, and buys new ones as he goes along; while the more provident man takes two or three pairs with him on starting. Immense numbers of those discarded shoes may be found on the sides of all the roads. In wet weather they wear under the shoe a wooden clog, which is attached to the foot by ties of plaited straw. Dignitaries sometimes wear slippers made of fine rattan slips neatly plaited.—*American Expedition to Japan*, p. 65.

(7592) SHOLA OR SOLA. This root is made into toys, artificial flowers, birds, garlands, floats for nets, or for bundles for crossing rivers. When charred it answers for tinder.

(7593) SHOREA, a small Indian genus of Plants, belonging to the natural order *Dipterocarpaceæ*, named in compliment to Sir J. Shore, afterwards Lord Teignmouth, then Governor-General of India. The genus is found as far south as the line; and *S. robusta*, the best known and most useful species, as far north as 30 N. lat in many parts forming the forest which skirt the south-western base of the Himalaya Mountains. The genus is characterised by having a calyx of 5 sepals enlarging into 5 long wings; petals 5; stamens 25 to 30; fruit 1-celled, 3 valved, and 1-seeded. The family to which the *Shorea* belongs is remarkable for the number of useful products yielded by its different species, as the camphor of Sumatra, resin, wood-oil, and valuable timber. *S. robusta* is remarkable on all these accounts, as it is a lofty and ornamental tree with showy inflorescence. It is well known as a timber-tree by the name of 'Saul,' or 'Sal', and chiefly employed in the northwestern province of India in all government works, house-timbers, gun-carriages, &c. The wood is of a uniform light-brown colour, close grained and strong. The tree exudes a resin which by the natives is called 'rál', and by the Europeans one of the kinds of Dammer, being used for the same purposes as any other resins, and in Bengal very frequently as a substitute for pitch in the dockyards. It is also sometimes used by the Hindoos as an incense.—*Eng. Cyc.*

(7594) SHOREA: *Species.* Doubtful Shorea. The largest tree in the Tenasserim Provinces of the wood oil tree family, yields no oil, and is probably a species of shorea; but, says Mr. Mason, have never seen it either in flower or fruit. It is principally used for making large boats, but its places of growth are usually of difficult access by water, and it is not in very general use. Mr. O'Riley says: "It is well adapted for spars for vessels."—*Mason.*

(7595) SHOREA ROBUSTA, Saul Tree. Roxb.

Uswukunida, Sans.	Saj, Arab.
Eing-gyeen, Burm.	Saul, Hind.

Shorea robusta or Saul tree, is of great size, a native of Morung, the Paulghaut mountains &c. Sepals afterwards changing into 5 long wings, petals 5, stamens 15, filaments capillary below the anthers, anther cells short, obtuse, connectum filiform, produce beyond the cells into a more or less elongated colored, deciduous bristle, ovarium 3 celled, with two pendulous ovules in each cell. Seed solitary, cotyledons stalked, not crumbled, radicle superior, leaves coriaceous, oblong, obtuse, often emarginate at the base, panicles numerous from the axils of the fallen leaves, branches and pedicles glabrous. The *Shorea robusta*, and indeed some other species, yield abundance of the resin called dammer, the superior kinds of which are efficient substitutes for the pine resin of the European Pharmacopœiæ. Captain Jenkins of Assam forwarded specimens of resin perfectly transparent and colorless; in the bazars the color ranges from pale amber to dark brown. It is devoid of taste and smell. Sp. gr. 1·097 to 1·123, easily fusible, partially soluble in alcohol (83 1 per 1000) almost entirely in either, perfectly in oil of turpentine and the fixed oils; sulphuric acid dissolves and gives it a red color. Two parts of colorless dammer and 2½ parts of oil of turpentine, make the best varnish for lithographic drawings. The dammer of the Northern Circars is chiefly produced by the varieties of the genus Shorea. The *Shoreas* are also found growing to a very limited extent on the Western coast, but do not appear to produce much, if indeed any. of the resin collected for sale. Saul is the Hindoostanie name of the very valuable wood of this tree, and is commonly employed for the beams and inside planks of ships.—*Ains. Mat. Med. p.* 210. Sal grows in a thick forest on Paras nath, in Behar.—*Hooker, page* 21. The Burman books say that Gaudama died in a grove of engyen trees; and the Pali name of en-

gyen is *thala*, the Sanscrit sal, the name of the *Shorea robusta*. It not improbably exists in the Tenasserim Provinces, but the trees of the dipterocarpus tribe are so large that, to use the language of Griffith, "the flowers are frequently inaccessible." On one of the islands near Mergui, Mason found an enormous tree, whose dry fruit, with the calyx enlarged into five long wings, proved that it was at least a species of shorea, and on the Karen mountains he gathered a similar fruit. The natives say that a part of the petrified wood found in the valley of the Irrawaddy belongs to this tree, and the Burman books that Gaudama was born under one of them; although the savans state that he was born under a Jonesia. *Shorea robusta* according to Captain Munro "is probably the best timber tree in India," and every species of the natural family that produces it, affords valuable timber.—*Mason.* In Pegu, *Shorea robusta* is found chiefly on the Shan side of the Tounghoo district, and in the Forests north of Tounghoo.—(McClelland's Light-brown wood) Dammer unites with the oxide of lead and forms plasters. Two parts of colourless dammer and 2½ of oil of turpentine make the best varnish for lithographic drawings —*O'Shaughnessy, page.* 221. The dammer that exudes from the cuts in the trunk of the black dammer tree (Canarium) of the Malabar coast, seems to be a great favourite of several species of insects especially of one resembling a bee, called by the Hillmen "Kulliada" (*earth hole*) which live in pairs in holes in the ground. This curious circumstance will doubtless account for the mode of formation of the resin called in Burmah, Poon-yet and Poey ne-yet specimens of which were exhibited at the Madras Exhibition of 1857, and are said to be found in the ground and supposed to be produced by some hymenopterous insect, it is also found in hollow trees. This substance although composed chiefly of a yellow brittle resin mixed with more or less sand or earth has an appearance precisely like that which would be looked for if used by an hymenopterous insect in the construction of its cells (See classified Catalogue of the Madras Exhibition of 1857, Class iv.) The Madras Exhibition of 1855, contained a substance from Malacca called "*Dammer klootee*" which had been evidently formed in the same manner, although the cells were longer and the resin black and harder than the Poon yet. Specimens of this curious substance *Poon-yet*, were exhibited by Dr. Cleghorn and the Honorable W. Elliot, Esq. They were brought from Burmah and are said to be produced by a species of Hymenopterous insect in holes in the ground and hollow trees. Indeed the cellular structure of the specimens much resemble that of a wasp's nest. In the course of the Jury's investigations of the origin of the dammers of the western coast, it was incidentally mentioned that a species of bee appeared exceedingly fond of the liquid dammer of the Canarium, this insect lives in holes in the ground and it will probably be found on inspection that its cells are composed of a similar substance to that now under consideration. —*M.E.J.R. of* 1857. Pwai-ngyet, *Burmese*, is given by Dr. McClelland as the Burmese name of the Resin of this Shorea.—*McClelland, p.* 141.

(7596) SHOREA (VATICA,) *Species.* LARD SHOREA. On the mountains in the interior of Tenasserim is a species of shorea which produces an oil of the consistence of lard, and has been hence named by the Karens "the hog's lard tree." The books say that the shoreas produce resin, and dipterocarpus oil, but the fine long scarious wings of the dried calyx afford incontrovertible evidence that it is a species of shorea.—*Mason.*

(7597) SHRUB ('Frutex'). All plants are divided into herbs, shrubs, and trees. A shrub is a plant with a woody stem, which approaches the tree in its duration and consistence, but never attains the height of a tree, and is generally taller than the herb. It varies in height from about four to twelve feet. Linnæus attempted to distinguish trees from shrubs by the former having buds and the latter having none. But this distinction is of no avail, as plants like the willow, generally called shrubs, passes buds, whilst most trees in hot countries are without them. In horticulture, shrubs are two well known to need a definition. For practical purposes they are divided into the deciduous and evergreen kinds, and each of these kinds may be further divided according to their hardy or tender habits, their form, size, mode of growth, colour, &c. The most ornamental flowering shrubs are those belonging to the genera *Rosa*, *Rhododendron*, *Azalea*, *Kalmia*, *Andromeda*, *Vaccinium*, &c. Among the evergreen shurbs are the Holly, the Ivy, the Jasmine, the Box, various Heaths, &c. Shrubs are often planted together, forming what are called shrubberries, and when the kinds are judiciously selected and arranged, these collections add greatly to the beauty of the gardens and pleasure-ground where they are introduced.—*Eng. Cyc.*

At the Madras Exhibition of 1855, a few shells were exhibited, belonging to the genera, *Haliotis*, *turbo*, &c., useful in connection with the manufacture of mother of pearl buttons, likewise the *Chanks*, which the Hindoos use in their processions, the exportation of these is very great, chiefly to Calcutta.—*M. E. J. R.* The inland waters of China produce many species of shells, and the new genus Theliderma allied to the Unio, was formed by Mr. Benson of Calcutta, from specimens obtained of a shopkeeper at Canton. The land shells are abundant especially various kinds of snails, and are not altogether unknown as articles of food. A catalogue of nearly sixty shells obtained in Canton, is given in Murray's China (v. iii p. 445), but it is doubtful whether more than a majority of them

are found in the country as the shops at Canton are supplied in a great degree from the Indian Archipelago. Shells are common along the coast; Dr. Cantor mentions eighty-eight genera occurring between Canton and Chusan.—*Williams, page* 272.

(7598)SHULGUM. BRASSICA RAPA. Turnip.

(7599) SHUMAC OR SUMACH. Sometimes called young fustic, is the powder of the leaves, peduncles, and young branches of a small deciduous plant (Rhus coriaria) native of the South of Europe, but which is also grown in Syria and Palestine, for its powerful astringent properties, which renders it valuable for tanning light colored leather, and it imparts a beautiful bright yellow dye to cottons, which is rendered permanent by proper mordants. It is principally imported from the Ionian Islands and the Morea. The species grown for the purpose in Spain, Portugal, and Italy is R. Cotinus, a shrub with pale purple flowers, whereas R. Coriaria has greenish yellow blossoms. They may be propagated by cuttings of the roots and layers. R. typhina and R. Glabra with their varieties, are North American species, which are also used for tanning purposes. In Montpellier and the South of France the twigs and leaves are known under the name of redoul or roudo. They are gathered every year, and the shoots are chipped or reduced to powder by a mill. The imports into the United Kingdom were in 1846, 10,256 tons; in 1847, 11,975 tons; in 1848, 9,617 tons; in 1849, 12,590 tons; in 1850, 12,929 tons and in 1852, 9,758; which were all retained for consumption. In 1841, we received about 9,000 tons from the port of Leghorn. There were exported from Sicily in 1842, 123,305 tons, valued at £68,894. It is imported in packages of about a cwt., wrapped in cloth. America takes a large quantity of Sumach. The imports into the port of Boston alone, were 19,070 bags in 1847, 34,524 in 1848 and 30,050 in 1849. The prices in Liverpool duty paid in the close of this year, are per cwt.

	s.	d.		s.	d.
Messina, ...	10	0	to	10	6
Palermo,.....	12	0	„	13	0
Trieste,..	7	0	„	7	6
Verona.	5	6	„	6	6
Tyrolese.....	8	0	„	9	0

Simmonds.

The trees producing Shumac, are,

Rhus Coriaria, Hide or Elm-Leaved Sumach.

Shumuk, PERS. | Tumtum, ARAB.

A native of Persia, Syria, Palestine, and the south of Europe, about 8 or 10 feet high, divided into numerous irregular branches. All parts of this plant are inodorous, but have a styptic taste; to the abundance of tannic acid it owes its properties and value in the arts: M. Tromsdorf has found in the berries a large quantity of bi-malate of lime.—O' *Shaughnessy, page* 282. Leaf 5-7 pairs of villous leaflets, elliptical, bluntly and coarsely toothed, petioles naked. Flowers in large loose panicles of a whitish-green. Drupes villous. This plant is extensively used for the purpose of tanning, and it is said that all the leather made in Turkey is tanned with the bark of this species of *Rhus.* The fruit is acid and astringent, and the seeds are often used as tonic for exciting the appetite.

Rhus continus, Venus-Sumach, or Wild Olive. Flowers hermaphrodite, arranged in loose panicles of a greenish-yellow colour: leaves simple, entire. This a very ornamental shrub, and is one of the European species, growing wild in various districts of the south of Europe. It is made use of, like many other of the species, for tanning, in Italy, and is called Scotino. The wood is used by the modern Greeks for dyeing wool, which is said to be of a beautiful rich yellow. It is frequently cultivated on account of its beauty.

Rhus glabra, Smooth Leaved Sumach. Leaf like the last, but broader and glabrous. Branches also glabrous. Fruit red, covered with silky hairs. This species, as well as another named *R. viridifolia,* is considered by some botanists as only a variety of *R typhina,* Like the last, this species is abundant in North America, over-running sometimes a whole district, and forming a troublesome weed. Its fruit is very sour, but may be eaten with impunity. Bees are very fond of the blossoms.

Rhus typhina, Fever-Rhus, or Stag's-Horn Sumach. Leaves with 8-10 pair of leaflets and an odd one, lanceolate-acuminate, serrated, pilose beneath. There are two forms of this plant; the one *R. t. arborescens,* in the form of a tree, from 10 to 25 feet in height; the other *R. t. frutescens,* shrubby, and only from 2 to 10 feet high. The young shoots are covered with down, which, with their somewhat crooked and stunted branches, give them the appearance of young stags'-horns: hence their name. The flowers are in dense spikes, at the ends of the branches, the pistilliferous ones developing themselves into woolly drupes, which are very conspicuous when ripe. It is found in every part of North America, and its dark-red leaves add much to the beauties of an American autumn. The fruit of this plant is exceedingly sour, and on this account it is frequently called vinegar plant, and is even used in some parts as a substitute for vinegar.

(7600) SIAMULIUM. A troublesome, dipterous insect (the "Peepsa," a species of *Siamulium*) swarms on the banks of the streams uniting with the little Rungeet river in Sikkim. It is very small and black, floating like a speck before the eye; its bite leaves a spot of extravastated blood under the cuticle, very irritating if not opened.—*Hooker Him Jour. Vol.* I. *p.* 157.

(7601) SIBIA GLOMERATA.

Thit-phyew, BURM.

Very plentiful in Prome, Pegu and Tounghoo,

as well as about Donabew; a compact and close-grained wood, seven or eight feet in girth, and is a timber that deserves to be attended to with a view of bringing it into use. Wood, white colored, adapted for fancy work and cabinet making.—*McClelland.*

(7602) SIDA, a genus af Plants belonging to the natural order *Malvaceæ*, containing nearly 200 species, which are very extensively distributed throughout the warm parts of the world, and abound in the peninsula and plains of India. The name was originally applied by Theophrastus to a plant growing in moist situations, which is believed to have been an *Althæa*, also belonging to the family of *Malvaceæ*, and was adopted by Linnæus for this genus.

Sida is characterised by having a naked quinquifid calyx with valvate segments, Corolla with 5 petals, which are obovate, with the claws often united into a tube, and joined to the bottom of the stamen tube. The stamens numerous, with their filaments connected into a columnar tube at their base, and free at the apex, bearing the reniform anthers. The styles are numerous, but more or less united at the base. Capsule 5-or many-celled, Cocci single-seeded; seeds suspended, roundish, and flattened. The species of this genus vary much in habit, as well as in the structure of their fruit and seeds, but they resemble each other, as indeed do all Malvaceous plants, in abounding in mucilage, and in some of them having tough ligneous fibres, which are employed for the purposes of cordage in different countries. From their mucilaginous nature several are employed as demulcents in India, such as *Sida Indica*, *S. Asiatica*, and *S. populifolia*, in the same way that the Mallow and the Marsh-Mallow are in Europe. The leaves of *S. carpinifolia* (a native of Brazil and the Canary Islands) are chewed by the Brazilians, and applied with success to the stings of wasps and bees. *S. rhomboidea* and *S. rhombifolia* abound in very delicate flax-like fibres, which may be used for many of the same purposes as hemp and flax; but when the plants are grown for the sake of their fibres, they ought to be sown thick, under which circumstances, like other plants similarly sown, they grow tall and slender without branches. So *S. periplocifolia*, a native of the Malay Islands, which succeeds well in India, may be cultivated for the same object, especially as when cut near the earth it quickly shoots into long simple twigs which abound in flax-like fibres. A species, *S. tiliæfolia*, is actually cultivated for this purpose in China. Seeds of this species were received at the Calcutta Botanic Garden under the name of King-ma from Pekin, in the neighbourhood of which the plant was said to be cultivated as a substitute for hemp and flax. At Rio Janeiro the straight shoots of *S. macrantha* are employed as rocket-sticks.—*Eng. Cyc.* Wight gives Sida acuta, 95; *Indica*, 12; and *populifolia*, 12.

(7603) SIDA ACUTA, Asiatica, indica, graveolens, &c. are malvaceous plants common in every part of India many of them containing fibres which might be turned to useful account.

(7604) SIDA HEMP OR FLAX OF BURMAH is the product of two species, Sida acuta and Sida stipulata, (Burmese, Pyen-dan-gna-len.) They are mere weeds, but the most troublesome, in Tavoy.—*Mason.*

(7605) SIDA LANCEOLATA, RETZ.

Sida acuta, BURM. | Kureta, DUK.
Pata, SANS.

A common plant, grows wild in many parts of the Deccan; flowers small, yellow, grows to the height of about three feet; and no doubt, like the S. Rhomboidea, a good fibre might be procured from it.—*Riddell* It is a native of the peniusula of India, and found also in the hilly districts. The root resembles common liquorice and is very bitter. Dr. Ainslie informs us that the infusion of this root combined with ginger is given in intermittents and in chronic diarrhœa. The leaves bruised with oil are applied externally as a poultice to accelerate suppuration. Dr. O'Shaughnessy used an infusion of the root with some advantage in the cases alluded to by Ainslie, but could not satisfy himself as to its febrifuge action. It promotes perspiration, increases the appetite, and is in many respects a useful substitute for more costly bitters. An electuary is prepared, in Bengal, from the expressed juice of the *Sida* and used in the treatment of worms in the intestinal canal, but experienced native practitioners say that no reliance can be placed on its efficacy. Care must be taken not to confound the classical name of this plant with the *Sidhee* of the bazar, which is a mixture of the dried leaves and young capsules of the Indian hemp, and a powerful narcotic.—*O'Shaughnessy, p.* 214. An infusion of pata root is a very useful bitter tonic and astringent. Dose, one to two ounces three times daily. Pata is also the name of Corchorus olitorious.—*Beng. Phar. p.* 304.

(7606) SIDA LANCEOLATA. THE LANCE LEAVED SIDA.

The root.

Malaytanghie vayr, TAM. | Vishabaddee, TEL.

This root, which is not unlike the common Liquorice root, in appearance, is intensely bitter and is prescribed in infusion together with Ginger in cases of Intermittent Fever, it is also considered as a stomachic, and is a useful remedy in chronic Bowel affections.—*Ains. Mat. Med. page* 87.

(7607) SIDA PERIPLOCIFOLIA, a native of the Malay Islands, was also one of those subjected to experiment by Dr. Roxburgh, who describes the plant as flowering and ripening its seed in the Botanic Garden at Calcutta, a great part of the year. " Its bark abounds in

serviceable flaxen fibres, and as it shoots quickly into long, simple twigs, particularly if cut near the earth, it answers well for procuring the fibre of good length for most purposes." Various species of Sida, as *S. asiatica, indica, graveolens,* and others, are extremely common in every part of India in the rainy season. Many of them, no doubt, contain fibre which might be turned to useful account.—*Royle Fib. Plants, page* 263.

(7608) SIDA RHOMBOIDEA AND SIDA RHOMBIFOLIA are the *sufed* and *lal bariala* of the natives of Bengal, where the plants are indigenous in the rainy season. The bark of both, according to Dr. Roxburgh, yields abundance of very delicate flaxy fibres, which he thought might be advantageously employed for many purposes. When the seed is sown thick on a good soil, the plants grow tall and slender, without branches, and are every way fit for such purposes.—*Royle.* Major Hanney sent from Assam to the Agri-Hortic. Soc., in Dec., 1851, some of the fibre of *Sida of rhomboidea,* which grows luxuriantly in that valley. Capt. Thompson thought from its length, its similarity to silk, and its great strength, that it would fetch a high price in England. The line (only half an inch in circumference) sustained, after exposure to wet and sun for ten days, 400 lb.

(7609) SIDA STIPULATA. SIDA HEMP. The most troublesome weed in Tavoy produces a very fine hemp or flax. There are two species *Sida acuta* and *Sida stipulata,* but they are not usually distinguished.—*Mason.*

(7610) SIDA TILIÆFOLIA. This species, *S. tiliæfolia,* referred at first by Dr. Roxburgh to *S. abutilon,* is cultivated for the purpose of its fibres in China. Some of its seeds were received many years ago at the Calcutta Botanic Garden, under the name of *King-ma,* from Pe-tsin, in the neighbourhood of which the plant is cultivated, for the sake of its fibre. Seeds were similarly received a few years ago by the Horticultural Society, and Dr. Royle saw a fine crop of the plants in the garden at Chiswick, which seemed about eight feet high. Some of these Dr. Lindley had steeped, in order to separate the fibres, and some were sent to Mr. Routledge in the year 1850, in order to try in his machine. Dr. Roxburgh notices "the fibre of this plant is strong and pliable, very silky in its nature, and the plant of very rapid and luxuriant growth, three crops being obtained in one year. It may be brought into England at the estimated price of £8 per ton, which is about one fifth of the price of Hemp of the best quality." Some of Dr. Roxburgh's original specimens, marked July, 1804, are still in the India House; the fibres are from four to five feet in length, and display a fine soft and silky fibre, as well as adapted for spinning as the Jute, but are apparently superior.

(7611) SIDEROXYLON (from σίδηρος and ξύλον), a genus of Plants belonging to the natural order *Sapotaceæ.* The species of this genus are natives of Africa, America, the East Indies, and Australia. They are evergreen trees, with axillary and lateral fascicles of flowers. They are remarkable for the hardness and weight of their wood, which sinks in water, and the genus has hence derived the name of Iron-wood. The *S. incime* (Smooth Iron-Wood) is a native of the Cape of Good Hope, and has long been cultivated in the greenhouses of Europe. None of the species however, are at all remarkable for beauty.—*Eng. Cyc.*

(7612) SIKAKUL. Root like a carrot, brought from Cashmeer; used in Ajmere as an aphrodisiac.—*Gen. Med. Top. p.* 150.

(7613) SILIGOREE, Dr. Hooker here noticed a wild hog, the first wild beast of any size he had seen in the plains, except the hispid hare (*Lepus hispidus*) and the barking deer (*Stylocerus ratwa.*) The hare he found to be the best game of this part of India, except the teal.—*Hooker, Him. Jour. Vol* I. *page* 369.

(7614) SILLARUS, STORAX LIQUID.

(7615) SILENE COMPACTA. SILENACEÆ. Catch Fly.—These are elegant flowering plants, of easy culture from seed, the flowers are of various colours, and require only the same treatment as the other species of Lychnis.—*Riddell.*

(7616) SILK.

Zyde, DUT.	Seta IT.
Soie, FR.	Ab reshum, PERS.
Seide, GER.	Seda, PORT. & SP.
Resum, Reshum, GUZ. and HIND	Schelk, RUS.

A soft shining filament, the product of several species of caterpillar, particularly the *Bombyx mori* or silk worm. Silk occurs in various forms. *Cocoons, knibs* or *husks,* are the balls as formed by the worm, about the size of a pigeon's egg, and of a golden yellow colour. *Raw silk,* the state when simply wound off the cocoons into skeins or hanks, is the thread composed of several fibres united by their natural gum. *Waste silk,* is that part which is first wound off the cocoons in the operation of reeling, and such cocoons as being eaten through by the worm, cannot be wound off the reel, but are afterward carded and spun. Silk husbandry is extensively prosecuted in Italy, France, China, Persia, Siam, and India. The descriptions of raw silks met with in the Bombay markets are China, Persian, Siam, and Bengal.—*Faulkner.* The Bombyx Huttoni has lately been brought to notice by Captain Hutton as producing a new variety of silk, spinning in all weathers, whereas the common silk worm is apt to be thrown off work by a passing cloud. It is thought that the new worm may prove commercially important.—*Friend of India.* A new process is announced of manufacturing silk directly from the bark of the Mulberry tree. The inventor's name is Signor Lotteri. The Exports from Madras, of silk, has reached 1666lbs.

value Rs. 6,569, and it is probable that the culture may be successfully carried on in the valleys of Neilgherries. Indeed, for some years past, experiments had been energetically carried on by the late Mr. Casamajor, and at present by Major Minchin: specimens of silk from Italian worms reared at Katy have been sent.—*M.E.J.R.*

Mysore.—The manufactured Silks sent to the Madras Exhibition of 1855, represented in a very partial degree the resources of the country in this useful as well as ornamental branch of Industry. The finest specimens of Madras silk manufacture, namely, the Shawls of Bangalore and the silk carpets of Tanjore and elsewhere very deservedly were awarded Medals. The Bangalore Shawls were very creditable from the harmony of colors and elegance of design. They have been much improved of late years both in quality of material and in beauty of pattern; white silk pocket handkerchiefs rivalling the China silk in softness and richness are also manufactured at Bangalore. The rearing of silk worms is carried on in all parts of the Mysore country, and great improvement has taken place in the quality of the silk at Bangalore, owing to the establishment, under the Mysore Government, of a farm, where mulberry trees from China and other countries have been introduced and where great attention has been paid to feeding the worms, &c. Still the state of the trade compared with that of the Bengal Presidency shows that much is yet to be done, in 1841, 1,175,308 lbs. of raw and waste silk were exported from the East Indies and Ceylon, of which nearly the whole was from Bengal. The exports from the Madras Presidency were, in 1853-4, 10,478 lbs. of raw silk and 1688 pieces of piece goods. In addition to the exports of this material, a great quantity is used in the manufactures of this country. The native cloths owe their beauty in a great degree to the richness of the silk borders. The satins, kincobs, &c. of Hyderabad are well adapted to Native costume, but hitherto little progress has been made in manufacturing articles for European costume, except in Bangalore. The silk of Tanjore and the lesser but elegant articles such as gimp, fringe, cords and tassels, braid for carriages, &c., are of every variety and of great excellence.—*M. E. J. R.*

Bengal.—Dr. Royle, writing on the silk culture in India, mentions that the Silk-worms which yielded the investments of Silk, were 1st. The large *Annual Worm* reared once in the year, and yielding its produce from only the middle of March till May. 2d. The *Desseey*, or *Indigenous Silk-worm* of Bengal, of which the cocoons are obtained throughout the year; that is, there are four or five collections annually; of these, the worm of the cold weather, or November breeds, and that of the dry weather, or March and April breeds, are superior to the others, from the more nourishing nature of the leaves at those seasons. 3d. The *China Silk worms* introduced into Bengal, which are next in estimation to the annual and country breeds; of these, both the yellow and white cocoons are abundant in the Radnagore district.

The Residents also described firstly, the *Nistry* tribe of worms, which is said to include three distinct kinds, the *madrassie*, *soonamooky* and *cranee*, and these yield a portion of what was formerly the Company's investment of Silk; secondly, the *Tusseh* Silk-worms, of which the *mooga*, *teerah*, and *bonbunda*, are described as different kinds; the cocoons of these are collected in September, and are called the Rain weather sorts; but there are others of the dry weather months which are denominated *dabba*, and *buggoy*. *Tarroy* is an inferior sort collected in December. The Tusseh, or Tussar Silk worm, is very extensively diffused, the Residents described the Worm as being reared in all the western forests from Ramghur to Midnapore. Dr. Roxburgh mentions it as a native of Bengal, Behar, and Assam, and that it is the same as the Bughy insect of other districts. The *Juroo* is also described as a variety, by Dr. Buchanan Hamilton, and as occurring in the districts of Bhagulpore and Dinajepore; by Col. Sykes it was found in the Bombay, and by Dr. W. Geddes in the Madras Presidency.

Mr. Hugon, Sub-Assistant to Captain Jenkins, Political Agent in Assam, describes six species of Silk-worm as being found in the central part of that province. Of these, the Mulberry Silk-worm, (Bombyx Mori); the Tusseh Silk-worm Saturnia (Phalæna) paphia and the Eria, or Arindy Silk-worm Saturnia (Phalæna) cynthia, were previously well known; but the others have been described by himself and by Dr. Helfer. The Mooga Silk-worm (Saturnia assamensis, Helfer), was also evidently known to the Resident (v. Report, p. 52). The Joree Silk-worm (Bombyx religiosæ, Helfer), is a new species discovered by Captain Jenkins on the Peepul tree (Ficus religiosa). This is said to yield a Silk certainly equal to that of the Mulberry Silk-worm.

Saturnia sylhetica, Helfer, is a native of the Kassia mountains, and of Silhet and Dacca. It also yields Silk, as do two other species, the wild Silk-worm of the central provinces, and another, which produces its cocoon upon the Mangoe tree. This the people of Malda gather, and mix with Arindy Silk cocoons in spinning.

There are probably other species in different parts of India, which may be found to yield useful products.

These wild Silk-worms may be thought by many unworthy of notice, as they do not yield the kind of Silk most valued in commerce; but they are more important than

they at first appear to be. We must remember that the culture of some in the forests, and the collection of all, affords employment to considerable numbers of the natives in the parts of districts least productive of useful occupation. They afford also clothing for many of the inhabitants, as Mr. Hugon informs us that Silk from the Eria, or Arindy worm (*Saturnia* (*Phalæna*) *cynthia*) is the daily wear of the poor in Assam, and is used by every class in winter. It is remarkable for its very great durability.

The Tussch Silk is still better known, having also afforded the natives in Bengal, &c. a coarse durable Silk, which is much esteemed in India, both for ladies' and children' dresses; for the latter especially, on account of its cheapness and durability. As an instance of the quantities in which the Tusseh Silk is produced in India, we may adduce the evidence of Mr. R. Montgomery of the Bengal Civil Service, in the Azimgurh district only, where 318,772 pieces of Tussch Silk are given as the quantity produced annually.

Mulberry Trees.—The White Mulberry (Morus alba) is infinitely to be preferred as food for the worms of the Bombyx mori, and this has been introduced from China into Europe, as well as into India. Morus Indica, the species most common in Bengal, is thought by Dr. Wallich to be only one of its varieties. Morus atro-purpurea is a species introduced into India from China, where it is employed as food for the Silk-worm, though Dr. Roxburgh states, that it had not been found to answer for that purpose in Bengal. Two varieties (one, the Doppa Foglia), of the Italian White Mulberry, received from St. Helena, were established in the East India Company's Botanic Garden at Dapooree, in the Bombay Presidency. The then Superintendent, Dr. Lush, forwarded to Calcutta young plants, which, in September 1833, were reported by Dr. Wallich to be in a flourishing condition. Two other species are common in the plains of North-western India, and others have been introduced there from Caubul and Cashmere; one distinct species occurs, moreover, in the Himalayas.

Col. Sykes has drawn attention to the great importance of introducing into India the Mulberry called Morus multicaulis, a distinct species or variety introduced by M. Perrottet into France, in 1821, from the Philippine Islands, where it had been brought from China. It is now thought by many, both in Italy and France, to be the most valuable sort for cultivation, and has become a favourite variety in America. It is said, besides growing easily, and affording abundance of leaves of the most nourishing kind, to be able to withstand a considerable degree of cold.

All the wild Silk-worms feed upon different trees, such as the Jujube, Ficus religiosa or Peepul, the Castor Oil Plant, Terminalia catappa some of the Laurel tribe, and others, which are found in almost all the forests of India.—*Boyle's Productive Resources of India.*

History of Silk trade with India.—Equal in antiquity to the growth of cotton was the production of silk in the countries of the East. Its limited extent, however, and the monopoly of this valuable traffic in the hands of the Phœnicians, and afterwards by the Persians, restricted its employment within the most confined limits. Until the time of the Roman empire, its very existence appears to have been unknown in the West; and when Dionysius, the imperial geographer, who visited the East in the first years of the Christian era, wrote an account of this new and beautiful product, he speaks of it as a precious web, finer than that of the spider, combed by the natives from flowers, and spun into rich garments of great price. Previous to the middle of the eighteenth century, Indian raw silk formed a very inconsiderable portion of the trade from the East. Its great inferiority to the Italian and French article was for a long period a great barrier to the profitable extension of this branch of Indian trade. The factors of the Company did no more than purchase the silk as it reached their hands from the three filatures, whence alone it came in those days. At Cossimbazar, Rungpore, and Commercolly, the natives grew large tracts of the common mulberry-plant, reared their worms, and reeled the produce of the cocoons; but with so small regard to the exigencies of the worms, and so little care bestowed upon the preparation of the silk, as to render it a most unprofitable and troublesome article in the hands of the European manufacturer; so much was this felt, that until the latter part of the last century, Indian silk was employed but for the manufacture of certain inferior minor articles of haberdashery, and never entered into the composition of satins, or silk piece-goods of any kind. One great cause of this inferiority was to be found in the careless method of winding the silk from the cocoons, which produced such inequality in the thread as to render it all but unserviceable. Besides this, it was loaded with gummy and other extraneous substances, and reeled without the least attention to colour or quality; so that it reached the buyer's hands in hanks comprising all sorts of shades. This part of their trade proved so annoying, and was attended with such fruitless results, that the Company were at one time on the point of issuing orders to cease all purchases of the article. Instead of acting on this first impulse, the Directors wisely made an effort to remedy the evil complained of, by sending to Bengal one or two persons acquainted with the Italian mode of reeling and assorting silk; these instructors were placed in the heart of the silk-districts, and appear, from after re-

sults, not to have laboured in vain. Inducements were at the same time held out to the ryots to extend the cultivation of the mulberry-plant, by allowing them all lands so used free of rent for two years, and afterwards assessing them very moderately. In this manner the silk-trade received an impulse hitherto unknown to it, and the exports of the raw article rose from 80,000 lbs. in 1750, to 320,000 lbs. in 1770. The partial success which had attended the introduction of a better mode of reeling silk induced the Company to attempt still further reforms; and we accordingly find that in the year 1771 a second supply of practical silk-reelers and mulberry-cultivators from Italy were dispatched to Bengal; proper filatures were established; a better mode of rearing the insects and growing the plants was introduced; and in addition to these measures, steps were taken to secure a supply of eggs from China, with the view of improving the breed of the Indian worms. Several years elapsed before these improvements were beneficially felt in the quality of the silks imported from Bengal; but that such was the case may easily be seen by the steady increase in the quantity taken by the manufacturers of England, which in 1785 amounted to 576,175 lbs. The greatest improvement effected by the Company at this period was the total abolition of the contract system, and the substitution for it of agencies throughout the silk-districts, by means of which supplies of the cocoons were constantly obtained from sub-agents called bekars, who received advances in money, and who, in their turn, engaged by similar means for the supply of silk-worms from the rearers in the different villages.

The vast improvements effected in England towards the end of the last century in the manufacture of cotton goods tended in a great measure to check the consumption of the more costly article of silk; and we find that from 500,000 lbs. weight of raw silk sold in 1785, the silk Company did not dispose of more than, on the average, 300,000 lbs. weight in the years 1800 to 1805. So much better were the silk transactions of the Company managed at this time, that in spite of this decline in the demand for their goods, their yearly profits gradually increased from a few thousands to the enormous amount of 132,982*l.* in 1801. The gradual decline to a certain date, in the imports of Bengal raw silk, from the cause already assigned, may be seen by the following list of exports to Great Britain, taken at intervals of ten years; and in the same may be observed the effect of the gradual relaxation of the Company's trading monopoly in favour of private merchants. In 1782 there were shipped to England from Bengal, 611,071 lbs.; in 1792 401,445 lbs.; in 1802, 114,744 lbs.; in 1812, 982,427 lbs.; in 1822, 1,042,617 lbs.; and in 1832, 956,453 lbs.

Some idea of the commercial value of thi branch of Indian trade may be formed from th fact, that between the years 1776 and 1785, th raw silk imported by the Company, and in th privileged tonnage by private traders, was wort 3,446,757*l.*; from 1786 to 1803, it amount ed to 5,221,596*l.*; and from 1804 to 181(to 3,115,044*l.*; being during these thirty five years almost equal to 12,000,000*l.* sterling Upon the last renewal of the East India Charte in 1833, which provided that the Compan should no longer engage in mercantile opera tions, their extensive and well-organised filature were put up for sale, and after some delay dis posed of to private parties. These establish ments were eleven in number, of which the fo lowing gave their names to the particular kind of silk produced by each of them, and by whic those varieties are to this day known in com mercial circles; they are Bauleah, Commercolly Cossimbazar, Hurripaul, Jungypoor, Radnagore Rungpore, Santipore, and Surdah. Besides th above, the Company possessed a number c hired filatures of less note.

The exportations of Bengal raw silk in 1814-1 amounted in value to 231,271*l.*; in 1827-8 t 855,398*l.* and in 1837-8 to only 465,451*l.* Bring ing down these figures to a more recent date, w find that the silk exports of Calcutta were, durin the years 1848-9 and 1849-50, to the value c 714,000*l.* and 655,000*l.* respectively.

Indigenous Silk Worms of India.—Beside the China, or mulberry silkworm, there ar several varieties of silk-spinning worms indige nous to India, of which mention is made in som of the earliest records of that country. Thes have been described by several scientific writers and are known amongst the natives as the mooga the arindy, the tussah, and the joree worms, a producing fibres, which, if not equal in commer cial value to those of the mulberry-worm, ar nevertheless esteemed and largely employe amongst the inhabitants of the districts in whic they are found. These insects inhabit vas tracts of forest in Upper Assam, in the Madra Presidency, and in that of Bombay; and th cloths made from the raw material are in ex tensive use amongst not only natives but Euro peans, who find them most economical anc durable for many purposes. Some idea may b formed of the extent to which these kinds o indigenous silk are produced, when it is stated that in 1837 there were in one district alone not less than 318,772 pieces of tussah silk manufactured. The food of the wild silkworm is obtained from the trees of the forests inhabited by them, and amongst those known as affording them nourishment are the leaves of the jujube the castor-oil plant, the peepul, or banyan-tree, some of the laurels, and a few other plants.

Bombay.—So early as 1795, some attempt ap pears to have been made at Bombay to introduce

the silk-worm, but evidently without effect; for until 1823 we hear nothing more of the matter, and then it seems to have been attempted at one of the public jails by the labour of the prisoners, the result of which appears to have been the preparation of a few bales of silk for local consumption. Later still, the zeal and industry of an Italian gentleman were brought to bear upon the subject, and under his directions a better cultivation of the mulberry plant, and a method of feeding and reeling was introduced, unattended with permanent results.

Madras.—In Madras this branch of industry met with great encouragement so long since as 1791. No efforts were spared to induce the natives to enter fully into the rearing of the worm and the growth of the plant; and, as the result shews, the success was, if not so great as in Bengal, still sufficiently encouraging.

China, History.—Silk is said by Chinese authors to have been known there for thousands of years. It has long been imported into India from China. The earliest notice, though there is some doubt about the passage, is in the Mahabharut where Cheenas, Hoonas, &c. are said to have brought silk, and silk-worms as presents to Yoodhistira.

Silk Worms and their products.—When the China silk-worm was first introduced into India as an object of culture we have no information; but what is called the indigenous (*desee*) silk-worm is carefully distinguished from the China worm; and there are several species of wild silk-worms, species of *Saturnia*, *Phalœna*, and *Bombyx*, all of which were shown at the Great Exhibition of 1851 with *Tussur*, *Moonga*, and *Eri* cloth. The former is much used in India by the natives, and is best known as an article of commerce, and has been used in Britain for parasols; in India it is esteemed for children's dresses. The Eri cloth is extensively used as an article of clothing by the inhabitants of Assam. The silk of Bengal was originally very inferior in quality, and very carelessly wound. The East India Company, in the year 1757, sent Mr. Wilder to improve the winding of silk; and in the year 1769 other Europeans, as drawers, winders, reelers, and mechanics. The filatures were all in Bengal, and to the Southward of 26° of N. lat., for the northwest provinces are much too hot and dry for the silk-worm. Experiments were for many years made on the western side of India to introduce the culture of the silk-worm, under an Italian, M. Mutti; but they have lately been abandoned from want of success. Some excellent silk is being produced in Mysore, and it is probable that the culture might easily be carried on in the valleys of the Himalaya.—*Royle. Arts. &c. of India, page* 496. Moorshedabad has long been a central mart for silk goods, and a variety of specimens of silk were sent from thence, and some satins (*mushroo*) from Benares, Cutch, and Hyderabad, chiefly in alternate species of different colours. On the Bombay side the culture did not succeed, and the raw material is imported from China and dyed, but the manufacture has not on that account been neglected. The weavers seem, in fact, to have paid an extra degree of attention to their art, and sent to the Exhibition of 1851, silk which is well woven, and in a variety of patterns, together with an excellent specimen (called *pytanee*) of double weaving, being red on one side and green on the other, and showing the colours and patterns very distinct. This was from Poona The silk, from Surat, Tanna, and Ahmednugger were also admired for their patterns, as well as the longees from Sindh. The silks from Cashmere attracted much attention, both from the substantial nature of the fabric, some of which is called tafeta, and for the moderate tone of the colours with which they are dyed. The flowered silks, or brocades, from Benares and from Ahmedabad, as well as those from Hyderabad, commanded notice for their richness and the happy disposition of pattern and combination of colours.—*Royle, Arts &c. of India, page* 497.

Mysore.—Surgeon Smith of the Madras Army, for many years in medical charge of the Mysore Commission, conducted experiments under his own superintendence, and the result of his observations contained in the following report may be relied on, as he spared no pains to make himself acquainted with the subject. General Sir MARK CUBBON, *Commissioner*. July. 1857

The cultivation of Silk is supposed to have been introduced into Mysore by Tippoo Sultan, and although the climate is evidently well calculated both for the growth of the Mulberry, and the development of Silkworms, the cultivation does not appear to have made any great progress until after the government of the country fell into the hands of the British in 1832.

The Mahomedans adopted the feeding and management of the worms and the reeling of the Silk as one of the few modes of gaining a livelihood to which they are not averse, purchasing the Mulberry leaves from the cultivators; and the Commissioner gladly encouraged the growth of Silk in every possible way, with a view of developing habits of industry among a class of men generally opposed to labor of any kind, unconnected with a Military life.

The open parts of the country alone seem to suit this cultivation, such as the Bangalore, Chittledroog, and open parts of the Astagram Divisions. None is grown in the Nugger, or in the Munjerabad sections of the Astagram Division, the climate is too damp in these last named Districts. Most of the Silk was formerly exported to Coimbatore and Tanjore, and a smaller

portion found its way to Bellary and Dharwar, for consumption in Native manufactures. At this time (1857), there is a considerable consumption of the raw material in Bangalore and Mysore in the manufacture of Silk Shawls, Handkerchiefs and Native Cloths, &c.

In 1841, four specimens of Silk grown in Mysore, were sent to Bengal, two of the specimens were purchased in the bazar and two were from cocoons purchased in the bazar, and privately and carefully reeled. The object being to find out the defects in the Mysore Silk, and to know if it would be valuable as an export in the state in which it is sold by the Natives. The following are Extracts from the Report: "One of the most apparent faults of this Silk is "its bad colour. This arises from the circum- "stance of the cocoons having been boiled in cop- "per pans instead of earthenware, and I should "imagine that at the time of reeling the Silk, "the water in which the cocoons were placed "was not changed often, as should be done. "This latter precaution would not only have "assisted to give the Silk a better colour, but "would have freed it somewhat more from the "gum, the superabundance of which renders "these specimens harsh and hard." It appeared from the above Extract that the faults of the Mysore Silk lay not so much in the article itself as in its mode of preparation.

A garden originally planted as a private speculation was taken by the Mysore Government in 1842, with a view to try how far Signor Mutti's proposal of growing Silk from standard Mulberry trees was likely to succeed in Mysore, and benefit the country. The larger and upper portion of the ground was planted with cuttings of the St. Helena Mulberry, and a few China ones, the lower and wet part, with Philippine, both grew well and for the first few years promised well. Eggs were obtained from Mr. Groves' Establishment at Chittoor, from an Establishment in the Neilgherries, and some of the annual March bund from Mr. Blechynder's Establishment in Bengal: these latter being annual worms, it was hoped would have proved a valuable auxiliary to the Mysore breed, and enabled us to feed from the standard trees, but in spite of every care and precaution they hatched on the eleventh day as in Mysore and from that time regularly produced their crops every fifty days. The Silk was certainly a great improvement on that of Mysore, but the worms were delicate and required more care and attention, so that I much doubt if they were ever extensively used by the Natives.

The Sub Peshkar of Bangalore, a man familiar with the country method of reeling Silk, was sent to Chittoor and placed under the tuition of Mr. Groves, who had an extensive plantation of Mulberries and experienced reelers. The man returned to Mysore well qualified for his post of Superintendent of the Government Garden. Reels of the best construction were made by Colonel Green and so expert did the Natives become, that in 1846, the following is the report of the Bengal Chamber of Commerce on the specimens sent for that purpose.

Report of the Silk Committee on specimens of Raw Silk, the produce of the Sirkar Gardens at Bangalore, forwarded by the Agricultural Society at Madras.

"Your Committee have examined these speci- "mens with great interest, and should be pre- "pared to give an unqualifiedly favourable opi- "nion on them, had the thread been a very little "stronger: as it is, it is remarkably even, round, "and free from knibs and gouts, and the colour "very pure and uniform, indeed, with the single "exception of being somewhat too fine, the pre- "sent are most admirable samples of Silk."

"Your Committee would however remark "that an opinion often prevails among such as "are not practically versed in the manufactures, "that the finer the Silk, the better and more "valuable, but it may be too fine, and the "present specimens, your Committee think, are "finer than it would be safe to prepare for the "English market, for the difficulty of unwinding "such Silk is extreme, and adds enormously to "the charge of preparing it for the weaver. A "Member of your Committee, Mr. Laidlay, ob- "serves that he has known in more instances "than one the most disastrous results from the "mistake of reeling the Silk too fine, for it will "not bear to be unwound by the machinery used "for the purpose in England.

"Your Committee however beg to add, that "these specimens are in every other respect un- "exceptionable, so clean, even, and beautiful, "that the reeler who prepared them may be pro- "nounced competent to produce Silk of the first "rate excellence, nearly, if not quite equal to "Italian. "The soil and climate too must cer- "tainly be favorable to the culture." (Signed) Robert Watson, J. W. Laidlay. Calcutta, March 1846.

To F. S. Gabb, Esq., Secretary, Agricultural and Horticultural Society, Madras. Sir,—The Honorary Secretary of the Calcutta Agricultural Society has handed to me two sample skeins of Raw Silk, the produce of Bangalore, and a copy of your letter 26th February to his address, with "Extract from Proceedings of a Meeting of your Society wherein the specimen of the Silk is ordered to be sent to the Chamber of Commerce here for report."

"Having laid such communication and the "samples before the Chamber, I am desired to "inform you that they consider the Silk very "beautiful, but the thread is too weak for free "reeling, if of stouter thread it would pay well at "the price you quote. Both sorts are too fine "for ordinary purposes and could not be re- "wound without great waste, even twice their

" thickness might be too fine to suit the English " market, the staple not being strong enough " to stand the action of the machinery used for " winding and preparing the article for the use " of the weaver, probably about 10 cocoons " would afford the best size to reel. The co- " coons from which these specimens were made " must have been very good indeed, equal to the " best annual cocoons of Bengal, but the thread " especially the white, is endy and it is not " twisted enough ; with improved implements, " and proper directions, the spinner should be " able to produce an article of superior charac- " ter and higer value."

" Though of minor importance I may here " mention that the skeins would be better if not " quite so thick. These weigh about 6 tolahs, " whereas the skeins generally made in India and " most approved in England weigh about 3 or 3½ " tolahs, a size which is attended with several " practical advantages," (Signed) W. Limong, *Secretary*. Calcutta, Bengal Chamber of Commerce, *April 25th*, 1846.

The brokers, Messrs. Norton, Thilburn and Co. of Saint Mary Axe, London, reported of some samples of the Silk sent to them in 1850, as follows," This Silk with care in the getting up " would prove a valuable substitute for many " other classes, and from its intrinsic qualities " would find a ready sale in this market." These Extracts prove the capability of Mysore to produce Silk of first rate quality. But until filatures conducted by Europeans are established as in Bengal but little of the Silk will ever find its way to the English market, At present the Natives find a ready sale in India for all they can produce, and it answers their purpose better to reel it roughly and sell it as they do, for although clean reeling will produce a greatly enhanced price, the proceeds of the Silk will be much less and the sale of the raw material not so certain as it is now. Since 1846 the average annual produce of Mysore has been about 10,000 maunds of 24 lbs. or 240,000 lbs weight, a quantity sufficiently large to attract attention to its cultivation.

The standard mode of cultivation failed for reasons explained in the following Extract from a letter to the Commissioner, dated 11th August 1849.

" When we consider the incessant demand for leaves made on the standard trees in consequence of the bi-monthly crops of silk which alone grow in Mysore, the cause of failure will be at once evident. The leaves of a plant are organs of respiration, digestion, and nutrition, a tree cannot be made to yield 5 or 6 crops annually without seriously impairing its vitality, if the leaves are stripped off a plant before the fruit has commenced ripening, the fruit will fall off and not ripen. If a branch is deprived of leaves for a whole summer, it will die, and not increase in size perceptibly, and this is exactly what has taken place with the standard trees at the Silk garden, they have aged, become woody, and throw out nothing but fruit unless pruned back to the stems, when an entire new set of branches is thrown out with an abundant crop of fine leaves ; these branches by the loss of their leaves age and die within the year, and the same process has to be renewed ; latterly the only mode of obtaining good leaves from the standards has been by cutting them down to the ground, the roots then throw up abundant fine shoots, a proceeding which in effect is returning to the bush system. On this subject I quote the following passage from a valuable little work by Count Dandalo on the " art of rearing Silk worms." He says—" It has been said, that in Asia they " obtain as many as twelve crops of cocoons in a " year. And some person made experiments, and " published some views on the subject ; stating, " that with us (that is in Italy) there might, at " least, be gathered two crops ; my experiments " on the contrary tend to prove, that it would be " a sure method of destroying the Mulberry trees, " and consequently the entire breed of Silk " worms. I cannot indeed bring myself strictly to " believe, that in Southern Asia it would be " possible to have such numerous crops of co- " coons. The southern part of China corresponds " very nearly, as to climate, with the Southern " parts of Persia, and yet there, according to the " illustrious Pallas, the boughs of the Mulberry " trees are cut only twice in the year, so as to " have in the same year two crops of cocoons. " In those climates they prune the small branches " twice a year, because the summer being long- " er, the Mulberry tree is more vigorous there " than it is with us. Here, on the contrary, the " Mulberry tree cannot even bear the stripping " of its foliage once a year without being injur- " ed, and certainly would die if stripped twice."

The Count is misinformed in regard to the number of crops annually. In Mysore, 6½ crops are the utmost ever obtained, each crop occupies 56 days, 33 in the worm, 12 in the cocoon, 11 in the egg, the insect requires food for 198 days in each year, where the succession is regularly kept up. The cultivation by standard trees is obviously not adapted to meet such an incessant demand. Of this, the Natives are perfectly well aware for Doctor Royle in speaking of the cultivation of the standard Mulberry, says, " This practice is not entirely foreign to the " Natives, as the Resident at Baulleah states that " the annual worm prefers the leaf of the shrub " which is well matured, to that which is young " and tender, and therefore he infers that it " would thrive better with the tree leaf than the " shrub leaf. He also says, that the tree is " cultivated in parts of the Rungpore and " Radnagore districts for the production of " cocoons. The Resident at Hurripal states, that

"there, the method of cultivation differs from that "in use about Baulleah and Malda, the leaves "being gathered only from standard trees, which "are preferred on account of the dryness of the "soil in that district."

The following are two Extracts from a paper taken out of an old Chinese work on the cultivation of Silk, of sufficient interest for insertion in this place. After describing at length the management of the worms for an annual crop, or a spring and autumn one at most, he says, "for if they (the Mulberry trees) are quite "stript one year, they die and fail entirely the "spring following." After speaking of the necessity for feeding the young worms every half hour during the first 24 hours of their life he says, "The reason why they take so much "pains to make these little insects eat so often, "is to forward their growth and make them spin "the sooner, the great profit which they expect "from these creatures depends upon this care, "if they come to their full growth in twenty-"three or twenty-five days, a hurdle covered "with worms, whose weight at first was a *mass*, "that is a little more than a drachm, will pro-"duce twenty-five ounces of Silk, whereas, if for "want of proper care and nourishment, they do "not come to their perfection in less than 28 "days, they will produce but twenty ounces, "and if they are a month or 40 days in growing "they will have but about 10 ounces." This is a most interesting fact, and applied to breeding in general, shows the vital importance of supplying young stock with abundant nourishment while growing: there is perhaps no other instance in nature, in which such an experiment could have been so accurately tried and its results ascertained with almost mathematical precision.

On the subject of the comparative merits of the standard and bush modes of cultivating the Mulberry, I wrote to the Secretaries of the Horticultural Societies of Bengal and Bombay. From the latter I received no reply, which I regret, for I was anxious to know how far Signor Mutti's plan had answered under his own superintendence. The Secretary to the Calcutta Agri Horticultural Society writes as follows: "The system of growing the Mulberry, as a "standard tree, has been tried in Bengal, and, "so far as the result of my enquiries enables me "to say, with as little success as has attended "the experiment of the St. Helena variety on "your side of India. The common bush Mul-"berry is very much preferred by the people at "Surdah, Commercally, Radnagore, and I be-"lieve, all other parts of Bengal, where Silk "cultivation prevails."

More than one private speculation with standard trees failed at Chittoor, and Conoor, under energetic and intelligent European superintendence. I have no reason to think that the experiment has failed from any want of care or attention on the part of the attendants, they have done their best, and if the Commissioner will refer to the report of the Bengal Horticultural Society on the specimens of Silk sent to Bengal in 1846, he will there see that the qualifications of the reeler at the garden are first-rate. I have lately found when obliged to hire reelers to wind off a large crop that it is not difficult to get very good reelers among the Natives, and the reason why the Natives do not practice reeling their own Silk cleanly and fit for the European market, is that it is not saleable in this country and there is a demand for all that can be produced reeled in the country fashion, independently of which the increased value of the Silk cleanly reeled will not compensate for the loss of weight and increased time and expenses of reeling.

The standard trees are all worn out and useless, they require to be replanted, and if replaced by young trees not a leaf should be taken from them for he next five years. A large portion of the garden is laid down with the common country bush Mulberry cuttings, of the St. Helena for standards planted at distances of 20 or 30 yards from each other among the bushes, and this I think is the proper way of growing standard trees, which thus planted, in no way interferes with the bush system, and at the same time affords food in seasons when, from want of water or other causes the bushes fail. The Philippine planted as bushes have not answered, though the leaf is large and nutritious. It is said by the Natives not to yield an equal weight of food on the same space of ground.

I beg respectfully to suggest to the Commissioner either that the entire garden be laid down in the country fashion, with standard trees at intervals as above described, or else that it be let out to Natives to be cultivated in their own way, keeping up the present breed of worms, which are very superior to their own in the bright colour of the Silk. Surgeon C. J. Smith. Bangalore, 11th August 1849.

At present, 1857, the cultivation of Silk is carried on by the Natives in their own way, and by the bush system which they have found practically the best. Captain J. Cunningham, *Secretary*.

Hyderabad in the Dekhan. The chief of the manufactures and the only one for which Warungul is famed is that of Persian carpets which are made of all sizes and of worsted cotton, or even of silk.

Silk cloth, of the width of the curtailed guz, is manufactured and sold for 12 annas a yard, but the quality is very inferior. It is dyed red with lac, green with indigo and turmeric, or yellow with turmeric alone. The *tusser* cloth manufactured is only half the value of the silk. *Cholees*, (women's boddices) are manufactured but not in sufficient quantity to supply the district, as they are imported.

The other manufactures in the Circar are *tusser* cloths at Hoosainpurty—and Chilpore silks at Mutwarrah.

The *Tusser* cloth—although the cocoons are the produce of the same insect as those of Bengal—bears no comparison in fineness or durability with the *tusser* cloth manufactured there. The silks are dearer, and the cottons of the same price as those produced nearer Hyderabad.—*M. L. S. J. No.* 35, 1849, *p.* 27.

Raw silk is imported from Madras and manufactured into sarees and women's breast cloths at Mutwarrah, Warungul, Maytpilly and Aimulwarrah, in Elgundel, at Maiduck and other Kusbahs. This manufacture is entirely for home use, and no great skill or taste is displayed by the weavers, the silk pieces are of a quality inferior to those sold at the same price in the Hydrabad bazar, and were it not for the transit duties, the manufacture would become extinct. The silk cloths are dyed red with the lac dye and yellow with turmeric; no other dyes are used. Tusser or jungle silk, the produce of a species of Saturnia, is made into sarees, punchees, and scarfs, at several towns of the Sircar of Warungul. But the chief seat of the tusser manufacture is the town of Mahdapore, on the right bank of the Godavery in the Ramgheer Sircar, where the moth that yields it is carefully reared, and from whence raw tusser silk is sent to other parts to be woven into cloth. The insect in its grub state is first fed on the tender leaves of the Careya sphærica, and, when more grown, on the leaves of the Pentaptera tomentosa; much watching and attention are bestowed in rearing the animal, subject as it is to destruction from birds, insects, and squirrels. The tusser cloths produced at Mahdapore are, in durability and fineness, very inferior to the cloths of the same kind manufactured in Bengal, they are dyed the same colour, and with the same materials as the silks, of which they are about one-half the price. At Mahdapore there are seventy to eighty families employed in rearing the insect and in the manufacture of the cloth, which is prepared principally for the Hydrabad market.—*J. M. L. S. No.* 38 of 1850 *p.* 224.

China. The two principal manufactures of China are, those of *silk* and *porcelain*, the originality of which was never contested, as the introduction of both into Europe is perfectly well ascertained; and could the Chinese urge no other claims to praise on account of their ingenuity, these two alone might serve to give them a high rank among the nations of the world. D'Herbelot justly considers that, as Rome obtained the silk manufacture from Greece, and Greece from Persia, so the last was indebted for it, according to the best Oriental authors, to China. The tradition, indeed, of the invention is there carried back into the mythological periods, and dates with the origin of agriculture. These two pursuits or professions, namely husbandry and the silk manufacture, the chief sources of food and clothing, form the subject of one of the sixteen discourses to the people, which have been before noticed. It is there observed, that "from ancient times the Son of Heaven himself directed the plough: the Empress planted the mulberry-tree. Thus have these exalted personages, not above the practice of labor and exertion, set an example to all under heaven, with a view to leading the millions of their subjects to attend to their essential interests." In the work published by imperial authority, called 'Illustrations of Husbandry and Weaving,' there are numerous woodcuts, accompanied by letter-press explanatory of the different processes of farming and the silk manufacture. The former head is confined to the production of *rice*, the staple article of food, and proceeds from the first ploughing of the land to the packing of the grain, the latter details all the operations connected with planting the mulberry and gathering the leaves, up to the final weaving of the silk.—*Mulberry Trees of China.*

Besides the common mulberry of China, which differs somewhat from that of Europe, they occasionally, in feeding the worms, have recourse to a wild specimen of the *morus* tribe, as well as to the leaves of another tree, supposed to be a variety of ash. The production of silk in the Chinese method, and with the aid of natives of the country, was tried experimentally by the East India Company at St. Helena; but has been abandoned, with the rest of their establishments on that island, since the expiration of the charter. The principal object, in the cultivation of the mulberry for feeding silkworms, is to produce the greatest quantity of young and healthy leaves without fruit. For this reason the trees are not allowed to exceed a certain age and height. They are planted at a convenient distance from each other, on the plan of a quincunx, and are said to be in perfection in about three years. The mulberry-tree for silkworms is chiefly cultivated in Che-keang, which province, together with the only three others that produce fine silk, namely, Keang-nan, Hoo-pe, and Sze-chuen, is crossed by the *thirtieth* parallel of latitude. Che-keang is a highly alluvial country, intersected by numerous rivers and canals, with a climate that corresponds pretty nearly to the same latitude in the United States of America. The soil is manured with mud, which is dug from the rivers, assisted with ashes or dung; and the spaces between the trees are generally filled with millet, pulse, or other articles of food. The time for pruning the young trees, so as to produce fine leafy shoots, is at the commencement of the year. About four eyes are left on every shoot, and care is taken that the branches are properly thinned, with a view to giving plenty of light and air to the leaves. In gathering these, they make use

of steps, or a ladder with a prop, as the young trees cannot support a ladder, and would besides be injured in their branches by the use of one. The trees, with their foliage, are carefully watched, and the mischiefs of insects prevented by the use of various applications, among which are some essential oils. The young trees of course suffer by being stripped of their leaves, which are the *lungs* of plants, and this is an additional reason for renewing them after a certain time. They endeavour in part to counteract the evil effects, by pruning and lopping the tree, so as to diminish the wood when the leaves have been stripped, and it is probable that a few leaves are left on. It is surprising, however, to observe how soon a tree in those climates will recover its leaves in the summer or autumn, after having been entirely stripped of them by a typhoon, or hurricane. Fresh plants are procured by cuttings or layers, or sometimes from seed. When the trees grow too old for the production of the finest leaves, and show a greater tendency to fruiting, they are either removed altogether, or cut and managed so as to produce fresh and young branches. Mr. Barrow, who observed the management of the trees and silkworms in Chekeang, confirms the usual Chinese accounts, by saying that "the houses in which the worms are reared are placed generally in the centre of each plantation, in order that they may be removed as far as possible from every kind of noise; experience having taught them that a sudden shout, or the bark of a dog, is destructive of the young worms. A whole brood has sometimes perished by a thunder storm." The chambers are so contrived as to admit of the use of artificial heat when necessary. Great care is taken of the sheets of paper on which the multitudes of eggs have been laid by the silkworm-moths; and the hatching of these eggs is either retarded or advanced, by the application of cold or heat according to circumstances, so as to time the simultaneous exit of the young worms exactly to the period when the tender spring leaves of the mulberry are most fit for their nourishment. They proportion the food very exactly to the young worms by weighing the leaves, which in the first instance are cut, but afterwards, as the insects become larger, are given to them whole. The greatest precautions are observed in regulating the temperature of the apartments, and in keeping them clean, quiet, and free from smells. The worms are fed upon a species of small hurdles of basket-work, strewed with leaves, which are constantly shifted for the sake of cleanliness, the insects readily moving off to a fresh hurdle with new leaves, as the scent attracts them. In proportion to their growth, room is afforded to them by increasing the number of these hurdles, the worms of one being shifted to three, then to six, and so on until they reach their greatest size. The hurdles, as well as the rest of the apparatus, were sent from Canton to St. Helena for the use of the Company's establishment there. When the worms have cast their several skins, reached their greatest size, and assumed a transparent yellowish colour, they are removed into places divided into compartments, preparatory to their spinning. In the course of a week after the commencement of spinning, the silken cocoons are complete, and it now becomes necessary to take them in hand before the pupæ turn into *moths*, which would immediately bore their way out, and spoil the cocoons. When a certain number, therefore, have been laid aside for the sake of future eggs, the pupæ in the bulk of the cocoons are killed by being placed in jars under layers of salt and leaves, with a complete exclusion of air. They are subsequently placed in moderately warm water which dissolves the glutinous substance that binds the silk together, and the filament is wound off upon reels. This is put up in bundles of a certain size and weight, and either becomes an article of merchandise under the name of "raw silk," or is subjected to the loom, and manufactured into various stuffs, for home or for foreign consumption. Notwithstanding the apparent simplicity of their looms, they will imitate exactly the newest and most elegant patterns from England or France. The Chinese particularly excel in the production of damasks and flowered satins. Their Silk crape has never yet been perfectly imitated; and they make a species of *washing* silk, called at Canton *ponge*, which becomes more soft as it is longer used.—*Davies Chinese, Chap.* xviii. *p.* 30. *Ed.* 1851.

Fortune spent a few days in the vicinity of Nan-tsin, and as it may be considered the centre of the great Silk country of China, I shall, he says, endeavour now to give a description of the cultivation and appearance of the mulberry trees. The soil over all this district is yellow loam, well mixed and enriched by vegetable matter; just such soil as produces excellent wheat crops in England. The whole of the surface of the country, which at one period has been nearly a dead level, is now cut up and embankments formed for the cultivation of the mulberry. It appears to grow better upon the surface and sides of these embankments than upon level land. The low lands, which are owing to the formation of these embankments, considerably lower than the original level of the plain, are used for the production of rice and other grains and vegetables. It is therefore on the banks of canals, rice fields, small lakes, and ponds, where the mulberry is generally cultivated, and where it seems most at home. But although large quantities of rice and other crops are grown in the silk districts, yet the country, when viewed from a distance, resembles a vast mulberry garden, and when the trees are in full leaf, it has a very rich appearance.

SILK.

The variety of mulberry cultivated in this district appears to be quite distinct from that which is grown in the Southern parts of China and in the silk districts of India. Its leaves are much larger, more glossy and have more firmness and substance than any other variety which has come under my notice. It may be that this circumstance has something to do with the superior quality of the silk produced in the Hoo-chow country, and is worthy of the notice of silk growers in other parts of the world. This popular variety is not reproduced by seeds and hence all the plantations are formed of grafted trees. Each plant is grafted from a foot or two feet above the ground, and rarely higher. The trees are planted in rows from five to six feet apart, and are allowed to grow from six to ten feet high only, for the convenience of gathering the leaves. In training them they are kept open in the centre; the general outline is circular, and they are not unlike some of those dwarf appletrees which are common in European gardens. The accompanying sketch gives a good representation of the habit and form of one of those trees which has attained its full size. The different methods of gathering the leaves in these districts are curious and instructive and show clearly that the cultivators well understand the laws of vegetable physiology. Leaves are not taken at all from plants in their young state, as this would be injurious to their future productiveness. In other instances a few leaves only are taken from the bushes, while the remainder are allowed to remain upon the shoots until the summer growth is completed. In the latter case the leaves are invariably left at the ends of the shoots. When the bushes have attained their full size, the young shoots with the leaves are clipped close off by the stumps, and shoots and leaves carried home together to the farm-yard to be plucked and prepared for the worms. In the case of young trees, the leaves are generally gathered in by the hand, while the shoots are left to grow on until the autumn. At this period all the plantations are gone over carefully, the older bushes are pruned close in to the stumps, while the shoots of the younger ones are only shortened back a little or allow them to attain to the desired height. The ground is then manured and well dug over. It remains in this state until the following spring, unless a winter crop of some kind of vegetable is taken off it. This is frequently the case. Even in the spring and summer months it is not unusual to see crops of beans, cabbages, &c., growing under the mulberry trees. During the winter months, the trees are generally bare and leafless. Those persons who are accustomed to live in countries with marked seasons, where the winters are cold, and where the great mass of vegetation is leafless, would not be struck with this circumstance in the silk country of China. But the view one gets in this country in the summer months, after the first clipping of the shoots, is curious, and striking. As far as the eye can reach, in all directions, one sees nothing but bare stumps. It looks as if some pestilential vapour had passed over the plain and withered up the whole of these trees, and the view is rendered still more striking by the beautiful patches of lively green which are observed at this time in the rice fields and on the banks of the canals. This system of clipping close in to the stumps of the old branches gives the trees a curious and deformed appearance. The ends of the branches swell out into a club like form, are much thicker there than they are lower down. After I had completed my inspection of the country near the town of Nan-tsin, I proceeded onwards to the west in the direction of Hoo-chow-foo. A few hours' sail on a wide and beautiful canal brought me within view of the mountain ranges which form the western boundary to the great plain of the Yang-tse-kiang, through which I had been passing for several days. The most striking hill which came first into view was crowned by a seven storied pagoda. It had a large tree by its side, equally striking in the distance, and which had probably been planted when the pagoda was built. I afterwards ascertained this to be the "maiden hair-tree" (Salisburia adiantifolia), a tree which attains a large size in this part of China, and is extremely ornamental.—*A Resid. among the Chi. p.* 343. The greater part of the silks and crapes used in this part of China are manufactured in the adjoining towns of Soo-chow and Kang chow. Flowered crape, however, a very beautiful production, is made in Hoo-chow. The process of manufacture is thus described by the Rev. Mr. Edkins in the "North China Herald':— "Two men are engaged at a loom in a cottage on the [illegible] stream. One sat at the end of the loom, using five pedals, and directing the shuttle and all that needed to be done with the threads that lay horizontal on the frame. The other was perched over head to superintend the pattern. This he did by means of vertical threads tied up in bundles, a large number of which, disposed transversely through the threads of the horizontal frame beneath him, were at his disposal. These he raised according to the requirement of the pattern, and thus caused that elevation in the threads on the frame which constituted the flowered part of the piece."—*Res. among the Chi. p.* 354. If there was little to notice in these temples with reference to Buddhism and its rites there were objects of another kind which soon attracted my attention. The halls and outhouses of the monastery seemed to be converted for the time into a place for feeding silkworms. Millions of these little animals were feeding in round sieves placed one above another

in open frameworks made for this purpose. So great was the number of the worms that every sieve, and there must have been many hundreds of them, was crammed quite full.' In one large hall I observed the floor completely covered with worms, I shall never forget the peculiar sound which fell upon my ear as I opened the door of this hall. It was early in the morning, the worms had been just fed and were at the time eagerly devouring the fresh leaves of the mulberry. Hundreds of thousands of little mouths were munching the leaves and in the stillness around this sound was very striking and peculiar. The place too seemed so strange; a temple —a place of worship with many huge idols, some from twenty to thirty feet in height looking down upon the scene on the floor. But to a Chinese there is nothing improper in converting a temple into a granary or a silk-worm establishment for a short time if it is required, and I suppose the gods of the place are supposed to look down with approbation on such scenes of peaceful industry. When from the large number of worms it is necessary to feed them on floors of rooms and halls, there is always a layer of dry straw laid down to keep them off the damp ground. This mode of treatment is resorted to when necessary, and not from choice. The sieves of the establishment, used in the frame work I have already noticed are greatly preferred. Whether the worms are fed on sieves or on the floor they are invariably cleaned every morning. All the remains of the leaf stalks of the mulberry, the excrement of the animals, and other impurities, are removed before the fresh leaves are given. Much importance is attached to this matter, as it has a tendency to keep the worms in a clean and healthy condition. The Chinese are also very particular as regards the amount of light which they admit during the period the animals are feeding. I always observed the rooms were kept partially darkened, no bright light was allowed to penetrate. In many instances the owners were most unwilling to open the doors, for fear, as they said, of disturbing them, and they invariably cautioned me against making any unnecessary noise while I was examining them. At this time nearly all the labour in this part of the country was expended on the production of the silk worm. In the fields the natives were seen in great numbers busily engaged in gathering the leaves; boats on the rivers were fraught with them; in the country market-towns they were exposed for sale in great quantities, and everything told that they were the staple article of production. On the other hand, every cottage, farm house, barn and temple, was filled with its thousands of worms which were fed and tended with the greatest care. On my way up from Hoo-chow-foo to Mei-chi and about the 23rd of June, I observed that many of the worms had ceased to feed and were commencing to spin. The first indication of this change is made apparent to the natives by the bodies of the little animals becoming more clear and almost transparent. When this change takes place, they are picked, one by one, out of the sieves, and placed upon bundles of straw to form their cocoons. These bundles of straw which are each about two feet in length, are bound firmly in the middle, the two ends are cut straight and then spread out like a broom, and into these ends the worms are laid, when they immediately fix themselves and begin to spin. During this process I observed the underside of the framework on which the bundles of straw were placed surrounded with cotton cloth to prevent the cold draught from getting to the worms. In some instances small charcoal fires were lighted and placed under the frame inside the cloth, in order to afford further warmth. In some of the cottages the straw covered with spinning worms was laid in the sun under the verandahs in front of the doors. In a few days after the worms are put upon the straw they have disappeared in the cocoons and have ceased to spin. The reeling process now commences and machines for this purpose were seen in almost every cottage. This apparatus may be said to consist of four distinct parts, or rather, I may divide it into these for the purpose of describing it. There is, first, the pan of hot water into which the cocoons are thrown; second, the little loops or eyes through which the threads pass, third, a lateral or horizontal movement, in order to throw the silk in a zigzag manner over the wheel; and lastly the wheel itself, which is square. Two men, or a man and woman, are generally employed at each wheel. The business of one is to attend to the fire and to add fresh cocoons as the others are wound off. The most expert workman drives the machine with his foot and attends to the threads as they pass through the loops over on to the wheel. Eight, ten, and sometimes twelve cocoons are taken up to form one thread, and as one becomes exhausted, another is taken up to supply its place. Three and sometimes four, of such threads are passing over on to the wheel at the same time. The lateral or zigzag movement of the machine throws the threads in that way on the wheel, and I believe this is considered a great improvement upon the Canton method, in which the threads are thrown on in a parellel manner. The water in the pan into which the cocoons are first thrown is never allowed to boil, but it is generally very near the boiling point. I frequently tried it and found it much too hot for my fingers to remain in it. A slow fire of charcoal is also placed under the wheel. As the silk is winding, this fire is intended to dry off the superfluous moisture which the cocoons have imbibed in the water in which they were immersed. During

he time I was in the silk country at this time was continually visiting the farm-houses and ottages in which the reeling of silk was going n. As silk is a very valuable production, it is eeled with more than ordinary care, and I ob-erved that in almost all instances a clean, ctive, and apparently clever workman was en-rusted with the care of the reeling process. The ld temple at Hoo-shan, which I visited again on ıy way down, was in a state of great excitement nd bustle. The quantity of silk produced here /as very large, and all hands were employed enerally all, rather averse to work of any kind, /ere obliged to take their places at the wheel or he fire. But as the silk was their own, they eemed, notwithstanding their habitual indolence, o work with hearty goodwill. On the following ıorning, when I awoke, I found myself quietly at nchor close by the west gate of Hoo-chow-foo, ıy boatmen having worked all night. I spent he next few days in the country to the north-/ard bordering on the T'aihoo lake, and partly ear the town Nan-tsin being anxious to see the nd of the silk season. About the eighth, or :om that to the tenth of July, the winding f the cocoons had ceased almost everywhere, nd a few days after this there was scarce-y a sign of all that life and bustle which s visible everywhere during the time that he silk is in hand. The clash of the winding-ıachines, which used to be heard in every ottage, farmhouse, and temple, had now ceased ; he furnaces, pans, and wheels, with all the ther parts of the apparatus in common use uring the winding season, had been cleared way, and a stranger visiting that country now ould scarcely have believed that such a busy ustling scene had been acting only a few days efore. During my peregrinations in the silk ountry I made many inquiries amongst the natives as to the price of raw silk in the districts /here it is produced. At Meiche the price was aid to range from twelve to eighteen dollars for 00 taels of silk. At Hoo-chow and Nantsin, /here the silk is of a superior quality, the rices in 1855 were from eighteen to twenty two ollars for 100 taels. The price of raw silk ke that of every thing else, no doubt depends ı a great measure upon the supply and demand, nd varies accordingly.—*A Res. among the Chi.* . 372.

The Honorable Mr. Morrison tells us that the ulberry is cultivated in all the provinces f China, except the most northerly, and lk is raised wherever the tree grows. The est raw silk, called *tayssam*, comes from the rovince of Hookwang ; the *tsailee* also comes om that province and Cheaking ; both kinds are alled Nanking raw silk, and are chiefly exported o England. In 1833-34, the price of the best orts was from £ 300 to £ 350 per pecul, and he annual exportation was between ten and twelve thousand bales ; in 1836-37, it was upwards of twenty thousand peculs, much of which was shipped off at $ 500 per pecul, since that period, for some undiscovered reason, the quantity brought to market has fallen off, and although the prices range between $ 400 and $450, still the whole amount hardly exceeds 5000 bales in a twelve month. In the new tariff the duty is the same on the raw silk from all the provinces ; for it is probable, that as the trade extends at Ningpo and Shanghae, inferior qualities of silk will be sent abroad ; indeed, if the exportation of silk and tea does not increase, it is difficult to see with what commodities the Chinese are to buy the large amount of foreign goods that are likely to be brought to the new ports. The Nanking raw silk exported the past year will average $ 450 per pecul, or $ 100 higher than it is set down in the statement. The waste or refuse raw silk goes entirely to India. *Silk organzine* is "formed of two, three, or more singles (*i. e.* reeled threads after being twisted), according to the substances required, twisted together in a contrary direction to that of which it is composed are twisted." It is included in the statements of trade under the name of silk thread. Organzine is also called *thrown silk*, though there may be some difference between the two, as it is said organzine is not made by the Chinese ; it is used in weaving piece goods. *Silk thread and ribbons* go to the United States, and South America. *Silk* piece goods of all kinds are shipped for the most part to the United States, Mexico and South America ; but considerable quantities go also to England chiefly for re-exportation : one seventh of the total exportation in 1836-7 was in English ships. Instead of the annual export of $400,000 stated in the Table, it should be one million of dollars, and the duties put at $ 30,000. Most of the various descriptions of silk piece goods usually exported are enumerated in the Table ; there are a few others, as gauze, crape shawls, levantines, taffeta, but all description of them is here omitted. — *Morrison.*

The manufacture of silk is original among the Chinese as well as those of porcelain and lacquered ware, and in neither of them have foreigners yet succeeded in fully equalling the native products. The notices of the cultivation of the mulberry and the rearing of silkworms found in Chinese works have been industriously collected and published by Mr. Julien by orders of the French government. From his work it appears that credible notices of the culture of the tree and manufacture of silk are found as far back as B.C. 780 ; and in referring its invention to the Empress Siling, or Yuenfi wife of the emperor Hwang-to, B. C. 2602, the Chinese have shown their belief of its still higher antiquity. "The Shi King contains this distich : The legitimate wife of Hwangti named Siling

shi began to rear silkworms." The best silk is found in the provinces of Sz'cheun, Hupeh Chehkiang, and Kiangnan, but every province south of 45° N. produces it of different degrees of fineness. Probably the kind called *tsatle*, brought from Hupeh, is the finest silk found in the world. While the worms are growing, care is taken to keep them undisturbed, and they are often changed from one hurdle to another that they may have roomy and cleanly places; the utmost attention is paid to the condition and feeding of the worms and noting the time for preparing them for spinning cocoons. Three days are required for them to spin, and in six it is time to stifle the larva; and reel the silk from the cocoons; but this being usually done by other workmen, those who rear the worms inclose the cocoons in a jar buried in the ground and lined with mats and leaves, interlaying them with salt, which kills the pupæ and keeps the silk supple, strong, and lustrous; preserved in this manner, they can be transported to any distance, or the reeling of the silk can be delayed till convenient. Another mode of destroying the cocoons is to spread them on trays, and expose them by twos to the steam of boiling water, putting the upper in the place of the lower one according to the degree of heat they are in, taking care that the chrysalides are killed, and the silk not injured. After exposure to steam, the silk can be reeled off immediately, but if placed in the jars, they must be put into warm water to dissolve the glue, before it can be unwounded. The raw silk is an article of sale; the sorts usually known in the Canton market are tsatle, taysaam, and Canton raw silk. The loom is worked by two hands, one of whom sits on the top of the frame, where he pulls the treddles, and assists in changing the various parts of the machine. The workmen imitate almost any pattern, excelling particularly in crapes, and flowered satins and damasks, for official dresses. The common people wear pongee and senshaw, which they frequently dye in gambier to a dust or black color; these fabrics constitute most durable summer garments, and the pongee becomes softer by repeated washing. Many of the delicate silk tissues known in Europe are not manufactured by the Chinese, most of their fabrics being heavy. The *lo* or law is a beautiful article, used for summer robes, musqueto curtains, festoons and other purposes, but is seldom sent abroad. The English words *satin*, *senshaw*, and *silk*, are probably derived from the Chinese terms *sz'tiin*, *sensha* and *sz*,' intermediately through other languages.—*Williams' Middle Kingdom, Vol.* I. *page* 123.

Silk, in Europe.—The discovery of the uses to which the cocoon of the silkworm might be applied, appears to have been first made in China: the written records of that country declare that an Empress was the first to unravel the filmy thread, and to work it into a web of cloth, and this is stated to have taken place 2,700 years before the Christian era. However this may be, it is a fact that when the existence of the silken fabrics of China became known in other countries, the manufacture was not in its infancy and imperfectly executed, but had attained a degree of excellence which proved a long and successful practice of it among the Chinese. Such indeed was its importance, that the very people and their country are named *Seres*, and *Serica*, in ancient writings, from the Chinese word *Se*, which signifies *Silk*. At length, about the middle of the sixth century, the western world received the great boon of a supply of silkworms' eggs: these were conveyed from China to Constantinople by two Persian monks, who had gone to the East as missionaries, and had observed in China the various processes connected with the rearing of the silkworm, the nature of the trees on which they fed, and the preparation of the silk. This occurred about the year 552, in the reign of Justinian, who gave every encouragement to the introduction of the valuable insect. The eggs were secretly conveyed from China within a hollow cane: at the proper season they were hatched, and the caterpillars were fed with the leaves of the wild mulberry tree. The monks continued to superintend, at Constantinople, the rearing of the insects, and the whole process of manufacturing the silk. From this small commencement the myriads of silkworms have sprung, which throughout Europe and western Asia have met the demand for silk, which has gone on increasing from that time to the present.

The silkworm in Europe, is the caterpillar of the mulberry tree moth (*Bombyx mori*) belonging to the tribe of mealy-winged nocturnal insects, of which in the summer evenings we see so many examples. The eggs of this moth are smaller than grains of mustard seed, very numerous, slightly flattened, yellowish at first, but changing in a few days to a blue or slate colour. In temperate climates they can be preserved through the winter without hatching until the time when the mulberry tree puts forth its leaves in the following spring. This tree forms the entire food of the caterpillar, and seems almost exclusively its own; for while other trees and vegetables nourish myriads of insects, the mulberry-tree is seldom attacked by any but this insect, which in many parts of its native country, China, inhabits the leaves in the open air, and goes through all its changes without any attention from man, whose only care is to gather in the harvest of silk cocoons at the right season. In some parts of China, however, the silkworm requires the same care in the way of shelter, feeding, and nursing which in other countries is found necessary to ensure success. The common mulberry-tree (*Morus nigra*), so well known in Great Bri-

tain, is not the best species for the nourishment of the silkworm, although the caterpillar feeds readily on the leaves. The whitefruited mulberry, *M. alba*, a native of China, is the best, and is greatly preferred by the insect. It is now cultivated in many parts of Europe, frequently as a pollard by road sides. It comes into leaf a fortnight earlier than the black mulberry, which is an advantage in the culture of silkworms. The white mulberry does not thrive in Britain, the winters being too severe. There is another variety of mulberry, called the *Philippine* mulberry, which is a favourite in the south of France, on account of the size and quantity of the leaves, and the ease with which it can be propagated. In the south of Europe mulberry leaves are sold by weight in the market, and the buyer chooses them either young or mature, according to the age of the insects which are to feed on them. Young worms are fed on tender leaves, while full grown caterpillars require the stronger nutriment of the mature leaf. Attempts have been made to store food for the silkworm by drying the leaves in the sun, then reducing them to powder, and placing the latter in jars. This powder moistened with water is eaten with avidity by the silkworm; and may prove a valuable resource in late seasons, or under circumstances which affect the principal crop. It is even thought that three or four crops of cocoons per year may be obtained even in northern climates, by keeping successive hatchings of eggs in warm rooms, and supplying the worms with this food during winter. The silkworm, when first hatched, is about a quarter of an inch long, and of a dark colour. If supplied with appropriate food it remains contentedly in one spot: this is the case throughout its changes, so that there is no trouble in retaining it within bounds, as there would be with some other caterpillars. After 8 days' feeding and rapid increase of size, it prepares to change its skin, the first skin having become too small for its body. It remains 3 days without food, during which time a secretion forms on the surface of the new skin, which helps the caterpillar to cast off the old one; but the operation is further facilitated by silken lines which the insect casts off and fixes to the adjacent object: these hold the old skin tightly, while the caterpillar creeps out of it. The whole covering of the body is thus cast off, including that of the feet, and of the teeth and jaws, but it is done with difficulty, and sometimes the skin breaks, and a portion of it remains attached to the hinder part of the body, compressing it, and usually causing death. The newly moulted worm is pale in colour, and wrinkled; but it immediately recovers its appetite, and grows so rapidly that the new skin is soon filled out, and in 5 days another mould becomes necessary. Four of these moults and renewals of the skin bring the caterpillar to its full size, when its appetite becomes voracious, and the succulent parts of the mulberry-leaves disappear with extraordinary rapidity. The insects is now nearly 3 inches long; its structure consists of 12 membranous rings, which contract and elongate as the body moves. There are 8 pairs of legs; the first 3 pairs being covered with a shelly or scaly substance, which also invests the head. The mandibles are strong, and indented like a saw. Beneath the jaw are 2 small orifices, through which the insect draws its silken lines. The silk is a fine yellow transparent gum, secreted in slender vessels, which are described as being wound, as it were, on 2 spindles in the stomach; these vessels, if unfolded, would be about 10 inches long. The insect breathes through 9 pairs of spiracles distributed along the sides of the body. The caterpillar has 7 small eyes near the mouth; the 2 spots higher up are not eyes, but portions of the skull. Arrived at maturity, the caterpillar is of a rich golden hue; it leaves off eating, and selects a corner in which to spin its cocoon. It first forms a loose structure of floss-silk, and then within it the closer texture of its nest, of an oval shape: here the caterpillar remains working until it is gradually lost sight of within its own beautiful winding-sheet. Taking no food, and emitting this large quantity of silk, its body diminishes one-half, and on the completion of its cocoon it changes its skin once more, but then becomes an apparently inanimate chrysalis, or aurelia, with a smooth brown skin, and pointed at one end. It remains in this corpselike state for a fortnight or 3 weeks, when it comes forth a perfect winged insect—the silk moth. In escaping from the cocoon it pushes aside the fibres, first moistening the interior of the cocoon with tasteless liquid from its mouth to dissolve the gum which holds the fibres together. The mouth has no teeth, therefore it cannot gnaw its way out as generally supposed. In the perfect form, the insect takes no food, and only lives 2 or 3 days: the female dies soon after laying her eggs, and the male does not long survive her. The common silkworm is not the only caterpillar from whose cocoons silk has been obtained for manufacturing purposes; but it is so superior in the quality and quantity of its silk to all other insects, that small mention is made of any other. The larvæ of many European moths produce a strong silk, and the native silkworms of America yield a material which has been manufactured into handkerchiefs, stockings, &c. by the inhabitants of Chilpancingo, Tixtala, and other places of South America. The ancient Mexicans used the internal layers of white cocoons, which strongly resemble Chinese paper, as a material for writing on. A quantity of inferior silk is obtained in India from the Tusseh and Arindy silkworms, both natives of Bengal. The first affords a coarse dark-coloured silk, which is woven into

a cheap durable cloth ; the second yields a delicate flossy silk, which cannot be wound from the cocoons, and is therefore spun like cotton. Of this, a coarse kind of white cloth is manufactured, which is loose in texture, but so durable that it can scarcely be worn out in a life-time. The domestic treatment of the silkworm has been brought to great perfection in Italy. Formerly the eggs were hatched at uncertain periods, depending on the natural warmth of the season, or they were put in manure-beds, or were worn in little bags about the person next the skin. They are now hatched in an apartment heated to the proper degree by a stove ; but they are first washed in water, and afterwards in wine, to separate light eggs, as well as dirt, and the gummy envelope which surrounds the heavy ones. The temperature of the hatching-room is at first 64°, but is gradually raised 1 or 2 degrees daily, until it reaches 82°, which it is not to exceed. Pieces of coarse muslin, or of white paper pierced with holes, are placed over the eggs when they are about to be hatched. Through these the worms creep to the upper surface, and are removed as soon as possible to a cooler place. Young leaves and sprigs of mulberry are laid upon the muslin or paper, when the worms eagerly settle on the leaves, and can thus be transferred to trays, and removed to the nursery. This is a dry room of regulated warmth, with windows on both sides, so that free ventilation may be attainable. Chloride of lime should be in use to purify the air, and a thermometer and hygrometer to regulate the heat and moisture ; the latter is apt to abound where silkworms are kept, and is very prejudicial to them. Moist exhalations arise from the leaves and from their bodies ; fermentation, also, soon takes place if litter and dung be not speedily removed from their trays ; these are fertile sources of disease among the worms, and may carry off thousands in a day. One of the diseases to which silkworms are liable is of an extraordinary character, consisting of the formation of a minute cryptogamous plant of mildew within the body of the living insect. Damp and fermenting food and litter produce, in the first place, among the fatty matter of the body of the caterpillar, an infinite number of sporules supported by minute stems. These increase to such a degree that the vegetation soon pierces the skin, gives a general mealy appearance to the body of the caterpillar, ripens its seed, which is borne by the winds to every part of the nursery, carrying contagion with it, and at length causes the death of the worms. The dead bodies of worms or moths (for the insect is infected in all stages) are sources of contagion unless immediately destroyed. This disease is called *Muscardine* in France, *calcinetto* in Italy ; the French name arises from the resemblance of the diseased caterpillar to a mealy kind of sugar-plum made in Provence, and sold by the name of muscardine ; the Italian name also refers to the chalky or mealy surface of the skin. Various fumigations and washes have been tried, in order to purify infected nurseries, and to preserve others from the ravages of this malady ; a solution of blue vitriol (sulphate of copper) applied to the wood-work, frames, &c. of the nursery is of great use in destroying the seeds of the fungus, but nothing is so good a preservative as rigid attention to cleanliness and good ventilation. The improved means, first employed in Italy, for preserving the health of these valuable insects, are due to Count Dandolo, who gave particular and scientific attention to the subject, and superseded many an absurd custom in the rearing of silkworms. According to his method wicker shelves are arranged in a room at convenient distances, and are lined with paper on which the worms are placed. Such worms only are placed together as have been hatched at the same time, the space allowed them being, for each ounce of egg, 8 square feet during the first age, 15 feet for the second age, 35 feet for the third age, 82½ feet for the fourth, and about 200 feet for the fifth age. The mulberry-leaves are chopped in order to present a large number of fresh-cut edges to the young insect. Four meals a-day, as a regular rule, and luncheons between when the worms are particularly voracious, is the liberal allowance for their subsistence. The temperature at which silkworms are healthiest appears to be from 68° to 75°, though they are able to bear a much higher temperature. Alternations of heat and cold are exceedingly injurious to them. When the silkworms are about to spin they are provided with little bushes of broom, heath, or other flexible substance, which are arranged upright between the shelves, their tops being bent into an arched form by the shelf above. The bushes are spread out like fans, to allow plenty of space for the cocoons ; for if crowded, the worms are apt to form double cocoons, two working together, and these are worth only half the price of single cocoons. Specimens of these bushes, laden with cocoons, appeared in the Great Exhibition, like diminutive trees bearing golden fruit. There were also illustrations in abundance of the advanced state of silk culture in France, and of the success of a series of systematic attempts which have been made in that country to improve the breed of silkworms, and to lessen their liability to disease. The *Central Society of Sericiculture of France* exhibited beautiful specimens of silk, remarkably pure in colour, strong, and lustrous. In the department of the Drome, where the culture is so extensive that upwards of 2,000,000 of mulberry-trees are required to supply the food of the myriads of worms, the method of managing the insects is slightly different from that which we have described. Instead of wicker shelves lined with paper, large bam-

boo-like rushes which grow on the banks of the Rhone, are cut down, split open, and attached together so as to form long cane beds about 2½ feet broad, called *claies*. These are arranged one above another on a rude frame-work erected throughout the chamber, spaces being left at intervals as passages for the attendants to traverse. The worms, as soon as they are hatched, are strewed among the *claies*, and the mulberry leaves at the proper moment scattered over and amongst them. The attendants make use of a short ladder to ascend to the higher *claies*. In other establishments the *claies* are arranged so as to hang from the circumference of large wheels placed at each end of the apartment; by turning these wheels the ranges of shelves rise and fall, and are transferred from side to side at the pleasure of the attendant. British India possesses the climate and the abundance of labour favourable to this undertaking. accordingly, we find the culture of the silkworm spreading and improving in that country. In Bengal there are 8 or 10 principal factories or *filatures*, each employing from 3,000 to 10,000 persons, and the results of the Great Exhibition prove the fine quality of the silk obtained. The manufacturing treatment of the silk, when the labours of the silkworm are over, is as follows:—When the crop of cocoons is complete it is gathered from the bushes, and bout one-sixtieth part is set aside for the production of eggs, the finest cocoons as to web and colour being selected for this purpose, A difference of weight generally determines which are the cocoons of male, and which of female insects: the latter are heavier and rounder than the former. The cocoons intended to produce eggs are preserved in a very dry room, and in about 10 days, they lose in weight to the amount of 7½ per cent. The main crop of cocoons is next sorted into 9 qualities, known in the factories as—1. *Good cocoons*, which are strong, firm, almost equally round at both ends, not very large, but free from spots. 2. *Calcined cocoons*, in which the worm has died *after* having completed its work, and is reduced to a powdery substance. 3. *Cocalons*, which are larger and less compact than good cocoons. 4. *Choquettes*, cocoons in which the worm has died *before* finishing its work. 5. *Dupian*, or double cocoons, difficult to unwind, and often kept for seed. 6 *Soufflons*, cocoons of so loose and soft a texture that they cannot be unwound. 7. *Pointed cocoons*, in which one end rises in a point, which breaks off after a little silk has been unwound, and so spoils the thread. 8. *Perforated cocoons*, from which the moth has escaped. 9. *Bad choquettes*, in which the silk is spotted, rotten, and blackish in colour. The vitality of the chrysalis is destroyed previously to unwinding the cocoons: this is done either by exposure to the sun, or by artificial heat, such as that of an oven after the bread is withdrawn. The floss silk is removed from the cocoo by opening it at one end and slipping out th cocoon. In reeling, it is necessary to use cocoon of one quality, as different qualities require diffe ent treatment. The natural gum of the cocoons softened by immersion in warm water, kept the proper temperature by a charc al fire, or b a steam pipe. After they have remained in for a few minutes, the reeler (generally a woman gently stirs up or brushes the cocoons with short birch-rod, and to this the loose threads the cocoons adhere, and are thus drawn out the water. They are then taken 4 or 5 togethe twisted with the fingers into one thread (as man as 30 can be wound together) and passe through a metal loop, which rubs off dirt an impurities; it then passes on to the reel, whic has a slight lateral motion, so that the threa of one revolution does not overlay the other If it were allowed to do so, the threads woul be glued together before the gum had time t harden by exposure to the air. When any singl thread breaks or comes to an end, its place i supplied by a new one, that the united threa may be of equal thickness throughout. Th new thread is merely laid on, and adhere to the rest by its native gum, and as th filaments are finer near their terminatio than at the commencement, it is necessar to add other cocoons before the first set i quite exhausted. The cocoons are not entirel wound off, but the husk containing the chrysali is used, together with the floss silk, under th name of *waste*. Improved methods of reeling ar introduced from time to time, but they are o the same principle as the above. The length o filament yielded by a single cocoon is 300 yards though some have yielded upwards of 600 yards Eleven or twelve pounds of cocoons yield on pound of silk, from 200 to 250 cocoons going t the pound weight: thus about 2,817 cocoons ar included in that quantity. The reeled sil is made up into hanks for sale and use. Th form and contents as well as the quality of thes hanks differ according to the quarter whenc they are received.—*Tomlinson*. See BOMBYCIDÆ MORUS, MULBERRY: SATURINA.

(7617) SILK CARPETS. At the Madra Exhibition of 1855, some very handsome specimens were contributed by the Tanjore and Hyderabad Local Committees, and His Highness th Rajah of Tanjore exhibited a very large silk carpet (No. 253) intended as a present for Her Majesty Queen Victoria. The colors were brilliant, the pile close and velvety, and the pattern harmonious. The Jury considered His Highnes entitled to a 1st Class Medal.—*M.E.J.R.*

(7618) SILK COTTONS. The species of Bombax, which are remarkable for their gigantic stature and their splendid inflorescence, on account of their capsules, which, on bursting, display a flocculent substance, are often mistaken by travellers for cot-

ton, and the tree is hence called *cotton tree*. But as this substance is more silky than cotton, it has been distinguished by the name of *Silk Cotton*. It differs also in not spinning like cotton. Some difficulty, therefore, is experienced in making use of this very abundant cotton like produce; but Mr. Williams, of Jubbulpore, has succeeded in spinning and weaving some of it so as to form a very good coverlet. It might be easily made use of for stuffing pillows, muffs, or coverlets, for wadding, or for conversion into half-stuff for paper-makers, perhaps for making gun-cotton. In the 'Trans. of the Agri-Hortic. Soc.,' iii. p. 274, there is a report from the Society of Arts on two pieces of cloth made from the Sinool or Silk Cotton tree; and it is observed that, from the shortness of the staple of the down, and its elasticity, it could not be spun by cotton-spinning machinery.—*Royle*. At the Madras Exhibition of 1855, small samples of the silk cotton from the *Bombax*, *Ochroma lagopus*, *Calotropis* and *Cryptostegia* were exhibited, but they appear to have been put to no other use than stuffing pillows; they might be employed for the manufacture of paper, and the silky down of the Cryptostegia being very strong might be applied to some textile manufactures. —*M. E. J. R.* Thus, the products of several plants, the *Bombax*, *Eriodendron*, the Ochroma lagopus, the feathery silk-like material in the pods of the Calotropis gigantea, and the Cryptostegia are so named. A trial has been given to the cotton of Calotropis gigantea, and Cryptostegia, as a material for cloth and cord, but their principal use hitherto has been for stuffing pillows: they might be employed as a material for making paper. There are two genera of plants, known under these names, Cotton tree or Silk cotton tree; the red and white cotton trees, common in many parts of India. They belong to the natural family Byttneriaceæ.—The red cotton tree and silk cotton tree, Bombax malabaricum, and white cotton tree, Eriodendron anfractuosum. Some difficulty is experienced in making use of the very abundant floss or cotton like produce of these trees; but it has been spun into cloth, and it might be employed for stuffing pillows, muffs, or coverlets for wadding, or for conversion into half stuff for paper makers: perhaps for gun cotton. From the shortness of the staple of the down, and its elasticity, it could not be spun by cotton spinning machinery.—*Royle, Mason.*

(7619) SILK GOODS. Those of China, go mostly to the United States, and raw silk to England, the supply is not equal to the demand, and only about ten thousand bales are now exported, while upwards of twenty thousand were sent off, mostly to England, in 1836, some of which rated as high as $500 a peeul. The refuse raw silk goes to India. The exportation to the United States for making silk thread is trifling. Silk goods are shipped to the United States, Mexico and South America, and elsewhere, to the annual value of about a million of dollars; they consist chiefly of pongees, handkerchiefs, crape-shawls, scarfs, sarsenet, senshaws, levantines and satins; ribbons, sewing thread, and organzine or thrown silk, are not much shipped. The silk trade is more likely to increase than any other branch of the commerce, after tea, and the Chinese can furnish almost any amount of raw and manufactured silks, according to the demand for them.—*Williams.*

(7620) SILK GUT OR SILKWORM GUT. A hard, white, transparent thread, about a foot in length, made in Italy and China, from the intestines of the silk worm, and used for angling. —*Waterston—Faulk.* *Silkworm Gut* is prepared for the angler as follows:—A number of the finest silkworms are selected when they are about to spin: they are killed by being immersed in strong vinegar, in which they are left for 12 hours closely covered up: should the weather be cool they may be left in the vinegar 2 or 3 hours longer. When removed therefrom, and pulled asunder, two transparent yellow green cords will be observed: this is the silkworm gut: the other portion of the entrails are of a dark-green colour. If the gut be soft, or break by stretching, that is an indication that the worm has been taken out of the vinegar too soon. When the gut is fit for drawing out, one end is to be dipped into the vinegar, and the other to be gently stretched to the required length, and it must be kept extended on a thin piece of board by inserting its extremities into slits in the end of the wood, or fastening them to pins, and in this state it is placed in the sun to dry.—*Tomlinson.*

(7621) SILK WORM.

Puttoo poochie, TAM.	Puttoo poorughoo, TEL.
Reshm ke keereh, DUK.	

These are the names of the common sort, but there is frequently met with in the southern parts of India, a large species of caterpillar, of a dirty, brownish, yellow color, which produces a very coarse kind of silk, or rather thread, and has, on this account, got from the weavers the name of "Nar puttoo pootchie," it is nearly three times as big as the common silk worm and its body is marked, not with seven, but eleven rings.—*Ainslie's Mat. Met. p.* 296.

(7622) SILPHIUM (Σίλφιον). Ancient authors mention this plant and its juice. Two kinds of this substance are described; one, from Cyrene, was probably yielded by *Thapsia Silphium* [LASER]; and the other was most likely assafœtida, which has been employed medicinally by Asiatics from very early times, though it has been known by this name in comparatively modern times. *Silphium* was however remarka.

ble for other properties, and hence has attracted the attention of modern travellers who have recently visited the countries where the *Silphium* is described as growing by the ancients. The army of Alexander, in crossing the mountain range which Arrian calls Caucasus (iii. 28, 10), and which is the same range that he afterwards mentions under the name of Paropamisus (v. 5, 3), met with the *Silphium*. Arrian says, on the authority of Aristobulus, "In this part of the Caucasus nothing grows except pines and *Silphium*, but the country was populous and fed many sheep and cattle, for the sheep are very fond of the *Silphium*. If a sheep should perceive the *Silphium* from a distance, it runs to it, and feeds on the flower, and digs up the root and eats that also. For this reason, in Cyrene, they drive the sheep as far as possible from the spots where the *Silphium* grows, and some even fence in such places to prevent the sheep from entering them if they should approach; for the *Silphium* is worth a good deal to the Cyrenæans." Burnes, in crossing the Hindu Koosh, and seeing both the men and cattle eating the young parts of the assafætida plant, supposed that it must be the *Silphium* of Arrian. But as this author describes the country where the *Silphium* grows as abounding in cattle, Dr. Royle had concluded that the *Prangos* of Mr. Moorcroft was the *Silphium* alluded to, and which is much fed on by sheep and cattle in the present day in Tibet, Mr. Vigne, when travelling in these regions, came to the same conclusion. It is probable therefore that both plants, being umbelliferous, and employed for the same purposes in nearly the same regions, may have contributed to form the accounts which are so brief in ancient authors. —*Eng. Cyc*

(7623) SILVER.

Fazzeh, ARAB.	Perak MAL.
Peddie, CYNG.	Nokra, PERS.
Yin, CHIN.	Srebro, POL.
Solv, DAN.	Prata, PORT.
Zilver, DUT.	Serebro, RUS.
Argent, FR.	Rajata, Rupya, SANS.
Silber, GER.	Plata, SP.
Nugdee Chandee, GUZ.	Vellie, TAM.
Rupa, HIND.	Vendie, TEL.
Argento, IT.	Silfver, SW.
Argentum, LAT.	Salaka, JAVANESE.

Silver is one of the most anciently known of the metals, is found native and also combined with Sulphur in considerable quantities, also as a Chloride, and alloyed with other metals, especially Lead, Gold, Antimony, Arsenic, Copper. It is separated from its ores by the process of amalgamation. The Arabs are thought to have been the first to employ it in medicine. In its metallic state it is inert, but being little liable to alteration, or to be affected by reagents, it is much employed for surgical instruments and for vessels for chemical purposes.—*Royle.* Among the metallic ores of Southern India, holding the promise of being marketable, are a rich ore of galena or sulphuret of lead from Jungumrazpillay in the vicinity of Cuddapah. This ore is rich in silver, and is worked by the Natives on this account, but all the lead is wasted and the silver is obtained by a tedious, clumsy, and expensive process. Mr. H. L. Pattinson's new process for separating the metals by careful, slow-cooling and crystalization, is applicable to this ore. The re-examination of the first specimen of a Kurnool ore proved it to contain upwards of 1 per cent of silver, or 374 ounces in the ton, the quantity of lead and silver together being only 45 per cent which was occasioned by there being a considerable quantity of gangue disseminated through the portion examined. Another specimen, given by Colonel Cotton, and also said to be from Kurnool, was found to contain 175 oz. 3 dwts. in the ton. Dr. Scott some years ago examined a specimen of the Kurnool Galena and found it to be free of silver. But the re-examination of the specimens in 1857, revealed the fact that at least some portions are very rich in the precious metal and this accords with the recent researches of Malagah and Durochet who have found that when Sulphide of Silver is associated with the Sulphides of other metals, it is *always* unequally distributed. It would appear therefore from the above facts that it would be quite impossible to calculate, with any approach to accuracy, from the examination of any given specimen, what would be the average yield of silver in a silver lead mine, until it is actually worked for the separation of that metal. Considering however that nearly one half of the silver now in circulation in Great Britain is recovered from silver lead ores similar to the above, and seeing that it is found to be advantageous to separate the precious metal where it exists to the extent of only 6 ounces in the ton, it becomes evident that these ores must be of great value provided they can be found in sufficient quantity. From recent information obtained from Kurnool it would appear that the Galena there occurs abundantly in all probability; therefore it would prove to be highly remunerative to work this mine, both for the lead and silver contained in the ores.—*M. E. of* 1857.

Silver has been got, in trifling quantities, in upper India. The late Mr. W. Mainwaring found it in the Madura district in a native Sulphuret of Zinc (blende) Captain Arthur was the first who discovered this metal in Mysore, both in its native state (in thin plates adhering to some specimens of Gold crystallized in minute cubes) and as a muriate in an ore containing Sulphur and oxide of Iron.—*Ainslie.*

At the Madras Exhibition of 1857, a rich ore of Argentiferous Galena was exhibited from Martaban by Dr. Brandis, granular, or in minute crystals, with silver passing through it in thready

veins. This ore assayed by Dr. Scott, contains about 80 per cent of silver lead. The quantity of silver was found to vary in the portion examined from 70 to 300 ounces in the ton of ore. It is imposible therefore to say what its commercial value may be, unless an average sample were obtained, but if the ore exists in any quantity and of the same quality as that examined, it is a most valuable one, and would be well worth working by Pattenson's mode for separating the silver, as the process proves remunerative where only 7 ounces of silver can be obtained from a ton of metal.—*M. E. J. R.* This is probably the ore referred to by the Rev. Francis Mason, A. M. in his publication on the natural productions of Burmah, where, he says, the limestone of the Provinces probably contains a large quantity of lead: in the valley of the Salwen there is a rich vein of argentiferous galena, which is reported to appear on the surface. A specimen which Dr. Morton sent to England for analysis, was said to be a very valuable mineral, and destined to make a fortune for some one. Professor Mitchell in the certificate that he furnished Dr. Morton of the analysis, says, it contains Lead, Sulphur, Silver, Gold, (traces) Lime, Magnesia, Iron, Silica, and Carbonic Acid. It is a sulphuret of lead or galena. The quantity of lead and silver appears to be considerable, but there was not sufficient of the mineral to estimate either." The ore is seen in the limestone precisely as galena is found in the limestone of the Mississippi, one of the richest known deposits of lead in the world.—*Mason.* In a small hand specimen from Martaban the amount of silver was found to vary in different portions of it, the per centage of lead being about 75. In the first trial, the silver was found to amount to about 70 ounces to the ton of the ore; but in the second to not less than 300 ounces in the ton, or a little less than 1 per cent.—*M. E. J. R.* Mr. O'Riley had a specimen of an ore of silver, antimony, copper, and sulphur brought him, which produced thirty-five per cent of silver; and the Tavoy gold, it would appear, contains nearly ten per cent of the same metal.—*Mason.*

Silver is brought from Yennan near the borders of Cochin-China and the mines in that region must be both extensive and easily worked to afford such large quantities as have been exported during the last five years.—*Williams' Middle Kingdom, p.* 144. Gold is found in many parts of the Japanese Empire, sometimes it is obtained from its own ore, sometimes from the washings of the earth or sand and sometimes it is mixed with the copper. The quantity in the country is undoubtedly great. An old spanish writer of the seventeenth century tells us that in his day the palace of the Emperor at Yeddo, as well as many houses of the nobility were literally covered with plates of gold. In the beginning of the Dutch trade the annual export was £840,000 sterling and in the course of sixty years the amount sent out of the Kingdom through the Dutch alone was from twenty-five to fifty millions sterling. Silver mines are quite as numerous as those of gold. In one year the Protuguese, while they had the trade, exported in silver £587,500 sterling. Copper abounds throughout the whole Japanese group and some of it is said to be not surpassed by any in the world. The natives refine it and cast it into cylinders about a foot long and an inch thick. The coarser kinds they cast into round lumps or cakes. Quicksilver is said to be abundant but this, so far as we know, has never been an article of export. Lead also is found to be plentiful but like quicksilver it has not been sent out of the kingdom. Tin has also been discovered in small quantities, and of a quality so fine and white that it almost equals silver, but of the extent of this mineral little is known, as the Japanese do not attach much value to it, and therefore have not sought for it. Iron is found in three of the provinces, and probably exists in others. The Japanese know how to reduce the ore, and the metal they obtain is of superior quality, of which they make steel unsurpassed in excellency. "They have no want of coals in Japan," says Kœmpfer, "they being dug up in great quantities in the province of Sikusen and in most of the northern provinces." Dr. Siebold also speaks of coal as being in common use throughout the country, and on visiting one of the mines he saw enough to convince him that it was skilfully worked. For domestic purposes they convert the coal into coke. Viewed in the light of commercial intercourse between the two hemispheres, this coal is worth more than all the metallic deposits we have enumerated.—In a region so volcanic, sulphur is, as might be expected, an abundant mineral. In some places it lies in broad deep beds, and may be dug up and removed with as much ease as sand. A considerable revenue is derived by the government from sulphur.—*American Expedition to Japan, p.* 76. On the island of Banca there are silver-mines, but the Sultan has a great objection to their being worked: there are silver mines too in the Kingdom of Ava. We also know this valuable metal to be a product of Siam, from which country it is occasionly brought to India as well as from Manilla and Batavia.—*Ainslie.* Crawfurd however says that no veins of this metal have hitherto been discovered in any of the islands of the Malay or Philippine Archipelagos, many of which contain such abundant stores of iron, gold, tin and antimony. A small quantity of it, however, appears to be contained in all the gold of these countries. In Malay the name for silver is perak, and in Javanese salaka. Both are native words of which the origin has not been traced.—*Crawfurd Dict. page* 395.

Silver was well known to the ancients, and

is mentioned in the book of Job. It is the whitest of all the metals, and capable of receiving a lustre which is scarcely inferior to that of polished steel. In its polished state it reflects more light and heat than any other metal, so that it has a very low radiating power for heat, and hence a silver vessel retains the heat of the liquid contained in it longer than a vessel of any other metal. The preference given to a silver pot for making tea is founded on correct observation: a black earthen ware vessel is such a powerful radiator of heat, that a hot liquid contained in it rapidly declines in temperature, and if used for making tea the temperature of the boiling water soon falls below the point required for making the infusion. Silver ranks next to gold in ductility and malleability. Its density is 10·47: it is harder than gold and softer than copper, and, when pure, it is so soft as to be cut by a knife: the addition of a small quantity of copper increases its hardness: it fuses at a full-red heat, corresponding to 1,873° Fahr. Exposed to the heat of a blast furnace, silver throws off metallic vapours, and when fused between the charcoal electrodes of a powerful voltaic battery it is readily volatilized. There is a large demand for silver not only for the purposes of coinage, but also for services of plate, for which it is admirably adapted, inasmuch as it is not attacked in the slightest degree by any of the substances used for food. The large demand for the metal thus occasioned is met by its comparative abundance in the native state or alloyed with various other metals; it is also found mineralized by the non-metallic elements, and also in combination with certain acids. It is also obtained in large quantities from lead ores, as noticed under LEAD. One of the richest and most abundant ores of Chili is the *chloride*, where it is often accompanied by native silver. A large proportion of the silver of commerce is extracted from ores which are too poor to allow of their being smelted or fused, even supposing fuel were abundant in the neighbourhood of the mines, which is not the case. Recourse is therefore had to the process of *amalgamation* founded on the ready solubility of silver and many other metals in metallic mercury. The Saxon process as adopted at Freyberg differs somewhat from the American process.—*Tomlinson.*

Silver, has been well known and highly valued from the remotest period, a circumstance which is readily explained by the fact of its occurring frequently native, and possessing great lustre and fitness for immediate use without being subjected to any metallurgic process. Native Silver occurs crystallised, arborescent, or dendritic, capillary, reticulated, granular, and massive. The primary form of the crystal is a cube. It has no cleavage. Fracture hackly. Colour white, but externally often blackish, owing probably to the presence of a little sulphur. Hardness 2.5 to 3. Lustre metallic. Color pure white, except when tarnished. Streak shining. Opaque. Specific gravity 10.47. Malleable, but commonly less so than pure silver, probably owing to an admixture of other metals. Soluble in nitric acid, and the solution colourless when pure, but blue, if copper be present; and if antimony, a white substance; and if gold, a black one remains undissolved. Fuses into malleable globules before the blow-pipe. Native Silver is met with in most parts of the western world; in the British Isles, Germany, Hungary, in the north of Europe, but especially, and in largest quantity, in Mexico and South America. Silver occurs in mixture or combination with other metals. The ores from which the silver of commerce is mostly obtained are the Vitreous Silver, Brittle, or Black Silver-Ore, Red Silver-Ore, and Horn Silver, in addition to Native Silver. Besides these, silver is obtained in large quantities from galena (lead-ore), and from different ores of copper; and some galenas are so rich in silver that the lead is neglected for the more precious metal. This metal occurs in rocks of various ages, in gneiss, and allied rocks, in porphyry, trap, sandstone, limestone, and shales; and the sandstone, and shales may be as recent as the middle secondary, as is the case in Prussia. The silver-ores are associated often with ores of lead, zinc, copper, cobalt and antimony, and the usual gangue is calc spar or quartz, with frequently flour spar, pearl spar, or heavy spar. The Silver of South America is derived principally from the Horn Silver and Brittle Silver-Ores, including Arseniuretted Silver-Ore, Vitreous Silver-Ore, and Native Silver. Those of Mexico are of nearly the same character. Besides, there are earthy ores called Colorados, and in Peru, Pacos, which are mostly earthy oxides of iron, with a little disseminated silver; they are found near the surface, where the rock has undergone partial decomposition. The sulphurets of lead, iron, and copper, of the mining regions, generally contain silver, and are also worked. (Dana). The principal mines of silver in Europe are those of Spain, of Konigsberg in Norway, of Saxony, the Hartz, Austria, and Russia. In England, argentiferous galena is worked for its silver. Forty thousand tons of this ore were reduced in 1837, which contained upon an average about six ounces of silver in a ton of lead. The annual product of the several countries of Europe is thus estimated by Dana in his 'Manual of Mineralogy:'—

	Pounds Troy.
British Isles,	7,500
France,	4,150
Austria,	63,000
Sweden and Norway,	13,000
Spain,	130,000
Saxony, the Hartz, and other parts of Germany,	78,500
Belgium	440
Piedmont, Switzerland, and Saxony	1,560

making in all 298,150 troy pounds, or about 4,500,000 dollars annually. With the sum from Russia, about 730,000 dollars, it becomes 5,230,000 dollars a year. This is small compared with the amount from America, which at the beginning of the present century equalled 2,100,000 pounds, or 31½ millions of dollars, nearly six times the above sum; and it is probable that these mines will again yield this amount when properly worked. The whole sum from Russia, Europe, and America, makes nearly 2,000,000 pounds avoirdupois.—*Eng. Cyc.*

(7624) SIMARUBACEÆ, *Quassiads*, a natural order of Plants belonging to the Gynobasic group of Polypetalous Exogens. The plants of this order are trees or shrubs, with alternate exstipulate usually compound leaves, and mostly without dots. The flowers are whitish-green or purple, on axillary or terminal peduncles, hermaphrodite, or occasionally unisexal; the calyx is 4-5-parted; petals 4-5, twisted in æstivation; stamens twice as many as the petals, arising from the back of an hypogynous scale; ovary 4-5-lobed; style simple; stigma 4-5-lobed. Fruit a drupe. Seeds pendulous, exalbuminous, with a superior short radicle drawn back within thick cotyledons. With one exception, they are all natives of Africa, India, and tropical America.—*Eng. Cyc.*

(7625) SIMIADÆ, the name of a Quadrumanous family of Mammalian Animals. It embraces the most highly-developed forms of the Monkey, and the relations of this family might be more or less given under the following articles: —APE; ATELES; BABOON; CHEIROPODA CHIMPANZEE; HYLOBATES; LAGOTHRIX; MACACUS; MYCETES, NASALIS; ORANG-OUTAN; QUADRUMANA; SAKIS; SAPAJOUS; and SEMNOPITHECUS. These animals were known at a very early period. The Kophim of the Scriptures (1 Kings, x. 22; 2 Chron., ix. 21), the Ceph of the Ethiopians, the Keibi and Kubbi of the Persians, the Κῆβοι of the Greeks, and Cephi of the Romans, were clearly Apes. They are to be traced in some of the earliest paintings of the Egyptians. (Rosellini, &c.) The Cephi exhibited by Pompey, (Pliny, 'Hist. Nat.,' viii. 19), as well as those shown by Cæsar, appear to have been Ethiopian apes; and in the Greek name inscribed near the Quadrumanous animals in the Prænestine pavement, the oriental origin of the word is apparent. It is remarkable that the name *Cebus* [SAPAJOUS] is applied by modern zoologists to a genus of monkeys which could not have been known to the ancients; for the *Cebi* of our present catalogues are exclusively American. The following is a definition of the family *Simiadæ*, which embraces the animals to which the term Ape is most properly applied. They are all of them inhabitants of the old world:—The nostrils are divided by a narrow septum; they possess opposable thumbs on their fore and hind feet; the callosites on the rump are generally naked. Some of the species only are furnished with cheek-pouches. They usually possess a tail. The dental formula is as follows:—

$$\text{Incisors } \frac{4}{4}\ \text{Canines, } \frac{1-1}{1-1};\ \text{Premolar, } \frac{2-2}{2-2};\ \text{Molars, } \frac{3-3}{3-3};\ = 32.$$

The following definition of the second family of the *Quadrumana*, the *Cebidæ*, will afford the means of contrasting the two families:—The *Cebidæ* are natives of America. The nostrils are separated by a broad septum; the thumbs are sometimes absent on the fore feet; callosities and cheek-pouches absent; the tail is always present, and sometimes prehensile. In the list of the specimens of *Mammalia* published by Dr. J. E. Gray, we find almost a complete representation of the Asiatic forms of this family. They are as follows:—

(7626) Chimpanzee (*Troglodytes niger*, Geoff; *Homo Troglodytos*, Linn). West Africa.

(7627) Orang-Outan, or Pongo (*Simia Satyrus*, Linn.; *S. Wurmbii, Kuhl; S Agrias*, Schreb.) Borneo. [ORANG-OUTAN.]

(7628) Siamang (*Siamanga Syndactyla*; *Simia Syndactyla*, Raffles, Horsf.) Java.

(7629) Hoolock (*Hylobates Hoolock*, Martin; *Simia Hoolock*, Harlan). [HYLOBATES.]

(7630) Oungka (*H. agilis*, F. Cuv.; *Simia Lar.*, Vigors and Horsfield; *Pithecus agilis*, Desm.). Himalaya and Malacca.

(7631) Gibbon (*H. Lar*; *Homo Lar*, Linn.; *S. longimana*, Schreb.). Malacca.

(7632) Silvery Gibbon, or Wou-Wou (*H. leuciscus* Kuhl; *Simia leucisca*, Schreb.). Malacca.

(7633) Kalasie (*Presbytes rubicunda*) Borneo.

(7634) Simpal (*P. melalophos*; *Simia melalophos*, Raffles). Sumatra.

(7635) Tianac (*P. flavimana*; *Semnopithecus flavimanus*, I. Geoff.). Sumatra.

(7636) Rufous Presbytis (*P. nobilis*, Gray *Semnopithecus melalophos*, Desm.). Himalaya.

(7637) Lutung (*P. Pyrrhus*). Java.

(7638) Chingkau (*P. cristata*; *Simia cristata*, Raffles) Java and Sumatra.

(7639) Dusky Presbytis (*P. obscura*). Singapoor.

(7640) Negro Presbytis (*P. maura; Simia maura*, Schreb. China.

(7641) Hooded Presbytis (*P. Jhonii; Simia Jhonii*, Fischer). India, Madras.

(7642) Hoonuman (*P. entellus*). Bombay and Nepaul.

(7643) Nestor (*P. cephalopterus; Cercopithicus cephalopterus*, Zimm.). Ceylon.

(7644) Zati, or Capped Macaque (*Macacus radiatus*, Desm.) India.

(7645) Munga, or Bonnet-Macaque (*M. Sinicus*, Desm.; *Simia Sinica*, Linn.) India.

(7646) Bruh (*M. nemestrinus*, Desm.; *Simia nemestrina*, Linnæus). Sumatra.

(7647) Macaque (*M. cynomolgus*, Desm.; *Simia cynomolgos*, Linn.) India, Sumatra.

(7648) Rhesus (*M. Rhesus*, Desm.; *Simia Rhesus*, Audeb.) India, Bengal.

(7649) Oinops (*M. Oinops*). Nepaul.

(7650) Brilliant Macaque (*M. speciosus*, F. Cuv.) Japan.

(7651) Black Macaque (*M. niger*, Bennett; *Cynocephalus niger*, Desm.). Philippines.

(7652) Wanderoo (*S. veter*; *Simia Silenus*, and *S. Veter*, Linnæus). Ceylon, China, India.

(7653) Gelada (*Gelada Ruppellii*). Abyssinia.

(7654) Tartarin (*Cynocephalus Hamadryas*, Latr: *Simia Hamadryas*, Linn.) Abyssinia.

The following forms of *Simiadæ* and *Cebidæ* were existing in the Gardens of the Zoological Society, Regent's Park, between the years 1847 and 1852 :—

Simiadæ.

Simia Satyrus, Hylobates Hoolook, Semnopithecus Gulettus, Cercopithecus nictitans, C. petaurista, C. melanogenys, C. cephus, C. albopilaris, C. Campbellii, C. Pluto, C. Mona, C. Pygerythrus, C. Sabæus, C. cynosurus, C. callithricus, C. Talaponi, C. niger, Cercocebus fuliginosus, C. Æthiops, Macacus sinicus, M. pileatus, M. cynomolgus, M. erythræus, M. nemæstrinus, M. Silenus, M. niger, Inuus sylvanus, Cynocephalus Hamadryas, C. Sphinx, C. Babouin, C. Porcarius, C. leucophæus, C. Mormon.

Cebidæ.

Ateles Chamek, A. paniscus, A. ater, A. Beelzebuth, A. marginatus; Pithecia chiropotes; Lagothrix Humboldtii; Brachyurus Ouakari; Saimiri sciureus; Callithrix torquatus; Nyctipithecus trivirgatus; Cebus apella, C. capucinus, C. cirrifer, C. xanthosternum, C. hypoleucus; Hapale Jacchus, H. aurita, H. penicillata, H. (Midas) Œdipus, H. (Midas) rufimanus, H. (Midas) Tamarin.

Fossil Simiadæ.—Remains of *Simiadæ* have been discovered and described from the tertiary formations of India, France, England, and Brazil. These fossils are illustrative of four of the existing types of quadrumanous or rather Simious forms. Thus we have *Semnopithecus* from India; *Hylobates* from the south of France; *Macacus* from Suffolk; and *Callithrix*, peculiar to America, found in Brazil. Nor is it unworthy of remark, that we here have evidence that so high a quadrumanous form as the Gibbon, a genus in which the skull is even more approximated to that of man than it is in the Chimpanzee, was living upon our globe with the Palæothere, Elephants, and other Pachyderms. We say that the skull of the Gibbon comes nearest to that of man, because, though the cranium of the young Chimpanzee approaches that of the human subject, it is far removed from it when the permanent teeth are developed. Teeth of *Macacus*, are the only remains of the *Quadrumana* which have been found in Britain. In other countries larger remains have been found. Thus, in 1836, Lieutenants Baker and Durand discovered, in the Sub-Himalayan Hills, near the Sutlej, an almost entire right superior maxillary bone, containing the five molar teeth and part of the canine. The strata in which this fossil was found was tertiary, and consisted of a mixed calcareous sandstone and clay. In the year following, Colonel Cautley and Dr. Falconer discovered in the same formation a considerable portion of the lower jaw, with all the molars of the right side, and a part of the teeth of the left side, together with two middle incisors and the right canine. These remains belonged to a species of *Semnopithecus*, which must have existed with the *Sivatherium* and *Hippopotamus*, whose remains were found in the same formation.—*Eng. Cyc.*

(7655) SIPHONOSTOMATA, M. De Blainville's name for his first family of Siphonobranchiate *Mollusca*. The forms comprised under this family are principally to be found under the extensive genus *Murex* of Linnæus. It is sometimes applied to several families forming a section of Prosobranchiated *Mollusca*. In Woodward's 'Manual' the following families are included :—

1. *Strombidæ.* [STROMBIDÆ.]
2. *Buccinidæ.* [BUCCINUM.]
3. *Conidæ.* [CONIDÆ.]
4. *Volutidæ.* [VOLUTIDÆ.]
5. *Cypræidæ.* [CYPRÆIDÆ.]

All the known animals belonging to it are carnivorous and marine, and all are furnished with a horny operculum. The *Siphonostomata* are thus subdivided by M. De Blainville :—

Pleurotoma (Lam.)

(7656) *P. Babylonia.* The shell fusiform-turreted, transversely carinated and belted, white, with black-spotted belts, the spots quadrate; whorls convex; tube or canal rather long. It is found in the East Indian Seas and the Moluccas.

British Islands and Greenland	17
Mediterranean	19
Africa	15
Red Sea and India	6
China	90
Australia	15
Western America	52
West Indies and Brazil	20

Fusus (Lam.).

(7657) *F. Colus* (*Murex Colus* Linn.) Shell fusiform, narrow, transversely furrowed, white, the apex and base rufous; whorls convex, nodulously carinated in the middle; canal long and slender; the lip sulcated within, and denticulate on the margin. It is a native of the East Indian Ocean.

Pyrula (Lam.)

(7658) *P. carnaria* (*P. Vespertilio*, Lam.; *Fusus carnarues*, Mart.; *Murex Vespertilio*, Gm.) Shell subpyriform, thick, ponderous, muricated anteriorly, of a rufous-bay colour; the last whorl crowned above with compressed tubercles; spire rather prominent; the sutures simple; canal sulcated and subumbilicated. It is a native of the Indian Ocean.

(7659) *P. Spirillus*. Shell ventricose anteriorly the canal very long delicately striated transversely, white, spotted with saffron-colour; body-whorl abbreviated; carinated in the middle, flattened above, tuberculated below the middle; spire very much depressed, its apex mamilliferous. It is a native of the East Indian Ocean and the coasts of Tranquebar.

(7660) *P. ficus*. Shell fig-shaped, delicately decussated, cœrulescent-gray; sprinkled with variegated bay or violet spots; transverse striæ the largest and most crowded; the spire short, convex, mucronated at the centre; mouth cœrulescent-violaceous generally. It is a native of the Indian Ocean and the Moluccas.

Pyrulæ have been found on mud, sandy muds, and sand, at depths ranging from the surface to nine fathoms. There are 59 recent species and 39 fossil. The recent are found in the West Indies, Ceylon, Australia, China, and West America. The fossil are found in the Neocomian beds of Europe, India, and Chile.

Fasciolaria (Lam.).

(7661) *F. Trapezium*. Shell fusiform, ventricose, tuberculiferous, rather smooth, white or rufescent, girt with rufous lines; the tubercles conical, subcompressed, and in a single series in the middle of the whorls: columella reddish-yellow; outer lip elegantly striated within, the striæ red. It is found in the East Indian Ocean.

(7662) *F. filamentosa*. Shell elongated, fusiform, turreted, transversely sulcated, white, painted with longitudinal orange-red stripes; middle of the whorls subangulated, and the whorls themselves crowned with short and compressed tubercles; the canal rather long; the outer lip striated within. It is found in the East Indian seas.

Fasciolariæ have been found on muddy bottoms, at depths ranging from the surface to seven fathoms. There are 11 recent and 28 fossil species. The former are found in the West Indies, Mediterranean, West Africa, India, Australia, the South Pacific, and Western America. The latter are found in the Upper Chalk.

Turbinella (Lam).

(7663) *Turbinella Rapa*. Shell subfusiform, ventricose in the middle, thick, very ponderous, unarmed, white; the whorls above covering the base of the preceding one; canal rather short; columella subquadriplicated. It is found in the East Indian Ocean.

(7664) *T. Scolymus*. Shell subfusiform, ventricose in the middle, tuberculated, pale yellow; spire conical, tuberculato-nodose; the last whorl crowned above with great tubercles; canal transversely sulcated; the columella orange-coloured and three-plaited. It is a native of the East Indian Ocean.

Turbinellæ have been found on bottoms of sandy mud, at depths varying from the surface to 18 fathoms. There are 70 recent species, chiefly tropical, and 20 fossil, from the Miocene Tertiary beds.

Triton (Lam.)

(7665) *Triton variegatus*, the Marine Trumpet, or Triton's Shell. Shell elongated conical, trumpet-shaped, ventricose below, grit with very obtuse smooth ribs, white, elegantly variegated with red and bay; the sutures crisped at the margin; the aperture red; the columella wrinkled with white and with a single plait above; the edge of the outer lip spotted with black, the spots bidentated with white. It is a native of the seas of the West Indies and the Asiatic seas, especially those of the torrid zone.

(7666) *Triton Lotorium*. Shell fusiform turreted, distorted below, very much tuberculated, transversely rugous, and striated, rufous; the whorls above angulate-tuberculated; canal tortuous, the extremity recurved; the aperture trigono-elongated and white; the outer lip toothed within. It is a native of the East Indian Ocean.

(7667) *Triton Anus*, the Grimace. Shell ovate, ventricose-gibbous, distorted, flattened beneath; nodulous above, subcancellated, white, spotted with rufous; the aperture narrowed, sinuous, irregular, ringent; the lip very much toothed; the canal short and recurved. It is found in the East Indian seas. Tritons have been found on various bottoms at depths ranging from the surface to 30 fathoms.

(7668) *Ranella* (Lam.).—Shell oval or oblong, depressed, having only two varices situated latterally; aperture oval; canal short, and a sinous at the union of the two lips, backwards.

(Genus *Bufo*, De Montfort).

(7669) *R. granulata*, a native of the East Indian Ocean.

(7670) *R. foliata*, found in the vicinity of Mauritius.

Ranellæ have been taken on different bottoms at depths varying from the surface to 20 fathoms.

Fifty recent and 23 fossil species have been described.

Murex. (Linn.).

(7671) *Murex Tribulus*, Linn. (*Murex tenuispina*, Lam).—Shell ventricose anteriorly, the tube very long, elegantly spired throughout its length, the spires set in triple order, each row at regular intervals, grayish or purplish gray, the spires very long, thin, rather closely set and somewhat hooked ; body of the shell transversely sulcated and striated ; the spire prominent. It is a native of the Indian Ocean and the Moluccas. This is the Venus's Comb of collectors, and when perfect is a most delicate and striking shell.

(7672) *M. haustellum* (Snipe's or Woodcock's Head of collectors) .Shell anteriorly ventricose, naked, scarcely armed, fulvous inclining to red, lineated with bay ; body of the shell rounded and furnished with three or more ribs between the varices ; the tube very long and slender ; the spire short ; mouth rounded, red. It is a native of the East Indian Ocean and the Moluccas.

(7673) *M. acanthopterus.* Shell oblong, fusiform, trialated, transversely sulcated and striated, white ; the alæ membranaceous ; whorls angulated ; aperture ovate rounded. It is a native of the East Indian Seas.

(7674) *M. adustus.* It is a native of the East Indian Ocean.

(7675) SINAPIS, the name of a genus of Plants belonging to the natural order *Cruciferæ*, or *Brassicaceæ*. All the species are known by the name of Mustard, a word derived from *Mustum ardens*, in allusion to their hot and biting character. The genus is known by its siliquose fruit, which is rather terete, with nerved valves ; small short acute style ; sub-globose seeds disposed in one row in each cell, and spreading calyx. The leaves are of various forms, lyrate or deeply toothed ; the flowers yellow, arranged on terminal bractless racemes ; they are chiefly natives of the temperate parts of both hemispheres of the Old World. Between 40 and 50 species of this genus are enumerated. Of these, two species are well known and much cultivated in this country, *S. nigra* and *S. alba*, the Black and White Mustard.—*Eng. Cyc.* Five or six species of Sinapis are cultivated in all parts of India, for the sake of the valuable oil they yield, those most frequently seen are *S. glauca*, *toria* and *racemosa*.—*M. E. J. R.*

(7676) SINAPIS ALBA. The seeds of the "sinapis alba" yield by expression 36 per cent of a bright yellow, pleasant tasted, edible oil, having a strong smell, and slight taste of mustard. The seeds of "sinapis nigra," yield only 28 per cent of an oil in all respects similar to the above. The average price of mustard seed in eighteen large stations, in all parts of the Madras Presidency, for the Quarter ending 31st October 1854, was Rs. 1 2 8 per maund of 25lbs., the maximum being Rs. 1 11 6 at Cannanore and the minimum As. 15 5 at Nagpore. In Vizagapatam it costs Rs. 2 8 per Sicca garee. The oil is not exported from Madras, but the seeds have been shipped as follows :

In the years	1847-48	Cwt.	5,828
,,	1848-49	,,	6,767
,,	1849-50	,,	9,435
,,	1850-51	,,	9,909
,,	1851-52	,,	3,636
,,	1852-53	,,	16,075

—*M. E. J. R.*

The Mustard plant is officinal on account of its seeds, or rather of the flour of these seeds, so well known as a condiment by the name of Mustard. But Dr. Pereira learnt that the best flour of Mustard is prepared by crushing the seeds of both Black and White Mustard between rollers, and then pounding them in mortars, when they are twice sifted to yield *pure flour of Mustard.* Dr. Christison's information confirms that of Dr. Pereira, that common flour of Mustard is adulterated, partly on account of the pungency of Black Mustard seed. "Two bushels of black, and three of white seed yield, when ground, 145 pounds of flour ; which, to diminish the pungency and improve the colour, is mixed with 56 pounds of wheat flour and two pounds of turmeric ; and the acrimony is retored without the pungency, by the addition of a pound of (capsicum) chilly pods, and half a pound of ginger." (*c*) Dr. Thomson says he could detect no turmeric, nor cayenne pepper in the specimen which he examined. The *pure flour* of Mustard ought alone to be used officinally. Though Black and White Mustard have both been minutely examined by several chemists, they still require further investigation. The former contains a Fixed Oil, Gummy matter, Sugar, a Colouring and a Peculiar green matter, a Fatty pearly matter ; *Myronic acid* in combination with Potash, or Myronate of Potash (the Sulpho-Sinapisin of Henry and Garot) *Myrosyne*, *Sinapisin*, and some salts.—*Royle.*

The oil.

Mustard Oil, ENG.	Kadaghoo yennai, TAM.
Avaloo and Sursava noona, TEL.	Raee ka tael, HIND.
Sarshapatailum, SANS.	Rai ka tael, GUZ.

This valuable oil, although seldom sold in the Market, being only made when required, is used in most parts of India in cookery, and is considered superior to all other oils for anointing the body, which it is supposed to invigorate. In medicine, it is sometimes given internally, but is more frequently applied as a rubifacient.—*M. E. J. R.* Common Mustard consists of the flour of the seeds of the Black Mustard, though generally mixed with that procured from the seeds of the White Mustard, or Sinapis alba, and deprived of fixed oil by expression. Both species have been

long used in medicine, being the *vara* of Hippocrates, and the Sinapi of the Romans.—*Royle.*

The botanical description *of Sinapis alba, or* "White Mustard." would be Siliques hispid, spreading, rather narrower than the ensiform beak; leaves lyrate, smoothish; stem smooth. It is a native of Great Britain and most countries in the south of Europe. It is frequently cultivated, and when young is eaten as a salad. —*Eng. Cyc.*

(7677) SINAPIS CHINENSIS. MUSTARD SEED. Lin.

Kadaghoo, TAM.	Sasavee, MALAY.
Rai, GUZ.	Tukhm-i sipeedan, PERS.
Rains, DUK.	
Rai, HIND.	Rajaca, SANS.
Khirdull, ARAB.	Avaloo, TEL.

Ainslie's Mat Med. p. 264.

(7678) SINAPIS DICHOTOMA, OR MUSTARD.

Moung-ngyeen, BURM.

This is cultivated in small quantity in the Tounghoo district.—*McClelland.*

(7679) SINAPIS NIGRA, Black Mustard, is known by its smooth, even, somewhat tetragonal siliques closely pressed to the peduncle; lyrate lower leaves, and lanceolate upper leaves. It is found in cultivated fields, waste grounds, and roadsides throughout Europe. The black Mustard is indigenous in almost every part of Europe. The root is thick and fleshy, the stem about 2 to 3 or 4 feet high, hispid below, with smooth round branches above. Lower leaves large, rough, lyrate, variously lobed and toothed; upper ones narrow, lanceolate, smooth, dependent. Calyx yellowish, equal at base, spreading. Petals obovate, yellow, spreading. Silique small, erect, or placed close to the stem, obtusely quadrangular, nearly even and smooth, tipped by a short quadrangular style, but without the proper, often seed-bearing beak of the genus; the valves convex, with one straight dorsal nerve, and a few lateral anastomosing veins. Seeds numerous, in a single row, small, round, blackish brown. Fig. 41.—E. B. t. 969.

(7680) SINAPIS TRILOCULARIS. MUSTARD.

Rai, DUK.

(7681) SINGHARA. This is the spinous fruit of Trapa bispinosa &c. The plant furnishing this important article of food appears to have been extirpated from the tanks of southern India, while it has been still preserved in the Mahratta Country and Deccan.—*M. E. J. R.* There are more than one species which produce the Singhara or Water Nuts. The large seeds of *Trapa bicornis*, a native of China, and of *T. bispinosa* and *natans*, species indigenous to India, are sweet and eatable, and the aquatic plants which furnish them are hence an extensive article of cultivation. In Cashmere and other parts of the East they are common food, and known under the name of Singhara nuts. In Cashmere the government obtains from these nuts £12,000 of annual revenue. Mr. Moorcroft mentions that Runjeet Sing derived nearly the same sum. From 96,000 to 128,000 loads of this nut are yielded annually by the lake of Ooller alone. The nut abounds in fecula. In China the kernel is used as an article of food, being roasted or boiled like the potato. The seeds of various species of *Nelumbium*, natives of the East Indies, Jamaica, and the United States, also form articles of food. The fruit of *N. speciosum* is supposed to be the Egyptian bean of Pythagoras. The petioles and peduncles contain numerous spiral vessels, which have been used for wicks of candles. The fruit of *Willughbeia edulis*, a native of the East, as its name implies, is eatable. The kernel of the mango can be reduced to an excellent flour for making bread.—*Simmonds.*

(7682) SIPHOCAMPYLOS. *Lobeliaceæ.*—These are small pretty shrubs growing well in a light sandy soil, and are propagated by seed and cuttings.—*Riddell.*

(7683) SIPHONANTHUS FRAGRANS.

Hatti-kana, DUK.

Double variety. A native of China.—*Riddell.*

(7684) SIPHONANTHUS INDICA. *Verbenaceæ.*

Burungee, DUK.

A tall, erect growing, suffruticose plant, with linear leaves; flowers white or cream coloured, with long tubes.—*Riddell.*

(7685) SIPHONIA, a genus of Plants belonging to the natural order *Euphorbiaceæ*, consisting of two species, but one may be only a variety of the other. This is celebrated as being the tree which yields the large quantities of caoutchouc, called cahuchu by the native Americans, annually imported from Para in South America.—*Eng. Cyc.*

(7686) SIPHONIA ELASTICA is a tree 50 to 60 feet in height, common in the forests of Guiana and Brazil, and which has been introduced into the West Indies. Condamine frequently mentions it in his voyage down the Amazon. Caoutchouc is the milky juice of the plant, which exudes on incisions being made and solidifies on exposuore to the air. [INDIA RUBBER.]—*Eng. Cyc.*

(7687) SISON, a genus of Plants belonging to the natural order *Umbelliferæ*. It possesses the following characters:—calyx obsolete; petals broadly obcordate, deeply notched, and curved with an inflexed point; styles very short; fruit ovate, laterally compressed; carpels with five filiform equal ridges, of which the lateral ones are marginal; interstices with single short club-shaped vittæ; seed gibbous, convex, plane in

front; universal and partial involucre of few leaves.—*Eng. Cyc.*

(7688) SISSOO, (Dalbergia Sissoo,) is one of the most valuable of the timber-trees of India, and with the Saul, is more extensively employed than any other in north-west India. The ship-builders in Bengal select it for their crooked timbers and knees; it is remarkably strong, its colour is a light greyish brown, with darker coloured veins. "In structure it somewhat resembles the finer species of teak, but it is tougher and more elastic." There are two kinds used respectively in Bengal and Bombay, the latter is much darker in colour. The Indian black rose-wood, (Dalbergia latifolia,) is a superior species of Sissoo, from the Malabar-coast.—*Holt.*

(7689) SITANUK. One valve of a muscle shell, with the dried fish attached. The punsaris call it "the small head of a sea animal:" used in Ajmere as an aphrodisiac, and also said to cure the cynanche of children: comes from Bombay via Pali: one seer costs two rupees.—*Genl. Med. Top. p.* 132.

(7690) SIVATHERIUM (from Siva, an Indian deity), a genus of extinct animals belonging to the family *Elephantidæ*. The remains of species of this remarkable genus were found by Dr. Falconer and Colonel Cautley in the valley of Mackanda, in the Sewalik Hills of the Himalaya. Two species of this genus, *S. giganteum* and *S. Perimense*, have been described. A cranium, lower jaw and teeth, and bones of the extremities of *S. giganteum* are now in the British Museum. The skull of this animal is nearly as long as that of the Elephant, the neck was shorter and stronger than in the Giraffe. The posterior portion of the skull is greatly developed, and formed of cellular cavities, as in the Elephant. "The face is short, and the nasal bones are remarkable for the manner in which they are prolonged into a pointed arch above the external nostrils, indicating a trunk, or proboscis. The very inclined direction of the front of the face in relation to the triturating surface of the teeth imparts a physiognomy altogether peculiar. Two horns arise from the brow between the orbits, and diverge from each other, and it is probably that the posterior protuberances of the forehead also supported a pair of short massive horns." (Mantell.) When living, the Sivatherium must have resembled an immense Gnu, or Antelope, with a short thick head surmounted with two pairs of horns. The front pair of these horns were small, whilst those behind were probably palmated. The eyes were small, and it had a nasal proboscis, an organ unknown amongst the *Ruminantia*. (Mantell, *Petrefactions and their Teachings*; *Journal of the Asiatic Society*.).—*Eng. Cyc.*

(7691) SIZE.

Sirrus. Guz.; Sirisht, Hind. Glue.

A gelatinous substance, obtained from parchment-shavings, fish skin, and several animal membranes. It is less adhesive than glue, and is used by book-binders, paper-hangers, and painters. (*Waterston.*)—*Faulkner.*

(7692) SKIMMIA LAUREALA. This plant has been lately introduced into English gardens, from the northwest Himalaya, and is greatly admired for its aromatic, evergreen foliage, and clusters of scarlet berries. It is a curious fact, that this plant never bears scarlet berries in Sikkim, apparently owing to the want of sun; the fruit ripens, but is of a greenish-red or purplish colour.—*Hooker, Him. Jour. Vol.* 1, *p.* 187.

(7693) SKIMMIA REEVESIANA. On the same stage, Fortune says, with this Azalea I observed a fine new shrub, which I mistook for a holly. It turned out to be a species of *Skimmia*, and I observed that Dr. Lindley has described it as *Skimmia japonica*. It is however quite a different plant from that known by the name in the gardens of England, and I propose to call it *Skimmia Reevesiana*. —*Fortune's Tea Districts, page* 329.

(7694) SKINS.

Peaux, Fr.	Pelli, It.
Felle, Ger.	Churm, Pers.
Chamro, Guz.	Pelles, Port.
Chumra, Hind.	Pieles, Sp.

This term is applied in commercial language to the skins of those animals, as calves, deer, goats, lambs, &c. which, when prepared, are used in the lighter works of book binding, the manufacture of gloves, parchment, &c; while the term hides, is applied to the skins of the ox, horse, &c., which, when tanned, are used in the manufacture of shoes, harness, &c. (*McCulloch.*) Salted and tanned hides, and also sheep and goat skins, are exported from Bombay to London and Liverpool.—*Faulkner.*

(7695) SLATE (Roof).

Ardoise, Fr.	Lavagna, Lastra, It.
Schiefer, Ger.	Pizarra. Sp.

A laminated stony substance, of which there are many kinds; though the only one of commercial importance is *clay slate*, employed for roofing. The principal slate quarries in Britain, are [illegible] Wales, Cumberland, and Scotland.—*Faulkner.*

(7696) SLIPPER PLANT. Euphorbia Tithymaloides.

(7697) SMALTE.

Smalte Dut.	Schmalz, Ger.
Smalt, Fr.	Lasor, Rus.
Smalto azzurro, Smaltino, It.	Esmalte. Azul-azur, Sp.

An oxide of cobalt, melted with siliceous earth and potash. It is sort of glass, of a beautiful deep blue colour; and being ground very fine, is known by the name of azure or powder blue. It is in great demand for the painting of earthenware, in the colouring of paper, and for other

arposes in the arts. Smalt is principally manuctured in Germany and Norway.—*Faulkner.* he Chinese use it for painting on porcelain and lazed copper vessels; the consumption, which as never very great, has fallen off, and the price eclined the last few years.—*Morrison.*

(7698) SMILACEÆ, *Sarsaparillas*, a small atural order of Plants belonging to Lindley's ass of Dictyogens. There has been much difrence of opinion amongst botanists with regard the position of *Smilax* in the natural system, s well as the number of genera that ought to be dmitted into the order *Smilaceæ*. Lindley has laced two genera, *Smilax* and *Ripogonum*, in his order, which possess the following characrs: — Flowers hermaphrodite or dioecious; cax and corolla confounded, inferior 6-parted; tamens 6, inserted into the perianth near the ase, seldom hypogynous; ovary 3-celled, the ells, 1- or many-seeded; style usually trifid; tigmas 3; fruit a roundish berry; albumen beween fleshy and cartilaginous; embryo usually istant from the hilum. They are mostly herbaceous plants, with a woody stem, and a tendency to climb. Their leaves are reticulated. his last character separates the order from *Liiaceæ* and its allied orders, with which it otherise closely agrees. *Smilax* is found in most arts of the world, especially in Asia and merica. [SMILAX].—*Eng. Cyc.*

(7699) SMILACINA, is a potherb growng in Thibet, North of *Kinchinjunga*, to which Dr Hooker was afterwards more indebted than uy. This beautiful *plant*, grows from two to five eet high, and has plaited leaves and crowded paicles of white bell-shaped flowers, like those of s ally the lily of the valley, which it also resembles in its mucilaginous properties. It is called 'Choklibi" and its young flower-heads, sheathed in tender green leaves, form an excellent vegetable.—*Hooker, Him Jour. Vol.* II. *page* 47.

(7700) SMILAX, a genus of Plants which gives its name to the natural order *Smilaceæ*. The name occurs in Greek authors, as Theophrastus and Dioscorides, and is applied to several different kinds of plants, as the yew-tree; a species of Phaseolus or Convolvulus (Σμίλαξ τραχεῖα) is *Smilax aspera*, which belongs to the present genus. *Smilax*, is characterised by having a 6-leaved corol-like perianth, with six stamens inserted into their base; the anthers are linear and fixed by the base; ovary 3-celled; ovules solitary, in each cell affixed to the apex; style very short; stigmas 3, spreading; berry 1-3-celled, 1-3-seeded; seeds globular; testa membranaceous, whitish; hilum large and coloured; albumen cartilaginous; embryo very small, remote from the hilum. The species form evergreen climbing shrubs, of which a few are found in temperate, but the majority in warm and tropical regions of both hemispheres, extending south to Australia, and north to Japan, North America, and the south of Europe. The species have fibrous or tuberous roots, stem often prickly; leaves alternate, petiolate; cordate or hastate, nerved, reticulate, venose, conchiferous stipulæ between the petioles; flowers sessile on a globular receptacle; subcapital pediculate and umbellate. Though the original species (*S. aspera*) of this genus is an inhabitant of the south of Europe, those now most celebrated for yielding the different kinds of Sarza or Sarsaparilla are natives of South America. But *S. aspera* still continues to be employed for medicinal purposes in the south of Europe, where it is called *Sarsaparilla Italica*, but there is no truth in the statement of its being the plant yielding Indian Sarsaparilla, which is *Hemidesmus Indicus*. Another celebrated species is the *Smilax China*, which has a tuberous root abounding in fecula, and therefore probably useful as a demulcent, though the Chinese esteem it invigorating, and ascribe to it other virtues. It is remarkable that two Indian species, which, like the Chinese species, have tuberous roots, should be called in Silhet Hurina-Shook-China and Gootea shook-China These are *Smilax glabra* and *S. lanceæfolia*, and their roots cannot be distinguished from the China root, or *Chob-chinee*, as it is called in India. A similar species is common in the southern parts of North America, and has been called *Smilax Pseudo-China*, though there is reason to believe that more than one species may be confounded under this name. *S. glycyphylla* is an Australian species, which has received its specific name from the sweetish taste of its leaves, and has been called Sweet Tea from its employment in the form of infusion, and is probably alterative and diaphoretic, as well as slightly tonic. It is probable that some of the species found in the Old World will be discovered to be possessed of virtues equal to the American species. Some of the Indian species were sent some years ago by Dr. Gibson, superintendent of the East India Company's botanic garden near Poonah, to the Medical Board of Bombay, for trial in the hospitals of that presidency. [See SARSPARILLA.].—*Eng. Cyc.* Dr. Wight gives Smilax [illegible]aculata, 2059; ovalfolia, 809; and Zeylanica, 2057-58.

Together with these we may notice, *S. Roxburghiana, Vern.* "Koomare shook China," and *S. oxyphylla. Vern.* "Chotee or small koomaree;" *S. rigida* and *ferox*, are Nipalese species. *S. elegans*, extends to the Deyra Doon, and *S. maculata* is found in Nepal, Kemaon, and Missouree. *S. prolifera* occurs very generally, and *S. Villandia* on the Morung hills.—(*Royle*). *O'Shaughnessy, p.* 645.

Mr. Royle also mentions a root sold in the bazars under the name of *Ashoba mugrabee*. This is translated sarsaparilla in Dictionaries, and the root much resembles that drug. Its origin is unknown.

Roxburgh states that the natives of India use the roots of the *S. glabra* in venereal and leprous ulcers, and that they also employ the *S. lanceæfolia* very extensively for the same purpose, and in the treatment of rheumatism.

Both these species deserve attentive examination. It seems however that the Ununtamol (*Hemidesmus indicus*) is likely to supersede all the varieties of sarsaparilla not only in Indian but in European practice.—*O'Shaughnessy, pages* 645 *and* 646.

(7701) SMILAX CHINA.

The roots.

Shookchina, Beng. | Chob Chinee, Hind.

Wild in China; the rhizome is hard, large, woody, knotty, brown or blackish externally, white in substance. The root is one of the China roots of the bazars, it is much, and we believe advantageously, employed as a substitute for sarsaparilla. It is largely imported into Calcutta from the Eastward, and much employed by native practitioners.—*O'Shaughnessy, p.* 645. The China root which comes to Ajmere via Bombay: is a largish, insipid, whitish root, in slices. taken as restorative and aphrodisiac in milk, one tola is a dose: used also in mesalihs: one seer costs two rupees. Natives suppose that this is the root of the "hazari," marygold (Tagetes erecta), after being in the ground three years.—*Gen. Med. Top. p.* 131.

(7702) SMILAX GLABRA.

Gootcea shook China, Beng.

A native of Sylhet and the adjacent country. A climber with a large tuberous rhizome. The stem and branches are thornless, leaves lanceolate, pointed, pale green beneath. Flowers umbellate, axillary, sessile and solitary. The root is identical in appearance with the China root of commerce.—*O'Shaughnessy, page* 645.

(7703) SMILAX LANCEÆFOLIA. Eastern Bengal.

Hurria shook China, Beng.

Much resembles the former, the leaves are lance shaped and three-nerved, umbels stalked —*O'Shaughnessy.*

(7704) SMILAX OVALIFOLIA. Wild Sarsaparilla. There or two are more species of smilax in Tenasserim jungles, one of which is used by the natives as medicine, to supply the place of a species of sarsaparilla, whose dried roots are sold in the bazars.—*Mason.* Smilax ovalifolia is indigenous at Dapoorie, and possesses perhaps the virtues of the genuine Sarsaparilla.—*Spry's Suggest. p.* 68.

(7705) SMUT OR DUST BRAND, (Uredo Segetum) is a disease produced in wheat by a fungus, and is said to infect chaff, straw, seeds and leaves.—*Hassell.*

(7706) SNAKE FRUIT. Eleagnus Conferta.

(7707) SNAKE GOURD. Trichosanthes anguina. A curious contorted gourd, peculiar to India, is in very general demand for vegetable curries. The plant is of easy culture on trellises around the doors of the native cabins, and the fruit often grows two feet long, beautifully striped, small, and tapering, so that streaming down from the trellis, they immediately remind one of striped snakes suspended from the foliage of trees.—*Mason.*

(7708) SNAKES HEAD LILY.—Amaryllis Frittilaria.

(7709) SNAKE-WOOD, Letter or speckled wood. A wood bearing this name is used at Demerara, Surinam, and along the banks of the Orinoko, for the bows of the Indians. The colour of the wood is red hazle, with numerous black spots and marks, which have been tortured into the resemblance of letters, or of the scales of the reptile; when fine it is very beautiful, but it is scarce in England, and chiefly used for walking sticks, which are expensive; the pieces that are from 2 to 6 inch diameter, are said to be the produce of large trees, from three to four times those diameters, the remainder being sap. Dr. Bancroft says, "*Bourra courra*, as it is called by the Indians, by the French bois du lettre, and by the Dutch Lettre hout, is the heart of a tree growing 30 feet in height with many branches," &c.

Canjica paise, No. 64, in Mr. Morney's collection of Brazilian woods, is somewhat like snakewood, but less beautiful; it is much less red, and the marks are paler and larger. If not an accidental variety, the wood would be worth seeking.

The above must not be confounded with the snake-wood of the West Indies and South America, the Cecropia, of which there are three species all furnishing trees of straight and tall growth, and a wood of very light structure, presenting sometimes distinct and hollow cells. The Balsas, or floats, used by the Indians of South America for fishing, &c. are very commonly constructed of this wood.—*Holtzappfell.*

(7710) SNOW, RED. The valley, says Hooker, remains almost level for several miles, the road continuing along the east bank of the Lachen. Shoots of stones descend from the ravines, all of a white fine-grained granite, stained red with a minute conferva, which has been taken by Himalayan travellers for red snow; a phenomenon Dr. Hooker never saw in Sikkim. Red snow was never found in the Antarctic regions during Sir James Ross's South Polar voyage; nor does Dr. Hooker know any authentic record of its having been seen in the Himalaya.—*Hooker, Him. Jour. Vol* II. *page* 118.

(7711) SNUFF.

Tabac en poudre, Fr.	Tabacco da naso, It.
Schnupftaback, Ger.	Nosowoi tabak, Rus.
Nass, Guz. Hind.	Tabaco de polvo, Sp.

Is tobacco in a powdered state, and in general use as an errhine. Other articles are sometimes added to vary its pungency, scent, &c.—*Faulkner.*

(7712) SOAP.

Saboon. Arab.	Sapo, Lat.
Zeep Dut.	Saboon, Sujah, Mal.
Savon, Fr.	Sabao. Port.
Seife, Ger.	Mulo Rus.
Saboon. Guz. Hind.	Jabon, Sp.
Sapone, It.	Natsowcaram, Tam.

The manufacture of Soap was known to the Romans, and has long been practised in India. Hard or Castile soap is made by beating together olive oil and a solution of caustic soda. Chemists conceive that at the time when soap is formed, the Elaine and the Margarine are, by a re-arrangement of their elements, converted into two acids, called Elaic and Margaric acids, and that these combine with the Soda forming Eleates and Margarates of Soda. But with the formation of the acids, a new substance, *Glycerine*, is also produced, and becomes dissolved in the water which forms one of the constituents of Soap. Some oils and animal fats contain Stearine, a substance closely allied to Margarine : in that case some Stearic acid is also formed. All Soaps are slightly alkaline, feel soft and slippery, and are detergent. The watery solution is readily decomposed by acids, also by earthy and many metallic salts, hence, when water holds any of them in solution instead of dissolving, the soap becomes decomposed. Such waters are called *hard*, while those which are comparatively pure are called *soft* waters. Castile Soap is composed of 9. to 10·5 of Soda, 76·5 to 75·2 of Oleic and Margaric acids, and of 14·3 to 14·5 of water, (*Ure*). Common Soap made of Tallow and Soda, and Yellow Soap of Tallow, Resin, and soda, are not so well adapted for medical use.—*Royle.*

Soap seems to have been introduced by the Mahomedans into India, though the Hindoos have long used alkaline leys, obtained from the ashes of plants, for many of the purposes of soap ; and they have a substitute for soap in several berries. Soap is made at Dacca, of shell lime, 10 mds. ; *sajie muttee*, 16 mds. ; common salt, 15 mds. ; sesamum oil, 12 mds. ; goat's suet, 15 seers. It is made of good quality at Saharunpore ; and some marine soap, of excellent quality though in small quantity, was sent to the Exhibition of 1851 from Calicut.—*Royle Arts &c. of India, p.* 484. Soap is an article of which a considerable quantity is made at Dacca. It is considered the best in India ; and like the Soap of Tranquebar, which is also of an excellent quality, it was formerly an export to the Mauritius, Penang, Sumatra, and the Islands of the Indian Archipelago. It is made of sajee mathee (impure carbonate of soda) sesamum oil, common salt, fine shell lime, and goat's suet. The manufacture of this article is carried on by Mahomedans, by whom it appears to have been introduced into India. The Arabic word *saboon* indeed, is the origin of the names given to soap in many countries, as that of *sabun* in the Crimea, and *savum* at Genoa. (See Dr. Clarke's Travels in Russia, and on the Don.) *Dr. Taylor.* At the Madras Exhibition of 1855, several samples of soap were exhibited and carefully examined by Mr. Stanborough. The best appeared to be a cake of castor oil soap, exhibited by Dr. G. W. Flynn, for which the Jury awarded a 2nd Class Medal.—*M.E.J.R.*

(7713) SOAP ACACIA. Acacia Rugata, Buch. The dried pods of this plant are sold in the Bazars of the Tenasserim provinces, and used as a substitute for soap in cleansing the hair. —*Mason.*

(7714) SOAP NUTS.

Reeta, Arectah. Duk. Guz. Hind.	Poovandie cottay Manay poongung kai. Tam.
Rarak, Mal.	Koomutti ghenzaloo, Tel.
Bindake-i-hindee, Pers.	
Arishta, Phenila, Sans.	

These capsules, which contain black seeds, have a singular sweetish bitter taste, and a smell not unlike that of an over-ripe mango. They are used medicinally by native practitioners ; and form, when bruised and agitated in water, a kind of sud like that of common soap, which is extensively used by the natives in India for washing their heads ; and by washermen for cleaning silks. The pounded seeds are said to be a valuable remedy for epileptic paroxysms, and other diseases. Soap nuts are procurable in most bazars.—*Faulkner.*

(7715) SOAP-NUT OIL—Sapindus emarginatus.

Poovandie cottay, or Poongum-kai yennai, Tam.	Koocoodie noona, Tel. Reethay ka tael, Hind.

This semi-solid oil is used medicinally by the natives, and is extracted from the kernel of the Soap-nut. Its cost prevents its general use. Excellent specimens are shown by the Trichinopoly Local Committee, and Lieut. Hawkes, also fair samples from Tanjore and the Madras Tariff.—*M. E. J. R.*

(7716) SOAP NUT TREE, Sapindus emarginatus.

Poochee-cottay, Tam. | Reethay ka jhar, Hind.

A tree met with about villages all over the country. The fruit used as indicated by the native name and sold in all bazars. Wood white, only used for fuel. In many situations, this tree yields a more profitable return than any other fruit tree. Wight No. 75, Hort. Garden. —*M E. J. R. The Soap Nut Tree.* These trees are very common in the Deccan villages. The leaves have a shining appearance,

and the flower stalk a soft brown downy look, bearing a small whitish flower. The berries are used for washing by the natives.

Resembles the S. Indicus. The seeds are used medicinally, and also for washing the finer kinds of silk.—*Riddell.*

(7717) SOAP, SOFT, as used in the arts, is made with Caustic Potash and Fish-Oil and Tallow; is semitransparent, of the consistence of honey, brownish-coloured, and nauseous. But that referred to by the Colleges as made with Potash and Olive Oil, Dr. Pereira was unable to meet with, and found on inquiry that common Soft Soap is usually substituted in making *Ung. Sulphuris Comp.*—*Royle.*

(7718) SOAPSTONE, STEATITE.

Sunkjeeroo. HIND. GUZ. | Bulpum, TAM. TEL

This mineral has a soft and greasy feel; is of a yellowish white or greenish gray colour; sometimes spotted or veined; with little lustre or transparency. It is composed of silica, magne-alumina, oxide of iron, and water, in various proportions, according to the variety and the place whence obtained. It occurs at the Lizard Point in Cornwall; and is used for porcelain manufactures.—*Eng. Cyc.* Soapstone is met with in India, where it is known by the name of *Sunkjeroo.* also *Bulpum.*—*Faulkner.* Soapstone, potstone, or steatite, is constantly for sale in the stalls, in Tenasserim, being used by the Burmese to write with on their black boards, as Europeans use chalk. It is not however a production of the Provinces but is imported from Burmah, where it is abundant.—*Mason.*

(7719) SOAP WORTS; Soap-fruits and Soap-nuts in tropical climates furnish substitutes for soaps, of a more or less useful character. Several of them are well known in Eastern Countries, and the dried berries of the Soap-worts, to which the genus Sapindus belongs, are to be found in almost every bazar, being used throughout India for special purposes, such as in washing silk, or hair, or woollens and cloths of various kinds.

In the W. Indies and the continent of America, *Sapindus saponaria* yields the so called soap berries, and, in Java, *Sapindus Rarak*: In India, several species, as *Sapindus Laurifolius, Sapindus acuminatus, Sapindus emarginatus, and Sapindus detergens,* yield berries, used as above. The fleshy part of these sapindus berries is viscid, and when dry and rubbed with water, they form a lather like soap, and the bark and roots have similar properties, though it is said that articles washed by the root and bark rapidly corrode. Hindoo physicians deem the *endocarp* a useful expectorant, and it is said the seeds, pounded with water and a small quantity put into the patient's mouth, often put an end to the epileptic paroxysm. The tincture or extract, of the Soapy matter of the Capsules of saponaria has been used in chlorosis. The berries, which are about the size of cherries, inclose black shining nuts which take a fine polish, and were formerly much used in England for making bottons after having been tipped with gold, silver or other metal. They are also made into beads, necklaces &c. The kernel contains an edible oil, which is sometimes used for burning. In India the nuts of the *Rheeta, S. emarginatus,* are eaten by young people, and in the West Indies, the fruits of S. Senegalensis and S. esculentus are deemed as palatable as the hazel nut and almond The *Sapindus* genus gives its name to the *Sapindaceæ,* the national order, to which it belongs. S. rubiginosus is a close-grained, hard wood, and forms an excellent timber. *Saponaria vaccaria,* is well known in India, and is identical in its properties with S. officinalis, a decoction of the root, frothing like a solution of soap.—*Kritz, kris, or kreess,* the root of some parisitical plant, but of unknown origin, is used in Cashmere to wash the shawls, soap being used only for the white shawls: It is used also medicinally, and for dyeing the color called na-furmanee.

(7720) SODA.

Jumd chenee, ARAB.
Sujacara, CAN.
Hydrate de Soude, FR.
Astz-natron, GER.
Sedjee Mittee. Sajeekhar (impurecarbonate) Papudkhar (sub-carbonate) GUZ. HIND.
Neter, HEB.
Charum, MAL.
Sajee-khar, Papud-khar PERS.
Sarjica, Sarjikashara, SANS.
Karum, Ponheer karum, TAM.
Savittie-munnoo-ooppoo, TEL.

The substance known in commerce by the name of soda is a carbonate of soda, but mixed with various impurities, according to the source whence it has been obtained; that is either from the Natron lakes, from the soda soils, from the burning of sea-weeds, or from the decomposition of other salts of soda. In commerce, soda generally occurs as a carbonate, as above stated, or in the impure forms of Barilla and Kelp. Barilla is the ash obtained by burning plants on the shores of the Mediterranean, of the Red Sea, and Indian Ocean. Kelp used to be prepared on the coasts of Scotland and its Islands, also on those of Ireland and Wales, and on that of Normandy in France, by burning a great variety of sea-weeds. In its original state, soda is of a gray colour, and fracture vitreous: it is an article of the greatest importance in the soap-glass, and other manufactures.

The Arabic name, *sagimen,* seems to be derived from the Hindoo *saji-noon,* that is, sajji, or soda salt. Nitre must have been produced then, as now, in their soil, and borax imported from Tibet, while sal-ammoniac must have been produced ever since they made bricks, as they now do. Alum is in India, obtained by throwing potash on alum slate, which has been sometime exposed to the air.—*Royle, Arts. &c. of India, p.* 463.

Dr. Taylor gave the following as Asiatic Salts of Soda.

Soda, from ashes of species of Salsola and Salicornia, on the Coromandel Coast.
Sujjee or carbonate of Soda, in Tirhoot.
Oosur Salt, Mirzapore, &c.
Lanee Kharee, Scinde.
Natron, from Lonar Lake in Lat. 20° and Long. 76° 30.
Mineral Alkali, Bombay.
Salt, common, (Chloride of Sodium,) Tumlook, Balasore, Tanjore.
,, or Samur, Samur or Samur Lake.
,, Rock Salt, Salt Range of Punjaub,
Borax, Kemaon and Gurhwall, from Tibet.
Khara Noon, (Sulphate of Soda,) Gyah, Tirhoot, &c.

(7721) SODA BIBORAS, SODÆ BORAS, BORAX, Biborate of Soda. Borate of Soda.

Borax Borate de Soude, FR.	Boraxsaures Natron, G.
Sohaga, HIND.	Tincana, SANS.

Borax or (Na O, 2 B O_5 + 10 Aq =192) Biborate of Soda, is supposed to have been known to the ancients, and to have been the *Chrysocolla* of Pliny. The Hindoos have long been acquainted with it; it is their *Sohaga*, Sanscrit *Tincana*, and one of the kinds of *Boorak* of the Arabs. Its nature was first ascertained by Geoffroy in 1732. It is produced by spontaneous evaporation on the shores of some lakes in Tibet, that is, in the same country, with Musk and Rhubarb; brought across the Himalayan Passes into India, and imported into other countries by the names of *Tincal* and *Crude Borax*. It is also obtained by saturating the Boracic Acid of Tuscany (p. 37) with Carb. Soda. Crude Borax is in pale greenish pieces, covered with an earthy coating, and feels greasy to the touch. The natives of Tibet are said to cover it with some fatty matter, to prevent its destruction by efflorescence. It is purified by calcining, which destroys the fatty matter, or by washing with an alkaline ley, which converts it into a kind of soap, then dissolving and re-crystallizing. It crystallizes in irregular hexahedral prisms often terminated by 2—4 converging planes. Sp. Gr. 1·35. It is colourless, transparent, somewhat shining; taste sweetish, a little styptic, and subalkaline. It has an alkaline reaction on Turmeric. The crystals effloresce slightly in the air, are soluble in 12 parts of cold and 2 of boiling water. When heated, they lose water, swell up into a porous substance called *Boraæ usta v. calcinata*, and at a red heat run into a transparent glass called *Glass of Boraæ*, much used as a flux. Another variety, more useful in the arts, contains only 5 Eqs. Aq., and crystallizes in octohedra, which are permanent in the air. Borax increases the solubility of Cream of Tartar, p. 86, and converts mucilage of Lichen and of Salep into a thick jelly. Comp. Na O 16·0 Bor' 35·79 Aq. 47 37=100.—*Royle.*

(7722) SODÆ CARBONAS, L. E. D. Carbonate of Soda. (Sodæ Subcarbonas. Aerated Mineral Alkali. Fossil Alkali. One of the kinds of *Nitrum* of the ancients, is the *neter* of the Hebrews. It was known to the early Hindoos, and is by them called *Sajji noon* (i. e. *Sajji* or Soda Salt); it is the *Sagimen vitri* of Geber. The Natron lakes of Egypt were known to the ancients, and it was early employed in glass-making, &c. Carbonate of Soda is a very valuable article of commerce being largely used not only in medicine but in arts and manufactures; but it is made from common Salt on a large scale in England, and so cheap that, it is a question if our Indian article, though a natural product, could compete with it in the market.—*Royle.*

(7723) SODA, IMPURE CARBONATE OF. CARBONAS SODÆ IMPURUS.

Karum also Poonheer	Saviti Munnoocoppoo, TEL.
Karum, Ovar Munnoo	Khar, HIND.
Karum, and Poong	Sargica, SANS.
Karum (TAM.)	Soudes de Commerce.
Kohlensaures Natron, GREEK.	Soudes brute. FR.

Barilla is the Ash obtained by burning plants, on the shores of the Mediterranean, of the Red Sea, and Indian Ocean. These plants belong mostly to the natural family of Chenopodeæ, q. v.; and chiefly to the genera Salsola, Salicornia, Suaeda, and Chenopodium. The quantity of Carbonate of Soda in the ash varies from 25 to 40 per cent, and is produced from the combustion of the Oxalate and other Salts of the Vegetable Acids. The soda is no doubt obtained from the soil, for Du Hamel planted Soda-plants inland, and they yielded only Potash. Infusion of a Salsola in cold water afforded by evaporation two Salts, Carbonate of Soda and Chloride of Sodium. *Murr. Chem.* ii. p. 612. A portion of the Chloride is no doubt converted into the Carbonate during the incineration.

Kelp used to be prepared on the coasts of Scotland and its islands, also on those of Ireland and Wales, and on that of Normandy in France, by burning a great variety of Algæ or Sea-weeds. The ashes when cold form *Kelp*, which is in hard cellular masses, of a bluish grey colour, and of a disagreeable alkaline taste, containing from 3 to 8 5 per cent. of Carbonate of Soda, and other salts, as in the case of Barilla, but also some Potash and Iodine (v. p. 4:). Carbonate of Soda is, however, now obtained very cheaply from Chloride of Sodium or Sea-salt. This is first converted into Sulphate of Soda by the action of Sulphuric Acid then mixed with pounded small Coal and Chalk, and heated in a reverberatory furnace and stirred. The Carbonaceous matter abstracts Oxygen both from the Sul. Ac. and the Soda; Sulphuret of Sodium is formed, and decomposed by the Lime; Carbonate of soda, insoluble Oxi-

Sulphuret of Calcium, caustic Soda, and Carbonaceous matter being the result. The insoluble parts are separated by lixiviation, and the Sulphur subsequently burnt away; during which the Soda is completely Carbonated. The mass now contains about 50 per cent. of Soda. Being lixiviated and evaporated, the Carbonate is obtained in large crystals. As Barilla is not sufficiently pure for medicinal purposes, the L. and D. Colleges give directions for its purification. The E.C. justly consider the Carbonate of Soda produced as above, pure enough.—*Royle.* Ainslie tells us that some of the more enlightened vyteans knew how to prepare Carbonate of soda from saline earths which contain it, such as Ovar Munnoo, and Poonheer. The soda prepared from the first, the Hakeems of lower Hiudoostan called "*Chour ke muttie ka nemuck,*" that from the second they call "Chowr ke pool ka nemuck."—*Ains. Mat. Med. p.* 43.

(7724) SODA, MURIATE OF. This mineral salt of very fair quality was exhibited from Bangalore, Bellary and Hyderabad, and is known to occur also in the Guntoor and Nellore Districts, and to be almost invariably accompanied with some interesting minerals, viz. Gypsum, magnesian limestone, sandstone, sulphur, red and brown iron ores, and Alum slate; as most of these minerals have come in from the districts that produce the mineral salt, it would be worth while to direct further search to be made in the vicinity for the sulphur and Alum slate, both of which are valuable products. Sulphur was exhibited from several Districts associated with the above and other combinations. Alum slate is also exhibited from the Cuddapah District, Vellore and the Neilgherries, but the accompanying minerals had not been forwarded. It is of great importance that the minerals associated with Rock Salt and Gypsum should always be recorded or collected, as Fossils of some kind or other almost invariably occur in the vicinity, and these are the best and safest guides for determining the relative ages of the accompaying strata. The following interesting description of the Salt Range in the Punjaub, by Dr. Jameson, will show the importance of this class of formations. The Salt Range, extends from the Eastern base of the Suliman Mountains to the River Jhelum in the Punjaub. Lat 32° 30'—33° 20'

The rocks in this part of the range are, first (1) Magnesian Limestone, (2) New Red Clay and sandstone, (3) Fossiliferous sandstone, (4) Red Clay and sandstone containing Coal and Mineral Sulphur, Rock Salt, Gypsum, brown and red Iron ore and Alum slate. The lower beds contain no organic remains but the upper abound in them. The Iron ore is a red or brown Haematite, so rich that in many places the needle of the compass becomes quite useless even at a considerable distance from the Rocks owing to their being highly Magnetic, from the quantity of Iron which they contain. The sandstone abounds with the Exuviae of enormous animals either Saurians or Sauroid fishes.

The Hills at Kala Bagh contain great quantities of Aluminous slate from which Alum is obtained at various manufactories in that Town. The slate well sprinkled with water is laid in alternate strata with wood, until the pile reaches a height of 25 to 30 feet; it is then lighted and the combustion continued for about twelve hours, in which time the color of the slate is converted from greyish black to dark red. This change of color indicating that the process has been carried to a sufficient extent, the mass is thrown into a tank holding as much water as it is computed the Alum is competent to saturate. After three days the water, which becomes of a dark red color, is drawn off, mixed with a due proportion of potash and boiled down. The residuum on cooling becoming a solid mass of Alum.

A very interesting series of salts consisting chiefly of the Muriate and carbonate of soda from the Loonar Lake in the Hyderabad territories was exhibited by Dr. George Smith, Residency Surgeon Hyderabad. These have already been carefully examined by Professor Mayer and reported upon at some length in Vol. 1, New series of the Madras Journal of Literature and science. The following is a condensed epitome of the Report, and of the chemical composition of the salts:—

No. 1. Dulla.

This is a Carbonate of Soda with a faint trace of Muriate of Soda and about 2 per cent of impurities.

No. 2. Nimmuck Dulla.

Is nearly pure Muriate of Soda.

No. 3. Khuppul.

Is carbonate of Soda, with water and about 2 per cent of impurities.

No. 4. Puppree.

Is nearly pure Carbonate of Soda.

No. 5. Madkhar.—This is an impure salt containing Carbonate of Soda, 27
Clay and sand,. 30 } water about 17.
Common Salt,. 25

No. 6. Bhooskee.

This is also a crude impure substance

containing Neutral Carb of Soda.	26
Insoluble matter chiefly sand and Clay,	58
Water, ...	15
Common Salt, ...	2

No. 7. Travertin.

This contains Carb of Lime, ...	78
Carbonate of Magnesia,...	4
Insoluble matter with Oxide of Iron &c.	9
Chloride of Sodium, ...	2
Water, ...	3

The Natron lake of Loonar occurs in the Circar of Meinker Soubah of Berar about 45 miles N. W. of Hingolie in Lat. 20 N. it is about 510 feet below the level of the surrounding ground

in a kind of Crater of 5 miles in circumference, the lake being about 3 miles in circumference and surrounded by luxuriant vegetation; springs of clear soft water occur close to the lake, which has evidently been extending its bounds lately, as numerous dead trees are standing within its margin, and a bowrie of sweet water protected by a wall is now completely surrounded by the water of the lake. An intolerable stench of sulphuretted hydrogen is emitted by the lake during the heat of the day and its waters prove destructive to animal and vegetable life, though flocks of Duck and Teal dot the surface of its waters. There are two saline springs near the Centre of the Lake and about ½ a mile apart. These never become dry. It is supposed that the muriate of Soda from this source coming in contact with the carbonate of Lime which abounds in the vicinity causes the deposition of the carbonate of Soda or Natron Salt in a greater or less state of purity. The depth of the lake near the salt springs varies from 6 feet during the hot months to 12 or 14 feet during the rains. The Salt is raised by divers who bring it up in their hands, it is much prized and finds a ready sale in Berar, Nagpore, Candeish, and Poonah, to which places it is carried in Bamboo baskets and retailed by dealers. The lake has not been regularly worked since 1836 in which year 2,136 candies of the different Salts were raised, valued at Rs. 60,081. In 1853 Major Johnston rsised 35 candies valued at Rs. 1,461-4-0.

Some suggestions have been proposed for increasing the productiveness and revenue of the lake. These are contrivances for preventing the flushing of the Lake with water, supplied by the main feeder, and by several streams from the surrounding water shed, such as bunds and channels.—*M. E. J. R.*

(7725) SODA, NITRATE OF, CUBIC NITRE.
Nitrate de Soude, FR. | Wurfelsalpetre GER.

Consists of nitric acid and soda. It is similar in its properties to saltpetre, differing chiefly in being more pungent in taste, more soluble in cold water, more inclined to attract moisture from the atmosphere, and in crystallizing in a rhomboid form. It is highly esteemed as a manure for pastures, and for all other sorts of agricultural produce, except that grown in heavy wet soils. It is also applied to many of the purposes for which saltpetre is used, though being more deliquescent than that salt, it is not adapted for the manufacture of gunpowder. This salt is found in immense quantities in deposits in South America, particularly in the districts of Atacama and Tarapaca in Peru.—*Waterston. Faulkner.* Samples of this Salt were exhibited at the Madras Exhibition of 1857, from Bellary and Hyderabad, where it seems to form a natural efflorescence. Its chief use is as a substitute for saltpetre for the manufacture of Nitric and other acids and chemical substances. It is too deliquescent for making gunpowder, though it answers well for some descriptions of fireworks. The samples exhibited were indifferent.—*M. E. J. R.*

(7726) SODÆ SESQUICARBONAS. Sesqui-Carbonate of Soda. Natron.

Anderthalb Kohlensaures Natron, GER. | Natron, FR.

A Sesqui-carbonate of Soda ($NaO\ 1\frac{1}{2}\ CO_2 + 2\ HO = 83$) exists in nature; for the Trona found near Tripoli in Africa, the Natron of the country to the west of the Delta of the Nile, and of the Lonar Lake described by the late Dr. Malcolmson, have all been proved to consist of $1\frac{1}{2}$ Eq. of Carbonic Acid to 1 of Soda; or Na O 38·55 + C 39·76 + Aq. 21·69=100. The analyses were made in the Laboratory, and the specimens are deposited in the Museum, of King's College. A solution of it may be obtained by heating Bicarbonate of Soda in solution to a temperature of 212°.—*Royle.*

(7727) SODÆ (SESQUICARBONAS, L.) BICARBONAS, E. D. *Sodæ Carbonas.* Bicarbonate, and Carbonate of Soda of the shops.

Zweifach Kohlensaures Natron, GR. | Bicarbonate deSoude, FR.

The Bicarbonate of Soda ($NaO\ 2CO_2 + 2HO = 94$) of the E. and D. P's is the same salt as the Sesqui-carbonate of the L. P. That which is met with in commerce is usually a pure salt, but occasionally mixed with a small portion of the Carbonate. It exists in some mineral springs highly acidulated with Carb. Ac., as in those of Vichy.

Prop. As usually sold, it is colourless, in powder, or in minute scale-like crystals, having a saline, slightly alkaline taste and reaction.—*Royle.*

(7728) SODA, SULPHATE OF. L. E. D. Sulphate of Soda. *Natrum Vitriolatum. Sal Catharticus. Sal mirabile Glauberi.*

Sulphate de Soude, FR. | Nemuck, PER. & HIND.
Schwefelsures Natron, GER. | Malh. ARAB.
Oopoo, TAM. & TEL. | Noona, HINDEE.

Sulphate of Soda ($Na\ O, S\ O_3 + 10\ Aq. = 162$, or Glauber's Salt, is found effloresced on the soil in some countries, as in India, where it is called *kharee nimuk* or *kharee noon.* It exists in sea-water, in that of some lakes and mineral springs, also in Glauberite. It is found in the ashes of many plants, and in some animal secretions.—*Royle.* In Bengal, *Sulphate of Soda*, or Khari Noon, is an impure sulphate of soda extracted from an earth in which the salt exists, in the proportion of from ten to fifty per 100. It is prepared in large quantities by simply washing the earth. It is usually sold in crystalline dirty brown masses. These are purified by a simple process often described.—*Beng. Phar. p.* 362.

(7729) SODII CHLORIDUM, L. SODÆ MURIAS (PURUM, E.) E. D. Chloride of Sodium. *Muriate of soda.* Sodæ Murias purum, E. *Sal Fossile. Sal Marinum. Sal Gemmæ.*

Chlorure de Sodium, FR. | Chlor Natrium, GR.

Chloride of Sodium (Na Cl=60), or Common Salt, is abundantly diffused in nature, and, being an essential article of diet, must have been known from the earliest ages. It is found in many animal solids and fluids, and in the juices of some vegetables. It exists in large quantities in the solid form as Rock Salt, or in solution in some springs, and everywhere in sea-water. From these it is obtained by evaporation, when it crystallizes with slight variations of appearance according to differences in the process. These varieties are known by different names in commerce, as Butter, Stone, and Basket Salt, also Sea Salt, and, in large crystals, as Malden, Fishery, and Bay Salt. Most of the kinds of Salt require purification, by being again dissolved and re-crystallized (Sodæ Murias purum, E.) as they are apt to contain other salts, as alkaline and earthy Sulphates and Chlorides, especially of Magnesium and of Calcium.—*Royle.*

(7730) SO-E. A garment of leaves, which, as well as hats, is fabricated by the agricultural laborers of Northern China, from the leaves of *Chamærops excelsa*, a palm indigenous in the Northern and Central parts of that country: but in the Southern districts of China, the *So-e*, is made from the leaves of the Bamboo and of other broad leaved grasses.

(7731) SOI KEERY, *Tam.* This green, says Ainslie, I have never seen, nor do I believe that the Botanical name of the plant has been ascertained. It grows in the Southern parts of the Peninsula and is eaten by the poor.—*Ains. Mat. Med. p.* 257.

(7732) SOJA, a genus of Plants belonging to the natural order *Leguminosæ*. *Soja hispida* (Mœnch), *S. Japonica* (Savi), the *Dolichos Soja* (Linn.), is a native of Japan and the Moluccas, and abundant in the peninsula of India, though probably introduced there. The seeds resemble those of the haricot, French or kidney bean, and are used by the Chinese to "form a favourite dish called 'tau-hu,' or 'tau-hu,' which looks like curd, and which, though insipid in itself, yet with proper seasoning is agreeable and wholesome." The Japanese call the seeds 'Miso,' and put them into soup, of which they sometimes partake three times a day. They likewise prepare with them the sauce termed 'Sooja,' which has been corrupted into 'Soy.' Soy is only sparingly used as a sauce in this country. It has the character of being a useful stomachic, but not more so than any of the other condiments when used with moderation.—*Eng. Cyc.*

(7733) SOLA, frequently *Shola*, is the name of a Plant common in moist places, and in the rainy season in many parts of the plains of India. It belongs to the genus *Æschynomene*, and has been called *Æ. aspera* by Linnæus, from the lower part of the stem being rough and scabrous, as well as the legumes. It has been called *Æ. lagenaria*, both by Loureiro and Roxburgh. The plants are remarkable for their light and spongy texture, and seem indeed to be composed almost entirely of pith. On this account the thicker stemmed plants are collected in the dry months and the light substance applied to a variety of uses, as for making some kinds of toys, and the floats of fishermen's nets; cut into thin slices and pasted together, they are much employed for making hats, which, being light and having broad brims, are well suited for protecting the head from the influence of the powerful Indian sun, especially if a handkerchief be put loosely into the crown of the hat. This substance has also been employed for lining drawers of natural history, and in its texture very much resembles the substance called rice-paper, which is the pith or stem of a Malvaceous plant cut into thin slices.—*Eng. Cyc.*

(7734) SOLANACEÆ, a natural order of Plants belonging to the dicarpous group of Monopetalous Exogens. This order is composed of herbs or shrubs, rarely of arborescent plants, with colourless juices, round or irregularly angled stems or branches, sometimes armed with thorns or prickles; their leaves alternate, simple, entire, or lobed. The inflorescence is variable, mostly axillary, sometimes terminal; pedicles without bracts, and the flowers regular and united. The plants of this order are natives of most parts of the world, without the arctic and the antarctic circles, and especially within the tropics. The order is one of the most important and interesting in its class, from its bringing together plants of the greatest utility, yet possessing apparently opposite properties. It is a great advantage of a natural system that it brings together not only plants that are allied in structure, but in properties also; but this order seems to form an exception. The Deadly Night-shade, the esculent Potato, the pungent Capsicum, the mild Tomato, the wholesome Egg-plant, and the poisonous Tobacco, are all found here. They will all however, on close examination, be found to possess the same properties in a greater or less degree. The potato, the tomato, and egg-plants possess, when uncooked, in a mild degree, the properties of the Nightshade, the Stramonium, and the Henbane, confirming the remark of De Candolle, "that all our aliments contain a small proportion of an exciting principle, which, should it occur in a much greater quantity, might become injurious, but which is necessary as a natural condiment." In fact, when food does not contain some stimulating principle, we add it in the form of spices. Many of the plants of this order are used in

medicine, amongst the most valuable of which are Henbane [HYOSCYAMUS], Deadly Nightshade [ATROPA], Bitter-Sweet [SOLANUM], Stramonium [DATURA], and Tobacco [NICOTIANA]. The species of *Physalis* were formerly used in medicine, but are not now in repute in England. *P. Alkekengi*, the Common Winter Cherry, is grown as an ornamental plant; and in Arabia, and even Germany and Spain, the berries are eaten as a dessert. *Lycium barbarum* is known in England as Tea-Plant, and has been recommended as a substitute for the Chinese plant. The Calabash-Trees of the West Indies and the American continent are different species of *Crescentia*, which is often referred to this order. The fleshy pulp of the fruit of some is eaten, but in most species is deleterious. The most valuable part of the calabashes is their rind, which is tough, and is applied by the negroes to a variety of purposes. Cups, mugs, bowls, basins, and saucepans, are made from them, and many other articles of household use. Cayenne-pepper [CAPSICUM] is the produce of the order, as well as the potato, tomato, and egg-plant [SOLANUM], which are used extensively as articles of diet.—*Eng. Cyc.*

(7735) SOLANUM, the name of one of the most extensive genera of Plants, the type of the natural order *Solanaceæ*. This genus is distinguished by the following characters:—Calyx permanent, 5-10-parted; corolla rotate; anthers oblong, connivent, opening by two pores at the extremity. Fruit a berry, subglobose, 2-celled, sometimes 3-4-celled. The species are herbs or shrubs, unarmed or prickly, rarely spiny. The leaves are entire, sinuated or lobed, mostly alternate. Upwards of 400 species of plants belonging to this genus have been enumerated, including many with apparently very opposite properties. The esculent Tomato, the Egg-plant and the invaluable Potato, with the various species of poisonous Night-Shades, are found united so closely by botanical characters that it is impossible generically to separate them. The properties of these plants however do not differ in kind but in degree; and the berries and leaves, and even the tubers when uncooked, of the Potato, possess in a mild degree the narcotic properties of the poisonous Night-shades. Many of them have also very handsome flowers, and are much cultivated in English gardens and greenhouses. From the immense list of species belonging to this genus, we shall select for description a few of those that are used as medicines, or food, or are much cultivated. Several of the species of *Solanum* are recorded as having medical properties. *S. Jacquini* is considered by the native practitioners of India as an expectorant; *S. Bahamense* is used as a gargle for sore throat in the West Indies; *S. mamosum*. *S. paniculatum* and *S. cernuum*, have the reputation of being diuretic and astringent.—*Eng. Cyc.*

(7736) SOLANUM. *Species.*

Vatarajakoolo, CAN.

Vatarajakooloo is the Canarese name of a species of wild Brinzal (without thorns) which is eaten by the Natives on the Malabar coast.—*Ainslie, p.* 246.

(7737) SOLANUM ÆTHIOPICUM. ÆTHIOPIAN NIGHTSHADE. Stem herbaceous, leaves ovate-repand, angular; peduncles usually 1-flowered, drooping. Berries torulose. It is a native of Ethiopia, China, and Japan. There are two varieties recorded: one, the *Æ. violaceum* is a native of China, and the fruit is frequently eaten in that country as a dessert. It has a large spheroid oval berry of a red colour. The other variety is the *S. Æsculentum*, having a prickly stem, and small yellow berries of the size of peas.

(7738) SOLANUM DULCAMARA, Woody Nightshade, or Bitter-Sweet. Stem shrubby, thornless, climbing, flexuous; leaves cordate, upper ones jagged; corymbs almost opposite the leaves. It is a native of Europe, Asia and North America, in hedges and among bushes. It is plentiful in Great Britain. It has purple flowers and crimson berries, which latter may be mistaken by children for red currants, a mistake that has sometimes been attended with fatal consequences.—*Eng. Cyc.* It is a native of temperate climates, a shrubby twining plant, with scarlet, oval, bitter and juicy berries. These are acrid narcotics, and poisonous in moderately large quantities. The young stalks and tops have been much used in medicine as a diaphoretic and alterative, especially in the treatment of cutaneous diseases, and in asthma; in lepra, psoriasis, and similar affections, it is said to be employed externally with good effect. It is on the whole, however, an unimportant article, and not likely to be much prescribed in Indian practice. The Sol. Dulcamara, or a variety thereof, is found on the Choor mountain. (*Royle.*) —*O'Shaughnessy, p.* 462.

(7739) SOLANUM INCERTUM.

Mannuttha-Kalee, TAM.

The leaves are used as a pot herb. The fruit and leaves in the preparation of chatnies; cultivated by the natives commonly.—*Jaffrey.*

(7740) SOLANUM JACQUINI. Fruit of Jacquin's Nightshade.

Cundungkatre kai, TAM. | Vankoodakai, TEL.
Dorle ka pull. DUK. | Kuntakari, SANS.

This is the edible produce of a low growing prickly (medicinal) plant, used only by the common people. See article Cundungkatri vayr in Ainslie's Catalogue 1st, Section 3d.—*Ainslie, page* 239.

(7741) SOLANUM LYCOPERSICUM. Lin. LOVE APPLE or TOMATO.

Seemie Takalie pullum, also Thuckkalee, TAM. | Tamatie, MALAY.

This is chiefly cultivated by the European inhabitants as a valuable ingredient in soups and

stews.—*Ainslie, p.* 232. Is used also for sauces, chatnies, garnishing, soups, &c. : produces the best fruit when trained on a trellis; more a luxury than valuable as a vegetable.—*Jaffrey.* The large lobed, red berries, and very succulent, of the Tomata, or love-apple, contains much malic acid, and used in sauces.—*O'Sh. p.* 463. Solanum Lycopersicum of Linnæus, is the Common Love-Apple or Tomato. This, with some other of the older species of *Solanum*, now form the genus *Lycopersicum*, which is distinguished by possessing a calyx 5-6 parted; corolla rotate, 5-6-cleft; stamens 5; anthers conical, connate at their extremities by an elongated membrane, and dehiscing lengthwise inside; berry 2-3-celled; seeds villous. The present species is called *L. esculentum*; it has herbaceous pilose stems; unequally pinnate leaves; leaflets cut, attenuated at the apex, glaucous beneath; flowers many, united; berries torulose. This plant is a native of South America, but it is much cultivated and well known in Southern Asia, United States of North America, and in France, Germany, and Italy. When ripe, the fruit has an acid flavour, and is added to soups, sauces, &c. It is also used in confectionary as a preserve, and sometimes as a pickle. It is not often used in Britain, but in Italy, near Rome and Naples, whole fields are covered with it, and scarcely a dish is served up into which it does not enter as an ingredient. In the cultivation of these plants, in England, the seed should be sown in March in a hot-bed, and when 2 inches high they may be pricked out into another hot-bed. In May they should be transplanted into a warm south border, where they may have the full sun, and the fruit may ripen quickly. The stem runs up 6 or 8 feet high, and should be trained to stakes or nailed up a wall or poles. The fruit begins to ripen in August, and may be gathered in October, and, when kept dry, will keep good till November. There are several varieties cultivated; the best are called the Large and Small Cherry and Pear-Shaped Red, and the Large and Small or Cherry-Shaped Yellow. The size of the fruit is seldom larger than a golden-pippin apple. (Don's Miller, vol. iv., p. 444).

(7742) SOLANUM MELONGENA, Egg-Plant, Mad Apple, or Jew's Apple.

Bengan, Brinjal, Hind. | Kuthecreekai, Tam.

This is everywhere cultivated in India and Cashmere. The fruits large, ovoid, firm, and innocent, insipid.—*O'Shaughnessy, page* 463. Several varieties are largely cultivated as a vegetable in Ajmere.—*Gen. Med. Top. page* 183. It is one of the most useful of Indian vegetables; and is used in culinary purposes in various ways, The large Cape varieties are the best; commonly cultivated and used by Europeans and Natives; require good soil and abundance of water.—*Jaffrey.*

Stem herbaceous, woody at the base, clothed with starshaped hairs; ovate serrated leaves flowering peduncles reflexed; fertile peduncle solitary, sterile one racemose; calyx campanulate corolla angular. It is a native of the East Indies and also said to be of Arabia. This plant has purple flowers, and bears large, smooth, shining berries, which are the shape and size of a small hen's egg. Two varieties of this plant are recorded—the *S. M. oviyerum*, in which the stem, calyx and leaves are without thorns; and the *S. M. esculentum*, in which these parts are more or less covered with thorns. Several sub-varieties of both these are recorded, varying in the shape and colour of the fruit. The berries are mostly of a white colour, but in some of the sub varieties they are yellow, red, purple, and black. The fruit of this plant is used by the French and Italians in stews and soups. For this purpose the varieties used are the oval-shaped white, the globular-shaped white, and the purple or violet-coloured of both forms. In cultivating them in Britain, they may be reared in hot-beds in rich light soil, or in fine summers they will even produce their fruit in that country against a wall, if planted out in June after having been struck in a hotbed. See Bayngum also Egg Plant.—*Eng. Cyc.*

(7743) SOLANUM NIGRUM.

Arrub ul-salib, Arab.

Common or Garden Nightshade. Stem herbaceous, without thorns; leaves ovate, bluntly toothed, and waved; umbels lateral, drooping. Throughout Europe it is a weed in cultivated ground, and is also found in Africa and Asia. It is common in gardens, fields, and waste places in Great Britain. It has white flowers, producing small berries of a black colour.—*Eng. Cyc. Solanum Nigrum* grows in waste places in most countries, and is employed as a narcotic by the Hakeems. The fruits are very dangerous, and act in the same manner as those of the belladonna mandrake. The extract of the whole plant according to Orfila, acts like *lactucarium*.—*O'Shaughnessy, page* 462.

(7744) SOLANUM NIGRUM, Fox Grape Var.

Munna Takalie pullum, Tam.	Ruba Tarbuc, Pers.
Communie, Duk.	Canchie pundoo, Tel.
Mackoe, Hind.	Anubussaleb, Arab.
	Kaka Machie, Sans.

This is the small black berry of a low growing species of Nightshade: which, although it has been reckoned poisonous in Europe, is eaten by the Natives of India, and as far as Ainslie learned, with impunity. It is sweetish, but not very palatable.—*Ainslie, page* 228.

(7745) SOLANUM OVIGENUM, or Egg plant, is distinguished from *melongena* by its pulpy fruits, which are stated to be narcotic.—*O'Shaughnessy, page* 463.

(7746) SOLANUM PSEUDOQUINA, False Quina Nightshade. Stem shrubby, unarmed

Leaves oblongo-lanceolate, narrow, acute-entire, glabrous above, but with fascicles of villi in the axils of the nerves beneath. Racemes extra-axillary, short; calyx glabrous. This plant is a native of Brazil in the district of Curitiba, in St. Paul without the tropics. The Brazilians use this for the same purposes as the Quina or Jesuit's Bark. It is intensely bitter, and may with advantage be used as a substitute for that bark.

(7747) SOLANUM PUBESCENS, Lin.

Choondaykia or soondaykia TAM.	Woostaykia, TEL.
Shondek pulla DUK.	Katoobie, SANS.

This is about the size of a small marble and grows wild in the woods. It is somewhat bitter and like the Toodoovullay (its congener) is commonly eaten fried, having been previously sprinkled with a little salt and water.—*Ainslie, p.* 238.

(7748) SOLANUM SANCTUM, Palestine Egg-Plant. Stem shrubby, tomentose; leaves ovate-repand, oblique at the base, clothed with hoary tomentum on both surfaces. Berries nearly globose. This plant is a native of Palestine; it is often found in collections of plants. There are several other species of *Solanum*, which, on account of the size, form, and colour of their fruits, are called Egg-Plants as *S. Indicum*, the Indian Egg-Plant, &c.

(7749) SOLANUM SODOMEUM, Sodom Egg-Plant, or Apple of Sodom. Stem shrubby, diffuse; prickles straight, dilated at the base; leaves oblong-sinuate, shining above, and rather scabrous and prickly on both surfaces; lobes obtuse-angular; peduncles bifid. It is a native of the North of Africa and the south of Europe. The Fruit of this plant is white, and about the size of a walnut. It is very subject to the attacks of an insect which deposits its eggs within the germen, and as the fruit enlarges, the larvæ of the insect, as in the case of many other fruits, destroy and pulverise the whole of the interior whilst the rind is left unchanged and entire. When the fruit is gathered under these circumstances, it is crushed to pieces by the hand; or if conveyed to the lips, the mouth becomes filled with an ash-like powder, exceedingly bitter to the taste. To these berries remarkable properties have been assigned by Josephus, Tacitus, and others. Mandeville, an old English writer, says, speaking of the Dead Sea, "And there besyden grown trees that baren fulle faire apples and faire of colour to beholden, butte whosoe breaketh them or cuttethe them in two, he shall find within them coles and cyndres." Milton finely alludes to this fruit in the lines:—

"Greedily they pluck'd
The fruitage fair to sight, like that which grew
Near that bituminous lake where Sodom flamed.
This more delusive, not to touch but taste
Deceived; they fondly thinking to allay
Their appetite with gust, instead of fruit
Chewed bitter ashes."

(7750) SOLANUM TORVUM.

Soonday-kai, TAM.

Used as a vegetable by the natives: a weed.

(7751) SOLANUM TRILOBATUM, Lin.

Moondla moostek-koora. TEL.	Toodoovullay Keeray, TAM.
Achooda, SANS.	

(7752) SOLANUM TRILOBATUM.

Fruit of the Three lobed Nightshade.

Moondlamoostek kai, TEL.	Toovullay kai, TAM.
	Achooda, SANS.

This is round and small being not much larger than a marrow fat pea. It has a somewhat bitter taste not unlike that of its congener the choondaykai, and is commonly eaten fried having been previously sprinkled with a little salt and water.—*Ainslie, p.* 245 *and* 357.

(7753) SOLANUM TUBEROSUM. Common Potato, is known in the genus by its tuberous subterranean stem, herbaceous stems without thorns, unequally pinnate leaves with entire leaflets, and articulated pedicles. It is one of the plants for which we are entirely indebted to America. It is found native in the greatest abundance on the western coast of South America. Like most plants which are much cultivated, an abundance of varieties have been produced from the original plant, and in the leaves, colour of the flowers, shape, size, and colour of the tubers, it has a great tendency to depart from its normal character. Two other species of *Solanum*, namely, *S. Valenzuela* and *S. montanum*, produce edible tubers, but they are little used.—*Eng. Cyc.* In Tenasserim the potatoe is of easy culture, but the tubers are very small, and it is not an object of cultivation, though with a little attention, it might possibly be made one. —*Mason.*

(7754) SOLANUM VERBASCIFOLIUM, Mullein-Leaved Nightshade. Stem shrubby; leaves ovato-oblong, acuminated, entire, tomentose, white beneath, without any leaves in the axils; corymbs nearly terminal, dichotomous; calyx semi-quinquefid. It is a native of Asia, America, and the tropical parts of Australia. This plant is frequently cultivated. Every part is covered with a powdery white tomentum. The flowers are white, and the berries are of the size of small cherries.

(7755) SOLE. PLAGUSIA. TENASSERIM SOLE. A small fish of the sole family that grows to nine inches or a foot long, is sometimes seen in the bazar. It has no pectoral fins, and the dorsal, caudal and ventral fins are united, so it is a species of plagusia. The natives think that two of them always swim together, with their flat, uncoloured sides united. —*Mason.*

(7756) SOLLYA HETEROPHYLLA. PITTOSPORACEÆ. These are ornamental little shrubs with bright blue bell flowers, should be

grown in a loamy soil, and are propagated by seed or cuttings,—*Riddell.*

(7757) SOMRAJ.—Seeds of Conyza (or Serratula) anthelmintica—a worm medicine often sold in the bazar instead of Zeera seeah, or black carraway.—*Ben. Phar.*

(7758) SONCHUS OLERACEUS.

Kaat-mooliugee-keeray, Tam.

The Sow Thistle; used in the Neilgherries as a pot herb by the natives.—*Jaffrey.*

(7759) SONERILA. Perhaps the prettiest little annual in the neighbourhood of Tavoy is a species of Sonerila. Its bright purple blossoms peeping up in the grass attract the attention of the most casual observer.—*Mason.*

(7760) SONF. Indian Fennel. Fœniculum Panmorium.—*Ben. Ph. page* 226.

(7761) SONNERATIA, a genus of Plants belonging to the natural order *Myrtaceæ*, so named by the younger Linnæus in compliment to M. Sonnerat, well known by his 'Voyage à la Nouvelle Guinée,' and his 'Voyages aux Indes Orientales et à la Chine,' and who made known many new plants. The genus is characterised by having a 4-6-cleft campanulate calyx, adhering to the ovary at the very base; petals 4 to 6, alternating with the valvate lobes of the calyx; stamens numerous; styles filiform, with a peltate stigma; fruit baccate, appearing half-superior, many-celled; seeds numerous, nestling in a fleshy pulp, curved: the species form moderate-sized trees, with opposite leaves, which are entire, thick, and almost veinless; flowers usually solitary, large.—*Eng. Cyc.* Dr. Hooker found *Sonneratia*, *Heritiera littoralis*, and *Careya*, forming small gnarled trees on the banks, in the Sunderbuns, with deep shining green-leaved species of *Carallia*, *Rhizophora*, and other Mangroves. Occasionally the gigantic reed-mace (*Typha elephantina*) is seen, and tufts of tall reeds (*Arundo*).—*Hooker, Him. Jour. Vol.* II. *page* 355.

(7762) SONNERATIA ACIDA, is the best known species, being the Pagapate of Sonnerat, and the Blatti of Rheede, which has an acid eatable fruit. The branchlets tetragonal; leaves oval, oblong; calyx 6-cleft; petals 6; berry globose. The tree is forty feet high, and is a native of New Guinea and the Moluccas, as well as of the Malabar coast and of the delta of the Ganges.—*Eng. Cyc.* This abounds in the Tenasserim mangrove swamps, and on the banks of almost every stream on that coast as far as tide-waters reach: the natives use it for various economical purposes, and it is said to be "a better substitute for coal in steamers than any other kind of wood."—*Mason.*

(7763) SONNERATIA ALBA, is a species of the Moluccas, and *S. apetala*, a native of Ava, near Rangoon, as well as in moist situations along the Burmese coast.—*Eng. Cyc.*

(7764) SONNERATIA APETALA. Weeping Sonneratia.

Kambala. Burm.

There is a species of sonneratia in the low wet lands near the mouths of some of the Tenasserim rivers, well deserving of a place in our cities. It bears a strong resemblance to the weeping willow and is one of the most graceful trees in the country. The casuarina has been removed from the coast to our compounds, and the sonneratia is quite as deserving.—*Mason. Sonneratia apetala*, furnishes a strong hard wood of coarse grain, found throughout the Sunderbunds, under the parallel of Rangoon. It is the timber of which boxes for packing beer and wine are made of in Calcutta; gives a red-colored wood, strong and adapted for house-building.—*McClelland.*

(7765) SOOJA. A pickle prepared in Japan from the Dolichos bean.—*Simmonds.*

(7766) SOONDREE. Heritiera Minor. *Syn.* Heritiera fomes. The soondree is a gloomy looking tree that may be distinguished from all others for many miles distant. It is remarkably characteristic of a peculiar soil. Wherever the tides occasionally rise and inundate the land, this tree is sure to be found throughout the whole Tenasserim Coast, but it is never found either on the high dry lands on the one hand, nor in the wet mangrove swamps on the other. It is the tree which was described by Dr. Buchanan Hamilton, who accompanied Symes' embassy, as *Heritiera Fomes.* It is the toughest wood that has been tested in India. When Rangoon teak broke with a weight of 870 pounds, soondree sustained 1312 pounds. It is not a very durable wood, but stands without a rival in strength, although so common on the other Coast, as to give name, as Captain Munro thinks, to the Soonderbunds, yet the tree grows much larger in the Tenasserim Provinces, and affords finer timber.—*Mason.*

(7767) SOONKASOOLA WOOD.

Soonkesooloo, Tel. | Vadee naroinin, Tam.
Sunkesur ke lakree, Hin. |

(7768) SOORINJAN, Hermodactylus. A root in appearance like the pignut, imported via Pali, is bitter and sweet in taste, used as an aphrodisiac.—*Gen. Med. Top. p.* 150.

(7769) SOORIYE. A hard, though somewhat coarse and open grained, heavy Ceylon wood, of a deep chesnut colour.

(7770) SOOT'HNEE. *Duk.* Dioscorea Fasciculata. Yam. Consists of many tubers, about the size and shape of an egg. They are covered with a light coloured thin skin; internally they are white. They are not only eaten, but starch is made from the roots.—*Riddell.*

(7771) SOPHORA, a genus of Plants belonging to the natural order *Leguminosæ*, said to be so named from an Arabic name (Sophera) of one of the species. These are ornamental shrubs and trees, found in central and tropical Asia, also in

the warm parts of North America and the equinoctial and sub-tropical parts of South America. The genus is characterised by having a 5-toothed campanulate calyx; corolla papilionaceous; petals of the keel usually united together at their apex; stamens 10, distinct; legumes moniliform, without joints or wings, and containing several seeds; the leaves are impari-pinnate, usually exstipulate and terminal; the inflorescence is in racemes or panicles of yellow, white, or blue flowers. The species best known in England are *S. Japonica* and *S. Chinensis*, which, being from the northern latitudes of the countries from which they are named, are hardy enough to withstand the climate of England; and it has been proposed to engraft the Nepaul *S. velutina* on the *Japonica*. Being handsome trees, with both leaves and trees differing much from European trees, they are well adapted for standing singly in lawns. They are raised from layers, but also from seeds and require a little protection when young.—*Eng. Cyc.* Wight gives Sophora glauca, 979; heptaphylla, 1155; robusta, 245 and *page* 16 *Vol.* III.

(7772) SORECIDÆ, the family of Shrews, or Shrew-Mice, comprising the genus *Sorex* of Linnæus. This family, according to Mr. Swainson, embraces the Shrews, Moles, and Hedgehogs, with the following characters:—Muzzle lengthened, pointed. Legs short, feeble; feet pentadactylous. Lower incisors generally very long, pointing forwards. No lateral membranes. Mammæ ventral. The family thus characterised includes the genera *Erinaceus*, Linnæus; *Sorex* Linnæus; *Mygale*, Geoff.; *Scalops*, Cuv.; *Chrysochloris*, Cuv.; *Talpa*, Linnæus; *Centenes* Cuv.; and *Condylura*, Desm.—*Eng. Cyc.*

(7773) *Sorex Indicus*, S. MYOSURUS, Pallas, the Musk-Rat of India, has much the same appearance in point of colour and the size of its naked ears as our Common Shrew, but is nearly as large as England's common Brown Rat, and the tail is round and thinly furnished with hairs. This species diffuses a most powerful odour of musk, which impregnates everything that is touched by it. Even the wine in a well-corked bottle, over which the animal has run, is rendered unfit for use in consequence of the flavour imparted to it. Cuvier states that this species is found throughout the East Indies and in a part of Africa, and that it is among the animals embalmed by the ancient Egyptians; but, according to others, it is *S. Olivieri*, Desm., which Olivier found in a mummy state in the catacombs of Sakkara.—*Eng. Cyc.*

(7774) *Mygale moschata, Castor moschatus.* Linn., appears to be the Dæsman of the Fauna Suecica; Le Desman of the French; the Biesamratze of the Germans; the Wychozhol of the Russians; and the Muscovy or Musk-Rat of the English. The tail is shorter than the body, scaly, nearly naked, contracted at its base, cylindrical, and convex in its middle, very much compressed vertically at its extremity; fur brown or dusky above, whitish-ash below. Total length, including the tail, about 15 inches, of which the tail measures 8 inches. It is found in the river Volga, and the adjacent lakes from Novgorod to Saratov. This species does not appear to have been seen on dry land; and indeed it is broadly asserted that it never goes there, but wanders from lake to lake in fortuitous floods only. It is often seen swimming or walking under the water, and coming for air to the surface, where, in clear weather, it is apt to sport.—*Eng. Cyc.*

(7775) SORGHUM, a genus of Grasses, said to be named from the Oriental name of one of the species, of which 'sorgo' is the Italian name. The species have sometimes been referred to *Holcus*, sometimes to *Andropogon*, but from their habit and uses they seem well entitled to be considered as a distinct genus, which may be characterised as having the flowers monœcious, panicled; glume coriaceous, cartilaginous, 2-flowered; the upper flower hermaphrodite, the lower palea more or less deeply bifid and awned between the lobes, the upper often wanting. The species form tall grasses with succulent stems, and are found in the tropical parts of Asia, whence they have spread to the warm parts of Europe.—The species commonly sown in India are *S. vulgare* and *S. bicolor* (Kala-Joar). *S. cernuum* is a distinct species, which forms the principal food of the mountaineers of the Munipoor district. *S. saccharatum* is also cultivated in many parts during the rainy and cold seasons, on land which is too high for rice. The stalks and straw of all are much valued as fodder for cattle, being cut into small pieces, commonly called Kurbee, *Hind.*—*Eng. Cyc.*

(7776) SORGHUM SACCHARATUM. SORGHUM MILLET. A millet plant is occasionally seen, which in the United States is called "broom-corn," it being there manufactured into brooms.—*Mason.*

(7777) SORGHUM VULGARE. HOLCUS SORGHUM. Great Millet. Holcus Saccharatus. Linn. Joar. Guinea Corn.

Cholum, TAM.	Chavela, MAL.
Juvar, GUZ.	Jolah, CAN.
Joarie, DUK.	Zonaloo, TEL.
Jooar, HIND.	Durra, also Zurrut, ARAB.

Red.

Red Jawaree, ENG.	Lall Jooaree, HIND.
Yerra jonnaloo, TEL.	Sagappoo soalum, TAM.

Brown.

Brown Jawaree, ENG.	Jooaree, HIND.
Jonnaloo, TEL.	Soalum, TAM.

White.

White Jawaree, ENG.	Safaid jooaree, HIND.
Tella jonnaloo, TEL.	Vellai soalum, TAM.

Sorghum Vulgare is the largest of the small cereal grains, and may be considered the

representative of the Indian Corn (*Zea Mays*) in America, where it is usually called Guinea Corn, and in some works the Great or Indian Millet. The different kinds are usually called Joar in India, where they form a principal object of culture, and one of much more importance than would appear in Europe, as many of the inhabitants live as much upon these small or dry grains as upon rice. The Joar is the Durra of some Arab tribes and the Zurrut of others ; its Indian origin is indicated by the Persian name, Jawur-i-Hindee. It is extensively cultivated throughout Asia, and appears to be the Tall Corn of the Chinese. It has been introduced into the south of Europe, where it is chiefly employed for feeding cattle and poultry, but it is also made in cakes. The flour is white, and a good deal resembles that of the Indian corn in nature.—*Eng Cyc.*

This is largely grown in the Chittledroog and in part of the Nuggur Divisions. It is sown during the thunder showers between the end of April and May ; and the crop is reaped in September and October. The great defect in this grain is that it will not keep, being soon destroyed by insects; and the Ryots have difficulty in preserving sufficient quantity of it for seed on the following year. The seed grain is mixed with ashes, and packed with paddy straw ; in spite of which, however,insects obtain admittance. The stems or straw of this grain when well preserved from rain, will keep for about ten years, and are used as fodder.—*M. E. of* 1857. This millet, of the Linnean genus Holcus, is often grown by the Karens, and occasionally by the Burmese. This is the millet designated in Ezekiel 4. 9.—*Mason.*

(7778) SORREL. This is grown by sowing the seed broad cast and thinning the plants to the distance of eight or ten inches from one another. It may be sown at the commencement of the rains.—*Riddell.*

(7779) SORREL. RUMEX ACETOSA. Used as spinach and salad, of little value, the French Sorrel, R, scutatus is a very delicate vegetable, of easy culture in light soil.—*Jaffrey.*

(7780) SOULAMIA (Soulamion is the name of the tree in the Moluccas), a genus of Plants belonging to the natural order *Polygalaceæ*. It has 5 sepals, the 3 outer ones very small, the 2 inner large and concave; the petal is concave; the capsule samaroid, indehiscent, compressed, corky, emarginate, and 2-celled.—*Eng. Cyc.*

(7781) SOULAMIA AMARA, Bitter Soulamia, is a shrub with crowded ovate leaves tapering to the base, quite entire, and veiny. It is a native of the Moluccas, and has white racemose flowers, the size of those of the vine. The fruit is compressed, thin at the edges, dry, with 2 seeds in each cell resembling cucumber seeds, but smaller, each lying in a small cavity of the cell. —*Eng. Cyc.*

(7782) SOUR SOP. ANONA MURICATA.

(7783) SOUSEE. *Hind.* is manufactured principally in the towns of Tanjore, Trichinopoly, St. Thomé or Mylapore. Those of Tanjore and Trichinopoly are made of silk and mixed with cotton of various colours and sorts ; but Mylapore weavers work only in cotton : they are 7 yards by 1, the silk pieces are sold at from 8 to 20 Rs., those of cotton at 2 to 7 Rs. each. These are used for undergowns, or Lungahs, by the Mahomedan females and as trousers for men.

(7784) SOUTHERNWOOD. ARTEMISIA ABROTANUM. This plant, of the same genus as wormwood, is seen in European gardens in Tenasserim.—*Mason.*

(7785) SOUTHERNWOOD. ARTEMISIA AUSTRIACA. Lin.

Downah, HIND.	Marikolundoo,
Dawanum, TEL.	TAM.

The Tamul people sometimes mix the fine powder of it with Gingilie oil and anoint themselves with it after bathing. The Mahometans prize it for its fragrance as a flower ; and it is one of the many sweet smelling shrubs that are strewed before the Hindoo gods at religious ceremonies.—*Ains. Mat. Med. p.* 44.

(7786) SOY.

Soy. CHINESE.	Soya, JAPANESE.

A peculiar savoury sauce, made from the *Soja*, a species of *Dolichos*, growing in the Eastern parts of Asia. Genuine soy is well flavoured, thick, brown, and clear ; and when shaken in a glass, it should have a coat on the surface of a bright yellowish-brown colour. It is obtained from Canton ; but the best is exported from Japan, by way of Batavia.—(*Waterston*) *Faulkner.* Soy, is made in some parts of the East, from a species of the Dolichos bean (soja hispida) which grows in China and Japan. In Java, it is procured from the Phaseolus radiatus. The beans are boiled soft, with wheat or barley of equal quantities, and left for three months to ferment, salt and water are then added, when the liquor is pressed and strained. Good soy is agreeable when a few years old, the Japan soy is superior to the Chinese. Large quantities are shipped for England and America. The Dolichos bean is much cultivated in Japan, where various culinary articles are prepared from it, but the principal products are a sort of butter termed mico, and a pickle called sooja. 1,108 piculs of soy were shipped from Canton in 1844, for London, British India, and Singapore. 100 jars, or about 50 gallons of soy, were received at Liverpool in 1850. The price is about 6s. per gallon in the London market.—*Simmonds' Commercial Products, page* 313. The best soy is made by boiling beans soft, adding an equal quantity of wheat or barley, and leaving the mass to ferment ; a portion of salt, and three times as much water as beans, are afterwards put in, and the whole compound left

for two or three months, when the liquid is pressed and strained. The flavour and ingredients of soy vary considerably, even among the people who make it, and much of that exported is supposed to be more or less adulterated.—*Williams' Middle Kingdom, Vol.* II. *p.* 402. Leguminous and cruciferous plants ocupy the largest part of the CHINESE kitchen garden; many sorts of peas and beans are cultivated, and the pods and seeds of two species of Dolichos are eaten, and the beans of another species made into soy by boiling and powdering the kernels and then fermenting them with yeast, and mixing other ingredients, according to the taste of the maker or purchaser.—*Williams' Middle Kingdom, Vol.* II. *page* 403. The widely diffused and extensive tribe of Leguminosæ holds an important place in Chinese botany, affording many esculent vegetables and valuable products. Peas and beans form important objects of culture, and the condiment called soy (a word derived from the Japanese soya), is prepared chiefly from a species of Dolichos. One of the commonest modes of making this condiment is to skin the beans, and grind them to flour which is mixed with water and powdered gypsum, or turmeric. The common Chinese eat few meals, without the addition of one form or other of the "bean" curd, or "bean" jelly. One genus of this tribe affords indigo, and from the bunds and leaves of a species of Colutea a kind of green dye is said to be obtained.—*Williams' Middle Kingdom, p.* 283.

(7787) SOYA, or SOWA, Dill Seed, an Umbelliferous Plant cultivated in India. It is the *Anethum Sowa* of Roxburgh, of which the aromatic seed is much used by the natives in cookery, as well as for medicinal purposes; the green parts also are cut down, and sold in the bazars, as the plant is used as a vegetable both by Mussulmans and Hindoos. The seeds are the 'shubit of Avicenna, which is usually translated Anethum; by the Arabs it seems to have been considered the Ἄνηθον of Dioscorides.—*Eng. Cyc. Ben. Ph.* 226.

(7788) SOYMIDA, a genus of Plants belonging to the natural order *Meliaceæ*, named by A. Jussieu from the Telinga name of the tree, which was referred to *Swietenia*, and called *S. febrifuga*, by Dr. Roxburgh. This is a large forest-tree, a native of the mountainous parts of the Rajahmundry Circars, and likewise of the jungly places in general of the central parts of Hindustan. The genus is characterised by calyx 5-leaved, imbricate; petals 5, shortly clawed; stamen-tube cup-shaped, 10-lobed, each lobe bidentate at the apex; anthers 10, included within the tube and lodged between the teeth of the lobes; ovary 5-celled, seated on a broad disc; ovules numerous, pendulous from the centre of the cells; style short, stigma peltate, 5 cornered; capsule woody, 5-celled, 5-valved; seeds winged. The only species known attains a height of 80 feet with abruptly pinnate leaves. The inflorescence is a large diffuse and terminal panicle. —*English Cyclopædia, p.* 859. This tree which is called Rohuna in Hindustan is particularly noted on account of its bark. This is of a dull red colour, of a fibrous nature and astringent and has been much employed in India for the cure of intermittent fevers.—*Eng. Cyc. p.* 859.

(7789) SOYMIDA FEBRIFUGA. *Cedrelaceæ*, Roxb. C. 17. Swietenia febrifuga. *Syn.* Red wood, or Bastard Cedar.

Shem Marum or Choar	Soymeda, TEL.
Kullie Marum, TAM.	Wond Marum, TAM.
Rohuna, Rohitaka, HIND.	

A large forest tree, a native of several of the mountainous districts of India, in the Rajamundry Circars, the district of Cuddapah, the Chunar hills, and the jungles to the south of Hazareebagh. Royle, indeed, states that it occurs in all the central and southern parts of India. The bark of this tree has enjoyed much celebrity. Mr. Breton and others have spoken very highly of the efficacy of this bark in the treatment of periodical fevers. It seems to us to be exactly similar to the mahogany bark, useful where astringent tonics are applicable, but of very questionable efficacy as a true anti-periodic. Although we cannot advise its use in the treatment of obstinate or dangerous cases, still for mild ague, in which doubtless like all other astringent tonics it will often succeed, we commend it to be given in the form of the *extract* described in our officinal preparations.—*O' Shaughnessy, p.* 247-9. This, says Wight, is the Swietenia febrifuga of Roxb. and Ainslie, I have not seen the wood and only know of its existence in Coimbatore from Botanical specimens of the tree brought under that Native name. The wood is said to be most durable and strong.—*Wight. Soymida or Swietenia febrifuga*, is very abundant in Nagpore and Southern India. Rohun bark is an undoubted febrifuge, but in the bazars in Bengal, Nux Vomica bark is often sold for it, and from this Mr. Piddington, who has shown much zeal in examining native febrifuges, procured a salt, which Dr. O'Shaughnessy found to be one of Brucine. Dr. O'Shaughnessy has never succeeded in obtaining an alkaloid from the tree Rohun, which it may be observed is of a dull red colour, with rough grey epidermis, and yields a red powder. The value of this bark as a febrifuge has been attested by Roxburgh, Duncan, Breton and Spilsbury. Dr. O'Shaughnessy does not think so highly of this bark as others do, not considering it much superior to that of its congener, Mahogany. He accounts it useful where astringent tonics are applicable, but of very questionable efficacy as a true antiperiodic; he thinks it may succeed where other astringent tonics will do so. From the reports of dispensaries I am inclined to have a somewhat higher opinion of this medicine and

believe that it is of considerable use, though by no means equal to the Berberis. If the statement of the Madras report be accurate, its virtues may be more powerful than is supposed. The reporters say, "We have from our own experience found that when taken beyond the quantity of 5 or 6 drachms in the course of the day it produced vertigo and other head symptoms." This is confirmed by Dr. Spilsbury, who says large doses were found to produce vertigo.—*Ind. Ann. Med. Sci. for* 1856. *p.* 191.

(7790) SPARIDÆ, or SPAROIDES, a family of Fishes belonging to the section *Acanthopterygii*, which are distinguished by the following characters combined, namely: the possession of a single dorsal fin, the anterior half of which is supported by spinous rays, and which is not divided, nor is it protected by scales; the operculum is spinous, the palate destitute of teeth, the branchiostegous membrane has five or six rays, and the pyloric appendages are few in number. The body is usually of an ovate form and covered with large scales; the mouth is not protractile. The species of this family feed chiefly upon the animals of small shell *Crustaceæ* &c., for crushing which their strong teeth are admirably adapted.

The genus *Pentapus* is founded upon certain Sparoid Fishes found in the India Seas, and off the coast of Australia, which approach the genus *Dentex*, but have two strong canine teeth in front of each jaw, between which sometimes are two or four much smaller teeth; the other teeth are minute, prickly, close together, and arranged in a sigle row in each jaw.

Lastly, the genus *Crenidens* is distinguishable by the foremost row of compressed teeth being dilated at the apex and notched; behind these are numerous small globular teeth There is but one species, the *C. Forskalii*, Cuv. and Val., an inhabitant of the Red Sea.—*Eng. Cyc.*

(7791) SPARAXIS. IRIDEÆ. This is a pretty species of Irideæ, and is cultivated by dividing the roots.—*Riddell.*

(7792) SPATHE (the Greek σπάθη). This term is applied to the sheathing involucrum of many plants. It is seen in the greatest perfection in the flowers of *Palmaceæ* and *Araceæ*, where, during the flowering of the plants, it embraces the entire inflorescence. This organ is considered by most botanists to be a modification of the bract.—*Eng. Cyc.*

(7793) SPATHIUM CHINENSE. SPATHIUM ROOT. In Tenasserim there are one or two species of Spathium, plants that grow in the water; one of which Voigt says, is found on the banks of the Irrawaddy, and has roots "nearly as good as potatoes."—*Mason.*

(7794) SPATHODEA, a genus of Plants belonging to the natural order *Bignoniaceæ*. The calyx is spathaceous, cleft and toothed or entire on the other side; the corolla is funnel-shaped, with a 5-lobed rather unequal limb; the four stamens are divided into two long and two short, with the additions of a fifth sterile filament; the capsule silique-formed, falcate, falsely 4-celled, and corky; the seeds are furnished with membranous wings; the species are erect shrubs or trees, rarely climbing shrubs; the flowers, somewhat panicled, orange colored, yellow, or purple. Dr. Wight gives Spathodea arcuata, 1340; and Rheedii, 1339.

(7795) SPATHODEA ADENOTHYLLA. A small introduced tree. Madras Hort. Garden. 53.

(7796) SPATHODEA ARCUATA. *Bignoniaceæ*, Icon. 1340.

Rau pallay marum, TAM.

A medium sized tree frequent in the Walliar jungles. I do not know the wood, but judging from its relations—padre and vadencoornee—I infer it will be found good.—*Wight.*

(7797) SPATHODEA LONGIFLORA, is an arboreous plant, and has large spreading terminal panicles, a bilabiate corolla, long pendulous slender sub-cylindrical follicles, with sharp edges and variously curved; the flowers are large yellow, and very fragrant; the follicles very long; the wood of this tree is high-coloured, hard, durable, and of much use amongst the inhabitants of the hills about the coasts of Coromandel and Malabar, where it is plentiful.—*Eng. Cyc.*

(7798) SPATHODEA RHEEDII has downy impari-pinnate leaves, roundish downy leaflets, terminal erect racemes, and a much-curved slender corolla; the shoots are covered with a whitish down; the racemes the length of the leaves; the flowers white and pretty large; the limb spreading; the fruit about a foot long, pendulous, twisted in various forms.—*Eng. Cyc.*

(7799) SPATHODEA ROXBURGHII has its leaves three in a whorl or scattered impari-pinnate; the leaflets from 4 to 5, in pairs serrated and smooth; the panicles erect, terminal, dense, downy, and many-flowered; the fruit narrow and 4-celled; the calyx generally 2 parted, with the upper lip 2-cleft and downy. It is a native of the Circars. The branches are very spreading; the back gray, with a few scabrous spots; the flowers large, rose-coloured, and delightfully fragrant; the limb of the corolla nearly equal, and elegantly waved at the edges. This species is remarkable on account of its serrated leaves. The wood is employed for many purposes by the natives.—*Eng. Cyc.*

(7800) SPATHODEA UNCINATA. BIGNONIACEÆ.—This genus of plants are showy and handsome, the colour of the flowers being yellow, purple, and red; they are easily propagated by seed or cuttings, and require a good garden soil.—*Riddell.*

(7801) SPATTALLA. PROTEACEÆ.—This genus are all Cape plants, and require the same treatment as others Proteaceæ.—*Riddell.*

(7802) SPEAR-MINT. Mentha viridis. Cultivated for the fragrant leaves, which are used in sauces, tea, &c., requires rich soil, shade and plenty of water, propagated by division of the plant.—*Jaffrey.*

(7803) SPELTER, ZINC, TUTENAGUE.

Pi-yuen, CHIN.	Dasta, NEP.
Zinc, FR.	Jussud, PERS.
Zink, GER.	Schpiauter, RUS.
Sungbusrie, DUK.	Zinco, Cinck, SP.
Jussud, GUZ. HIND.	Tootoo nagum, TAM. and TEL.
Zincum, LAT.	
Zinco, IT.	

A metal of a blueish-white colour and lustre. Being cheap, light, and a metal which, when superficially oxidized, long resists the further action of air and water, it is now employed as a substitute for lead in lining water cisterns and roofings: alloyed with copper it forms brass; and several of its compounds are used in medicine. Zinc is obtained either from *Calamine*, a native carbonate, or *Blende* a native sulphuret: it has never been found in a state of purity. Localities, Great Britain, China, Germany.—*Faulkner. Spelter*, is in China used in the manufacture of brass; it is in plates of half an inch thick of a whitish-blue color. There was formerly a monopoly of spelter, so that no foreigner could either buy or sell it; the consumption may perhaps increase a little under the new arrangement, but the native tutenague and white copper will probably prevent much consumption of foreign spelter.—*Morrison.*

(7804) SPERMACETI.

Blanc de Baleine, also Sperme de Baleine, FR.	Spermaceti IT.
Wallrath, GER.	Spermazet RUS.
	Esperma de Ballena. SP.

The produce of a species of whale *Physeter macrocephalus*, found chiefly in the South Seas. It is characterised by a large head, great part of which is occupied by a triangular cavity filled with a white oily substance, which, after its death congeals into an unctous mass, and from which a considerable quantity of oil may be obtained by expression. The residuum is a concrete fatty substance called spermaceti, which, after being purified, is cast into blocks or cakes. These are of a white colour, have a peculiar lustre, are transparent, brittle, smooth, but not greasy; smell-peculiar, but weak. Spermaceti burns with a brillant flame, without smell; and is used in the manufacture of candles; also for medical purposes.—*Faulkner.* The *Physeter macrocephalus*, called the Cachalot, or White Whale, is of immense size, frequently 60 or more feet in length, of which the head constitutes one-third. This part is the chief reservoir of the spermaceti, which however is found in several other parts of the body, mixed with the sperm oil. It is mostly lodged in two large cavities of the upper jaw, one above and the other below, divided from each other by the nostrils. These cavities are subdivided into numerous cells of unequal size by ligamentous or tendinous partitions; these partitions are of the same nature as those which separate the fat in other animals, but, owing to the great size of the creature, of a larger and stronger kind. The purest spermaceti is contained in the largest and least ligamentous cells. The part in which it is lodged is quite distinct from the cranium containing the brain, which spermaceti was at one time supposed to be. During the life of the animal the spermaceti is in a fluid state, and on the head being open has the appearance of an oily clear white liquid. On exposure to the air the spermaceti concretes and deposits from the oil. They are then separated, and put into different barrels.—*Eng. Cyc.*

(7805) SPERMACETI-WHALE. CETACEA.

(7806) SPERMADICTYON, a genus of Plants belonging to the natural order *Rubiaceæ*, named from σπέρμα, seed, and δικτυον, a net, from the manner, in which the seeds cover the placenta. The genus is characterised by having the calyx-tube ovate, 5-partite, persistent: corolla densely pubescent; tube long, straight, 5-lobed; stamens 5, included within the corolla-tube; stigma 5-cleft; capsule crowned by the calyx, contains 5 nuts. The species form shrubs, with white and light blue very fragrant flowers, with leaves lance-shaped, shortly petioled; stipules short. They are natives of Hindustan. *S. suaveolens*, the *S. Hamiltonia* of Roxburgh, ascends the Himalayas to elevations of 3000 feet, and has been cultivated in Great Britain as a stove-plant.—*Eng. Cyc.*

(7807) SPHENOCLEA, a genus of Plants belonging to the natural order *Campanulaceæ*, consisting of only a single species. The genus is characterised by having a superior 5-parted calyx with inflexed segments. Corolla 5-parted, with the segments inflexed and somewhat auricled at the base, and which conceal the 5-sessile stamens; ovary inferior; style very short and 2-lobed; capsule membranous, many-seeded, with a central fungous placenta, circumsessile; seeds minute, embryo without albumen, straight, with the radicle next to the hilum. The only known species, called *S. Zeylanica*, is an annual, with alternate entire leaves, without stipules; found in marsh situations in all parts of India. It is sometimes made the type of an order.—*Eng. Cyc.*

(7808) SPHÆRANTHUS. Of this genus, Wight gives Sphæranthus amaranthoides, 1149; and hirtus 1094.

(7809) SPHÆRANTHUS INDICUS. INDIAN SPHÆRANTHUS.

Kottangkarundei, TAM.	Bodatarum, TEL.
Moondie, DUK.	Moondee, SANS.
Dookkon, ARAB.	

The small oblong seeds and receptacles of this low growing herbaceous plant (2) are reckoned by the Vyteans amongst their anthelmintics and are prescribed in powder. Rheede tells us that the powder of the root is considered as stomachic, and that its bark ground small, and mixed with whey, cures the piles.—*Ains. Mat. Med. p.* 85.

(7810) SPHÆRANTHUS MOLLIS: Soft. Globe Flower.

Gork-mundi. Hind.

Common near the Ana-sagur; used by the natives in medicine.—*Genl. Med. Top. p.* 135.

Sphæranthus Mollis and Indica, are common near water banks at Ajmeer: S. mollis has a round pink blossom: considered heating: cleanses the blood: aphrodisiac: also opens the bowels: the flower and seed capsules are used.—*Genl. Med. Top. p.* 206.

(7811) SPHÆROCARYA, a genus of Plants belonging to the natural order *Rhamnaceæ*, so named from σφαιρα, a sphere, and καθυον, a nut. The species forms moderate-size trees in Nepaul. The clayx is 5 parted. Petals 5 and alternate with the 5 stamens, which, like the petals are inserted into the clayx, and with 5 fringed scales placed between the stamens, and opposite the calycina segments. Drupe pear-shaped, containing a smooth round nut.—*Eng. Cyc.*

(7812) SPHÆROCARYA EDULIS, is so called from its fruit being eaten and relished by the Nepaulese, though not very palatable to a European taste. This tree is a native of the forests of Nepaul, and has alternate, ovate-entire, exstipulate leaves, with axillary and terminal villous racemes of small greenish-coloured flowers, which are without odour.—*Eng. Cyc,*

(7813) SPHÆROCOCCUS, a genus of plants belonging to the natural order *Algæ*. It was formed by Stackhouse, and applied to the plants belonging to it, on account of their globose fructification. A great number of species of this genus have been described including amongst them some of the most useful of the sea-weed tribe. These species have been distributed by later botanists into the genera *Rhodomenia, Gigartina, Chondrus*: *Gelidium*, and *Phyllophora* and the genus *Sphærococcus* has only one species, the *S. coronopifolius*. The genus *Chondrus* affords the Carrageen Moss, which is so much used as an article of diet. It is a species of *Gelidium*, with which, as some assert, the swallows build their nests in the Eastern Archipelago and which are so highly valued as articles of food by the Chinese.—*Eng. Cyc.* The gelatinous substance of which the nests are composed, however, seems, really, to be a natural secretion from the swallow itself.

(7814) SPICES.

Specerye, Dut.	Spezj, Spezierie, It.
Epiceries, Epices, Fr.	Especiaria, Port.
Spezereyen, Ger.	Pranue korenja, Rus.
Gurm-mussala, Guz. Hind.	Especias, Especerias. Sp.

Under this denomination are included all those vegetable productions which are fragrant to the smell, and pungent to the palate: such as cloves, ginger, nutmegs, cinnamon, allspice, cardamoms, &c.—*Faulkner.* Spices and condiments are largely employed by the people of India. Some are imported and many of them are exported to a considerable extent. They are obtained from the barks, the dried seeds, the fruit, flower-buds, and root-stocks of different plants. The chiefly aromatic barks are the Cinnamon and Cassia lignea; the seeds and fruits include Pepper, Cardamoms, Coriander, Cummin seed, Star anise, nut-megs and chillies. The flower buds of some furnish cloves and cassia buds, and the roots supply ginger, and turmeric. The English and botanical names of the principal of the series are given below, and their descriptions will be found under their several heads.—*Madras Exhibition of* 1857. *English Cyclopædia, Simmonds.*

Areea or betle nut,	Areca catechu.
Betle leaf or pan,	Piper betle.
Cassia bark, ...	Laurus cassia.
Cassia buds, ...	Cinnamomum iners.
Cinnamon, ...	Cinnamomum aromaticum.
Cloves,...	Eugenia caryophyllata.
Mace & nutmegs,	Myristica moschata.
Cardamoms, ...	Elletaria cardamomum.
Do. wild,...	
Pepper, ...	Piper nigrum.
Do. long,...	Piper longum.
Chillies, ...	Capsicum, (var. sp.)
Ginger, ...	Zingiber officinale.
Turmeric, ...	Curcuma longa.
Coriander, ...	Coriandrum sativum,
Cummin, ...	Cuminum cyminum.
Mustard, ...	Sinapis, (var. sp.)

(7815) SPIDER-WORTS. Several species of spider-worts are abundant in Tenasserim. One *Commelyna cæspitosa*, a creeping species of commelyna may be often seen trailing up the sides of fences. Another with blue flowers like the former, but with a different habit, is sprinkled among the grasses at almost every door. The latter belongs to the genus aneilema, *Aneilema herbacceum*. There are also one or two other species common, but I do not find them described.—*Mason.*

(7816) SPIGELIA, a genus of Plants belonging to the natural order *Spigeliaceæ*. It is commemorative of Adrian Spigelius. The characters of this genus are:—Calyx 5 parted; corolla funnel shaped, with a 5 cleft equal limb; anthers converging: capsule didynamous, 2-celled, 4-valved many-seeded. This genus consists of annual and perennial herbs, and under shrubs with opposite leaves and rose coloured or purple flowers. They are natives of North and South America, and are found in various soils.—*Eng. Cyc.*

(7817) SPIGELIA MARYLANDICA. Carolina Pink, Pink Root, India Pink. A peren-

nial, herbaceous, medicinal plant, (*S. Marylandica*), a native of S. America. The part chiefly valued is the root, which, in its newly dried state, is celebrated as an anthelmintic. It has a bitter nauseous taste, and a tea-like smell.—*Faulkner.*

(7818) SPIKENARD.

Sunbul-ul-Teeb, ARAB.	Jettamassie. TEL.
Bal-chur, BENG. HIND.	Narden also Nardos, GREEK.
Jettamansi, Chebur, GUZ.	Nardoom, LAT.
Sattamansi, SANS.	
Shad-a-mangie, TAM.	

The root is of a blackish colour, and resembles the bushy tail of the Ermine. Its odour is strong and fragrant; and it is much esteemed by all Eastern nations. The plant is a native of the mountains of the north of India, at very great elevations; and the roots are also brought to India from the Persian Gulf.—*Faulkner.* Spikenard is a substance which has enjoyed celebrity from the earliest period of the world's history, and has engaged the attention of numerous commentators on the works of the ancients, as well as of some modern authors. It is interesting therefore not only as making us acquainted with one of the substances known to and esteemed by the Greeks and Romans, but it is important likewise as being mentioned in the Bible, since the Nard of Scripture is supposed to be the same substance as the Nardos of the ancients called also *Nardostachys* (ναρδόσταχυς) and hence Spikenard, the word Stachys being rendered by the word Spike. Dioscorides, in the first chapter of his first book, treats of the various aromatic and stimulant substances which were known to the ancients, and among these of the various kinds of Nard. Of the first kind, called simply Nardus (νάρδος), there are two varieties, the one Syrian, the other Indian; the former so called, not because it comes from Syria, but because the mountains in which it is produced have one part turned towards Syria and the other towards India. This may refer either to the Hindu-Kush, or to so many Indian products finding their way to Syria, by the way of the Red Sea and the Euphrates, from the earliest times. The other variety is called Gangitis from the river Ganges, near which, while flowing round a mountain, it is produced, bearing many hairy spikes from one root. These are strong-smelling, but those growing in moist situations less so than those found on the mountains. One variety, he further says, is called Sanphariticon, from the name of a place. This first kind being called Nardus, and distinguished into the Syrian and Indian varieties, the second kind he calls Celtic Nard (νάρδος Κελτική), and the third kind a Mountain Nard (νάρδος ορεινή) On consulting Avicenna, we are referred from Narden to Snubul, pronounced Sumbul, and in the Latin translation from Nardum to Spica, under which the Roman, the mountain, the Indian, and Syrian kinds are mentioned. This proves, as has been already stated by Sir William Jones, that Sumbul, &c, was always considered by Arabian authors as synonymous with the Nardos of the Greeks. In Persian works on Materia Medica, all translated from the Arabic, as, for instance, the 'Mukhzun al-Adwieh,' or 'Magazine of Medicines,' we have four different kinds of Sunbul:— 1, Sunbul Hindee; 2, Sunbul Roomee, called also Sunbul Ukletee, and Narden Ukletee, evidently the above Celtic Nard, said also to be called Sunbul Italion, that is, the nard which grows in Italy; 3, Sunbul Jibullee, or Mountain Nard: hence it is evident that the kinds described by Dioscorides are alluded to, and in fact the accounts given are merely translations of his descriptions. The fourth kind of Sunbul appears to be a hyacinth or polyanthus. But the first is that with which alone we are at present concerned. The synonyms given to it are—Arabic, Sunbul-al-Teeb, or Fragrant Nard; Greek, Narden; Latin, Nardoom, and Hindee, Balchur, and Jatamansee. Having the Hindee and Sanscrit names of an Indian plant, the next step was to obtain it. This was first attempted by Sir William Jones, at a time when we had no access to the Himalayan Mountains, and a wrong plant was sent him. Dr. Royle informs us that on making inquiries on the subject, when at Saharunpore, in 30° N. lat., about 30 miles from the foot of the Himalayas, he learnt that Jatamansi, better known in India by the name Bal-Chur, was yearly brought down in considerable quantities from the mountains, such as Shalma Kedarkanta, near the Ganges and Jumna rivers, to the plains. Having obtained some of the fresh brought down roots, he planted them both in the East India Company's Botanic Garden, and in the mountains, in a nursery attached to it. The plant produced was found to belong to the natural order *Valerianaceæ*, and has been named *Nardostachys Jatamansi* by De Candolle, and formerly *Patrinia Jatamansi* by Mr. Don, from plants sent home by Dr. Wallich, from Gossainthan, a mountain of Nepal. Mr. Don obtained the additional corroboration that Spikenard bought in a chemist's shop by this name exactly corresponded with the roots of the Jatamansi.' (Royle, 'Illust. Himalayan Bot.,' p. 242.) Hence there can be no doubt that the Nardos described by Dioscorides is the Jatamansi of the Hindoos, and probably the same substance which has been mentioned by such writers as Hippocrates; and there is nothing improbable in its being the Nard of Scripture, and it has been shown to be a plant belonging to the natural order *Valerianaceæ*. It is curious that the Celtic and mountain nards are also Valerians, the former being yielded by *Valeriana Celtica* and *V. Saliunca*, still exported from the mountains of

Austria to Egypt, whence it has spread into both Africa and Asia, being valued for its fragrance, and hence employed in perfuming baths; and the other by *V. tuberosa*. Dr. Royle mentions it as a curious coincidence, if not allowed to be a sign of accurate knowledge, that the Persians should translate the φυ of Dioscorides, which he also calls Wild Nard, Foo of the Arabians, by the term Bekh-i-Sunbul, Root of Soonbul. The plant correctly ascertained by Sipthorp has been named by him *Valeriana Dioscoridis*.

(7819) SPILANTHES ACMELLA. This species of spilanthes is planted by the natives of Tenasserim for its medicinal properties.—*Mason*,

(7820) SPINACIA, a genus of Plants belonging to the natural order *Chenopodiaceæ*. This genus is dicœcious, the male and female flowers being on different plants; the male flowers are composed of a calyx, with 5 deeply cloven concave oblong obtuse segments; 5 stamens, with filaments longer than the calyx, with oblong double anthers. The female flowers have a monosepalous calyx, with four divisions, two of which are smaller and opposite; a superior ovary with 4 styles and simple stigmas. As the fruit ripens the calyx hardens and adheres to it. The ovary contains a single seed. There are only two species, which are herbaceous plants with alternate leaves, and axillary flowers of a green colour.

(7821) SPINACEA OLERACEA, The Common Spinach.

Vusayley-keeray, Tam.

Is well-known on account of its use in the kitchen. It has an herbaceous stem one or two feet high, branched, and hollow; arrow-shaped leaves; male flowers in long spikes, abounding with pollen; female flowers on another plant, axillary, herbaceous, and small. The fruit is a small round nut, which is sometimes very prickly.—Both Spinacea oleracea and New Zealand spinach are commonly cultivated in all gardens.

Spinach is used as a culinary vegetable. It grows in rich soil, requires plenty of water, should be sown thinly in drills or broad cast every month or six weeks, may be had during the hot months in sheltered situations, with attention to water.—*Jaffrey*.

(7822) SPINACIA TETRANDRA.

Choolaee, Hind.

This Hindustanee name is indifferently given to Spinacia Tetrandra, Tetrandous Spinach and Amarantus polygamus. The former is a common sort of native greens, and, when boiled, resembles spinach; it is procurable nearly all the year round. The latter is much cultivated by the natives. It is sown broad-cast in beds from June to March. The leaves are sold in the bazar at one pice the seer. Used as a greens and also in curries.—*Riddell, Jaffrey*.

(7823) SPINAGE, NEW ZEALAND. Is a hardy annual, with fleshy leaves and numerous branches. As a spinage it is as valuable as the Orache. If watered, grows freely, and produces leaves in the hottest weather.

(7824) SPINEL occurs crystallized either in regular octahedrons, or in macles presenting different forms. It is of various shades of red, violet, or yellow, more rarely black. By lapidaries, the scarlet coloured, is termed *spinel ruby*; the rose-red, *balas ruby*; the yellow or orange red, *rubicelle*; and the violet-coloured, *almandine ruby*. The first is the most valuable. Spinel is not so hard as the oriental ruby; and is readily distinguished both by its colour and crystallization. Principal localties Sweden, Ceylon, Malay Peninsula.—(*Waterstone*) *Faulkner*. According to the English Cyclopædia *Spinell Spinell Ruby, Balas Ruby Ceylanite Candite* &c., is a Mineral occurring in loose and imbedded octohedral crystals. Primary form the cube. Cleavage easy, parallel to the faces of the octohedron of the black opaque variety; difficult in the other varieties. Fracture conchoidal. Hardness greater than that of quartz, but less than that of corundum. Colour red, blue, violet, green, yellow, brown, and black. The first is the most common. Streak white. Lustre vitreous. Transparent, translucent, opaque. Specific gravity 3·5 to 3·7. Infusible by the blow-pipe; the red varieties are rendered black and become opaque by exposure to it, but on cooling, at first of a fine green by transmitted light, then nearly colourless, and at last become again red. Spinell is found in Ceylon and Siam in isolated and rolled crystals in the beds of rivers. It is found embedded in carbonate of lime in North America and Sweden. Several varieties have been analysed; red transparent spinell by Vauquelin; blue, by Berzelius; green and black, by Dr. Thomson:—

	Red.	Blue.	Green.	Black
Silica,.....	—	5·48	5·62	5·59
Alumina,..... ,...	82·47	72·25	73·30	61·78
Magnesia,.....	8·78	14·63	13·63	17·86
Protoxide of Iron,.	—	4·26	7·42	10·56
Lime,.....	—	—	trace	2·81
Chromic Acid,.....	6·18	—	—	—
	97·43	96·62	99·97	98·60

(7825) SPIRÆA, a genus of Plants belonging to the natural order *Rosaceæ* tribe *Spiraceæ*. The name occurs in ancient authors, and is supposed to be derived from σπεῖρα, a cord, in allusion to the fitness of the plants for twisting into garlands. The genus is diffused through the temperate parts of the northern hemisphere, and is characterised by having a 5-cleft permanent calyx; stamens 10 to 50, inserted in a torus with the 5 petals, which are inserted into the calyx; carpels sessile, solitary or several rarely connected into a capsule; seeds 2-15, pendulous,

very rarely ascending. The species, upwards of 50 in number, form small unarmed shrubs or perennial herbs; leaves usually simple, sometimes pinnately cut; flowers white or reddish. They are found in Europe, North America, Siberia, China, and the Altai and Himalayan Mountains. —*Eng. Cyc.* Fortune mentions amongst Chinese shrubs the *Spiræa callosa* and *Spiræa Reevesiana*.

(7826) SPIRITS.

Daroo Guz. Hind. | Shurab, Pers.

All inflammable liquids obtained by distillation, as brandy, rum, geneva, whiskey, &c, are comprised under this designation.—*Faulkner*.

(7827) SPOGEL SEED. PLANTAGO ISPAGHULA.

Ispagool, Pers.	Esubgool, Ispagool, Duk. Guz. Hind.
Buzr kaloona, also Buzra-kotuna, Arab.	Fusliioon, Greek.
	Ispoghul Verei, Tam.

The seed of a plant (*Plantago Ispaghula*), grown in the upper provinces of India, Guzerat, Persia, &c. The seeds are of a very cooling nature, and form a rich mucilage with boiling water, which is much used by native practitioners, and occasionally by European medical men in India, in cases with inflammation of mucous membranes. The seeds met with in Bombay are brought from the Persian Gulf, Guzerat, and Sonmeeanee.—*Faulkner*. In India the Plantago Ispaghula is cultivated during the cold season for the seeds, which are used as an emollient and light article of diet for convalescents —*O'Shaughnessy, page* 510. In making a decoction of Ispaghool take of Ispaghool seeds two drachms, distilled water one pint. Boil and strain: this preparation is a simple demulcent. That of Ispaghool is used in dysenteries, and recommended by Mr. Twining.—*Bengal Phar. p.* 277.

(7828) SPONDIACEÆ, a natural order of Plants belonging to the Syncarpous group of Polypetalous Exogens. It has unisexual flowers; a 5-cleft regular calyx; 5 petals, inserted under the disc; 10 perigynous stamens arising from the same part as the petals; superior sessile ovary, 25-celled, with 5 very short styles and obtuse stigmas; one ovule in each cell. Fruit drupaceous. Seeds without albumen. The plants of this order are trees without spines, having alternate unequally pinnate leaves without pellucid dots. The flowers are arranged in panicles or racemes. This order was formerly included in *Terebinthaceæ*, but has been separated by Kunth and Lindley, on account of their syncarpous fruit and the absence of a resinous juice. The real affinity of *Spondiaceæ* appears to be with *Aurantiaceæ*, from which they differ in little beyond their perigynous stamens and the absence of dots on their leaves. They are natives of the West Indies, the Society Islands, and the Isle of Bourbon. The fruit of some of the species of *Spondiaceæ* is eatable, and is known in the West Indies by the name of Hog-Plums. —*Eng. Cyc.*

(7829) SPONGIA, the generic name under which Linnæus and many subsequent systematists have ranked the very numerous forms of organisation analogous to the sponges of commerce. Generally, and we think justly, zoologists have claimed these organisations for the animal kingdom, and ranked them among the *Zoophyta*; but there are eminent writers who dissent from this view on different grounds, and prefer to rank the marine and freshwater sponges with plants. For in regard to their constituent structure, they are composed, as so many of the *Polypifera* are, of a firm horny or stony skeleton immersed in a soft gelatinous living mass: in respect of the aspect of these two substances, the resemblance which they offer to *Alcyonia* appears very strong, with their external forms, uncommonly varied, sometimes resemble *Alcyonia*, often approach to *Palmipora*, frequently to *Pavonia*, *Agaricia*, and other forms of Lamelliferous *Zoophyta*. The currents of water which pass through the canals of their substance are analogous to many operations among *Polypifera* and *Mollusca*, and depend on similar ciliary organs, which have been detected in situ in *Grantia ciliata*. As however they contain no *Polypi*, it is difficult to rank them under the *Polypifera*. Dr. Johnson omits, in his excellent work on British *Zoophyta*, the sponges; and the following summary of his reasons deserves attention:— "If they are not the productions of Polypes, the zoologist who retains them in his province must contend that they are individually animals, an opinion to which I cannot assent, seeing that they have no animal structure or individual organs, and exhibit no one function usually supposed to be characteristic of the animal kingdom. Like vegetables, they are permanently fixed; like vegetables they are non-irritable; their movements, like those of vegetables, are extrinsical and involuntary; their nutriment is elaborated in no appropriated digestive sac; and, like cryptogamous vegetables or algæ, they usually grow and ramify in forms determined by local circumtances, and if they present some peculiarities in the mode of the imbibition of their food, in their secretions, yet even in these they evince a nearer affinity to plants than to any animal whatever." On this we may remark, that very many animals are as permanently fixed as sponges; that irritability is not to be looked for in every part of a sponge any more than in a *Rhizostoma*, whose divided digestive cavities are very unlike ordinary stomachs; and that the forms of sponges include remarkable analogies with the supports of *Polypi*. It is to our countrymen Ellis and Grant that the history of sponges is most indebted. The

former established the existence and nature of the currents of water which pass through the substance; and the latter, besides confirming the results of Ellis, added a vast quantity of new and valuable observations. Mr. Bowerbank has contributed precise information regarding both the fossil and recent sponges. (Ellis, 'On Corallines;' Grant, 'On Sponges,' in 'Edinburgh Philosophical Journal;' Bowerbank, 'Geological Proceeding,' 1840; and 'Microscopical Journal,' 1841.) Sponges may be thus characterised:—They consist of an albuminous skeleton and gelatinous matter, forming a mass not irritable, with numerous holes, connected internally with anastomosing canals. The skeleton is either simple, consisting of horny fibres, as the species so commonly used for domestic purposes; or compound, being strengthened by calcareous or siliceous spicula. Some of the skeletons of sponges are entirely horny; others are entirely siliceous; some are entirely calcareous; but the greater number are compound, and consist of horny matter with additions of spicula in various proportions. The gelatinous matter, abounding in horny matter and transparent globules, connects the different parts of the skeleton and membranes, lines the various canals, and forms the margins of the openings. The pores are minute openings (on the surface) with a gelatinous margin, strengthened or defended by the skeleton or specula, into which the water enters in currents, generated probably by a ciliary apparatus, which, however, has not yet been detected by the microscope, except in *Grantia ciliata*. The water, after traversing the interior canals, is ejected by means of orifices which are larger than the pores, and in many species are elevated above the surface in the form of tubular prolongations of the canals. The ova are numerous, at first appearing like groups of minute, irregularly shaped opaque granules, derived from the gelatinous matter, which unite into ovate bodies, falling at maturity into the canals, and are expelled by the orifices. These ova float in the water, and exhibit spontaneous motion by the rapid action of the cilia, which cover the anterior portion of the body, at length attach themselves, and then expand into the forms of maturity. The currents from the orifices are best examined by placing the recent animal in a shallow dish of water, and throwing a little powdered chalk on the surface, the motion of which will indicate the direction of the streams. For the purpose of examining the skeleton, it is requisite to macerate the sponge in hot water, which removes the gelatinous matter, and leaves the skeleton in a state fit to be examined under a microscope. When the spicula are siliceous, the animal matter may be removed by nitric acid, or by combustion, as was practised by Müller ('Zool. Dan,' t. 85), when the vitreous needles will appear unaltered. The gelatinous substance of sponges is scarcely capable of conservation. It is usually of a ropy consistence, sliding off from the skeleton, or else pressed off by the divers for sponge. It is of various colours, but commonly fawn-coloured; or orange-coloured; in this respect resembling the gelatinous parts of *Polypiaria*. Horny Sponges with anastomosing fibres, fit for domestic use, belong mostly to warm zones of the sea; sponges with calcareous spicula are rather numerous on the British coasts; and siliceous spicula are common in the sponges of most latitudes [SPONGIADÆ.] Remains of both horny and spicular sponges occur in a fossil state.—*Eng. Cyc.*

(7830) SPONDIAS ACUMINATA.

Ambut, DUK.

A middle-sized elegant tree, with shining leaves; fruit the size of a small egg.—*Riddell.*

(7831) SPONDIAS DULCIS. The Otaheite apple, much cultivated in the Society Islands. Introduced into Bombay.—*Riddell.*

(7832) SPONDIAS MANGIFERA.

Mirreymangi-kai, TAM.
Ambalam, RHEED. HIND. and BENG.
Ambara also Amra, TEL.
AMATAM.

The Hog-plum. The leaves of this tree are used in the preparation of chatnies. The green fruit used as pickles.—*Jaffrey.* The hog plum is a large tree with pinnate leaves; deciduous in the cold weather; they have a peculiar smell when bruised: the fruit is acid, and only used in curries.—*Riddell. Spondias Mangifera* is cultivated generally by the Burmese in groves near large towns. The tree grows to a considerable size and yields abundant seed.—*McClelland.* Hog's plum, is an intensely astringent fruit very appropriately named. The Karens have a tradition that in those Golden Days when God dwelt with men, all nations came before him on a certain day, each with an offering from the fruits of their land, and the Karens selected the hog's plum for their oblation; which gave such offence, that God cursed the Karen nation and placed it lowest among all the nations by whom they are surrounded.—*Mason.* The wood of this tree is soft and of little if any use. From wounds made in the bark at the beginning of the hot season very large quantities of transparent juice issue, which soon hardens into a mild insipid gum very like gum arabic. The fruit is eaten raw when ripe, and before ripe is pickled, put into curries, made into tarts &c.—*Rhode, M.S.S.*

(7833) SPONGE, SPONGIA OFFICINALIS.

Isfeng, ARAB.
Eponge FR.
Schwamm, GER.
Mooabadul, GUZ. HIND.
Spungia, IT.
Uniwatta, JAP.
Abermoordeh, PERS.
Esponja, SP.

A soft, light, very porous, compressible substance, readily imbibing water, and as readily giving it out again; and now ascertained to be

a species of zoophite. The colour is generally yellow or brown.—*Faulkner.* The Officinal Sponge is so well known for its economic uses, that it does not require a detailed description. Numerous species are known, with soft porous bodies, traversed by tortuous canals; but the officinal Sponge is imported from the Mediterranean and Red Sea; some of the coarser kind from the West Indies. Those of the British Seas would probably answer equally well for burning. When collected, Sponge contains numerous small fragments of corals and minute shells, from these it must be freed before it can be used. Sponge is composed of Gelatine and Coagulated Albumen. (*Hatchett.*) When burnt, its ashes give Carbon, and some Silex, Carbonate and Phosphate of Lime, Carbonate of Soda, Chloride and Iodide of Sodium, Bromide of Magnesia, with a little Oxide of Iron.—*Royle.*

(7834) SPRAT. BRISTLE-FINNED SPRAT. SETIPINNA. A small fish of the herring tribe found in Burmah seas. It is, however, easily distinguished by a long filament or bristle, which is attached to each pectoral fin. This and another species are often called sprats by Europeans, and they belong to the same tribe.—*Mason.*

(7835) SPRINGS. The Tenasserim Provinces are well supplied with hot springs; and some of them are probably not inferior in their medicinal qualities to the fashionable Spas of Europe and America. Though their waters have never been subject to any minute analysis, yet we know there is a great variety in the properties of different springs. They may be arranged in three different classes,—carbonated, sulphureous, and saline.

Carbonated thermal springs.—The hot springs on the Ataran, according to Dr. Helfer's description, belong to the carbonated class. They are situated within two miles of the old town of Ataran, and Dr. Helfer writes: "There are ten hot springs or rather hot water ponds, of which I could only examine the nearest, as the access to the others was through deep water at 130° Fahrenheit This one was a semicircular pond about fifty feet in circumference. In one place it was thirty-five feet deep. The quantity of carbonic acid which the springs evolve, seems to render the neighborhood peculiarly adapted to support vegetable life. —The ground around the spring is strongly impregnated with iron, and the water which runs over the ochre mud has a strong styptic taste. The springs on the Ataran approach in their composition nearest to the celebrated waters of Tœplitz. "Their medical properties would render them excellent remedies in a number of diseases: liver complaints would find a powerful remedy in them. If Amherst should be selected as a resort for invalids, the hot springs on the Ataran could easily be turned to advantage. In a direct line, they would be only four or five hours distant, and a road could be cut through the country without difficulty, so that patients could be removed there and bathe in loco." Dr. Morton found, on analysis, that the waters contain a considerable quantity of calcareous matter, and that the tufa, which it deposits on the border of the springs, is a carbonate of lime. They appear to arise from the mountain limestone, and thus to hold a geological position similar to that of the hot springs of Great Britain, most of which rise from strata below the coal, and hence from, or through the limestone.

Sulphureous thermal springs.—About four miles below Matah at the forks of the Tenasserim, and a few miles north of the latitude of Tavoy, there are hot springs highly charged with sulphuretted hydrogen gas, so readily recognized by its smell which is precisely that of the washings of a gun barrel; the odor in both instances being produced by this same gas All the stones in the springs are of a bright brass color, produced apparently by the deposition of the sulphur; and although the virtues of these waters are hidden from man, they appear to be well known to the beasts of the forest. To judge from the tracks around in the morning, the most incongruous parties are held here every night. The delicate little tread of the chevrotain and barking deer, are seen side by side with the massive steps of the elephant and rhinoceros; and the tiger, and the leopard seem to lay aside their fierceness, and peaceably walk away satisfied with a draught of the much coveted beverage. Dr. Helfer said these springs belonged to "the class of sulphureous mineral waters, tinged slightly with chalybeate, like the water of Brighton." Their heat above the atmosphere is not great. Mr. Bennett at a recent visit, found the thermometer to rise in the hottest spring to only 119°. They rise from the slate rocks, like the warm springs of a considerable part of Germany.

Saline Thermal Springs.—On the margin of the granite range east of Tavoy, either near the junction of the slate and granite, or in the granite itself, is a series of the hottest springs in the Provinces. I have visited, says Mr. Mason, four or five in a line of fifty or sixty miles, and found them uniformly of a saline character Around one nearly east of Tavoy, the stones are covered with an efflorescence resembling epsom or glauber salt. Mr. Bennett found the Thermometer in this spring, to rise to 144°. Major McLeod visited one of the series at Palouk, and writes: "There are two spots where the springs show themselves. One immediately in the right bank of the river, and another two or three minutes walk to the northest inland.—There must be 30 or 40 bubbling up along a line of about 50 feet by 20.—The hottest was 196°

another 194°. No disagreeable smell or taste." The hottest springs are at Pai, ten or fifteen miles north of those visited by Major McLeod, and according to Phillips they are hotter than any on record out of volcanic regions, with the questionable exception of three springs in China, which, " probably exceeded the temperature of the air from 70 to 120 degrees." The principal spring at Pai,—for there are several,—is in a little sandy basin in the midst of granite rocks on the margin of a cold-water stream, where it bubbles up from three or four vents, and on immersing the thermometer into one, the mercury rises to 189°, within fourteen degrees of boiling water. Its location is rather peculiar, not being in a valley like the others I have seen, but on the side of a hill more than a thousand feet above the level of the sea, and surrounded by large masses of coarse grained granite rocks, which seem to have been detached from the summit above.—*Mason.* See MINERAL SPRINGS also HOT SPRINGS.

(7836) SQUALIDÆ, a family of Fishes of the section *Chondropterygii*. In this family, which includes the various species of Sharks, the branchiæ are attached by their outer margin to the skin, and the water taken in for respiration makes its escape through narrow outlets corresponding in number to that of the interspaces between the branchiæ: the number of these openings is usually five. So far the present fishes agree with the Ray or Skate family [RAIIDÆ]; but the peculiar rhomboidal form of the body renders it easy to distinguish the Rays, which moreover have a peculiar cartilage arising from the nasal part of the skull, and extending towards and even meeting the anterior part of the crest of the pectoral. This character is pointed out by Muller and Henle, who state that it is found in all the Ray tribe, and also in *Rhinobatus* and *Pristis*, whereas there is no trace of it in any Shark.

In the Sharks the body is elongated, and tapering gradually from the head to the tail, or but little dilated in the middle. The muzzle is rounded or pointed, depressed, and projects over the mouth; the nostrils are situated on the under side of the muzzle, in the form of oblique openings, which vary somewhat in figure, according to the species. The fins generally consist of two dorsals, two large pectorals, two ventrals, an anal fin, and a caudal, the form of which is peculiar. The portion of the tail of the Shark which supports the tail fin is almost always bent upwards at an obtuse angle with the body; the fin itself may be divided into three parts—a superior, an apical, and an inferior portion; that which runs along the upper surface is usually narrow; that on the under surface is broader, but decreases in width to its point of junction with the apical portion, which is more or less dilated at the extremity and obliquely truncated. Such is the most common character of the tail and tail-fin in the present fishes, and one which is not found in any recent fishes not belonging to the Chondropterygian group. The Male Sharks are smaller, and differ externally from the Females in possessing two elongated appendages, one of which is attached to the hinder edge of each of the ventral fins, the uses of which are not known. Some species of sharks bring forth their young alive, whilst others are inclosed in oblong simitransparent horny cases, at each extremity of which are two long tendrils. These cases are frequently found on the sea-shore, and are called Sea-Purses, Mermaid's Purses, &c. They are deposited, observes Mr. Yarrell, by the parent shark near the shore in the winter months. The convoluted tendrils, hanging to sea-weed or other fixed bodies, prevent the cases being washed away into deep water. Two elongated fissures, one at each end, allow the admission of sea-water; and the young fish ultimately escapes by an opening at the end, near which the head is situated. For a short time the young shark continues to be nourished by the vitelline fluid contained in the capsule attached to its body by the connecting pedicle, till having acquired the power of taking food by the mouth, the remains of the ovum are taken up within the abdomen, as in birds and some other animals. " A curious peculiarity has been observed in the young both of the Sharks and Skates during a very early stage of their existence. From each of the branchial apertures branchial filaments project externally; each filament contains a single minute reflected vessel, in which the blood is thus submitted to the action of the surrounding medium. The appendages are only temporary, and the blood of the fish is afterwards aerated by the true gills. This very interesting discovery, which, I believe, is of recent date, forcibly reminding us of the temporal external branchiæ in the young Batrachian Reptiles in the tadpole state, has been observed by Mr. Richard Owen in the Blue Shark (*Carcharias glaucus*); by Mr. John Davy, in the Torpedo; and by Dr. Allen Thompson, of Edinburgh, in the Thornback. Cuvier had previously noticed it, and, in 'Regne Animal,' has referred to a figure, published by Schneider, of a very young shark in this condition, for which, regarding it as the normal state of the fish, that industrious pupil of Bloch had proposed the name of *Squalus ciliaris*."—(Yarrell.)

The *Squalidæ* and *Raiidæ* have long occupied the attention of Professor Muller and Dr. Henle, who have conjointly published an excellent work on these groups, 'Systematische Beschreibung der Plagiostomen.' The characters of the various genera into which they divide the Sharks are here given.

(7837) *Scyllium*, Cuv.—This genus is res-

ricted to such species as have the anal fin placed nearer to the head than the second dorsal fin.

(7838) *Pristiurus*, Bonah., differs from *Scyllium* in having a long snout, and also in possessing a series of larger scales, arranged like the teeth of a saw on the upper edge of the tail. It contains but one species.—*Eng. Cyc.*

(7839) *Chiloscyllium*.

(7840) *Hemiscyllium*, Muller and Henle.

(7841) *Crossorhinus*, Muller and Henle.

(7842) *Ginglymostoma*, Muller and Henle.

(7843) *Stegostoma*. Muller and Henle.

(7844) *Carcharias*, Cuv.—Teeth flat, sharp, and serrated on each side, either in the upper jaw only, or in both jaws.—*Eng. Cyc.*

(7845) SQUILL, COUNTRY. ERYTHRONIUM INDICUM. Rottl.

Unsool, Iskeel, ARAB.	Peyaz-i-dushtie, PERS.
Nurriala, CYNG.	Nurri-Vunjyum, TAM.
Junglee-Peeaz, DUK. GUZ. HIND.	Addi Vitella guddaloo, TEL.
Nurri Vungayum, TAM.	Unsool, ARAB.
Junglie piaz, DUK.	Kanda, HIND. and TEL.

This is not the produce of the Scilla maritima, though it has, improperly, been so called by the English in India, from its resemblance to the true Squill in medicinal virtues. Ainslie did not find the Native medical Practitioners employ it. Farriers are in the habit of using it, in conjunction with other articles, for horses, in cases of Strangury and Fever. It grows in abundance in these districts, in waste, sandy soils.—*Ains. Mat. Med. p.* 44.

(7846) SQUILL, SEA ONION.

Meerzwiebel, GER.	Scille, FR.
Scilla, Cipolla marina, IT.	Scilla, LAT.
	Cebola albarrana, SP.

A perennial bulbous rooted plant (*Scilla maritima*), found on the shores of Spain, Portugal, North of Africa, and the Levant. The bulbs are pear-shaped, and vary in size from that of the fist, to the compass of a child's head. The root is very nauseous, intensely bitter, acrimonious, and causing inflammation when rubbed in the skin. As met with in the shops, squill is commonly in the form of the dried shreds of the root. It is one of the most useful remedies in the materia medica.—*Faulkner.*

(7847) STACHYS. LABIATÆ. These are plants of no great beauty, and being of a weedy nature are hardly worth cultivating.—*Riddell.*

(7848) STACHYTARPHETA MUTABILIS. VERBENACEÆ. A shrubby plant with variegated scarlet flowers in terminal spikes; propagated by cuttings.—*Riddell.*

(7849) STACHYTARPHETA JAMAICENSIS. An annual, with blue flowers in terminal spikes; common.—*Riddell.*

(7850) STAGMARIA, a genus of Plants belonging to the natural order *Terebinthaceæ*. It was named by Mr. W. Jack, assistant-surgeon in the East India Company's service, and author of 'Malayan Miscellanies,' from the Greek word στάγμα, 'a dropping fluid.' The tree *S. verniciflua*, which is the *Arbor vernicis* of Rumphius, and the Kayo Rangas of the Malays, is full of acrid resinous juice, and is a native of the Eastern Islands, but not very abundant in Sumatra, though occasionally found in the neighbourhood of rivers. The calyx is tubular, with the limb irregularly ruptured, deciduous. Petals 5, longer than the calyx, obtuse spreading, subreflexed. Stamens 5 alternating with, but inserted above, the petals into the stipelike torus. Filaments filiform, equal to the petals in length. Anthers oblong. Ovary stipitate, 3-lobed, lobes 1-seeded, 1-2 of which are usually abortive. Styles 1-3, terminating the lobes of the ovary. Stigmas obtuse. Berry kidney-shaped, furrowed, 1-seeded, with a warty rind. Embryo exalbuminous, erect: cotyledons united; radicle incurved. The genus is nearly allied to *Rhus*, but besides the difference indicated in the above character, it has simple leaves, which are without stipules. The wood of the tree is of a fine dark colour towards the centre. The bark exudes a resin which is extremely acrid, causing excoriation and blisters when applied to the skin, in this, as well as in becoming black when exposed to the air, it resembles the *Melanorrhœa*, Cashew-Nut Tree, Poison-Oak, and many others of the *Terebinthaceæ*. According to Rumphius, this tree yields the celebrated Japan lacquer, or varnish, and he considers it the same with that of Siam and Tonquin. Loureiro however represents the latter to be the produce of an *Augeia*. Mr. Jack says the varnish of Siam and Cochin-China is probably the best, but that of Celebes and of Java, which is the produce of this tree, is also employed for the same purposes, and cannot be much inferior, as it bears an equally high price. Rumphius says the exhalations of this tree are considered noxious, and the people of Macassar, and of other parts of Celebes in particular, entertain such dread of it, that they dare not remain long under it, much less repose under its shade. As however it furnishes the celebrated varnish, the Chinese and Tonkinese boldly repair to the tree, but employ caution in collecting the resin. This they do by inserting into the trunks two pieces of bamboo, sharpened at their points, in such a manner as to penetrate the bark in a somewhat oblique direction. These remain all night, and are extracted before sunrise the next morning, the trees yielding no juice during the day. This fluid resin bears a high price, being sold in Tonkin and Camboja for 33, 50, or 60 dollars, the pecul, of about 133 lbs, but in many of the provinces of China for 200 or 300 dollars. The varnish is prepared for use by boiling it with an equal weight of the oil of Tang-yhu, which is a Chinese tree allied to the *Mimusops elengi*, from whose fruit an oil is

prepared. The proportions are varied according to the purposes for which the varnish is required. Sometimes dry pigments are added for the sake of red or other colours. The Japanese are the most skilful in preparing and ornamenting all kinds of work with this varnish, and their black lacquered works are conveyed to all parts of the world. (Jack, *Malayan Miscellany*, No. 3 reprinted by Sir W. Hooker.—*Eng. Cyc.*

(7851) STAGMARIA VERNICIFLUA, one of the black varnish trees of China.—*O'Sh.*

(7852) STALACTITE AND STALAGMITE. Stalactitic Carbonate of Lime occurs chiefly in long masses suspended from the roofs of caverns in limestone rocks. Stalactites appear to be continually forming; water containing carbonate of lime held in solution by carbonic acid, trickling through crevices in the roofs of the caverns, gradually during its exposure to the air loses its carbonic acid, and consequently deposits its carbonate of lime; the water passing over the portion first deposited gradually adds to it, and eventually gives the carbonate of lime its great length and stalactitic character. The flatter deposits, called stalagmites, are formed on the floor of the cavern by the water there depositing that portion of its carbonate of lime which is not separated during the formation of the stalactite. Stalactic Carbonate of Lime is met with in the veins of lead-ore in Durham and Northumberland. Caverns are sometimes nearly filled with these deposits, which in some cases are of very large dimensions. The most remarkable instances of their occurrence in Britain are in the cavern at Castleton in Derbyshire, and Macallaster Cave in the Isle of Skye. The grotto of Antiparos in the Archipelago, the Woodman's Cave in the Harz in Germany, and that of Auæelle in France, are striking instances of their formation in other countries. Besides the occurrence of this variety of carbonate of lime in the stalactitic form, it is sometimes met with reniform and tabular, and in other imitative shapes. The facture is sometimes perfectly lamellar, occasionally fibrous, the fibres diverging from a centre, with pearly or silky lustre, and sometimes resinous or waxy. The colour varies from white to grayish, brown, red, and yellowish-white. Opaque, but frequently translucent. The Oriental Alabaster, much employed by the ancients in statuary and the formation of vases, appears to be of stalactitic origin.—*Eng. Cyc. Carbonate of Lime*, is a very abundant mineral in the Tenasserim Provinces and embraces several varieties. Stalactical Carbonate of Lime is one of these. All the Tenasserim limestone caves have stalactites hanging from their roofs; and stalagmites raised on their floors. The Siamese Karens often bring over bits of limestone of the shape of a shell, and when broken, a shell usually of the genus melania appears, that has been encrusted with carbonate of lime. Much of the alabaster of which ornaments are made is stalagmite; but all the alabaster images of the Tenasserim coast are made of marble: and not of compact gypsum, which they much resemble.—*Mason.*

(7853) STALAGMITES (from σταλαγμός, a dropping), the name of a genus of Plants belonging to the natural order *Clusiaceæ*, or *Guttiferæ*. It has polygamous or bisexual flowers; 4-5 sepals, which are persistent and bractless; 5 petals alternating with the sepals; 4-5 united stamens, the bundles flat, elongated, and divided at the apex into several short antheriferous portions opposite to the petals, and alternating with 5 large truncated glands; the anthers are 2-celled, bursting longitudinally; the ovary is 3-5-celled, with 1 ovule in each cell; stigma 3-5-lobed; the fruit a berry. The species are trees natives of the East Indies and Ceylon, and belong to the family which produces the gamboge of commerce. Dr. White states that one of the species, the *S. ovifolia*, which is a native of Ceylon, yields a true gamboge, which is employed in commerce. It is known by its oval shining leaves, its lateral fascicled flowers, male and hermaphrodite mixed. Its anthers are arranged in 6 or 8 bundles, and it possesses a 3-celled 1-3-seeded ovary.—*Eng. Cyc.*

(7854) STALAGMITES OVALIFOLIA, BROWN AND GRAHAM. *Syn.* Xanthochymus ovalifolius. (Roxb. ii. p. 632.) A native of the Southern provinces of India and Ceylon. The seeds were sent from Ceylon by General Hay MacDowal, to the Calcutta Garden, under the Cingalese name *Ambul Ghorka*; in 7 to 10 years the trees began to blossom during the whole of the hot season, and in July 1812, when ten years old, they produced perfectly ripe fruit. Dr. Wight is of opinion that this tree yields one kind of gamboge in Ceylon. It is desirable to ascertain what may be the produce of the trees in the Calcutta Garden.—*O'Shaughnessy, page* 236.

(7855) STALAGMITES PICTORIA, *Syn.* XANTHOCHYMUUS PICTORIUS. (Roxb. ii. p. 633.)

Dampel, BENG. and HIND. | Kata Ghorka, CING.

A native of the mountainous districts of India; leaves opposite, linear, lanceolate; flowers in lateral fascicles, berry ovate, pointed. Fruit ripens in November and December, and the tree yields a large quantity of inferior gamboge.—*O'Shaughnessy, page* 236.

(7856) STAPELIA, ASCLEPIADEÆ.—This is an extensive genus of plants with curiously marked flowers like a toad's back, they are star-shaped, and grow from the roots; these plants being succulent, are apt to drop off if grown in too rich or moist a soil, they give seed and may be cultivated from it, but more readily from slips shaded partially, and watered sparingly.—*Riddell.*

(7857) STAPELIA BUFFONIA. ASCLEPIADEÆ.

Kar alum. DUK.

The Toad-like Stapelia.

(7858) STAPELIA GRANDIFLORA AND S. VARIEGATA.—The species are stemless plants with fœtid flowers, star-shaped, colour resembling a toad's back: the plants should not have much water or be exposed to the sun; easily propagated by seed or cuttings.—*Riddell.*

(7859) STAPELIA VIRGATA. ROTTL.

Callymolian, TAM | Koondana Komooloo TEL

Ainslie's Mat. Med. p. 259.

(7860) STAPHYLEA (from σταφυλή, a bunch of grapes), the name of a genus of Plants, the type of the natural order *Staphyleaceæ*. It has a coloured 5-parted calyx, with an urceolate disc at the base; five upright petals; five stamens standing round the disc; an ovary with from two to three styles, with a small stigma; a membranaceous swelled capsule with two or three cells, and one or two seeds in each. This genus has six species, of which one is a native of Europe, one of North America, one of Japan, two of Jamaica, one of Peru, and one of the Himalayas.—*Eng. Cyc.*

(7861) STAPHYLEA EMODI is an Indian species: it was found by Dr. Royle in the Himalayas, at an elevation of 7000 feet. (Royle, 'Ill. Him. Bot.,' p. 165.)

(7862) STAPHYLEACEÆ, *Bladder-Nuts*, a small natural order of Plants belonging to the Syncarpous group of Polypetalous Exogens. They are shrubs with opposite pinnate leaves, having, both common and partial petioles, and the flowers arranged in terminal stalked racemes. The calyx has five sepals, which are imbricated in æstivation; petals five; stamens five, alternate with the petals, perigynous; ovary 2- or 3-celled, seated on a disc; fruit membranous or fleshy, frequently deformed by the abortion of some of its parts; exalbuminous roundish ascending seeds, with a bony testa, large hilum, and thick cotyledons. There are only three genera and ten species belonging to this order, which are inhabitants of the warmer and temperate parts of the earth. Only one species, the *Staphylea pinnata*, is found in Europe. This order was separated by Lindley from the order *Celastraceæ*, with which it is most nearly allied, but from which it is distinguished by its opposite pinnated stipulate leaves. One of the genera, Turpinia has unisexual flowers. The species do not possess active properties. The seeds of all contain a mild oil, which may be expressed.—*English Cyclopedia, page* 892.

(7863) STARCH.

Abgoon, ARAB.	Neeshashta, PERS.
Amidon, FR.	Kruchmal, RUS.
Amidam, GER.	Amidon, Almidon, SP.
Amodi, IT.	

Procured generally from wheat flour and potatoes. The best kind is white, soft, friable, and easily reduced to powder. It is insoluble in cold water and alcohol, but readily affords a gelatinous solution in warm water, which is largely employed for stiffening articles of wearing apparel, and for dressing some descriptions of goods after weaving. It is also much employed by calico printers, and others.—*Faulkner.*

Starch is a substance which is found very generally present in the vegetable kingdom. It occurs in the forms of irregularly shaped granules inclosed in the cells of plants. It is easily detected in the cells of plants under the microscope, by the addition of a small quantity of solution of iodine which immediately gives to the starch granules a blue colour. Starch can be readily separated from the tissues of plants, on a large scale by bruising them and stirring them in water; when left at rest the cellulose of the tissue falls to the bottom of the vessel, and the starch floats in the water. If the water containing the starch is now poured off and allowed to stand a few hours the starch will fall to the bottom of the vessel, and is easily collected. In this way it is obtained for commercial and dietetical purposes. Starch is thus found to be diffusible through water, but not soluble in it. It differs then from cellulose, on the one hand, by its diffusibility through water; and on the other, from dextrine, sugar, and gum, by its insolubility. In composition it resembles these substances, and during the growth of the plant it is evidently converted into one or the other according to the necessities of the plant. It contains carbon, hydrogen, and oxygen (C_{12}, H_8, O_3,) and belongs to that series of substances to which the term Dextrine has been applied. In certain groups of plants, intermediate substances between those mentioned have been obtained. Thus, in the Lichens, a substance exists which resembles starch in many of its properties, but does not assume its definite granular form. This is called Lichein. Another substance also closely approaching starch in its general characters is Inulin. This substance is not coloured blue by iodine, and has other distinctive properties. It is rounded in the various species of *Inula*, and has also been detected in other plants. From these facts we may gather that Starch is the result of the chemical activity of the plant-cell at particular stages of its growth. It is one of those secretions to which the name assimilable is applied, and is evidently capable of undergoing great changes during the life of the plant. It is almost constantly present during the earlier stages of cell-growth, so much so as to lead to the supposition that its presence is universal during certain stages of the life of the plant-cell. In some plants and parts of plants however it rapidly disappears, being either converted into sugar or cellulose, or some of the

numerous unassimilable secretions of plants. That the latter takes place very frequently is rendered probable by the discovery that caoutchouc and gutta percha can be artificially manufactured from starch, whilst it has long been well known that starch may be converted into sugar and gum. Starch differs from sugar in its not being fermentable. It is however readily convertible into sugar by agents which induce fermentation. It has been supposed that the protein of the plant-cell acts chemically in converting starch into sugar during germination, and the term Diastase has been applied to the proteinaceous matters found in connection with the starch of germinating seeds. Starch occurs usually in the cells of plants in the form of granules. In the earlier stages of their growth these are attached to the sides of the cell, or to portions of the endoplastic protein wherever they may be placed. In most cases these granules are simple or single; but when they are developed near each other a union is formed of one or more, and the result is a compound granule. Schleiden also describes Amorphous Starch, and states that in some plants the sides of the cells are lined with a layer of starch having no definitely-formed granules. In the majority of starch-granules a little spot may be seen which is called the hilum, and has been by some regarded as a nucleus or central point of the formation of the granule. It does not however seem to bear the relation in all cases. Much difference of opinion exists as to the true nature of the starch granule. Some observers have supposed that it consists of a series of flattened plates or dishes laid one upon the other, the result of successive depositions of starch matter. This view will be seen to be erroneous if the starch-granule is submitted to heat, or sulphuric acid, when it will be found to unfold and exhibit itself in the form of a vesicle or bag. From this it appears that this bag is compressed in the ordinary state of the starch, and its sides being folded in, gives it the appearance of dishes. At one time it was supposed that starch was characteristic of the vegetable kingdom. Veichow has however demonstrated its existence in connection with cellulose in a large number of animals. Bush first pointed it out in the human brain. It has been found also in the human blood; and with cellulose and sugar it can no longer be regarded as truly characteristic of the vegetable kingdom.

Starch is a substance easily manufactured, and is largely used in several of the arts, as well as an article of diet. It can be obtained from a great variety of plants, and many of the most productive of it are natives of the tropical countries in the East. Starch occurs in the forms of irregularly shaped granules enclosed in the cells of plants, and can be easily separated from the tissues of plants, on a large scale by bruising them, and stirring them in water; when left at rest the cellulose of the tissue falls to the bottom of the vessel, and the starch floats in the water. During certain stages of the life of the plant-cell, the presence of starch is supposed to be universal, but in some plants or parts of plants it rapidly disappears, being either converted into sugar or cellulose, or some other secretion. Indeed no two writers agree as to the per centage of starch yielded by different plants, nor is this result unexpected, for even in the same plants, the quantity of starch varies with the season, the soil, climate, age, ripeness, length of time the roots have been out of the ground, &c. It will be seen however that starch is one of the constituent parts in all mealy farinaceous seeds, fruits, roots, and other parts of plants. In the West Indies, the Maranta arundinacea, allomyca, and nobilis and various species of Canna furnish this fecula, Two varieties of Cassava furnish a very superior quality, which is known in commerce as Brazilian arrow root, the amylaceous matter from Zamia pumila and other species at the Cape of Good Hope has been sent as arrow root, a similar product is obtained in Chili, from Alstromeria pallida and the Singalese get a kind of starch from the nut of the Cycas circinalis by pounding, the fresh kernels. The following are the chief fecula or starch-like substances of the East and may be consulted separately also under the head ARROW-ROOT, FOOD AND MARANTEA.

Arrow root, West Indian,	... Maranta arundinacea.
Arrow Root, East Indian	... Maranta ramossissima. ... Curcuma angustifolia.
Do. do.	... from other species of Curcuma.
Do. do.	
Do. Mergui,	... Tacca pinnatifida.
Tapioca,	... Jatropha manihot.
Cassava-meal.	... Do.
Plantain meal.	... Musa paradisiaca.
Sago, Singapoor,	... Arenga saccharifera.
Sago, Malabar,	... Caryota urens.
Sago-meal,	... Phœnix farinifera.
Salep,	... Habenaria, &c.
Nelumbium seeds,	... Nelumbium speciosum.
Singhara seeds,	... Trapa bispinosa
Yams,	... Dioscorea, (var. sp.)
Telinga potato,	... Amorphophallus campanulatus,
Sweet potato,	... Batatas esculenta.
Ceylon moss,	... Plocaria candida.
"Kotee kalangoo."	... Aponogeton Monostachyon.
Farina of	... Parkia Biglobosa.
Chara kelangoo,	... Plectranthus tuberosus.
Champoo,	... Caladium Nymphifolium.
Sago, Indian,	... Cycas revoluta.
,,	... Cycas Circinalis.

The specific quantity of starch derived from several plants varies from 1·41 to 1·47. and probably those specimens prepared from dry seeds, such as wheat and maize starch, which, as commercial articles at least, are less pure than those prepared from recently dug roots, have also the lowest density. As an article of diet, the most tenacious varieties of starches are preferred, on account of the economy of employing an article of which a less quantity will suffice, and the same is true when applied to starching linen, provided the Jelly be not deficient in clearness. In respect to tenacity, there is a very great differ-

ence between the Jellies prepared from the different starches, a disc of jelly prepared from sweet Cassava breaking with 78 grains, while that of a jelly from the *Tous les mois*, of the West Indies did not break with a weight of 2,446 grains. Experiments of a similar kind are required to test the starches of India. When Starch jelly is used for the purpose of starching or glazing linen, or cotton goods, the most transparent varieties are preferred, provided they also possess the requisite tenacity, but on this point, also experiments regarding our Indian Starches are necessary.—*Madras Exhibition of* 1857. *English Cyclopædia. Simmonds' Commercial Products.* Starches from different plants are best distinguished from one another by examining either as transparent opaque objects their grains or globules with a microscope, for though in the same species, there are considerable differences in size and form, the different kinds are on the whole quite distinguishable. This is of the more importance because the adulteration of starches is chiefly effected by mixing a cheap variety with a higher priced one, and in practice when the observer has a number of pure and authentic specimens before him to have recourse to as standards of comparison the discrimination is by no means difficult.—*Hassall.*

(7864) STATICE. PLUMBAGINEÆ. Sea lavender.—Many of these species bear pretty purple, white and blue flower, and are much cultivated in Britain; the S. Arborea is a very handsome shrub and requires a large space for its spreading roots, is propagated by seed, in good garden soil.—*Riddell.*

(7865) STAUNTONIA, a genus of Plants belonging to the natural order *Menispermaceæ* and tribe *Lardizabaleæ*, named after Sir George Staunton. This genus is remarkable as being one of those which is common to China and the Himalayan Mountains, and has hence afforded useful inferences respecting the districts where the tea-plant might be successfully cultivated. The genus is characterised by having monœcious flowers; the male having a 6-leaved calyx, with the leaflets in two rows; petals 6 or wanting; stamens 6, opposite to the petals, distinct or monadelphous; anthers adnate, opening outwards; rudiment of ovary. The female flower has the calyx of the male; no petals; 6 sterile dwarfish stamens; ovaries 3, distinct, oblong, with many ovules; stigmas sessile, simple-flowered. Berries often fewer than 3, divaricate, fleshy, opening longitudinally on their inner side. Seeds numerous, oblong-ovate, or reniform; embryo minute in base of a fleshy albumen; radicle inferior. The species are divided into two subgenera—*Stauntonia* being without petals and having monadelphous stamens: *Holbaellia* having 6 gland-like petals and the stamens free. The species form large climbing shrubs, with alternate petiolate peltately digitate leaves. Leaflets leathery in texture, 3-nerved, very entire, with all the petioles swelled and jointed at both extremities; racemes fascicled, axillary, a few flowered at the base of the branches. Flowers white, externally purple, fragrant. Berries large and purple. The Himalayan species are found in Nepal and in 30° N. lat., at elevations of 5000 and 6000 feet. Their fruit, having a sweetish pulp, is eaten by the natives of these mountains, and they might no doubt be acclimated in the gardens of this country, as they experience a considerable degree of cold at the elevations where they are found.—*Eng. Cyc.*

(7866) STEARIN. The harder portion of animal fats; *olein* or *elain* being the softer one. Stearin yields an acid, called *Stearic acid*, having the form of brilliant, white, scaly, crystals, which is largely employed in soap and candle making. (*Waterston.*)—*Faulkner*

(7867) STEATITE, a soft magnesian mineral *silicate of magnesia*—unctuous to the touch, for which reason it is also termed *soapstone*. It is also known in Commerce as *French chalk*. Its sp. gr. is 2.65 to 2.9; its colour is usually greyish, but, when worked and varnished, it becomes dark olive green. It occurs in beds generally associated with talcose slate. Like *potstone* and *serpentine*, which it nearly resembles in composition, it becomes considerably harder by exposure to the air. When first raised it may be easily turned with chisels: the turned articles may be polished first with sand and water, and afterwards with tripoli and water, and, for the highest gloss, with rotten stone and oil, woollen cloths being used in each case. When the steatite has become hard, the methods employed for alabaster, may be resorted to. Steatite has also been named *figure stone* in consequence of its having been used as the material for idols and other figures, which form the household gods of the Chinese: it was formerly supposed that they were made of a preparation of rice. The refractory nature of soapstone, and the facility with which it is worked, admit of its being cut into slabs for fire stones in furnaces and stoves, and for jambs for fire-places. It is also mixed with blacklead in the manufacture of crucibles. It is bored out for conveying water instead of lead pipes. It is an excellent material for kitchen-sinks, wash-tubs, bath-tubs, urinals, &c. It is readily wrought, and may be bored, turned, and planed by the ordinary tools of the carpenter, and it may be screwed together almost as easily as hard wood. It is used in the manufacture of porcelain: it makes the biscuit semi-transparent, but brittle. It forms a polishing material for serpentine, alabaster, and glass, and removes grease spots from cloth. It is ground into a powder and used for diminishing the friction of machinery. Dana states that soapstone is used in the United States for the sizing-rollers in cotton factories; in which case they

are of large dimensions, such as 4½ feet long, and 5 to 6 inches in diameter. The advantage of soapstone as a material for baths and sizing rollers, are, that it is not affected by the acid usually employed in sizing, and is not liable to warp, contract, or expand, by change of temperature and moisture.—*Tomlinson.* *Steatites* are common in Southern Asia, and of all sorts and colors. At Kurnool and at Salem and near Mysore there are very fine and beautifully white soapstones, and near Chittoor there is a valuable description, (similar to the Cornish serpentine) procurable in large blocks and suitable for many statuary and decorative purposes. There is a quarry of excellent potstone at the Nagery Hills, which is likely to become a valuable addition to the Madras trade. The stone is of fine grain, easily worked with the chisel and susceptible of a high polish, when oiled, this stone resembles in a great degree black marble. Some interesting specimens of manufacture in this material, show a considerable advancement in design and execution.—*M. E. J. R.* See SOAPSTONE.

(7868) STEEL.

Acier, Fr.	Chalybs, Lat.
Stahl, Ger.	Stal, Rus.
Foulad, Guz. Hind. Pers.	Acero, Sp.
Acciajo, It.	Stal. Sw.

Is iron combined with a small quantity of carbon. It is brittle, resists the file, cuts glass, affords sparks when struck on flint, and retains the magnetic virtue for any length of time. It loses this hardness by being ignited, and cooled very slowly. Steel is used for making razors, surgeon's instruments, swords, forks, &c.—*Faulkner.*

Conasamoondrum Steel, is made at several villages in the Circar of Elgundel at Ibrahimputnum, and Konapore in the Karaolla Purgunnah, and at Atmacore and Chintulpet in the Velloorla Talooka, it formerly was prepared at several other places, but the Steel furnaces in them are now abandoned. The teepoor as it is called, the raw material of the steel, is manufactured at Maytpilly a village twelve miles south of the Godavery, belonging to Balmookund, from a ferruginous sand procured from gneiss by roasting, pounding and washing. The whole process of the manufacture of this steel is detailed with accuracy and minuteness by Dr. Voysey in the first volume of the Asiatic Society's Transactions and also by Dr. Malcolmson in the Geological Society's Transactions of 1839. Both these gentlemem visited the steel furnaces at Konasamoondrum in the adjoining district of Neermul which supply the material from which the Damascus blades are manufactured. The steel manufactured at these villages is very inferior to the Konasamoondrum steel—and does not fetch half its price. Yet the teepoor is used for both, and the same care is apparently bestowed in the preparation, the only difference that could be detected was that the pure iron which along with the teepoor and the bran is placed in the crucible, is in the case of the Konasamoondrum steel prepared from the yellow clay iron ore, found in the laterite at Taatpilly, while at Ibrahimputnum and the other villages any iron without reference to the ore from which it is smelted is used. The exact chemical condition of the metal under the form of steel has as yet evaded scientific investigation which renders it probable that the inferiority of the Ibrahimputnum steel may be attributable to this one neglect. The Mogul who rents the Konasamoondrum furnaces would seem to be of this opinion as he holds a strict monopoly over the Taatpilly iron, insomuch that I had some difficulty in procuring a specimen of the metal. In the steel furnaces, five men are employed, viz; the principal workman who has the care of the crucibles, which he is continually moving about the furnaces by means of a long iron rake, and four bellows men. The daily pay of the chief is two seers of rice, and two annas a day. The others receive half the rice and money, if the steel comes out of the crucible at all blistered or unequal on the surface, it is rejected as worthless.—There are two kinds of crucibles, the large and the small, each of which contains a lump of steel of from one to two pounds in weight. The cost of the furnace varies from four to six annas for the smaller pieces, and from eight to ten annas for the larger. The workmen complain that the Hyderabad market is now lost to them, their steel being undersold by steel from Europe, which is there preferred for the manufacture of arms. The chief consumption is confined to the country about, where it is used for hatchets, sickles, &c. At Lingampilly and another village, both close to Aimulwarrah, barrels for Pistols and Matchlocks are prepared. All kinds of old iron, old moat buckets, agricultural instruments, &c. are collected and formed into rods of the thickness of a man's finger.—These are then twisted by an instrument for the purpose; three or four of these rods are joined together lengthways, another band of iron of the same breadth and of the thickness of a third of an inch is taken and welded to this, both being formed into a band which is twisted and afterwards beaten into a solid cylinder which is bored by a hard steel chisel. Pistol barrels are made after the same manner, but less trouble is bestowed in the manufacture of a coarser kind of Matchlocks—the process commencing with simply twisting a band of metal. Pistol barrels manufactured by the first process are sold for Rupees twenty and upwards, and Matchlock barrels so prepared for double that amount, the last made after the simpler manner are much cheaper. Swords, daggers, bullum

and spear heads are manufactured at Elgundel from the country steel.—Cuth. Davidson, Assistant Resident.—*M.G.C. for Ex. of* 1851. The manufacture of steel is a branch of Industry for which India has long been celebrated. This substance can be made of good quality in small quantities and at a comparatively trifling cost; the process is more carefully conducted than that of making iron and the results are on the whole more satisfactory. Some defects however are found in the cast steel of India, which interfere materially with its sale in the European market. These are the hardness of the external surface of the melted lumps, and their inequality, few being alike. The hardness is caused by the lumps cooling too rapidly on the surface from the small size and thinness of the crucibles. This branch of manufacture is susceptible of improvement in India, and there is a great abundance of rich ores, fluxes, and refractory clay in most of the districts of this Presidency. The great desideratum, however, is a bed of good coal that would convert into coke Some of the black sandstones and band irons exhibited in this class with their accompanying strata of lime, fire-clay, white pipe-clay and thick beds of yellow and red sandstone, are very similar to those found in the coal bearing strata of Bengal and other countries.

The steel wire of Chinnapatam in Mysore, has long been known: a specimen exhibited by the Superintendent, Bangalore Division, is worthy of Honorable Mention.—*M.E.J.R.*

(7869) STENACTIS. Compositæ.—This is a showy purple flower, and well adapted for borders; it is a native of California and propagated by cuttings or dividing the roots.—*Riddell.*

(7870) STERCULIA, a genus of Plants which gives its name to the natural order *Sterculiaceæ*, which sometimes forms a section of the order *Bytteriaceæ*. The name is derived from 'stercules,' as that from 'stercus,' some of the species being remarkable for the strong and disagreeable odour of their leaves or flowers. The genus is characterised by having polygamous or monœcious flowers; calyx 5-lobed, somewhat coriaceous; petals wanting; stamens monadelphous, disposed in a short sessile or stipitate urceolus; anthers adnate, ten, fifteen, twenty, in one or two rows; solitary or ternately aggregate; ovary stipitate or sessile; carpels, follicular, five, or fewer from abortion, distinct, 1-celled, one or many-seeded, opening on the inner side: seeds disposed in two rows along the suture of the carpels; sometimes, when the carpels have opened and become spread out, they appear to be arranged along the sides of a leaf-like membrane; seeds with fleshy albumen, and flat leafy, equal cotyledons. The species consist of various-sized trees, with soft timber, which are found in the tropical parts of the world with simple or compound leaves and axillary panicles or racemes of flowers Many of them are of considerable use in the countries where they are indigenous. Like the order to which they belong several species are mucilaginous; and others yield fibre, which, from its tenacity, is made into ropes. Some yield a gummy exudation resembling tragacanth, and which is sometimes substituted for it; thus the gum called Tragacanth, which is sometimes imported from Sierra Leone, is said by Dr. Lindley to be yielded by a species which he called *S. Tragacantha*, the *S. pubescens* of others. So Dr. Roxburgh states Kuteera Gum, which is often substituted for tragacanth, to be produced by *S. urens*, a tree of the mountains of the Coromandel coast. Dr. Royle however states that the kuteera gum of many parts of India is yielded by *Gochlospermum Gossypium.—Eng. Cyc.*

It is however certain that a species of Sterculia yields a tragacanth-like gum on the west coast of America, as another does in India. Several species of this genus are remarkable for the tenacity of the fibre of their bark, which is employed for cordage, as *Myrodia longiflora* in Guiana, and *Chorisia crispifolia* in Brazil, *Dombeya umbellata* in the Isle of Bourbon, and *Sterculia Ivria* in the West Indies *Helicteres Isora* may be similarly employed in India. *Sterculia guttata* is a tree, a native of Malabar, which was first made known by Capt. Dickenson, in the year 1802. The bark of the younger parts of the tree abounds with very strong, white, flaxen fibres, of which the inhabitants of Wynaad manufacture a kind of coarse cloth. It is not usual to make use of the bark until the tenth year, when its size will be equal to that of most forest trees. The tree is felled, the branches lopped off, and the trunk cut into pieces of six feet long, a perpendicular incision made in each piece, the bark opened, and taken off whole, chopped, washed, and dried in the sun. By these means, and without any further process, it is fit for the purposes of clothing.

Sterculia villosa, called *Oadal* in Assam, is another tree of this genus, which is a native of the mountainous countries to the eastward of Bengal. Trunk straight. The bark is smooth, but fibrous. Bags are made of it. Its fibres are made into cords by the natives of the eastern frontier of Bengal, to bind wild elephants with. Of a coil of *Oadal* rope, Major Jenkins gave the following notice in the year 1847; The *Oadal* tree is very common, and the rope is made most readily; the bark, or rather all the layers, can be stripped off from the bottom to the top of the tree with the greatest facility, and fine pliable ropes may be made from the inner layers of bark, whilst the outer yield coarse ropes. The rope is very strong and very lasting—wet doing it little injury."

Oadhal is a creeper in Kemaon, with fine, strong fibres; and *Microlæna spectabilis* is

a tree found at the foot of the Himalayas, which yields fibres fit for rope-making. —*Royle Fib. Plants.*

The seeds of *S. macrocarpa* and of *S. heterophylla* are called Cola on the African coasts. In Asia, in the same way, the seeds of *S. Balanghas*, are described by Rumphius as being roasted and eaten by the natives of Amboyna, while the capsules are burned for the preparation of the colouring matter called Cassoumba. The seeds of *S. urens* and of *S. fœtida* are likewise eaten in India after having been roasted, as are those of *S. chicha* in Brazil. Those of *S. alata* are also said to be used as a cheap substitute for opium in the district of Silhet; but this statement, implying the presence of narcotic principles, requires careful examination before it can be received as a fact, as we generally find an accordance rather than so great a difference in the properties of species of the same genus.—*Eng. Cyc.*

(7871) STERCULIA: *Species.* Nar or bast from a species of the tree common in Wynaad on the higher elevations. The bast is as durable as ordinary Russian bast, but inferior to the best Russian bast.—*McIvor.*

(7872) STERCULIA ALATA. Boodh's cocoanut. A handsome tree bearing a large fruit, called Boodh's cocoanut is met with in the Tenasserim Provinces, whose winged seeds are sometimes eaten by the natives.—*Mason.*

(7873) STERCULIA COLORATA.

Bhace or karaka, Duk.

A large tree with palmated five-lobed leaves; deciduous in the cold season; flowers in March and April; carpels of a bright red, somewhat resembling the broad pod of a pea opened with the peas adhering; the tree when covered with them has a strange appearance. —*Riddell.*

(7874) STERCULIA FŒTIDA, Linn. Fetid Sterculia.

Peenata marum, Tam.	Clompan Boerong, Rumph.
Karill, Mal.	
Peenary Marum, Tam.	Gurrapa Badum Chettoo, Tel.

Grows to a very large size, with digitate leaves; deciduous in the cold weather. Flowers in March and April, of a dull crimson colour, and of an offensive odour: the seeds are roasted and eaten.—*Riddell.*

A large tree but chiefly found on the W. Coast and Mysore, where it is applied to a number of useful purposes. This is one of the trees which are believed to furnish the smaller "Poon spars," Hort. Garden. 19.—*M. E. J. R.* In the cells of this fruit there are contained certain white kernels which have a very pleasant taste intar carnem ossiculum locatur oblongo-rotundum nucleum continens candidum amaro-dulcem. "Vide *Hort. Mal. Phar. 4, page 75.* The flower has a most offensive smell and hence the Tamul name. —*Ainslie, p. 230.* The *Sterculia fœtida*, distinguished by the abominable fœtid smell of its flowers, is common on the continent of India and Java, where the fruit is used in the treatment of gonorrhœa. The leaves are deemed aperient, and a decoction of the fruit mucilaginous and astringent. The seeds are oleaginous, but are deemed unwholesome. The fœtid sterculia is not uncommon in the forests, and its seeds are eaten like filberts.—*Mason.*

The oil.

Goodira pusjun yennai, Tam.

The semi-solid oil obtained by expression from the seeds of this large jungle tree, appears to contain a large per centage of stearine, but it is doubtful if it can be obtained in large quantities; it was sent to the Great Exhibition of 1851 from Bombay.—*M. E. J. R.*

(7875) STERCULIA FOLIIS DIGITATIS.

Malay Taynga, Tam.	Conda Thankaia, Tel.
Hill Cocoanut, Eng.	

The edible seeds of this plant are eaten by the poor and are contained in follicles, each of which is nearly as large as two hands joined.—*Ainslie, page 227.*

(7876) STERCULIA GUTTATA.

Goldar, Duk.	Pee marum, Tam.

A large erect tree; leaves long petioled, villous underneath; flowers in simple terminal racemes, pubescent on both sides, outer and inner of a pale yellow colour, marked with purple spots; deciduous. Carpels the size of a large apple, three or more growing together, of a reddish colour; seeds size of a chesnut, roasted and eaten by the natives.—*Riddell. Sterculia guttata* is a native of Malabar, and was first made known by Capt. Dickenson, in the year 1802. The bark of the younger parts of the tree abounds with very strong, white, flaxen fibres, of which the inhabitants of Wynaad manufacture a kind of coarse cloth. It is not usual to make use of the bark until the tenth year, when its size will be equal to that of most forest trees. The tree is felled, the branches lopped off, and the trunk cut into pieces, of six feet long, a perpendicular incision made in each piece, the bark opened, and taken off whole, chopped, washed, and dried in the sun, by these means, and without any further process, it is fit for the purposes of clothing.—*Royle.* This, says Wight, is a large tree; but I am not acquainted with the timber, no specimen having been sent with the leaves.—*Wight.* From Wynaad, Captain Dickenson sent the seeds to the Botanic garden in 1802, and the young trees reared therefrom blossomed for the first time in December 1809. They were then about twenty feet high, and the trunk twenty-one inches in circumference four feet above the ground. The bark of this tree, the Malabars convert into a flaxy substance of which the natives of the lower coast of Wynaad contrive to make a sort of clothing,

which derives its name from the first process of its manufacture, viz., the chopping the bark into small pieces, from suragoonoo, to cut. It is not customary to manufacture the bark until the tenth year, when its size will be equal to that of most forest trees.—*Rhode M. S. S.*

(7877) STELLARIA MEDIA.

Kaaray Munthu-keeray Tam.

Chickweed. This English weed is used by the natives on the Neilgherries as a pot herb, eaten alone, and mixed with others, probably introduced.—*Jaffrey.*

(7878) STERCULIA PARVIFLORA: small flowered Sterculia. Abundant in the jungles of Ajmeer.—*Gen. Med. Top. p.* 202.

(7879) STERCULIA URENS. Byttneriaceæ, Roxb. c. 24 Stinging Sterculia.

Vellay pootallie marum, also Kavali, Tam.	Bulee, Beng. Kateria kooli, also Kur Kutila, Hind.

A large tree, a native of the mountainous countries on the Coast of Coromandel, Hindoostan &c. common also in the Ajmeer hills, and in Kotah.—*Med. Top. p.* 201. Leaves round, cordate and five-lobed; deciduous in the cold weather; flowers in February and March, very small; the carpel is covered with rigid bristly hairs, which puncture like the Mucuna pruriens. The bark of the trunk is white, and gives the tree a dead appearance. —*Riddell.* The kutila gond, is obtained in great abundance from this tree; the seeds of the stinging pods are palatable when roasted and very wholesome: many bushels must be yielded by one large tree, and the poor in famines should collect the seeds for food: the star-shaped pods are covered with stinging pubescence. The wood of this tree is soft and spongy, except towards the centre of large trees, where it is reddish. Mr. Rohde does not know of any use it is put to except to make fuel. I observed, he says, that the water on which I kept the green branches for examination became thick, like clean glutinous jelly. Bark exceedingly astringent, tinges the spittle reddish. It yields a gum not unlike Tragacanth, and has been sent to London as such, but the artists, who used the gum, did not find it answer. The seeds are roasted and used by the natives as an article of diet and also as a dainty.—(*Roxb.*) *Rhode M. S. S.* The gum, which exudes spontaneously during the hot season, occurs in large light brown transparent tough masses. Immersed in water they swell like a jelly, but do not dissolve but by protracted boiling. The solution is not adhesive, and is destitute of the thickness of solutions of ordinary gum. The uses of this gum are very limited: the want of adhesiveness renders it unsuitable for the arts, while its difficult solubility renders it inferior to most other gums for medicinal purposes. A similiar gum called Kutira is afforded by the Cochlospermum gossypium of Coromandel, Travancore, and Ceylon, a large tree, with bright yellow flowers. For an account of properties and use of the true tragacanth gum, which the Kutira much resembles, see *Astragalus*, also *kuteera*. The roasted seeds, which contain starch and fixed oil, have much the flavour of chestnuts, and are eaten by the natives of this country.—*O'Shaughnessy.* The wood of this very large tree is soft and loose grained, only fit for the most common purposes. The leaves when soaked in water have the property of rendering it ropy and glutinous. The bark yields a gum resembling gum tragacanth. —*Wight.*

The Gum.

Katila ka gond, Hind. | Tshaw, Burm.

The white transparent gum of the kur tree: tasteless and similar in property to tragacanth: swells exceedingly when placed in water but does not dissolve: in Medicine considered cooling and astringent, and given, in Ajmere, in "dai" and "luddoo."—*Gen. Med. Top.* Six species of *Sterculia*, four of which, *viz. Sterculia ramosa*, *S. fœtida*, *S. campanulata*, *S. piperfolia*, are very plentiful throughout the Pegu Province, yield a gum which is known in the bazars of Bengal under the name of Kotheela. The other two species, *Sterculia balangas* and *S. calorata*, are not so plentiful. This gum is probably analogous to the *Tragacanth*, which Dr. Lindley states is obtained from a species of *Sterculia* at Sierra Leone.—*McClelland.*

(7880) STERCULIA VILLOSA. A large tree; leaves palmated, five or seven-lobed.—*Riddell.*

(7881) STERCULIACEÆ, *Sterculiads*, a natural order of Plants belonging to the syncarpous group of Polypetalous Exogens. The plants belonging to this order are trees or shrubs, with alternate, stipulate, simple, often toothed, leaves, with a variable inflorescence, and a stellate pubescence. The calyx is either naked or surrounded with an involucre, consisting of five sepals, with a valvular or nearly valvular æstivation; five petals, hypogynous often saccate at the base: stamens definite or indefinite and monadelphous; anthers 2-celled; the pistil consists of five carpels, often surrounding a columnar gynophore; fruit a capsule with three or five cells; seeds often winged, sometimes woolly; albumen oily or fleshy, and embryo straight; cotyledons either flat and plaited or rolled round the plumule.

The order thus defined includes several groups of plants, which have by many writers been made to form distinct orders. Sterculiaceæ are most nearly allied to Malvaceæ from which they differ in the possession of 2-celled anthers. From Dipteraceæ and Tiliaceæ, to which they are allied by the valvate æstivation of the calyx, they differ in the possession of monadelphous stamens. The subdivisions of this order are marked by very evident peculiarities of structure.

Helictereæ have an irregular calyx and corolla.

Sterculieæ, no petals and definite stamens placed at the end of a long column.

Bombaceæ, a calyx with a ruptile dehiscence usually woolly seeds, and the cells of the anthers anfractuose.

Dombeyæ, a part of the stamens sterile, and flat; well formed petals.

Byttnerieæ, a part of the stamens steriles, and small petals bagged at the base.

Lasiopetaleæ, a petaloid calyx and rudimentary petal.

Hermannieæ, spirally twisted petals with only five stamens, and those opposite the petals.

Sterculiaceæ, are natives of India, Australia, the Cape of Good Hope, and South America with the West Indies. Most of its subdivisions have however a very definite Geographical range.

Sterculiaceæ, are found in India, and equinoctial Africa. The genus Sterculea contains many species that are used as food or medicines.

Byttnerieæ, are principally natives of South America and the West Indies, about one-seventh of the species are found in the East Indies, and the same proportion in Australia. To this group belongs the plant that produces the cocoa [Theobroma] of commerce. These plants, like the whole of the order and its allies, abound with mucilage and are often used in medicine as demulcents. The fruit of Guazuma ulmifolia possesses a mucilaginous pulp and is eaten in Mexico by man, but principally employed for feeding cattle. The bark of this plant is bitter, and is said to be serviceable in the horrible disease called Elephantiasis.

Hermannieæ—Two-thirds are found at the Cape of Good Hope; the remainder are natives of the East and West Indies, South America, and the islands of the Pacific. The species of *Waltheria* abound in mucilage, and are used in medicine as demulcents.

Dombeyæ are all African, East Indian, or South American. Their properties are similar to the preceding. One of the species, *Wallichia spectabilis*, forms a handsome tree, approaching the Linden, and points out a relation between this order and *Tiliaceæ*.

Lasiopetalæ are found entirely in Australia, and possess no remarkable properties. Further information on the properties of plants of this order might be arranged under BOMBACEÆ, ADANSONIA, STERCULIA, and THEOBROMA.—*Eng. Cyc.*

(7882) STEREOSPERMUM. Of this genus Wight gives, in Icones, Stereospermum chelonoides, 1341; suaveolens, 1342.

(7883) STEREOSPERMUM CHELONOIDES. *Bignoniaceæ*, Icon. 1341.

Velapauthrie marum, TAM.

Usually pronounced padrie marum, the flowers are very fragrant, and the tree a very handsome one, though not large. It is probable there is some confusion in the specimens, as the proper padrie marum is reddish, and this is called the white padrie, though the specimens seem to be the same as the other. This may easily happen, as the trees are very like, being principally distinguished by the colour of the flowers; yellowish on this, brownish purple in that. Hence, perhaps the two names, black and white pantherie. This is said to be the stronger wood of the two.—*Rohde.*

(7884) STEREOSPERMUM SUAVEOLENS. *Bignoniaceæ*, Icon. 1341.

Padrie marum. TAM. | Ooloomanthiree Mara. CAN.

A middle sized three with pinnate leaves, and panicled inflorescence, very fragrant wood (according to Wight,) strong and elastic, said to be fitted for making bows. Wight No. 63, Mysore 38.—*M. E. J. R.* A considerable tree, frequent in the Walliar jungles, wood strong and elastic (said to be fitted for making bows), wood dark and good.—*Wight.*

(7885) STERNIDÆ, the name of a family of Web-footed, long-winged Birds, which are commonly known as Sea Swallows and Terns.—*Eng. Cyc.*

(7886) STEVIA PURPUREA. COMPOSITÆ. PUREA. These are pretty, small flowering plants, natives of new Spain and Mexico, propagated by seed, cuttings and division of the roots in any good garden soil.—*Riddell.*

(7887) STILAGINACEÆ, a small natural order of plants, belonging to the rectembryose group of Apetalous Exogens. They are trees or shrubs, with alternate simple stipulate leaves, the stipules being deciduous. The flowers are unisexual, mostly seated on amentiform spikes or racemes. Calyx 3-5-parted; stamens two or more, arising from an enlarged receptacle with capillary filaments and 2-lobed anthers dehiscing transversely; ovary superior, stigma sessile; fruit a drupe with one seed, which is pendulous; the embryo is green, lying in the midst of fleshy albumen. The species of this order are all of them natives of the East. In its relations this order is obscure. It has some resemblance to *Urticaceæ*, from which it is distinguished by its enlarged disc, its peculiar anthers, and unelastic filaments. In these characters it resembles *Hensloviaceæ*, but they differ from this order in having but one carpel and a single seed. Many of the fruits of this order have a pleasant subacid flavour, and are eaten by the natives of the East Indies.—*Eng. Cyc.*

(7888) STILAGO, a genus of Plants sometimes united with, at other times separated from the genus *Antidesma*, belonging to the natural family *Antidesmeæ*, which by some botanists is called *Stilaginaceæ*. The species are few in number, forming shrubs and moderate-sized trees, which are found in Madagascar and Mauritius,

as well as in some of the Indian islands, and in India, where the species extend even to northern parts. The genus is characterised by having dicœcious flowers, the male having a 3- or 5-parted perianth. Stamens 2, 3, or 5, inserted in an annular disc with the rudiment of an ovary. The female flower has the perianth of the male, and the disc surrounding the base of the ovate single-celled ovary. Ovules 2, pendulous from the apex of the cell. Stigma sessile, 3- to 5-rayed. Drupes 1-seeded, crowned by the stigma, with the nut rugose both inside and out. Albumen fleshy, scrobiculate. Cotyledons foliaceous. Embryo inverse. The flowers are arranged in axillary catkin-like spikes. The leaves of *Antidesma alexiteria* are employed in the Mauritius as an antidote against snake-bites. Cordage is made with its bark, as well as with that of *A. Zeylanica* in Ceylon. The small fruits of both species are eaten and preserved: the fruits of *A. pubescens* (*Stilago*), *Bunias*, and *Diandra*, are eaten by the natives of India.—*Eng. Cyc* Wight, in l cones, gives Stilago Bunias, 819; lanceolaria, 766; pubescens, 821; tomentosa, 767-8.

(7889) STILAGO DIANDRA, *Antidesmeæ*, R. C. 166.

Asary poolie-marum TAM. | Tengurce, BENG.
Tella Goomoodoo, TEL.

A tree, a native of the mountainous parts of the Circars. Roxburgh says the wood of this tree is put to various uses, but seems himself to be but little acquainted with it, judging from a branch specimen, nearly white at first, but becoming brownish by exposure to the air.—*Wight* The berries are eaten by the natives when ripe. The wood serves for various uses.—*Rohde M.S.S.*

(7890) STILLINGIA, a genus of Plants belonging to the natural order *Euphorbiaceæ*, so named in compliment to Dr. Stillingfleet, known as an English botanist. The genus now includes the species of *Sapium*, and is distinguished by one of its species being the famous Tallow-Tree of China. The generic character of *Stillingia* is; Flowers monœcious; males aggregate; calyx cup-shaped, crenulate, or bifid; stamens two, inserted; filaments united at the base; anthers opening outwards; female flowers solitary; calyx tridentate or trifid; ovary sessile, 3-celled, each cell with a single ovule; style short, thick; stigmas three, simple, spreading; capsule globose, tricoccous; cocci single seeded. The species consist of milky trees or shrubs found in the tropical parts of Asia and America, and likewise in the islands of Bourbon and Mauritius. The leaves are alternate, petiolate; petioles bi-glandular at the apex. Male flowers usually crowded in terminal spikes, supported at the base by a bi-glandular bract. The female flower is commonly below the spike, sometimes sub solitary on another branch.—*Eng. Cyc.*

(7891) STILLINGIA SEBIFERA, the Tallow-Tree of China, at one time attracted considerable attention, and was introduced into various European colonies, in the East and West Indies. It may be met with in English hothouses. Dr. Roxburgh describes the plant as common in his time about Calcutta, but that it did not yield any useful product, and was therefore only an ornamental tree, being in flower and fruit most parts of the year. It is found in China on the borders of rivulets, and is also cultivated. It grows to the height of a pear-tree, having a trunk and branches like the cherry, and foliage like the black poplar, but which turns red in autumn. It was met with in Chusan by the late expedition, and seeds sent home by Dr. Cantor, which have been sown in the Horticultural Society's Garden at Chiswick. The fruit of this tree furnishes the Chinese with candles, and oil for their lamps. The seed-vessels and seeds are bruised and then boiled in water. The fatty particles rising to the surface are skimmed off, and on cooling condense into tallow. To give it greater consistence some wax is added, together with linseed-oil in the proportion of three parts to ten of the tallow. The candles made with it are beautifully white. Sometimes they are coloured red by the addition of vermilion. These candles are sometimes said to be coated with wax procured from another Chinese tree (probably *Ligustrum lucidum*,) which forms an external crust and prevents them running. This tallow is also employed in medicine instead of lard.—*Eng. Cyc* The kernel of the seeds of the tallow tree of China, Stillingia sebifera, says Simmonds, contains an oil, which, when expressed, consolidates through the cold to the consistence of tallow, and by boiling, becomes as hard as bees' wax. The plant also yields a bland oil. A similar fatty product is obtained from a shrub in British Guiana the Myristica (Virola) sebifera. *Simmonds* The celebrated tallow tree (Stillingia) symmetrical shaped tree, is a native of all the eastern provinces of China, and resembles the aspen in the form and colour of the leaf, and in its general contour —*Williams, Middle Kingd. page* 282. According to Mr. Williams the tallow tree (*Stillingia sebifera* occurs over all the eastern part of China, and when fully grown is a beautiful tree, resembling the aspen in its shape and foliage; it would form a valuable addition to the list of shade trees in Britain. The seeds grow in clusters like ivy berries, and are collected in November; when ripe, the capsule divides, and falling off discovers two or three kernels covered with the pure white tallow. When the tallow is to be prepared, these are picked from the stalks and put into an open wooden cylinder with a perforated bottom, in which they are well steamed, over boiling water. In ten or fifteen minutes, the tallow covering the seeds becomes soft, and they are then thrown into a stone mortar and gently beaten with a mallet t

detach it. The whole is then sifted on a hot sieve, by which the tallow is separated from the kernels, though containing the brown skin which envelops the latter, and presenting a dirty appearance. The tallow in this state is inclosed in a straw cylinder, or laid upon layers of straw held together by iron hoops, and subjected to pressure in a rude press from which it runs clear in a semifluid state, and soon hardens into cakes. The candles made from it become soft in hot weather, and are sometimes coated by dipping them in colored wax.—*Williams' Middle Kingdom, Vol.* II, *page* 107. The tallow tree (Stillingia sebifera) is abundant in the valleys of Chusan, and large quantities of tallow and oil are yearly extracted from its seeds: tallow mills are erected in several parts of the island for this purpose. The Laurus Camphora, or camphor tree, is also abundant, but no camphor is extracted or exported from the island. *Fortune's Wandering, page* 67. At another place, he says, for the following account of the Chinese method of extracting the tallow from the seeds of the *Stillingia Sebifera*, I am indebted to Dr. Rawes, of the Madras army, who was some time a resident in the island of Chusan; "The seeds are picked at the commencement of the cold weather, in November and December, when all the leaves have fallen from the trees, this I saw at Sing-kong when out shooting in the sah-hoo-valley close by our quarters, through the village. The seeds are in the first place taken to the building where the process of making the tallow is carried on, and picked and separated from the stalks. They are then put into a wooden cylinder, open at the top, but with a perforated bottom. This is placed over an iron vessel (about the same diameter or rather larger than the wooden cylinder, and about six or eight inches deep) containing water, by which means the seeds are well steamed, for the purpose of softening the tallow and causing it more readily to separate. The furnace I saw had four or five iron vessels in a row, was about three feet high, four or five feet broad and eight or ten feet long. The fire was placed at one end and fed with the husk of the rice, dry grass, and such like cheap materials which make a great flame, and the flue was of course carried directly under the whole of the iron vessels. "When the seeds have steamed ten minutes or a quarter of an hour, they are thrown into a large stone mortar and are gently beaten by two men with stone mallets for the purpose of detaching the tallow from the other parts of the seed. They are then thrown upon a sieve heated over the fire, and sifted, by which process the tallow is separated, or nearly so, although they generally undergo the process of steaming &c. a second time that nothing may be lost. The other part of the seed is ground and pressed for oil. "The tallow now resembles coarse linseed meal, but with more white spots in it and derives its brown colour from the thin covering over the seed (between it and the tallow) which is separated by the pounding and sifting. In this state it is put between circles of twisted straw, five or six of which are laid upon each other, and thus forming a hollow cylinder for its reception. When this straw cylinder (we may call it so) has been filled, it is carried away and placed in the press, which is a very rude and simple contrivance, but which like every thing Chinese, answers the purpose remarkably well. The press consists of longitudinal beams of considerable thickness, placed about a foot and a half, or two feet, asunder, with a thick plank at the bottom, forming a kind of trough, and the whole is bound together with iron. The tallow is pressed out by means of wedges driven in very lightly with stone mallets, and passes through a hole in the bottom of the press into a tub, which is sunk there to receive it. It is now freed from all impurities, and is a semifluid of a beautiful white colour, but soon gets solid, and in cold weather is very brittle. The inside of the tubs which collect the tallow are sprinkled or dusted over, with a fine red earth, well dried, which prevents the tallow from adhering to their sides. It is thus easily removed in a solid state from the tubs, and in this condition the cakes are exposed for sale in the market. As the candles made from this vegetable tallow have a tendency to get soft and to melt in hot weather, they are commonly dipped in wax of various colours as red, green and yellow. Those which are intended for religious purposes are generally very large, and finely ornamented with golden characters. The cake, or refuse, which remains after the tallow has been pressed out of it, is used for fuel, or to manure the land, and so is the refuse from the other part of the seeds from which oil is extracted.—*Fortune.*

(7892) STIPA, a genus of Grasses belonging to the tribe *Stipaceæ*. It has stalked florets, the paleæ coriaceous, the inner entire. *S. pennata*, the only British species, has a very long twisted feathery awn, with a glabrous base. It is a very beautiful plant, and is common in English gardens. Found on rocks in Long Seadale near Kendal.—*Eng. Cyc.* This beautiful species of grass is grown chiefly in gardens for the sake of the beautifully feathered heads.—*Riddell*

(7893) STIZOLOBIUM, a genus of Plants which was so named by Persoon, from στίζω to prick, and λοβός, a lobe or pod, from the pods of the several species being covered with hispid hairs. The species have now been removed chiefly to *Pachyrhizus* [DOLICHOS] and to *Mucuna*; of the latter of these *Stizolobium* now forms a sub genus. The principal species are mentioned under COWITCH and MUCUNA. Cowitch is no doubt a corruption of the Hindustanee name Kiwach, which is the *Mucuna prurita* of Hooker,

indigenous in various parts of India, but usually confounded with *M. pruriens*, a native of the West India Islands. The Indian *M. prurita* is distinguished by its smaller leaves, its more obtuse leaflets, the middle one being more truly rhomboidal, its flowers more constantly in threes, and by its legumes being much broader, compressed, and free from any raised line on the back of the valve, whilst in the American *M. pruriens* the pods are narrower, terete, and keeled on the valves. Another valuable but little known species is *M. utilis*, the Bois Noire of the islands of Mauritius and Bourbon, and thought to be a native of Arabia. It is universally employed in the above islands for enriching the soil for the cultivation of sugar. The thick covering of herbage with which the soil becomes covered, must be useful in preventing the soil from becoming parched, while the whole crop, being afterwards ploughed in, is found to be eminently useful in enriching the soil. The seed has been introduced into India and is spreading over the country.—*Eng. Cyc.*

(7894) STIZOLOBIUM ALTISSIMUM.—Assam Bean.

Kalee Seem. Duk.

This bean is grown like most others, and may be first sown at the commencement of the rains and continued during the cold season.—*Riddell.*

(7895) STOMAPODA. M. Milne-Edwards comprises in the order *Stomapoda* all the Podophthalmous *Crustacea* which are deprived of thoracic branchiæ lodged in interal cavities. This division is entirely composed of Swimming Crustaceans, whose body is elongated, and whose general form often approaches closely to that of the Macrourous Decapods; but in those animals the concentration of the rings of the head and thorax is carried less far.

(7896) *Lucifer Typus.*—This species differs from the only other, *Reynaudii*, (which was found in the Indian Ocean by M. Reynaud) in the form of the median piece of the caudal fin, which is lamellar, and without any notch below, in the more considerable length of the middle blades, and in the apparent absence of a separation between the carapace and oculiferous prolongation.

(7897) *Squilla.* (Rondeletius).

(7898) *Squilla Maculata.* Length from 10 to 12 inches. It inhabits the Asiatic seas.

(7899) *Squilla Stilifera.* Length about 3 inches. It is a native of the island of Mauritius.

(7900) *Gonodactylus* (Latreille).

(7901) *Gonodactylus Chiragra.* Length about 3½ inches. The species are found in all the seas of warm climates: the Mediterranean, American coasts, Seychelles Islands, near Trincomalee, and Tongataboo.

(7902) *Gonodactylus Scyllarus.* Length about 4½ inches. It is found in the Indian Seas and on the coasts of Mauritius.

(7903) STONE. *Working in stone*, polishing the hardest surfaces, engraving its surface with imperishable records, and sculpturing it into various forms, even excavating gigantic temples out of the solid rock, are all departments of sculpture and engraving to which the Hindoos have paid attention from the earliest times; and their buildings are conspicuous for a quality for which those of Egypt have often been admired, that is, the exquisite polish and glass like appearance of some of the hardest granite &c. Kennedy has fortunately given us an account of the process by which they effect this. "The tools," he says, "which the Hindoos use are a small steel chisel and an iron mallet. The chisel, in length, is not more than about twice the breadth of the hand of the Hindoo workman; which, as is well known, is very small; and it tapers to a round point like a drawing-pencil. The mallet, also in iron, a little larger than the chisel, but not weighing more than a few pounds. It has a head fixed on at right angles to the handle, with only one striking face, which is formed into a tolerably deep hollow and *lined with lead.* With such simple instruments they formed, fashioned, and scooped the granite rock which forms the stupendous fortress of Dowlatabad, and excavated the wonderful caverns of Ellora; for it seems by no means probable that the Hindoo stone-cutters ever worked with any other tools." Dr. Kennedy adds, "The traces of the pointed chisel are still visible on the rocks of Dowlatabad, as they are also on some of the great works of Egypt. The stone having been brought to a smooth surface, it is next dressed with water in the usual way, and is then polished in the following manner. A block of granite, of considerable size, is rudely fashioned into the shape of the end of a large pestle. The lower face of this is hollowed out into a cavity, and this is filled with a mass composed of pounded corundum-stone, mixed with melted bees-wax. This block is moved by means of two sticks, or pieces of bamboo, placed on each side of its neck, and bound together by cords, twisted and tightened by sticks. The weight of the whole is such as two workmen can easily manage. They seat themselves upon, or close to, the stone they are to polish, and by moving the block backwards and forwards between them, the polish is given by the friction of the mass of wax (and lac?) and corundum."—*Royle* Nearly the same materials, and with a still greater degree of success are employed in polishing such delicate articles as beads and bracelets; elegantly shaped cups, or the models of cannon. Of the processes employed a very interesting account, which is published in the "Illustrated Catalogue," is given by Mr. Summer of Cambay. The stones

are first fixed on a steel spike, and there roughly rounded with an iron hammer, and then polished with a composition of lac and corundum variously applied. The holes are bored with a steel drill, tipped with a small diamond. Cups and saucers and similar hollow articles, are wrought, according to the required external shape on the steel spike, and a rough polish given on the rough polishing stones. The cavity is formed by the diamond-tipped drill to the depth of one-fourth of an inch all over the space, until it exhibits an honey-combed appearance; the prominent places round the holes are then chipped away; and this process is repeated until the depth and form desired are obtained. They are then polished upon prepared moulds of convex forms, and of the same composition as the polishing-plates which are attached to the turning-wheel.—*Royle, Arts &c. of India, page* 513 *and* 515.

(7904) STORAX.

Usteruck, Salajet, Meah, Arab.	Storax, Fr.
Storace, It.	Stryax-broom, Ger.
Styrax, Lat.	Azumbar. Sp.

The produce of a tree (*Styrax officinale*), growing in the South of Europe and the Levant. It is usually met with in tears, which is pure; and in lumps or *red storax*, which is mixed with saw dust and other impurities. Storax has a fragrant odour, and a pleasant, sub-acidulous, slightly pungent, and aromatic taste; it is of a reddish brown colour, and brittle. (*McCulloch.*) —*Faulkner.*

(7905) STORAX LIQUID, Sillarus; Rose Mallows.

Sillarus, Miati-lubni Meih-katar, Arab.	Sillarus Meih-Seela, Guz, Hind. Pers.

Liquid storax is usually more or less opaque, of the consistence of bird-lime, grayish colour, warm balsamic taste, and peculiar vanilla-like odour, if pure. Small quantites are imported annually into Bombay from Suez and the Arabian Gulf in skins; it is re-exported to England and China under the designations of Rose Mallows (Rosa mallos) and Sillarus, in barrels of about four imperial gallons capacity each.—*Faulkner.* See Ambar Liquid, also Liquidambar.

(7906) STRAWBERRY, the English name of the fruit and plant of the *Fragaria*, a genus of plants belonging to the natural order *Rosaceæ*. The fruit of the *Fragaria* is one of the most delicious of England's summer fruits. The name *Fragaria* is derived from the Latin *Fragum*: and the English name from the practice in that country of cultivating the plant with straw surrounding it. The genus *Fragaria* is known in its family by possessing a calyx with a concave tube, the limb of which is 10-parted, and the outer 5 segments accessory; 5 petals; stamens and carpels indefinite, the latter placed upon a fleshy and succulent receptacle, forming the juicy and succulent part of the fruit. The species are perennial plants, throwing out runners; the leaves are trifoliate, each leaflet being coarsely toothed; the receptacle on which is seated the carpels, and which is called the fruit, is round, and assumes a variety of colours from a scarcely perceptible pink to a dark red. Several species of this genus have been described. Linnæus gave only two; but Wildenow admitted eight; and Don, in 'Miller's Dictionary,' enumerates fourteen. Duchesne, who is followed by many French botanists, makes only two species, and makes the species of other writers varieties of these. All of them are natives of temperate or cold climates; and are found in Europe, America, and the mountains of Asia.—*Eng. Cyc.* Mr. Mason raised very fine strawberries in his garden at Tavoy, but the plants required considerable care.—*Mason.* The yellow flowered Indian Strawberry in the Terai ascends 7500 on the mountains.—*Hooker Him. Jour., p.* 395.

(7907) *Fargaria Chilensis*, Chili Strawberry, is a native of South America, both in Chili and Peru.

(7908) *Fragaria Collina*, the Hill Strawberry, has the sepals erect after flowering, and the hairs on the peduncles and calyx erect. This species is a native of Switzerland and Germany, and is characterised by its producing green fruit. The varieties of strawberries which are called Green are the produce of this species. In flavour and size they are only a second-rate strawberry.

(7909) *Fragaria elatior*, the Hautbois Strawberry, has the sepals reflexed on the peduncle, the hairs of the peduncles and petioles extending horizontally. It is a native of North America, and is occasionally found in groves in the south of England. The shape, size, and colour of the fruit of the Hautbois are subject to great varieties, according to its mode of cultivation. It is the parent of a great number of sorts known in gardens, most of which, when properly managed, produce fruits of a first-rate kind.

(7910) *Fragaria grandiflora*, large-flowered Strawberry, is a native of Surinam, and has furnished English gardens with the sorts called Pine strawberries.

(7911) *Fragaria Majanfea*, the Majanfe of the French.

(7912) *Fragaria vesca*. Wood or Alpine Strawberry, has plicate leaves, pilose beneath; the sepals reflexed and the hairs on the peduncle pressed down. It is found wild in woods and on hill-sides throughout Europe, and is abundant in Great Britain. Duchesne describes eight varieties of this species, mostly characterised by the different form of the fruit or fleshy receptacle. Many of these produce the cultivated varieties which are known in gardens. The *F. v. semperflorens* produces the Red, the White, the American, and Danish Alpine strawberries, all of which are of a fine flavour, and greatly valued.

F. v. minor produces the Red Wood-Strawberry, or Frasier d'Angleterre, and the White Wood-Strawberry, both very fine kinds. To the *F. v. flagellis* belongs the Red and White Alpine Bush-Strawberry, but these do not produce so good fruit as the last.

(7913) *Fragaria Virginiana*, the Virginian Strawberry.—*Eng. Cyc.*

Dr. Riddell gives the following instructions on the cultivation of strawberries in the Dekhan :—

General Observations.—"*The Strawberry* multiplies itself from runners and suckers; the old plant, after it has ceased bearing, throwing them out. As soon as the rains have set in, these runners may be removed into a nursery bed, for their being more easily looked after, and should have the space of nine or ten inches allowed between them: they will throw out other runners, the whole of which may be separated and transplanted at the proper season. They thrive best in a light soil with good old stable and vegetable manure at first, and as soon as they show a disposition to flower, may have old goats' or sheep's manure added around each plant, a couple of a double handsful being sufficient. In no part of the Deccan, should the plants be put out for fruiting before the close of the rains, the latter part of September being quite early enough. Suckers which I planted for experiment at the commencement of August, grew to a good size, and did nothing for ten or twelve weeks but throw out suckers, which were continually removed, and after all fruited badly: the finest and most prolific crop were got from suckers put out in the beginning of October. Some strawberries were gathered in November from the plants put out in August, but they were so few as in no way to induce me to try the experiment again. Varieties can only be procured from seed; and to procure the seed, select the finest ripe fruit, rub it on a sheet of paper, and dry it. When the rains commence, soak the seed in water, reject all that float, the remainder sow in baskets in a light loam, when they will be fit to remove in about six weeks, and should be put in other baskets four or five inches apart, and taken care of until ready to be transplanted into beds, where they are to remain. As these plants throw out suckers very fast, they must be constantly looked after, and removed unless you have a scarcity of plants. They will commence bearing in six months from the time of sowing the seed. You may, as soon as the rains have ceased, put your suckers that have rooted into square beds, each not less than one foot apart, five in a row: this will give you twenty-five in each bed—as many as can be easily looked after and gathered without trampling on the bed and thereby injuring the plants. When the earth is of a clayey consistence, I have seen the strawberry cultivated on ridges. Some think this is a good plan, but I prefer the beds: however, it can be easily tried. It is sometimes necessary, in consequence of flooding the beds, to put tiles under the fruit to keep it clean, but it also attracts the notice of the birds: if straw or grass be used, then the chances are that white ants destroy your plants. This it is that makes some persons prefer the ridge system of growing, as they say the fruit is cleaner in consequence: all I know is, that fine fruit may be grown either way; and if on ridges, the same distance must be allowed between the plants as in beds—and even in the latter the plants may be put on raised cones of earth. The common vegetable manure is all that is required at first until near flowering, when a handful or two of goat's or sheep's dung should be put round the plant, opening the earth and scraping it together. Water during the evening and very early in the morning."—*Riddell.*

(7914) STREPTOCARPUS. BIGNONIACEÆ. This is a handsome plant from the Cape of Good Hope, produces abundance of pale, purple flowers, it requires a good garden soil, and is increased by seed.—*Eng. Cyc.*

(7915) STRIGIDÆ. The Owls. This family of Birds, includes the Nocturnal Birds of Prey. The following table gives Mr. Swainson's arrangement for the entire family.

	Genera.
1. Typical Group.—Ears large, operculated, no egrets,.....	*Strix.*
2. Subtypical.—Ears smaller, no operculum, egrets,.....	*Asio.*
Ears small, no egrets or operculum, disc imperfect.	
3. Aberrant.—Head small, claws feathered, tail short.....	*Nyctea.*
Head large, claws naked, tail moderate.....	*Nyctipetes.*
Head small, claws feathered, tail wedged.....	*Surnia.*

Mr. G. R. Gray makes the *Accipitres Nocturni* the second sub-order of his first order *Accipitres*. His third family, the first of that suborder, is formed of the *Strigidæ*, which are thus subdivided by him :—

Sub-Family 1.—*Surninæ*,

Genera.—*Surnia*, Dum. (*Syrnia*, Steph., *Strix*, Gm.); *Accaba*, Wagl. (*Surnia*, Cuv., *Strix*, Shaw); *Nyctea*, Steph. (*Noctua*, Cuv., *Nyctia*, Sw.); *Athene*, Boie (*Nyctipetes*, Sw., *Strix*, Daud.); *Huhua*, Hodgs.

Sub-Family 2.—*Buboninæ*.

Genera.—*Scops*, Sav., (*Scops* Sav., *Asio*, Briss., *Otus*, Less., *Strix*, Linn.); *Lophostrix*, Less., *Ketupu*, Less. (*Cultrunguis*, Hodgs., *Strix*, Gm.,); *Bubo*, Sibb. (*Feliceps*, Barr., *Asio*, Antiq., *Ulula*, Bonap *Heliaptex*, Sw., *Ascalaphus* J. Geoff., *Strix*, Linn.).

Sub-Family 3.—*Ululinæ*.

Genera.—*Syrnium*, Sav., (*Scotiaptex*, Sw., *Ulula*, Briss., *Strix*, Linn.,); *Otus*, Day (*Asio*,

Briss., *Brachyotus*, Gould, *Strix*, Linn. ; *Urrua*, Hodgs. ; *Nyctalops*, Wagl. ; *Ulula*, Cuv. (*Strix* Gm.) ; *Glaucidium*, Boie (*Stix*, Linn., *Noctua*, Cuv., *Athene*, Boie) ; *Nyctale*, Brehm. (*Scotophilus*, Sw., *Nudipedes* and *Ptilipedes*, Less., *Strix*, Bechst., *Athene*, Boie) ; *Ninox*, Hodgson.

Sub-Family 4.—*Striginæ*.

Genera.—*Strix*, Linn. ; *Pholidus*, J. Geoff. (*Strix*, Horsf,) ; *Bulaca*, Hodgson.

The geographical distribution of this family is very wide ; extending as high as the Polar Sea, where *Stryx Nyctea* is recorded by Sabine as having been seen on the islands in the summer months, and by Sir James Ross as having been observed about Victoria Harbour throughout the winter, where several pairs had bred in the preceding autumn ; and as low at least as Port Famine in the Straits of Magellan. *Strix rufipes* and *S. nana*, &c., King). Species are found in Europe, Asia, Africa, America, and in Australia. They feed on birds and quadrupeds, and even fish (in the case of *Strix nyctea* and *S. flammea*), according to the size of the species. Hares, partridges, grouse, and even the turkey, are attacked by the larger horned owls of Europe and America ; while mice, shrews, small birds, snakes, and crabs suffice from the inferior strength of the smaller *Strigidæ*. Mr. Yarrell states that the Short-Eared Owl (*Strix brachyotus*) is the only bird of prey in which he ever found the remains of a bat.

(7916) *Strix flammea*, the common White or Barn-Owl, is the Effraie, Fresaie, and Petit Chathuant Plombé of the French ; Barbagianni, Alloco Commune e Bianco of the Italians ; Schleierkauz, Perlschlierkautz, and Perl-Eule of the Germans ; De Kerkuil of the Netherlands ; Barn-Owl, White Owl, Church Owl, Gillihowlet, Howlet, Madge-Howlet, Madge-Owl, Hissing-Owl, and Screech-Owl of the English ; and Dylluan Wen of the Welsh. The upper parts are bright yellowish, varied with gray and brown zig-zag lines, and sprinkled with a multitude of small whitish dots ; face and throat white ; lower parts in some individuals rusty-white, sprinkled with small brown dots ; in others bright white, marked with small brownish points ; in others again without the slightest appearance of spots ; feet and toes covered with a very short down, more scanty on the toes : iris yellow. Length about 13 inches. In the female all the tints are brighter, and more developed. The young are covered with a thick white down, and remain long in the nest. Mr Blyth states that the first set of feathers grows very slowly, and is not moulted till the second autumn.

Varieties.—Whitish, or entirely white.

This bird is common in England and Ireland, less common in Scotland. Not common in the Orkneys, but present in some of the islands. Found in Denmark, but said not to inhabit Sweden or Norway ; generally spread over temperate Europe : found in Madeira ; common in Lorraine ; extending in Africa from the north to the Cape of Good Hope ; met with in India, Japan, and Australia.

(7917) *Strix badia*, Horsf., Wowo-wiwi, or Kolongwiwi of the Javanese, is an Asiatic species. Dr. Horsfield states that this species, whose head is proportionally large, has a general resemblance to *S. flammea* in the distribution of its colours and external marks. The upper parts are, he observes, generally dark, and the lower of a paler hue. The neck is surrounded by a loose ornamental collar ; the plumes encircling the eyes are rigid, and disposed with perfect regularity, and the legs are entirely covered. A resemblance also exists, he adds, in the lustre of their covering. It is a native of Java, in the closest forests of the district of Pugar, and the ranges of low hills south of the capital of Surakarta. (Horsfield.) The habits of this species are nocturnal. Dr. Horsfield speaking of *S. Javanica* (which, he says, his specimens show to be merely a variety of *S. flammea*), remarks, that it is the only species of this division which is occasionally found near villages and dwellings. The same author states that eight species of owl from Java have been arranged in the museum at the India House ; three eared-owls, and five smooth-headed. —*Eng. Cyc.*

(7918) STROMBIDÆ, a family of Marine Gasteropodous *Mollusca*, belonging to the *Alata* of Lamarck and the *Angyostomata* of De Blainville. In this article the *Strombidæ* will be confined to the genera and sub-genera *Strombus*, *Pteroceras* and *Rostellaria*.

(7919) *Strombus*. There are about 60 recent species of *Strombus* described. Five fossil forms have been described from the Chalk and three from the Miocene beds of the Tertiary.

The species are extremely numerous, and many of them are gigantic in size, the well-known *S. gigas* of the West Indies for example. Like some others of the Turbinated Testaceans, the animals of the genus *Strombus* occasionally produce pearls. Mr. Wood, in his Zoography relates that he saw a pink pearl which was taken from the body of the animal of *S. gigas*, which is fished for the table off the island of Barbadoes. The pearl was discovered by chance while the men were employed in cleaning the fish. Its weight was 24 grains, but it would have been more valuable if it had been round. The same author states that only four of these pearls had been discovered in the vast number of shell-flesh that are annually brought to market in that part of the world, though he has reason to believe that this is in some measure owing to the carelessness of the negroes, who clean their fish without consideration, and have probably in their hurry returned many a pearl to its native element with the refuse of the animal. This pearl was exactly of the same

colour as the interior coat of the shell, and like it in every respect except in figure. Immense quantities of this shell are imported into England from the Bahamas; 300,000 were imported into Liverpool alone in the year 1850. They are used in making cameos, and in the manufacture of porcelain. The species are found in the seas of warm climates; many from those of India, and some from those under and near the equator. They are carnivorous. Species have been found at depths varying from the surface to 13 fathoms.

(7920) *Strombus latissimus* has the shell turbinated, ventricose, smooth on the back, somewhat wrinkled on the wing, brown-orange spotted with white; the spire short and nodulous; the external lip very broad, rounded above, projecting beyond the spire; the anterior margin sharp, but the side of it very thick; the aperture smooth and white, tinged with rose colour. It is found in the East Indian seas.—*Eng. Cyc.*

(7921) *Pteroceras.*—Shell with the wing digitated, and furnished forwards with an elongated canal. There are 10 recent species, inhabitants of the Indian seas, and 100 fossil species, found from the Lias beds up to the Chalk.

(7922) *Pteroceras scorpius.* Shell ovate oblong, gibbous, tuberculate, transversely rugose and knotty, 7-fingered, white spotted with rufous; the fingers rather slender, and knotted at intervals throughout their length; the anterior ones and the tail the longest, and curved; aperture violaceous red wrinkled with white. It is a native of the East Indian seas.—*Eng. Cyc.*

(7923) *Rostellaria.*—Animal imperfectly known, but bearing a considerable resemblance to that of *Murex*, according to Cuvier. The species are found in the Asiatic seas, if we except *Rostellaria Pes Pelecani* and *R. Pes Carbonis* (genus *Aporrhais*), which are found in the Mediterranean and other European seas. A very fine specimen of *Rostellaria rectirostris* was brought up in the mud lying on the fluke of an Indiaman's anchor, in the Straits of Macassar. They are carnivorous. There are 7 recent species, and 70 fossil species. The latter range from the Neocomian beds to the Chalk.

(7924) *Rostellaria curvirostris* (*Strombus fusus*, Linn.) the spindle of collectors, is by far the most common of the Asiatic species.—*Eng. Cyc.*

(7925) STROPHANTHUS. There is a shrub about Amherst that bears a flower resembling the nerium, but with very long linear filiments to the end of each segment of the corolla. It is a species of Strophanthus and well deserving of cultivation.—*Mason.*

(7926) STRUTHIONIDÆ, a natural family of Terrestrial Birds, in which the locomotive energy is thrown into the lower extremities, the wings being in no case adequate to raising the body into the air, and in the majority of instances merely rudimentary. In this respect the genera which compose it are the very reverse of the Humming-Birds, Swallows, Albatrosses, Tropic-Birds, and Man-of-War-Bird; for in the latter the moving-power resides in the highly-developed wings, whilst the feet, especially in the Man-of-War-Bird, are feeble. The *Struthionidæ* consist of the Ostrich, American Ostrich (*Rhea*), Cassowary, Australian Cassowary, or Emu, and that extraordinary bird the Kivi-Kivi, or *Apteryx*, of New Zealand. The anatomy of these animals is referred to in great detail by Professor Owen in his paper on the 'Anatomy of the Apteryx,' in the Transactions of the Zoological Society, London. The most remarkable modifications of the skull in this family occur in the Asiatic Cassowary and the *Apteryx*. In the former the bony crest which is so highly developed in the adult, is hardly perceptible in the young bird, but increases with age, as in the Hornbill and the Guinea Hen [Pavonidæ] —*English Cyclopædia, page* 932.

Mr. G. R. Gray makes the *Struthionidæ* the first family of the order *Cursores*, Temm., the sixth order in Mr. Gray's arrangement, and includes under it the following sub-family and genera:—

Sub-Family 1. *Struthionidæ.*

Genera:—*Struthio*, Linn.; *Casuarius*, Briss.; *Dromaius*, Vieill.; and *Rhea*, Briss.

Sub-Family 2. *Apterygineæ.*

Genus:—*Apteryx*, Shaw.

Sub-Family 3. *Didinæ* (*?*).

Genus:—*Didus*, Linn.

Sub-Family 4. *Otinæ.*

Genera:—*Ctis*, Linn; *Tetrax* Leach; *Sypheotipes*, Less.; *Chlamydotis*, Less.; and *Eupodotis*, Less.

The *Struthionidæ* are placed in Mr. Gray's arrangement between the *Tinamidæ*, the last family of his *Rasores*, and the *Charadriadæ* the first family of his *Grallatores.*

Amongst the *Mammalia* the *Marsupiata* make the nearest approximation to the *Ovipara;* and amongst the birds the *Struthionidæ* approach the Mammals and the Reptiles.

This approximation of Struthious Birds to the *Mammalia* especially cannot fail to strike the physiologist. In the first and typical genus, *Struthio*, it is strongly manifested.

(7927) *Struthio.* Linn. The Ostrich. Joneh, Jaanah and Rinonim of Scripture.

Neamah, also Thar ood-jemmel, Arab.	Struthio camelus, Lat.
Struthio camelos, Ger.	Strazzo, also Struzzulo, It.
Autruche, Fr.	Strausse, Germ.
	Shutr-murgh, Per.

Bill moderate, obtuse, straight, depressed at

the point, which is rounded and unguiculate; mandibles equal and flexible; nasal fossæ longitudinal, prolonged half way down the bill, open. Feet very robust; toes two only, stout and strong, directed forwards, and connected at their base by a strong membrane, the internal toe considerably larger than the external, and furnished with a thick and hoof-like claw, external toe clawless. Wings useless for flight, furnished with long soft undulating plumes, and armed with two spurs, or rather two plumeless shafts, not unlike a porcupine's quill. Head and upper half of the neck scantily covered with a thin down, through which the colour of the skin is visible. There is but one species, the *S. Camelus*.

It would be a needless occupation of space to give a minute description of a bird which is so well known in these days of zoological societies and menageries. The Ostrich is generally understood to be the bird designated by the terms Joneh, or Jaanah, and Rinonim in the Scriptures (Levit, xi. 19; Deut., xiv. 15; Job, xxx. 29; Isai., xiii. 21; xxxiv. 13; xliii. 20; Jer., l. 39; Lament., iv. 3; Mic., i 8; Job, xxxix. 13) In many of these passages, Jer., l. 39, and Isai., for instance, our version reads 'Owls,' and in Levit. does not mention the Ostrich, but the general opinion seems to be in favour of the Ostrich being intended. It is the Neamah of the Arabs, Thar Edjammel (Camel-Bird) of the Orientals, Στρουθοκάμηλος of the Greeks, *Struthiocamelus* of Pliny and the Romans, Struzzo and Struzzolo of the Italians, Strauss of the Germans, Autruche of the French.

The approximation in the digestive organs of the Ostrich to the structure of some of the parts in the *Ruminantia*, especially in the additional ventricle of the bird, is still further strengthened by the bisulcous foot, which may not be inaptly compared to that of the camel, and probably led in no small degree to its appellation of Camel-Bird, to which, moreover, its height, lengthened neck, habit of frequenting the desert, and patience under thirst may have contributed. The food of the ostrich consists of vegetable substances only, but seeds and grain appear to be preferred, and it is consequently a most unwelcome neighbour to the cultivator of the soil, on whose crops the bird commits great devastation. Its iron-eating propensities have long been celebrated, and indeed it picks up and swallows any mineral substance, metallic or not, with indiscriminating voracity. Nor is this propensity confined to the devouring of minerals; for leather, hair, cordage, and wood do not seem to come amiss. In the stomach of one of these birds Valisnieri found a farago of grass, nuts, cords, stones, glass, brass, iron, tin, copper, lead, wood, and among the stones one weighing more than a pound. Perrault took from an ostrich's stomach 70 roubles, the greater part of which were worn down three-fourths of their substance by collision against each other or the pebbles found with them: those which were bent were worn and polished on the convex side, while they remained entire on the concave surface. These copper pieces had tinged everything in the stomach with green. This eagerness for picking up everything, whether or not it can be assimilated or can assist in the grinding down of the food by the action of the stomach, to which no doubt the polishing and wasting of the pieces of money mentioned by Perrault were due, is often fatal to the Ostrich. Too great a quantity of copper or iron thus taken into the stomach has caused the death of the bird. Valisnieri saw one killed by swallowing a quantity of quick-lime; and one kept in the gardens of the Zoological Society of London was first deformed and afterwards died from swallowing part of a parasol. Some of the heterogeneous contents found in the stomachs of these birds are preserved in the Museum of the Royal College of Surgeons. Their speed is great. The swiftest greyhound cannot overtake them; and even the Arab and his horse are obliged to have recourse to cunning as well as speed to close the chase, by throwing a stick dexterously between its legs, or otherwise to disable it. In its flight it spurns the pebbles behind it like shot against the pursuer. Nor is this its only mode of annoyance. Dr. Shaw, who gives a pretty account of the airs which the Ostrich plays off in a domesticated state fanning itself with its expanded wings, and seeming to admire its own shadow, states, that though tame and tractable to those familiar with them, these birds were often very fierce to strangers, especially those of the poorer sort, whom they would try to run down and attack with their feet. They are capable of striking with great force, and the same author gives a melancholy account of a person whose belly was ripped up by a stroke from the pointed and angular claw. The European sportsman, after riding so that the bird shall pass within shot, dismounts and brings it down with the rifle. The strength of the Ostrich is great. Adanson mentions the rapidity with which a large tame one ran, first under the weight of two little blacks, and afterwards under two full-grown negroes, while a smaller bird carried with equal facility one full-grown negro.

The general opinion is that the Ostrich is not polygamous. The number of eggs does not seem to be correctly ascertained. From 20 to 30, and 38 with 13 others scattered around the [illegible] nest—a mere pit in the sand, which is thrown up so as to form an elevated edge round it, about three feet in diameter—have been found together. Some have made the number 80; others reduce it to 10. This is the number that Le Vaillant would assign to a single female, although he disturbed one from the nest containing

the 38 eggs surrounded by the 13 others. This nest he watched, and saw during the day the four females successively sit upon them; and towards the close of the evening a male took his turn of incubation. This then was probably a common nest in which several females had laid their eggs. The passage in Job (xxxix. 14) will occur to every one, and there is no doubt that within the torrid zone the heat of the sun's rays renders the incubation of the female unnecessary, excepting perhaps at night; but in cooler latitudes she performs the maternal office with assiduity, and even in the warmer climates, where an officious determination to sit would in all probability endanger vitality of the eggs, she watches over them; and indeed the hunters have learned from her actions, and doubling back in her flight to one particular spot, where to seek for the nest. If, as has been asserted, the outlaying eggs are intended to serve for the nourishment of the young, it is a proof of provident care for her offspring on the part of the mother.

The flesh of the Ostrich when young is good and palatable, and the eggs are considered a great delicacy. Both Europeans and natives agree in this last opinion. The Hottentot, who abstracts the egg from the nest with a long stick, that the hen may not take alarm at the human touch, and not abandon the nest, but go on laying, as the common hen will do to a great extent when her nest is robbed, buries them in hot ashes. They are said to be excellent when eaten with a sufficient quantity of butter. The brains of hundreds of these birds not unfrequently made a dish at the insane Roman suppers; and Firmus is said to have eaten a whole ostrich at a meal. The flesh of the bird was prohibited by the Mosaical law as unclean, and the Arabs regard it in the same light; but many of the barbarous tribes in the interior of Africa feed on it without scruple. The well known plumes form a material article of commerce for the head-dress of European ladies, &c. There is in the noble and admirably arranged zoological gallery of the British Museum a fine and well-preserved series of young ostriches. Not the slightest trace of a nail is observable on the external toe of any of them, any more than on that of the adult bird. The usual height of the ostrich is from 7 to 8 feet, but it has reached 11 feet. The ostrich is a native of Africa and is scarcely known beyond the limits of the Arabian deserts.

(7928) *Casuarius* (Briss.)—Bill straight, carinated above, rounded and bent at the point; upper mandible slightly vaulted; the edges depressed, and notched or jagged towards the extremity; the lower mandible rather angular below towards the point; nasal fossæ nearly as long as the bill. Head helmeted. Front of the neck naked, and furnished with two wattles. Toes three. Wings entirely unfit for flight, furnished with five rounded naked pointed quills.

(7929) *Casuarius Emeu* has the bill compressed laterally, the head surmounted with a bony prominence covered with a horny substance; skin of the head and the upper part of the neck naked, tinged with cærulean blue and flame colour, with pendent wattles like those of a turkey-cock; wings furnished with some stiff featherless quills; nail of the internal toe much the strongest. "It is," says Cuvier in continuation, "the largest of the birds after the ostrich, from which it differs sufficiently in its anatomy, for it has short intestines and small cæca, wants the intermediate stomach between the crop and the gizzard, and its cloaca does not exceed that of other birds in proportion. This well-known bird was named Emeu by the early Portuguese navigators. It is the *Emeu* vulgo *Casoaris* (the latter appearing to be the Malayan appellation) of Bontius, the *Struthia Casuarius* of Linnæus, *Casuarius galeatus* of Vieillot, and Cassowary of the British naturalists, who now apply the term Emeu to the Australian Cassowary (*Dromaius*, Vieill.). Its height when erect is about 5 feet. It is a native of the peninsula of Malacca and the great chain of islands to the south and east. Bontius notes it from Ceram and the other neighbouring Molucca Islands. M. Lesson observes that it is very common in the islands of the Asiatic Archipelago, and especially at New Guinea. It is frequently seen alive in English menageries, and is common in museums. The species, which is characterised by M. Lesson as "stupid and massive," feeds on seeds and herbage according to him; but Cuvier says that it eats fruits and eggs, but no grain. Bontius states that he does not think it should be placed among the birds: "Alæ enim ad currendum pro velo, non ad volandum inserviunt." He adds, that when irritated, it does not rush forward to the attack, but turns itself obliquely, kicking backwards at the enemy. Cuvier observes that the featherless quills serve the bird for offensive weapons. Bontius remarks that the eggs are very different from those of the Ostrich, by reason of their thinness and colour, for their shell is greenish, ornamented with numerous tubercles of a deeper green (saturé viridibus): he adds that they are eaten by the natives. Cuvier relates that the bird lays a small number of green eggs, which it abandons, like the Ostrich, to the heat of the climate.—*Eng. Cyc.*

(7930) STRYCHNOS (from στρύχνος), a name applied by Theophrastus and Dioscorides to a kind of Nightshade, and adopted by Linnæus for a genus of Plants belonging to the natural order *Apocynaceæ*. This genus has been made the type of a distinct order by Blume, who has been followed by Link, D. Don, and others. The principal difference that it presents from the order *Apocynaceæ*, to which it is referred by Von Martius, Brown, and Lindley, is in its peltate seeds and simple succulent fruit. This genus is com-

posed of trees or shrubs, which do not yield a milky juice, and have opposite usually nerved leaves and corymbose flowers. Some of the species are possessd of tendrils, and are climbing plants. The calyx is 5-parted; corolla tubular, funnel-shaped, with a 5-parted spreading limb, which is valvate in æstivation: the stamens are 5, inserted into the throat of the corolla; ovary 2-celled, with a single style and capitate stigma; fruit a berry, pulpy inside, with a hard rind; seeds peltate, numerous, attached to a central placenta, with copious albumen, and foliaceous embryo. The species are not numerous, and are found principally in the tropical parts of Asia and America. One has been described by Mr. Brown a native of Australia.—*Eng. Cyc.*

(7931) STRYCHNOS COLUBRINA. Malabar and Ceylon.

Modira canoram, RHEEDE. | Naga musada, TEL.

The wood (lignum colubrinum), Pao de Cobra. A climber with stem of great size, often from 8 to 12 inches in diameter, wood hard, intensely bitter, and of light grey colour. The wood of this plant is the true Pao de Cobra of the Portuguese. That of the root is deemed a powerful remedy for the bite of the cobra capella. Several woods have however received the appellation of *Bois de couleurre*, (Lignum colubrinum) in different countries, viz. the Ophyoxylum serpentinum in Amboyna, the Ophiorhiza mungos in Java, Polygala senega in North America, &c. all for their supposed virtues as antidotes to snake poison. A very large proportionate quantity of strychnine exists in the wood of this root.—*O'Shaughnessy, page* 442.

Strychnos Colubrina, Snake-Wood, or Snake-Poison-Nut Tree, is a climbing plant with simple tendrils; leaves oblong or oval, obtuse, 3-nerved, shining; ovaries many-seeded. It is a native of the coast of Coromandel and of Silhet. It has small greenish-yellow flowers, and fruit as large as an orange, of a yellowish colour. It is called by the Telingas Naga Mussadi, and is considered by the Indian doctors as an effectual remedy for the bite of the Naga, or Cobra di Capella, the well-known poisonous snake; for this purpose it is used both externally and internally. It should however be stated as the result of the observation of the most intelligent travellers, that these vegetable remedies are not to be depended on in cases of bites of serpents, and that where danger is apprehended the only effectual remedy is excising the wound. The wood of this and other species of the genus is brought to Britain, and is known under the name *Lignum colubrinum.—Eng. Cyc.*

(7932) STRYCHNOS IGNATII, St. Ignatius's Bean, has ovate acute glabrous leaves; pyriform fruit with many seeds, and 4-flowered axillary peduncles. It is a climbing shrub, without tendrils, bearing long drooping white flowers, which have the scent of jasmine. This species is the *Ignatia amara* of Linnæus, but has been referred to the present genus by later botanists. It is a native of Cochin-China, the Philippine Islands, and other parts of Asia. This plant is called Papeeta in India, and is used by the native doctors as a remedy in cholera, but is administered in conjunction with Jehiree (*Cocos Maldivica*). When given in over doses the symptoms are those of poisoning by strychnia, as vertigo, convulsions, &c. and the remedy used for these effects is lemonade in large quantities, which is said to afford relief speedily.—*Eng. Cyc.* See S. SANCTO IGNATI.

(7933) STRYCHNOS LIGUSTRINA. Cajualar, Caju-nassi, Cajubadaira pail or laut. Malayan archipelago. A tree resembling the orange tree; berries globose, yellowish green, two to eight seeded. This yields the *Lignum colubrinum* of Timor, used for the objects already described.—*O'Shaughnessy, page* 443.

(7934) STRYCHNOS NUX VOMICA.

Mooshtee, TEL.	Moottee, TAM.
Kachla, HIND.	Kha-Boung, BURM.
Yettie cotay, TAM.	Koochila, BENG. DUK. HIND.
Musada, TEL.	
Culaka, Cutaka, also Vesha-moosti beejum, SANS.	Koodaka dornatta, CING.
	Khanek ul Kalb, ARAB.

A moderate sized tree, with a short crooked trunk. Branches irregular, the young ones long and flexuose, with smooth dark-grey bark. Wood white, close-grained, and bitter. Leaves opposite, with short petioles, oval, smooth, and shining, 3 to 5-nerved, differing in size. Flowers small, greenish-white, in terminal corymbs. Calyx 5-toothed. Corol funnel-shaped; limb 5-cleft, valvate. Stamens 5; filaments short, inserted over the bottom of the divisions of the calyx; anthers oblong, half exserted. Ovary 2-celled, with many ovules in each cell, attached to the thickened centre of the partition. Style equal to the corol in length. Stigma capitate. Berry round, smooth, about the size of an orange, covered with a smooth somewhat hard fragile shell, of a rich orange-colour when ripe, filled with a soft white gelatinous pulp, in which are immersed the seeds attached to a central placenta. Seeds peltate or shield-like, slightly hollowed on one side, convex on the other, about ¾ of an inch in diameter, and about two lines in thickness, thickly covered with silky ash-coloured hairs attached to a fibrous testa, which envelopes the kernel composed of horny bitter albumen, of the form of the seed and of the embryo imbedded in a hollow in its circumference.—Roxb. Corom. i. t. 4.—A native of the Indian Archipelago and of the forests of the Peninsula of India, as well as of the Southern parts of the Bengal Presidency, as near Midnapore.—Esenb and Eberm. 209. St. and Ch. 11. 52.—*Royle.*

All parts of the plant, except the pulp and flowers, are exceedingly bitter especially the wood of the root, and the inner layers of the bark.—*Roxb. Fl. Ind. i.* 475. The seed is inodorous, but its taste insupportably acrid and bitter. It is very difficult to reduce the seeds to powder; they must be first rasped, the raspings steeped in mucilage, then dried and powdered; or what is preferable, the rasping should be exposed to the steam of water for an hour, and then stove-dried, and powdered in a covered mortar. The *bark* is of an ash-grey colour while young, thin, compressed, inner surface black, outer surface of the larger pieces spotted with red rust-like patches. Fracture brittle, taste intensely bitter; nitric acid gives a blood-red stain to the black parts, and changes the red to a rich grass green. This bark is known to the European druggists under the name of the "*false angustura.*" Its nature was long suspected, but first clearly ascertained by Dr. O'Shaughnessy, (see the Journal of the Medical and Physical Society of Calcutta, Jan. 1837). The same bark is commonly sold in Calcutta, under the name of "*Rohun,*" and substituted for the harmless bark of the *Soymida febrifuga.*—*O' Shaughnessy, p.* 437.

Strychnos nux Nomica. Grows in the hilly parts of the Concans; where the nuts are used for poisoning fish.—*Riddell.* It is very common on the rocky sides of the hill at the back of Maulmain. The reputed property of the wood to cure the bite of venomous snakes, as stated by Lindley, is never heard of there, and is doubtless quite apocryphal.—*Mason.*

Strychnos nux-vomica is a very common tree throughout the Pegu Forests. The timber is strong and close-grained, but never of very large size. Wood, white colored, adapted for fancy work and cabinet making.—*McClelland.* Dr. Pereira thinks that the *Nux Mechil* of Serapion is Nux Vomica; but in Persian works this name is applied to a Datura. The wood of the Nux Vomica tree is said by Dr. Christison to be often substituted for the *Lignum Colubrinum,* or Snake-wood.—*Royle.* See NUX VOMICA.

(7935) STRYCHNOS POTATORUM. Lin.

Clearing nut, ENG.	Tsillaghenzaloo, TEL.
Tettam cottay, TAM.	Chil binj, HIND.
Chilbingeka phull, DUK.	Katake, SANS.

The Wood.

Induga wood. ENG.	Chilbeenj, kee lakree HIND.
Induga kurra, TEL.	

The Tree.

Clearing nut tree ENG.	Chillbeeng or neermul or neermulee, HIND.
Chilla ginja, TEL.	
Taitan, TAM.	Induga or Titan cotta BENG.

A large tree found among the mountains of Bengal, flowers during the hot season, occurs in gardens in many parts of India. The wood is hard and durable, pulp when ripe eaten by the natives. The ripe seeds are sold in the bazars for clearing water. The entire plant is destitute of the poisonous ingredients of the other species. By rubbing the nuts round the inside of water-pots, the impurities very soon fall to the bottom. This effect is so generally known that the seeds are usually carried by travellers in India. The nature of the action has not been clearly ascertained. It probably depends on astringency in the fruit. Ainslie informs us that the ripe fruit is deemed emetic by the Tamools of Southern India, when given in powder to the quantity of about half a tea spoonful—*O' Shaughnessy, page* 443. On this point, Ainslie, says, this fruit though, when very young, it is made into a preserve and eaten, is reckoned in its ripe state amongst the emetics of the Tamool Practitioners. The seeds are used for the purpose of clearing muddy water. One of them being usually rubbed hard for a short time round the inside of an earthern pot, the water is afterwards poured into it and left to settle: the impurities soon subsiding the water will be found clear and tasteless. The Canarese name of the tree is chittu.—*Ains. Mat. Med. p.* 119. Dr. Hooker found the *Strychnos potatorum,* forming a dense foliaged tree, 30 to 60 feet high, and while some individuals are a pale yellow, others are deep green, yet both in apparent health.—*Hooker Him. Jour. p.* 50.

Strychnos Potatorum, the Clearing-Nut, has ovate or oval glabrous pointed leaves; a deeply-fissured bark; and berries containing only one seed. It is an abundant plant in the woods and mountains of the East Indies. It has shining fruit, which is black when ripe. When full grown it attains a height of from 15 to 20 feet, and, has a very hard wood, which is used for various economical purposes. The English name is derived from the use which is made of the seeds, which, when dried, are sold by the natives for the purposes of clearing muddy water.—*Eng. Cyc.*

(7936) STRYCHNOS SANCTI IGNATII. ST. IGNATIUS' BEAN. *Syn.* Ignatia amara.

Papeeta. HIND.

A branching tree, a native of the Philippine islands. The seeds are an inch long, (the size of a large olive.) According to the analysis of Pelletier and Caventou, these beans contain igasurate (strychnate) of strychnia, wax, concrete oil, yellow colouring matter, green starch, bassorine, and vegetable fibre. The strychnine is present in three times the quantity of that in the kuchila nuts, but there is no brucine. Its activity is consequently very great, its uses the same as those of nux vomica. Besides the symptoms therein described the papeeta nut purges in small doses, and is hence deemed, and

we believe correctly, to be an efficacious vermifuge medicine.—*O'Shaughnessy, page* 441. See S. IGNATII.

(7937) STRYCHNOS TIEUTE. (TSHELLIK OR TJETTIK.) A native of Java, a large climbing shrub; an exceedingly violent poison, which acts exactly in the same manner as strychnine, is prepared from the bark of the root of this tree. The root is called Upas Radja, but does not belong to the true Upas tree of Java, which is the Antiaris toxicaria of the Mat. Med. Order Urticaceæ.—*O'Shaughnessy, page* 444.

The *Strychnos Tieute*, Tjettek, or Upas Tieute, has elliptical, acuminate, 3-nerved, glabrous leaves, and simple tendrils, which are thickened opposite the solitary leaves. This plant is a climbing shrub, and is a native of Java and is said to be the true Upas-Tree of that country. It is undoubtedly the most poisonous species of the genus, and yields the greatest quantity of strychnia. There are several other plants which are called by the name of Upas in various parts of Asia. The natives of Java prepare from this species one of the most deadly of the various poisons that are used by barbarous nations for producing death by the wounds occasioned by their arrows.—*Eng. Cyc.*

(7938) STRYCHNOS TOXIFERA. A native of Guiana, ascertained to be the basis of the celebrated Woorara poison.—*O'Shaughnessy, page* 443.

(7939) STUCCO. A compound of paris-plaster and lime, used in making cornices, &c.

(7940) STURIONIDÆ, a family of Fishes belonging to the section, *Chondropterygii*, the species of which are distinguished from others of the section by the gills being free, as in ordinary fishes, thus differing from the second great division of the fishes having a cartilaginous skeleton, such as the Sharks and Rays, in which the gills are fixed, and have their outer margin attached to the skin. The *Sturionidæ*, or Sturgeon Tribe, have moreover but one opening to the gills, and this is protected by an operculum. Four genera are contained in this family, *Accipenser, Spatularia, Chimæra*, and *Collorhynchus*. To the first of these genera belongs the common Sturgeon (*Accipenser Sturio*, Linn.), which is not unfrequently met with in mouths of English rivers. It is of an elongated form, and has the body protected by numerous indurated plates, which are arranged in a longitudinal series; the head is entirely covered by bony plates; the muzzle is elongated, and more or less pointed; and the mouth, which is placed on the under side of the head, is tubular, and destitute of teeth: on the back is a single dorsal fin, which is placed on the hinder third of the fish: the tail is forked, and the upper lobe is the largest, as in the Sharks.—*Eng. Cyc.*

(7941) STYLIDIUM (a diminution of 'stylus,' column), the name of a genus of Plants, of the type of the natural order *Stylideaceæ*. This is chiefly an Australian genus of plants, and is remarkable for its gynandrous structure, and for the irritability of the column formed by the union of filaments and style. The species of this genus described by Mr. Brown, in his 'Prodromus Floræ Novæ Hollandiæ,' are forty-five in number; besides these there are two or three natives of the East Indies.—*Eng. Cyc.*

(7942) STYLOCERUS RATNA. The Barking Deer, occurs at Siligoree, in the Terai.—*Hook. Him. Jour. p.* 399,

(7943) STURNIDÆ, Mr. Vigors' name for the Starling Family, belonging to his order *Insessores*. Linnæus placed his genus *Sturnus*, consisting of only five species, among which the Water-Ouzel appears as *Sturnus Cinclus*, between *Alauda* and *Turdus*, in his order *Passeres*. Cuvier arranges the Starlings between the Cassiques (*Cassicus*) and the Crows (*Corvus*).

(7944) STURNUS VULGARIS, the Common Starling, the Stare. This bird is well known in Great Britain as one of the handsomest of British birds, and is a general favourite. It is intelligent, sprightly, has a retentive memory, and, when kept in confinement, the males learn to whistle tunes and imitate some of the sounds of the human voice. They are social, living in flocks throughout the greater portion of the year. The Starling builds in church steeples, under caves, and in holes of houses, towers, or ruins. The nest is made of slender twigs. The eggs are four or five in number, of a delicate pale blue, 1 inch 2 lines in length by 10 lines in breadth. Their food consists of worms, insects, and snails. They are frequently seen in meadows searching for food amongst cattle and sheep. They sometimes eat berries and grain. They occasionally congregate together in prodigious numbers in shrubberies and plantations. The Starling is common in almost every part of the United Kingdom. It is found in the north of Europe, and as far east as Nepaul, the Himalaya Mountains, Calcutta, China, and Japan. It has been seen in Africa as far south as the Cape of Good Hope.

(7945) *Pastor roseus*, the Rose-Coloured Ouzel. This bird is an accidental visitor in the British Islands. Like the Common Starling, it has a wide geographical range. It is very numerous in various parts of Hindustan. It inhabits Syria, Egypt, and Africa. It flies in flocks, and has many of the habits of the Common Starling. The adult male has a beak of a yellowish rose-colour; the head, neck, wings, and tail black, glossed with violet-blue; the feathers on the head elongated so as to form a flowing crest; the back, scapulars, and rump of a delicate rose-

colour; the chin, throat, and front of the neck, black; breast, sides, and abdomen, like the back, of rose colour; thighs and under tail-coverts black; legs and toes yellowish-brown; claws darker brown. (Yarrell.)—*Eng. Cyc.*

(7946) STYRACEÆ, *Storaxworts*, a small natural order of Plants, placed by Lindley in his Polycarpous group of Monopetalous Exogens. The species are trees or shrubs, with alternate leaves without stipules, usually turning yellow in drying. The flowers are axillary, and are either solitary or clustered with membranaceous bracts. The calyx is persistant, and has five divisions frequently differing from the calyx and with imbricated æstivation; stamens varying in number, arising from the tube of the corolla, with 2-celled anthers; ovary 3-5-celled, with few ovules, a simple style, and capitate stigma; fruit a drupe; seeds solitary, with the embryo lying in the midst of albumen. This order is nearly allied to *Ericaceæ* from which it differs in habit, its definite seeds, and its frequently inferior ovary. It differs from *Ebenaceæ* in its stamens being perigynous, in the insertion of the ovules, and its simple style. It is however an order on which there are many different opinions, some referring all its genera to *Ebenaceæ*, whilst others separate from it the genera *Symplocos* and *Halesia* as types of distinct orders. The species are found in the temperate and tropical parts of North and South America, and also in Nepaul and China. This order is chiefly remarkable, in an economical point of view, for furnishing the Storax and Benzoin of commerce, which contain a peculiar acid called the Benzoic Acid. Some of the species are used for dyeing yellow, and a species of *Alstonia* is employed as a substitute for tea. The various species of *Halesia* are the Snow-Drop Trees of the Carolinas. —*Eng. Cyc.*

(7947) STYRAX, Linn. *Decand. Monog.* Calyx rather campanulate, nearly entire, or 5-toothed. Corolla campanulate at the base, deeply 5—7 cleft. Stamens 6—16, seldom 10, exserted; filaments united to the tube of the corol, sometimes adhering at the base into a ring; anthers linear, 2-celled, opening by internal longitudinal slits. Ovary inferior, Style simple. Stigma obtuse, somewhat lobed. Drupe dry, splitting imperfectly into 2 or 3 valves, with 1—2—3 stones. Seed solitary, erect, with a large, leafy, thin embryo lying in the midst of fleshy albumen, with an inferior radicle (*Lindley.*)—Styrax officinale and S. Benzoin yield officinal products. —*Royle.*

(7948) STYRAX BENZOIN, Benjamin, Storax, or Gum-Benjamin Tree. Leaves ovate oblong, pointed, glabrous above, downy beneath; racemes compound, almost the length of the leaves. It is a native of Sumatra and Java. It is the plant which produces the Benzoin, or Gum Benjamin, of commerce; and which, as well as Storax, is used in medicine. [BENZOIN.] The great consumption however of these resins is not as medicines, but in their use as incense in the worship of the Roman Catholics and Mohammedans. Though older botanists, as Garcias, Grim, and others, were acquainted with the tree that yielded Benzoin, Ray confounded it with the genus *Laurus*, and Linnæus with the genera *Croton* and *Terminalia*. Dryander gave a correct account of the plant in 1787, and referred it to its present position.—*Eng. Cyc.*

(7949) STYRAX OFFICINALE. L. E. D. Balsamum, L. Resina, E. Balsamic exudation, E. of Styrax officinale, Linn. Officinal Storax. A small tree with smooth bark, and downy spots and petioles. Leaves ovate-obtuse, of a green colour, and shining above, white and downy on the under-surface, something like those of the Quince tree. Flowers white, in terminal racemes of a few flowers, which resemble those of the orange. Calyx downy (2), cup-shaped, 5 to 7 toothed. Corolla externally hairy, with 5 to 7 segments. Stamens (2) 10 to 16. Fruit about the size of a cherry, coriaceous, downy, with 1 or 2 nuclei. —A native of Asia Minor and Syria common in Greece, and cultivated in the south of Europe. As this plant does not yield a balsamic exudation in all these situations some Storax has been thought to be yielded by *Liquidambar orientale*. Du Hamel, however, states having seen it flow from a tree near the Chartreuse of Montriau.—Ehenb. and Eberm. 210. Fl. Græc. t 375. St. and Ch. 47. Storax (στυραξ) was well known to the Greeks. Dioscorides compares the tree producing it with the Quince tree. It is called *asteruk* in the East. Much of the Storax of commerce is yielded by this tree when incisions are made into it. The tree is common in Asia Minor where Professor Forbes was informed Storax was collected from it. Several kinds are known in commerce and described in books. (*v.* Pereira.) Of these, Storax in grains, Reed Storax (Storax calamita), called Storax amygdaloides by Guibourt, used to be most common. One kind of Liquid Storax is yielded in the islands of Cos and Rhodes by *Styrax officinale*, which is there called βουχουρι. This seems only the Arabic word *Bukhoor*, signifying incense or fumigation, put into Greek letters. Common Storax is in brown or reddish-brown masses, varying in shape (in turf-like cakes, *c.*), light and friable, but possessing some tenacity, softening when warmed. It has a fragrant balsamic odour, and a warm aromatic taste. It consists evidently of saw-dust united with some balsamic substance. Merat and De Lens inform us that a factitious compound is made both in the Levant and at Marseilles with the saw-dust of the wood and the juice of this tree, with a little Benzoin. The ancients also employed saw-dust, honey, wax, iris-root, &c. Storax, when exposed to air, becomes covered with an efflorescence of Benzoic Acid.

It burns with a white flame, leaving a carbonaceous residue; gives a slight colour and odour to water; but the greater part, with the exception of impurities, is dissolved by Rectified Spirit. Reinsch gives as the constituents of the Red Storax, a trace of Volatile Oil, Benzoic acid 1 to 2-6 per cent., Gum and Extractive 7-9 to 14, Resin 32·7 to 53·7, with much woody fibre. It hence requires to be purified.—*Royle. p* 471. *Storax*, then, Ustrouk Hind., occurs in three different forms—1. in grains; 2. in soft masses; 3. in brittle masses.

1. *Storax in grains*, the rarest and purest of all, in transparent, yellowish-white or reddish-yellow grains, the size of a small bean, the consistence of wax, and capable of consolidating into a thick mass. Odour strong, penetrating, and very agreeable. Taste aromatic and bitter.

2. *Storax in soft mass*, or amygdaloid storax (*Storax calamite*, Lemery), softer than the preceding species, easily fusible, with brown fracture, displaying almond-like yellowish tears. Odour very sweet, like benzoin, taste sweet and perfumed.

3. *Massive hard storax*. Light brown, yellow, reddish brown and friable, sometimes slightly tenacious, softens under the teeth. Odour less than that of two preceding varieties, and resembling balsam of Tolu; flavour sweet. This variety is very impure, being usually adulterated with saw-dust, &c. The better kinds of storax burn with a white flame, and give a light, spongy, carbonaceous residue. It communicates to water a yellow colour and fragrant smell. It is soluble (except the impurities) in alcohol and ether. Storax is brought to Europe from Turkey in Asia; formerly it was packed in bulrushes, at present it is sent in bladders. M. Fee deems the origin of this drug uncertain; the styrax tree, cultivated in the south of Europe, affords no balsam, but this may be because the soil and climate differ from those of its native country. The strong resemblance between this product and the balsam copalm produced by the Liquidambar styraciflua, led to the idea that storax might probably be secreted by some congenerous tree, and Bernard de Jussieu pointed out the Liquidambar orientale, a tree common in Syria, as the most likely source of the article. It is now, however ascertained that storax is in reality produced by the Styrax officinale, a native of the Levant, Syria, Palestine, Greece, and the Peloponesus. Storax or styrax, (Greek στυραξ, Arabic *estorak*,) is a word of unknown origin.—*O'Shaughnessy page* 429-30.

(7950) SUÆDA. Of this genus Wight, in Icones, gives Sueda Indica, 1796; monoica, 1792.

(7951) SUÆDA INDICA.

Koyey Passeeray keeray, Tam.

A procumbent weed with pea green leaves, found in salt marshes, sometimes in gardens, used in native culinary as spinach.—*Jaffrey.*

(7952) SUBZEE OR SUBJA. An intoxicating liquor prepared from hemp leaves; black pepper cardamoms; Poppy seed: cucumis utilissimus and sativus. It exhilirates without injurious consequences.—*Herklots.*

(7953) SUCCORY. Cichorium Intybus. Much used in France as a winter salad under the name of *Barbe du Capucine*. The common way to grow this plant is similar to carrots. When the tapering roots have attained some size, they are lifted, the leaves cut off, the roots are then planted in sand in a dark room or cellar; where in consequence of the absence of light the roots throw out white leaves which make an excellent vegetable. This plant is the Cichory of commerce used in the adulteration of Coffee.—*Jaffrey.*

(7954) SUFURA KOOMRA. *Hind.* Suppara Koomrog, *Duk.* Cucurbitis Ovifera. Vegetable Marrow.

(7955) SUGAR.

Sukkur, Arab.	Shakur, Pers.
Suiker, Dut.	Acucar, Port.
Sucre, Fr.	Sachar, Rus.
Zucker, Ger.	Sarkara, Sans.
Shuckar, Guz Hind.	Azucar, Sp.
Zucchero, It.	Sakkara, Tam.
Goola Mal.	Panchadara, Tel.

The commercial Sugars of Asia are chiefly the products of the

Sugar-cane, Saccharum officinarum.
Do. do. do. sinense.
Date Sugar, Phœnix sylvestris.
Palmyra Sugar, Borassus flabelliformis.
Cocoanut Sugar, Cocos nucifera.
Ejoo or Gomuti Sugar, (Saguerus Rumphii,)
Arenga saccharifera.
Nepal Sugar, Nipa fruticans.

The great commercial importance of this product would require that it were treated in a large volume, and to keep an intelligible notice of it within the scope of this work may be an impossible task.

Sugar exist in all vegetables having a sweet taste, but is chiefly procured from boiling the expressed juice of the sugar cane, a plant which thrives from the equator to the 32° of latitude. In commerce, Sugar is met with in different degrees of purity, from *common brown*, to *double refined* and *crystalized*; each quality being generally characterised by a distinctive appellation. Sugar of various quality, is largely manufactured in the Bengal, Madras, and Bombay Presidencies, from the Sugar-cane. A large quantity of the sugar made in India is exported to the Arabian and Persian Gulfs, London, &c. China and Siam sugar is largely imported intoBombay, a good deal of which is re-exported to the above named ports.—*Faulkner.*

History—Coeval with the use of other vegetable products, for domestic purposes in India, appears to have been the employment of the juice of the sugarcane; though it would not seem that the ancients possessed any knowledge of the process by which this saccharine matter is converted into a crystallized substance. Every mention made of it, from the various passages in Scripture down to the commencement of the Christian era, is simply that of a "sweet cane," or of a "fine kind of honey found in an Indian reed." Nearchus, the admiral of Alexander the Great, was the first who made known the existence of the sugar-cane, in the western world; and from his time we find frequent allusion to this vegetable product, by Theophrastus, Varro, Dioscorides, and others. Herodotus alludes to "honey made by the hands of men;" but enters into no details. Lucan speaks of the sweet juice expressed from reeds, which the people of India were fond of drinking, and which Pliny calls "saccharine." Still later, Arrian, in his *Periplus of the Red Sea* alludes to the honey from reeds called sacchar, as an article of trade between the Indian ports and the countries of the Red Sea. The sugar-cane was found growing in the meadows about Tripoli in Syria; and mention is made by a writer of that day of eleven camels loaded with sugar being taken by the Crusaders. Marco Polo, who travelled in the East in the year 1250, found abundance of sugar produced in the province of Bengal; and from the almost universal growth of the cane in that presidency at the first occupation of the country by the British, there is good reason for believing that its culture had rapidly extended at a very early period. From the earliest European intercourse with India, sugar in a great variety of forms was met with in daily use. No Hindoo lives without it, either as sugar, in its natural state, or in cakes called "jaggery." Upon the first possession of Calcutta by the Company there was a flourishing export trade in sugar to the Indian coasts, some of the Eastern islands, and a few ports in Arabia and Persia, to the extent of about 1500 tons; whilst the local consumption of the article was enormous. The quality of this sugar was, however, very inferior; and about the year 1776 some attempts were made to introduce into India the Jamaica mode of growing the cane, and manufacturing the sugar; but at that time these efforts were not attended with any success. The culture of the cane was nevertheless greatly extended; and by the year 1792, when the British duties on tea were reduced, and a consequent increased demand for sugar arose, not only in England but in many parts of Europe, so as greatly to enhance its price, the Company made large shipments of the article home; although all endeavours to get it rated for duty on the same scale as that from the West Indies failed. The price realised in the English market for Company's sugars was at this time 88*s.* 6*d.*; but it rose gradually until it reached 156*s.* per hundred-weight: a figure which, in spite of discriminating duties and high freights, left to the importers a clear profit of eighty or ninety per cent. The first agitation against the slave-trade and slave grown produce helped to bring East-India sugars into more favourable notice; and the result of this growing demand, met by increasing culture in Bengal, was, that from 100 or 200 tons shipped home in 1790, the imports into London from Bengal in 1805 and 1807 amounted to 5000 tons. The following were the exports of Bengal sugar to Great Britain between the years 1803 and 1810:

Years.	Cwts.	Value.	Years.	Cwts.	Value.
1803	27 808	£56 789	1807	105,755	199,873
1804	78,619	208,060	1808	48,499	88,016
1805	102,732	295,814	1809	33,617	68,750
1806	67,455	150,250	1810	43,236	101,040

From this time forward the sugar trade with British India steadily increased; the throwing open of the Indian ports to private ships; the final cession of the Company's trade; the reduction of the Imperial duties on Sugar, the produce of the British possessions in the East; the failure of all the West Indian plantations, aided by the growing demand for sugars of all kinds, were all causes that had a sensible influence in bringing this branch of commerce to a degree of importance which fifty years since, could not have been anticipated by the most sanguine. In 1844 the imports of Bengal and Madras sugars into the port of London alone, amounted to 31,000 tons: in 1845, to 44,000 tons, in 1851 to 80,294 tons, of which $\frac{2}{3}$ were from Bengal and $\frac{1}{3}$ from Madras. The general import of sugar from the East Indies was as follows.

	1849	1850	1851	1852	1853
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Refined,.....	56,074	12,474	31.407	2,565	15,464
Unrefined, ...	1,471,139	1,362,837	1,574,478	1,302,150	1,225,273
Total, ...	1,527,213	1,375,311	1,605,884	1,304,721	1,240,737

Capper's Three Presidencies.

In addition to the Sugar-cane, however, as was noticed at the commencement of this article, this product is now obtained from several other sources, which will be noticed as we proceed. Of the palm tribe, as producing Sugar, it may be here mentioned that the fermented toddy from the Gomuti palm, the *Arenga saccharifera*, is boiled to a syrup, and thrown to cool in small vessels, the form of which it takes, and in this shape it is sold in the markets.

Upwards of four thousand years ago, the Hindoos knew how to make sugar from the flowers of the Madhuca (*Bassia latifolia*, Roxb.) but there is reason to suppose that sugar was

made from some of the palms, at a much earlier period. At Jaffna in Ceylon, the sweet unfermented toddy, of several palms, is boiled until it becomes a thick syrup, when a small quantity of scraped cocoanut is thrown in, to ascertain, by the feel, whether the syrup has attained the proper consistency: if that be the case, it is poured into small baskets of palmyra leaf, in which it cools and hardens into jaggery. In the year ending 5th January 1850, Ceylon exported 9,580 cwts., of jaggery, bearing a customs value of £1,937, fully two thirds of which consisted of the produce of the palmyra. To make *Vellum*, or crystallised jaggery, the syrup is not boiled for so long a time, the pot which contains it, is covered, and put aside for some months, at the end of which period the crystals are found in abundance. The juice of the palmyra possesses a greater quantity of saccharine matter than most of the other palms; about three quarts of it suffice for boiling into one pound of jaggery. The chief fault of the jaggery made at Jaffna, seems to arise from the excessive application of lime, a small quantity of which is of course absolutely necessary to prevent fermentation. It is said that sugar which is chiefly the produce of the jaggery, is more granulated and higher prized than that obtained from the sugar-cane. Large quantities are imported into Europe or Cuddalore and Madras. The Export of Sugar from Ceylon for Madras is about nine thousand tons annually and a considerable portion of that is supposed to be the produce of the Palmyra.

Cocoanut tree.—In Ceylon when the toddy of the cocoanut tree is to be converted into sugar, particular care is taken to employ only clean and well dried vessels, which are regularly changed. Eight gallons of sweet toddy, boiled over a slow fire, yield two gallons of a very luscious fluid, called Penni, or honey, or Jaggery, or sugar water; which quantity being again boiled, yields a kind of coarse brown sugar, known as jaggery, which is formed into round cakes. When prepared for domestic purposes, each cake is separately tied up in pieces of dried banana leaves and suspended in a smoky place.

Phœnix dactylifera. Sugar.—Every twelve pints of its toddy boils down to one of *Jaggery* or *goor*, and four pounds of jaggery yield one of good brown sugar, so that the average produce of each tree is about seven or eight pounds of sugar annually. In the whole province of Bengal, about 15,000 maunds or 1,000,000 hundredweight of sugar is manufactured from this Date tree annually, but it sells at about one-fourth the price of that of Sugar cane.

The sugar made from the juice of the Kittul tree, the *Caryota urens*, is considered to possess more saccharine properties than that produced from the cocoanut tree.—*Cupper.*

Sugar is obtained from many grasses. It is procured in Italy from *Sorghum saccharatum*; in China, from *Saccharum sinense*; in Brazil, from *Gynerium saccharoides*; in the West Indies, from *saccharum violaceum*; and in many other parts of the world from *S. officinarum.* The last two are commonly known as sugar canes, and they are generally considered as varieties of a single species of the *S. officinarum*, which is now widely spread over different parts of the world. Some curious specimens of palm sugars were exhibited at the Great Exhibition of 1851, among others,—gomuti palm sugar (*Arenga saccharifera*) from Java; date palm sugar, from the Deccan; Nipa sugar, from the stems of *Nipa fruticans*, as also from the *Bassia latifolia*,—an East Indian tree. Among the other sugars shown were beet-root sugar, maple sugar, date sugar, from Dacca, sugar from the butter tree (*Bassia butyracea*), produced in the division of Rohelkund; sugar candy, crystallized by the natives of Calcutta and other parts of India. Sugar and molasses from the grape, were also shown from Spain, Tunis and the Zollverein. An experienced sugar-dealer easily judges of the value of sugar by the taste, smell, specific gravity, moisture and general appearance. The value of molasses may be determined by drying at 220 degs., and by the taste.

The commercial demand for sugar is nevertheless mainly supplied from the juice of the cane, which contains it in greater quantity and purity than any other plant, and offers the greatest facilities for its extraction. Although sugar, identical in its character, exists in the maple, maize, the beet-root, and mango, and is economically obtained from these to a considerable extent, yet it is not sufficiently pure to admit of ready separation from the foreign matter combined with it, at least by the simple mechanical means which the ordinary producers usually have at command; unless carried on to a large extent, and with suitable machinery and chemical knowledge and appliances. The different species of commercial sugar usually met with in England are four, viz:—brown, or muscovado sugar (commonly called moist sugar); clayed sugar; refined or loaf sugar, and sugar candy; these varieties are altogether dependent on the difference in the methods employed in their manufacture.

The cultivation of the sugar cane, and the manufacture of sugar, were introduced into Europe from the East, by the Saracens, soon after their conquests, in the ninth century.

The common sugar cane is a perennial plant, very sensitive to cold, and is, therefore, restricted in its cultivation to regions bordering on the tropics, where there is little or no frost. In the Eastern hemisphere its production is principally confined to situations

favorable to its growth, lying between the fortieth parallel of north latitude and a corresponding degree south. The cultivation of this plant is principally confined to the West Indies, Venezuela, Brazil, Mauritius, British India, China, Japan, the Sunda, Philippine, and Sandwich Islands, and to the southern districts of the United States. The varieties most cultivated in the latter are the striped blue and yellow ribbon, or Java, the red ribbon, violet, from Java, the Creole, crystalline or Malabar, the Otaheite, the purple, the yellow, the purple-banded, and the grey canes. The quantity of sugar produced on an acre varies from five hundred to three thousand pounds, averaging, perhaps, from eight hundred to one thousand pounds.

Six to eight pounds of the saccharine juice of the plant, yield one pound of raw sugar; from 16 to 20 cartloads of canes, ought to make a hogshead of sugar, if thoroughly ripe. The weight necessary to manufacture 10,000 hhds. of sugar, is usually estimated at 250,000 tons, or 25 tons per hhd. of 15 or 16 cwt.

Years.	British Plantation. Tons.	East India & Mauritius Tons.	Total of B. P. E. I. and Mauritius.	Consumption. * Tons.
1838–39	176,033	54,017	230,050	195,483
39–40	141,219	60,358	201,577	191,279
40–41	110.739	52,232	162,971	179,741
41–42	107,560	97,792	205,352	202,971
42–43	123,685	80,429	204,114	199,491
43–44	125,178	78,943	204,121	202,259
44–45	122,639	81,959	204,598	206,999
45–46	142,384	102,690	245,074	244,030
47–48	164,646	125,829	290,475	289,537
48–49	139,868	107,844	247,712	308,131
49–50	142,203	121,850	264,053	296,119
50–51	129,471	119,317	248,788	305,616
51–52	148,000	110,000	258,000	312,778

The above figures refer to raw sugar only. At these periods, calculating from 1838-39, the duty on British sugar ranged from 24s. down to 10s. per cwt., and foreign slave-grown sugar from 63s. down to 14s. The greatest impetus was given to foreign sugar, when the duties were reduced, in 1846.

The average annual quantity of cane sugar produced and sent into the markets of the civilised world, at the present time, may be taken at 1,500,000 tons, exclusive of the amount grown and manufactured for local consumption in India, China, Cochin-China, and the Malay Archipelago, of which no certain statistics exist, but which has been estimated at about another million tons. So far back as 1844, the Calcutta "Star," in an article on sugar, estimated the domestic consumption in India, at 500,000 tons. This may be considerably below the mark, even if India is taken in its limited signification, as including only British subjects. On this estimate the 94,000,000 of British subjects, men, women and children, would not individually consume more than one pound avoirdupois by the month. A Brahmin, at any of the festivals given by the great, will digest for his own share a large quantity without at all embarrassing his stomach.

Assuming the million and a half of tons that find their way into civilized markets, to represent an average value at the place of production of £15 per ton, we have here the representation of £22,500,000 sterling. But this value may fairly be increased by one-fourth. The whole exportable production of the sugar-growing countries was found to be, in 1844, about 780,000 tons, of which Cuba furnished 200,000 tons. In 1845, notwithstanding Cuba only produced 80,000 tons, the increase from others sources was so considerable namely:—the British Colonial supply 40,000, United States 40,000, Porto Rico 15,000, Brazil 10,000 tons that the total produce fell very little short of the previous year—having reached 764,000 tons. The present supply of sugar to the markets of Europe, is nearly as follows:—

	Cwts.
England,.....	8,000,000
France.....	2,550,000
German League.....	1,350,000
Prussia,..	220,000
Austria (ten Provinces)....	560,000
Belgium..... ...	294,000

The whole annual production of the world is estimated by another party at 1,471,000,000 lbs., of which the United States produced 150,000,000 lbs., including 40,000,000 lbs. of maple sugar. Of the whole amount of sugar produced, Europe consumes about 648,700 tons, divided nearly as follows:—

	lbs.
Great Britain.....	803,360,096
France.....	160,080,000
Belgium.....	19 840,000
Netherlands.....	42,000,000
Russia.....	70,000,000
Denmark and Sweden...	22,000,000
German Zollverein.....	101,300,000
Other parts of Germany	160,000,000
Austria.....	50,000,000
	4,428,580,096

The consumption of sugar then in the whole world may be roughly estimated at two and a half million tons, of which the United Kingdom may now be put down for 350,000; the rest of Europe 420,000, and the United States 300,000.

The production of sugar in the last four years may be stated comparatively as follows :—

Cane Sugar.	1849	1850	1851.	1852.
	Tons.	Tons.	Tons.	Tons.
Cuba	220,000	250,000	252,000	320,000
Porto Rico	43,600	48,200	49,500	50,000
Brazil	106,000	103,000	113,000	100,000
United States	98,200	120,400	103,200	110,000
The West Indies.				
1. French Colonies.	56,300	47,200	50,000	50,000
2. Danish ... Do.	7,900	5,000	6,000	5,000
3. Dutch ... Do ...	13,800	14,200	15,000	20 000
4. British ... Do.	142,200	129,200	148 000	140,000
The East Indies	70.403	67,300	66,000	60,000
Mauritius	50.782	57,800	55,500	65,000
Java	90,000	89,900	99 347	104,542
Manilla	20,000	20,000	20,000	20,000
	919,182	952,200	977,547	1,044,542

Beet root Sugar.	1849.	1850.	1851.	1852.
	Tons	Tons.	Tons.	Estmd. T.
France	38,000	61,000	75,000	60,000
Belgium	5 000	6,000	8,000	9,000
Zollverein	33,000	38,000	49,000	50,000
Russia	13,000	14 000	15,000	16,000
Austria	6,500	10,000	15,000	18,000
	95.500	129,000	162,000	153,000
Cane Sugar	919,182	952,200	977,547	1,044,542
Total	1,014,682	1,081,200	1,139,547	1,197,542

Mauritius.—In the year 1813, the exports of sugar from this island were but 549,465 lbs., and increasing gradually to 128,476,547 lbs. in 1849, or two-hundred fold in thirty-six years. The equalisation of the duties in 1825, and the admission of Mauritius sugars into England on the same footing as those from the West Indies, had the effect of stimulating the sugar trade of Mauritius, and advancing it to its present remarkable success. Notwithstanding its immense crops, scarcely more than three-fifths of the island is yet under cultivation ; but it has the advantage of a cheap and abundant supply of labor, and much improved machinery has been introduced. The planters first commenced introducing Coolies in 1835, and were for some time restricted to the single port of Calcutta for their supply. The recent advices from Mauritius furnish some interesting information regarding the progress making in the sugar production of that colony. In reference to the cultivation of the cane, it is stated that by the introduction of guano upon several estates in the interior, the production has been very largely increased ; but as the value and economy of manure has not been hitherto sufficiently estimated, its introduction has not been so general as could be desired. The importance of free labor to the cultivation of the estates, has now become fully appreciated by the planters ; it being found that an equal amount of work can be obtained by this means from a less number of hands, and that at lower rates of wages than were current in previous years, the average of which is shown in the following table :—

Years.	Number of Coolies employed.	Aggregate amount of wages paid per week.	Average wages per head per week.	
		£	s.	d.
1846	47,733	33.484	14	0
1847	48,314	35,338	14	9
1848	41 777	26,627	12	9
1849	45,384	27 625	12	2
1850	47,912	31,664	12	3
1851	42.275	27,832	12	2

In 1826, to make from 25 to 30,000,000 lbs. of sugar, it required 30,000 laborers (slaves) ; at the present time, with less than 45,000 (from which number fully 5,009 must be deducted as absent from work from various causes), 135,000,000 lbs. are produced, or about five times the quantity under slavery. The coolies are found to be an intelligent race, who have become inured to the work required, and by whose labor this small island can produce the fifth part of the consumption of the United Kingdom, and that with only about 70,000 acres under cane cultivation. About 10,000 male immigrants, introduced since 1843, are not now working under engagement, but are following other occupations, and thus become permanent consumers. Some cultivate land on a small scale, on their own account, but very few plant canes, as it requires from eighteen to twenty months before they obtain any return for their labor ; but the most important fact established by this and other official statements is, that only a small number of immigrants leave the colony at the expiration of their industrial residence. In the manufacture of sugar from the cane, considerable improvement has been effected by the introduction of new methods of boiling and grinding. The vacuum pan and the system of Wetsell are all tending to economise the cost of production, and to save that loss which for years amounted, in grinding alone, to nearly one-third of the juice of the cane. The planters begin to find that they can increase the value of their sugar 30 to 40 per cent. by these improvements, and that their future prosperity depends upon carrying them out. Unfortunately, however, here, as in many other of our colonies, a very large number of planters do not yet appreciate the advantages to be obtained by the adoption of improved machinery and manufacture, or by improved cultivation, and still struggle on under the old system of waste and negligence, which can only result in the ruin and destruction of their property. In 1827, the number of sugar estates in operation in Mauritius, were 49 worked by water power, 50 by cattle or horses,

and 22 by steam--total 111 ; in 1836, this number had increased to 186, viz.—64 moved by water power, 10 by horse, and 112 by steam. In 1839, the number was 211, of which 138 were worked by steam power—70,292 acres were then under cultivation with sugar. There are now about 490 sugar estates, whereof only 231 have mills—42 are worked by water power, the rest by steam. The annual Mauritius crops, as exported, for the last ten years, have been as follows. The shipments frequently extend beyond a year, hence a discrepancy sometimes between the year's crop and the year's export :—

1842-43	24,400	1847-48	59,021
1843-44	28,600	1848-49	50,782
1844-45	37,600	1849-50	51,811
1845-46	49,100	1850-51	55,000
1846-47	64,100	1851-52	65,800

Besides its exports to Great Britain, Mauritius ships large quantities of sugar to the Cape of Good Hope and Australia. Its local consumption is moreover put down at about 2,500 tons. The progressive increase in its exports is marked by the following return of imports into Great Britain from the island :—

	cwt.		cwt.
1826	93.723	1839	604,671
1827	186,782	1840	690,294
1828	204,344	1841	545 356
1829	361,325	1842	716,009
1830	297,958	1843	696,652
1831	485,710	1844	545,415
1832	517 553	1845	716,173
1833	521 904	1846	845,197
1834	516,077	1847	1,193.571
1835	[illegible]8,891	1848	886.184
1836	558,237	1849	893,524
1837	497,302	1850	1 003,296
1838	537,455	1851	999,337

Java.—Attention has been withdrawn, in a great measure, from sugar cultivation in Java, owing to coffee being found a more remunerative staple. The following figures serve to show the extent of its exports of sugar : —

	cwt.		cwt.
1826	23,565	1838	873 056
1827	38,357	1839	999,895
1828	31,301	1840	1,231,135
1829	91,227	1841	1,252,041
1830	129,300	1842	1,105,856
1831	144.077	1843	1,162,211
1832	292.705	1844	1,260,790
1833	151 128	1845	1 812,500
1834	443,911	1848	1,798,612
1835	523,162	1850	1,797,874
1836	607,336	1851	1,987.957
1837	820,063	1852	2,090,845

In 1840 England imported from Java 75,533 cwt.: in 1841, 87,342 cwt. ; in 1842, 24,922 cwt. ; in 1843, 35,161 cwt. ; and in 1844, about 72,000 cwt. ; but most of this was only sent to Cowes, for orders, to be transhipped to the Continent.

Philippines.—The Exports from Manila into great Britain in 1841, were 133,482 cwt. : in 1842, 63,464 cwt. ; and in 1843, 48,977 cwt. In the fifteen years between 1835 and 1850, the export of sugar from the Philippine Islands more than doubled :—

	Tons.		Tons.
1835	11,542	1841	15 321
1836	14.875	1842	18,540
1837	12 293	1843	22 239
1838	12,375	1844	21,528
1839	15,631	1845	24,500
1840	16,563	1850	28,745

About a third of this is raw sugar, the rest is clayed or refined. It is singular, that though these islands belong to Spain, the export of this staple product to that country should be limited to about 600 tons ; America taking about one-sixth, and England and her colonies the remainder. There is now an increased demand for the Australian colonies, consequent upon the large influx of population to that quarter.

Export of sugar from Manila in 1850.

	Piculs.
To Great Britain	146,926
„ Continent of Europe	50,830
„ Australian Colonies	142,359
„ Singapore, Batavia, and Bombay	12,749
„ California and the Pacific	29 144
„ The United States	77,919
	459,927

Sugar cane.—The sugar cane occurs in a wild state on many of the islands of the Pacific, but in no part of the American continent, notwithstanding a contrary opinion has been expressed.

The following are the chief varieties cultivated in the West Indies, Louisiana, the East Indies, and Mauritius :—

1. Common or creole cane, so called from being introduced from the New World.
2. Yellow Bourbon.
3. Yellow Otaheite.
4. Otaheite with purple bands.
5. Purple Otaheite.
6. Ribbon cane.

Mr. L. Wray, in his "Practical Sugar Planter," considers the Bourbon, and yellow, or straw-coloured Otaheite cane, as identical, but merely altered by change of soil and climate. The yield from these cane-plants seems to be about the same in either Indies, viz., in good land about two-and-a half tons of dry sugar per acre—sometimes three tons.

A very large species of red cane, grown at Gowhatty, in Assam, is made favorable mention of for its strength of growth, early maturity, and juiciness ; and Mr. Wray strongly recommends the introduction into the West Indies of another fine variety, generally grown in the Straits' Settlements, where it is known by the name of the Salangore cane. He considers they would ratoon better than any other cane, and the return from it is on the average 3,600 lbs. of dry sugar to the acre.

"For my own part, he says, I have always reckoned as an average, 3,600 lbs. of dry sugar to the acre as the return this cane will give, on anything like good land, in the Straits, according to the present imperfect mode of expressing and manufacture; but, considering the surpassing richness of land in the West India Islands, Demerara, and Mauritius, I should not be in any way surprised to find that it would there give even three tons an acre. The Salangore cane grows firm and stong; stands upright much better than the Otaheite; gives juice most abundantly, which is sweet and easy of clarification, boils well, and produces a very fine, fair sugar, of a bold and sparkling grain."

Much discussion has arisen on the subject of raising the sugar cane from seed, and the possibility has been universally denied among the planters and agricultural societies of the West India colonies. Mr. Pritchard, a sugar planter of Louisiana, in the "United States Patent Report for 1850," however, states:—"It is an error to suppose that the cane cannot be propagated from the seed. This may be the case when the seed is obtained from plants that have been produced for a number of years from buds, or eyes. All plants that have been produced in this way for a series of years, lose the faculty of forming prolific seeds; and the sugar cane is governed by the same laws which govern the whole vegetable kingdom. It cannot, therefore, be expected to produce seeds after it has been cultivated for a great length of time."

India.—Sugar is a very old and extensive cultivation in India. It would propably be within the mark, to estimate the annual produce of the country at a million of tons. An official return showed that the quantity of sugar carried on one road of the interior, for provincial consumption, was about equal to the whole quantity shipped from Calcutta—some 50,000 or 60,000 tons. India is fast becoming a great sugar producing country, although its produce and processes of manufacture are rude and imperfect. The Coolies who return from time to time to the India ports, bring with them much acquired knowledge and experience from the Mauritius. In 1825, the import of sugar from the East Indies was but 146,000 cwt, and it fluctuated greatly in succeeding years, being occasionally as low as 76,600 cwt. In 1837 the quantity imported was just double what it was in 1827. In 1841, it had reached as high as 1,239,738 cwt., and subsequently kept steady for a few years at 1,100,000 cwt.—and for the last four years ending 1851, has averaged 1,400,000 cwt.

Some years since, (*Report, 18th December*, 1822) the East India Company instituted inquiries relative to the cultivation of the sugar cane in Hindostan, and the information obtained was published in a large folio volume. The Reports furnished by their officers, from almost every district, concur in stating that there were three kinds cultivated:—1, The purple. 2. The white. 3. A variety of the white, requiring a large supply of water. The epitome of the Reports affords this information:—

1. *The purple coloured cane* yields a sweeter, richer juice, than the yellow or light coloured, but in less quantity, and is harder to press. Grows on dry lands. Scarce any other sort in Beerbhoom, much in Radnagore, some about Santipore, mixed with light colored cane. Grows also near Calcutta; in some fields separate, in others mixed with pooree or light colored cane. When eaten raw, is more dry and pithy in the mouth, but esteemed better sugar than the pooree, and appears to be the superior sort of cane. Persons who have been West Indian planters do not know it as a West Indian cane.

2. *The light colored cane*, yellow, inclining to white; deeper yellow when ripe, and on rich ground, it is the same sort as that which grows in the West India Islands; softer, more juicy than the Cadjoolee, but juice less rich, and produces sugar less strong; requires seven maunds of pooree juice to make as much goor or inspissated juice as is produced from six of the Cadjoolee. Much of this kind is brought to the Calcutta markets, and eaten raw.

3. *The white variety*, which grows in swampy lands, is light colored, and grows to a great height. Its juice is more watery, and yields a weaker sugar than the Cadjoolee. However, as much of Bengal consists of low grounds, and as the upland canes are liable to suffer from drought it may be advisable to encourage the cultivation of it, should the sugar it produces be approved, though in a less degree than other sugars, in order to guard against the effects of dry seasons. Experience alone can determine how far the idea of encouraging this sort may answer. Besides the foregoing, several kinds are now known to the Indian planter. One of them, the China sugar cane, was considered by Dr. Roxburgh to be a distinct species, and distinguished by him as *Saccharum sineuse*. It was introduced into India in 1796, by Earl Cornwallis, as being superior to the native kinds. It is characterised by a hardness which effectually resists most of the country rude mills; but this hardness is importantly beneficial, inasmuch as that it withstands the attack of the white ants, hogs, and jackals, which destroy annually a large portion of the common cane. *Reports of Dr. Roxburgh, Mr. Touchet of Radanagore, and Mr. Cardia of Mirsapore, Cutna, Papers on the India Sugar, page 258.*

Mysore.—Dr. Buchanan found four kinds known in Mysore. Two of these are evidently the purple and white generally known; but as this is not distinctly stated, Mr. Simmond has retained the form in which he

notices them. *Restali*, the native sugar of the Mysore, could only be planted in the last two weeks of March and two first of April. It completes its growth in twelve months, and does not survive for a second crop. Its cultivation has been superseded by others.

Puttaputti.—This was introduced from Arcot, during the reign of Hyder Ali. It is the only one from which the natives can extract sugar; it also produces the best *Bella* or *Jaggery*. It can be planted at the same season as the other, as well as at the end of July and beginning of August. It is fourteen months in completing its growth; but the stools produce a second crop, like the ratoons of the West Indies, which ripen in twelve months.

Maracabo, Cuttaycabo.—These two are very small, seldom exceeding half an inch diameter; yet in some districts of Mysore, as about Colar, the last-named is the variety usually cultivated; but this arises from its requiring less water than the larger varieties. The best varieties are those introduced from the Islands of Otaheite and Bourbon. Hindostan is indebted for their introduction to Captain Sleeman, who brought them hither from the Mauritius in 1827. He committed them to Dr. Wallich, under whose care, at the Botanic Garden, they have flourished, and been the source from whence the benefit has been generally diffused. Their superiority over those which have been usually cultivated by the natives has been completely established. The largest of the Hindoostan canes, ripe and trimmed ready for the mill, has never been found to exceed five pounds; but it is not uncommon for an Otaheite cane, under similar circumstances, to weigh seven pounds. [Many are of opinion, that although the juice of this cane is larger in quantity, yet that it contains less sugar. There is some sense in the reason they assign, which is, that in the Mauritius and elsewhere it has the full time of twelve or fourteen months allowed for its coming to maturity—whereas the agriculture of India and especially in Bengal, only allows it eight or nine months, which, though ample to mature the smaller country canes, is not sufficient for the Otaheite.] The extra weight arises proportionately from an increased secretion of superior sap. The sugar is more abundant, granulates more readily, and has less scum. Other superior qualities are, that the canes ripen earlier, and are less injured by the occurrence of protracted dry weather. Of the history of the sugar cane a popular tradition obtains amongst the natives, that, in very ancient times, a vessel belonging to their country chanced by accident to leave one of her crew, under a desperate fit of sickness at a desert island at a considerable distance in the Eastern Seas, and that, returning by the same route, curiosity prompted them to inquire after the fate of their companion, when, to their utter astonishment, the man presented himself to their view, completely recovered from his sickness, and even in a state of more than common health. With anxiety they inquired for the physic he had so successfully applied, and were conducted by him to the sugar cane, on which he acquainted them he had solely subsisted from the time of their departure. Attracted by such powerful recommendation, every care and attention was bestowed, we may suppose, to convey such an invaluable acquisition to their own lands, where the soil and climate have mutually since contributed to its present prosperity.

Soil.—The soil best suiting the sugar cane is aluminous rather than the contrary, tenacious without being heavy, readily allowing excessive moisture to drain away, yet not light. One gentleman, Mr. Ballard, has endeavoured to make this point clear by describing the most favorable soils about Gazepore as "*light clays*," called there *Mootearee*, or *doansa* according as there is more or less sand in their composition.—*Trans. Agri-Hort. Soc.* i. 121. Mr. Peddington seems to think that calcareous matter, and iron in the state of *peroxide*, are essential to be present in a soil for the production of the superior sugar cane. There can be no doubt that the calcareous matter is necessary, but experience is opposed to his opinion relative to the peroxide. The soil preferred at Radnagore is there distinguished as the soil of "two qualities," being a mixture of rich clay and sand, and which Mr. Touchet believed to be known in England as a light brick mould. About Rungpore, Dinajpore, and other places where the ground is low, they raise the beds where the cane is to be planted four or five feet above the land adjacent. The experience of Dr. Roxburgh agrees with the preceding statements. He says, "The soil that suits the cane best in this climate is a rich vegetable earth, which on exposure to the air readily crumbles down into very fine mould. It is also necessary for it to be of such a level as allows of its being watered from the river by simply damming it up (which almost the whole of the land adjoining to this river, the Godavery, admits of), and yet so high as to be easily drained during heavy rains. Such a soil, and in such a situation, having been well meliorated by various crops of leguminous plants, or following, for two or three years, is slightly manured, or has had for some time cattle pent upon it. A favourite manure for the cane with the Hindoo farmer is the rotten straw of green and black pessaloo (*Phaseolus mungo, max.*)" Roxburgh on the Culture of Sugar and Jaggary in the Rajahmundry Circar; Third Ap. to Report on East India Sugar, p. 2. Many accordant opinions might be added to the preceding, but it seems only necessary to observe further that the sugar cane requires a soil sufficiently elevated to be entirely free from inundation,

but not so high as to be deprived of moisture, or as to encourage the production of white ants (*termes*). The sugar cane is an exhausting crop, and it is seldom cultivated by the ryot more frequently than once in three or four years on the same land. During the intermediate period, such plants are grown as are found to improve the soil, of which, says Dr. Tennant, the Indian farmer is a perfect judge. They find the leguminous tribe the best for the purpose. Such long intervals of repose from the cane would not be requisite if a better system of manuring were adopted.

Mr J. Prinsep has recorded the following analysis of three soils distinguished for producing sugar. They were all a soft, fine-grained alluvium, without pebbles. No. 1 was from a village called Mothe, on the Sarjee, about ten miles north of the Ganges, at Buxar, and the others from the south bank of the Ganges, near the same place. There is a substratum of *kunkar* throughout the whole of that part of the country, and to some mixture of this earth with the surface soil the fertility of the latter is ascribed :—

	1	2	3
Hygrometric moisture, on drying at 212 deg.	2·5	2·1	3·6
Carbonaceous and vegetable matter, on calcination....	1·8	2·1	4·0
Carbonate of lime (No. 3 effervesced.)	1·6	0·6	3·9
Alkaline salt, soluble.	1·0	1·1	0·3
Silex and alumina.	94·1	94.1	88·2
	100·0	100·0	100.0

The earths unfortunately were not separated. Mr. Prinsep says the two first were chiefly of sand, and the third somewhat argillaceous. The former required irrigation, but the other was sufficiently retentive of moisture to render it unnecessary.—(Journ. Asiatic Soc., ii. 435.)

Manures.—The sugar cane being one of the most valued crops of the ryot, he always devotes to it a portion of the fertilising matter he has at command, though in every instance this is too small. In the Rajahmundry district, previously to planting, the soil is slightly manured, either by having cattle folded upon it, or by a light covering of the rotten straw of the green and black pessalloo, which is here a favourite fertiliser. In some parts of Mysore the mud from the bottom of tanks is employed, and this practice is more generally adopted in other places. Thus the fields being divided by deep ditches in Dinajpoor, the mud from which is enriched by the remains of decayed aquatic plants and animals, forms an excellent manure for the sugar cane, and of this the ryots make use, spreading it over the surface before the ploughing is commenced; and when that operation is completed, the soil is further fertilised by a dressing of oilcake and ashes. Crushed bones would unquestionably be of the greatest benefit if applied to the sugar cane crop. Not only would their animal matter serve as food for the plants, but the phosphate of lime of the bones is one of the chief saline constituents of the sugar cane.

Salt is said to be valuable manure for this crop. Dr. Nugent, in a Report made to the Agricultural Society of Antigua, observes that salt has been found a valuable auxiliary in cultivating the sugar cane. Many trials of it, he says, have been made during successive seasons applied generally to the extent of about nine or ten bushels per acre. It destroys grubs and other insects, and give the canes an increased vigor and ability to resist drought. It is a singular remark of the intelligent traveller, M. de Humboldt, while speaking of the practice adopted in the Missions of the Orinoco, when a coco-nut plantation is made, of throwing a certain quantity of salt into the hole which receives the nut ; that of all the plants cultivated by man there are only the sugar cane, the plantain, the mammee, and the Avocada pear, which endure equally irrigation with fresh and salt water.

In the West Indies, when the cane is affected by what is called there the *blast*, which is a withering or drying up of the plants, an unfailing remedy is found to be watering them with an infusion of dung in salt water [L'Explotation de Sucreries.] Porter on the sugar canes. 35, 321.

Preparation of soil.—In the *Rajahmundry* district, during the months of April and May, the ground isfrequently ploughed, until brought into a very fine tilth. About the end of May, or beginning of June, the rains usually commence, and the canes are then to be planted. If the rains do not set in so early, the land is flooded artificially, and when converted into a soft mud, whether by the rain or by flooding, the canes are planted.

In *Mysore*, the ground is watered for three days, and then, after drying for the same period, ploughing commences, this operation being repeated five times during the following eight days. The clods during this time are broken small by an instrument called *col kudali*. The field is then manured and ploughed a sixth time. After fifteen days it is ploughed again, twice in the course of one or two days. After a lapse of eight days it is ploughed a ninth time. Altogether these operations occupy about forty-four days. For planting, which is done in six days, an implement called *yella kudali* is employed.

In *Dinajpoor*, " the field, from about the middle of October until about the 10th of January, receives ten or twelve double ploughings, and after each is smoothed with the *mogi*. During the last three months of this time it is manured with cow-dung and mud from ponds and ditches. On this account, the land fit for sugar cane is generally divided into fields by wide ditches, into which much mud is washed

by the rain, and is again thrown on the fields when the country dries, and leaves it enriched by innumerable aquatic vegetables and animals that have died as the water left them. When the ploughing has been completed, the field is manured with ashes and oilcake."

About *Malda*, "the land is first ploughed in the month of Cartick, length and breadth ways, and harrowed in like manner; four or five days after it is again ploughed and harrowed, as before, twice. In the month of Aghun, the whole land is covered with fresh earth, again twice ploughed, and harrowed in different directions, and then manured with dung. Fifteen or twenty days afterwards it is to be twice ploughed, as before; eight or ten days after which, it is to be slightly manured with dung and the refuse of oil, mixed together; then twice ploughed and harrowed in different directions, so that the clods of earth brought be well mixed together with the land. This preparation continues until the 20th or 25th of the month Poons."

In the vicinity of *Dacca*, during "Cautic or Augun (October, November) the Ryots begin to prepare their ground. They first dig a trench round their fields, and raise a mound of about three feet in height. If the ground to be cultivated is waste, about nine inches of the surface are taken off, and thrown without the enclosure. The ground is ploughed to the depth of nine inches more. The clods are broken, and the earth made fine. In Maug or Faugun (January, February) the sugar cane is planted; a month afterwards earth is raised about the plants; after another month this is repeated. The crop is cut in Poous and Maug (December, January). If the ground be not waste, but cultivated, the surface is not taken off. After cutting the crop, it is not usual again to grow sugar cane on the same ground for eighteen months, on account of the indifferent produce afforded by a more early planting.

In the Zillah, *North Mooradabad*, the land is broken up at the end of June. After the rains have ceased it is manured, and has eight or ten ploughings. This clears it of weeds. In February it is again manured and ploughed four or five times, and just before the sets are planted some dung, four cart-loads to each cutcha beegah of low land, and five cart-loads to high land, are added. The land is well rolled after the four last ploughings, and again after the cuttings are set.

About *Benares* and the neighbouring districts, Mr. Haines says, that owing to the hot winds which prevail "from March until the setting in of the annual rains in June or July, the lands remain fallow till that period. In the mean time, those fields that are selected for sugar cane are partially manured by throwing upon them all manner of rubbish they can collect, and by herding their buffaloes and cattle upon them at night, though most of the manure from the latter source is again collected and dried for fuel. When the annual rains have fairly set in, and the Assarree crops sown (in some instances an Assarree crop is taken from the lands intended for sugar cane), they commence ploughing the cane lands, and continue to do so four or five times monthly (as they consider the greater number of times the fields are turned up at this period of the season, the better the crop of cane will be), till the end of October, continuing to throw on the little manure they can collect. Towards the end of October, and in November, their ploughs are much engaged in sowing their winter (or rubbee) crops of wheat, barley, grain &c.; and at this period they make arrangements with the shepherds who have large flocks of sheep, to fold them upon the fields at night, for which they pay so much per beegah in grain. During the latter part of November, and early in December, the fields are again ploughed well, and all grass, weeds, &c., removed with the hoe; then the surface of the field is made as smooth as possible by putting the "*hengah*" (a piece of wood eight to ten feet in length, and five to six inches in breadth, and three or four inches in thickness, drawn by two pairs of bullocks, and the man standing upon the wood to give it weight), over several times for three or four days in succession. This makes the surface of the field very even and somewhat hard, which prevents the sun and dry west wind from abstracting the moisture, which is of great importance at this period of the season, for, should there be no rain, there would not be sufficient moisture at the time of planting the cane to cause vegetation. In this state the land remains till the time of planting the cane cuttings, which is generally the 1st to the 15th of February; but should there have been a fall of rain in the mean time, or excess of moisture appear, the field is again ploughed, and the hengah put over as before. A day or two previous to planting the cane, the field is ploughed and the hengah lightly put over."—(Trans. Agri-Hort. Soc. vi. 4, 5.)

Sets.—When the canes are cut at harvest time, twelve or eighteen inches of their tops are usually taken off, and stored, to be employed for sets. Each top has several joints, from each of which a shoot rises, but seldom more than one or two arrive at a proper growth. When first cut from the stem, the tops intended for plants are tied in bundles of forty or fifty each, and are carefully kept moist. In a few days they put forth new leaves: they are then cleared of the old leaves, and separately dipped into a mixture of cowdung, pressed mustard seed, and water. A dry spot is prepared, and rich loose mould and a small quantity of pressed mustard seed; the plants are separately placed therein, a small

quantity of earth strewed amongst them, and then covered with leaves and grass to preserve them from heat. Ten or twelve days afterwards they are planted in the fields.

In *Burdwan*, the tops, before they are planted, are cut into pieces from four to six inches long, so that there are not more than four knots in each. Two or three of these plant tops are put together in the ground, and a beegah requires from 7,500 to 10,240 plants.

In *Rungpore* and *Dinajpoor*, about 9,000 plants are required for a beegah, each being about a foot in length.

In *Beerbhoom*, 8,000 plants are said to be requisite for a beegah, each cane top being about fifteen inches long.

Near *Culcutta*, from 3,000 to 8,000 plants are required for a beegah according to the goodness of the soil, the worse soil needing most plants.

In *Mysore* an acre contains 2,420 stools, and yields about 11,000ripe canes.

Near *Rajamundry* about 400 cuttings are planted on a cutcha beegah (one-eighth of an acre).

In Zilla, *North Mooradabad*, 4,200 sets, each eight inches long, are inserted upon each cutcha beegah of low land, and 5,250 upon high land.

In the district of *Gollagore* the Ryots cut a ripe cane into several pieces, preserving two or three joints to each, and put them into a small bed of rich mould, dung, and mustard-seed from which the oil has been expressed.

At *Radnagore*, when the time of cutting the canes arrives, their tops are taken off, and these are placed upright in a bed of mud for thirty or forty days, and covered with leaves or straw. The leaves are then stripped from them, and they are cut iuto pieces, not having less than two nor more than four joints each. These sets are kept for ten or fifteen days in a bed prepared for them, from whence they are taken and planted in rows or three together, eighteen inches or two feet intervening between each stool.

Planting.—The time and mode of planting vary.

In the *Rajahmundary Circar*, Dr. Roxburgh says, that "during the months of April and May the land is repeatedly ploughed with the common Hindoo plough, which soon brings the loose rich soil (speaking of the Delta of the Godavery) into very excellent order. About the end of May and beginning of June, the rains generally set in, in frequent heavy showers. Now is the time to plant the cane; but should the rains hold back, the prepared field is watered or flooded from the river, and, while perfectly wet, like soft mud, the cane is planted. "The method is most simple. Laborers with baskets of the cuttings, of one or two joints each, arrange themselves along one side of the field. They walk side by side, in as straight a line as their eye and judgment enable them, dropping the sets at the distance of about eighteen inches asunder in rows, and about four feet from row to row. Other laborers follow, and with the foot press the set about two inches into the soft, mud-like soil which, with a sweep or two with the sole of the foot, they most easily and readily cover."—(Roxburgh on the Culture of Sugar.)

About *Malda*, in the month of Maug (January, February), the land is to be twice ploughed, and harrowed repeatedly, length and breadth ways; after which it is furrowed, the furrows half a cubit apart, in which the plants are to be set at about four fingers' distance from each other, when the furrows are filled up with the land that lay upon its ridges. The plants being thus set, the land is harrowed twice in different directions; fifteen or twenty days afterwards the cane begins to grow, when the weeds which appear with it must be taken up; ten or twelve days after this the weeds will again appear. They must again be taken up, and the earth at the roots of the canes be removed, when all the plants which have grown will appear.

At *Ghazepore* the rains set in at the beginning of March, and planting then commences.

Near *Calcutta* the planting takes place in May and June.

In *Dinajpoor* and *Rungpore* the planting time is February.

About *Commercolly* it is performed in January. The field is divided into beds six cubits broad, separated from each other by small trenches fourteen inches wide and eight inches deep. In every second trench are small wells, about two feet deep. The irrigating water flowing along the trenches fills the wells, and is taken thence and applied to the canes by hand. Each bed has five rows of canes. The sets are planted in holes about six inches in diameter, and three deep; two sets, each having three joints, are laid horizontally in every hole, covered slightly with earth, and over this is a little dung. When the canes are planted in the spring, the trenches must be filled with water, and some poured into every hole. At the other season of planting the trenches are full, it being rainy weather; but even then the sets must be watered for the first month.

Mr. Haines says that in *Mirzapore* and the neighbouring districts, "in planting the cane, they commence a furrow round the field, in which they drop the cuttings. The second furrow is left empty; cuttings again in the third; so they continue dropping cuttings in every second furrow till the whole field is completed, finishing in the centre of the field. The field remains in this state till the second or third day, when for two or three days in succession it is made even and hard upon the surface with the hengah, as before stated."—(Trans. Agri-Hort. Soc. vi. 5.)

Bombay.—Mr. Vaupell, in describing the most successful mode of cultivating the *Mauritius* sugar cane in Bombay, says, that "after the ground is levelled with the 'paur,' in the manner of the cultivators, pits of two feet in diameter, and two feet in depth, should be dug throughout the field at the distance of five feet apart, and filled with manure and soil to about three inches of the surface. Set in these pits your canes, cut in pieces about a foot and a half long laying them down in a tringular form, thus ▲. Keep as much of the eyes or shoots of the cane uppermost as you can; then cover them with manure and soil; beds should next be formed to retain water, having four pits in each bed, leaving passages for watering them. The cutting should be watered every third day during hot weather, and the field should always be kept in a moist state."—(Ibid. iii 43.)

About *Benares*, the sets require, after planting, from four to six waterings, until the rains commence, and as many hoeings to loosen the surface, which becomes caked after every watering. The moister nature of the soil renders these operations generally unnecessary in Bengal.

After-culture.—In *Mysore*, the surface of the earth in the hollows in which the sets are planted is stirred with a stick as soon as the shoots appear, and a little dung is added. Next month the daily watering is continued, and then the whole field dug over with the hoe, a cavity being made round each stool, and a little dung added. In the third month water is given every second day: at its close, if the canes are luxuriant, the ground is again dug; but if weakly, the watering is continued during the fourth month before the digging is given. At this time the earth is drawn up about the canes, so as to leave the hollows between the rows at right angles with the trenches. No more water is given to the plants, but the trenches between the beds are kept full for three days. It is then left off for a week, and if rain occurs, no further water is requisite; but if the weather is dry, water is admitted once a week during the next month. The digging is then repeated, and the earth levelled with the hand about the stools. The stems of each stool are ten or twelve in number, which are reduced to five or six by the most weakly of them being now removed. The healthy canes are to be tied with one of their own leaves, two or three together, to check their spreading; and this binding is repeated as required by their increased growth. In the absence of rain, the trenches are filled with water once a fortnight. When the *Putta putti* is to be kept for a second crop, the dry leaves cut off in the crop season are burnt upon the field, and this is dug over, and trenches filled with water, and during six weeks the plants watered once in every six or eight days (unless rain falls), and the digging repeated three times, dung being added at each digging. The after-culture is the same as for the first crop.

In the *Upper Provinces*, Dr. Tennant says, if moderate showers occur after planting, nothing more is done until the shoots from the sets have attained a height of two or three inches. The soil immediately around them is then loosened with a small weeding iron, something like a chisel; but if the season should prove dry, the field is occasionally watered; the weeding is also continued and the soil occasionally loosened about the plants. In August, small trenches are cut through the field, with small intervals between them, for the purpose of draining off the water, if the season is too wet. This is very requisite, for if the canes are now supplied with too much moisture, the juice is rendered watery and unprofitable. If the season happens to be dry, the same dikes serve to conduct the irrigating water through the field, and to carry off what does not soak into the earth in a few hours. Stagnant water they consider very injurious to the cane, and on the drains being well contrived depends in a great measure the future hope of profit. Immediately after the field is trenched, the canes are propped. They are now about three feet high, and each set has produced from three to six canes. The lower leaves of each are first carefully wrapt up around it, so as to cover it completely in every part; a small strong bamboo, eight or ten feet long, is then inserted firmly in the middle of each stool, and the canes tied to it. This secures them in an erect position, and facilitates the circulation of the air. Hoeing cannot be repeated too frequently. This is demonstrated by the practice of the most successful cultivators.

In Zilla, *N. Mooradabad*, in April, about six weeks after planting, the earth on each side of the cane-rows is loosened by a sharp-pointed hoe, shaped somewhat like a bricklayer's trowel. This is repeated six times before the field is laid out in beds and channels for irrigation. There, likewise, if the season is unusually dry, the fields in the low ground are watered in May and June. This supposes there are either nullahs, or ancient pucka wells, otherwise the canes are allowed to take their chance, for the cost of making a well on the uplands is from ten to twenty rupees—an expense too heavy for an individual cultivator, and not many would dig in partnership, for they would fight for the water.

In the vicinity of *Benares*, as the canes advance in growth, they continue to wrap the leaves as they begin to wither up round the advancing stem, and to tie this to the bamboo higher up. If the weather continue wet, the trenches are carefully kept open; and, on the other hand, if dry weather occurs, water is occasionally supplied. Hoeing is also performed every five or six weeks.

Wrapping the leaves around the cane is found to prevent them cracking by the heat of the sun, and hinders their throwing out lateral branches. In January and February the canes are ready for cutting. The average height of the cane is about nine feet, foliage included, and the naked cane from one inch to one inch and a quarter in diameter.

Near *Maduna*, the hand-watering is facilitated by cutting a small trench down the centre of each bed. The beds are there a cubit wide, but only four rows of canes are planted in each.

It is deserving of notice, that the eastern and north-eastern parts of Bengal are more subject to rain at every season of the year, but especially in the hot months, than the western; which accounts for the land being prepared and the plants set so much earlier in Rungpore than in Beerbhoom. This latter country has also a drier soil generally; for this reason, so much is said in the report from thence of the necessity of watering. The Benares country is also drier than Bengal, therefore more waterings are requisite.

At *Malda*, ten or fifteen days after the earth has been removed from the roots of the canes and the plants have appeared, the land is slightly manured, well cleared of weeds, and the earth that was removed again laid about the canes; after which, ten or fifteen days, it must be well weeded, and again twenty or twenty-five days afterwards. This mode of cultivation it is necessary to follow until the month of Joystee. The land must be ploughed and manured between the rows of canes in the month of Assaar; after which, fifteen or twenty days, the canes are to be tied two or three together with the leaves, the earth about them well cleaned, and the earth that was ploughed up laid about the roots of the canes something raised. In the month of Saubun, twenty or twenty-five days from the preceding operation, the canes are tied as before, and again ten or fifteen days afterwards; which done, nine or ten clumps are then to be tied together.

In the *Rajahmundry Circar*, on the Delta of the Godavery, Dr. Roxburgh states "that nothing more is done after the cane is planted, if the weather be moderately showery, till the young shoots are some two or three inches high; the earth is then loosened for a few inches round them with the weeding iron. Should the season prove dry, the field is occasionally watered from the river, continuing to weed and to keep the ground loose round the stools. In August, two or three months from the time of planting, small trenches are cut through the field at short distances, and so contrived as to serve to drain off the water, should the season prove too wet for canes, which is often the case, and would render their juices weak and unprofitable. The farmer, therefore, never fails to have his field plentifully and judiciously intersected with drains while the cane is small, and before the usual time for the violent rains. Immediately after the field is trenched, the canes are all propped; this is an operation which seems peculiar to these parts. In Dinajpoor, in about a month after planting, "the young plants are two or three inches high; the earth is then raised from the cuttings by means of a spade, and the dry leaves by which they are surrounded are removed. For a day or two they remain exposed to the air, and are then manured with ashes and oilcake, and covered with earth. Weeds must be removed as they spring; and when the plants are about a cubit high, the field must be ploughed. When they have grown a cubit higher, which is between the 13th of June and 14th of July, they are tied together in bundles of three or four, by wrapping them round with their own leaves. This is done partly to prevent them from being laid down by the wind and partly to prevent them from being eaten by jackals. During the next month three or four of these bunches are tied together; and about the end of September, when the canes grow rank, they are supported by bamboo stakes driven in the ground. They are cut between the middle of December and the end of March." If the canes grow too vigorously, developing a superabundance of leaves, it is a good practice to remove those leaves which are decayed, that the stems may be exposed fully to the sun. In the West Indies, this is called *trashing* the canes. It requires discretion; for in dry soils or seasons, or if the leaves are removed before sufficiently dead, more injury than benefit will be occasioned.

Harvesting.—The season in which the canes become ripe in various districts has already been noticed when considering their cultivation. In the Rajahmundry Circar, about the mouth of the Godavery, Dr. Roxburgh adds, "that in January and February the cane begins to be ready to cut, which is about nine months from the time of planting. Their height, when standing on the field, will be from eight to ten feet (foliage included), and the naked cane from an inch to an inch and a quarter in diameter."

In *Malda* the canes are cut in January and February. In N. Mooradabad, upon the low land, the canes are ripe in October, and upon the high lands a month later. The fitness of the cane for cutting may be ascertained by making an incision across the cane, and observing the internal grain. If it is soft and moist, like a turnip, it is not yet ripe; but if the face of the cut is dry, and white particles appear, it is fit for harvesting.—(*Fitzmaurice on the Culture of the Sugar Cane.*)

Injuries.—1. *A wet season*, either during the very early or in the concluding period of the cane's vegetation, is one of the worst causes of

injury. In such a season, the absence of the usual intensity of light and heat causes the sap to be very materially deficient in saccharine matter. But, on the other hand,

2. *A very dry season*, immediately after the sets are planted, though the want of rain may in some degree be supplied by artificial means, causes the produce to be but indifferent. These inconveniences are of a general nature, and irremediable.

3. *Animals.*—In India not only the incursions of domesticated animals, but in some districts, of the wild elephant, buffalo, and hog, are frequent sources of injury. Almost every plantation is liable, also, to the attack of the Jackal, and rats are destructive enemies.

4. *White Ants.*—The sets of the sugar cane have to be carefully watched, to preserve them from the white ant (*Termes*), to attacks from which they are liable until they have begun to shoot. To prevent this injury, the following mixture has been recommended :—

Asafœtida (hing), 8 chittacks.
Mustard-seed cake (sarsum ki khalli), 8 seers.
Putrid fish, 4 seers.
Bruised butch root, 2 seers ; or muddur, 2 seers.

Mix the above together in a large vessel, with water sufficient to make them into the thickness of curds ; then steep each slip of cane in it for half an hour after planting ; and, lastly water the lines three times previous to setting the cane, by irrigating the watercourse with water mixed up with bruised butch root, or muddur if the former be not procurable. That the above application would be beneficial, is rendered still more worthy of credit from the following experience:—In the Dhoon, the white ant is a most formidable enemy to the sugar planter, owing to the destruction it causes to the sets when first planted. Mr. G. H. Smith says, that there is a wood very common there, called by the natives *Butch*, through which, they say, if the irrigating waters are passed in its progress to the beds, the white ants are driven away. (Trans. Agri-Hort. Soc. of India, v. 65.] The experience of farmers in Europe, has however shown that the use of any poisonous dring, to protect the seed or sets, is highly dangerous to the health of those who eat the produce, and the employment of "Butch" or arsenic cannot therefore he recommended. A very effectual mode of destroying the white ant, is by mixing a small quantity of arsenic with a few ounces of burned bread, pulverised flour, or oatmeal, moistened with molasses, and placing pieces of the dough thus made, each about the size of a turkey's egg on a flat board, and covered over with a wooden bowl, in several parts of the plantation. The ants soon take possession of these, and the poison has a continuous effect, for the ants which die are eaten by those which succeed them. (*Fitzmaurice on the Culture of the Sugar Cane.*) They are said to be driven from a soil by frequently hoeing it. They are found to prevail most upon newly broken-up lands.

In *Central India*, the penetration of the white ants into the interior of the sets, and the consequent destruction of the latter, is prevented by dipping each end into buttermilk, asafœtida, and powdered mustard-seed, mixed into a thick compound.

Storms.—Unless they are very violent, Dr. Roxburgh observes, "they do no great harm, because the canes are propped However, if these are once laid down, which sometimes happens, they become branchy and thin, yielding a poor, watery juice.

Maize Sugar.—The stem and branches of Indian corn, during the time that its grain is filling, abounds with sugar, even when grown in England ; so much so, that it might be turned to account by those of the peasantry who have small plots of ground attached to their cottages ; and by a simple method a rich syrup may be obtained from it, equal in sweetness to treacle, and superior to it in flavor. The proper time for cutting down the plant (which should be done within an inch of the ground), is when the corn in the ear is small and full of a milky juice. All the large and old leaves should be stripped off, leaving only the young and tender ones ; they should then be cut into short lengths, thoroughly bruised, and the juice entirely pressed out from them. Where the means cannot be obtained for expressing the juice by this method, the following may be employed :—After the plants have been cut into small pieces, put them into a large pot or copper, with only just sufficient water to extract the juice ; boil for one hour, and then strain off the liquor ; to each gallon of this liquor add a wine-glass full of lime-water whilst warm ; but if it be the expressed juice, obtained as above mentioned, add double the quantity of lime-water. When the liquor is cold, for every three gallons beat up an egg with some of the liquor ; put altogether into a boiler, and boil gently till the syrup acquires the consistence of treacle. Whilst this is going on, the liquor should every now and then be well stirred, and the scum which rises to the surface taken off. This syrup, which will be found a better substitute for sugar than treacle, and more wholesome, should be kept in lightly-covered vessels, in a dry place.—*Extracts from Simmonds, pages 137 to 215.*

Sugar cane, its History.—*Sugar* has, from an early period of the world's history, been used in some form or other as an article of food ; indeed, the practice of sweetening food is more ancient than the knowledge of sugar. The juice of a large number of vegetables owes its sweetness to the presence of sugar.

The ancients used honey for the purpose; and at a later period, when a sweet substance, which exuded from a species of cane, was used, it was termed *mel arundinaceum*. Dioscorides, in the first century, refers to a kind of honey produced by canes growing in India and in Arabia Felix, and named σάκχαρον, or *sugar*. Pliny records the same fact, but remarks that it was used only in medicine. Sugar was not known in Northern Europe as an article of food, until the time of the Crusaders. The sugar-cane was introduced into Cyprus from Asia, and about the year 1148 is said to have been largely cultivated there; at which time it was transplanted to Maderia, and from thence, in 1506, to the West Indies. There is evidence that the sugar-cane was cultivated on the coast of Andalusia before the invasion of the Arabs, in the middle of the fifteenth century. The Arabs had many sugar factories, and with them probably originated the art of boiling down the juice for the production of sugar. The refining of the raw product is of later date, and is referred to a Venetian. In the year 1597, a refinery existed in Dresden.

Sugar making and Refining.—*Sugar-candy* is mentioned in the *Alchemia* of Libanius in 1595. Up to the close of the seventeenth century, syrup and honey were used by the poorer classes in Germany for sugar; and it was not until tea and coffee had come into general use that sugar was regarded as one of the necessaries of life. In the year 1747, Margraf, a German chemist, discovered that cane sugar existed ready formed in the roots of many plants, especially in beet-root; but nearly half a century elapsed before any attempt was made to establish a factory of beet-root sugar; this was done by Achard, at Cunoom, in Silesia, not, however, with any great success. The first energetic impulse that was given to the manufacture was by Napoleon, who, anxious to ruin the colonial trade of Great Britain, ordered the blockade of the continent, and in order to supply the demand for sugar, which formed so important a part of our commerce, he offered premiums for the best methods of separating sugar from beet-root. The chemists of France exerted themselves with their accustomed method and skill. Extensive experiments were made on the cultivation of the beet-root, and the best method of obtaining its juice, and extracting the sugar from it. Factories were soon at work, and the first sample of French beet-root sugar was conveyed at once to the emperor, who received it with joy, placed it under a glass case as one of the choicest ornaments of his drawing-room. The extensive and valuable series of apparatus invented or improved by his subjects, for the preparation of beet-root sugar, adapted by the English, have been the means of saving English colonies, which had prospered in spite of his opposition, but which at a later period, chiefly b the renunciation of slave labour, had bee brought to the verge of ruin.

Chemical Relations of Sugar.—Sugar ma be defined as a substance soluble in wate possessing a sweet taste, and capable undergoing fermentation. There are two leac ing varieties of sugar: one the produce of th *Arundo saccharifera*, or sugar-cane; also foun in beet root, in the sap of certain species of ma ple, in the stems of palms, maize, &c., an known as *crystalline* or *cane-sugar*: the other con tained in grapes, figs, plums, and fruits in gene al, and is known by the several names of *grann lar*, or *grape sugar*, *glucose* or *sugar of fruit* Fruit sugar is however distinguished by som chemists from grape-sugar, as will be notice more particularly hereafter. The property c submitting to the action of ferments and resolv ing itself into carbonic acid and alcohol is pe culiar to fruit or grape-sugar; and whe other varieties of sugar undergo this remarkabl process, they are by the action of ferments firs converted into fruit or grape-sugar, and the undergo fermentation. Cane-sugar is furthe distinguished from fruit or grape-sugar by it pure and powerful sweetness, and the facilit with which it crystallizes. Grape sugar is ver inferior in sweetness; it crystallizes imperfectly and is usually obtained in a granular state. I is accompanied in fruits by malic, citric, or tar taric acid. It may be produced artificially b the action of various agents on cane-sugar, an also upon lignin, starch, and gum. It forms th solid crystalline portion of *honey*; it also occur in urine in the disease called *diabetes*. The term sugar has also been applied to *manna* or *man nite*, which occurs in the juice of some kinds o ash, in orchard trees, in celery, &c.: this kin of sugar, however, does not ferment. The juic of the *liquorice* root, and a few other substances are also classed under sugar.

Cane-sugar.—Cane-sugar, when pure, is whit and brittle: it becomes phosphorescent by fric tion, and a lump, on being broken, emits a electric spark which is visible in the dark. It density is about 1·6. It dissolves in about one third of its weight of cold water, but in a muc smaller quantity of boiling water. The *syrup* thus formed is viscid, and on being evaporate at a moderate heat, deposits fine crystals o *sugar candy*, of which the usual crystalline form is a six-sided prism commonly flattened and ter minated irregularly. The crystals are said t consist of 100 parts sugar, and 5·6 parts o water. A solution, saturated at 230°, forms i cooling a granular mass or *tablet*, but when th solution is rapidly boiled down until it acquire a tendency to vitreous fracture on cooling, o when fused at about 280°, or until a portion *feathers* or concretes on being thrown off from stirrer, it may be poured out upon a marble o

metal slab, and will form a transparent amorphous mass on cooling. This vitreous mass was formerly obtained by rapidly boiling down a concentrated solution of sugar in barley-water or sweet-wort, and hence the name of *barley-sugar* applied to sticks of it formed by cutting the amorphous mass while hot into strips, rolling the strips into cylinders. and then giving a spiral twist to the cylinders. In this state the sugar is vitreous and transparent, but after some time especially if exposed to air, it crystallizes, acquires a fibrous or granular texture, becomes opaque first on the surface, and then throughout the mass. Confectioners add a small quantity of vinegar or tartaric acid to the sugar which retards this tendency to opacity. The show-sticks which are kept in the windows of grocers &c. are made of coloured glass very accurately resembling the barley-sugar in its freshest and most transparent state. The tendency to crystalize is also removed by keeping the syrup for a long time at a temperature near its boiling point ; but in such case a portion of the sugar probably passes into glucose.

The cultivator distinguishes 3 species of canes. 1. The *Oreole* cane, which has dark green leaves, and a thin but very knotty, stem ; it is indigenous to India, and was transplanted thence to Sicily, the Canary Isles, the Antilles, and to South America. 2. The *Batavia*, or *striped* cane, which has a dense foliage, and is covered with purple strips ; it is chiefly cultivated in Java for the manufacture of rum. 3. The *Otaheite* cane grows most luxuriantly : it is the most juicy, and yields the largest product. This variety is chiefly cultivated in the West Indies and South America. It becomes ripe enough for the mill at 10 months, and is more hardy than the other varieties. The sugar cane being originally a bog plant, requires a moist nutritive soil, and a hot, tropical, or subtropical climate. It is propagated by slips or pieces of the stem with buds on them, and about 2 feet long. It takes from 12 to 16 months, according to the temperature, before it arives at maturity. Towards the flowering season the leaves fall off, and the stem acquires a straw-yellow colour. Some planters cut the cane before the flowering season, but generally some weeks after. The plantations are so arranged that the various divisions of the fields may ripen in succession. The land should be well supplied with manure rich in nitrogen, but not containing much saline matter.

A beet-root factory established at Naples, near the sea-shore, experienced heavy losses in consequence of employing beet-roots grown in the neighbouring fields ; and we have also heard of similar losses in a German factory from the use of beet grown in a field in front of the graduation-house of the salt works at Manheim. A similar effect has been observed with respect to sugar-cane. Those which are grown near the sea make an inferior sugar to those grown inland ; the quantity of melasses is greater, and the sugar more deliquescent. Mr. Kerr states, [A Practical Treatise on the Cultivation on the Sugar cane and the Manufacture of Sugar, by Thomas Kerr, Planter, Antigua, London, 1851.] that on the windward coast of Barbadoes he has tasted melasses as salt if it had been mixed with strong brine. After the harvest the roots strike again and produce a fresh crop of canes ; but in about six years they require to be removed. The time for cutting the canes varies with the soil and season, and the different varieties of the cane. The usual signs of maturity are a dry, smooth, brittle skin; a heavy cane ; a grey pith, approaching to brown ; sweet and glutinous juice. The canes should be cut in dry weather, or the juice will be diluted with an excess of water. The development of the buds which form the secondary stole of a plant that has been cut, are named *rattoons*, and they are *first*, *second*, or *third*, &c., according to the age of the root which produces them. They diminish every year in length of joint and circumference, and although they have not the handsome appearance of the original plant they yield much richer juice and produce finer sugar. The juice from the rattoons is also said to be more readily clarified than that from the plant cane. The canes should be cut as close to the stole as possible, in order to give vigour to the rattoons that are to spring from the old root : besides this, the juice of the lower joints is the richest in the cane. The cane-top, with one joint of the cane, or two joints if not quite ripe, must also be cut off. The canes are tied up in bundles, and conveyed to the crushing mill, particular attention being paid that the supply does not exceed the demand, otherwise the cut canes would ferment and spoil. Mr. Kerr recommends that the land should be deeply ploughed and thoroughly pulverized ; that cultivation should no longer be carried on by hand, but with implements, as in the best farming in England; and in putting in a plea for the better treatment of the cattle, he reminds the planter that the Psalmist, in praying for the prosperity of his people, asks emphatically, among other blessings, that " our oxen may be strong to labour, that there be no decay." Mr. Kerr states, that it is usual to plant the canes in parallel rows 6 feet apart, and the canes 4 feet from each other in the row. He recommends wider spaces, such as eight feet between the rows ; and states that in Barbadoes, in 1847, 90 acres of cane, planted 8 feet by 4 yielded 230 hogsheads of sugar. Some have even recommended to increase the distance to 10 feet, and others have advocated 8 feet square : that is, the canes in rows 8 feet apart and 8 feet distant from each other. It is also advisable to extend the planting over a period of 5 months ; to begin early, so as to finish before the rainy season sets

in. In addition also to the many advantages of returning the cane-trash to the land, Mr. Kerr states, that by spreading it over the spaces between the cane rows, it prevents the disastrous effects of severe droughts. The cheap rate at which coals can be sent from Great Britain to the colonies makes it desirable to abandon the use of cane-trash as fuel. The juice of the sugar-cane consists of a nearly pure solution of sugar in water, with traces of albumen, about $\frac{7}{100}$ of gum and a peculiar substance resembling gluten or vegetable gelatine, which is deposited in large quantities in the vats in which sugar is fermented for making rum. The juice also contains of cerosin and a green vegetable wax, about $\frac{3}{100}$ to $\frac{4}{100}$. The mineral ingredients are similar to those in other plants and vegetable juices, and consist of the sulphates of lime, and potash, chlorides of potassium and sodium, phosphate of lime, silica &c. The juice is sometimes colourless, but generally yellow : it is made turbid by the presence of greyish globules of suspended matter. Its taste is agreeable, but rather insipid, and it has a peculiar balsamic odour. After the cane has been passed through the rollers and as much of its juice squeezed out as this imperfect method admits of, it is called *cane straw*, *bagasse* or *cane-trash*. It consists of—

	Martinique. Otaheite	Guadaloupe. Cane.	Cuba. Creole cane.
Water	72.1	27	65.6
Sugar	1·8	17.8	17.7
Woody matter...	9·9	9,1	16.4
Salts	——	0.4	——

The trash is used as fuel in evaporating the juice as already stated. 100 parts of its ash consist of—

	Trinidad.	Berbice.
Silica.....	45·78	46·24
Phosphoric acid..... ..	3·75	8·12
Sulphuric acid.....	6·64	7·48
Chlorine.....	2·70	2 39
Lime.....	9·13	5·75
Magnesia.....	3·65	15·53
Potash.....	27·32	11·87
Soda.....	1·03	2 62

It is important to observe, that while the chemist has proved that as much as from 17 to 20 per cent. of crystalline cane-sugar exists in the cane or fresh juice, the sugar-boiler in the colonies does not obtain more than 7½ per cent., or less than one-half. His object is to convert the juice as speedily and with as few operations as possible into raw sugar ; hence he has not been very active in improving on the old method of manufacture, which entails loss or deterioration of juice at every stage of the process : there is first a large loss in consequence of the imperfect method of expressing the juice from the cane, and, secondly, a chemical change in consequence of long exposure to the atmosphere at

ordinary as well as at high temperatures, whereby the crystalline sugar becomes degraded into mucilaginous or non-crystalline sugar, commonly called *molasses* or *treacle*. The juice of the cane is purer, and contains twice as much sugar as that of beet-root, and yet the manufacturer of beet-root sugar manages, by means of improved processes and apparatus, to make the beet-root juice as productive as cane juice. It is true that the planter labours under certain disadvantages which may not be altogether compensated by a richer juice ; the sugar cane contains 2 or 3 times as much woody fibre as the beet, which is soft and full of cells, while the cane is fibrous and spongy, and is surrounded by a hard integument difficult to submit to pressure. Moreover in the climate of the sugar cane the ordinary temperature of the air is highly favourable to fermentation, so that the danger of decomposition is greater than in the case of the beet. The fact, however, still remains, that while science has been actively employed in perfecting the manufacture of beet-root sugar, she has, until recently, done little or nothing for the manufacture of cane-sugar ; and now that attention had been fairly directed to the subject, in consequence of the depressed condition of our colonies, much of the beet-root apparatus is found to be admirably adapted to the wants of the colonial sugar boiler. The original crushing apparatus of India was a kind of squeezing mortar, made out of the hollow trunk of a tamarind-tree, worked by a yoke of oxen, the pestle or stamper being a strong beam, 18 feet long, and rounded at the bottom so as to squeeze or crush the canes in the mortar. Squeezing mills, similar to those used for expressing oils from seeds, were also used. There were also other forms of apparatus before rollers were introduced. Rollers of stone or iron were first used with the axes in a vertical position ; but the horizontal was soon found to be more convenient and economical. The scarcity of fuel is so great in some of the colonies, that it has even been purposed, instead of expressing the sugar-cane, to cut it in slices to dry them, and send them to Europe for manufacture into raw or refined sugar. But the very defect of fuel which led to this proposition would evidently be the chief barrier to carrying it out, since the fuel required for drying the canes would be wanting. The true remedy for the enormous waste that attends the present mode of manufacturing raw sugar, must be found in the application of a regulated steam heat with coals for fuel, while the cane trash shall be left to its more legitimate application of manuring the land for future crops. The waste of sugar by the old process has attracted the notice of French as well as English writers. Thus Dumas states that of the 84 to 90 per cent of juice in the fresh cane, only from ⅔ds to ¾ths are obtained from the presses : that this ⅓ds contain only 12 per cent.

of the sugar actually existing in the fresh cane, 6 per cent. being left in the trash which is used as fuel : so that for every 80 milions of kilogrammes of raw sugar imported into France, 40 millions of kilogrammes have been burnt in producing them; the value of which, about 20 millions of francs, is actually thrown into the fire.

Clarification or *defecation* of the juice is produced by heat, which coagulates the albumen, and by the addition of lime, which neutralizes the acid, and renders some of the solid impurities insoluble. By the old method an arrangement called the *copper wall*, consisting of 5 pans, iron boilers, or *teaches*, as they are called, walled together in a row, and heated by one common fire, are used for the purpose. From the juice reservoir, below the crushing mill, the juice is conducted into the clarifying pan, the fifth in the row, the largest, and farthest from the fire. It should be capable of holding the whole of the juice produced at one crushing, and should be ready to receive the juice almost as quickly as it is expressed. In some cases two copper walls are built under the same shed. The proper dose of milk of lime, or *temper*, as it is called, should be measured out by means of a vessel graduated into inches, each inch corresponding to $4\frac{1}{2}$ oz. of milk of lime. Not less than 5, or more than 10 oz. are required to clarify 1,800 litres, or about $\frac{1}{1000}$ to $\frac{3}{1000}$ the entire weight of juice. When the proper temperature has been acquired, 10 litres of juice yield 15 grammes of precipitate, containing,

Gum resembling cherry gum	50.25
Green matter (chlorophill)	10.05
Albumen, with particles of wood fibre	22.78
Phosphate of lime	3.35
Silica	14.07
	100.60

The phosphoric acid is originally present in the form of an acid salt ; hence if copper vessels be used in clarifying, the metal is soon attacked and phosphate of copper formed : the lime converts this salt into a basic phosphate, which combines with silica and organic matters, and materially assists the precipitation of foreign ingredients. A dense impure scum collects on the surface, and is removed by skimming. The juice is then passed through the other 4 teaches, and heated until the evaporation is complete. During this process a large quantity of thick scum is removed by means of a perforated copper plate attached to a handle. The formation of this scum is a striking illustration of the defects of the system, for the scum consists of nearly pure sugar, decomposed by heat, together with the natural impurities of the juice : it is passed into the melasses cistern, and is chiefly used for making rum. As the bulk of juice is diminished by evaporation, so the teaches are usually made to diminish in size, the juice being passed from one to the other by a copper ladle or dipper worked by hand. The sugar is greatly injured by this repeated ladling and exposure in small quantities, to the atmospheric air, and indeed the whole plan justifies the satirical remark, that it is "an elaborate and effectual means of converting pure sugar into melasses and scum." And Mr. Kerr remarks, that "the whole system, from the breaking up of the first clod of earth, to the rolling of the hogshead of sugar into the waggon, appears to have been expressly contrived for employing the greatest possible amount of labour." When most of the scum has been removed in a compact form from the clarifier, the juice is ladled to the next pan, and as it diminishes in volume fresh juice is added. The pans are in some cases on different levels, so that the juice may be drawn off from one into the next below it, by means of a syphon ; but the pans are not usually terraced, so that the juice has to be scooped from pan to pan. In the second pan the concentration begins ; the boiling liquor throws up a scum, which the negroes collect and return to the clarifying vessel. In the last pan but one the juice is concentrated to 30° Baume, and it is then passed into the last and smallest pan, which is situated directly over the fire. Here the boiling is tumultuous, in consequence of the formation of *panstone*, a deposit of lime consisting of—

Basic sulphate of lime	92·43
Carbonate of lime	1·35
Silica	4·70
Phosphate of copper	1·41
	99·89

with organic matter. The panstone forms more or less in all the boiling operations : it causes the juice often to be over-heated, the sugar to be burnt, and caramel to be formed, as when the incrustation cracks and the juice comes in contact with the hot metal. The crust is from time to time removed by heating the empty pan to redness, when, in consequence of the greater expansion of the metal, the crust breaks up and peels off. Sometimes the last and smallest copper contains a *skipping-teach*, a smaller vessel of the same shape, with a valve at the bottom worked by a handle. This vessel is let down by a crane into the pan, removes the sugar from it and conveys it to the coolers. In some cases, the concentrated syrup is discharged down shoots into the coolers. Sometimes the term *teache*, or *tayche*, is applied only to this last vessel, in which the syrup is reduced to the *granulating* point, or sufficiently concentrated to separate on cooling into grains of sugar. The required consistency is ascertained by taking a small portion of the syrup upon the thumb, then bringing the forefinger in contact with it, and again separating them, noting the length to which a thread of syrup can be drawn before it breaks ; if it ex-

tend to about half an inch in length, the sugar is judged to be fully boiled. This trial by the *touch* is supposed to have given the name of *teache* to the pan. The coolers are shallow open vessels, each capable of containing about a hogshead of sugar. They are of wood, with thick sides, that the cooling may be gradual. In about 24 hours the sugar grains, or forms, into a soft mass of crystals, imbedded in melasses, which are separated in the *curing-house*, to which the soft sugar is removed. The sugar in the coolers is frequently stirred with iron rods, to produce a uniform temperature and consistency. The curing-house is a large building, the lower part of which is lined with lead, forming the melasses' reservoir. Over this, on an open framing, are placed the hogsheads or *potting-casks*. In the bottom of each cask are bored several holes an inch in diameter, into each of which is placed a plantain stalk, or a crushed cane, of sufficient length to reach to the top of the hogshead. The soft sugar being placed in these casks, the melasses gradually drain away through the spongy stalks or canes, leaving the crystalline portion tolerably dry. In 2 or 3 weeks, or 5 or 6 if the mass be mucilaginous and the grain small, it is fit for shipment; a further drainage of melasses takes place in the hold of the vessel, and even after this there are melasses entangled with the crystals of the raw sugar, to the injury of its quality. Such is *raw* sugar of commerce: it varies greatly in quality, but really consists of a crystalline flour of pure sugar, moistened throughout with melasses, often to the extent of one-third of its weight, and often more than the crystals can contain. Hence as it attracts moisture from the damp air of the vessel and becomes more liquid, it escapes from the crevices of the casks. It is calculated that about 12 per cent. of sugar is lost in this way from the English colonies alone, or about 27,000 tons annually. In places where the sugar is not packed in hogsheads for the sea voyage, it is set to drain in the curing house, in wooden moulds of deal. The syrup which drops from the moulds, or from the hogshead, into a cistern, deposits on cooling a sugar, the grain of which resembles fine sand, and forming a layer on the bottom several inches in thickness. This inferior product is called by the French planters, *fond de cisterne*. It averages about 10 per cent. of the raw sugar, depending on the temperature at which the sugar is placed in the moulds. It has a moist and smeary character, and is an admixture of various salts, of gelatinous silica, mucous or gum deposited from the refuse syrup, or mother-liquor, of the first crop of crystals. The defects of the old system most plainly appear from the various modes adopted for calculating the loss. We have already given one or two estimates, and will conclude this section with one or two more. From every 1,000 parts of sugar-cane the old process yields from 60 to 80 parts raw sugar, and 25 to 30 of melasses; while according to chemical analysis the yield should be 180 to 200 parts of crystallized sugar. The following table has been drawn up from a large number of comparative results:—

In 1,000 parts—		
Raw Sugar	79	73
Melasses	30	27
Trash	386	395
Water	505	505

Thus of the 180 to 200 parts of crystalline sugar in 1,000 parts of cane, there are obtained from 73 to 79 parts of raw sugar: 18 to 20 parts of melasses; cane trash, 28 to 33; and waste in the process of manufacture, from 48 to 61 parts. Mr. Kerr also states that of the 1,500 gallons of juice required to make a hogshead of sugar netting 15 cwt. in the English market, the planter does not get a return of more than 6 per cent. of moist muscovado sugar, and that of very inferior quality.

Improved System of Manufacturing Raw Sugar.—The various improvements in the rude process of manufacturing sugar described in the last section have for their objects the preservation of the juice from fermentation, and its concentration with as little agitation and exposure to the air, and at as low a temperature as possible. Several proposals have been made for removing or diminishing the causes which lead to the rapid fermentation of the juice. Among other plans, Dr. Mitchell proposed to destroy the vitality of the glutinous fermenting matter, and to coagulate the albuminous substance in the tissue of the cane, by plunging the canes into some boiling liquid as soon as possible after they are cut. This plan would prevent the albumen, &c., from passing into the juice by expression. From some experiments made on this subject, it appears that a colourless juice was obtained: it was full of floating feculæ which immediately subsided, and the juice being decanted off and boiled down without the addition of any lime or temper, or any necessity for skimming, furnished a pure white sugar. By this process, the juice is diminished in quantity, but increased in density. Some of it was kept for 18 hours without undergoing any change. M. Payen recommends the use of sulphurous acid or of bisulphite of lime for preventing the rapid fermentation of the juice. He advises that the ends of the canes be dipped into a solution of the bisulphite as soon as they are cut. An infusion of tannin or nut-galls has also been recommended for the separation of the diliquescent matter and soluble salts. As the crushing-mill is generally on the ground, the juice is raised to the clarifying vessels by force-pumps of peculiar construction, and with very little agitation. For this purpose it

is admitted into an apparatus called a *monte-jus*, from which it is forced up a pipe by the pressure of steam on the surface of the liquor where is a vessel for receiving the juice, which passes into it by a pipe for supplying steam for forcing the juice up. There is an air-cock, through which the air escapes on the admission of the juice: the pipe attached to this cock dips 2 or 3 inches below the top of the cylinder, so that the juice never rises above that height: the space above being filled with air, acts as a cushion between the steam and the cane-juice, thereby preventing the juice from being heated to the temperature of the steam. The pipe is not only continued to the bottom of the receiving vessel, but dips into a sunken receptacle, by which means all the juice is collected; for it is of importance not to leave layers of juice at the bottom of vessels to ferment and damage the fresh juice afterwards added. Steam-heat is used for the clarifying vessel, into which the juice is raised by the monte-jus. This vessel consists of a hemispherical copper pan surrounded by a cast-iron jacket, and steam is admitted into the space between the two, the supply being regulated by a valve. On the top of the copper pan is fixed a *light course* or copper band, from 15 to 18 inches deep, to prevent the scum from frothing over. The plug in the bottom of the pan is furnished with two or three holes, through one of which clarified juice passes down the hollow of the plug to the smaller channel of the two-way cock. When the clear liquor is run off, the plug is removed by the means of the handle and the thick scum and sediment pass off through the larger way. The condensed steam passes away by a pipe and there is a cock which is opened for a short time on the admission of steam, to allow the air to escape. The clarifier being filled with juice, steam is admitted and the temperature raised to 176° Fahr. Any particles which rise to the top of the liquor are skimmed off, and milk of lime is poured in in quantities just sufficient to neutralize the acid, which is ascertained by the frequent use of litmus paper. The heat is continued until there is formed a thickness of 3 or 4 inches of scum, consisting of most of the impurities of the juice. In about 10 or 12 minutes from the first application of heat the scum should be well formed and about to break up. The moment it begins to crack the steam is shut off, and the liquor being left for 15 to 20 minutes, the lighter impurities will have mostly risen to the surface, and the heavier ones sunk to the bottom, while between the two is a pale and beautifully clear liquor. The hollow plug which is ground into the hole in the bottom of the pan, is now turned by its long handle so as to throw open a hole in the side 3 or 4 inches from the bottom, and consequently above the subsided impurities: by this opening the clear liquor escapes and proceeds along the small channel of the two-way cock until scum begins to appear; the cock is then turned on to the larger way, the plug is altogether removed, and the heavy matters and scum pass out through the hole, and are conveyed to a cistern, placed in bags, and the juice squeezed out. The juice in the clarifier is never allowed to rise above 208° or 209°, or the impurities would become so mixed up with the juice as to be incapable of separation; a result which will also be attained unless the process be speedily conducted. The clarified juice still contains matters in suspension, which require to be removed by filtration. The filters consist of fine copper-wire sieves in sets of 4 or more each, the one above fitting into the one below, the mesh of the lower sieves increasing in fineness. In filling in the bone-black, the first few inches are pressed compactly down; after which it is filled lightly, but evenly, to within a short distance of the top, where a space is left for the accumulation of the cane juice. In the charcoal filters used in France, upon the false perforated bottom a filter-cloth is spread, and upon this the charcoal is placed, first in well packed layers, and afterwards a little more loosely. Another cloth is placed on the top, and upon that a perforated plate of metal. The syrup to be filtered is let in from the cistern and the supply is regulated by a ball-cock, a certain quantity being always kept at the top of the filter to prevent the charcoal from drying and dividing into vertical channels or cracks, and forming what the French call *de fausse voies*. To allow the syrup to accumulate in the bottom reservoir of the filter, it is necessary to let the air escape, for which purpose a tube is provided. There is a man-hole for cleaning out the filter when required. The object of filtering is to remove all vegetable colouring matter and any excess of lime that may have been accidentally added in the clarification, together with mineral salts, such as sulphate of lime, originally present in the juice. About 5 tons of animal charcoal are required for every 100 tons of sugar made. After this the charcoal is reburnt, and thus its useful properties are restored to it. When filtered liquor is ready for evaporation, according to the improved processes, it may be conducted either in the *vacuum-pan* or in open pans, containing a coil of steam-pipe. The usual plan is to concentrate the liquor in open pans to the density of 25° to 28° Baumé, up to which point it is not greatly acted on by the atmosphere. The evaporators used for this purpose are large iron vessels, with copper pipes at the bottom bent round, the extremities of which terminate in a straight gun-metal tube passing through stuffing-boxes: the pipe, which conveys the steam, is at one end of the straight tube, and the pipe which discharges the condensed water at the other. By this arrangement the pipes

can be raised up out of the vessel for the purpose of cleaning it thoroughly; for if the cane juice be allowed to hang about the pipes, it will become acid and infect the next charge. By means of a lever the evaporator can be tilted into a sloping position for the purpose of better running off the evaporated juice by the cock. In these vessels the juice is evaporated to about 27° B. before going into the vacuum-pan. The drainings are collected in pots or treacle-jars which support the moulds, and are boiled down with other refuse of the sugar-houses into an inferior sugar. A separate pot for each mould is not to be commended, for if the pots are not well washed out there is a liability to fermentation, or *smear*, as it is called, and this will spread through the whole establishment with astonishing rapidity, and when once formed is difficult to eradicate. We have heard of a sugar-refiner who had to work up the whole of his stock twice before this evil could be got rid of. The use of pots is, in many cases, superseded by supporting the moulds in frames, and allowing them to drain into gutters or false floors of thin sheet-copper, sloping towards a centre constructed under the main floor, where the syrup is conveyed by copper pipes to a cistern. It has been proposed to expedite the draining of the moulds by connecting their nozzles with a pipe communicating with an air-pump; but in such an arrangement the sugar would be liable to be drawn through the perforations with the syrup. Several other plans on the vacuum principle have also been proposed. When the sugar is properly drained it is taken out of the moulds in the form of loaves, which are trimmed to shape, placed in a stove or hot room of the temperature of 130° to 130,° and when the moisture has evaporated, they are fit for the market. The sugar thus obtained is half the weight of that let down into the heater from the vacuum-pan: the remainder consisting of moisture or drainings. A very small proportion of the syrup that drains away consists of uncrystallizable sugar or treacle in which all the impurities of the loaf are accumulated. If the improved operations have been well conducted the produce is equal to refined sugar, and there is no practical reason why perfectly white sugar should not be produced from the canes at one operation. The sugar, as it comes direct from the canes, contains only 1·5 per cent. of impurities, whereas the sugar-refiners in England have to operate on a material considerably deteriorated by previous mismanagement. Fiscal regulations have hitherto interfered with colonial improvement, a larger duty having been imposed on sugar above a certain standard, thus actually discouraging the production of white sugar at its natural seat of manufacture, and encouraging slovenly and bad work. In the islands of Java and Cuba, where the best machinery has been introduced, from 30 to 40 per cent. is now saved in the quantity of sugar produced, and its market value is increased from 5*s*. to 10*s*. per cwt. The manufacture of *sugar-candy* may be regarded as a branch of the refiner's art. The large crystals of sugar, which pass by this name, are prepared from a syrup clarified with a less quantity of charcoal-powder than is usual, and not passed through the filter. The crystals, which are coloured, inclose a certain portion of non-crystalline sugar. If the candy is required for the sake of its solvent action on the mucous membrane of the throat, it should not be prepared from clarified or clayed sugar. To increase its mucilaginous and sticky properties it should, after clarification with white of egg, be boiled over an open fire and not in vacuo; and for the darker kinds of sugar-candy a higher temperature should be employed than for the lighter. The syrup is set to crystallize in a copper vessel with smooth sides, and contracted towards the bottom that the crystals may be easily removed. At the sides are several small rows of holes at equal heights, through which strings are passed which serve as nuclei to the crystals. The copper is filled up above the strings, and is then placed in a drying chamber at the temperature of from 104° to 122°. As the syrup cools and evaporates, solid crystals are slowly formed, partly on the surface, but chiefly on the strings and the sides. The crystals on the surface are frequently broken up. In 6 or 8 days the crystallization is complete; the vessel is inverted, the syrup drains off, and when the dropping ceases the crystals are removed and dried.

Palm Sugars.—The various kinds of palms contain in their stems a juice charged with cane-sugar, which, in the fresh state, is named *toddy*, in India, and when fermented and distilled, *arrack*; it is by the evaporation of toddy that the sugar termed *jaggery* is obtained.—*See pages* 1771 and 1772.

The process from one of the palms, the cocoanut is thus described: a man named a "toddy-drawer" ascends the tree, cuts off the point of the spadix, and passes a ligature firmly round the stump. It is then beaten with a stick, which is supposed to determine the sap to the wounded part. The process is repeated for several days, a small portion of the end of the spadix being cut off each day. The juice soon begins to flow from the cut surface of the flower, and is carefully collected in an earthenware vessel suspended from the spathe. A thin portion of the flower and spathe is sliced off daily, and the end of the stump is bound with a ligature. A good healthy blossom will give from 2 to 4 pints English of sweet juice or *suri* daily, and some flowers will continue to yield juice for 4 or 5 weeks. There are frequently 2 spathes on one tree yielding suri at the same time, which by exposure to the air immediately begins to ferment, and forms the intoxicating liquor, *toddy*. By distillation,

this juice yields about one-eighth part of arrack, of the same strength as good brandy. The seamen belonging to the Royal Navy in the Indian Seas, are furnished with it instead of rum. By allowing the juice to pass into the acetous fermentation, an excellent vinegar is obtained, in which a great variety of vegetables are pickled. Suri is the yeast commonly used by the bakers in Ceylon. In order to obtain sugar (*jaggery*) from suri instead of spirit, great care must be taken to prevent fermentation. The earthenware pot in which it falls is emptied twice or thrice in the course of 24 hours, and is well cleaned and dried each time; a small quantity of lime is then thrown into it: the juice is filtered through the reticulated substance at the base of the leaf, and then slowly boiled in an earthenware vessel until it becomes light coloured and viscid. While still warm and semifluid, it is poured into sections of coco-nut shells, where it soon becomes solid. A gallon of juice yields about a pound of sugar. Jaggery contains both the crystallizable portion of the juice, and a quantity of molasses or liquid sugar; but they are separated by a subsequent operation. This coarse sugar is usually made into small loaves of the shape of a hemispherical vase from the form of the vessel in which it cools. It has a deep chocolate colour, and when broken presents many clear particles of sugar. In the Malay language, jagery is called *goola* or *goora itan*, black sugar or black sweet. Jaggery is sold at the rate of about 2*d*. per pound. The Ryots, or peasants dependent on the land-owners in the East Indies, also cultivate the sugar-cane, express the juice, and boil it down to a thick syrup: they then transfer it to the Goldars, who produce the solid sugar. The crude syrup is named *goor*, and is of various qualities, one of which, in common use, is also called by the English settlers *jaggery*. There is an association of farmers, who convert the syrup and send the produce of each man's land to a common manufactory. Jaggery is sometimes adulterated with earth and sand. The colonists of Ceylon and India prepare refined sugar from jaggery: it is of a yellowish white colour: it is known in the English market under the name of *date-sugar*. A similar product from Africa is known as *date-sugar of Mogador* (the port of Morocco). See TODDY.

Manufacture of Rum.—The refuse of the sugar-cane is chiefly employed in the manufacture of rum The melasses, the skimmings from the clarifying and evaporatiug coppers, and even raw cane-juice diluted with water, are all used for this purpose; *dunder*, or the wash of former operations, deprived of its alcohol by distillation, being used as a ferment. The fermentation is complete in from 5 to 7 days, and the liquor must be transferred to the still before the acetous fermentation shall have set in. A small portion of lime or of solid limestone is added to correct any acidity that may have formed. The spirit is allowed to flow through the worm until it is no longer inflammable. It is then rectified in a smaller still. Mr. Wray states that 1,200 gallons of wash yield 113 gallons of proof rum. Rum is coloured by means of caramel. Mr. Wray lays great stress on the action of the dunder. He terms it the aromatic substance which modifies the changes or transformations which take place during fermentation, that it increases the density of the liquor, and prevents violent fermentation; that good dunder should be light, clear, slightly bitter, and quite free from acidity; and that its action is similar to hops in diminishing the influence of decomposing azotised bodies, which is to convert alcohol into acetic acid.—*Tomlinson.*

Sugar, its impurities and adulterations.—As already noticed, two kinds of sugar have been particularly distinguished by chemists, viz., cane and grape sugar or glucose. The first is obtained from the sugar-cane, the beet-root, the maple tree and some other plants, while the second is contained in greater or less quantities in most fruits, and particularly in grapes and figs. Honey, although usually described as consisting of grape-sugar, contains a large quantity of crystallisable sugar resembling cane-sugar, and is therefore probably a mixture of two kinds. These two sugars differ considerably in many of their properties. Cane sugar consists of oxygen, hydrogen and carbon, in definite proportions; it is crystallisable, the crystals are six sided oblique prisms, and when pure, not prone to deliquesce, or alter when exposed to moisture or a moderate temperature.

Grape sugar consists of the same elements, but contains a less proportion of carbon. Unlike cane-sugar its manufacture can be effected by art, that is by the action of the dilute mineral acids, particularly the sulphuric, on either starch or woody fibre: it has but little disposition to crystallise and when it does so the crystals assume no definite figure but are arranged in acicular tufts; exposed to moisture or a moderate temperature it readily deliquesces.

Pure and unadulterated cane-sugar, should present a highly crystalline texture; should be of light colour and free from clamminess or moisture. These two sugars may be readily discriminated from each other by the action of certain tests and grape-sugar particularly by the copper and potassa tests. Now grape-sugar is frequently introduced for the purpose of adulteration.

On Vegetable Albumen in Cane-Sugar—Vegetables, like animals contain principles into the composition of which nitrogen largely enters: the chief of those is vegetable albumen.

Substances entirely different from sugar in their nature are but seldom employed in the adulteration of that commodity. The grocers having recourse to proceedings more

natural and more difficult of detection, but scarcely less dishonest, than the introduction of foreign matters possessed of wholly different properties. The Mixing or Handling of sugar, consists in the mixing together, in various proportions, of sugars of different qualities and prices, none of which are very pure, and some highly impure: an article is thus prepared, presenting a tolerable appearance to the eye, but which is really one of very great impurity, and rarely what it professes to be, "real Jamaica," or "Demarara sugar," &c.

The impure sugars are dark-colored; imperfectly crystallised, heavy, and clammy, readily caking into masses: examined with the microscope they are found to contain fragments of cane, woody fibre, grit &c., and to abound with the acari and sporules of fungus. The raw or Muscovado sugar of the West Indies is of this nature, as well as, indeed, to a less extent nearly all the brown sugars imported into Great Britain. Now these inferior sugars are largely employed to mix with the whiter and drier sugars of the East Indies and the Mauritius, and are thus sold to the public.

Blood in sugar.—The employment of the blood of animals is confined to the manufacture of loaf sugar—but its use, we believe, is now very frequently dispensed with, even in the preparation of this article. The blood acts only through the albumen which it contains. One of the great difficulties of sugar-refining arose from the presence of vegetable albumen in the cane-juice, and here we have the apparent contradiction involved in the practice of putting albumen into the solution of sugar. The advantages derived from the use of this substance, we presume, are considered to more than counterbalance the disadvantages attending it and indeed it would appear that there is not the same difficulty in the removal of animal albumen as is experienced in the abstraction of vegetable albumen. The mode of its operation is as follows: the fluid albumen is diffused throughout the whole of the sugar solution to be clarified; on the application of heat the albumen immediately solidifies, and forms meshes and films, which being lighter than the water, ascend, and in their upward course carry with them the solid impurities contained in the solution, on the surface of which a scum is gradually formed, consisting of the impurities in question and the solidified albumen this scum may be removed by skimming. Now, as it is the albumen of the blood only which assists in clarifying the sugar-solution, and not the blood itself, it would be far better that albumen alone, as white of egg, should in all cases be employed. Blood is a fluid compounded of fibrin, albumen and a variety of salts and effete substances, its use, therefore, in the manufacture of lump sugar, is not merely disgusting, but is calculated to prove injurious to the health.

Acarus sacchari, or *sugar Insect.*—There is very commonly present in the more impure kinds of sugar, a beetle-like animalcule, of the genus Acarus.

The discovery of the very general presence of this acarus rests we believe entirely with Dr. Hassall. The sugar acarus approaches somewhat, in organisation and habits, the louse and the itch insect itself which are also included in the genus Acarus The sugar mite is in size so considerable that it is plainly visible to the unaided sight. When present in sugar, it may always be detected by the following proceeding: two or three drachms or tea-spoonfuls of sugar should be dissolved in a large wine-glass of tepid water, and the solution allowed to remain at rest for an hour or so, at the end of that time, the animalcules will be found some on the surface of the liquid, some adhering to the sides of the glass, and others at the bottom mixed up with the copious and dark sediment, formed of fragments of cane, woody fibre, grit, dirt, and starch granules, which usually subsides on the solution of even a small quantity of sugar in water. We will now proceed to give a description of the acarus in question and observe in the first place that the whole of its development may be clearly traced out in almost every sample of brown sugar. The *Acarus sacchari* is first visible as a rounded body, or egg; this gradually enlarges and becomes elongated and cylindrical until it is about twice as long as broad; after a time, from the sides, and one extremity of this ovum, the legs and proboscis begin to protrude. The acarus thus far formed goes on increasing in size until it attains its full growth, when it is visible to the naked eye as a mere *speck*. Dr. Hassal gave the following, as the results of his Microscopical and Chemical Analyses of samples of Brown sugars, the produce of the different countries, noted below.

Madras.—Sugar dark, moist, staining the paper; somewhat crystalline, crystals small: contains fragments of cane; several acari, very few starch granules; grit, much grape-sugar and vegetable albumen.

Madras.—Contains a few pieces of cane; starch granules, much grit; several acari and ova; grape-sugar; albumen.

Mauritius.—Contains much cane; ten or twelve acari, of large size, several ova of same; a few starch granules; fragments of woody fibre; grit; much grape-sugar and albumen.

Mauritius.—Contains some cane; several acari, a few starch granules—those of arrowroot; grit; grape sugar and albumen.

Calcutta.—Sugar not very dark, dry, earthy looking, but few crystals apparent, and those very

small not much cane; a few starch granules; no acari visible, grape sugar; albumen.

...ta.—Sugar perfectly white, dry, and crystalline, resembling crushed lump, a few granules, no acari, fungus, cane, or scarcely a trace of grape-sugar or albumen.

Bombay.—Sugar exceding dark-colored, earthy damp, contains some cane; a great many starch granules: (sago ?) numerous acari; much grape-sugar; albumen.

Cassipore, Calcutta.—Sugar pale straw-colour, dry and highly crystalline, large-grained, a very few species of cane, one small acarus, a few starch granules; scarcely a trace of albumen or grape-sugar; a little grit.

Cassipore, Calcutta.—Sugar pale straw colour, not very dry, fine-grained; the crystals being very small contains a few pieces of cane; starch granules, several acari of large size, much grit; a little grape-sugar and albumen.

Jamaica.—Sugar dark-brown not very dry, but still not staining the paper, tolerably large-grained and crystalline; contains much cane; several acari and ova of same, a few starch granules; no grit.

Rio de Janeiro.—Contains much cane, several acari and ova of same; a great many starch granules, like those of Indian corn; much grit; grape-sugar, vegetable albumen. On an attentive consideration of the above eleven analysis... bility... arch of... that only two of the sugars could signed... ded as pure, and in a condition fit is chi... sumption—the white, large grain- side ... gar, resembling crushed lump, and inche... w-colored, large grained, highly Sati... assipore sugar. Of these samples, beau... alcutta was by far the best. It would seem ... vantage if the above described sugars ... oduced in large quantity into logs ... and sold at moderate prices.—*Trassall.*

(7956) SUIDÆ. The Hog tribe. Different Suidæ offer more or less variations in the length of the head. The Wild Boar (Sus Scrofa, Linn.) has the face longer and the skull less elevated; the domestic pig of Europe has the cranium slightly more elevated, and the face still sufficiently long: the Siamese Pig has the face shorter, the cranium more convex in the frontal region and larger in proportion. Dr. J. E. Gray makes the *Suina* a subfamily of the *Elephantidæ*. He includes in it the following species, of which specimens exists in the British Museum:—

Sus fasciatus, the Striped Boar.

S. Scrofa, the Boar.

S. Papuensis, the Bene,

S. Indicus, the Indian Wild Boar.

Babirussa Alfurus, the Babirussa.

Choiropotamus Africanus, the Bosch-Vark.

Phacochærus Æthiopicus, the Valke-Vark, or Emgallo.

P. Æliani, the Haruja, or Hallup.

Dicotyles Tajacu, the Peccary, or Tajacu.

D. labiatus, the Tagnicate.

We now proceed to give some account of the Asiatic forms.

(7957) *Sus Scrofa*, Linn., *S. Aper*, Briss, the Wild Boar, Le Sanglier of the French, The khanzeer, of the Arabs, the Junglie Soor of Hindustan; Dookur, Mah. Adave Pendie, Tel. is still an inhabitant of many of the temperate parts of Europe and Asia, but no longer exists in a natural state in the British Islands,

Dental Formula:—Incisors $\frac{6}{6}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{7-7}{7-7} = 44$

The Wild Boar harbours in the most solitary places in retired forests. His lair is generally in some wild and remote spot, not far from water, and commanding by some devious path access to the open country. The young, or Marcassins, as they are termed by the French, the Squeakers of the English in India, are striped with longitudinal bands. Throughout Europe the boar was long held in high estimation as a beast of chase. Nobles, princes and even kings, delighted to take the field with the boar-spear, and peril their persons in hunting this fierce animal. In England where it formerly rioted in the dense forests which have now vanished before the inroads of an increasing population, the loss of his eyes was the punishment inflicted by Willam the Conqueror on him who was convicted of killing a wild boar. In the vast forest which so late as Henry II.'s time stood on the north side of London, were stags, fallow-deer, wild boars, and bulls. In the 'Leges Wallicæ' it appears that Howel-dda gave permission to his grand huntsman to chase the boar from the middle of November to the beginning of December. In Europe, the boar-spear has given way to the rifle; but in India, hunting the wild-boar with the spear is still regarded as the most exciting of all the field sports of the English Officer there, and, perhaps, it is requisite once to see a Bombay Officer descending the tabular trap mountains of the Dekhan, in close pursuit of one of these fierce animals, to know what an Arab Horse and a British rider can do. The hunt of the Wild Boar in Western India, has been made the subject of song, and those alone who have seen or shared their sport can appreciate the proud but well earned exulting with which their poet comrade's song begins, and the consciousness as marked in its close, that the friendships acquired in the

field in youth, will still be vivid in the memory at the decline of life. He sings

The Boar, the mighty Boar's my theme,
Whate'er the wise may say,
My morning thought, my midnight dream,
My hope throughout the day,
Youths daring spirit, manhood's fire,
Firm hand and eagle eye,
Must they require, who dare aspire,
To see the wild boar die,
Then pledge the Boar, the mighty Boar,
Fill high the cup with me,
Here's a health to all who fear no fall,
And the next grey Boar we see.
* * * *
When age hath weakened manhood's fire,
And every nerve unbraced
Those scenes of joy will still be ours,
In memory's tablet traced.
And with those friends whom death hath spared,
When life's wild course has run,
We'll talk of the dangers we have shared,
And the tusches we have won,
Then pledge the Boar the mighty Boar,
Fill high the cup with me,
Here's a health to all who fear no fall,
And the first grey Boar we see.

Throughout India, where the field is taken on horseback, the spear is still used, and hog-hunting is one of the most exciting of all the wild sports of this land of the sun. An attempt was made by Charles I. to restore this noble game to England, and he turned out several wild boars in the New Forest; but the civil wars were no friendly times for the experiment, and they were all destroyed. More recently General Howe procured some wild boars and sows from Germany, and turned them into the forests of Walmer and Alice Holt, or Ayles Holt, "to the great terror of the neighbourhood," as White says, in his 'History of Selborne;' "and, at one time, a wild bull or buffalo: but the country rose upon them, and destroyed them." The senses of the Hog are acute, especially that of smelling. The broad snout ploughs up the herbage; and not a root, an insect, or a worm, escapes the olfactory sense. If fairly treated, it is by no means a dirty animal; but it is too often styed up in its own filth. There are few more pleasing scenes in the farmyard than a well laid-out piggery properly kept. The animal itself is anything but stupid, and is capable of strong attachment where kindness is shown to it. That it is docile the number of learned pigs proves; and still more the famous sporting sow, that went regularly out with the gun, and stood for game as staunch as any pointer. It is said that the Hog is trained on the Continent to hunt for truffles.

(7958) *Babirusa*, F. Cuv.—F. Cuvier has separated this form from *Sus*.

(7959) *Babirussa Alfurus*, the Babirussa, *Sus babirussa* of Linnæus; Le Babyrousa of Buffon; Le sanglier des Indes Orientales of Brisson; and Le Cochon Cerf of Lesson and other French authors. The Babirussa stands high upon its rather slender legs. The skin which is of a grayish colour inclining to fawn colour on the belly, is calthinly furnished with hair. The upper There is come through the skin of the muzzle, impure nearly a circle directed backwards, often of the ing the skin again on their downward curvature. The females are smaller than the males, and are without these tusks. It still inhabits the marshy forests of the island of Bourou, and is said to be abundant in the Moluccas, and a few other islands of the Indian Archipelago. F. Cuvier has given very good figures, and a lively description of two males and females brought to France in the Astrolabe, and kept in the Paris Menagerie. The female was much younger and more active than the male, which was aged and very fat, and spent his short life in eating, drinking, and sleeping. The female bred once after her arrival in Europe. When the male retired to rest she would cover him completely over with litter, and then creep in under the straw to him, so that both were concealed from sight.

(7960) *Sus Papuensis*, the Bene of the natives of New Guinea, is described as being remarkable for its small stature and its agreeable and slender form. The canines of the upper jaw are very small, and nearly of the same form as the incisors; the bristles are rather thick, short, yellow, and brownish below, white above early [illegible]ated with black; the tail is very short wn sugar. [illegible] (Marcassins) are of a brown colo[illegible]e as a rounded deep, with five rather bright fulvo[illegible]larges and bethe back. The length of the P[illegible]til it is about three feet. It is common in the [illegible]ime, from the Guinea, and the Papuans highly es[illegible]vum, the legs which the French found excellent. [illegible]he acanthus thus catch the young in the woods in o[illegible] size until it them in a kind of domestication visible to the remarks that the *S. Papuensis* Dr. Hassal gave of analogy with the Peccaries, a[illegible] of Brown intermediate between them and the True Hogs. —*Eng. Cyc.*

(7961) SUKUR KUND. CONVOLVULUS BATATAS. Sweet Potatoe.

Sukur kund, DUK. | Nutter Aloo, HIND.

A sweet-tasted nutritious root, of which there are two sorts, red and white. The tubers are long, and, when boiled or roasted, very wholesome. They are sown precisely in the same manner as a potatoe, after the hot season, and are fit to be taken up in six months. They sell from two to four pice a seer.—*Riddell.*

(7962) SULPHUR, BRIMSTONE.

Kibreet, [illegible] ARAB.	Bierong or balerang, MAL
Lew, CHI[illegible]	Gowgird, PERS.
Gundaka, CYNG.	Gandhaka, SANS.
Souffre, FR.	Azufre, SP.

GER. | Sanyaya, TAG.
GUZ. HIND. | Gendagum, TAM.
Ghendagum, TEL.
Ill. ...v.
Billo...=16), from *Sal*, salt, and *πυξ*, *fire* ...d in medicine by the Greeks, Arabs ...oos. It occurs in some animal sub-...ces, as albumen in Eggs, &c., in some plants, as in Cruciferæ, Umbelliferæ, Garlic, Fungi &c., but chiefly in the Mineral Kingdom ; also combined as in gases or salts, in some minerals and mineral waters. It is frequently found in combination with metals, as in the common ores called Pyrites, the Sulphurets of Iron, of Copper, Lead, Mercury, &c., whence it is obtained by roasting, in England, Germany, Sweden, and at Cuddapah, in this country ; the Sulphur, being volatilized, is collected in chambers. Native or Virgin Sulphur uncombined, is either a volcanic product, or occurs in beds in many parts of the world ; that of commerce is brought chiefly from Italy, Sicily, and the adjacent islands, whence, in 1830, 246,338 cwt. of rough Sulphur were imported. It is afterwards purified by fusion, distillation, and sublimation, hence known under the names of Stick, Roll, Sublimed, and Flowers of Sulphur. Native Sulphur is purified by distilling it from earthen pots arranged in two rows on a large furnace. The Sulphur fuses and sublimes, and passes ...ough a lateral tube in each pot ... on the outside of the furnace, for all fra... ed near the bottom, to allow bility. ...ur to flow into a pail contain- arch of 2... it congeals and forms *rough* or signed a... This being redistilled, forms is chiefl...r. When fused and cast into side of ...ns *stick* or *roll* sulphur. Native inches ...ound in acute octahedrons, and Satin ... this form, with imperfect octahedral beauti... also occurs massive. The colour seen ...lphur is yellow, sometimes orange- logs are ...t ... Transparent to translu- wood till ... to 2-5. Specific gravity 2.07. without ...inguished by burning blue, and the... sulphur odour. The great reposi- ...s of sulphur are either beds of gypsum and ...associated rocks, or the regions of active or tinct volcanoes. In the valley of Noto and azzaro in Sicily, at Conil near Cadiz in Spain, ...x in Switzerland, and Cracow in Poland, it curs in the former situation. Sicily and the ighbouring volcanic islands, Vesuvius and the lfatara in its vicinity, Iceland, Teneriffe, Java, awaii, New Zealand, Deception Island, and ost active volcanic regions, afford more or less lphur. The native sulphur of commerce is ought mostly from Sicily, where it occurs in ds along the central part of the south coast and some distance inland. It is often associated th fine crystals of sulphate of strontian. It dergoes rough purification by fusion before portation, which separates the earth and clay with which it occurs. Sixteen or seventeen thousand tons are annually imported from Sicily into England alone. Sulphur is also exported from the crater of Vulcano, one of the Lipari Islands, and from the Solfatara near Naples. It is also found in the United States of America, on the Potomac, and in districts where sulphuretted hydrogen is evolved from mineral-springs. Sulphuric Acid is said to occur in the waters of the Rio Vinagro in South America, also in Java, and at Lake de Taal in Luzon in the Eastern Islands. —*Eng. Cyc.* Sulphuric acid has been detected in the fumes of volcanoes. Sulphur undergoes no alteration in the air at common temperatures. That of commerce, obtained from Pyrites, is often contaminated by metallic impurities, as Zinc Carbonate and Sulphate, Iron Oxide and Sulphuret, Arsenic, the Sulphuret, Silica, Magnesia, Alumina, and Carbonate of Lime. Flowers of Sulphur are sometimes contaminated by the presence of a minute quantity of Sulphurous (stated by some to be Sulphuric) Acid, formed by a portion of the Sulphur during sublimation uniting with the Oxygen in the apparatus. It should be freed from acidity by washing with hotwater, when it should not affect Litmus paper. —*Royle.*

(7963) *In Tenasserim, Sulphur* only exists in the ores that are found in the form of sulphurets, as the sulphuret of iron, the sulphuret of antimony, the sulphuret of lead, and the sulphuret of copper ; but native sulphur has not been found in the Provinces.—*Mason.* The *Sulphur* from Canara and Nellore is of fair quality, and in pure though small crystals. This substance is found in small quantities, in several districts of the Madras Presidency, as Salem, Masulipatam, Guntoor, Cuddapah and Trichinopoly ; it occurs along with Gypsum in marl and clay beds, and also very largely in the form of metallic sulphurets. The natives are acquainted with the modes of subliming sulphur, and they prepare it of indifferent quality for the manufacture of the gunpowder, which is used for Engineering purposes, &c. *M. E. J. R.*—This would appear to be a very rare production in India, we are told that about thirty miles north of Andipore in Upper Hindoostan, it is met with, but of a quality inferior to that brought from the Gulph of Cutch and Persia. Dr. Heyne tells us, in his Tracts Historical and Statistical of India (p. 186, 187), that he met with sulphur in small heaps and in tolerable abundance, at the Northern extremity of a lake which is near a small Village called Soorasany yanam, about 12 miles east from Aumlapore, and not far from Maddepolem. It was in a loose soft form, or in nodules of a greyish yellow color. The greater part of the Sulphur, which is exposed for sale in the Indian provinces, is brought from Muscat, from Sumatra, or from the Banda island called Gonangapi, where it is a volcanic production. In China, Dr

Abel, had some most beautiful and splendid native sulphur brought to him from the crater of Gunang Karang. We know that it is a product of the Philippine islands particularly in the island of Zeyti, whence the gunpowder works of Manilla are supplied: most of the sulphur brought to Hindoostan contains a considerable portion of orpiment, being much less pure than either that which is dug out of the solfaterra near Naples, or that imported from Sicily, which last, Dr. Thomson says, contains seldom more of impurity than about three per cent of a simple earth. A bright shining yellow sulphur is sold in the bazars of lower India under the name of Nellikoya gundagum (Tam.) By Dr. F. Hamilton's excellent account of Nepaul, p. 78, it appears that Sulphur is there numerous: this useful article is also found in Persia in mountains behind Takran and in mountains south of Kelat in the province of Mekran. It is met with in Cabul in the District of Balkh, it is also a product of Armenia, of Moultan, of China and Thibet; also, according to Morier, at Balianlia in Persia in the District of Kabul. With regard to the Indian Islands, Mr. Crawfurd in his history of the Indian Archipelago says (Vol. I. p. 201,202) that sulphur is found in all the pseudo volcanoes of these islands in great purity, but that the manufacture of gunpowder amongst the Malays is very imperfect. Sulphur would not appear to be found in great abundance in our Indian dominions: In the district of Oudipour in upper India, it is to be met with, but of a quality inferior to that which is brought from the gulphs of Cutch and Persia. In Travancore it has, I understand, says Ainslie, been discovered by the ingenious and indefatigable Captain Arthur, of the corps of Engineers, in combination with Iron, in the form of Pyrites, and also in combination with Alum. In Cotiole (in Canara) too, I am told, it may be procured. The greater part of the sulphur, however, exposed for sale in the Madras provinces, was in Ainslie's time brought from Muscat, from Sumatra, or from the Banda island Gonang-Api. Sonnerat tells us that it is common at Pegu, and we know it also to be a product of the Philippine islands.—*Ains. Mat. Med. p.* 45. Sulphur is in the Malay balirang, and in Javanese wálirang, essentially the same word. This name extends from Sumatra up to Celebes, where we find a new one for it, cholok. In one of the languages of the Philippines, the Tagala, strangely enough, the name is sanyaya, which is, no doubt, a corruption of the Malayan word sandawa, saltpetre. In the Bisaya, as well as in the Tagala, the name for gunpowder is maliling, doubtless a corruption of the Malay and Javanese name for sulphur. In the Madagascar, the name for it is sulifara, a corruption of the French soufre, from which it may be safely inferred that the article was unknown to the natives of this non-volcanic island until ...re le... to their knowledge by Europeans. I... cal... to say to what use the natives of the ...ealth. ...chipelago could have put sulphur, b... there is ...troduction of fire arms, unless to t... impure ...ture of fire-works, known by the nati... of the marchun and rabok. The Malay a... cur... lippine Archipelagos, the most extensive vo... canic region in the world, must necessarily contain a vast supply of sulphur, but hitherto it has been very little availed of for economic use. From the Philippines alone it is exported, the export being to China only, and at the price at Manilla usually of about a Spanish dollar of 4s. 2d. a cwt. Among these islands those which most abound in it are Luzon and Leyte, but particularly the last, where the article is of the best quality. A spanish writer asserts that the quantity is such at the volcana of Taal or Bombon, in the province of Botengas in Luzon, that many ships might be loaded with it. The difficulty, in all these cases, of obtaining a cheap supply, must arise from the absence of good roads, and the consequent costliness of transport.—*Crawfurd Dict. page* 412.

(7964) SULPHURIC ACID, Oil of Vitriol, Vitrolic acid, Spirits of Vitriol.

Rohazim Maulkibrit. Arab.	Gunduck-ka teil Guz
Gandaka rasa, Cyng.	Gunduc kateil, Hind
Acide Sulfurique, Fr.	Schw... vellow, Ger.
Acidum Sulphuricum, Lat.	Arikly ... lated Ghera sugar. Ta... as a rounded

Sulphuric Acid (S. or SO_3 = ...ges and be... the most important compounds ... it is about This acid is produced in small... e, from the nature, as near volcanoes, in some ...m, the legs and exists in combination in numero... acarus thus especially those of Lime (*Gyps*... ize until it Magnesia, found as minerals, or in ... ible to the springs. It was known to the ... Hassal gave and Hindoos. Sulphuric ... of his Microsco... its name, to have been ob... the True Hogs. Europe, and probably also in Per... decomposition of Vitriol or Sulphate o... practice still followed at Nordhausen in Saxe... The Sulphate is first calcined, so as to expe... nearly the whole of the water (of crystallization it contains. The acid, distilled off in an earthenware retort at a red heat, comes over in vapours, which condense into a dark-coloured oily-looking liquid. This fumes when exposed to the air, and contains less than 1 Eq. of Water to 2 of Sulphuric Acid, has a Sp. Gr. of 1·9 and is known in commerce as the Nordhausen Fuming, or Glacial Sulphuric Acid.

The Acid of the Colleges, *Acidum Sulphuricum* L.E.Sulphuric Acid. Acidum Sulphuricum Vi... nale, D. Oil of Vitriol *Vitriolic Acid. Spirit ... Vitriol. Prop.* Liquid Sulphuric Acid, (S, Sul... S O, H O = 49) is a dense oily-looking liquid usually colourless, devoid of smell, but intensel...

[illegible] powerfully corrosive. At first it feels [illegible] in destroying the cuticle, but soon acts [illegible] tic, charring both animal and vegetable [illegible] by combining with the water and [illegible] the carbon. It freezes at from— [illegible]°, according to its density, and boils [illegible]°. Its affinity for water is great, heat and condensation being produced on their union. It may be diluted with it to any extent. It unites with alkalis, earths, and metallic oxides, rapidly dissolving some metals, as iron and Zinc, when diluted with water. By the action of S. Acid on alcohol, Ether is produced.

Sulphuric acid used to be made in England by burning the imported Sulphur with a little Nitre. After the great increase which took place in the price of Sulphur, some manufacturers employed that obtained from Pyrites, which often contains Arsenic as an impurity. The proportion of Nitre was $\frac{1}{9}$ which was burnt with Sulphur either in the same chamber, lined with lead, and having its bottom covered with water, or in a furnace, from whence the vapours produced were conveyed into a similar chamber. The mode of making Sulphuric acid now varies from the above in many places, and has been described by Professor Graham. In this process Sulphurous Acid, from burning Sulphur, Nitric Acid vapour, and steam, are simultaneously admitted into oblong leaden chambers and, [illegible]honed that the vapours can for all frame [illegible]vly, and thus allow the whole bility. In [illegible]d Acid to be deposited.—*Royle.*

arch of 20[illegible]ACH, SHUMAC. See RHUS, also signed and [illegible]th

is chiefly [illegible]-RHAB. | Sommaco, IT.
side of C[illegible]o | Sumak, PERS.
inches of [illegible]GER.

Satin wo[illegible]UMBUL ROOT. The Sumbul root, beauti[illegible]s recently been introduced into the seen[illegible]t, is the root of an umbelliferous logs are not dis[illegible]aracterised by a strong odour of wood till sawn, [illegible]s, on their return from without one [illegible] import to Salonika, Constan- thered [illegible] among other articles of trade, [illegible] plants with a musk like odour. The preparation of these vegetable substances is said to be effected by smearing them over with musk-balsam.—*Simmonds' Comml. Products, p.* 648.

(7967) SUMUNDUR JUG. Sumundr-phen. Bone of the cuttle fish, considered refrigerant used in eye ointments; also in mesalihs.—*Genl. Med. Top. p.* 150.

(7968) SUN-FLOWER, the English name of a genus of Plants called *Helianthus* from ἥλιος, the sun, and ἄνθος, a flower. Two reasons have been assigned for giving the plants of this genus this name: first, the resemblance of the large disc and ray of their flowers to the sun; and second, the tendency of these flowers, in a stronger degree than in other plants, to present their face to the sun. From this circumstance, the French Tournesol, Italian Girasole, an English Turnsol have been given. This is a gen consisting of very stately herbaceous plant and containing upwards of 40 species, all which are indigenous to America. It belongs the natural order *Compositæ*, and has the follo ing characters:—Head composed of ma flowers, the flowers of the ray being ligulate a neuter, the flowers of the disc tubular and herm phrodite; involucre irregularly imbricated, t outer scales foliaceous, the inner ones scal receptacle plane or convex, covered with oblo acute scales; tube of the corolla of disc flowers short, 5-toothed; style appendiculate Fruit an achenium compressed laterally; pa pus in the form of two lanceolate acute decid ous scales. The leaves are opposite, sometim superiorly alternate, and either entire or toothe The whole plant is scabrous or villous. T flowers are solitary, and of a yellow oran colour.

Helianthus annuus, Annual Sun-Flower, is herbaceous annual plant with thick rou stems from 6 to 20 feet in height; leav alternate, petiolate, nearly heart-shaped, cren lated or dentated, rough. The heads a large, from one to two feet in diamet and composed of a multitude of flowers of beautiful yellow colour, terminal, solitary, incl ed, the disc vertical and oftenest facing t south. This species is the largest of the gen It is indigenous in Mexico and Peru; it w early introduced into Europe after the discov of America, and has since been very genera cultivated in gardens, on account of its v large and handsome yellow flowers. The pl however in Europe never attains the height the flowers the size they do in their native and climate. The albumen of the seeds of t plant contains a large quantity of oil; and it been proposed to cultivate it for the sake of taining this oil, which is very palatable, might be used for the table. Cows and ox horses, sheep, pigs, rabbits, and poultry are fond of it. When torrified in the same man as the seeds of coffee they make an agreea drink, which may be used as a substitute that article. *H. multiflorus*, Many-Flowe sun-Flower, is not so high a plant as the l nor are its flowers so large. It has vivaci roots, which produce numerous herbaceous ste which are branched and rough; its leaves alternate, petiolate, dentated, the inferior o are heart shaped, the superior oval and acun ate; the heads of flowers are numerous and inclined. It is a native of Virginia.

Helianthus tuberosus, Tuberous Sun-Flowe Jerusalem Artichoke. This latter name is a l barous corruption of the Italian Girasole, this cies having been introduced into Europe at Farnese Garden at Rome, whence it was origin distributed. The roots are composed of a nun

of oblong tubercles, very large and fleshy, reddish outside and white within, resembling a potato; the stems are herbaceous and upright; the leaves are alternate and opposite, petiolate oval, rough; the heads of flowers are yellow, and small compared with the two preceding species. It is a native of Brazil. In France it is also known by the name of Topinambour and Porire de Terre. According to Braconnot and Payen, the tubers do not contain fecula, but a vegetable principle called Inulin, or Dahlin. These tubers, when cooked, form a good substitute for potatoes, and by some are even preferred.

Some of the species secrete a resinous juice, which is found to exude from the various organs of the plant. This is most observable in the *H. thurifer*, in which the resinous matter runs down the stem. This is sometimes observed to occur in the flowers of *H. annuus*. The *H. Indicus* of Linnæus and our gardens is probably only a variety of *H. annuus*, and is not a native of India, as its name would imply. This last species, according to Dr. Royle, is cultivated by the natives of India for the purpose of obtaining oil from its seeds.—*Eng. Cyc.*

(7969) SUN ROSE. HELIANTHEMUM.

(7970) SUNG-I-BUSRA is an officinal article at Lahore. It is a compound earthy mass of a greyish color, occasionally varying (from the different composition or manipulation) sometimes it is to be met with in small pieces, at other times in a tubular form, as thick as a finger. Whether its name, "basree" be from Bassora, or from vision, as formerly the lapis divinus was used is not known. It is certain that no Zinc is in it. But in Ainslie's Mat. Indica, *Vol.* 1, *p.* 573, Sung busrie is erroneously stated to be Zinc. According to the analysis made by the Professor of Chemistry, Dr. Joseph Redtenbacher, in the Chemical Laboratory at the Thersianum in Vienna, the constituent parts of this compound are: clay, magnesia, silica, and oxyde of iron. It is probably, prepared from Diorite, the analysis of which showed the same ingredients. Sung-e-Busree (1) proved an excellent remedy in the cholera epidemy at Lahore, in 1835.—*Thirty five years in the East, by Dr. Honig. p.* 351.

(7971) SUNG DIRAN. An impure and weak Nitro-muriatic acid, made by attars by mixing equal parts of alum, nitre and salt with a little water in an earthen pot (gurra,) and distilling; an acid fluid comes over that is applied to cure herpetic eruptions.—*Genl. Med. Top. p.* 152.

(7972) SUNG-I-MISRE. A red and white stone, imported via Pali, is used as an aphrodisiac: one tola for one anna.—*Genl. Med. Top. p.* 152.

(7973) SUNG SURMIYA. A concretion from the head of a fish comes from Delhi, used as an aphrodisiac. Sold at eight annas a tola.—*Genl. Med. Top. p.* 152.

(7974) SUNN. BROWN HEMP, SA[illegible] HEMP.

Sunn, GUZ. HIND.	Ghore Sunn al[illegible]
Janapa also Shanapa, TAM.	BENG.
Wucko nar, MAL.	Kenna, CING
Concanee, TAG.	

See CROTALARIA.

(7975) SUR. A Sind grass, perhaps Arundo kurka: its flower stalks are beaten into firm fibres called Moonyah, from which string or twine is fabricated.

(7976) SUTHERLANDIA GRANDIFLORA. LEGUMINOSÆ.—This is a pretty shrub with scarlet flowers, native of the Cape, and is readily increased by seed in any good garden soil.—*Riddell.*

(7977) SUWARROW NUTS, SAOUARI NUTS. Are a species of butter nuts or Berries, the produce of a large tree (*Caryocar raciferum,*) which grows in Guiana.

(7978) SWAINSONIA GALEGÆFOLIA. LEGUMINOSÆ. This is a pretty species of shrub with purple, red and white flowers grown from seed in good garden soil.—*Eng Cyc.*

(7979) SWALLOW-HAWK. [FALCONIDÆ.]

(7980) SWALLOW TRIBE, *Hirundinidæ*, a family of Insectivorous Birds[illegible] yellow, and[illegible] powers of flight are very highly [illegible]lated which have the feet comparatively [illegible] as a rounded

Hirundo esculenta, is the Swallo[illegible]ges and be- the edible nests that form a consi[illegible] it is about of Chinese commerce. The species, [illegible]e, from the Lawet of the Javanese, is small. [illegible]m, the legs above, and whitish beneath and [illegible] acarus thus the tail, which last is forked. Thize until it by some said to be made of [illegible]sible to the species of *Fucus* [ALGÆ] whi[illegible] Hassal gave macerates and bruises before[illegible] his Microsco- material in layers so as to[illegible] of Brown gelatinous cup-shaped nests so [illegible] True Hogs. delicacies and restoratives by the Chi[illegible] dissolved in their soups. Bontius, who seems to have thought that the nest was formed of no vegetable material, says of these birds, "ex spuma maris basin scopulorum alluentis, tenacem quandam materiam colligunt, sive ea Balænarum seu aliorum piscium sit semen, ex qua nidos suos ædificant, in iisque ova ponut, et pullos excludunt." The nests are affixed to the rocks, and the finest are semi-transparent. Coarse or dirty nests are used for glue, but the good ones are eagerly sought after. "Galenses hos nidos e scopulis avulsos, ingenti quantitate per Indiam venales ferunt, gulosis in summas delicias, qui eos gallinæ, sue vervesis decocto disolutos, avide devorant, et ostreis, fungis et cæteris gulæ irritamentis, longe antetonunt." This recipe for making the famous birds' nest

ds a chapter which begins poetically and ally with the following lines :—

Sy[illegible] scopulos, Progne, quid inhospita littora nidis
Ill. [illegible] *per medias hos gula quæret aquas ?*"

Billo*irundo fuciphaga*. There is another Velv*fuciphaga*, the Linchi of the Javan- do[illegible] five inches long, nearly an inch than *H. esculenta*, which has a white odomen and longer wings in proportion its size. This species constructs its nest mosses and lichen connected by the me glutinous substance which composes the ible nest of *H. esculenta*. Dr. Horsfield, who ates this in his 'Systematic Arrangement and escription of Birds from the Island of Java' Linn. Trans., vol., xiii.), there remarks that e specimens of *H. esculenta* examined by him Java and those which he brought home differ om Latham's description in being uniformly of blackish-colour without a white extremity to e rectrices. Bontius, who gives a rude cut the nests adhering to the rock, with the birds tting and approaching, describes his birds, in ...e chapter 'De nidis hirundinum edulibus,' above referred to, as 'Aviculæ parvæ discolores, hirundinum specie.' Specimens of *H. esculenta* and *H. fuciphaga* are preserved in the Museum of the East India Company.

(7982) *Macropteryx*.—Tarsus remarkably sho[illegible]nterior toes long; the outer wheels and [illegible]han the middle; the inner short- for all fra[illegible]very short. Tail long, forked. It bility. I[illegible]ndia. (Swainson).

arch of 2[illegible] *longipennis*.—Above obscure signed a[illegible]throat, breast, and lower part of is chiefl[illegible]t-gray; belly, spot on the scapu- side of [illegible] over the eye, white; ears rufous; inches [illegible] incumbent crest. Mr. Swainson Sati[illegible]*acropteryx* intermediate between the beauti[illegible]ts and the Swallows. To the first, seen spec[illegible]s allied by its strong scansorial logs are not [illegible] by the length and fixed posi- wood till sa[illegible], and the depression of the without [illegible]. The Wood-Swallows of Australia and India there[illegible]though closely related to, the *Hirundi-* [illegible], but differ in the structure of their bills and feet. Mr. G. R. Gray arranges them under his sub-family *Dicrurinæ* amongst the *Ampelidæ*. They belong to the genus *Artamus*, which is often placed in the *Laniadæ*, and is thus defined: —Bill gradually arched from the base, where it is very broad. Culmen thick and convex without any ridge; the base dividing the frontal feathers, and somewhat dilated. Rictus bristled. Nostrils wide apart, naked, small without a membrane, and pierced in the bill. Feet short, strong. Wings very long and pointed; the first quill longest. Tail short. (Swainson.)

(7983) *Artamus leucorhynchos* is the *Lanius leucorhynchos* of Gmelin, Pigreische Dominiquaine de Philippines of Sonnerat, and White-Bellied Shrike of Latham. Size rather larger than a sparrow, and in shape much more elongated. Head, neck, breast, back, wings, and tail black. Belly and upper part of the rump white. Under part of the wings (which are very long, and reach at least an inch beyond the tail) gray. Bill grayish, conical, and very strong, slightly curved at its extremity, and its base surrounded with stiff bristles directed forwards. Legs black. Sonnerat states that this bird flies with rapidity, poising itself in the air like the swallows. It is, he adds, an enemy to the crow; and although much smaller, the wood-swallow not only dares to oppose but to provoke him. The combat is long and stubborn, sometimes continuing for half and hour, and concludes with the retreat of the crow. Perhaps, says Sonnerat, the crow despises this too feeble enemy, which only harasses him, and avoids his strokes by his activity, darting away, returning as he sees his opportunity.—*Eng. Cyc.*

(7984) SWEET BRIAR. Rosa rubiginosa.

(7985) SWEET FLAG, ANDROPOGON CALAMUS AROMATICUS. Sweet Calamus.

Kist-ul-durrera, Wuj, ARAB.	Calamo aramatico, IT.
Shwet Buch, BENG.	Kawa-sob, JAP.
Bagy, CAN.	Calamus aromaticus, LAT.
Tachxudogbo, COCH CHIN.	Vudge, PERS.
Wadda-kaha, CYNG.	Dringo, PORT.
Buch. DUK.	Vacha, Godavuz, Venkum
Acorus odorant, FR.	Haimavati, Golomi, SAN.
Kalmis Wurtzel. GER.	Vassambo, TAM.
Kussub-bewa, Godavuz, Venkund, Wuj Igir, GUZ. HIND.	Vudza, TEL.

Sweet Calamus, the aromatic, which was c equal celebrity with Spikenard, mentioned b the same authors, and procured from th same country, is described by Dioscorides un der the name of Κάλαμος ἀρωματικος. It is sup posed by Sprengel and some authors that th *Acorus Calamus* of botanists is intended, whic is possessed of slight aromatic properties, is con mon in European ditches, and is likewise four in India in mountainous situations. This known to the Arabs by the name Wuj, which a pears to be a corruption of the Hindoo Buc Sanscrit Vacha, and has in the Arabian worl the name Akoron assigned as its Greek sync nyme, no doubt intended for the Ακορον of Dio corides. Therefore there is no foundation for th opinion of Sprengel that this Acoron is the *Ir pseudacorus* of botanists.

Calamus aromaticus is described by Dioscorid immediately after Σχοῖνος, or Σχῖνος, which usually translated *Juncus odoratus*, and is a knowledged to be the *Andropogon Schœnanth* of botanists, commonly known by the name Lemon-Grass. This has also had the names Camel's Hay, Palea de Mecha, &c., applied to i *Schœnanthus* is evidently compounded of 'scho nus' and 'anthos' (ἄνθος, 'a flower,'). Theophrast treats of Calamos and Schœnos together, a states that they were found among the mountains Libanus, on the shores of an extensive lake; b

Burckhard in such situations could only find rushes and reeds. It is possible therefore that a Syrian locality may have been assigned to drugs obtained from more distant countries by the route of the Euphrates, for Dioscorides says they are produced in India. By Hippocrates they are called Κάλαμος εὐώδης and Σχοῖνος εὔοσμος, also Κάλαμος σχοῖνος (Hipp., f. 5 p. 138, l. 17), evidently showing that if they agreed in properties, they had also some resemblance in nature. If we desire to find something similar to *Schœnanthus*, and possessed of still more aromatic properties, we have only to search in the genus to which this belongs, and we shall find several plants famous for their agreeable odour. The roots of *Andropogon muricatum*, commonly known in the shops of Britain by the Tamul name Vitivayr and made into small bundles for brushing velvet, are remarkable for their fragrance: hence several essences are now prepared from them in Paris. The roots are also well known in India by the name of Khuskhus, being used throughout the several Presidencies for making tattees; these thatched screens being fitted to doors and windows, have water constantly sprinkled over them; the hot air in passing through becomes much cooled by the great evaporation, and enters the room both cool and refreshing, diffusing a delightful fragrance. The aroma here depends on the presence of a principle analogous to myrrh. But other species are still more fragrant, and secrete odorous volatile oil in sufficiently large quantities to be profitably distilled. Of these, Lemon-Grass, or *Andropogon Schœnanthus*, is the best known. The infusion of its leaves is often employed in India as a pleasant stomachic, and Lemon-Grass Oil is probably distilled from them. *A. Nardus* (?) is another species, called Ginger or Spice-Grass, by Ainslie, which is said by him to be common in the Courtallum Hills and the Indian Peninsula, where the natives occasionally prepare with it an essential oil useful in rheumatism, and use the infusion of its leaves as a stomachic. *A. Iwarancusha* is a species which comes near *A. Schœnanthus* in habit and taste. It skirts the bases of the mountains of north-west India, and was found by Dr. Blane and by Dr. Boyd about Hurdwar: it was considered by the former to be the Spikenard of the ancients. Dr. Royle also found it near Hurdwar, and in the upper parts of the Doab of the Ganges and Jumna rivers, and he states ('Illustra. Himal. Bot.' p. 425) that it is there called Mirchiagund, with Izkhir given as its Arabic, and Iskhinos as its Greek synonym; and infers that it may have been the Σχινος of the Greeks as well as *A. Schœnanthus*. But another species is still more extensively diffused, and still more remarkable for its very powerful and delightful fragrance. This is the species which yields the Grass-Oil of central India, commonly called Oil of Spikenard. It extends southward to between the Godavery and Nagpore, and northward to the Delhi territories, but probably still farther north, as it is cultivated in a dry and barren soil. In central India generally at Namur, Ellichpore, &c., a very fragrant oil is distilled from this plant. There is impure is highly valued in the East as a substitute of the added to the finer expressed oils employed for anointing the hair or the bodies of the natives. It is also much esteemed as an external application in rheumatism, and has been introduced into practice in England, and is highly valued by some, though unknown to the generality of practitioners. It has the advantage of diffusing an agreeable odour at the same time that it is efficacious as a stimulant remedy. This or the preceding species extends into Afghanistan. Sweet Cane, or Calamus, being described by Dioscoride immediately after Σχινος, which is generally acknowledged to be *A. Schœnanthus*, appears to Dr. Royle to belong to the same genus, and indeed to be the above far-famed species, as *Calamus aromaticus* is thought also to be the Sweet-Cane and the rich aromatic reed from 'a far country' of Scripture. He states that there is no plant which more closely coincides in description with everything that is required than the tall grass which yields the fragrant Grass-Oil of central India, and which he has named *Andropogon Calamus-aromaticus*. ('Illust. Himal. Botany,' p. 4[illegible] vellow,

(7986) SWEET PEA. Lathyrus [illegible]ulated

(7987) SWEET SULTAN. [illegible]n sugar. P[illegible]

(7988) SWEET WILLIAM, [illegible] as a rounded

(7989) SWIETENIA, a small [illegible]arges and be- of the natural family *Cedrilaceæ* [illegible]til it is about quin in honour of G. van Swieten[illegible]ne, from the *Swietenia* is characterised by ha[illegible]um, the legs 4-5-cleft calyx; petals 4 to 5, de[illegible] acarus thus mens 8 to 10, the filaments united [illegible]size until it a toothed tube, bearing the anther[illegible]isible to the side: stigma peltate; ovary 5-[illegible]r. Hassal gave a stipes; seeds winged. Th[illegible] of his Microsco- few in number are found in t[illegible] of Brown world, form large trees, and [illegible] the True Hogs. timber.—*Eng. Cyc.*

(7990) SWIETENIA CHICKRASSA. Chittagong Wood.

Nga-bagi, Burm. | Chickrassa, Hind.

S. Chickrassa, is now formed into a new genus, Chickrassia tabularis. This Indian tree is greatly admired for its beauty. The wood is very light coloured, close grained and most elegantly veined and much employed for furniture, and cabinet work.—*Eng. Cyc.* It grows in abundance in the Chittagong woods, and is much esteemed by the Cabinet makers as being little inferior to its congener the Swietenia Mahogani (Willd.).—*Ains. Mat. Med. p.* 210. It is found along with Teak in the Pegu districts, but it is not very plentiful: wood, red; equivalent to mahogany.—*McClelland.*

(7991) SWIETENIA CHLOROXYLON. *Syn.* CHLOROXYLON SWIETENIA. *Cedrelaceæ*, Ill. 56 bis. Satin wood tree.

Billoo Kara, TEL.	Kodawah porsh, TAM.
Velva Maram also Moodoodi, TAM.	Boorooch gaka, CYNG.
	Dhoura, HIND.

S. chloroxylon is another species, which has been formed into a new genus, and is now *Chloroxylon Swietenia.*

It is the tree yielding the beautiful East Indian satin wood, which is of a deep yellow colour close grained, heavy and durable.—*Eng. Cyc.* This chiefly Ceylon tree grows abundantly in the mountainous districts of the Madras Presidency, in the Jungles of Goozerat and the Deccan, but seldom attains a large size. Occasionally planks of 10 to 15 inches in breadth may be procured. The wood is very close grained, hard and durable, of a light orange colour, takes a fine polish, and is suited for all kinds of ornamental work, but is somewhat apt to split. For picture frames, it is nearly equal to American maple. The timber bears submersion well. In some instances it is beautifully feathered but it has the peculiarity of losing its beauty by age, unless protected by a coat of fine varnish.—*M. E. J. R.* The Billu Kara of the Circars, says M. Rohdes, is a most serviceable hard wood, well suited for naves of wheels and, were it procurable in any quantity, for all frame work requiring strength and durability. In Ceylon, the Peradenia bridge, a single arch of 205 feet on the road to Kandy, was designed and principally executed in this wood : it is chiefly procured in the jungles on the Eastern side of Ceylon where it attains a diameter of 18 inches of sound wood. The flowered or feathered Satin wood when first polished is one of the most beautiful woods in the world. Mr. Rohde has seen specimens surpassingly beautiful, these logs are not distinguishable from ordinary satin wood till sawn, and twenty or forty may be cut without one of any beauty being found. The feathered satin wood seems very liable to sever when dry and old ; articles of satin wood get darker and lose much of their beauty by age, unless protracted by a coat of fine varnish.—*Rohdes.* Though satin wood is highly esteemed in Ceylon, where it attains a large size, until very lately Dr. Wight had never seen it exceed a good sized shrub in India. Planks have since been obtained 15 inches broad from the Animullay Forests. In Ceylon where it is abundant and well known, it is very highly esteemed, and their shell boxes are made of it.—*Wight.* An essential oil is found in *Chloroxylon Swietenia.*

(7992) SWIETENIA FEBRIFUGA of Roxburgh has been formed into a new genus, *Soymida.* [SOYMIDA.]—*Eng Cyc.*

(7993) SWIETENIA MAHOGANI. MAHOGANY TREE. Indigenous in South America, and naturalized in some parts of India. The bark is used in the West Indies as a substitute for c chona. It is very astringent, but contains alkaline principle, and is not used by Europe practitioners.—*O' Shaughnessy, page* 248. T is the most important species, and, from the moval of the others to separate genera, n nearly alone constitutes the genus : is a nat of Compeachy and of the West Indies. It i lofty branching tree with a large spreading he and pinnate shining leaves. The timber wh is so well known from its extensive employm for furniture and cabinet making is of a redd or yellowish brown colour, of different degrees brightness, much mottled and streaked, ve little liable to shrink or warp, free from taste smell, except when kept for some time, when acquires an agreeable odour from the exudati of a semi-resinous juice which serves to prese the wood from the attacks of insects. It d not appear to have been imported into gr Britain before 1724. The quality of the wo varies much according to the situations in wh it grows, that which is produced on rocky s and exposed situations is the best. Spanish mal gany is imported into England, in logs of about feet long and from 20 to 26 inches square. Fr the elevated parts of the West Indies and fr the Spanish Main the wood is close-grained a of a darker colour than the Honduras Mahoga This is imported in logs of from 2 to 4 f square though both kinds are no doubt produ by the same tree. Some years ago the Mess Broadwood gave the large sum of £ 3000 for th logs of Mahogany, which were each about 15 f long and 38 inches square. The wood v extremely beautiful and capable of taking t highest polish.—*Eng. Cyc.* See MAHOGAN

(7994) SYLHET, possesses a few manuf tures. The Natives there excel in some kin ivory work. They manufacture a variety of ar cles, including Ladies' Bonnets. They also ma shields of Buffalo and Rhinoceros' hides, wh are celebrated throughout India for their du bility and polish. The varnish is made of t juice of the Semecarpus anacardium (or Indi marking nut,) which has already attracted a tention. One description of target call *afla-o-i*, which is made here, is not varnis ed but is rendered by some peculiar pr cess of preparing the leather, semi-transparen The otter skins of the District are an article traffic, and would bear a comparison with simil furs in Europe. Considerable quantities of the are prepared annually both here and in Myme sing. They were formerly sent to Thibet, b they are now chiefly exported to China. T other manufactures for which Sylhet is fame are sword handles, morahs, articles of brass wo (made at Toroff,) and fine " sectalpatee" ma such as are commonly used in Bengal, for cov ing the seats of chairs, beds, and couches. Th place has also long been celebrated for the m

paration of certain perfumes, as the attars of *uggur* or lign aloe, and *naugissore* (Mesua ferrea); also several compounds of essential oils, of which that of Cassia is one of the principal ingredients, the tree (Aquilaria agallocha. Roxb.), which yields the lign aloe, grows in the Naga country between Sylhet and Assam, also in Cochin China and Siam. Both the wood and the essence extracted from it at Sylhet, are purchased by Mogul merchants for exportation to Bassora, and other Mahomedan countries, where they are held in high estimation and much used, the attar, as a perfume, and the wood, for fumigating apartments and cloths. Lign aloe is interesting from its antiquity as an export from India, being an article that was formerly much used as incense in Western Asia. It is mentioned under the name of *agallochum* in Scripture.—*Dr. Taylor.* Amongst the articles of export, are a variety of parti-coloured cloths, generally known by the name of Sylhet cloths. Some of them are dyed of rich colours, and being of a strong durable texture, are well adapted for table covers, to which purpose they are usually applied in the Eastern part of Bengal.

(7995) SYMPHOREMA. Of this genus, Wight in Icones, gives involucratum, 362; polyandrum, 363; and *polyandrum*, 1474.

(7996) SYMPHOREMA INVOLUCRATA. VERBENACEÆ, A species of St. Peter's Wort, cultivated by seed or cuttings.—*Riddell.*

(7997) SYMPHYTUM OFFICINALE. Συμφυτον, Diosc. iv. p. 9.

Sunkootun, HIND

Roots large, externally black, and branching, about a foot long, the thickness of the finger, fleshy, brittle, succulent, and pulpy. Inodorous, taste, sweetish and mucilaginous. The plant is highly mucilaginous, and rather astringent, it also contains sugar and albumen. The recent root is in popular use in France in cases of rupture and bruises. Indeed the plant derives its name from its supposed virtue in consolidating wounds.—*O'Shaughnessy, page* 496.

(7998) SYMPLOCOS (from συμπλοκή a knitting together), a genus of Plants belonging to the natural order *Styraceæ*. This genus was made the type of a natural order, *Symplocineæ*, by D. Don, which contained only this example. It has a 3-parted half-inferior calyx; rotate monopetalous 3-10-parted corolla, imbricate in æstivation; indefinite stamens inserted in the lobe of the corolla, with the filaments cuspidate at the apex, and polyadelphous at the base; erect anthers bursting longitudinally; 3-5-celled ovary with 4 ovules in each cell. The fruit is a fleshy drupe, containing a 3-5-celled nut; the cells containing but one seed, which has an inverted embryo lying in albumen, and a superior radicle. The species are trees, having alternate either entire or serrated leaves without stipules, and turning yellow in drying. The flowers are axillary, sessile, or pedunculate, few, of a white or scarlet colour, and supplied with bracteas at their base. Upwards of 30 species have been described. They all possess an astringent principle in their leaves, and some are used in dyeing.—*Eng. Cyc.* Wight, in Icones, gives Symplocos foliosa, 1234; Gardneriana, 1231; microphylla, 1232; monantha, 1236; nervosa, 1235; obtusa, 1233; pendula, 1237; pulchra, 1230; *racemosa*, 1235.

(7999) SYMPLOCOS RACEMOSA, RACEMED SYMPLOCOS.

Lodh. HIND.

Racemose-Flowered Symplocos. Leaves oblong glabrous, serrated; flowers arranged in racemes, mostly axillary; nut of fruit 3-celled. This plant is a native of Burdwar and Midnapore, in Bengal. It is used extensively by the natives as a red dye.—*Eng. Cyc.* Grows in the Kotah jungles; the bark, used to dye red with, is exported.—*Genl. Med. Top. page* 197. The bark of the root is used, and the tree is found in Rajpootanah, but the root is imported into Ajmere from Delhie, and used in dyeing red; also in medicine, being considered heating, and promotive of the secretions; used in mesalihs of animals: four seers are sold for one rupee.—*Genl. Med. Top. p.* 144.

(8000) SYMPLOCOS. *Species.* A few of the people of Lampteng in Sikkim find employment in drying the leaves of a shrub, one of the genus Symplocos, for the Tibet market, which are used as a yellow dye.—*Hooker, Him. Jour. Vol.* II. *p.* 41.

(8001) SYMPLOCOS SPICATA. The nuts of *S. spicata* are very hard and resemble a little fluted pitcher. This plant is a native of Silhet. —*Eng. Cyc.*

(8002) SYNANTHEREA. A great and very natural order, usually termed *Compositæ*, and named as above from their anthers being collected into one adherent mass. They have been also named *Syngeneseæ* from the same cause. It is composed of herbaceous, rarely woody plants, with compound flowers, that is, bearing a variable number of flowers, sometimes uni-sexual, and sometimes hermaphrodite, united together on a common receptacle. They occur in all parts of the globe; in France they constitute as much as one-seventh of all the phanerogamic division; at the Cape one-sixth; in Germany one-eighth; in America one-sixth. Dr. Wallich enumerates 426 India species from the plains and mountains of India. A bitter principle abounds in several of this order, for example in the Absinthiums or wormwood; essential oil exists plentifully in the camomiles and pellitory, and these species are at the same time exceedingly bitter; the seeds of many possess a fixed oil in such quantities as to render its manufacture economical; for instance, the

seeds of the sunflower, and ramtill. The essential oil resides in the periaperm, the fixed oil in the almond.

The proper juice of some Synantherеæ is milky and rather narcotic, still but few are justly suspected of dangerous properties. Starch is but in very small proportion in any of the species, hence few can be deemed alimentary, though from the presence of mucilage, saccharine matters, and extractive or modified bitter principles, some are used as table vegetables, such as the artichoke, lettuce, and endive ; no peculiar principle of much importance has been detected in the plants of this order.

In their medical uses these plants are tonic, febrifuge, vermifuge, or emollient. The properties of one species generally co-exist in all the congenerous individuals, and thus the research for substitutes is much facilitated.—*O'Shaughnessy, page* 405.

(8003) SYNDESMIS TAVOYANA. MERGUI RED-WOOD.? Mergui red-wood is a valuable dye wood for both black and red, but more especially for orange. From an article in the Journal of the Asiatic Society, it appears that " a number of experiments, made at the request of Mr. G. Swinton, by Mr. Thomas Speir, upon the Mergui dye wood, prove that it affords, with the mordants commonly used by dyers, colours equally bright, and of a more permanent nature than those of most other dye woods. The colours imparted to silk with different mordants were as follows :—

1.—*Muriate of tin.* Three shades of orange, varying with the temperature of the bath, and the time of immersion.

2.—*Acetate of alumin.* Two shades of flame colour.

3.—*Acetate of iron.* Two shades of drab.

4.—*Ditto, with a weak decoction of galls.* A fine black, two shades.

5.—Mixed with *manjit*, a variety of red and pinks are obtained, but not perhaps equal in intensity to those of the *manjit* alone. The chief attraction of this wood as a dye, is the orange colour which it yields with the aid of muriate of tin and acetate of alumina, of a great variety of shade.—*Mason.*

These results shew that the Mergui wood is deserving of further attention, and that it may become eventually an important article of commerce with our possessions on the Tenasserim Coast." It is not quite certain, however what tree produces, the Mergui red-wood. The flowers which accompanied the specimens of the wood sent to Calcutta, belonged to the Burman black varnish tree, yet Mr. Maingay who sent them, thought it a different tree. Mr Mason imagines there was some mistake, and that the Mergui red-wood is identical with the Tavoy red-wood, viz. *Syndesmis Tavoyana.—Mason.*

Tavoy red-wood makes handsome furnit and is used in Tavoy for the same purp to which gum kino wood is applied at M main. When the wood is steeped in fe ginous mud, it turns jet black, and looks ebony. The large cylinder knobs, one or inches in diameter, so often noticed in the of Karen women at Tavoy, are made of wood after the colour has been changed.—*son.*

(8004) SYNGNATHIDÆ, a family of Fis embracing, according to some authors, the P Fishes, the Sea-Horses, and the Winged S Horses. These forms are sometimes assig to distinct families, as in the following defi tions :—

(8005) *Syngnathidæ*, Pipe-Fishes.—Body p longed, slender, linear, or angulated ; sn greatly prolonged, cylindrical ; mouth termi vertical. Ventral fins absent ; caudal fin wa ing in some.

(8006) *Hippocampidæ*, Sea-Horses.—H and body compressed ; snout narrow, tubul mouth terminal. Pectorals small ; dorsal sing caudal fin wanting.

(8007) *Pegasidæ*, Winged Sea-Horses.—B broad, depressed ; snout suddenly contract narrow, somewhat protractile ; mouth termi beneath. Pectorals generally large ; caudal small. They all agree in having the endo-s leton partially ossified ; exo-skeleton gano gills tufted (hence the group is named *Lop branchia*), in the opercular aperture being sm and the swimming-bladder without an air-du We shall illustrate this family by a short descr tion of the British species :—

(8008) *Syngnathus* has the body elongat slender covered with a series of indurated pla arranged in parallel lines. Head long ; b jaws produced, united, tubular. No ventral fi In certain of the species the males are furnis with an elongated pouch under the tail ; th are called marsupial, and include the Brit species *S. Acus* and *S. Typhle.*

(8009) *Syngnathus Acus*, the Great Pipe-Fi is one of the most common forms of the genus. is found on many parts of the British coast, so times at low-water amongst sea-weeds, at ot times in deep water. The most curious feat in the economy of this fish is the fact that roe is transferred from the belly of the female the pouch of the male.

(8010) *Syngnathus Typhle* (Linnæus), Deep-Nosed Pipe-Fish, Lesser Pipe-Fish, Shorter Pipe-Fish ; *Acus Aristotelis* and *Typ antiquorum* of Willughby. This fish is distingui ed from the last by the more compressed form the jaws. From the British species it is dist guished by the possession on the part of male of a pouch for the reception of the o The habits of this fish resemble those of the la

(8011) *Syngnathus æquoreus*, the Æquor

Pipe-Fish. This fish has no subcaudal pouch. It is comparatively rare on the British coast.

(8012) *Syngnathus anguineus*, the Snake Pipe-Fish. Although this and the preceding species possess no subcaudal pouch, the ova after exclusion from the female are carried by the male in separate hemispheric depressions on the external surface of the abdomen.

(8013) *Syngnathus ophidion*, the Straight-Nosed Pipe-Fish, is known by its stright nose. It is about nine inches in length.

(8014) *Syngnathus lumbriciformis*, the Worm Pipe-Fish, is the smallest of the British species. It has been taken on various parts of the coast. It does not exceed five inches in length. The young of this species have been observed to undergo a curious metamorphosis. On their escape from the egg the tail is covered with a fin-like membrane, and it also possesses pectoral fins. During their growth the caudal membrane and pectoral fins are absorbed.

(8015) *Hippocampus*.—The Jaws are united and tubular, the mouth placed at the end. The body compressed, short, and deep. The whole length of the body and tail divided by longitudinal and transverse ridges, with tubercular points at the angles of intersection; both sexes have pectoral and dorsal fins; the females only have an anal fin; neither has ventral or caudal fins.

(8016) *Hippocampus brevirostris*, the Sea-Horse, or Short-Nosed Hippocampus, is occasionally met on the British coasts. The habits of these creatures are very singular. When swimming about they maintain a vertical position, but the tail is ready to grasp whatever meets it in the water. It quickly entwines in any direction round weeds or other objects, and when fixed the animal intently watches surrounding objects and darts at its prey with great dexterity. When two are together they often twist their tails together. Their eyes move independently of each other, as in the chameleon.

(8017) *Pegasus* has a snout as in the previous genera, but the mouth is under it, and moveable. Two distinct ventral fins behind the pectoral, which are often large, hence the name of *Pegasus* or Flying Horse. The species are found in Indian Seas (Yarrell, *History of British Fishes*; Adams, *Manual of Natural History*.)—*Eng. Cyc.*

(8018) SYRINGA (from σῦριγξ, a pipe), the name of a genus of Plants belonging to the natural order *Oleaceæ*. The English name of this genus, Lilac, is said to be derived from 'lilag,' the Persian for a flower. It is known by a small 4-toothed calyx; funnel-shaped corolla, with a 4-parted limb; 2 stamens; a trifid stigma; a 2-celled, 2-valved, 2-seeded capsule; the valves boat-shaped, with a dissepiment in the middle. The species are natives of Europe and the colder parts of Asia. They are deciduous shrubs, with simple leaves, having purple or white flowers, which are arranged in beautiful thyrsoid terminal panicles, and are very fragrant.—*Eng. Cyc.*

(8019) SYRINGA is also the name that is commonly but improperly given to the species of *Philadelphus*, or Mock-Orange. The name *Syringa* was given to the Lilac on account of its stems being used for the manufacture of Turkish pipes. The stems of the *P. coronarius* are also used for the same purpose, and equally with the Lilac it had the name of Pipe-Privet, or Pipe Tree, given it when first introduced into great Britain and afterwards the name *Syringa*.—*Eng Cyc.*

(8020) SYRINGA CHINENSIS, Chinese Lilac. Leaves ovate-lanceolate. Flowers purple. It is a native of China. In character it is intermediate between *S. vulgaris* and *S. Persica*, and agrees with a hybrid plant produced at Rouen by M. Vain, and called *S. Rotomagensis*, the Rouen Lilac. It is a plant that grows vigorously, and attains a height of ten or twelve feet. The sorts known in nurseries as the Belgic Lilas de Marly and the Lilas Saugé, are varieties of this species.—*Eng. Cyc.*

(8021) SYRINGA EMODI has elliptical-oblong leaves, glaucous beneath, attenuated at the base, and acuminated at the apex, with purple flowers. It is a native of Kumaon near the Himalayas.—*Eng. Cyc.*

(8022) SYRINGA PERSICA, the Persian Lilac. Leaves small, lanceolate. Flowers purple. It is a native of Persia, and is a small shrub, from four to six feet high. It is one of the most ornamental of low deciduous shrubs, and on that account is very commonly cultivated. When planted in pots and forced, it may be made to flower at Christmas; but by this process the fragrance of the flowers is lost. Of this species also three varieties are found in English nurseries, the White, the Cut-Leaved, and the Sage-Leaved Persian Lilacs.—*Eng. Cyc.*

(8023) SYRINGA VILLOSA has villous leaves, and is found in China on mountains about Pekin, but neither of these species is cultivated in England although both would probably bear the climate.—*Eng. Cyc.*

(8024) SYRINGA VULGARIS, the Common Lilac, known by its ovate heart-shaped pointed leaves. It is a native of Persia, Hungary, and the borders of the Danube. Dr. Sibthorp found it wild on Mount Hæmus, but not in Greece. This shrub has been long cultivated by the Turks, and was brought from Constantinople to Vienna by the ambassador Busbequius, in the middle of the 16th century, from whence it spread over the rest of Europe. It is now one of the commonest ornaments of our shrubberies blossoming, together with the laburnum, in May. It is one of the few shrubs that resists the injurious influence of the smoke of cities, and flourishes in great perfection in most of the squares of London. It grows to the

height of 20 feet and upwards, and sends up from the parent stem an abundance of suckers, which, if allowed to grow, form a dense mass of stems: these are commonly left, but if cut down as they are produced, the parent stem may be trained so as to grow as a small tree. It grows very fast, as much as from eighteen inches to three feet in the year, and endures, according to the soil, for twenty to fifty years. Several varieties are well known.—*Eng. Cyc.*

(8025) SYZYGIUM, a large tropical genus of Plants belonging to the natural order *Myrtaceæ*, so named from συζυγος, coupled, in consequence of the manner in which the branches and leaves are united together in pairs. The calyx-tube is obovate, with the limb nearly entire. Petals 4-5, forming a calyptra; stamens numerous, free; style single; stigma simple; ovary 2-celled, ovules several in each cell. Berry 1-celled, 1- or few-seeded. Trees, or shrubs, of a highly ornamental appearance from their smooth shining leaves, which are opposite and entire.

Of the species, *S. Guineense*, a native of the coast of Guinea and Senegal, has been employed as a remedy in rheumatism. *S. paniculatum*, a native of the Isle of Bourbon, is there called Bois a Ecorce Blanche. *S. Jambolanum* is a native of the East Indies, and there most extensively diffused, being planted near villages in clumps of trees, chiefly on account of its fruit, which is sometimes called Java Plum by Europeans, but Jamoon by the natives. It is a rich purplish colour, but of a subastring sweetish taste, which is more agreeable to native than to the European palate. The f is sometimes soaked for an hour in salt water, when it makes an approach to the flav of olives. The bark is astringent, and dyes brown colour; the wood is hard, close-grai and durable, and therefore much employe *Eng. Cyc.* Dr. Wight, in Icones, gives Syzyg *carophyllaceum*, 540; densiflorum, 999; J bolanum, 535-553; lanceolatum, 530; n osum, 552; oblatum, 622; rubicundum, 5 rugosum, 339; salicifolium, 539; and Ze nicum, 73.

(8026) SYZYGIUM JAMBOLANUM.

Jamoon, Hind.	Nœrala Mara, Can.
Nawel Marum, Tam.	Neradi, Tel.

A fine large tree of common occurrence, s ed for avenues; the fruit small, and somew astringent, sold in the bazars. The woo much used for ordinary purposes, but is of li value. Travancore 361, Mysore 21,22,37, sulipatam, Palamcottah 247, Bangalore 3 Hort. garden 45. The bark," Neradi Ba has been classed as a tanning substance Buchanan, in his journey to Mysore, and in Jury Reports of the Great Exhibition, bu proved a failure even with the careful mana ment of Mr. Bowden.—*M. E. J. R.*

T.

(8027) TABASHEER, Banslochun, Sugar of Bamboo,

Tabasheer, Arab.	Vanslochun, Guz.
Bansk, Beng.	Tabasheer, Hind.
Chuh-hwang, Chin.	Tabashir, Lat.
Oonamakoo, Unalie, Cyng.	Tabashir, Turk.
Banslochun, Cash.	Moongil ooppoo, Tam.
Tabachir, Fr.	Veduroo-ooppoo. Tel.
Tabaschir, Ger.	Banslochun. Beng.
	Tivakshera. Sans.

A siliceous concretion found in joints of the female bamboo. It is bluish white, concrete, adhesive to the tongue, at a red heat fuses into a transparent glass. It is composed of silica 70, potash 30, per 100. The Persians deem it tonic and aphrodisiac. The Arabs suppose it to be astringent. From its composition we are warranted in supposing it to be entirely inert.—*Faulkner. O'Shaughnessy, page* 694.

Some Tenasserim bamboos secrete tabasheer, which has a place among native medicinal substances.—*Mason.* It resists acid, is indestructible by fire; and forms, on being fused with alkalies, a sort of glass. It is much esteemed by the Hindoos, Persians, and Arabs as a powerful tonic, and is said by them to have great efficac internal bruises. It is imported into Bom chiefly from Singapore: small quantites are so brought from the Malabar Coast.—*Fa ner.* Dr. Irvine has often removed it f old bamboos at Hoshungabad. It is brou to Ajmeer from Hurdwar, and is used as aphrodisiac and in general debility. One ma is the dose, and it is sold at two tolahs for rupee.—*Gen. Med Top. p.* 128.

(8028) TABERNÆMONTANA, a genus Plants belonging to the natural order *Apo naceæ*, found in the West Indies and So America, also in Australia, India, and ot tropical parts of Asia. The genus is charac ised by having monopetalous inferior flowe corolla salver-shaped; stamens 5, include anthers sagittate: ovaries 2; style filifor stigma dilated at base, trifid. Seeds in a f cle, immersed in pulp. The flowers of m species are very sweet scented, and the dou flowered variety of *T. coronaria* is a very o mental shrub, and one of the most commo Indian gardens. The deep red pulp surroun

the seeds of this species appears capable of yielding a beautiful colour. The cream-like sap of *T. utilis*, the Milk-Tree, or Hya of Demerara, is not only of an innoxious character, but said to be very nourishing. It affords a remarkable example of a tree of this suspected family yielding an article of food. Some of the other species are employed as medicines in the countries where they are indigenous. The sap of *T. persicariæfolia* is considered a poison in Mauritius. The wood is employed in turnery. Dr. Wight in Icones, gives Tabernaemontana coronaria, 477; crispa, 470; dichotoma, 433; parviflora, 393; and recurva, 476.

(8029) TABERNÆMONTANA CORONARIA. GARLAND. TABERNÆMONTA.

Firki Tugar, HIND.,

Is the name of the single flowered Tabernæmontana, and Bura-Tugur that of the double flowered. Common in gardens at Kotah and elsewhere. This shrub is very ornamental and the flowers are fragrant during the night.—*Genl. Med. Top. p.* 186. In the Dekhan Tabernæmontana Coronaria, is a common shrub in gardens with dark shining leaves, flowers generally double, colour pure white, resembling wax, having a faint pleasant smell; propagated readily by cuttings.—*Riddell.*

(8030) TEBERNÆMONTANA CORONARIA, VAR: FLORA PLENA.

The foliage of the double flowered Garland Tabernæmontana tree very beautifully contrasts with its large blue white double flowers; which are often improperly called on the Tenasserim Coast, "wax flowers" The wax flower of Bengal is a trailing creeper, *Hoya carnosa*, which has been recently introduced into European gardens. The single flowered variety is seen occasionally but not often.—*Mason.*

(8031) TABERNÆMONTANA PERSICARIÆFOLIA, POLYGONUM LEAVED TABERNÆMONTANA.

Tugur, HIND.

A straight middling sized tree in the gardens at Kotah; the tree is sacred, and the wood is scented and used in incense.—*Genl. Med. Top. p.* 186.

(8032) TABERNÆMONTANA RECURVA. RECURVED TABERNÆMONTANA. This is a low shrub indigenous about Maulmain, remarkable for its recurved peduncles and fragrant flowers. —*Mason.*

(8033) TABLE-CLOTHS. This manufacture is carried on at the towns of Cuddalore, Chingleput, and in the outskirts of Madras, and are equal in quality to those of English manufacture. They are of different sizes, the largest 9 cubits in breadth and 15 in length and 12 cubits long by 6 broad, the smallest 9 by 4. They are sold at different rates. The Table cloths and Napkins of Pondicherry from the works of Monsieur R. Godfroy are very good in quality, varying in size from the ordinary table cloth to those of dimensions suited to public entertainments. The Madras Exhibition Jury expressed their unqualified approbation of this fabric, made with thread and wove, with machinery set up by the enterprising firm connected with this manufacture in this country. The design, now commonly called the Damask pattern, and imitated in various parts of the Madras Presidency, was introduced at these works. The Jury desired to bring this manufacture to the especial notice of the Committee of the Madras Exhibition and awarded a 1st Class Medal.—*M. E. J. R.* Polar Chetty exhibited the finest quality of wove Table Cloths and Napkins made at Madras, the Jury awarded him a 2nd Class Medal.—*M. E. J. R.*

(8034) TACAMAHAC. A resin obtained from the *Fagara Octandra*; and likewise, it is supposed, from the *Populus balsamifera* It is imported from America in large oblong masses wrapt in flag leaves. It is of a light brown colour, very brittle, and easily melted. When pure it has an aromatic smell, between that of lavender and musk; and dissolves completely in alcohol, water having no action on it. *Thomson's Chemistry.—Faulkner.*

(8035) TACCA, a genus of Plants belonging to the natural order *Taccaceæ*, placed near *Aroidaceæ*, and *Aristolochiaceæ*, and resembling *Dioscoreaceæ*, in having radical tubers which abound in fæcula. The genus is named from the Malay name of one of the species, which are found in the hotter parts of India and in the South Sea Islands. The genus is characterised by having a 6-partite calyx, with a 6 partite corolla, and 6 stamens which are inserted in the calyx: styles 3; stigmas stellate. Very dry, hexangular, many-seeded. The plants have perennial tubers, with a short compressed rhizoma, from which proceed the stalked and the so-called radical leaves and herbaceous scapes. The plants of this family are possessed of some acridity both in their tubers and in their herbaceous parts, but the roots lose some of this quality by culture, at the same time that they become larger. Those of *T. pinnatifida*, the best-known species, and a native of the Malayan Peninsula, the Moluccas, Madagascar, and Australia, are roundish, red, the size of a man's fist, extremely bitter, and acrid. The tubers of this plant, and also those of *T. dubia* and *T. montana*, are rasped and macerated for four or five days in water; a white highly nutritious fæcula like arrow-root is then separated, and, like sago, is employed as an article of diet by the inhabitants of the Malayan Peninsula and the Moluccas. In Tahiti and some of the Society Islands they make cakes of the tubers of *T. pinnatifida*, which are the Tacca Youy of some navigators. They form an article of diet in China and Cochin-China, and also in Travancore, in India, where, according to

Dr. Ainslie, they attain a large size, and the natives eat them with some acid to subdue their acrimony. (Royle's 'Illustr.,' p. 378.) The petioles and stalks boiled for some time are also used as articles of diet in China and Cochin-China. In Tahiti the plant is called Tya: its fæcula is largely prepared, and is sometimes preferred to that of Maranta arrow-root by the English, to whom it is sold under that name by the native converts at the missionary station, and exported to London. It is also sometimes called Tahiti Salep. This plant must not be confounded with the *Arum macrorhizum*, the tuberous root-stalk of which is also edible, and when prepared is called Taka,, which similarity in name and in uses has frequently caused confusion, and the mistaking of one plant for the other. In Singapore *T. cristata* is called Water-Lily.—*Eng. Cyc.*

(8036) TACCA PINNATIFIDA Lin.

Cara Carnay kalung, Tam.	Tacca, also Leeker, Malay.
Kunda, Duk.	Soorana, Sans.
Cunda gudda. Tel.	
Toja, Bunda.	

This root, says Ainslie, appears to be eaten in many Eastern countries, such as China, Cochin-China, and Banda, in which last mentioned, where sago is scarce, it is in common use. In Otaheite and other Society isles, they make, of the meal of it, a nourishing gelatinous cake, like that made of salep. It possesses a considerable degree of acrimony, and requires frequent washing in cold water previously to its being dressed. In Travancore, where this root grows to a very large size, and is called Chanay kelengu, it is much eaten by the Natives who are in the habit of mixing a sufficient portion of some agreeable acid with it, to subdue its natural pungency.—*Ainslie p.* 248. See Arrow Root, also Food, also Maranta.

(8037) TACCACEÆ, a small natural order of Endogenous Plants belonging to the Epigynose group. There are but two genera belonging to this order, *Tacca* and *Attaccia*. The species are large perennial herbaceous plants, with a tuberous root, a short stem bearing scapes, and having exstipulate radical pedatifid pinnatifid rarely entire leaves, with curved parallel veins. The flowers, which are placed on the top of a single scape, are in umbels, and are united; the tube of the perianth is superior, and united to the germen; limb petaloid, equal or unequal, persistent; stamen 6; filaments dilated; ovary composed of 3 connected carpels, with 5 parietal polyspermous placentæ; styles 3, connate. The fruit baccate, with seeds lunate, striated, and the embryo situated on the outside of fleshy albumen.—*Eng. Cyc. p.* 1004.

(8038) TACSONIA PINNATISTIPULA. Passifloraceæ. These are climbing plants nearly allied to the Passion Flowers, and require the same treatment. Colors rose or pink.—*Riddell.*

(8039) TADAH WOOD.

Tadda, Tel. | Kakatatee, Tam.

(8040) TÆNIS BLECHNOIDES, Tai worm fern. The tapeworm fern, so called fr the resemblance of the line of sori to a ta worm, is not infrequent in Tenasserim.—*Mas*

(8041) TAGETES ERECTA, Tall Mai gold.

Geuda, Hind.

A great variety in gardens.—*Gen. Med. T p.* 206.

(8042) TAGETES LUCIDA, Composit African Marigold. This is common in all g dens, and readily grown from seed.—*Riddell.*

(8043) TAGETES PATULA, Fren Marygold.

Gool-jafare, Hind.

Common in gardens.—*Gen. Med. Top. p* 206.

(8044) TALAUMA HODGSONI, a magn lia growing on Tonglo in Sikkim at an elevati of several thousand feet. It is a large tr with very dense foliage, and deep shining leav a foot to eighteen inches long, most of its flo ers drop unexpanded from the tree and diffus very aromatic fragrance: they are nearly large as the fist, the outer leaves purple, inner pure white.—*Hooker, Him. Journ. Vol page* 163.

(8045) TALC.

Kobub ul arz, Arab.	Abruck, Tulk, G Hind.
Minirum, Cyng.	Talcum, Lat.
Tulk Cash.	Tulk. Pers.
Tulk, Duk.	Abraka, Sans.
Talc, Fr.	Tilk, Turk.
Talk, Ger.	
Appracum, Tam. Tel.	

Talc is one of the hydrous silicates of mag sia. It occurs *crystallized* and *massive*. primary form of the crystal is a rhomboid, it usually occurs in the secondary form of he gonal laminæ, and even in long prisms. cleavage is distinct and perpendicular to axis. It is readily separable into thin pla which are flexible, but not elastic. The lus is pearly, and the colour a shade of light gr or greenish white: sometimes it is silvery-wh and also greyish-green and dark olive green. is unctuous to the touch, and is easily impres by the nail,—the hardness being equal to 1 1.5: the density varies from 2·7 to 2·9. Crys lized talc occurs in small quantity in serpent rocks, accompained by carbonate of li actinolite, steatite, and massive talc, &c. massive varieties occur in beds of mica ous schist, gneiss, and serpentine. Mas talc or soap-stone reduced to powder fo what is called *boot-powder* or Bootmaker's d dusting the inside of a tightly fitting boot v this substance to enable it to be drawn on eas

This substance was largely used some years ago at Manchester, as one of the ingredients for converting an inferior low-priced tea into a high-priced one. The manufacturers of boot-powder, surprised at the large demand for their article by one house, and that house a tea-ware-house, made some inquiries, which led to sufficient publicity to put a stop to the fraud.—*Faulkner. Tomlinson. Talc or Mica*, has been used as a substitute for glass, in the taking of Collodion Pictures, the Collodion film adheres to it very firmly. On it Negatives can be as easily carried, without injury, in a portfolio, as on paper, and positives backed with color, and a plain varnish can be pasted, without risk of deterioration in a book. The mica being attached to a piece of glass by its back being moistened, may be then coated, exposed and developed, after which it may be detached and fixed. Talc mines abound in Bengal: upwards of a thousand maunds or nearly forty tons are sent to Calcutta annually, of the value of seven thousand five hundred rupees, at seven and half rupees per maund. —*Friend of India.*

Indurated talc occurs in primitive mountains, in clay-slate, and serpentine; it is massive, of a greenish-grey colour; the structure schistose and curved; it is of a shining and sometimes pearly lustre; translucent, soft and rather unctuous to the touch, and of the sp. gr. 2.9. Lamellar talc contains, according to Vauquelin, silica 62 per cent. magnesia 27, alumina 1.8, oxide of iron 3.2 and water 6. Nearly allied to mica, are steatite, chlorite, and other magnesian minerals. —*Eng. Cyc.*

Talcose slate resembles mica slate [See MICA], but has a more greasy feel from its containing talc instead of mica. It is of a light-grey or dark-greyish brown colour; it breaks into slabs, which are used for fire-stones. *Talcose rock* is a kind of quartzose granite, containing more or less talc: it is intersected by veins of white quartz, and also contains chlorite. "The talcose rocks," says Dana, "are, to a great extent, the gold-rocks of the world. This rock contains the topaz of Brazil, and also euclase, and many other minerals."—*Tomlinson.*

(8046) TALIPOT TREE. CORYPHA UMBRACULIFERA, is one of five species of a genus of palms, all inhabitants of Asia. The Talipot tree grows in stony parts of the mountains of Ceylon, Malabar and the Malay coast. Its leaves are of gigantic size, the petiole being seven feet long, the blade six feet long and thirteen broad. The out spread leaf affords shelter for seven or eight persons. They are extensively used by the Cingalese as umbrellas and some of their records are written with a style on pieces of the blade of this palm.—*Seeman.*

(8047) TALLOW.

Shahum, ARAB.	Pech, PERS.
Hurruk tail, CYNG.	Sato, Toplenoe, RUS.
Suif, FR.	Sebo, &c. PORT.
Talg, GER.	Maat Kolupoo, TAM.
Churbee, GUZ. HIND.	Passarum kowoo, TE.
Sevo, IT.	Govapa, SANS.
Lemakchair, MAL.	

Animal fat melted and separated from the fibrous matter mixed with it. It is procured chiefly from oxen and sheep. Its quality depends principally on the care taken in purifying it, and also to a certain extent from the animal from which it is obtained. Tallow is an important article of trade, being used in the manufacture of candles, soap, in the dressing of leather and in various other processes of the arts.—*Faulkner.*

(8048) TAL MAKHANA. The seed of the plant comes from Shekhawattee to Ajmere: a stimulant, used in general debility, but chiefly as an aphrodisiac.—*Genl. Med. Top. p.* 152.

(8049) TALPIDÆ, a family of Animals belonging to the order *Insectivora*, and including the Moles. The genus *Talpa* of Linnæus, as it stands in the 12th edition of the 'Systema Naturæ' between the genera *Didelphis* and *Sorex*, comprises two species only, *Talpa Europæa*, the Common Mole, and *T. Asiatica*.—*Eng. Cyc.*

(8050) TAMARICACEÆ, *Tamarisks*, a small natural order of Plants, belonging to the syncarpous group of Polypetalous Exogens. The species are either shrubs or herbs, having rod-like branches with alternate entire leaves, resembling scales; the flowers are in dense spikes or racemes. The clayx is 4-5 parted, persistent the petals inserted into the calyx, both with imbricate æstivation; stamens hypogynous, distinct or united, equal in number with the petals or twice as many; ovary superior, with a short style and 3 stigmas; fruit a capsule, 3-valved 1-celled, with numerous seeds, which are comose; embryo straight with an inferior radicle. The species are found only in the Old World; the greatest number being met with in the basin of the Mediterranean. The plants of this order are innocuous and all are more or less astringent and their ashes after burning are remarkable for possesing a large quantity of sulphate of soda. *Myricaria germanica* is recommended as a diuretic.—*Eng. Cyc.*

Dr. O'Shaughnessy tells us that this well known order occurs in many parts of the world chiefly in hot and sandy districts adjacent to the sea or great rivers. Dr. Roxburgh describes two in India, the *Tamarix indica* (probably identical with *T. gallica*) and *dioica* (*jhuo*). The *T. Furca* occurs in the drier parts of the Doab, and in the neighbourhood of Delhi, where it is called *Asul* or *Atul* as in Arabia; other species are also found in the peninsula.

The Tamarices are bitter and astringent. In Denmark they are used instead of hops for mak-

according to Dr. Royle, they are on this account used in medicine by the native doctors of India. The same property also renders them valuable in dyeing. Other Indian species of the Tamarisk produce galls, which are used for the same purposes as those of *T. Indica.*—*Eng. Cyc.* It is a tree of considerable size, common in the Ajmeer district, but the wood is very inferior.—*Irvine.* In the Dekhan it is a small tree or shrub; grows abundantly in the beds of many rivers, and affords great shelter for all sorts of game.—*Riddell.* Tamarix Indica grows in the Punjab and in Cashmere. The galls formed on it are officinal, and are exported from Cashmere.—*Thirty-five years in the East by Dr. Honig. p.* 355.

(8058) TAMARIX ORIENTALIS, the Eastern Tamarisk, is a tree attaining a height of from 10 to 20 feet; it is glabrous all over, with minute, distant, sheathing, mucronate leaves, with slender lateral spikes of flowers, and a 4-valved capsule. This tree is a native of Arabia, Persia, and the East Indies, and is one of the largest and most elegant of the species of the Tamarisk. One of the finest specimens of this tree existing is at Babylon.—*Eng. Cyc.*

(8059) TAMBRA-BIJ. Seed of a small plant from Harowtee; stimulant.—*Gen. Top. p.* 153.

(8060) TANARIUS MAJOR.

Lacca Tree, ENG. | Laka, MALAY.

A tree with a red coloured wood, a native of Sumatra, used in dyeing and pharmacy. It is an article of considerable native trade, and is chiefly exported to China.—*Crawfurd, p.* 204.

(8061) TANNING MATERIALS. The manufacture of leather in India generally, is by no means so thriving as it might be, considering the great abundance of Tanning materials at command. This is probably owing to the very low rank of the Artisans (*Chucklers*), for the art of leather production is well understood and successfully practised by the European tanners at Pondicherry, Hoonsoor, Guntoor, Bangalore and Madras, the leather being scarcely inferior to that made in Europe.

Goat skins, Sheep skins, Buffalo and Bullocks' Hides are much used and are generally procurable, but are very badly dressed, as may be readily imagined from the excellent description of the usual process given by Mr. Rohdes, which accompanied the consignment of leather from Guntoor, currying the leather being the province of the wife, while manufacturing it for the market belongs to the husband. Inferiority of Indian leather may be ascribed to want of skill on the part of the currier, and the use of quicklime.

It is generally supposed that there is no better tanning material than Oak bark—but it has been shown in the article Leather (See LEATHER) that similar substances may be employed with great success, as for instance, Divi Divi, Catechu, Tanghedu Bark, &c., which produce their effect m rapidly, and the leather so manufactured is saic be nearly as durable. At the Madras Exhibit of 1855, a valuable series of Tanning mater accompanied the leather prepared by Mr. B den at Guntoor, and some interesting samp were shown from the Government Tanne Hoonsoor, with hides tanned by the differ barks, to illustrate the practical application these various substances.—*M. E. J. R.* The tract procured from the bark of the Butea; t of the Buchanania latifolia; the Syzygium Ja bolana &c. are of much consequence to Tanne —*Spry's Sug. p.* 67. Several species of Acac Conocarpus, the gum of the Dhak and others also used.—*Royle's Productive Resources of Ind* The rose-coloured fruit of the tamarind gi beautiful deep red-colour, approaching purp The wood of the *Adenanthera pavonina* dyes r and the wood of the black varnish tree afford red dye.—*Mason.* The extract procured fr the bark of the Butea, that of the Buchanai latifolia, the Syzygium (Calyptranthes), Jaml lana, &c. are likely to be of consequence to tanners, and could be produced in India in la quantities. Specimens of these and of the b of the Saul tree, of Nyctanthes arbor tristis, T minalia angustifolia, and of the "*gaub*" fr (Diospyros glutinosa), were shown by the E India Company at the Exhibition of 1851. *Simmonds' Comml. Products, p.* 494.

The following are the principal of the su stances of Southern and Eastern Asia, whi are or may be used in Tanning.

Babool bark,.....	Acacia arabica.
Catechu, cutch,.....	Acacia catechu. Fruit Acacia vera.
Gambier,.....	Uncaria gambier.
Kino,.....	Pterocarpus marsupium
Pulas kino,.....	Butea frondosa.
Turwur,.....	Cassia auriculata.
Pomegranate rind,.....	Punica granatum.
Tamarisk galls, (sumrut-ool-asl,.....	Tamarix indica.
Divi divi,.....	Cæsalpinia coriaria.
Myrobalans,.....	Terminalia, *several speci*
Gall Nuts,.....	(Quercus Infectoria).
Bark of,.....	Bauhinea variegata, in Si
Bark of.....	Careya.
Mangrove Bark,.....	Rhizophora conjugata.
" "	" gymnorhiza.
" "	" mangle.
Bark of,.....	Bruguiera Rheedii.
" "	" eriopetala.
" "	" parviflora.
" "	Carallia lucida.
" "	Kandelia Rheedii.
Juice of,.....	Asclepias gigantea.
Bark of,.....	Buchanania latifolia.
" "	Shorea Robusta.
" "	Nyctanthes arbor-tristi
" "	Diospyros glutinosa.
Petals of.....	Hibiscus Rosa-Sinensis

The Tenasserim Provinces are rich in materials for tanning. It is there that the bark of the Careya, and of half a dozen different species of mangrove, the fruit of the sea-cocoanut, and the peel of a species of ebony, all abound in tannic acid. The principal sources are,

Rhizophora conjugata.
Rhizophora gymnorhiza.
Bruguiera Rheedii.
Bruguiera eriopetala.
Bruguiera parviflora.
Carallia lucida.
Kandelia Rheedii.—*Mason.*

The bark of Bauhinia variegata, is made use of as a tanning substance in Sinde and other parts of Asia. The bitter astringent bark and the galls of several of the Tamarisk tribe are also well suited for the purpose. The bark of the Cassia auriculata, and the milky juice of the Asclepias gigantea, are used for tanning in India. —*Simmonds' Comml. Product, p.* 493 *and* 494.

Tannin.—The substance from which pure tannin is most frequently obtained for chemical purposes is nutgalls, for tannin constitutes above 40 per cent. of their weight. It may however, as above shown, be procured from several other sources, such has oak, horse chestnut, sumach, and cinchona barks, catechu, kino, &c. The basis of the skins of animals is composed of a substance to which the name of gelatine is given. One of the properties of this substance is, that when combined with tannin, it forms the compound of tannate of gelatine, or leather, a substance which is so useful to mankind. From time immemorial, the substance employed in Britain, to furnish the tannin to the hides of animals, in order to convert them into leather, had been oak bark. But as the purpose for which oaks are grown there, is their timber, and not their bark, the supply of oak bark cannot be calculated upon, and this is, perhaps, one of the causes why tanning as an art is in such a backward state. The consumption of tannin required in the leather manufacture may be estimated from the fact that more than 672,000 cwts. of raw hides were imported into England in 1851, besides the hides of the cattle, &c., consumed in the United Kingdom. On the Continent of Europe and in the United States, the consumption of bark for this purpose is also considerable. The imports into England, of bark for the use of tanners and dyers has amounted yearly to the very large quantity of 380,674 cwt., besides what England obtains at home. Oak bark contains usually the largest proportion of tannin, and according to Davy's experiments eight-and-a-half pounds of oak bark are equivalent, for tanning purposes, to two-and-a-quarter of galls, three of sumach, seven-and-a-half of Leicester willow, eleven of Spanish chesnut, eighteen of elm, and twenty-one of common willow bark. Tannin obtained from these sources, however, differs materially in some of its characters. The tannin of gall-nuts, which is that generally employed for chemical purposes, is sometimes called gallo-tannic acid, to distinguish it from other species. Notwithstanding the number of different substances which have from time to time been introduced for the use of tanners, it is, nevertheless, pretty generally acknowledged that there is nothing superior, or even equal, to good oak bark, and that all attempts to hurry the leather-making process beyond a certain point by the use of concentrated solutions of tan, &c., are for the most part failures, as the manufacture of good leather, to a great extent, depends on the process being conducted in a slow and gradual, but—at the same time—thorough and complete manner. Oak bark is, however, as we have already shown, by no means the only astringent bark well suited to the use of the tanner, and in various parts of the world other similar substances are used with very great success. All these tanning materials, though they may not be considered by the English tanner equal to the best oak bark, are, nevertheless, of great value to him; they may be employed in conjunction with oak bark, or even as a substitute in times of scarcity, or when the price of oak bark is high; in fact the very existence of such substances tends to keep down and equalise the price of bark, and to prevent it from undergoing those great fluctuations in value which would necessarily occur were it the only tanning material available to our manufacturers.—("*Prof. Solly in Jury Reports of Great Exhibition.*")

The vast number of barks and other substances useful for tanning purposes, which are found in the tropics, are comparatively unknown or little regarded in Europe; although they might be readily obtained in large quantities and at a trifling cost. The bark of many species of *Acacia* furnishes the tanning principale in a great degree, particularly that of *A. arabica*, which, under the name of Babul wood, is largely used all over India; where it is regarded as a powerful tonic. The fruit of *A. vera*, termed Egyptian and Senegal "bablah," has been employed in tanning and dyeing. Numerous species of this tribe are found abundant in New South Wales and the Cape Colony, and these, particularly the Wattle bark of Australia, are in common use for tanning, from their astringent properties. The bark and rind of the fruit of the pomegranate (*Punica Granata*) have similar properties. The bark of *Avicenna tomentosa* is in great use in the Brazils for tanning. So are the curved pods of *Cæsalpinia coriaria* in the East and West Indies under the name of Divi-divi. *Coriaria myrtifolia* is not only used in tanning leather, but also for staining black. It is worth £9 to £10 per ton. *Pterocarpus marsupium* furnishes about Tellicherry the concrete exudation called kino, a

powerful astringent used for tanning. The plants of the mangrove tribe, *Rhizophora Mangle*, and other allied species, have frequently an astringent bark, which is in many cases used for tanning and dyeing black. This tree is very common in most tropical countries, where it forms dense thickets on the muddy banks of rivers and the sea shores. The bark of *Bauhinia variegata*, is made use of in Scinde and other parts of Asia. The bitter astringent bark and the galls of several of the Tamarisk tribe are also well suited for the purpose.

Mesembryanthemum nodiflorum, one of the numerous indigenous species of the Cape, is used in making morocco leather.

The extract procured from the bark of the *Butea*, that of the *Buchanania latifolia*, the *Syzigium* (*Calyptranthes*), *Jambolana*, &c., are likely to be of consequence to the tanners, and could be produced in India in large quantities. Specimens of these, and of the bark of the Saul tree, of *Nyctanthes arbortristis*, *Terminalia angustifolia*, and of the gaub fruit (*Diospyros glutinosa*), were shown by the East India Company. The bark of the hemlock tree is extensively employed for tanning in New Brunswick.

The bark of yellow hercules (*Xanthoxylum ochroxylon*), and the pods of *Acacia tortuosa* are used for tanning in the West Indies.

In the instructions given by the Admiralty to Sir James Ross, when proceeding on his Antarctic Expedition, his attention was particularly called to the astringent substances adapted for tanning, and to the various extracts of barks, &c. imported into England from our Australian settlements, and which are employed by the tanner. Little sterling information has as yet been obtained as to the qualities of the astringent gums, barks, and dyes, yielded in such abundance by the trees of those colonies, and the proportion of tannin they contain. In 1846, 563 tons of bark for tanning were exported from Port Phillip. A large quantity of tannin is extracted from various species of Eucalyptus, the gigantic gum trees in Australia and Van Diemen's Land (of which quarter all the species are natives), and sent to the English market; it is said to be twice as powerful in its operations as oak bark. Some of these trees attain a height of 200 feet. Their bark separates remarkably into layers. A sort of kino gum, an astringent resinous-like substance, is also extracted from *E. resinifera*, the brown gum-tree of New Holland, which is sold in the medicine bazars of India. It exudes in the form of red juice from incisions in the bark. A single tree will often yield 60 gallons. In Brazil they use the bark of *Luhea panicata*, an evergreen climber, for tanning leather; and in Peru the bark of some species of *Weinmannia* serves the same purpose. Among other powerful astringents may be noticed the root of a species of Sea Lavender (*Statice Caroliniana*), *Myrica cerifera*, and *Heuchera Americana*, all natives North America. Also the petals of *Hibis Rosa-sinensis*, a native of Asia. The sea-side gr (*Coccolaba uvifera*) yields an astringent substa known as Jamaica kino. The bark of the *Cas auriculata*, and the milky juice of the *Asclep gigantea*, are used for tanning in Ind The black mangrove (*Rhizophora mangle*) i tree attaining an altitude of from 30 to 50 fe and occupying marshy situations in t vicinity of the sea. Almost every part of t mangrove—the bark, roots, and the fruit m particularly—abounds in an astringent prin ple, which is successfully applied to the pu poses of tanning. As the tree is so abunda within the tropics, it might be worth the wh of some practical speculator, to make an e tract on the spot, and introduce it into t English market, for the use of tanners a dyers. For tanning, the mangrove is said be infinitely superior to oak bark, completi in six weeks an operation which with the l ter occupies at least six months, and the so leather so tanned is said to be more dural than any other. The bark and leaves, whi contain nearly as much tannin as the oak, a made use of in the West Indies, as well as Sinde and other parts of Asia. 3,713 pie of mangrove bark, valued at £819, were shi ped from Shanghae, one of the Chinese por in 1849. See MANGROVE also RHIZOPHORA.

Myrobalans.—This is a name applied to the a mond-like kernels of a nut or dried fruit of whi there are several sorts known in the East. Th are the produce of various species of *Terminali* as *T. Bellerica*, *chebula*, *citrina*, and *angustifoli* They vary from the size of olives to that of g nuts, and have a rough, bitter and unpleasa taste. Many of the trees of this tribe, which a all natives of the tropical regions of Asia, Afri and America, are used for tannin, and some f dyeing. They are highly valued by dyers, cre ing, when mixed with alum, a durable dark brov yellow. Myrobalans fetch in the Bombay ma ket 8s to 26s. the Surat candy of 821 lbs. T bark and leaves of *T. Catappa* yield a black pi ment, with which Indian ink is made; the see are eaten like almonds. A milky juice is sa to flow from *T. angustifolia* which when drie is fragrant, and, resembling Benzoin, is used a a kind of incense in the Catholic churches in t Mauritius. The fruit of *T. Bellerica*, and of *Chebula*, both useful timber trees, indigenous t the East Indies, are used medicinally as a ton and astringent. 117 cwts of myrobalans we shipped from Ceylon in 1845. The annual im ports of myrobalans into Hull, amount to abo 1,600 cwts. The quantity which arrived Liverpool was 185 tons in 1849, 851 tons i 1850; 27,212 bags in 1851, and 19,946 bag in 1852; they come from Calcutta an Bombay, and are also used for dyeing yellow an

black. The price in January, 1853, was 6s. to 12s. per cwt. The average annual imports into the United Kingdom may be taken at 1,800 tons.

Kino.—The Kino of commerce is the product of several trees (*see* KINO). The Kino of Botany Bay and Van Diemen's Land is the produce of the Iron Bark tree, *Eucalyptus resinifera*. White (Jour. of a voyage to N. S. Wales) says, this tree sometimes yields, on incision, 60 gallons of juice. Kino is imported in Boxes. That chiefly used as East Indian kino, is an extract formed by inspissating a decoction of the branches and twigs of the gambier plant. Vauquelin analysed it, and found it to consist of, tannin and peculiar extractive matter, 75; red gum, 24; insoluble matter, 1. The East Indian kino, imported from Bombay and Tellicherry, is the produce of *Pterocarpus marsupium* a lofty, broad-spreading forest tree, which blossoms in October and November. The bark is of a greyish color, and is upwards of half an inch in thickness on the trunk. When cut, a blood-red juice speedily exudes and trickles down; it soon thickens, and becomes hard in the course of fifteen or sixteen hours. The gum is extracted in the seasons when the tree is in blossom, by making longitudinal incisions in the bark round the trunk, so as to let the gum ooze down a broad leaf, placed as a spout, into a receiver. When the receiver is filled it is removed. The gum is dried in the sun until it crumbles, and then filled in wooden boxes for exportation. Another species, *Pterocarpus erinaceus*, a tree 40 to 50 feet in height, a native of the woods of the Gambia and Senegal, furnishes kino, but none is collected in or exported from Africa. *Butea frondosa*, or the dhak tree of the East Indies, furnishes a similar product, in the shape of a milky, colored, brittle, and very astringent gum. Some specimens of Butea kino, analysed by Prof. Solly, after the impurities had been separated, yielded 73¼ per cent. of tannin. See RHUS.

(8062) TANPING. There is imported into Shanghae from the north of China, a great quantity of a dry paste, known, under the name of Tanping: the residuum or husk of a leguminous plant called "Teuss," from which the Chinese extract oil, and which is used after being pressed as manure for the ground.—*Simmonds.*

(8063) TANSY. Tanacetum vulgaris and *var.* crispum. The young leaves cut small, are used in coloring and flavouring puddings, omelets, cakes, &c. The curled *var.* T. cripsum in garnishing; succeeds on the plains of India, and grows freely in any good soil.—*Jaffrey.*

(8064) TAPIOCA, a form of STARCH, prepared in South America from two species of *Janipha*, or the *bitter* and *sweet cassava* or *manioc* roots. From the facility with which the bitter cassava can be rasped into flour, it is cultivated almost to the exclusion of the sweet variety, which contains in its centre a tough fibrous ligneous cord, which is absent in the bitter variety. The latter, however, contains a highly acrid and poisonous juice, which is got rid of by heat or by fermentation, so that the cassava bread is quite free from it. When the juice has been carefully expressed, the fecula or flower is washed and dried in the air without heat, and forms the Brazilian Arrow-Root of commerce; but when dried on hot plates it becomes granular and forms Tapioca. An artificial Tapioca is made with gum and potato starch. The granules of this are larger, whiter, and more brittle and more soluble in cold water than genuine tapioca. —*Tomlinson.* At the Madras Exhibition of 1855, Tapioca was exhibited by Mr. Rundall, of Razole near Rajahmundry, which in respect of feel and taste was excellent. It is manufactured by him at the rate of Rs. 7 8 0 per maund. Various other samples of Miscellaneous "Hill Tapioca" were exhibited—obtained from the roots of different species of Arum, Dioscorea or Terrestrial Orchids: none of them appeared important, and from deficiency of exact information, the jury were unable to enter into details, *Amorphophallus campanulatus* (Telinga Potatoe,) esteemed a very wholesome food, was likewise exhibited from Travancore, under the name of "karna kelungoo"—The large dark coloured flowers have a very curious appearance.—*M. E. J. R. Tapioca*, of late years, has been prepared in various parts of India of a superior quality from the roots of the *Jatropa manihot.*—*Faulkner.* See ARROW ROOT, also CASSAVA, also JANIPHA, also IATROPHA, also FOOD.

(8065) TAPIRUS, *Tapir*, the name of a genus of Animals belonging to the family *Pachydermata*. *Tapirus* has the following generic characters: —Molars presenting on their crown before they are worn two transverse and rectilineal tubercles (collines); nose terminated in a small moveable proboscis, but not terminated with an organ of touch like that of the Elephant; neck rather long; skin rather thick, and covered with hair, looking as if it had been close shorn; two inguinal mammæ. Anterior feet with four toes; posterior feet with three toes. The species are found in Asia and America. The dental formula of the Asiatic species is as follow:—

$$\text{Incisors}, \frac{6}{6}; \text{ Canines}, \frac{1-1}{1-1}; \text{ Molars}, \frac{7-7}{6-6} = 42.$$

(8066) TAPIRUS MALAYANUS. (*T. Indicus* of the French zoologists; Le Maiba, F. Cuv., 'Mamm.'), the Asiatic Tapir. "The Malay Tapir resembles in form the American, and has a similar flexible proboscis, which is six or eight inches in length. Its general appearance is heavy and massive, somewhat resembling the Hog. The eyes are small; the ears roundish, and bordered with white. The skin is thick and firm, thinly covered with short

hair. There is no mane on the neck, as in the American species. The tail is very short, and almost destitute of hair. The legs are short and stout; the fore feet furnished with four toes, the hind feet with three. In the upper jaw there are seven molars on each side, one small canine inserted exactly on the suture of the incisor bone, and in front six incisors, the two outer of which are elongated into tusks. In the under jaw there are but six molars; the canines are large; and the number of the incisors, the outer of which are the smallest, is the same as in the upper jaw. The general colour is glossy black with the exception of the back, rump, and sides of the belly, which are white, and separated by a defined line from the parts that are black." (*Raffles.*) The habits of this species in a state of nature are probably similar to those of the American Tapirs. In captivity, Major Farquhar describes it as of a mild and gentle disposition. "It became as tame and familiar as a dog; fed indiscriminately on all kinds of vegetables, and was very fond of attending at table to receive bread, cakes, or the like." Sir Stamford Raffles adds, that the living specimen sent from Bencoolen to Bengal was young, and became very tractable. It was allowed to roam occasionally in the park at Barrackpore, and the man who had charge of it informed Sir Stamford that it frequently entered the ponds, and appeared to walk along the bottom under water, and not to make any attempt to swim. Sir Stamford also states that the flesh is eaten by the natives of Sumatra. The individuals which have been exhibited in the Regent's Park Gardens have been very mild and gentle.—*Eng Cyc.*

(8067) TAR.

Goudron, Fr.	Smola gesta, Pol.
Theer, Ger.	Degot, Smola Shitkaja, Rus.
Catrame, It.	
Pix liquida, Lat.	Tjara, Sw.

A thick black, unctuous substance, obtained by burning pine and fir trees in a close smothering heap, with a channel through which the tar exudes. It is extensively used for resisting moisture on wood, rope, &c., and is consequently in great request as a marine store. It is largely made in Russia, the United States, and Sweden. —*Faulkner.* Tar is chiefly employed for marine uses. Tar water was long a celebrated remedy, in the treatment of some chronic diseases of the lungs.—*O'Shaughnessy, page* 618.

(8068) TARAXACUM OFFICINALE, Dandelion. *Syn.* Leontodon Taraxacum. A native of Europe and the Himalayas. The inspissated juice of the plant, the infusion, decoction, and extract of the root, are strongly bitter, and prove tonic and diuretic, in large doses aperient. It is a favourite, and we believe useful remedy in the old hepatic diseases of persons who have long resided in India, and returned to a cold climate. The dose of the extract is 3 to 10 grains, thrice daily. For formulæ for infusion and decoction, *see Pharmacopœia.—O'Shaughnessy, p.* 407.

(8069) TARE, Fitch, Vetch. A species of pulse (*Vicia sativa*). Cultivated in Great Britain principally for its stems and leaves, which are used in the feeding of sheep, horses, and cattle; and partly also for its seed, which is used in the feeding of poultry.—*Faulkner.*

(8070) TARINE A hard, fine, close-grained, rather heavy Ceylon wood, much resembling English birch.

(8071) TARSIUS. (Storr), a genus of Animals belonging to the family *Quadrumana.* It has the following characters:—Head rounded; muzzle short; eyes very large; posterior limbs very much elongated, with the tarsus thrice as long as the metatarsus. Tail long.

Dental formula:—Incisors. $\frac{4}{2}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{6-6}{6-6}$ = 33

(8072) TARSIUS BANCANUS. Dr. Horsfield remarks, that although the *Tarsius* from Banca agrees in the essential points with the other species of this singular genus which have hitherto been discovered, it has no intermediate front teeth, and the exterior tooth on each side is, compared with other species, very minute. Counting (with Desmarest) one canine tooth on each side, above and beneath, it has, says Dr. Horsfield, only five grinders in each jaw. The hands of this creature are small and delicate, and externally covered with a very soft down. Internally they are naked. The nails of all the fingers of the hand, as well as of the thumb and the third and fourth finger of the feet, are triangular, and represent a delicate compressed scale: on the index and middle finger of the feet they are erect, sharp, compressed, slightly curved and not inaptly compared by Mr. Fischer to the thorns of a rose-bush, constituting one of the essential characters of this genus. The body is handsomely formed, and, as in the other species, somewhat contracted towards the pelvis; the lower extremities also have in general a similar character, but the tarsus has less of the extravagant length which is common to the other *tarsii.* The fur is remarkably soft to the touch; it is compressed, of a thick and very delicate wool, which envelopes the body, head, and extremities, forming a coat of an unequal surface, from which irregular straggling hairs project; at the root of the tail, and at the hands of both extremities, it terminates abruptly in the form of a ring. The general colour is brown, inclining to gray; on the breast, abdomen, and interior of the extremities it is gray, inclining to whitish; a rufous tint is sparingly dispersed over the upper parts, which shows itself most on the head and extremities; the naked parts of the tail near the root are considerably darker than the extremity. ('*Zoological Researches in*

Java.') Dr. Horsfield obtained this animal in Banca, near Jeboos, one of the mining districts, where, he says, it inhabits the extensive forests in the vicinity.—*Eng Cyc.*

(8073) TARTAR (CRUDE), ARGAL, ARGOL. ORGOL.

Wynsteen, DUT.	Tartaro volgare, IT.
Tartre-cru, Blanc et rouge FR.	Tartarus, LAT.
Roher Weinstein, GER.	Tartaro, PORT.
	Winnui kamen, RUS.
	Tartaro, SP.

An acidulous salt, which exists in the juice of the grape, and is deposited in wine casks in the form of a crystallized incrustation more or less thick, which is crude tartar or argol. It is either white, or red, according to the colour of the wine; the former is preferred as it contains fewer impurities than the red; but the properties of both are essentially the same. When good, it is thick, hard, brittle, and brilliant, with but little earthy matter. It is obtained from Florence, Naples, Sicily, and Cape of Good Hope, and is used in hat-making, gilding, dyeing, and in the preparation of tartaric acid. (*Waterston.*) —*Faulkner.*

(8074) TEA.

Chai, ARAB.	Te, IT.
Cha, Te, CHIN.	Tsja, JAP.
Chai, CASH.	Teh, MAL.
Cha-i, DUK.	Cha-i, PERS.
Te, DUT.	Cha, PORT.
Thé, FR.	Tchai, RUS.
Thee GER.	Te, SP.
Cha, Cha-ie, GUZ. HIND.	Tchai, TURK.

The leaf of an evergreen shrub, a native of China and Japan; it is also cultivated in Java, Assam, Brazil, and other places; but at present the chief commercial source of tea is China, whence it is exported to different parts of the world.—*Faulkner.*

The Honorable Mr. Morrison says that the limits of his work could not admit of a full description of the various sorts of tea, or an account of their preparation; nor would the most minute details enable any one to select good teas, or supply that skill which practice gives in discriminating their qualities. An account of the cultivation of the plant, and mode of curing the leaves, together with some information respecting the different varieties of black and green teas, the origin of the names and other particulars relating to its sale and consumption, is contained in the Chinese Repository Vol. VIII pages 132-164, to which he refers the reader. In the Tabular statement, the total exportation of tea is put down at 350,000 peculs or forty millions of pounds, but it is probably nearer 427,500 peculs, or fifty-seven millions of pounds; viz. to England, 40,000,000 lbs.; to the United States 14,000,000 lbs.; and to all other countries, 3,000,000 lbs. which at 25 taels per pecul, instead of the 20 in the Statement, amounts to 10,687,500 tales, or $ 14,500,000. The present duty of 2 5t. exclusive of all shipping and other charges, which were before included in the total sum of 5 taels paid the hong-merchant as duty.—*Morrison.*

Tea statistics.—The immense traffic in the produce of this simple shrub, the growth of a remarkable country, for long almost entirely isolated from the western nations, is one of the most remarkable illustrations of the enterprise and energy of modern commerce. The trade in tea now gives employment to upwards of 50,000 tons of British shipping, and about ten millions sterling of English capital, producing a revenue to Great Britain of nearly six millions sterling.

Tea, its properties.—Every reflecting man will admit that articles of such vast consumption as tea and coffee (amounting together to more than 348,500 tons annually), forming the chief liquid food of whole nations, must exercise a great influence upon the health of the people. There is scarcely any country in the world in which a dietetic drink or beverage resembling tea, is not prepared, and in general use from some exotic or indigenous shrub. The two chief plants laid under contribution are, however, the Chinese tea-plant, and a species of holly peculiar to South America producing the Paraguay tea. *Astoria theiformis* is used at Santa Fe as tea. The leaves of *Ceanothus Americanus*, an astringent herb, have been used as a substitute, under the name of New Jersey tea. It has been a matter of surprise why tea should be so much sought after by the poorer classes, since by many it is looked on more as a luxury than of use to the human system. The manner in which it acts, and the cause why it is so much in demand by all classes, is satisfactorily explained by Liebig; and the benefit, therefore, which will be conferred by selling it at a low rate, and thus placing it within the means of all, has at last come to be duly appreciated. Liebig says, without entering minutely into the medical action of caffeine, theine, &c., it will surely appear a most striking fact, even if we were to deny its influence on the process of secretion, that the substance, with the addition of oxygen and the elements of water, can yield taurine, the nitrogenised compound peculiar to bile:—

	Carbon.	Nitrogen.	Hydrogen.	Oxygen.
1 atom caffeine or theine =	8	2	5	2
9 atoms water..... =	...	...	9	9
9 atoms oxygen ..... =	...	...	...	9
= 2 atoms taurine...	8	2	14	20
=	2	4	9	10

Commerce in Tea.—The first tea imported into England was a package of two pounds, by the East India Company, in 1664, as a present to the king; in 1667, another small importation took place, from the company's factory at Bantam. The direc-

tors ordered their servants to "send home by their ships 100 pounds weight of best *tey* they could get." In 1678 were imported 4,713 lbs.; but in the six following years the entire imports amounted to no more than 410 lbs. According to Milborn's "Oriental Commerce," the consumption in 1711 was 141,995 lbs.; 120,595 lbs. in 1715, and 237,904 lbs. in 1720. In 1745 the amount was 730,729 lbs. For above a century and a half, the sole object of the East India Company's trade with China was to provide tea for the consumption of the United Kingdom. The company had the exclusive trade, and were bound to send orders for tea, and to provide ships to import the same, and always to have a year's consumption in their warehouses. The teas were disposed of in London, where only they could be imported, at quarterly sales. The act of 1834, however, threw open the trade to China. From a Parliamentary return, showing the quantity of tea retained for home consumption in the United Kingdom, in each year, from 1740 to the termination of the East India Company's sales, and thence to the present time, it appears that in 1740, 1,493,695 lbs. of tea were retained for home consumption. Two years afterwards, the quantity fell to 473,868 lbs. and in 1767 only 215,019 lbs. were retained. Next year the amount increased to 3,155,417 lbs.; in 1769 it was 9,114,854 lbs.; in 1795, 21,342,845 lbs.; in 1836, 49,842,236 lbs. The return in question also specifies the quantity of the various kinds of tea, with the average sale prices. According to the annual tea reports of Messrs. W. J. Thompson and Son, and Messrs. W. E. Franks and Son, the total imports into Britain of tea during the last fifteen years were as follows, reckoned in millions of lbs.:—

Years.	Black.	Green.	Total.	Home Consumption.
1838	26,786 ...	8,215 ...	35,001 ...	36,415
1839 ...	30,644 ...	7,680 ...	38,324 ...	36,351
1840 ...	21,063 ...	7,161 ...	28,224 ...	31,716
1841 ...	24,915 ...	6,303 ...	31,218 ...	36,811
1842 ...	31,915 ...	9,729 ...	41,644 ...	37,554
1843 ...	39,513 ...	7,340 ...	46,853 ...	39,902
1844 ...	39,644 ...	8,749 ...	48,393 ...	41,176
1845 ...	39,518 ...	11,790 ...	51,338 ...	44,127
1846 ...	44,017 ...	12,486 ...	56,503 ...	47,534
1847 ...	46,887 ...	8,368 ...	55,255 ...	46,247
1848 ...	37,512 ...	7,611 ...	45,123 ...	48,431
1849 ...	43,234 ...	9,156 ...	52,400 ...	50,100
1850 ...	39,873 ...	8,427 ...	48,300 ...	51,000
1851 ...	62,369 ...	9,131 ..	71,500 ..	54,000
1852 ...	55,525 ...	9,175 ...	64,700 ...	54,724

Duty.—In England, duty on tea was gradually raised from 9d. per lb. in 1787 to 3s. a lb. in 1806. It was 2s. 2d. per lb. until May, 1852, when 4d. per lb. was taken off, and further annual reductions are to be made. Down to the year 1834 the duty was an *ad valorem* one of 96 per cent. on all tea sold under 2s. a lb., and of 100 per cent. on all that were sold at or abo 2s., charged on the prices which they brought East India Company's sales. The *ad valore* duties ceased on the 22nd of April, 183 and under the act 3 and 4 William IV. 100, all tea imported into the United Kingdo for home consumption was charged with a cu toms duty as follows:—

Bohea	1s. 6d.	per lb.
Congou, twankay, hyson skin, orange pekoe and canpoi	2 2	„
Souchong, flowery pekoe, hyson, young hyson, gunpowder, imperial, and other teas not enumerated	3 0	„

In 1836, the uniform duty of 2s. 1d. per l on all descriptions of tea was imposed, whic with the additional 5 per cent. imposed in 184 made the total duty levied per lb. 2s. 2d. and fraction.

Cost of Tea.—The average cost of tea in Chi at the ship's side is 10d. per pound, while it is co fidently asserted that it could be produced in ma parts of America at 5d. the pound. The great co in China is owing to the expensive transportatic the cultivation of the fuel used, the absence all economy of machinery, &c. It is only adulteration that tea is sold in China as che as 10d. In America the heating and rolling the leaves (one half of the labor) could be do by the simplest machinery, fuel could be econ mised by flues, &c. The Russian teas broug by caravans, are the most expensive and b teas used in Europe. The Chinese themselves p 7½ dollars per pound for the "Yen Pouchong" te Full chests were exhibited in 1851, by Mr. Ripl of various Pekoe teas, some of which fetch 5 per lb. in the China market; whilst 7s. is t very highest price any of the sort will fetch England, and this only as a fancy article. T plain and orange-scented Pekoes now fetch lit with us; but all caravan teas are purchased the wealthier Russian families. The finest, ho ever, never leave China, being bought up by t Mandarins; for though the transit expenses a 3s. to 4s. per lb. to the value when sold in Ru sia, the highest market price in St. Petersbu is always under 50s. Among these scented te are various caper teas, flavoured with chloranth flowers and the buds of some species of plan belonging to the orange tribe, *Magnolia fusca* olea flowers, &c. The Cong Souchong, or Nin young teas, are chiefly purchased for the Ame can market. Oolong tea is the favourite dri in Calcutta, though less prized in England, delicate flavor being injured by the length the voyage. For delicacy, no teas, appro those usually called "Mandarin teas," which ing slightly fired and rather damp when in fittest state for use, will bear neither transp

nor keeping. They are in great demand among the wealthy Chinese, and average 20s. per lb. in the native market.—*Jury Report* of Ex. of 1851.

Consumption of Tea.—The consumption of tea in the United Kingdom may now be fairly taken at fifty-four million pounds yearly, and sold at an average price to the consumer of 4s. 6d., per pound. The money expended for tea is upwards of twelve millions sterling. The population of the Chinese provinces, as quoted by Dr. Morrison, from an official census taken in 1825, was 352,866,012, and we may fairly conclude that during the last twenty-eight years this population has extensively increased. If we multiply the population of China by four, we have—

	lbs.
Total consumption of tea in China	1,411,464,048
Export to Great Britain and Ireland, for the year ending June 30, 1851	64,020,000
Export to the United States, same period	28,760,800
Exported to Holland, returned at 2,000,00) in "Davis's China."	3,000,000
Inland trade to Russia	15,000,000
Export to Hamburg, Bremen, Denmark, Sweden, &c, seven cargoes, about	3,000,000
Export to Sydney, and Australasian Colonies, at least	6,000,000
Export to Spain and France, four cargoes	2,000,000
Total lbs.	1,533,244,848

The above is exclusive of the heavy exportation in Chinese vessels to all parts of the east where Chinese emigrants are settled, such as Tonquin, Cochin China, Cambodia, Siam, the Philippines, Borneo, and the various settlements within the Straits of Malacca. In comparison with such an enormous quantity, the 54 million lbs. consumed in the United Kingdom sink into insignificance.

	£
The cost of tea to America, at the ship's side in China, say 29,000,000 lbs., at an average of 1s. per lb, would be	1,450,000
The cost to England, 64,000,000, at the same price	3,200,000
The cost to other places, say 25,000,000	1,250,000
Russia, 15,000,000	750,000
Total	£6,650,000

Production of Tea.—It is important, in calculating what tea may be had from China, to consider the manner of its production. It is grown over an immense district, in small farms, or rather gardens, no farm producing more than 600 chests. "The tea merchant goes himself, or sends his agents to all the small towns, villages, and temp in the district, to purchase tea from the prie and small farmers; the large merchant, into whc hands the tea thus comes, *has to refire it a pack it for the foreign market.*'—(*Fortune's T Districts.*) This refiring is the only additional pr cess of manufacture for the Foreign market. M Fortune elsewhere, in his valuable work, givi an account of the cost of tea from the farme the conveyance to market, and the merchan profit, states that "the small farmer and ma pulator is not overpaid, but that the great pr fits are received by the middlemen."—*Simmon*

Habit. of Tea Plant.—Thunberg informs that the Tea-plant grows plentifully in Jap both in a wild and cultivated state, and I Wallich says that it is found in Coch China. I have met with it says Fortune in cul vation in China, from Canton in the south up the 31st degree of north latitude, and Mr. Reev says it is found in the province of Sham-tun near the city of Sang-chow-foo, in latitude 3(30' north. page 272. The principal tea distric of China, however, and those which supply t greater portion of the teas exported to Euro and America, lie between the 25th and 31 degrees of north latitude, and the best distric are those between 27° and 31°.—*Fortune's T Districts, page* 272.

Tea districts.—The tea districts in Chi extend from the 27th degree to the 31st degr of north latitude, and, according to missionari it thrives in the more northern province Kœmpfer says it is cultivated in Japan, as f north as 45 degrees. It seems to succeed bc on the sides of mountains, among sandstor schistus, and granite.—*Simmonds.*

The green-tea shrub is cultivated very exte sively in the interior of the island of Chusan.- *Fortune, page* 117.

Mauritius, Bourbon, St. Helena, Cape.- Mr. Boyer, director of the museum at Po Louis, Mauritius, has succeeded in rearing 40,0(tea-trees, and expresses an opinion, that if t island of Bourbon would give itself up to t cultivation, it might easily supply France wi all the tea she requires. The culture has al been commenced on a small scale, in St. Hel na, and the Cape Colony. The cultivation the tea-tree might be tried with probability success in Natal, and the Mauritius. The pla grows in every soil, even the most ungratefu resists the hurricanes, and requires little car The picking of the leaves, like the pods of co ton, is performed by women, children, and t infirm, without much expense. The preparatic is known to the greater part of the Chines of whom there are so many in Mauritius; b sides, it is not difficult. A Mr. Duprat h planted a certain extent of land in the neig bourhood of Cernpipe, in that island, but have not yet learnt with what success.

Cochin China.—The tea of Cochin China is considered inferior to that of China, being less strong and pleasant in flavour. An inferior sort of tea, with a leaf twice or thrice as large as that of Bohea, grows wild in the hilly parts of Quang-si, and is sold at from 12s. 6d. to 40s. the picul of 133 lbs.

Java.—The Dutch have devoted much attention to tea cultivation in Java, and the plantations are in fine order. Nearly a million lbs. of tea were shipped thence in 1848; but the tea is said to be of inferior quality, and grown and manufactured at considerable expense.

Japan.—Japan produces both black and green tea. The Japanese prefer the latter to the Chinese green tea. The black tea is very bad. The Japanese tea-tree, is an evergreen, growing in the most sterile places to the height of about six feet. It is described by Kœmpfer, as having leaves like the cherry, with a flower like the wild rose; when fresh, the leaves have no smell, but a very astringent taste. Tea grows in all the southern provinces of Japan, but the best green is produced in the principality of Kioto, where it is cultivated with great care.

Ceylon.—A few years ago, Messrs. Worms attempted the cultivation of tea in Ceylon. The Island, however, lies too far within the tropics to offer a climate like Assam, which is situate without them. The plants may thrive to appearance, but that is not a demonstration of their quality.

Pinang,—The tea-plant has reached upwards of six feet in height at Pinang, and in as healthy a state as could be desired, but the leaf had no flavor, and although thousands of Chinese husbandmen cultivated species, and other tropical productions on that island, no one thinks it worth while to extend the cultivation of the tea-plant in Pinang. The Chinese there laugh at the idea of converting the leaf into a beverage.

India.—Dr. Wallich mentions it in Cochin-China in N. lat. 17°, and in China in the southern provinces of Yunan and of Qung-tung. Mr. Reeves informed Dr. Royle that, in a Chinese Herbal, tea is said to be produced, among other places to the northward of 31°, in nine places in Hoo-Quang, three places in Ho-nan, one place in Shensi, and two places in Shantung; one of these latter, and the most northward of the whole, is Tangchow-Foo, in 36° 30' N. lat.—and in the Japan islands, which extend from 30° to 41° of N. lat., Dr. Abel states having found it in an apparently wild state at See-chou, in the province of Kiang-see, about N. lat. 26°, where the hills were covered with pines. Dr. Royle has, since the publication of his observations, seen an excellent specimen in flower in the British Museum, collected by another botanist (Mr. Cunningham) near Chusan, which is in 30° of N. lat. and where, he says, it delights on the tops of mountains like the pine. [This specimen was pointed out to Dr. Royle by Mr. R. Brown, distinguished as the first botanist of the day. The note attached to it is in the hand-writing of Cunningham. "Thea frutex flore alho rosaceo summitatibus montium gaudens uti pinus."—Herb. Mus, vol. xciii., fol. 146.] He further informs us, that "a plant was given to him at Suddiya, which he had reason to suppose was a genuine tea tree." Lieut. Charlton writes, on the 17th May, 1834, that he had been informed three years previously of the tea plants growing wild near Bheesa, whence indeed, he obtained three or four young trees, which he gave to Dr. John Tytler, to be planted in the Government Botanical Garden. On the 8th November, he sent to Calcutta some seeds and leaves of the tea trees of Assam, which were forwarded on the 24th December to the Government by the Tea Committee, who announced that "the tea shrub is beyond all doubt indigenous in Upper Assam, being found there, through an extent of country of one month's march within the Honourable Company's territories, from Suddiya and Beesa to the Chinese frontier province of Yunnan, where the shrub is cultivated for the sake of its leaf." So far back, however, as 1826, Mr. D. Scott sent from Munnipore, to Mr. G. Swinton, then Chief Secretary to the India Government, specimen of the leaves of a shrub which he insisted was a real tea. These we find were first discovered by Mr. Bruce, who was then in command at Suddiya. He sent tea seeds and plants to Mr. Scott, having been previously informed of their existence by his brother, the late Major Bruce; and he subsequently, in 1833, brought it to the notice of Capt. Jenkins.—(Tea Cultivation in India, p. 91.) Descriptions have been published by these gentlemen of the several tea tracts which they had at that time an opportunity of examining. These, according to Dr. Wallich, were five in number,—Koojo and Niggroo, among the Singpho, Nuddooa (Noadwar) and Tengrae, in the Muttuck country, and Gubroo, at the foot of the Naga Hills, in the territories of Rajah Purrendur Singh. The last, Dr. Wallich supposes, is connected with others to the southward, and with the tea plant originally announced as existing in Munnipore, and this, he says, may have originated from the plant at Hookum, and that all may have "originally travelled from the frontiers of China," where we know that a kind of tea is cultivated in the province of Yunan. Mr. Bruce, in his latest account, published in August 1839, in the Journal of the Asiatic Society, gives an account of the discovery of other tea tracts, which then amounted to no less than "one hundred and twenty, some of them very extensive, both on the hills, and in the plains." The hills on which tea has been found by Mr. Bruce, are the Naga Hills, and those of

Gubroo and Tipum.—*Royle's Productive Resources of India.* These discoveries were not lost sight of, and the Calcutta *Daily News* thus notices the half yearly report of the Assam Tea Company :—"The crop of Tea which in 1855 was 588,379 lb. and in 1856, 638,789 lb. is expected in 1857 to reach 700,000 lb. or nearly twenty times as much as the produce of the Government establishments in the North West in the fifteenth year of their existence. Nothing is said of the cost of the Tea ; but that was, we suppose, shewn in the accounts which were laid before the shareholders, but which have not been sent to us for publication. The whole of these Teas appear to have been hitherto shipped to England and those now arriving, will probably command extreme prices in consequence of the war with China. Should the notion be started at home that the Chinese may possibly medicate their Tea, there is no saying what prices may be paid for the Indian article, warranted genuine. The meeting by the secretary Mr. Elliot, read a letter from Dr. Jameson, Superintendant of the Botanical Garden at Saharunpoor, giving an account of the Tea plantations in the Himalayas. The encouragement given to the cultivation of tea in the last two years bids fair to render tea a staple article of produce in the N. W. Provinces. Last year the quantity turned out was 40,000 lbs. ; this year, that amount will be doubled. It is now in great demand at Almorah and Deyrah, the best kinds realizing from 3 Rs. to 4 Rs. 8 Annas per pound, and this not for small quantities, the amount disposed of having been 20,000 lbs. A great proportion of the second class teas was purchased by natives for the purpose of bartering with the Bhotiahs in the interior of the Himalayas and Thibet in exchange for Borax and other products of the Mountain region. Up to this time the Mountain races have been in the habit of consuming the brick teas of China. It is certainly a remarkable fact that an integral part of the Chinese Empire is receiving its supplies of tea from India, and Dr. Jameson is sanguine that if aided by good roads the trade with the Bhotiahs will soon become an important one, and that the Indian teas will be sold at rates so cheap as to drive the Chinese article out of the market in these regions.—*Calcutta Daily News*, 1857.

Introduction of Chinese plants into INDIA, *especially Assam and Himalayas.*—We have shown that it thrives equally well in the vicinity of Canton, and the milder climate of Nankin, as in the northern latitudes of Pekin and Japan ; embracing, therefore, a distribution over twenty degrees of latitude. The knowledge of this fact led to an inquiry in India, so long since as 1827, as to the practicability of introducing the culture of the tea-plant into the northern regions of that vast country ; and the result was an opinion of the Company's botanist, Dr. Royle, that it might be successfully grown in the north-western portion of the Himalaya districts. He pointed out some localities particularly suited to the experiment in the district of Kumaon, a portion of the province of Delhi, and situated between the 29th and the 30th degrees of north latitude, to the north-west of Nepaul. This opinion was afterwards backed by the investigations of others, who agreed in the belief that there was no impediment to the successful introduction of the tea culture in the Himalayan regions beyond the difficulty of obtaining a supply of plants, and some details relative to the Chinese mode of cultivation and curing of the article. In 1834 Lord William Bentinck formed a committee, with the view of adopting measures for attempting this cultivation in India ; and the first step taken was the dispatch of agents to the tea districts of China, whence a supply of seeds and plants, and much valuable information was brought. Nurseries were formed in Calcutta, and some ten thousand plants were reared, the greater portion of which were dispatched to Kumaon, though but a small fraction of them reached the Himalayas ; whilst a quantity was forwarded to the hill districts of the Madras presidency, but without any commercial results. The plants dispatched northwards were distributed in several directions, and so well did they thrive, that in the year 1838 many of them had produced seed, which was at once sown, and thus formed fresh nurseries.

In the meantime the existence of the plant in a wild state had been ascertained in the upper districts of Assam, one of the north-eastern provinces of the Bengal presidency ; and inquiries having been directed to it, evidence was not long wanting to shew that the plant was growing in not less than a hundred different tracts amongst the dense jungles of that country. In 1837, samples of tea, prepared from the wild plants of the Assam district, were forwarded to Calcutta, and favourably reported on. Observations and researches instituted in the Assam country went to shew that the district really possessed most of the requisites of soil, position, altitude, and climate. Some valuable reports upon the peculiarities of this district, and the results of a number of experiments in the culture of the indigenous plants, were published at intervals between 1837 and 1840 ; and from these it appears that the best seasons for the manipulation of the tea-crop are in March, May, and July. Every inquiry goes to prove that the greatest success has been attained whenever the culture has been attempted on hilly slopes, or in the vicinity of rivers, with a temperature ranging from 27° to 80° ; indeed, it appears certain that the latter consideration is of far more importance than that of soil. The China tea-plants introduced into Upper Assam by the instrumentality of the Company's servants

have not only thriven remarkably well, but attained a size and vigour unknown to them in their native soil. The first parcels of tea from these districts were highly approved of on their arrival in England, and realised enormous prices, partly owing, in all probability, to their novelty. The result of these sales, however, placed it beyond a doubt that the cultivation of tea could be profitably carried on in that part of India; and in consequence, a public company, entitled the "Assam Company," was formed for the purpose of carrying on the culture and manufacture of British Indian tea on an extensive scale. The East India Company having thus acted the part of pioneers, handed over their experimental plantations and establishments to the new company, who have since greatly enlarged the plantations and works, and have succeeded in producing a tea superior to any imported into this country from China, and equalled only by the fewer samples which, under the old company's system, used to be occasionally obtained. During the first years of their operations, the Assam Company encountered many obstacles, arising from the difficulty of procuring labour in sufficient quantity, from the want of skill of their first managers, and, above all, from the extreme remoteness of their property from all supervision. The formation of a Calcutta committee had obviated the latter evil, whilst the remaining difficulties have been successively overcome by patient perseverance: and the company is now on a most solid foundation, having increased their extent of plantation to twelve hundred acres, with a crop in 1853 calculated at 300,000 lbs., which has hitherto realised fully a third above the China teas. The produce of the company's tea-crop of 1847 realised 9,728*l.* nett; that of 1848, 12,552*l.*; that of 1849, 16,628*l.*; that of 1850, 18,153*l.*; and that of 1851, as above stated, 22,151*l.* The nett average price per pound in those years was, for 1847, 1*s.* 4*d.*; 1848, 1*s.* $5\frac{1}{16}$*d.*; 1849, 1*s.* $6\frac{13}{16}$*d.*; 1850, 1*s.* $6\frac{2}{16}$*d.*; and 1851, 1*s.* $8\frac{1}{2}$*d.*

In the Himalayan districts the labours of the tea experimentalists have been equally successful with those carried on in the more easterly province of Assam. About the year 1842, the aid of some of the Chinese cultivators, who had been introduced in the Assamese plantations, was obtained for tea-farms in the Kumaon district of the Himalayan country; and by their instrumentality a quantity of black tea was produced and dispatched to Calcutta, whence it was shipped to Great Britain, and pronounced superior in strength and flavour to the generality of Souchongs. By the end of the year 1844 these experimental plantations contained upwards of a hundred thousand plants; and two years later covered nearly two hundred acres, at various altitudes, varying from 2500 to 6500 feet above the sea-level. In the year 1848 this cultivation was still further extended, reaching to an extent of 1000 acres, not in one immediate neighbourhood, but stretching through many miles of country, and in some parts reaching the recently acquired Sikh territories on the north west frontier. The quantity of tea produced from these plantations must now be of some importance, and although the great distance of these districts from a port of shipment will always be a barrier to any successful competition with more favoured tea-producing countries, the supply of the local demand, already largely on the increase since this culture has commenced, will of itself prove a trade of no small value. So deeply impressed was the local government with the importance of this new branch of industry, that a grant of ten thousand pounds sterling a year was voted to carry out the experiment until it should, as in Assam, be taken up by private enterprise. In 1850 the East India Company, determined to lose no opportunity of fully testing the value of this cultivation, dispatched Mr. Fortune to China to glean all possible information regarding the tea-plant, its natural history, and the manipulation of its leaves; and, if possible, to bring away from the Chinese dominions a fresh supply of plants and seed of the best varieties, as also some experienced cultivators and work-people. In all these objects their agent was singularly fortunate, having but recently returned to India with a supply of all that was desired, in plants, seed, work-people, and, better still, in accurate data regarding the various processes of the cultivation and manufacture of this article.—*Capper's Three Presidencies, p.* 330.

Assam.—A company for the cultivation of tea, under the title of the Assam Company, was established in March, 1839; and which, with a called-up capital of £193,337, has, as our previous observations have shown, made, up to the present time very profitable progress; having now got its plantations into excellent cultivation, and all its arrangements in admirable working order, it has sold teas to the amount of £90,000, and has a steamboat, a considerable plant and machinery. In the report of the Company, at their annual meeting, held at Calcutta, in Jan., 1850, it was stated, as the result of their operations, that during the year 1849, the manufacturing season was unusually cold and ungenial, in consequence of which the development of leaf for manufacture was much checked. Although some loss was sustained, there was considerable increase in the crop notwithstanding, attributable to the continued improvements in the culture which had been obtained, and improvements over the previous season in some departments of the manufacturing process. The gross quantity of unsorted tea manufactured in the southern division was 207,982 lbs., being 2,973 lbs., less than that of the previous season, but the actual net out-turn was expected to reach 200,000 lbs.

As much as 157,908 lbs. of the crop had been already received and shipped to England. These teas consisted chiefly of the finer qualities. Whilst the crops have been thus sensibly advancing in quantity and quality, and the value of the Company's plantations permanently raised by extended and improved culture, and some increase to the sowings, the total outlay had been somewhat less than the previous year, the expenditure being limited to £500 for a crop of 24,000 acres of tea. With more extended gardens, the produce will be raised at a yet lower rateable cost than at present. The number of acres in cultivation in 1849, was about 12,000: these were not all in bearing, but would shortly be so, and the produce from this extent might be estimated at 300,000 lbs., and the cost of producing this would be about £11,000. 1,010 chests of the produce were sold in London on the 13th of March, 1850, at a gross average of 1s. 11½d. per lb. The produce of 1847, sold in England, was 141,277 lbs., at a gross average of 1s. 8d. per lb.: that of 1848 was 176,149 lbs. which sold at the average of 1s. 8½d. The produce of 1849 was 216,000 lbs., and there was every expectation of the average prices realised being higher than those of the previous years. The season was cold and unfavourable, or the crop would have been 10,000 lbs. more. The exact amounts obtained for the Company's teas in the five years, ending with 1851, will be seen from the following figures:—

	Net produce, lbs.		Average price.	£
1847 ...	144,164	at per lb. ...	1s. 7 1/16d.	11,513
1848 ...	182,953	,, ...	1s. 8¼ d.	15,436
1849 ...	216,000	,, ...	1s. 9½ d.	19,350
1850 ...	253,427	,, ...	1s. 6⅛ d.	18,163
1851 ...	271,427	,, ...	1s. 8½ d.	22,152
1852estmd.	280,000			

This exhibits a progressive increase in the aggregate value of the Company's produce, and this has been effected, it is stated, without any sensible increase of the current expenditure. It exhibits also a rise in the value of the tea (157,942 lbs. having been sold at the high average price of 1s 11½d.), a fact strongly indicative of its increasing excellence. The details of the crop of the season of 1849 showed a net produce of 237,000 lbs. of tea; so that the Company are increasing their cultivation to the extent of nearly ten per cent. per annum, and the increase will doubtless proceed with greater rapidity, whenever the increase of capital enables the directors to extend their operations. The prices in the years 1851, 1852, in London, have been fully maintained at 1s. 3d. to 4s. 4d., according to sorts. Of Assam tea, the sales in the London market in 1851 amounted to 2,200 packages, against 1,900 packages in 1850, and all were freely taken (on account of their great strength) at very full prices.

Kumaon.—Seventy-six packages of Kumaon tea, both black and green, grown by the East India Company, in the Himalayas, as an experiment, were, in 1851, also brought to sale. They were teas of high quality; but being of the light flavored class, and not duly esteemed in the English market, they realised only about their relative value as compared with China teas of similar grade. The Souchong and Pouchong sold at 1s. 1¼d. to 1s. 3½d.; the Hyson, Imperial, and Gunpowder realised 1s 7¾d. to 2s. 6½d. Mr. Robert Fortune, who, in the service of the Horticultural Society of London, gave such satisfaction by his botanical researches in China, was, on his return to England, in 1848, engaged by the Directors of the East India Company to proceed again to the Celestial Empire, and procure and transmit to India such a quantity and variety of the tea plant, that its cultivation in the north-western provinces would be a matter of mere manual labor. Having penetrated about 300 miles into the interior, he left Hong Kong in the middle of 1851 for Calcutta, with a large quantity of choice plants, selected in the green tea districts, and these have flourished as well as could possibly be expected; so that, in the course of a few years, there is every probability that tea will form a considerable article of export from our Indian Presidencies. Mr. Fortune secured the services of, and took with him, eight Chinese, from the district of Weichow, under an agreement for three years, at the rate of fifteen dollars a month each. Six of these were regular tea-manufacturers; the other two were pewterers, whose sole business is that of preparing lead casings for tea-chests.

Punjab.—In the British portion of the Punjaub, it was, at first, resolved to expend £10,000 a year on the cultivation of the tea plant on the banks of the Beas, as well as at Anarkullee, and Kotghur in the Simla jurisdiction. Beyond the Beas there is a series of valleys on to Noonpoor, viz., the Palklun, Kangra, Rillo, &c., from 3,000 to 4,000 feet above the level of the sea, separated from each other by small ranges of hills. The valleys are from three to four miles in breadth, and from sixty to seventy in length: they are sheltered on the north by high mountains.—*Simmonds.*

India Tea Farms, Kumaon Plantations.
Mr. Fortune's Report 1856.

Bhurtpoor.—This place is situated eight or ten miles to the eastward of Nainee Tal, and is at an elevation of about 4,500 feet above the level of the Sea. It consists of a succession of terraces reaching from the bottom to the top of a small Hill; the soil is composed of light loam mixed with small pieces of clay-slate and trap or green stone, of which the adjacent rocks are chiefly composed. In 1851, when I visited this Plantation, it covered about four and a half acres of land. Since that time it has been extended down to the bottom of the Hill, and may now be

about six acres in extent. The bushes are in excellent condition, and fully justify the favourable opinion I formed of the Plantation on my first visit. I then stated, in my Report to Government, that "both the situation and the soil of this Plantation are well adapted to the requirements of the Tea shrub." The centre portion of the land, about half way up to the Hill, is particularly worth pointing out as an example of what I consider most excellent soil for Tea cultivation. A large tract of land in the hills adjoining Bhurtpoor has been set apart for the extension of this farm.

Lutchmesir and Kuppeena.—These Plantations are on a Hill side near Almorah, about 5,000 feet above the level of the Sea, and together cover about seven acres of land. They were very favorably noticed in my former Report. The soil is light and sandy, and wherever it is of sufficient depth it is well adapted for Tea cultivation. The bushes, generally, are in good health, and for many years past have been yielding large crops of Tea. Of the two, Kuppeena is at present in the best condition; many of the plants in Lutchmesir appear to be getting too old and require to be renewed.

Hawulbaugh and Chullar.—These farms are situated about six miles North-West from Almorah, at an elevation of 4,500 feet above the Sea. In 1854, Dr. Jameson states that Hawulbaugh covered fifteen acres, and Chullar thirty. The former has always appeared to me well-adapted for Tea cultivation, both on account of the soil and also from its undulating character. As the best portions, and on which the bushes are in the finest order, I may direct attention to the ground from the large tank up to the Chinese tombs, and particularly to that between the tombs and the Carpenter's shops, and also to those portions South and West of this. The worst land on the farm is that on the West side of the Tea factory. In the Chullar farm adjoining, some portions of the higher land are in very good condition, such, for example, as those below the Tea factory and houses occupied by the Chinese; but the greater part is too wet. The water during the rains seems to ooze out everywhere, and would probably be difficult to drain. Perhaps the best method to adopt in the circumstances would be to plant only on dry land, and on land moderately rich and having a soil of sufficient depth. Land is abundant in all directions about Almorah, which is much better suited for Tea cultivation than most parts of Chullar.

Kutyoor.—A large tract of land has been taken up near the head of the Byznath Valley, about 35 miles Northward from Almorah. This land extends from a stream in the bottom of a Valley up to the top of a Hill on the North side. Its surface is generally undulating in character, and consists of numerous ridges and furrows running from the top of the Hill down to the stream. The soil in this extensive tract of land varies much in its nature and composition. In some places it is a stiff clay, while in others it is loam, darkened and enriched by vegetable matter. A considerable portion of this farm seems well-suited for the cultivation of Tea. Wherever the soil is deep, moderately rich, and *not* marshy, the Tea plants, properly cultivated, will flourish admirably. A Plantation of great extent may be made here, if such portions only are selected and planted. But there are other parts of this farm—and extensive ones—on which it is not adviseable to attempt this cultivation.—*Fortune, 25th October* 1856, *Report in No.* 23. *Selections from the Records of the Government of India.*

Gurhwal Plantations, Guddowli.—This Plantation is in Eastern Gurhwal, near the village of Paorie, in Latitude 30° 8' North, and Longitude 78° 45' East. It consists of a large tract of terraced land extending from a ravine in the bottom of a valley to more than 1,000 feet up the sides of the mountain. The lower portion of this land is said to be about 4,300 feet above the Sea, while the top of the surrounding mountains are from 7,000 to 8,000 feet. In a large Plantation of this kind the soil is, of course, very varied in its composition. In some places it consists of a mixture of loam, sand, and vegetable matter, is deep, and altogether well-suited for Tea cultivation. In other parts it is stony, extremely shallow, and scarcely worth the expense of bringing under cultivation. Much of the higher portion of the farm, planted apparently within the last four or five years, is of this description. In the lower part of the Plantation, on spots where the soil is moderately deep and rich, the plants are succeeding very well and yielding fair crops of Tea. As an example of excellent Tea soil, I may point to a small portion of the Plantation lately planted about half a mile from the work-shops and out-houses on the road to the Overseer's house. Here the plants are growing admirably, and are quite equal to any Plantations of the kind I have met with in China.—*Fortune, 25th October* 1856, *Report in No.* 23, *Selections from the Records of the Government of India.*

Deyrah Dhoon Plantations, Kaolagir.—This farm is situated on the West side of Deyrah, and extends over 400 acres of land. The soil is composed of a mixture of clay, sand, and vegetable matter, varying in depth, but generally deep enough for Tea cultivation. It rests on a gravelly sub-soil, consisting of limestone, sand-stone, clay-slate, and quartz rock, or of such rocks as enter into the composition of the surrounding mountains. In consequence, I believe, of the suggestions contained in former Report, the system of cultivation has entirely changed. The trenches in which the plants were planted were filled up, irrigation was discontinued

nued, and more judgment was exercised in gathering leaves from very young plants. In fact the China system of cultivation was followed as far as it was understood, and the result of all this has been most satisfactory. The remarks I have to make upon the Plantation apply only to the Eastern portions of the farm and to the original nursery at the upper end. I have great pleasure in stating that I have never seen finer or more productive Plantations in China. The plants are in high health, large and bushy, and are yielding annually abundant crops of leaves. Many of the bushes are five and six feet in diameter. One I measured was eight feet, another ten, and both six feet in height. Of course these are the giants of the Plantation. And it is to be noted that these plants are not "drawn up" with few branches and leaves; but they are dense bushes in high health, and formed to give large quantities of Tea.—*Fortune, 25th October* 1856, *Report in No.* 23, *Selections from the Records of the Government of India.*

Punjab Plantations, Nagrowta.—This Plantation is situated in the Kangra Valley, about nine miles from the Old Fort, and covers apparently about four acres of land. It was planted in 1847, and consequently has been in full bearing for several years. In 1855 it produced 1,427lbs. of Tea, or about 330lbs. per acre. The soil is a brownish loam, moderately rich in vegetable matter, and well suited for Tea cultivation. The plants are healthy and vigorous.

Bowarnah.—This is another small experimental Plantation further to the Eastward in the same valley, and about twenty miles from Kangra. It appears to be five or six acres in extent, and was planted about the same time as the former. It is consequently in full bearing, and yields annually upwards of 300lbs. per acre. It is to be remarked, however, that a considerable portion of the produce of both these Plantations is made up from old leaves, which had much better been left on the bushes. The soil of Bowarnah is a brown loam, not quite so rich as that at Nagrouta, but contains a larger portion of sand, and is equally well suited for the cultivation of the Tea shrub. This Plantation is also in a flourishing condition at present.

Holta.—The success which had attended these two small Plantations just noticed, induced the late Governor General, Lord Dalhousie, to comply with the wishes of Dr. Jameson to extend the cultivation of Tea in this part of the country. Accordingly, the lands at Holta were set apart for this purpose. Holta is about 26 miles North East from Kangra, at the foot of the high mountain range, and nearly 4,000 feet above the level of the Sea. Here snow falls annually and covers the ground for several days at one time. The high mountains behind are white with snow for the greater part of the year. The extent of this Plantation is stated to be about 1,200 acres, and of these 700 are already under cultivation. About 20 acres were planted in January 1852, 300 in 1853-54, and 380 in 1855-56. The condition of the plants upon this Plantation is highly satisfactory; they are healthy, vigorous, and quite equal to the best Plantations I have seen in China. Upon the whole, I am inclined to think this Plantation the most promising of all under Dr. Jameson's management, and it certainly reflects great credit both upon him and his Overseer, Mr. W. Rogers.—*Fortune, 25th October* 1856, *Report in No.* 23, *Selections from the Records of the Government of India.*

Future prospects of Tea cultivation in the Himalayas.—From the description which I have given of the Government Plantations it will be observed that the experiments have proved that the Hills in these Provinces are well adapted for the cultivation of Tea. And further, I believe that its cultivation, if carried on in a judicious manner, will prove an excellent investment for foreign capital. But a knowledge of the habits of the plant, and of agriculture or horticulture is, in my opinion, indispensable to make success certain. In every trade and profession of life, a course of teaching is considered indispensable to success. The lawyer, the doctor, the farmer, and the gardener have all to devote long years of careful study to their profession before they will be trusted by the people whom they wish to serve. And I believe it is a rule with the Indigo Planters in Bengal and Tirhoot to make their young men study for some time on their estates before they can be entrusted with the entire management.

On the selection of Land and Cultivation.—It is a fallacy to suppose that Tea can be cultivated profitably on poor land where nothing else will grow. I drew attention to this point in my former Report, and stated that "Tea, in order to be profitable, requires a good sound soil: a light loam, well mixed with sand and vegetable matter, moderately moist, and yet not stagnant or sour," was instanced as most suitable for the requirements of the Tea shrub. There is no scarcity of such lands in the Himalayas, and if such are chosen, success is certain, in so far as the land is concerned. In many instances it would probably be cheaper to buy land from the Zemindars than to clear it. In taking large grants of hill land, the whole will rarely be found suitable for Tea cultivation. In this case those portions only should be cleared and planted where the soil is of such a nature as I have pointed out. *See Remarks on the Bhurtpoor and Kulyoor Lands.*

On plucking the leaves.—This, as I have already pointed out, is a very important part of the business, and requires to be carefully studied. Every vegetable physiologist knows that it is easy to render a plant unhealthy, or to destroy

it altogether by continually depriving it of its leaves. Overseers and Tea Planters ought to study carefully the "Theory of Horticulture," a work of Professor Lindley. In my former Report I directed attention to the bad system of taking too many leaves from very *young plants*, and stated that, for the first two or three years, the leading shoots only should be topped, in order to *form* the plants and make them *bushy*. This has been adopted in the Government Plantations, and the good effects are apparent. But it is also necessary to bring the laws of vegetable physiology to bear upon plants which are fully grown. If too many leaves are annually taken from them, they will soon become sickly, stunted in appearance, and covered with dead branches. And thus the method adopted in order to obtain a large return, although apparently successful for a year or two, will *in the end defeat itself*. In China every child seems to possess intuitively the knowledge necessary to enable it to pluck leaves in the right way, and hence in that country the proper leaves only are taken, and the plants are rarely injured by over-plucking. The object the Chinese have in view is to obtain as large a quantity of leaves as the bushes are capable of yielding, not in any given year, but during the period of their existence; and although not vegetable physiologists, no one knows better than the Chinese that the way to accomplish this is by allowing the bushes to become fully developed, and to keep them in high health and vigour. The natives of India, at present, seem to have no idea of the importance of this principle, and consequently they do much harm to the bushes by over-plucking and by plucking in the wrong way. Instead of nipping off the upper part of the young shoot with its leaves, as the Chinese do, they strip the leaves from it and leave the bare stems. These bare stems generally die down to the nearest leaves, and then the plants get covered with dead stems and present a sickly appearance. Besides the injury this system inflicts on the plants *a great loss is sustained at the same time*. About an inch and a half, and some times more, of the top of the young shoots is soft and succulent, and makes just as good Tea as the leaves themselves. The Chinese know this well, and hence they always nip off this portion with the leaves. The natives of India have no idea of it, and they leave it to die upon the bush. In India large quantities of *old tough leaves* are also stripped from the bushes at each gathering. It is these leaves which form that coarse kind of Tea called "Bohea" at the Government Sales—a Tea totally unsuited for the foreign markets; and even the prices paid for it at the present time in India will not cover the expense of labor and packing. But although these leaves are worthless in Tea-making, they are invaluable to the health of the plants if left upon them, and therefore as few ought to be plucked as is possible. I have no doubt the time will soon come when the principal test of a good Overseer and a flourishing Plantation will be the small quantity of this so-called "Bohea." Since 1848, when I first went to China in the service of Government, large quantities of the best kinds of implements, in use in the Districts already named, have been imported for the use of the manufacturers and for models for imitation in India. Many thousands of Tea plants have also been introduced from these districts, and to these I beg to draw especial notice and to place on record the following remarks. They have been carefully treated and propagated extensively on the various Plantations by Dr. Jameson; but it is to be greatly feared that, in the changes which take place from time to time in Overseers, &c., they will become mixed up and confused with the original plants. I therefore suggest the propriety of taking effectual measures to prevent the possibility of this taking place, whatever changes may occur amongst Overseers or other workmen. It is just possible that the faults found by the London Brokers with Himalayan Teas may be remedied by the new and superior method of manipulation; but if the cause of this lies in the constitution of the original variety of the plant, then those obtained in the best Districts of China will prove of very great value. All the plants from the black Tea Districts ought therefore, to be kept together, and marked so that no mistake can by any possibility occur, and the same thing ought to be done with the plants from the green Tea Districts, marking particularly those from Hwuy-chow. The different Districts were carefully marked in the lists sent from China by me with the plants and seeds. When I visited these Provinces in 1851, I had some hopes that the Zemindars would speedily take to the cultivation of Tea on their farms, and that the Hill sides would soon be dotted over with small Plantations, such as one meets with in the Tea Districts of China. These hopes, I regret to say, have not yet been realized. There seems to be a deeply-rooted prejudice against the innovation which it may still take some years to overcome. One man, in particular, has acted in such an extraordinary and unaccountable manner that I cannot help noticing the circumstances in this Report. The circumstances in which this man was placed were altogether most favourable. Supposing the [illegible] to have been yielding annually 800lbs. of [illegible] leaves per acre, which is a very low average, he would have been realizing Rupees 80 an acre for his land, or Rupees 640 for the 8 acres under Tea—a sum I should imagine twice as large as he would make from any other crop and with less trouble. Captain Ramsay has another Plantation on the old Sepoy Lines near Hawulbaugh. This is at present in most excellent condition and is most promising. If managed in a proper manner, it will be very

valuable in a year or two. All that it requires at present is—*first*, to be kept clean; *secondly*, the plants *formed* by topping the leading shoots in order to make them *bushy*; and, *thirdly*, good drains made and kept open to carry off the springs, which in some places ooze from the Hill side. In two years more it will yield a large crop of leaves, and will go on yielding for many years. Although Tea cultivation amongst the Zemindars has not made much progress up to the present time, yet it is by no means to be regarded as hopeless. In all countries, it is difficult to induce the inhabitants to make any change in articles of cultivation, and the more ignorant they are, the more averse are they to any innovation. Even in England, in which there is perhaps less of this feeling now than in most other countries, every one can call to mind instances in which great improvements in agriculture were long retarded, owing to the ignorance and prejudice of the people. But although the introduction of Tea cultivation amongst the Zemindars may be slow at first, yet, in the end, it is almost certain to be adopted. And when once the prejudices which now exist against it have passed away, when a few have felt the advantage which such a crop is certain to confer upon them, others will speedily follow in their footsteps, and as in China, every village amongst these Hills will furnish its portion of Tea, the coarse kinds of which the natives will consume themselves, and the rest will be sold to merchants for consumption in the plains, or for exportation. The large amount of foreign capital, which will necessarily be brought into these Provinces to carry on Tea cultivation on an extensive scale, will be of very great importance to the people, and this alone is well worth the attention which Government has bestowed upon it. But although the resources of the country will thus be largely developed, and a good demand for labour established, these benefits will be slight when compared with those which would be conferred upon the inhabitants, could they be induced to cultivate and produce the article themselves. They would not only have, for their use, a simple and healthy beverage to drink, but it would also furnish them with the means of procuring a few of those harmless luxuries, which would have a tendency to raise their character, and to make them, as a people, more intelligent and industrious. At present, as a general rule, the natives of these Hills are lazy and indolent, and seem perfectly satisfied with a bare subsistence—indeed they can scarcely be said to enjoy the common necessaries of life. Their clothing is miserable in the extreme, and their dwellings would scarcely be considered fit for the lower kinds of animals, I will not say in England, but even in a half civilized country like China. If a change in the habits of the people could be brought about by the cultivation of Tea, such a famine as that which was felt in Kumaon and Gurhwal this year is not likely to occur. But if a people are so indolent as to allow their lands to lie waste, or only half tilled—if they are content with their daily bread and make no provision for the future—a dry season such as the last may occur at any time when the crops fail and a famine is the result. Such a state of things could never take place in China, at least from such slight causes, because the Chinese feel that the necessaries and luxuries of life are indispensible to their happiness, and they are industrious in order to supply them. Another great advantage of Tea cultivation for the Hill farmers is this; it would never fail to yield a crop, even in the driest seasons. Last spring I had an opportunity of seeing all the Government Plantations in the dry weather, and, when nearly every other crop had failed, the Tea seemed uninjured. This is a fact of very great importance, and shows that, with proper management, there is scarcely a chance of failure even in the driest year. The poor in India are never likely to enjoy this healthy and refreshing beverage, until they can produce it themselves on their own lands, for the price will be higher than they can afford to pay. It is for these reasons I estimate so highly the importance of Tea cultivation amongst the Zemindars in the Himalayas. I am quite sure that, notwithstanding the prejudices which exist in their minds against it at present, if the influential Officers of Government as a body were to encourage its cultivation, these prejudices would rapidly disappear. And when they have passed away,—when small Tea Plantations are seen dotted on every Hill side as in China—when the natives are met on the roads in large numbers carrying the produce of their little farms to the market towns, or to the factories of foreigners for sale,—a boon will have been conferred upon them of inestimable nature.—*Fortune, 25th October* 1856, *Report in No.* 23, *Selections from the Records of the Government of India.*

Tea plants: *Are the Black and Green Teas from the same plant*?—The plant in cultivation about Canton, from which the Canton teas are made, is known to botanists as the *Thea bohea*, while the more northern variety, found in the green tea country, has been called *Thea viridis*. The first appears to have been so named upon the supposition that all the black teas of the Bohea mountains were obtained from this species, and the second was called *viridis* because it furnished the green teas of commerce. These names seem to have misled the public, and hence many persons, until a few years back, firmly believed that black tea could be made only from *Thea bohea*, and green tea only from *Thea viridis*. In my "Wanderings in China,' published in 1846, I made some observation upon the plants, from which tea is made in different parts of China, while I acknow-

ledged that the Canton plant, known to botanists as *Thea bohea*, appeared distinct from the more northern one called *Thea viridis*, I endeavoured to show that both black and green teas could be made from either, and that the difference in the appearance of these teas, in so far as colour was concerned, depended upon manipulation, and upon that only. In proof of this I remarked that the black tea plant found by me near Foo-chow-foo, at no great distance from the Bohea hills, appeared identical with the green tea plant of Che-kiang.

It is now well known that the fine Moning districts near the Poyang Lake, which are daily rising in importance on account of the superior character of their *black* teas, formerly produced nothing else but *green* teas. At Canton green and black teas are made from the *Thea bohea* at the pleasure of the manufacturer, and according to demand.

Green tea.—When the leaves are brought in from the plantations they are spread out thinly on flat bamboo trays, in order to dry off any superfluous moisture. They remain for a very short time exposed in this manner, generally from one to two hours; this however depends much upon the state of the weather. In the mean time the roasting-pans have been heated with a brisk wood fire. A portion of leaves are now thrown into each pan and rapidly moved about and shaken up with both hands. They are immediately affected by the heat, begin to make a crackling noise, and become quite moist and flaccid, while at the same time they give out a considerable portion of vapour. They remain in this state for four or five minutes, and are then drawn quickly out and placed upon the rolling table. The rolling process now commences. Several men take their stations at the rolling table and divide the leaves amongst them. Each takes as many as he can press with his hands, and makes them up in the form of a ball. This is rolled upon the rattan worked table, and greatly compressed, the object being to get rid of a portion of the sap and moisture, and at the same time to twist the leaves. These balls of leaves are frequently shaken out and passed from hand to hand until they reached the head workman, who examines them carefully to see if they have taken the requisite twist. When he is satisfied of this the leaves are removed from the rolling table and shaken out upon flat trays, until the remaining portions have undergone the same process. In no case are they allowed to lie long in this state, and sometimes they are taken at once to the roasting-pan. Having been thrown again into the pan, a slow and steady charcoal fire is kept up, and the leaves are kept in rapid motion by the hands of the workmen. Sometimes they are thrown upon the rattan table and rolled a second time. In about an hour or an hour and a half the leaves are well dried and their colour has become *fixed*, that is, there is no longer any danger of their becoming black. They are of a dullish green colour, but become brighter afterwards. I am not now alluding to teas which are coloured artificially. The most particular part of the operation has now been finished, and the tea may be put aside until a larger quantity has been made. The second part of the process consists in winnowing and passing the tea through sieves of different sizes, in order to get rid of the dust and other impurities, and to divide the tea into the different kinds known as twankay, hyson skin, hyson, young hyson, gunpowder &c. During this process it is refired, the coarse kinds once, and the finer sorts three or four times. By this time the colour has come out more fully, and the leaves of the finer kinds are of a dull bluish green. It will be observed, then, with reference to green tea—1st, that the leaves are roasted almost immediately after they are gathered; and 2nd, that they are dried off quickly after the rolling process.—*Fortune's Tea Districts, pages* 272, 277, *and* 278.

Black tea.—When the leaves are brought in from the plantations they are spread out upon large bamboo mats or trays, *and are allowed to lie in this state for a considerable time.* If they are brought in at night they lie until next morning. The leaves are next gathered up by the workmen with both hands, thrown into the air and allowed to separate and fall down again. They are tossed about in this manner, and slightly beat or patted with the hands, for a considerable space of time. At length, when they become soft and flaccid, they are thrown in heaps and allowed to lie in this state for about an hour or perhaps a little longer. When examined at the end of this time, they appear to have undergone a slight change in colour, are soft and moist, and emit a fragrant smell.—*Fortune, Tea Districts, page* 278. The next part of the process is exactly the same as in the manipulation of green tea. The leaves are thrown into an iron pan, where they are roasted for about five minutes and then rolled upon the rattan table. After being rolled, the leaves are shaken out, thinly, on sieves, and exposed to the air out of doors. A framework for this purpose, made of bamboo, is generally seen in front of all the cottages amongst the tea-hills. The leaves are allowed to remain in this condition for about three hours: during this time the workmen are employed in going over the sieves in rotation, turning the leaves and separating them from each other. A fine dry day, when the sun is not too bright, seems to be preferred for this part of the operation. The leaves, having now lost a large portion of their moisture, and having become reduced considerably in size, are removed into

the factory. They are put a second time into the roasting pan for three or four minutes, and taken out and rolled as before.—*Fortune, page* 279. The charcoal fires are now got ready. A tubular basket, narrow at the middle and wide at both ends, is placed over the fire. A sieve is dropped into this tube and covered with leaves, which are shaken on it to about an inch in thickness. After five or six minutes, during which time they are carefully watched, they are removed from the fire and rolled a third time. As the balls of leaves come from the hand of the roller they are placed in a heap until the whole have been rolled. They are again shaken on the sieves as before and set over the fire for a little while longer. Sometimes the last operation, namely, heating and rolling, is repeated a fourth time : the leaves have now assumed their dark colour. When the whole has been gone over in this manner, it is then placed thickly in the baskets, which are again set over the charcoal fire. The workman now makes a hole with his hand through the centre of the leaves, in order to allow vent to any smoke or vapour which may rise from the charcoal, as well as to let the heat up, and then covers the whole over with a flat basket. Previous to this the heat has been greatly reduced by the fires being covered up. The tea now remains over the slow charcoal fire until it is perfectly dry ; it is, however, carefully watched by the manufacturer, who every now and then stirs it up with his hands, so that the whole may be equally heated. The black colour is now fairly brought out, but afterwards improves in appearance : the after processes, such as sifting, picking, and refiring, are carried on at the convenience of the workmen. If the reader is desirous of obtaining more information upon this subject, he should consult Mr. Balls' ' Cultivation and Manufacture of Tea.' It will be remarked, therefore, with reference to the leaves which are to be converted into black tea,—1st, that they are allowed to lie for some time spread out in the factory after being gathered and before they are roasted ; 2d, that they are tossed about until they become soft and flaccid, and then left in heaps, and that this also is done before they are roasted ; 3d, that after being roasted for a few minutes and rolled, they are exposed for some hours to the air in a soft and moist state ; and 4th, that they are at last dried slowly over charcoal fires. The differences in the manufacture of black and green teas are therefore most marked, and I think fully account for the difference in colour, as well as for the effect produced on some constitutions by green tea, such as nervous irritability, sleeplessness, &c. This is shown in some observations made by Mr. Warrington, of Apothecaries Hall, in his paper which I have already quoted.—*Fortune, Tea Districts, page* 281.

Raw tea leaves.—That is, just as they had been plucked from the bushes, and unmanufactured, were also found by Fortune exposed for sale in the market. They were sold at from three farthings to five farthings a pound ; and as it takes about four pounds of raw leaves to make one pound of tea, it follows that the price paid, was at the rate of threepence to fivepence a pound, but to this must be added the expence of manipulation. In this manner the inhabitants of large towns in China, who have no tea-farms of their own, can buy the raw leaves in the market and manufacture the beverage for themselves and in their own way.—*A Res. among the Chi. p.* 45.

Tea, Caper.—On entering one of the hongs or factories, says Fortune, the first thing to which we directed our attention was the tea which was to be made into "caper." I have already stated, he continues, that this description of tea is produced near a place called Tai-shan, in the Canton province, a few miles inland from the city. Here, it undergoes only the first process of manipulation ; that is, it is fired, rolled, and dried, and the colour fixed but nothing further is done to it. It is then packed up in mat-bags or baskets and sent down to Canton to be made up in the approved manner, and scented for exportation. On examining this tea, it has a very rough appearance, and in the state in which it was, seemed unsuited for the foreign markets. The workmen were busily engaged in remaking it during the time of our visit, and they went to work in the following manner : A convenient quantity, about twenty or thirty pounds, was thrown into the drying-pan, which had been heated for the operation. Here it was sprinkled with a basinful of water, and rapidly turned over with the hands of the workman. The dry leaves immediately imbibed the moisture and became soft and pliable. This softening process prevented them from breaking down into dust, and fitted them also to take any form which was considered desirable by the manipulator. The water used on this occasion stood in a large basin adjoining the drying-pans and had a yellow dirty appearance which Fortune was rather at a loss to account for. At first sight I thought it was mixed with some ingredient which was intended to give a peculiar tint or colour to the tea, but on inquiry it turned out that my conjecture was wrong. Our guide, on being appealed to for information on the subject, coolly informed us that " there was nothing in the water, it was quite clean, but that the workmen were in the habit of washing their hands in it !" As soon as the leaves had become softened by the moisture and heat in the pan, they were taken out and put into a strong canvas bag, and twisted firmly into a round form, resembling a football. This bag was then thrown down on the floor, which had been covered with a mat, and a man jumped upon it

with both feet, supporting himself at the same time by laying hold of a bamboo pole, which had been erected in a horizontal position for the purpose. The heel, sole, and toes of his feet were now kept in perpetual motion, in turning and twisting the ball while the weight of his body compressed it gradually into a smaller size. As the bulk of the ball is thus reduced by pressure, the canvass slackens, and it is necessary for the workman from time to time to jump off it and tighten its mouth by giving it an extra twist with his hands. The balls by this process of rolling and twisting, become at last very hard and solid, and are then thrown on one side, and allowed to be in this state for several hours: if this work has been done in the evening, they remain all night. By this system of pressing, twisting, and rolling, the greater portion of the moist leaves take a circular form, which goes on to perfection during the subsequent drying which the leaves have, of course, to undergo, and ends in the production of the round shot-like appearance by which this kind of tea is known. It is a most curious sight to a stranger who sees the mode of making this tea for the first time. A whole row of these men, nearly naked when the weather is warm, each with a large ball under his feet, which he is twisting and rolling with all his might, is so unexpected a sight in tea-making. The clever sketch in his Frontispiece by his friend Mr. Scarth gives a good idea of this curious process. The best kind of caper takes the round form naturally during the manufacture of souchong or congou, but as I have already mentioned only a very small quantity, about five per cent. could be procured in this way. By far the greatest portion of the caper exported is manufactured in the manner I have just described. But as I am letting out all the secrets of tea manufacture I may just as well notice another mode of making caper which is scarcely as legitimate as the former. In one corner of the factory we observed a quantity of tea exceedingly coarse in quality, in fact the refuse of that which we had been examining. All the art of the manipulator, in so far as heating and pressing and rolling in the usual way, was not equal to make a good-looking "caper" out of this. The leaves were too old, too large and coarse in their present state. But although there might be some difficulty even to a Chinese in making small leaves into large ones, there was none whatever in making large leaves small and their mode of doing this was as follows. These coarse leaves were first of all heated and moistened as the others had been, in order to make them soft and pliable. They were then thrown into square boxes and chopped up for some time until the size of the leaves was reduced. When this was accomplished to the satisfaction of the operator they were then made into nice-looking round "caper" suitable for the market. The origin of the name this tea bears is no doubt from its resemblance in form to the flower buds of the caper-bush of the south of Europe, and yet it is rather a curious coincidence that the greater part of caper tea finds its market in the Cape of Good Hope. Our Chinese guide informed us, with a peculiar grin on his countenance, that when there is a large demand for green teas, caper is converted into imperial and gunpowder by dyeing it with prussian blue and gypsum. The "*orange pekoe*" of commerce which is produced in the same district as the caper, is somewhat like congou in make but the leaf is much more wiry and twisted, and is of a lighter complexion. The infusion produced by this tea has a yellow or orange tint, and hence the name of orange pekoe which it bears. Like hyson pekoe amongst green teas, this is made from the young leaves soon after they unfold themselves in spring, and hence many of the leaves are covered with white hairs which are formed at this season of the year. These hairy leaves are called pekoe ends by the trade. A large quantity of this tea is gathered and dried by itself, while another portion is taken out of that of which the "caper" is ultimately made."—*A Res. among the Chi. page* 212.

Black Tea.—During the days of the East India Company's Charter all the best black teas were produced in the province of Fokien. The towns of Tsin-tsun and Tsong-gan in the vicinity of the far-famed Woo-e hills were then the chief marts for the best black teas exported by the Company. At that period the districts about Ning-chow, in the Kiangse province, were known only for their green teas. Now however, and for many years past, although the Fokien black teas are, and have been, largely exported, those produced in the Ning-chou districts have risen in the public estimation, and I believe, generally fetch very high prices in the English market. If there be any one now who still clings to the old idea that green teas can be made only from the plant called *Thea viridis*, and black ones only from *Thea bohea*, he will find a difficulty in giving credit to the account I have to give of the manner in which the Ning-chou districts have changed their green teas into black. But, however difficult it may be to get rid of early prejudices, facts are stubborn things and the truth of what I have to state may be fully relied upon. Many years ago a spirited Chinese merchant who, no doubt saw well enough, that black and green teas could be made easily enough from the same plant, had a crop of black teas made in the Ning-chow district and brought to Canton for sale. This tea was highly approved of by the foreign merchants at that port, and was bought, I believe, by the great house of Messrs. Dent and Company and sent to England. When it got home it found a ready sale in the market and at once established itself as a black tea of the

first class. Year by year after this the demand for this tea steadily increased and was as regularly supplied by the Chinese. At the present time the Ning-chow districts produced black teas only, while in former days they produced only green. If proof were wanting, this would appear sufficient to show that black or green teas can be made from any variety of the tea plant, and that the change of colour in the manufactured article depends entirely upon the mode of manipulation.—*A Res. among the Chinese, page* 393.

Brick tea of Thibet.—A sample of this curious product was shown by the East India Company in 1851. It is formed of the refuse tea-leaves and sweepings of the granaries, damped and pressed into a mould, generally with a little bullock's blood. The finer sorts are friable masses, and are packed in papers; the coarser sewn up in sheep's skin. In this form it is an article of commerce throughout Central and Northern Asia and the Himalayan provinces; and is consumed by Mongols, Tartars, and Tibetans, churned with milk, salt, butter, and boiling water, more as a soup than as tea proper. Certain quantities are forced upon the acceptance of the Western tributaries of the Chinese Empire in payment for the support of troops, &c.; and is hence, from its convenient size and form, brought into circulation as a coin, over an area greater than that of Europe.—*Dr. Hooker, in Jury Reports.* (*Simmonds*).

Tea, the varieties manufactured.—In order to give the reader some idea of the different sorts of teas manufactured for the European and American markets, I cannot do better than quote some excellent remarks on this subject by Sir John Francis Davis, in his work, "The Chinese." "As tea has always held so principal a place in our intercourse with China, it requires some particular consideration as an article of commerce. We have seen before, that the fineness and dearness of tea are determined by the tenderness and smallness of the leaf when picked. The various descriptions of the Black diminish in quality and value as they are gathered later in the season, until they reach the lowest kind, called by us Bohea, and by the Chinese (Ta-cha), 'large tea' on account of the maturity and size of the leaves. The early leaf buds in Spring, being covered with a white silky down, are gathered to make Pekoe, which is a corruption of the Canton name Pak-ho 'white down.' A few days' longer growth produce what is here styled 'black leaved pekoe.' The more fleshy and matured leaves constitute Souchong; as they grow larger and coarser they form Congou; and the last and latest picking is Bohea. Tea-farmers, who are small proprietors or cultivators, give the tea a rough preparation, and then take it to the contractors, whose business it is to adapt its farther preparation to the existing nature of the demand. The different kinds of tea may be considered in the ascending scale of their value.

1. Bohea, which in England is the name of a quality, has been already stated to be, in China, the name of a district where various kinds of black tea are produced. The coarse leaf brought under that name to Great Britain is distinguished by containing a larger proportion of the woody fibre than other teas; its infusion is of a darker colour, and as it has been more subjected to the action of fire, it keeps a longer time without becoming musty than the finer sorts. Two kinds of Bohea are brought from China: the lowest of these is manufactured on the spot, and therefore called "Canton Bohea," being a mixture of refuse Congou with a coarse tea called Woping, the growth of the province. The better kind of Bohea comes from the District of that name in Fokein, and, having been of late esteemed equally with the lower Congou teas, has been packed in the same square chest, while the old Bohea package is of an oblong shape.

2. Congou, the next higher kind, is named from a corruption of the Chinese Koong foo, 'labour or assiduity.' It formed for many years the bulk of the East India Company's cargoes; but the quality gradually fell off, in consequence of the partial abandonment of the old system of annual contracts, by which the Chinese Merchants were assured of a remunerating price for the better sorts. The consumption of Bohea in Great Britain, has of late years increased, to the diminition of Congou, and the standard of the latter has been considerably lowered. A particular variety, called campoi, is so called from a corruption of the general name Kiew-peoy, 'Selection—choice'; but it has ceased to be prized in Great Britain, from the absence of strength, a characteristic which is stated to be generally esteemed beyond delicacy of flavour.

3. Souchong (Scaou-choong, 'small, or scarce sort') is the finest of the stronger black teas, with a leaf that is generally entire and curly, but more young than in coarser kinds. What is called 'Padre Souchong' is packed in separate paper bundles, of about half a pound each, and is so fine as to be used almost exclusively for presents. The probability is that its use in that way by the Catholic missionaries first gave rise to to the name. The finest kinds of Souchong are sometimes scented with the flowers of the Chloranthus inconspicuus, and Gardenia florida; and they cannot be obtained, even among the Chinese except at high prices. A highly crisped and curled leaf called Sonchi, has lately grown into disrepute and been much disused, in consequence of being often found to contain a ferruginous dust, which was probably not intended as a fraud, but arose from the nature of the ground, where the tea had been carelessly and dirtily packed.

4. Pekoe being composed mainly of the young spring-buds, the gathering of these must, of course, be injurious in some degree to the future produce of the shrub, and this description of tea is accordingly both dear and small in quantity. With a view to preserving fineness of flavour, the application of heat is very limited in drying the leaves, and hence it is, that Pekoe is more liable to injury from keeping than any other sort of tea. There is a species of Pekoe made in the Green tea country from the young buds in like manner with the black kind; but it is so little fired that the least damp spoils it; and for this reason, as well as on account of its scarcity and high price, the Hyson-pekoe, as some call it, has never been brought to England. The mandarins send it in very small canisters to each other, or to their friends, as presents, under the name of Loong-tsing, which is probably the name of the district where the tea is made. Green teas may generally be divided into five denominations, which are 1. Twankay; 2. Hyson-skin; 3. Hyson; 4. Gunpowder; 5. young Hyson. Twankay tea has always formed the bulk of the green teas imported into England being used by the retailers to mix with the finer kinds. The leaf is older and not so much twisted and rolled as in the dearer descriptions: there is altogether less care and trouble bestowed on its preparation. It is, in fact, the Bohea of green teas; and the quantity of it brought to England has fully equalled three fourths of the whole importation of green. Hyson skin is so named from the original Chinese term, in which connection the skin means the refuse or inferior portion of anything; in allusion, perhaps, to the hide of an animal or the rind of fruit. In preparing the fine tea called Hyson all those leaves that are of a coarser yellow and less twisted or rolled appearance are set a part and sold as the refuse or skin tea at a much inferior price. The whole quantity, therefore, depends on, and bears a proportion to, the whole quantity of Hyson manufactured, but seldom exceeds two or three thousand chests in all. The word Hyson is corrupted from theChinese name which signifies flourishing spring, this fine sort of tea being of course gathered in the early part of the season.—*Fortune's Wandering, pages* 319, 220, 221 and 222.

Mr. Williams writing on the same subject says. Its botanical affinities ally it to the Camellia, and both have the same name among the Chinese; botanists call it Thea. and it is still a matter of dispute whether the different sorts are distinct species or mere varieties. Mr. Fortune found them growing together, and Loureiro, a medical missionary in China, regards all the varieties as ascribable, to these causes, though De Candolle divides them into three species, *Thea bohea*, *Thea viridis*, and *Thea cochinsinensis*. The plant is from three to ix feet high, and usually presents a dense mass of foliage on an infinite number of small twigs, a result of the practice of cutting it down. In Assam where it has been found wild, it reaches the height of thirty feet. The leaf is a dark green color, of an oblong oval shape, and the flowers are white, inodorous, and single; the seeds are like hazel-nuts in size and colour, three of them being inclosed in a hard husk, and so oily as to corrupt soon after ripening; this oil is rather acrid and bitter, but is useful for various purposes.—*Williams, Vol.* I, *page* 127.

The Chinese names given to the various sorts of tea the produce of these varieties, are derived for the most part from their appearance or place of growth; the names of many of the best kinds are not commonly known abroad. *Bohea* is the name of the Wu-i hills (or Bu-i as the people on the spot call them), where the tea is grown, and not a term for a particular sort among the Chinese, though it is applied to a very poor kind of black tea at Canton; *Sunglo* is likewise a general term for the green teas produced on the hills in Kiangsu. The names of the principal varieties of black tea are as follows: *Pecco*, "white hairs," so called from the whitish down on the young leaves, is one of the choicest kinds and has a peculiar taste; *Orange Pecco*, called *shang hiang*, or "most fragrant," differs from it slightly; *Hungmuey*, "red plum blossoms," has a slightly reddish tinge; the terms *prince's eyebrows, carnation hair, lotus kernel, sparrow's tongue, fir-leaf pattern, dragon's pellet*, and *dragon's whiskers*, are all translations of the native names of different kinds of Souchong or Pecco. Souchong, or *sian chung*, means *little plant* or sort, as *Pouchong*, or *folded sort*, refers to the mode of packing it; Campoi is corrupted from *kan pei*, *i. e.* carefully fired; *Chulan* is the tea scented with the chulan flower, and applied to some kinds of scented green tea. The names of green teas are less numerous: *Gunpowder*, or *ma chu*, [illegible] hemp pearl, derives its name from the form into which the leaves are rolled; *ta chu*, or "great pearl," and *chu lan*, or "pearl flower," denote two kinds of *Imperial; Hyson*, or *yu tsien*, *i. e.* before the rains, originally denoted the tenderest leaves of the plant, and is now applied to the *young Hyson;* as also another name, *mei pien*, or "plum petals;" while *hi chun*, "flourishing spring," describes *Hyson; Twankay* is the name of a stream in Chehkiang, where this sort is produced; and *Hyson skin* or *pi cha*, i. e. skin tea, is the poorest kind, the siftings of the other varieties; *Oolung*, "black dragon," is a kind of black tea with green flavor. Ankoi teas are produced in the district of Nganki, not far from Tsinenchan fu, possessing a peculiar taste, supposed to be owing to the ferruginous nature of the soil. De Guignes speaks of the Pu-'rh tea, from the place in Kiangsu where it grows, and

says it is cured from wild plants found there, the infusion is unpleasant, and used for medical purposes. The Mongols and others in the west of China prepare tea by pressing it when fresh into cakes like bricks, and thoroughly drying it in that shape to carry in their wanderings.—*Williams' Middle Kingdom, Vol.* II, *page* 135. The poorer natives substitute the leaves of a species of Rhamnus or Fallopia, which they dry; Camellia leaves are perhaps mixed with it, but probably to no great extent. The refuse of packing houses is sold to the poor at a low rate.—*Williams' Middle Kingdom, Vol.* II, *page* 136.

Manufacture.—The questions have been often discussed whether black or green teas are made from the same plant, and whether they can be made from each other. Chinese account ascribes the difference in the color of black and green tea wholly to the mode of preparation; green tea is cured more rapidly over the fire than the black, and not dried in baskets afterwards; but throwing the leaf into red hot pans, and subsequently exposing it to the sun and drying it over a covered fire makes it black. Green tea can therefore be changed into black, but the contrary cannot be done, because the leaf is already black. Green tea is made by simply drying the leaves, "young ones over a gentle heat and old ones over a hot fire, for about half an hour, or while two incense-sticks can burn out." By this mode more of the essential oil remains in the leaf, and is one reason, perhaps, why a greater proportion of green tea spoils or becomes musty during the long land journey to Canton. The tea cured for home consumption is not as carefully or thoroughly fired as that intended for exportation, and consequently probably retains more of its peculiar properties.—*Williams' Middle Kingdom, Vol.* II, *page* 133.

Testing of Tea.—Both kinds are repeatedly tested during the various stages of manufacture by pouring boiling water on a few leaves, to observe the color, aroma, taste, strength, and other properties of the infusion. As many as fifteen drawings can be made from the best leaves before the infusion runs off limpid. In the usual manner of Chinese writings ten things are specifically mentioned by the native author to be observed in selecting green tea; such as, that the leaf must be green, firmly rolled, and fleshy; there must be no petioles adhering, no dirty or broken leaves of twigs; and the infusion should be greenish, aromatic, and oily. In selecting all kinds of tea, the color, clearness, taste, and strength of the infusion are the principal criteria; the weight of the parcels, taste and color of the dry leaf, and its smell when strongly breathed upon, are also noticed. Some Aukoi teas are tried by a lodestone to detect the presence of minute particles of iron.—*Williams' Middle Kingdom.*

Soil suitable for its Cultivation.—The soil most favourable for the growth of tea is a rich sandy earth, with a large proportion of vegetable mould in it, and situations on the sides of hills, where there is a good exposure and supply of water, produce the best flavoured leaves. The patches above the rice grounds are favorite situations, but the plant is seldom cultivated on the plains or lowlands. A loamy subsoil, with a sandy loose covering, produces a good crop of leaves and in the plantations visited in the Aukoi hills in Fuhkien, much of it is colored with iron. The greater part of the tea exported is grown in the provinces of Fuhkein, Chehkiang, and Kiangsu, but all the eighteen produce it, except in the northern regions lying along the base of the table-land in Chihli and Shansi, though the eastern parts, between the parallels of 25° and 35° north, afford it in the greatest perfection and abundance. With the increased demand its cultivation has extended, and perhaps that of cotton has diminished in a corresponding degree, the southern hills of Fuhkein, the western parts of Kwangtung, and districts in Kwangsi, also afford it for foreign markets. Russia is supplied from Szchuen and the adjoining region, while Birmah gets a part from Yunnan.—*Williams' Middle Kingdom, Vol.* 1, *page* 127.

Cultivation.—Tea is usually raised by individuals, who cultivate a few dozen or scores of shrubs upon their own lands, and either cure the leaves themselves, or sell them to their neighbours, after assorting them according to their quality. There are very few large plantations under the care of rich landlords, but each little farmer raises tea as he does cotton, silk, or rice upon his own premises. The seeds are thickly planted in nursery beds, because many of them fail from their oily nature, and when the nurslings are a foot or more high they are transplanted into rows about four feet apart; sometimes they are put in the spot designed for them, and if more than one seed in a hole succeeds, it is removed. No preparation of the ground is necessary, nor is much care taken to keep the shrubs in a healthy state; those near Canton are usually covered with lichens, and when thus neglected worms attack the wood. The leaves are picked from the plant when three years old, but it does not attain full size before six or seven, and thrives according to circumstances and care from fifteen to twenty years, being in fact gradually killed by constantly depriving it of its foliage. Pruning the twig to increase the quantity of leaves develops the branches laterally, so that large, healthy shrubs resemble a collection of plants rather than a single bush. The interspaces are frequently sown with vegetables, and the practice is to spread them as much as possible in order to prevent their being shaded. In the Bohea hills, where the best tea is produced, there is, accord-

ing to the Chinese, considerable difference in the quality of the leaves from gardens not very far apart, and connoisseurs are as particular to inquire the name of the place whence their tea comes as western wine drinkers are to learn the names of the vineyards producing the best brands. The produce of old and celebrated nurseries is carefully collected and cured by itself, and one native authority states that the prices of these particular lots vary from $15 to $100 per pound.—*Williams' Middle Kingdom, Vol.* II, *page* 128. The annual produce of a single plant of large size is said to be from 16 or 18 to 24 ounces; but an English visitor to the Ankoi hills ascertained that the common average yield was not far from six ounces, and that a thousand square yards contained between 300 and 400 plants. Three crops of leaves are gathered during the season. The first picking is about the middle of April, or whenever the tender leaf buds begin to open, and while the leaves are still covered with a whitish down; these, though not very numerous, produce the finest tea, and the notion that some of the delicate sorts of tea are made from the flowers has originated from the whitish appearance this down imparts to them; for no tea can be made from the thin, scentless petals of the tea blossom. The second gathering is about the first of May, when the shrubs are covered with full-sized leaves. Chinese writers say that the weather has great influence upon the condition of the leaves, and that an excess or want of rain mildews or withers them, so as materially to affect the quality and quantity of the crop. When the proper time has arrived, a large number of hands should be employed to gather the leaves rapidly, and at this period the whole population, men, women, and children, find employment. Each person can on an average pick 13lbs. of leaves in a day, for which the wages are about six cents. The third crop is collected about the middle of July, and there is also a fourth gleaning in August, called *tsiulu*, i. e. autumn dew, from the name of the season in which it takes place; the three previous ones called first, second, and third springs. The two last crops afford only inferior kinds, seldom exported.

Cultivation in China.—The tea-shrub is cultivated every where and often in the most inaccessible situations; such as on the summits and ledges of precipitous rocks. Mr. Ball states that chains are said to be used in collecting the leaves of the shrubs growing in such places; and the greatest quantity is grown on level spots on the hill-sides, which have become enriched, to a certain extent, by the vegetable matter and other deposits which have been washed down by the rains from a higher elevation. Very little tea appeared to be cultivated on the more barren spots amongst the hills.—*Fortune, Tea Districts, page* 237.

Soil.—The soil of the tea-lands about Woomshan seemed to vary considerably. The most common kind was a brownish-yellow adhesive clay. This clay, when minutely examined, is found to contain a considerable portion of vegetable matter mixed with particles of the rocks above enumerated. In the gardens on the plains at the foot of the hills the soil is of a darker colour, and contains a greater portion of vegetable matter, but generally it is either brownish yellow, or reddish yellow. As a general rule the Chinese always prefer land which is moderately rich, provided other circumstances are favourable. By far the greatest portion of the tea in this part of the country is cultivated on the sloping sides of the hills. I observed a considerable quantity also in gardens on the level land in a more luxuriant state even than that on the hill-sides; but these gardens were always a considerable height above the level of the river, and were consequently well drained.—*Fortune, Tea Districts, page* 255.

Cultivation and management of plantations.—In the black-tea districts as in the green, large quantities of young plants are yearly raised from seeds. These seeds are gathered in the month of October, and kept mixed up with sand and earth during the winter months. In this manner they are kept fresh until spring, when they are sown thickly in some corner of the farm, from which they are afterwards transplanted. When about a year old they are from nine inches to a foot in height, and ready for transplanting. They are planted in rows about four feet apart. Five or six plants are put together in each hole, and these little patches are generally about three or four feet from each other in the rows. Sometimes, however, when the soil is poor, as in many parts of Woo-e-shan, they are planted very close in the rows, and have a hedge-like appearance when they are full grown.—*Fortune's Tea Districts, page* 258. The young plantations are always made in spring, and are well watered by the rains which fall at the change of the monsoon in April and May. The damp, moist weather at this season enables the young plants to establish themselves in their new quarters, where they require little labour afterwards, except in keeping the ground free from weeds A plantation of tea, when seen at a distance, looks like a little shrubbery of evergreens. As the traveller treads his way amongst the rocky scenery of Woo-e-shan, he is continually coming upon these plantations, which are dotted upon the sides of all the hills. The leaves are of a rich dark green, and afford a pleasing contrast to the strange and often barren scenery which is every where around. The natives are perfectly aware that the practice of plucking the leaves is very prejudicial to the health of the tea-shrubs, and always take care to have plants in a strong and vigorous condition before they commence gathering. The young planta-

tions are generally allowed to grow unmolested for two or three years, or until they are well established and are producing strong and vigorous shoots; it would be considered very bad management to begin to pluck the leaves until this is the case. Even when the plantations were in full bearing I observed that the natives never took many leaves from the weaker plants, and sometimes passed them altogether in order that their growth might not be checked.—*Tea Districts, page* 259.

The Tea plant.—I must now make some observations upon the tea-plant itself. It has already been remarked that two tea-plants, considered to be distinct varieties, are met with in China, both of which have been imported into Europe. One, the Canton variety, is called *Thea bohea;* the other, the northern variety, is called *Thea viridis.* The former produces the inferior green and black teas which are made about Canton, and from the latter are made all the fine green teas in the great Hwuy-chow country and in the adjoining provinces. Until a few years back it was generally supposed that the fine black teas of the Bohea hills were also made from the Canton variety, and hence its name. Such, however, is not the case. When I visited Foo-chow-foo for the first time in 1845, I observed that the tea-plant in cultivation in that neighbourhood was very different from the Canton variety, and apparently identical with the *Thea viridis* of Chekiang. Foo-chow-foo was not a very great distance from the Bohea hills, and I had good reasons for believing that the Bohea plant was the same as the Foo-chow one; but still I had no positive proof. The tea-plant is multiplied by seed like our hawthorns, and it is perfectly impossible that the produce can be identical in every respect with the parent. Instead therefore of having one or two varieties of tea-plant in China, we have in fact many kinds, although the difference between them may be slight. Add to this, that the seeds of this plant are raised year after year in different climates, and we shall no longer wonder that in the course of time the plants in one district appear slightly different from those of another, although they may have been originally produced from the same stock.—*Fortune, Tea Disirict, page* 284. For these reasons I am of opinion that the plants of Hwuy chow and Woo-e are the same species, and that the slight differences observed are the results of reproduction and difference of climate. With regard to the Canton plant, both in constitution and habit, it too may have originally sprung from one and the same species.

These changes however, do not alter the commercial value of those plants found cultivated in the great tea-countries of Fokien and Hwuy-chow, where the finest teas are produced; for, while the tea-shrub may have improved in the course of reproduction in these districts, it may have become deteriorated in others. For this reason seeds and plants ought always to be procured from these districts for transmission to other parts of the world where it is desirable to grow tea.—*Fortune's Tea Districts, page* 285.

Cultivation at Hwuy-chow.—In the green-tea district of Hwuy-chow, and I believe in all other parts where the shrub is cultivated, it is multiplied by seeds. The seeds are ripe in the month of October. When gathered they are generally put into a basket, and mixed up with sand and earth in a damp state and in this condition they are kept until the spring. If this plan is not pursued only a small portion of them will germinate. Like the seeds of the oak and chesnut, they are destroyed when exposed to sudden changes in temperature and moisture. In the month of March the seeds are taken out of the basket and placed in the ground. They are generally sown thickly, in rows or in beds, in a nursery, or in some spare corner of the tea-farm, and sometimes the vacancies in the existing plantations are made up by sowing five or six seeds in each vacant space. Page 91. When the young plants are a year old they are in a fit state for transplanting. This is always done at the change of the monsoon in spring, when fine warm showers are of frequent occurrence. They are planted in rows about four feet apart, and in groups of five or six plants in the row. The distance between each group or patch is generally about four feet. The first crop of leaves is taken from these plants in the third year. When under cultivation they rarely attain a greater height than three or four feet.—*Fortune, Tea Districts, page* 91. When the winters are very severe the natives tie straw bands round the bushes to protect them from the frost, and to prevent it and the snow from splitting them.

Tea Picking or Tea Harvest.—Mr. Fortune says, I made Ayukas temple my head-quarters for several days after the events took place which I have related in the previous chapter. My time was now fully occupied in visiting all the tea farms in the neighbourhood, and in getting information concerning the cultivation and manufacture of tea. It was the harvest-time for the principal crop of the season, and the natives were observed on every hill-side busily engaged in gathering the leaves. These tea gatherers were generally seen in small groups consisting of from eight to twelve persons. One old man was usually at the head of each group, the others being women and children. Each had a small stool formed like the letter T, but broad of course at the top, for sitting on while gathering the leaves on the lower sides of the bushes. The foot stool being pointed, it was easily forced into the ground in order to render it steady, and as easily drawn out and carried to a different spot. When these tea gatherers are hired they are not paid by the day, but by the quantity of leaves they bring in

to their employers. In making inquiries on the point I found they were paid at the rate of four and five cash a catty, and that they were able to gather from thirty to forty catty a day. In other words, each was able to gather from forty to fifty three pounds of raw leaves per day, for which was received from 6d. to 9d., or thereabouts. But it is only very expert and well trained hands that can make such a sum as this, children and very old people make, of course, something considerably less. Wages of labourers in the tea districts of China range from 2d. to 3d. per day with their food, which is almost always furnished by the farmers and which may cost about 3d. or 4d. more, making the whole day's labour amount to 6d. or 7d. The food of this people is of the simplest kind—namely, rice vegetables and a small portion of animal food, such as fish or pork.—*A Res. among the Chin. p.* 41.

Scenting of Tea.—Having taken a passing glance at all these objects on entering the building, I next, says Fortune, directed my attention to the scenting process, which had been the main object of my visit, and which I shall now endeavour to describe. In a corner of the building there lay a large heap of orange-flowers, which filled the air with the most delicious perfume. A man was engaged in sifting them to get out the stamens and other smaller portions of the flower. This process was necessary, in order that the flowers might be readily sifted out of the tea after the scenting had been accomplished. The orange-flowers being fully expanded, the large petals were easily separated from the stamens and smaller ones. In 100 parts 70 per cent. were used and 30 thrown away. When the orange is used, its flowers must be fully expanded, in order to bring out the scent; but flowers of jasmine may be used in the bud, as they will expand and emit their fragrance, during the time they are mixed with the tea. When the flowers had been sifted over in the manner described they were ready for use. In the mean time the tea to be scented had been carefully manipulated, and appeared perfectly dried and finished. At this stage of the process it is worthy of observing that, while the tea was perfectly dry, the orange-flowers were just as they had been gathered from the trees. Large quantities of the tea were now mixed up with the flowers, in the proportion of 40lbs of flowers to 100 lbs. of tea. This dry tea and the undried flowers were allowed to lie mixed together for the space of twenty-four hours. At the end of this time the flowers were sifted out of the tea, and by the repeated sifting and winnowing processes which the tea had afterwards to undergo they were nearly all got rid of. Sometimes a few stray ones are left in the tea, and may be detected even after it arrives in England. A small portion of tea adheres to the moist flowers when they are sifted out, and this is generally given away to the poor, who pick it out with the hand. The flowers, at this part of the process had impregnated the tea leaves with a large portion of their peculiar odours, but they had also left behind them a certain portion of moisture which it was necessary to expel. This was done by placing the tea once more over slow charcoal-fires in basket sieves prepared for the purpose of drying. The scent communicated by the flowers is very light for some time, but, like the fragrance peculiar to the tea leaf itself, comes out after being packed for a week or two. Sometimes this scenting process is repeated when the odour is not considered sufficiently strong, and the head man in the factory informed me he sometimes scented twice with orange-flowers and once with the "Mo-le" (Jasminum sambac). The flowers of various plants are used in scenting by the Chinese, some of which are considered better than others, and some can be had at seasons when others are not procurable. I considered it of some importance to the elucidation of this subject to find out not only the Chinese names of these various plants, but also, by examining the plants themselves, to be able to give each the name by which it is known to scientific men in all parts of the world. The following list was prepared with great care, and may be fully relied upon. The numbers prefixed express the relative value of each kind in the eyes of the Chinese and the asterisks point out those which are mostly used for scenting teas for the foreign markets in the order in which they are valued. Thus the "Mo-le" and the "Sieu-hing" are considered the best and so on:—

1 Rose scented (Tsing moi-qui-hwa).
1 or 2 plum double (Moi-hwa)
2 *Jasminum sambac (Mo-le-hwa)
2 or 3 *Jasminum paniculatum, (Sieu-hing-hwa).
4 *Aglaia odorata, (Lan-hwa-or yu-chu-lan).
5 Olea fragrans (Kwei-hwa).
6 *Orange (Chang-hwa).
7 *Gardenia florida (Pak-sema-hwa).

It has been frequently stated that the Chloranthus is largely used. This appears to be a mistake, originating, no doubt, in the similarity of its Chinese name to that of Aglaia odorata. The Chloranthus is called "Chu-lan," the Aglaia "Lan" or "Yu-chu-lan." The different flowers which I have just named are not all used in the same proportions. Thus, of orange-flowers there are 40 lbs to 100 lbs. of tea; of Aglaia there are 100 lbs to 100 lbs.; and of Jasminum sambac there are 50 lbs. to 100 lbs. The flowers of the Sieu-hing (Jasminum paniculatum) are generally mixed with those of the mo-le (Jasminum Sambac), in the proportion of 10 lbs. of the former to 30 lbs. of the latter, and the 40 lbs. thus produced are sufficient for

100 lbs. of tea. The "Kwei-hwa" (Olea fragrans) is used chiefly in the northern districts as a scent for a rare and expensive kind of Hyson Pekoe—a tea which forms a most delicious and refreshing beverage when taken a la Chinoise without sugar and milk. The quantity of flowers used seemed to me to be very large; and I made particular inquiries as to whether the teas that are scented were mixed up with large quantities of unscented kinds. The Chinese unhesitatingly affirmed that such was not the case, but, notwithstanding their assertions, I had some doubt on this point. The length of time which teas thus scented retain the scent is most remarkable. It varies, however, with the different sorts. Thus the Olea fragrans tea will only keep well for one year, at the end of two years it has either become scentless, or has a peculiar oily odour which is disagreeable. Teas scented with orange blossoms and with those of the Mo-le will keep well for two or three years, and the sieu hing kinds for three or four years. The Aglaia retains the scent longer than any, and is said to preserve well for five or six years. The tea scented with the Sieu hing is said to be most esteemed by foreigners, although it is put down as second or third rate by the Chinese. Scented teas for the foreign market are nearly all made in Canton and are known to merchants by the names of "scented Orange," "Pekoe," and "scented Caper." They are grown in and near a place called Tashan, in the Canton province. Mr. Walkinshaw informs me that other descriptions of tea, both black and green, have been scented for the English market, but have been found unsuitable. True caper is to black tea what the kinds called "imperial" and "gunpowder" are to green: it assumes a round, short looking form during the process of manipulation, and it is easily separated from the other leaves by sifting or by the winnowing machine. It is a common error to suppose that "imperial" or "gunpowder" amongst green teas, or "caper" amongst black ones, is prepared by rolling each leaf singly by the hand. Such a method of manipulation would make them much more expensive than they are. One gathering of tea is said to yield 70 per cent. of orange pekoe, 25 of souchong, and 5 of caper. The quantity of true caper would therefore appear to be very small; but there are many ways of increasing the quantity by peculiar modes of manipulation, as I shall afterwards show. In a large factory, such as this at Canton, there is, of course, a considerable quantity of dust and refuse tea remaining after the orange pekoe, caper, and souchong have been sifted out of it. This is sold in the country to the natives at a low price, and no doubt is often made up with paste and other ingredients into those ie teas which now-a-days find a market in England. Nothing is lost or thrown away in China. The stalks and yellow leaves which have been picked out by women and children are sold in the country; while the flowers which have done their duty in the scenting process are given to the poor, who pick out the few remaining tea-leaves which had been left by the sieve or winnowing machine. Some flowers, such as those of the Aglaia for example after being sifted out from the tea, are dried and used in the manufacture of the "fragrant Joss-stick," so much used in the religious ceremonies of the country. It appears from these investigations that many kinds of fragrant flowers besides those used by the Chinese would answer the purpose equally well, and therefore in places like India, where tea is likely to be produced upon an extensive scale, experiments in scenting might be made with any kinds of fragrant jasmines, daphnes, aurantiaceous or other plants of a like kind indigenous to the country. It will be observed from the description just given that the method of scenting teas, like most of the arts in China, is exceedingly simple in its nature and most efficient. It used to be said by those who knew nothing about the matter, that "the flowers were put over a slow fire, with the tea in a separate basket above them, and so the fire drove the scent from the flowers into the tea." Knowing the immense capacity which dry tea has for moisture of any kind, how much more simple and beautiful is the process of allowing it to lie for a space of time mixed up with undried flowers! A few years ago I published a description of the Chinese mode of yielding green teas to suit our depraved tastes in Europe, and particularly in America, where they are largely consumed. Scenting teas is a very different thing, and nothing can be urged against the taste for them. That this is so in the eyes of the Chinese may be gathered from the fact that, while they dye their teas, not to drink, but only to sell, they consume and highly appreciate these scented ones. The price paid for flowers used in the scenting process varies, like everything else according to the demand or supply in the market. In 1854 and 1855, it was about seventeen dollars per pecul, but sometimes as much as thirty dollars are paid for the same quantity. In former years,—ten or twelve years ago,—as much as sixty dollars per pecul used to be paid for flowers. This information was given me some time after I had been examining the method of scenting in the Honan factory, and by another manufacturer and confirmed me in the opinion I had then formed, namely, that after the tea is once scented with the proportions of flowers mentioned above, it is mixed up with large quantities of unscented tea. Were this not so, the large quantity of flowers used would render the tea much more expensive than it really is. Upon making further inquiries, of different individuals and at different times, I found that my surmises were correct. The results of the information

thus obtained were, that sixty pounds of this highly-scented mixture were capable of scenting one hundred pounds of unscented tea, and no doubt it is sometimes used in even smaller proportions, the kinds called "Caper" and Orange Pekoe are quite different in appearance from teas made in the great black-tea provinces of Fokien and Kiang-si as large quantities of these teas—indeed, the whole which are exported—are made up near Canton.—*A Residence among the Chi. page* 198.

Tea is well known to the natives of Lahore and Cashmere; but the latter, are the more fond of tea, and prefer the Thibetan product to the English or even Chinese, notwithstanding the absence of aroma and perfume. The Bokharians and Russians are also fond of tea, and use generally the genuine Chinese production. The former make a soup of tea, by boiling the leaves, and then adding milk, salt and butter; a great cupful of this with bread, forms their daily breakfast. Both Russians and Bokharians drink generally tea without sugar, and chew the leaves afterwards, so that nothing is lost—*Thirty-five years in the East by Dr. Honig, page* 358.

Adulterations.—Before noticing these, Dr. Hassall repeats some of the information previously given. He tells us that the tea plant is a hardy evergreen and leafy shrub which attains the height of from three to six feet and upwards. It belongs to the natural family Columniferæ (Ternstrœmiaceæ of Lindley,) which includes the Camellias. It is generally propagated from seed and the plant comes to maturity in from two to three years, yielding in the course of the season three and in some cases four crops of leaves. The first gathering takes place very early in the spring, a second in the beginning of May, a third about the middle of June, and a fourth in August. The leaves of the first gathering are the most valuable, and from these Pekoe tea which consists of the young leaf buds as well as black teas of the highest quality are prepared. Those of the last gathering are large and old leaves and consequently inferior in flavour and value. The leaves vary considerably in size and form; the youngest leaves are narrow convoluted and downy; the next in age and size have their edges delicately serrated with the venation scarcely perceptible: in those of medium and large sizes the venation is well marked, a series of characteristic loops being formed along each margin of the leaf and the serrations are stronger and deeper and placed at greater intervals.

Varieties of Tea.—The principal varieties of *black tea* are Bohea which is of the commonest and coarsest description, Congou, Souchong, Caper, and Padry Souchong and Pekoe, which are of the highest quality, the last consisting of the very young and unexpanded leaves and which when clothed with down constitute flowery Pekoe.

The principal varieties of *green tea* are Twankay, Hyson-skin, young Hyson, Hyson Imperial, and Gunpowder, which in green tea corresponds with flowery Pekoe in black. Imperial Hyson, and young Hyson consist of the second and third gatherings, while the light and inferior leaves separated from Hyson by a winnowing Machine constitute Hyson-skin, a variety in considerable demand amongst the Americans.

Tea plant.—There is according to most writers but one species of the tea-plant from which the whole of the above and many other varieties of tea are obtained, the differences depending upon soil, climate, weather, age of the leaves and mode of preparation. The plants from which black teas are prepared are grown chiefly on the slopes of hills and ledges of mountains, while the green tea-shrubs are cultivated in manured oils. Upon this circumstance many of the differences between the two varieties depend. Other differences are occasioned by the processes adopted in the preparation and roasting of the leaves. Thus while *black tea* is first roasted in a shallow iron vessel called a "kuo" and secondly in sieves over a bright charcoal fire, *green tea* does not undergo the second method of roasting but only the first that in the "kuo."

An important part of the manufacture of tea consists in the rolling the leaves, so as to impart to them, their characteristic twisted shape. This is effected by subjecting the leaves to pressure and rolling by the hands in a particular manner. The first effect of the application of heat to the leaves in the Kuo is to render them soft and flaccid. When in this state, they are removed from the vessel and submitted to the first rolling, an operation which, after the renewed action of the Kuo on each occasion, is three for four times repeated with superior teas, before the process is considered to be complete.

Scenting of Tea.—The following observations on the scenting of tea are extracted from Mr. Ball's "Account of the Cultivation and Manufacture of Tea in China."

The Chinese seem universally to agree in ancient as in modern times that no factitious scent can be given to tea which shall equals its natural fragrance: in short that only common Tea requires scenting. Those persons who have had the opportunity of drinking some of the finest kinds of Souchong will perhaps agree with the Chinese in these opinions. There are however many scented teas which so far from being inferior are even costly and much esteemed both in China and in Europe. Of these the Chu Lan, or Cowslip Hyson, may be considered the best. "The tea about to be scented must be taken hot from the last roasting (which immediately precedes the packing, and poured into a Hyson chest so as to form a layer of two inches in height from the bottom a handful or more of the fresh flowers (green) separated from the

stalks) is then strewed over the tea. In this manner the tea and flowers are placed in layers until the chest is quite full. The mouth of the canister is then closed and thus the tea remains for twenty-four hours. The proper proportion is three catties of flowers to one hundred catties of tea. The next day the chest is emptied when the tea and flowers are mixed together they then undergo the process of "Poey," about three catties being put into one sieve. The Poey Song is completely closed that the tea and flowers are thus roasted about from one to two hours or rather until the flowers become crisp. The flowers are then sifted out and the tea packed. If the tea require any further scenting, fresh flowers most be used and the process repeated as before. The tea thus prepared is then mixed with other tea in the proportion of one part of scented tea to twenty of plain. The whole is then slightly heated in a kuo (chao), and when packed constitutes the description of tea denominated in England Cowslip Hyson. Tea may be scented at any time with this kind of tea, but it must be previously heated or roasted about two hours. "The mode of scenting black tea differs from that of green, and, so far as I understand, there are two or three methods of performing this process. The Souchong or Caper teas, the Tetsiong and other teas of the Cowslip flavour, are also scented with the Chu Lan flower, *Chloranthus inconspicuus*. "After gathering, the flowers are separated from the stalk as before when some people dry them in the sun: but the best mode is to dry them in a Poey Song over a slow fire taking care not to change the yellow colour of the petals. When dried they are put aside to cool and are afterwards reduced to powder. If this powder, the scent of which is very powerful be sprinkled over the leaves previously to the last or two last roastings and rollings in the process of Poey, the tea will be highly scented, but this is an expensive mode, on account of the additional quantity of flowers required, and therefore is seldom practised. The usual mode is by sprinkling a small quantity of this powder over the tea during the last process of Poey, which take[illegible] previous to packing. A small white powde[illegible]ntly found in black teas of the caper flavour, cannot have escaped the observation of the tea dealers in England; this powder is that of the Chu Lan flower, whose colour has been changed to white in the process of Poey. "There is another scented tea of excellent flavour, which is made in small quantities and occasionally sent to foreigners as presents. This is a Souchong tea, scented with the flower of the 'Pae sheem' Gardenia florida.) "There are two other scented teas, also of fine flavour both Souchong teas, the one scented with the Quy-fa, or K[illegible]hoe (Olea fragrans) and the oth[illegible]he Moo-Ly-Hoa (Jasminum Sambac). Some people say that the three last teas are mixed with the flowers as the Hyson tea is mixed with the Chu Lan and are scented in the same manner. But others say that two sieves are placed in the Poey Song, the lower one containing the flowers and the upper one the tea. The latter is the mode in which the Pae Sheem tea to which I have previously alluded is scented. These are all the flowers with which I am acquainted which are employed to scent tea, but in the Keun Fang Pu, and Quang Tong Chy, or Canton Geographical History, many others are enumerated as eligible for that purpose. These works also observe that flowers so used should be full blown. M'Culloch, in his "Commercial Dictionary," draws an interesting parallel between the wine and the tea plant. "Considered as an object of agricultural produce the tea plant bears a close resemblance to the wine. In the husbandry of China it may be said to take the same place which the vine occupies in the southern countries of Europe. Like the latter its growth is chiefly confined to hilly tracts not suited to the growth of corn. The soils capable of producing the finest kinds are within given districts limited and partial. Skill and care both in husbandry and preparation are quite as necessary to the production of good tea as to that of good wine. "The best wine is produced only in particular latitudes as is the best tea, although perhaps the latter is not restricted to an equal degree. Only the most civilised nations of Europe have as yet succeeded in producing good wines, which is also the case in the East with tea, for the agricultural and manufacturing skill and industry of the Chinese are there unquestionably pre-eminent. These circumstances deserve to be attended to in estimating the difficulties which must be encountered in any attempt to propagate the tea-plant in colonial and other possessions. These difficulties are obviously very great and perhaps all but insuperable. Most of the attempts hitherto made to raise it in foreign countries were not indeed of a sort from which much was to be expected. Within the last few years however, considerable efforts have been made by the Dutch government of Java to produce tea on the hills of that island, and having the assistance of Chinese cultivators from Fokien, who form a considerable part of the emigrants to Java, a degree of success has attended them beyond what might have been expected in so warm a climate. The Brazilians have made similar efforts, having also, with the assistance of Chinese labourers, attempted to propagate the tea shrub near Rio de Janeiro, and a small quantity of tolerably good tea has been produced; but owing to the high price of labour in America, and the quantity required in the cultivation and manipulation of tea, there is no probability, even were the soil suitable, to the plant, that its culture can be profitably carried on in that country. It may perhaps succeed in

Assam where its culture is now being attempted, for labour is there comparatively cheap, and the hilly and table lands are said to bear a close resemblance to those of the tea districts of China; but we are not sanguine in our expectation as to the result." "All the black teas," says McCulloch, "exported (with the exception of a part of the Bohea grown in Woping a district of Canton) are grown in Fokien, a hilly, maritime, populous and industrious province, bordering to the north east on Canton. Owing to the peculiar nature of the Chinese laws as to inheritance, and probably, also in some degree to the despotic genius of the government, landed property is much sub-divided throughout the empire, so that tea is generally grown in gardens or plantations of no great extent. The leaves are picked by the cultivator's family and immediately conveyed to market, where a class of persons who make it their particular business purchase and collect them in quantities and manufacture them, in part, that is, expose them to be dried under a shed. A second class of persons commonly known in the Canton market as the tea merchants, repair to the districts where the tea is produced and purchase it in its half-prepared state from the first class and complete the manufacture by garbling the different qualities, in which operation, women and children are chiefly employed. A final drying is then given and the tea packed in chests and divided according to quality in parcels of from 100 to 600 chests each. These parcels are stamped with the name of the district grower, or manufacturer, exactly as is practised with the wines of Bordeaux and Burgundy, the indigo of Bengal and many others commodities; and from this circumstance get the name of chops, the Chinese term for a seal or signet. "The greater part of the tea is brought to Canton by land carriage, or inland navigation, but chiefly by the first, it is conveyed by porters, the roads of China in the southern provinces not generally admitting of wheel carriages, and beasts of burden being very rare. A small quantity of black tea is brought by sea, but probably smuggled, for this cheaper mode of transportation is discouraged by government, which it deprives of the transit duties levied on inland carriage. The length of land-carriage from the principal districts where the green teas are grown to Canton, is probably not less than 700 miles; nor that of the black tea over a mountainous country, less than 200 miles. The tea-merchants begin to arrive in Canton about the middle of October, and the busy season continues until the beginning of March, being briskest in November, December and January." There is another particular to which the comparison between the vine and tea plant made by Mr. M'Culloch may be extended, namely, the not less general use of the infusion made from the leaves of the tea plant by the people of various nations of both the old and new worlds. In China, as appears from the following extract, tea is the common beverage of the people. The late Sir George Staunton informs us that tea, like beer in England, is sold in public-houses, in every town, and along public roads and the banks of rivers and canals, nor is it unusual for the burdened and weary traveller to lay down his load, refresh himself with a cup of warm tea, and then pursue his journey." The wealthy Chinese simply infuse the leaves in an elegant porcelain cup, which has a cover of the same material; the leaves sink to the bottom of the cup, and generally remain there without inconvenience, though occasionally some may float or rise to the surface. To prevent this inconvenience sometimes a thin piece of silver, of filagree, or open work, is placed immediately on them. Where economy is necessary to be studied the teapot is used. The wealthy Japanese continue the ancient mode of grinding the leaves to powder; and after infusion in a cup, it is whipped with a split bambo, or denticulated instrument, till it creams, when they drink both the infusion and powder, as coffee is used in many parts of Asia."

Analysis of Tea.—The infusion made from tea contains gum, glucose or saccharine matter, a large quantity of tannin, and a peculiar nitrogenised principle called theine; this is identical with caffein, and upon its presence many of the properties of tea depend. The amount of gum and tannin contained in a given sample of tea afford data by which its quality may to some extent be determined.

Properties of Tea.—Lo Yu, a learned Chinese, who lived in the dynasty of Tang, A. D. 618 to 906, gives the following agreeable account of the qualities and effects of the infusion of the leaves of the tea plant.

"It tempers the spirit and harmonises the mind; dispels lassitude and relieves fatigue; awakens thought and prevents drowsiness; lightens or refreshes the body and clears the perceptive faculties." In Pereira's "Materia Medica" we find the following remarks relating to the properties of tea.—Its astringency is proved by its chemical properties. Another quality possessed especially by green tea, is that of diminishing the tendency to sleep. Tea appears to possess a sedative influence with regard to the vascular system. Strong green tea taken in large quantities, is capable in some constitutions of producing a most distressing feeling and of operating as a narcotic.

Adulteration of Tea. On the Use and Detection of Leaves other than those of the Tea plant.—It has been stated that the Chinese not unfrequently make use of the leaves of other plants besides those of tea and in particular the leaves of Camellia sasanqua and Chloranthus inconspicuus.

With La Veno Beno. This is an article which may be noticed in this place, being now very commonly sold under the above attractive title, to mix with tea. La Veno Beno consists of a coarse powder, of a reddish brown colour, intermixed with small fragments of a leaf which is stated to be that of sumach; to the taste the powder is astringent and bitter, and on analysis, it is ascertained to be composed in great part of coarsely powdered catechu.

Chinese Botanical Powder.—Like La Veno Beno, it is put up in packages, and sold at the same price; it consists of a coarse powder, of a reddish-brown colour and astringent taste, and is made up of a mixture of catechu and wheat-flour, the latter ingredient being added to reduce the strength of the catechu. *Its use is open to the same objections, sanitary and others, as La Veno Beno.*—From a consideration of the analysis of tea made by Dr. Hassall, it appears.—

1st. That not one of Thirty-five samples of black tea, as imported into England, contained any other leaf than that of the tea-plant.

2nd. That out of the above number of samples, twenty-three were genuine and twelve adulterated. The genuine teas were the Congous and Souchongs &c. and the adulterated teas, samples of scented Pekoe and scented Caper Chu'an or black gunpowder as well as imitations of these made from tea-dust.

3rd. That the adulterations detected consisted in facing, so as to improve the appearance of the teas, the surfaces of the leaves with black lead, an iridescent powder resembling mica, indigo, and turmeric, and in the manufacture of imitation tea out of tea dust, sand &c.

The second table which he framed affords conclusive evidence.

1st. That the fabrication of spurious black tea was extensively carried on at that time in the British metropolis, and in other towns of that kingdom.

2nd. That two processes of fabrication are adopted. In the first, the exhausted tea-leaves are made up with gum, and re-dried; black lead, and the mica-like powder, rose-pink, and carbonate of lime being sometimes added to bloom or face the leaves as well as sulphate of iron to darken the colour of the leaves and to give astringency. In the second, leaves other than those of tea (the kind matters but little) are used. These, after being dried, are broken down mixed with gum, catechu and made into a paste; the leaves are then re-dried and further broken down, and sometimes coated with gum. The spurious tea made from exhausted leaves is seldom sold alone, but is used either for mixing with genuine black, or is converted into green tea, in the manner to be described hereafter; while that made from British leaves and catechu is either mixed with black tea in the form of dust, or else is faced and bloomed, until it is made to resemble green tea.

From the Third table it appears,

1st. That out of twenty-four samples of black tea purchased of tea dealers and grocers resident in the British metropolis, twenty were genuine and four adulterated, the former being Congous and Souchongs, and the latter samples of scented Pekoe and scented Caper. It thus appears, that while the great bulk of the black tea used in England—viz, Congou and Souchong—as delivered to the consumer, is in a genuine state, the scented teas—viz, the Pekoes and Capers—are invariably adulterated. Lastly, that from the extensive fabrication of spurious black tea in Great Britain; it is necessary that the purchaser should be constantly on his guard.—*Hassell's Food and its adulterations, p.* 268.

Adulteration by artificial colouring in China.—The superintendent of the workmen managed the colouring part of the process himself. Having procured a portion of Prussian blue, he threw it into a porcelain bowl, not unlike a chemist's mortar, and crushed it into a very fine powder. At the same time a quantity of gypsum was produced and burned in the charcoal fires which were then roasting the teas. The object of this was to soften it in order that it might be readily pounded into a very fine powder in the same manner as the Prussian blue had been. The gypsum, having been taken out of the fire after a certain time had elapsed, readily crumbled down and was reduced to powder in the mortar. These two substances, having been thus prepared, were then mixed together in the proportion of four parts of gypsum to three parts of Prussian blue, and formed a light blue powder, which was then ready for use.—*Fortune's Tea Districts, page* 92. "This colouring matter was applied to the teas during the last process of roasting. About five minutes before the tea was removed from the pans—the time being regulated by the burning of a joss-stick, the superintendent took a small porcelain spoon, and with it he scattered a portion of the colouring matter over the leaves in each pan. The workmen then turned the leaves rapidly round with both hands, in order that the colour might be equally diffused. "One day an English gentlemen in Shanghae, being in conversation with some Chinese from the green-tea country, asked them what reasons they had for dyeing the tea, and whether it would not be better without undergoing this process. They acknowledged that tea was much better when prepared without having any such ingredients mixed with it, and that they never drank dyed teas themselves, but justly remarked that, as foreigners seems to prefer having a mixture of Prussian blue and gypsum with their tea, to make it look uniform and pretty, and as these ingredients were cheap enough the Chinese had no objection to supply them, especially as such teas always fetched a higher price.—*Ibid page* 93. I took some trouble to ascertain precisely the

quantity of colouring matter used in the process of dyeing green teas, not certainly with the view of assisting others, either at home or abroad, in the art of colouring, but simply to show green-tea drinkers in England, and more particularly in the United States of America what quantity of Prussian blue and gypsum they imbibe in the course of one year. To 4½ lbs. of tea were applied 8 mace 2½ candareens of colouring matter, or rather more than an ounce. In every hundred pounds of coloured green tea consumed in England or America, the consumer actually drinks more than half a pound of Prussian blue and gypsum. And yet tell the drinkers of this coloured tea that the Chinese eat cats, dogs, and rats, and they will hold up their hands in amazement, and pity the poor celestials." Two kinds of Prussian blue are used by the tea manufacturers one is the kind commonly met with, the other I have seen only in the north of China. It is less heavy than common Prussian blue, of a bright pale tint and very beautiful. Turmeric root is frequently employed in Canton, but I did not observe it in use in Hwuy-chow.—*Ibid page* 95. I procured samples of these ingredients from the Chinamen in the factory, in order that there might be no mistake as to what they really were. These were sent home to the Great Exhibition of 1851, and a portion of them submitted to Mr. Warrington, of Apothecaries' Hall, whose investigations in connexion with this subject are well known. In a paper read by him before the Chemical Society, and published in its 'Memoirs and Proceedings,' he says, "Mr. Fortune has forwarded from the north of China, for the Industrial Exhibition, specimens of these materials (tea dyes,) which, from their appearance, there can be no hesitation in stating are fibrous gypsum (calcined), turmeric root, and Prussian blue; the latter of a bright pale tint, most likely from admixture with alumina or porcelain-clay, which admixture may account for the alumina and silica found as stated in my previous paper, and the presence of which was then attributed possibly to the employment of Kaolin or agalmatolite."—*Fortune's Tea Districts, page* 95.

Green tea and its Adulterations.—According to most writers, there is but one species of tea plant from which the whole of the numerous varieties of tea both black and green are obtained, the differences in colour, quality &c., resulting from soil, climate, age of the leaves and mode of preparation. We have already pointed out in a very brief manner the principal difference in the cultivation and preparation of black and green teas. The plants from which black teas are prepared are grown chiefly on the slopes of hills and ledges of mountains, the leaves are obtained in three and in some cases even four gatherings, those of medium size and age being chiefly used for the great bulk of the black tea, viz. the congous and souchongs. They are dried either under covered sheds open at the sides, which is the best method, or else by exposure to the sun. This process is a somewhat lengthened one and during it a degree of fermentation is set up which is intimately associated with the colour, scent and flower of the leaves. Lastly the leaves are subjected to a double process of roasting first in a shallow iron pan termed a kuo, an operation which is repeated two or three times as may be necessary, and second in sieves called "poey longs" over a bright charcoal fire. The shrubs which furnish the leaves from which green tea is prepared are cultivated in manured or garden soils, the leaves are greener, more tender, and juicy, and two gatherings of them only are made, the first begins between the 20th of April and the 5th of May, and lasts for about ten or fifteen days, and the second at the summer solstice. After gathering, the leaves should be dried and roasted as soon as possible, in fact the same day, that is, before the slightest fermentation has had time to set in, all exposure to the air being unnecessary and to the sun injurious. During the roasting, which is repeated once or twice in the "kuo" only the second method viz: that in the poey long, not being practised the leaves are at the same time fanned to hasten the drying by dissipating the moisture which rises during the operation. The principal varieties of green tea are Twankay, an inferior description of Hyson, young Hyson; Hyson Skin, Gunpowder and Imperial; all these, except the Twankay, are obtained from unsorted Hyson or Mao Cha in the manner described by Mr. Ball.

In the analysis of black tea, several substances were found to be employed either for the purposes of facing and colouring the surface of the leaves or to impart astringency to the exhausted leaves. The substances ascertained were,

Starch,	Black Lead,
Gum,	Talc,
Catechu,	China clay,
Sulphate of Iron,	Soap-Stone,
Ro-e Pink,	Indigo,
Log wood,	Turmeric.

In addition to the above it has been ascertained that many other substances are employed. The colours used in the facing of green tree are usually three, yellow, blue, and white. The yellow and blue colours, when mixed, form a green, and white is added, either to lessen the intensity of the former colours, or else to give polish to the surface of the leaves. The following is a recapitulation of the more important results arrived at by Dr. Hassall in the course of his investigations. The chief points ascertained with regard to Black tea are,—

1st. That the principal black teas, namely, the Congous and Souchongs, arrive in England, for the most part, in a genuine state.

2nd. That certain descriptions of black tea as scented Orange, Pekoe and Caper are invariably adulterated, the adulteration in general consisting in the glazing of the leaves with plumbago or black lead; the Caper likewise being subject to admixture with other substances; as paddy husk, Lie tea and leaves other than those of tea.

3rd. That several varieties of a spurious Caper, or black Gunpowder, are prepared, which consist of tea dust, and sometimes the dust of other leaves and sand made up into little masses with gum, and faced or glazed with plumbago, Prussian blue, and turmeric powder. In some cases, these imitations are sold separately, but most frequently they are used to mix with, and adulterate the better qualities of Caper; viz. those which are made of tea faced with plumbago only. With respect to green tea, the principal conclusions are,

1st. That these teas, with the exception of a few of British growth and manufacture from Assam, are invariably adulterated, that is to say, are glazed with colouring matters of different kinds.

2nd. That the colouring matters used are in general Prussian blue, turmeric powder, and China clay, other ingredients being sometimes but not frequently employed.

3rd. That of these colouring matters, Prussian blue, or ferro cyanide of iron, possesses properties calculated to affect health injuriously.

4th. That, in Great Britain, there is really no such thing as a green tea—that is, a tea which possesses a natural green hue.

5th. That green teas, and more especially the Gunpowders, in addition to being faced and glazed, are more subject to adulteration in other ways than black teas, as by admixture with leaves, not those of tea, with paddy-husk, and particulary with Lie tea.

6th. Lie tea is prepared so as to resemble green tea, and is extensively used by the Chinese themselves to adulterate gunpowder tea; it is also sent over to Great Britain in vast quantities, and is employed for the same purpose by English tea-dealers and grocers.

The above are the more important conclusions as to the condition of black and green teas, as imported, but these articles undergo further deterioration in our own country.

Thus has been adduced evidence to show,

1st. That exhausted tea leaves are frequently made up with gum, &c., and resold to the public as genuine black tea, and, when artificially coloured and glazed, even as green tea.

2nd. That the substances employed in the colouring are in many cases very much more objectionable and injurious than those used by the Chinese, being often highly poisonous.

3rd. That it is no uncommon thing for tea, both black and green, to be fabricated from leaves not those of tea, and possessing no properties in commonwith the leaves of that plant.

4th. That black Lie tea is often coloured and extensively employed by English dealers and grocers for the adulteration of green tea.—*Hassall's Food and its adulterations, page* 291.

Shevaroy Hills, Madras.—The experiment of growing tea in the Madras Presidency has been often successfully tried, on a small scale. A number of plants supplied by government, through Dr. Wallich, were planted in the Shevaroy hills, about twelve or fourteen years since, and have thriven well: but though no doubt is entertained of the ease with which they could be propagated over a wide extent of country, no attempt has been made to give the cultivation a practical turn, or to make a cup of tea from the southern India tree.

Coorg.—In Coorg, too, the experiment has been tested with like results, so that sufficient warranty exists to justify trials on the largest scale.

Java.—The Dutch have introduced the tea plant in their rich and fruitful colony of Java. That island lies between the sixth and eighth degrees of south latitude. In 1828, the first experiment in the cultivation of tea was made in the garden of the Chateau of Burtenzorg, at Java, where 800 plants of an astonishing vigor, served as an encouragement to undertake this culture, and considerable plantations were made in many parts of the island. The first trials did not answer to the expectations, as far as regards the quality of the article, the astringent taste and feeble aroma of which caused the conjecture that the preparation of the leaf, and its final manipulation, are not exactly according to the process used in China. At present tea is cultivated in thirteen Residencies: but the principal establishment, where the final manipulation is made, is in the neighbourhood of Batavia. The tea which Java now furnishes yearly to the markets of the mother country, may be stated at from 200,000 to 300,000 pounds. It is intimated that the government intends to abandon this culture to the industry of private individuals, under the guarantee of equitable contracts. The mountain range, which runs through the centre of the island, is the most productive, because the tea gardens, extending from near the base, high up the mountains, reach an atmosphere tempered by elevation. The plant escapes the scorching heats of the torrid zone, and finds a climate, by height rather than by latitude, adapted to its nature. But the plant is not confined to lofty ridges. In the plains, the hedges and fences, if one may so call them, are all planted with the tea shrub, which flourish in greater or less perfection throughout the island. But, as has already been intimated, the equatorial latitudes are not the most auspicious for the vigorous growth of a plant that requires a temperature equally removed from the extremes of heat and cold, and the quality of the tea is as much affect-

ed by the climate as the growth of the plant. A considerable quantity of tea is annually shipped from Java to Europe; but the extension of the cultivation is no doubt checked by the exceeding fertility of the soil, and its adaptation to the growth of the rich products of tropical regions. Mr. Jacobson, inspector of tea culture in Java, has published at Batavia a work in three volumes, upon the mode of cultivating this plant, upon the choice of grounds, and the best processes for the preparation and manipulation of the leaves. This book, the fruit of many years of experience and care given to the subject, has been well received by the cultivators, who devote themselves to this branch of industry. If, by means of careful experiments and experience, the government succeed in conferring on the island of Java this important branch of commerce, she may hope to obtain brilliant results; at all events, it will open to the country a new source of prosperity and riches.—*Simmonds.*

(8075) TEAK, TECTONA GRANDIS. Verbenaceæ, Roxb. C. 6.

Teak, ENG.	Teak Chettoo, TEL.
Teak marum, TAM.	Sagwan, HIND.

A native of the mountainous parts of Malabar and of the mountains bordering on the banks of the Godavery, above Rajahmundry, the Pegu, Moulmein and Rangoon forests. This well known and far famed tree grows straight and lofty, with cross armed panicles of showy, white flowers. It seems to require 80 yards to attain perfection The wood is very hard, but easily worked; it is soon seasoned, and being oily, does not injure iron; and shrinks little. It is probably the most durable timber known, hence its value in shipbuilding. The Malabar Teak is considered the *best*, and is always most valued in Indian Government dock yards. A valuable report by Dr. Falconer on the Teak forests of the Tenasserim Coast, was published lately among the Selections, from the Records of the Bengal Government. The price of Teak-wood at present is 3 Rs. per cubic foot, double the ordinary rate. It is matter of regret considering the vast importance of teak timber to England, as a maritime nation, that the preservation of the teak forests was so long disregarded. (Wight No. 100, Mysore 2, Tinnevelly 2, 9, 63, 27, Coorg 11, Rajahmundry, Paulghaut 3, 23, 30, Bangalore 4, Mangalore 15 Travancore 64, 70, 254, Penang 130, 165, Canara 55.)—*M. E. J. R.* This most useful tree, on the Coromandel Coast, flowers in June and July and the seeds ripen in September and October. The wood of this tree has from long experience been found to be by far the most useful timber in Southern Asia; it is light, easily worked and at the same time both strong and durable. That which grows on the mountains in the vicinity of the Godavery is occasionally beautifully veined and mottled. For ship building purposes, Teak is superior to every other sort of wood, being light, strong, and durable, whether in or out of water. Pegu, produces the largest quantity and their navigable rivers enable the natives to bring it down to the sea ports at a cheap rate, which enables them to undersell that of any other part of India. This timber has been found ill adapted for Gun carriages. Indeed when it is observed how easily it splits, it is surprising that it had been for so many years applied to this purpose, especially for the felloes.

Godavery Teak.—The great depot for the Godavery teak is Coringa where many vessels are built, yet there it is found more profitable to plank vessels chiefly with teak brought from the opposite coast. Either from want of means of transport or the force of habit, the wood cutters about the Godavery cut short almost every log to a length of eighteen or twenty feet, and cut away one half of the thickness of the finest logs; leaving three projecting pieces which are pierced for staples for convenience in lashing either to the yokes of the buffaloes or for conveying it from the forest or in rafts on the water. Some years since a wise enactment was passed for the Tenasserim provinces limiting a person cutting trees according to his means of transporting them. The Messrs. Palmer of Hyderabad at one time farmed teak forests, and sent down some very fine timber, but the speculation was given up as their agent at Neelapully was unable to obtain their prices. Government might easily prevent the waste noted by charging an exportation duty on all timber so hacked. It is strange that this waste is only in the teak timber, and not in inferior descriptions. In the Masulipatam and Rajahmundry district the timbers are classed as Tanabees 18 to 20 ft × 18 in. × 10 in. Toondoors 14 ft × 12 in diameter.—*Rohdes, M. S. S.*

At another place Mr. Rohdes observes, Teak is brought in large quantities from the country bordering the Godavery and its tributaries, and though the large logs are hacked away, when the Palmers of Hyderabad farmed the teak forests several of the finest trees felled by them within 100 miles of the coast remained from want of sufficient means of transport. *By a heavy duty on all logs hacked to waste, to the extent much of the timber is, Government would do much to preserve the supply.* Mr. Rohdes has seen several enormous teak logs washed down, clearly showing that even the banks of the rivers have not yet been deprived of their finest timber. A great deal of good timber, from 8 to 12 inches diameter, is brought to Masulipatam by carts returning from Nagpoor, the Chandah road to which runs for many miles through teak forests. The average price of teak at Rajahmundry is under 8 annas a cubic foot. It is classed as,

Tanchees, say 18 feet × 20 in × 8.
Toondoos 15 ,, × 12 in diameter.
Sirambees, 18 ,, × 8 in.

The Godavery teak varies much in density: much of it is finely veined; generally it is heavier than the Rangoon teak, but not equal to some from the Malabar Coast. In Ceylon, the Dutch largely planted teak, which has attained considerable size. Teak seems to require about 80 years to obtain perfection, but after 20 years a teak plantation would probably yield a valuable return in thinning.—*Rohdes.*

Malabar Teak.—Upon the whole, the Malabar teak seems the best. That of Rangoon is lighter and more open in the grain and is preferred for masts and spars. The dark or heavy teak of the mountains bordering on the Godavery is very little if at all inferior to the Malabar, but a good deal of the Godavery teak is very open grained. The logs brought to market are always irregular in shape. Where strength without any regard to size and shape is required, the small heavy logs brought down by return bullock carts to Masulipatam may be used. Major Campbell's experiments show the weight of a cubic foot to vary in the several specimens from 52 to 37 lbs, practical value of S. 92 to 50. Mr. Rohdes has frequently been struck with the want of strength in logs apparently sound, but has generally found the darkest veined wood the strongest. It is said that a varnish is extracted in Pegu from this tree.—*Rohdes, M.S.S.*

Tenasserim Teak —Teak is the staple timber of the Tenasserim Provinces, and from its abundance in Province Amherst, and its valuable property of being impervious to the white ants, it is used in Maulmain almost exclusively, both for building purposes, and for furniture. In 1848, eighteen thousand tons of this timber were exported, and Mr. O'Riley estimated that more than three thousand tons were used for home consumption; the total value of the whole falling little short of a million of rupees.—*Mason.*

The teak tree is of rapid growth, and the trunk grows erect, to a vast height, with copious spreading branches. The wood of the teak tree is by far the most useful timber in India; it is light, easily worked, and, though porous, it is strong and durable; it requires little seasoning, and shrinks very little: it affords tar of good quality and is rather of an oily nature, therefore does not injure iron, and is the best wood in this country for ship-timber, house carpentry, or any other work where strong and durable wood is required. Malabar teak is esteemed superior to any other in India, and is extensively used for ship-building at Bombay. It grows in the teak forests along the western side of the Ghaut Mountains, and the contiguous ridges, where the numerous streams afford water carriage for the timber. There a variety, says Dr. Roxburgh, which grows on the banks of the Godavery, of which the wood is beautifully veined, closer grained, and heavier than that of the common teak tree; this kind is well adapted for furniture. The cohesive force of teak wood varies from 13,000 to 15,000 pounds per square inch; the weight of its modulus of elasticity is 2,167,000 pounds per square inch, according to Mr. Barlow's experiments; and the weight of a cubic foot seasoned, varies from 41 to 53 pounds. Representing the strength of oak by 100,

	that of teak will be,	109
Stiffness of oak by 100,	,,	126
Toughness of oak by 100,	,,	94

From which it appears, that it is much superior to oak in these properties, except in toughness; but it is to be remembered, that these proportions, are drawn from two or three experiments on teak, and most probably these were tried on very select specimens; whereas those for oak from a mean specimen, selected from pieces of oak of various qualities.—(*Tredgold?*) Teakwood, says Tredgold, is the produce of the Tectona grandis, a native of the mountainous parts of the Malabar coast, and of the Rajahmundry Circars as well as of Java, Ceylon, and the Moulmein and Tenasserim Coasts. It grows quickly, straight, and lofty, the wood is light and porous, and easily worked, but it is nevertheless strong and durable; it is soon seasoned, and being oily, does not injure iron, and shrinks but little in width. Its colour is light brown, and it is esteemed the most valuable timber in India for shipbuilding and house-carpentry, it has many localities. The Malabar teak which grows on the western side of the Ghaut mountains is esteemed the best and is always preferred at Government dock-yards. Teak is considered a more brittle wood than the Saul or the Sissoo. In 25 years, the teak attains the size of two feet diameter, and is considered serviceable timber, but it requires 100 years to arrive at maturity. There is a variety, says Dr. Roxburgh, which grows on the banks of the Godavery in the Deccan, of which the wood is beautifully veined, closer grained and heavier than the common teak tree, and which is well adapted for furniture. Some of the old trees have beautiful burrs, resembling the Amboyna, which are much esteemed. I have an excellent specimen of the burr of the teakwood, through the kindness of Dr. Horsfield, of the East India House. Wood in general does not very perceptibly alter in respect to length; Teak, says Colonel Lloyd, is a remarkable exception. He found the contraction in length, in the beams of a large room he erected in the Mauritius, to be three quarters of an inch in 38 feet. The teak-wood when fresh has an agreeable odour, something like rose wood, and an oil is obtained from it. He adds, "The finest teak now produced comes from Moulmein and other

parts of Burmah ; some of this timber is unusually heavy and close grained, but in purchasing large quantities, care must be taken that the wood has not been tapped for its oil, which is a frequent custom of the natives, and renders the wood less durable." " At Moulmein, so much straight timber is taken and the crooked left, that thousands of pieces called shin logs," and admirably adapted for ship timbers, are left. Teak contains a large quantity of siliceous matter, which is very destructive to the tools. African teak does not belong to the same genus as the Indian teak ; by some it is thought to be a Euphorbiaceous, plant and by Mr. Don to be a Vitex.—*Tredgold.* Teak, says Edye, has been brought into use in the British navy at Bombay, Calcutta, and Cochin. The following is a list of the ships of war built of this timber :—

Ships of the Line.—Minden, Cornwallis, Melville, Malabar, Wellesley, Ganges, Asia, Bombay, Calcutta. Hastings.

Frigates.—Salsette, Amphitrite, Trincomalee, Seringapatam, Madagascar, Andromeda, Alligator, Samarang, Herald.

Sloops.—Victor, Cameleon, Sphynx, Cochin.

It has been considered by many, that a ship built of this sort of wood would last good from thirty to fifty years, for which time, report says, many ships have been known to run in India. The old Milford Bombay ship, in the country trade of India, was the oldest and best-conditioned ship that ever came under Mr. Edye's notice. She was, he says, built of teak-timber about thirty-five years before I saw her ; she had been constantly at sea, and only had a small repair during that period. She was built of the Malabar teak. It is generally considered that there are three sorts of teak. That sort which grows to a very large size is of an open, porous grain, and very much resembles Dantzic oak : it is found in the forests at the foot of the Ghats ; in valleys where the soil is deep and rich ; and on the banks of great rivers. On the bank of the Iruarri river, near the Ghauts, about eighty miles from Cochin, he caused a tree of teak to be felled. It was seven feet in diameter, and at seventy feet from the butt it was twenty-six inches in diameter. It was not durable as timber ; but for planks and boards, such as the native carpenters use, it is preferred to any other of the small knotty woods. It is a fact, he adds, which my experience in the county has taught me, that all teak-timber, above twenty inches in diameter at the butt, has the heart shake from end to end, and consequently, requires much care to convert it to use ; which should be done by a saw-cut into the heart of the wood and then either of the two parts might be used as timber or plank. But teak generally grows straight, and, consequently, for the timber of a large ship its curve crosses the grain of the wood : the shake runs through the timber on the outside at the head and heel, and, in the inside, it follows the curve in the middle, nearly breaking through to the surface. This shake, of four or five inches broad, and an inch or an inch and a half open in the heart of the timber, must be totally destructive to it ; as must have been the case in the Minden seventy-four gun ship.—The next sort of teak on the coast is that which grows in the forest of the Ghats. It is curved, hard and knotty, as the soil is not deep, its bed being rocks. This timber resembles in growth and appearance the English oak ; its weight is very considerably more than that which grows to the large size ; and the texture and durability of this timber is well known to those who are acquainted with the grain of woods.—Teaks will be found to differ in weight from thirty-nine pounds six ounces to fifty-two pounds fifteen ounces the cubic foot, when seasoned ; but the heaviest, when green, that I have found, were only fifty-seven pounds nine ounces the cubic foot. I am told some of the teaks from the Cochin forest weigh as much as sixty pounds the foot, when green. The third sort of teak is procured from Pegu, Rangoon, Ava, and the Burmese territories. For ship building it is very inferior to that of Malabar. It is generally considered, by persons unacquainted with the nature of timber, that " the teak from that country is superior to any other in India," this is acknowledged by competent persons so far only as regards the size of the tree, and the free and clear grain of the wood. There can be no doubt that it is better for purposes of house-building, and the general uses of the native carpenter, from the ease he finds in working it. This timber, as well as that before described, grows on a rich deep soil, and, consequently, its maturity is rapid and its dimensions large ; but the texture of the wood is as different from that of the forests of the Ghauts, as the American and Dantzic are from the English oak. At Rangoon and Pegu this timber is split in the heart shake into two parts, which the natives call shimbins, and this shews the freeness of the grain of the wood. These pieces are priced according to their size ; and this sort of teak is better known to the merchants and captains of the country-trade than any other, on account of its use for the repairs of vessels, or as sea-shore timber. The teak may be said to be the most valuable tree in India. It produces a good oil, which is used with paint as a substitute for Linseed-oil ; and which also makes a good varnish for paint or wood, and is known generally by the name of wood oil. The leaf of this tree is large and round, in shape resembling a cabbage leaf, about ten inches in diameter, but very thin, although its fibres are strong. The blossoms and berries are produced in large bunches : when in bloom, they may be compared to hops ; when in seed, as to size, to a bunch of grapes. The nut is of a dark russet brown, and very

hard: when ripe, it falls to the ground and plants itself. A forest patch of teak, when in full bloom, has much the appearance of a field of ripe corn when viewed from a distance, with a few spots of green interspersed; by this appearance the native hill people discover the trees of teak at this season, and cut around their roots to prevent the sap from ascending the next year. The persons who work the forests of teak on the side of the hill are thus able to distinguish at a distance those trees from the others, and cut them down for floating to the depot, which can only be done at the setting in of the monsoon, when the rapids fill the nalas; and then the tremendous torrents dash whatever may be thrown into them from one fall to another, from heights of fifty feet at a fall, until at last it reaches the depot, having been brought down by a circuitous route of one hundred miles, from a height of from 1000 to 2000 feet above the level of the sea. Much might be said on the uses and durability of teak and foreign timber, but it will be desirable to postpone that until its practical uses have been proved. There cannot be a doubt that the climate and temperature of its native atmosphere is the most favourable to its durability. Its value, for the purposes of ship-building, does not consist merely in its durability; a still greater advantage is, that the ship is at all times ready for service, while ships of European wood, constructed with oak and fir, are constantly warping and crazy, and in forty-eight hours after the caulking of the topsides are frequently as leaky as before: the health of the crew suffers, in consequence, at the change of the monsoon, from exposure to the damps of a tropical climate; and also, from this cause, the carpenter's crew are kept fully employed. But the teak ship, when well caulked, remains dry and comfortable to the crew; and is always an efficient ship for service. The many contradictory reports of sailors on the state of ships of war on foreign stations, is to be placed to the want of knowledge of the true state of facts. It is well known in the dockyards that, by a continual caulking of the sides or decks of a ship, the wood is so completely compressed on the seams and edges of the plank by the caulking iron, that the oakum is forced through the seam into the ship, and that that seam can never be again caulked tight. From this cause the oakum in the seam becomes wet and rotten; and the ship's crew are exposed to the injurious effects of inhaling the putrid air through the openings of the ship's timbers. The confined state of a ship under hatches in a tropical climate, is well known to all who have been on board one in the heavy tropical rains and gales of wind when the monsoon sets in, and which last for days and weeks together.—*Edye, Malabar and Canara.* See TECTONA.

(8076) TEAK WOOD OIL. An opaque dull ash coloured oil, under this name, is procurable in most of the large Bazars of India; when allowed to rest for some time, it separates into two layers, an upper or dark coloured clear stratum and a lower and more solid deposit. Its chief use is for applying to woodwork of all sorts, either alone as a natural varnish, or in combination with certain resins.—*M. E. J. R.*

(8077) TEAL, the common name of a Natatorial Bird belonging to the family *Anatinæ*. This bird is the *Querquedula crecca*, Steph.; the *Anas crecca*, Linn. It is one of the smallest of the *Anatidæ*, and most beautiful of ducks. It is the Sarcelle, Petite Sarcelle, Cercelle, Cercerelle, Alebrande, Garsote, and Halebran, of the French; Cercedula, Cercevolo, Scavolo, Sartella, Anitrella, and Anitra d'Inverno, of the Italians; Spiegel-Entlein and Kriekente of the Germans; Winter Taling of the Netherlanders; Arta and Kræcka of the Swedes; Kestelort-And of the Norwegians; Krik-And of the Danes; Cor Hwyad and Brach Hwyad of the Welsh. This species is one of the most delicate of the ducks. Willughby remarks that, for the taste of its flesh and the wholesome nourishment it affords the body, it "doth deservedly challenge the first place among those of its kind." In the 'Portraits d'Oyseaux' (1557), the following quatrain celebrates its excellence, and alludes to its habits:—

"Bien peu souvent se plonge la sarcelle
Entre deux eaux, de lequelle la chair
Est delicate: aussi couste elle cher
Autant qu'oyseau qui soit petit comme elle."

Accordingly we see it holding a high place in ancient feasts. We find it among the 'goodly provision' at the banquet given at the enthroning of George Nevell, archbishop of York, in the reign of Edward IV.: 'Mallardes and Teales, 4000. The price in the Northumberland Household Book is—'Teylles, 1*d.*,' mallards being 2*d.*—*Eng. Cyc.*

(8078) TEASEL, FULLER'S THISTLE, OR TEAZLE.

Chardo a carder, FR.	Weberdistel, Kratzdistel, GER.
Cardon da Cardare, IT.	Cardencha, Cardo peinador, SP.

This plant, which is cultivated in the North and West of England, is of considerable importance to clothiers, who employ the crooked awns of the heads for raising the nap on woollen cloths, &c. (*McCulloch*)—*Faulkner.*

(8079) TECOMA, a genus of plants belonging to the natural order *Bignoniaceæ*. It has a companulate 5-toothed calyx, a short-tubed corolla with a companulate throat, and a 5-lobed bilabiate limb; 4 didynamous stamens with a sterile filament of a fifth; a bilamellate stigma; a sillique-formed 2-celled capsule, having the dissepiments contrary to the valves; the seeds winged, disposed in 2 rows.

The species are erect trees or shrubs or scandent plants, with unequally pinnate or digitate simple leaves with terminal panicles, and yellow or flesh-coloured flowers. They are natives of the Old and New World in tropical and sub-tropical climates. They are all elegant plants, and well worthy of cultivation. Several species of *Tecoma* have reputed medicinal virtues. *T. speciosa* is said to be a useful diuretic, also a cathartic. *T. impetiginosa* and *T. Ipe* contain large quantities of tanning.—*Eng. Cyc.*

(8080) TECOMA CAPENSIS. An elegant creeping plant with orange colored flowers well adapted for covering a wall or running up a trellis work, grown from seed in common garden soil.—*Riddell.*

(8081) TECOMA JASMINOIDES. This plant is cultivated in the same way as the former. The color of the flowers pink.—*Riddell.*

(8082) TECOMA RADICANS is a climbing glabrous plant with rough rooting branches. It grows against a wall by throwing out roots from its branches in the same manner as ivy. It has large flowers, which are called Trumpet-Flowers. —*Eng. Cyc.*

(8083) TECOMA STANS is a small tree, or ornamental garden shrub. Its roots are reputed diuretic, Hort Garden 6.—*M. E. J. R.*

(8084) TECTONA, a genus of Plants belonging to the natural order *Verbenaceæ*. It is characterised by having a 5-6-toothed calyx, which becomes inflated over the growing pericarp; corolla 1-petalled, 5-6-cleft; stamens 5, but often 6; germ superior, 4-celled; cells 1-seeded, attachment central; drupe obtusely 4-sided, woolly, spongy, dry, hid in the calyx. Nut hard, 4-celled. Seed solitary; embryo erect without perisperm.—*Eng Cyc.*

(8085) TECTONA. *Species.*

Oomy takoo marum, TAM.

Dr. Wight says of this I am as yet uncertain whether to view this as a variety or distinct species of teak. Specimens tested here proved very inferior in strength to the true teak, breaking with a weight of only 300 lbs., while the other sustained above 400.—*Wight.*

(8086) TECTONA GRANDIS.

Teak tree, ENG. | Takoo chettoo, TEL.
Sagwan, HIND. | Take marum, TAM.

The only species is the Teak-Tree, which grows to an immense size, and is remarkable for its very long leaves, which are from 12 to 24 inches long and from 8 to 16 inches broad, and are compared by oriental writers to the ears of the elephant. The best teak-timber for ship-building was supplied to Bombay from the mountains of the Malabar Ghauts, where the tree is found rather in detached clumps, of some extent however, than in extended forests. It is also found on the mountainous parts of the Coromandel coast, along the banks of the Godavery up to Poloonsha. It proceeds far into the interior of India, and may be seen in the mountains of Bundulcund, in the form however of only a moderate-sized shrub. Dr. Roxburgh introduced the Teak into the low grounds of the Circars as early as 1790, and Lord Cornwallis and Colonel Kyd planted it in Bengal about the same time. The Calcutta Botanic Garden contains a number of these trees. From the Saharunpore Botanic Garden, in 30° 9' N. lat. (where, its buds being covered with scales, it is enabled to resist cold, besides its leaves falling and giving it a season of rest), the tree has been spread along the Doab Canal; the whole of the intermediate country is suited to its cultivation, and the East India Company have ordered the Malabar forests to be preserved. The most extensive forests are however those extending along the banks of the Irrawady, especially in Pegu —*Eng. Cyc.* See TEAK.

(8087) TECTONA GRANDIS. *Var.* HUL TEAK. Wynaad about Sultan's Battery, scarce; considered superior to the common Teak.—*McIvor. M. E.*

(8088) TECTONA HAMILTONIA HAMILTON TEAK. This is an inferior species of teak that grows on the banks of the Irrawaddy; and from native descriptions, appears to be found in the province of Yay.—*Mason.*

(8089) TECTONA TERNIFOLIA, of Tenasserim.—*Mason.*

(8090) TEJBAL.

Tejbal, GUZ. HIND. PERS.

The seeds and capsules of the *Xanthoxylum hostile*, which are employed by the natives of northern India as a remedy for the tooth-ache, and also for intoxicating fish. They have a warm, spicy, pepper-like pungency, a property which is participated in by the bark, and other parts of the tree.—*Faulkner.*

(8091) TEJPATA. LEAVES of LAURUS or CINNAMOMUM. Malabathrum, the folia Malabathri of the ancients.—*Ben. Phar.*

(8092) TELEKIA, COMPOSITÆ.—This plant bears a yellow flower, and grows in any common garden soil.—*Riddell.*

(8093) TELINI, INDIAN BLISTERING FLY. Meloe or Mylabris Cichorii. The wing coverts are marked with large spots of light brown alternating with deep blue. Another blistering fly is small, steel blue, Cantharis Violacea.—*Ben. Phar.*

(8094) TEMIA (Le Vaillant), a genus of Perching Birds, which, Cuvier observes, M. Vieillot has changed into *Crypsirina*, and Dr. Horsfield into *Phrenotrix*, whilst M. Temminck arranges them under *Glaucopis*. Mr. Swainson thus characterises *Crypsirina*.—Bill shorter than the head, much compressed; the culmen considerably arched, and curved from the base. Nostrils small, basal, concealed by incumbent feathers, which are either soft or setaceous. Wings short, much rounded; the primaries hardly longer than

the secondaries. Tail feathers broad and obtuse. Feet moderate, arboreal. The middle toe and claw short, but as long as the tarsus; lateral toes unequal; hind toe and claw shorter than the tarsus. It is a native of India.

(8095) *Crypsirina vagabonda* (*vagabundo*) and *C. Temia* are among the species given as examples. The first of these is the *Pica vagabunda* of Gould ('Century of Birds from the Himalaya mountains'). Dr. Horsfield, who gives *Corvus varians* as the synonym of his *Phrenotrix Temia* (the Chekitut, or Benteot, of the Javanese), states that although not a rare bird in Java, his *Phrenotrix* is by no means familiar, and never approaches the villages and habitations like many others. ('Zoological Researches in Java.')—*Eng. Cyc.*

(8096) TENTUKIE, the Malayala name of a Ceylon tree which grows to about twelve or eighteen inches in diameter, twelve feet high: it can not be considered valuable. It is sometimes used by the natives for inferior and common purposes.—*Edye, Ceylon.*

(8097) TEPHRODORNIS (Swainson), a genus of Drongo Shrikes, *Dicrurinæ*. [LANIADÆ] —*Eng. Cyc.*

(8098) TEPHROSIA (from τεφρός, ash-coloured), the name of a genus of Plants belonging to the Papilionaceous division of the order *Leguminosæ*. The genus consists of shrubs or herbs, with usually unequally pinnated leaves, and lanceolate or subulate stipules distinct from the petiole. The flowers are white or purplish, arranged in racemes which are mostly axillary; the calyx is without bracts, 5-toothed, nearly equal; vexillum of corolla large, silky outside, and reflexed in a spreading manner; wings adherent to the keel; stamens separate or united in one or two parcels; legume mostly sessile, linear, compressed, many seeded, with the valves flat; seeds compressed. This genus at present includes 84 species, but it is probable that a more accurate investigation will result in making several genera of the present one. The American and Asiatic species are in some measure distinguished by their properties. In the former a narcotic poison is more frequently secreted; in the latter a colouring matter.—*Eng. Cyc.* Dr. Wight, in Icones gives Tephrosia incana, 371; sentiçosa, 370; spinosa, 372; and tinctoria, 388.

(8099) TEPHROSIA APOLLINEA. *Syn.* Galega apollinea. A native of Egypt. The leaflets are obovate, oblong, emarginate, silky underneath. They yield indigo when fermented, and are often mixed with the Alexandrian senna.—*O'Shaughnessy, page* 292. *T. Apollinea* is shrubby, and covered with a close pubescence; the leaflets are silky beneath, and in 2 or 3 pairs; the legume is 6 or 7-seeded, and rather pubescent. It is a native of Egypt, and yields a blue colouring-matter, which is used in dyeing.—*Eng. Cyc.*

(8100) TEPHROSIA PISCATORIA, the Fisher's Tephrosia, contains the narcotic principle of the genus, and is used in the East Indies for the same purposes as *T. toxicaria* is in the West Indies.—*Eng. Cyc.*

(8101) TEPHROSIA PURPUREA. GALEGA PURPUREA.

Poonkhie, SANS. | Surpunka, BENG.

A native of the sandy coast of Coromandel. The root is bitter, and given by the native practitioners in dyspepsia and chronic diarrhœa.—*O'Shaughnessy, page* 292.

(8102) TEPHROSIA TINCTORIA, the Ceylon Indigo, is a shrubby glabrous plant with 5 pairs of leaflets, silky and villous beneath; flowers purple or flesh-coloured, seated on axillary peduncles; straight pendulous legumes. This plant is a native of Ceylon, where it is called Anil. Its tissue yields a blue colouring-matter, which has the same properties as the indigo, and is used in Ceylon for the same purposes. There are other plants used in Ceylon for dyeing also, called Anil.—*Eng. Cyc.*

(8103) TERAI. At the north foot of the Khasia, in the heavily timbered dry Terai, stretching for sixty miles to the Burrampooter, it is almost inevitable death for a European to sleep, any time between the end of April and of November. Many have crossed that tract, but not one without taking fever: Mr H. Inglis was the only survivor of a party of five, and he was ill from the effects for upwards of two years, after having been brought to death's door by the first attack, which came on within three weeks of his arrival at Churra, and by several relapses. Temperature in September 77° to 80°; and in November 75° to 77°.—*Hooker Him. Jour. Vol.* I. *page* 266.

(8104) TEREBELLUM, a genus of *Mollusca* placed by Cuvier among his Pectinibranchiate Gasteropods, between *Ovula* and *Voluta*; by De Blainville among his *Angyostomata*, between *Conus* and *Oliva*; and by Rang between *Mitra* and *Ancillaria*. The fossil *Terebellum convolutum* is the type of Montfort's genus *Seraphs*.

(8105) TEREBELLUM SUBULATUM, a native of the East Indies, may be taken as an example of the recent species, and *T. convolutum* of the fossil forms.—*Eng. Cyc.*

(8106) TEREBINTACEÆ, a natural order of Dicotyledonous Plants constituted by Jussieu, and adopted by De Candolle, Arnott, Don, and other writers on systematic botany. Brown has however divided it into five orders, viz. Anacardiaceæ; Burseraceæ; Connaraceæ; Spondiaceæ; Amyridaceæ.—*Eng. Cyc.*

(8107) TERMINALIA (from 'terminus'), is the name of a genus of Plants belonging to the natural order *Combretaceæ*. The species of this genus consist of trees and shrubs, with alternate leaves, which are usually crowded together at the ends of the branches. The flowers are

destitute of petals, and are disposed in spikes, which are racemose and panicled; in the lower part of the spikes they contain both stamens and pistils, but in the upper part they contain only stamens; the limb of the calyx is campanulate, 5-cleft, with acute lobes; the stamens are 10 in number, arranged in two series, and are longer than the calyx; the ovary contains two ovules; the style is acute, and the fruit is drupaceous, containing only one seed. All the species are inhabitants of the tropical parts of Asia and America. They are numerous, and many of them are used in medicine and the arts. —*Eng. Cyc.* In the celebrated Myrobalans of ancient and eastern pharmacy, an astringency is the prevalent principle, although the fruits of *Terminalia Chebula* are gently laxative also. *T. Catappa* affords edible kernels, like almonds, and are named *badam*. *T. Benzoin* in the Mauritius gives a milky juice, which becomes fragrant as it dries, and is burned as incense in churches. —*O' Shaughnessy, page* 339.

(8108) TERMINALIA. *Species.* PENTAPTERA? Every member of the genus terminalia yields useful timber, and the chebula, and bellerica have been noticed as indigenous in Tenasserim. A still larger timber tree is common in the interior, whose winged fruit indicates its connection with Roxburgh's genus pentaptera.—*Mason.*

(8109) TERMINALIA ALATA, Ainslie. T. TOMENTOSA, Wall. Roxb. *Combretaceæ, Icon* 195.

Muddee, TEL.	Arjuna, SANS.
Maroodum Tree, ENG.	Kumbuk, CING.
Jungly karinj, HIND.	Kooroo-marthi mara, CAN.
Maroodum marum, TAM.	
Urjoon, HIND.	Junglee karing, DUK.

This tree often grows to a very large size. The wood of it is employed for long beams in house building. In the northern parts of Canara it is used for making boats and canoes.—*Ains. Mat. Med. p.* 209. Fruit glabrous, bark deeply cracked, astringent and febrifuge. As found in the Bazars its colour is reddish brown, taste astringent; in powder and with oil it is used in apthæ. (Roxb. Fl. Ind. ii. 440.)—*O' Shaughnessy, p.* 340.

The Bark.

Marndum Bark, ENG.	Muddie putta, TEL.
Marudum puttay, TAM.	Arjuna, SANS.

The bark as it appears in most of the Indian bazars is of a reddish brown colour, and has a strong but not unpleasant, astringent taste. In the Southern provinces, the powder of it in conjunction with Gingilie oil, is used as a valuable application for the kindatalie, (Apthæ of grown people) and the Akkirum, or Apthæ of infants. —*Ains. Mat. Med. p.* 58. In the Wynaad, Carroo-Marrathoo, Terminalia alata, is used for the same purposes as Ben teak, under which name it is frequently sold: common on the Western Ghauts and in Wynaad: wood not durable. —*McIvor.*

(8110) TERMINALIA ANGUSTIFOLIA. The leaves are linear-lanceolate, very thin at both ends, pubescent beneath; the petioles are also pubescent, and have two glands at their apex. This tree is a native of the East Indies, and was formerly called *Terminalia Benzoin*, as it yields on tapping a gum-resin very similar to benzoin, and possessing the same properties.—*Eng. Cyc.*

(8111) TERMINALIA BELLERICA. (BELERIC MYROBALAN.) *Combretaceæ*, Ill. 91.

Bulla, DUK.	Tam kaia marum or Tonda muram, also Tanikoi or tandee marum Cattoo eloopæ, TAM.
Beleyluj, ARAB.	
Bahira, SANS.	
Beheyra, HIND.	
Beleyleh, PERS.	
Tadi chettoo, TEL.	

A very large tree; common in Mysore and mountainous parts of India; has a straight trunk and spreading head; leaves deciduous about the beginning of the hot season, when the flowers appear; fruit round, covered with a grey silky down; common in the Deccan. The flowers have an offensive smell —*Riddell.* Of this tree, the wood is white and soft, and not much used. The kernel of the fruit is eaten by the natives. (Wight No. 11-99, Mysore 27, 18, Tinnevelly 47, Travancore 306, Cleghorn.)—*M. E. J. R.* Drupe oval, somewhat five-angled, size when dry of a gallnut, and dirty brown colour; size of a nutmeg, and fleshy when fresh, with a grey silky down, very astringent; kernels eaten, and deemed intoxicating; bark abounds in gum. Ainslie reckons the fruit as astringent, tonic, and attenuant. Dose one to two drachms. It is much used in the arts as an astringent, and as the basis of several colours.—*O'Shaughnessy, page* 341. It is abundant in the Kotah jungles and the wood is very hard.—*Irvine.* Wood said by Roxburgh to be durable, but not much used. In Malabar it is hollowed out for canoes, which however are said not to be lasting. It is not an uncommon tree in the Walliar Jungles, but is considered of no value there. Perhaps the tree called by the name of *Tanikai Marum*, or *tonda marum*, in Malabar, is the Terminalia Berryi, which also attains a large size, and is more nearly allied to the Curray Murdah, as belonging to the same section of the genus.—*Wight.* It furnishes a large and valuable timber. The wood is employed for making Catamarans, and is also hollowed out into grain measures, &c.—*Ains. Mat. Med. p.* 206. Myrobalans are the dried fruits of trees very common in many districts of India; viz: several species of *Terminalia.* They are much valued as a tanning material. The myrobalans are about an inch in length, about the size and shape of a Spanish olive, with an ash yellow coloured pericarp, generally strongly marked with longitudinal wrinkles. They have become a very important

item in commerce, but their introduction to general use can only date back about ten years. The imports into England, according to Mr. Poole, now amount to about 1200 tons annually: from Madras, 1853-54, the exports were 4,145 cwt. value 8,447 Rs.—*M. E J. R.*

(8112) TERMINALIA BERRYI. COMBRETACEÆ.

Vellai maroodóo, TAM.	Vallay murdah marum, TAM.
Vellay murdah wood, ENG.	

This, judging from some introduced plants growing in Coimbatore, is a very large tree. The bark is quite smooth, and nearly as green as the leaves. The wood is white, described as of ordinary quality, used on the coast for canoes, and for making the broad wooden platters in use among fishermen and ship lascars.—*Wight.* This tree attains a large size, especially at the foot of the W. Ghauts, where it is used for canoes, &c. (Wight). Wight No. 111, Travancore 225, 320, Hort. Garden 64.—*M. E. J. R.*

(8113) TERMINALIA CATAPPA, Lin. Icon. 172. *Combretaceæ.*

Country almond tree, ENG.	Vadom vettello, TEL.
Nattoo vadom cottay, also Nattoo vadom marum, TAM.	Catappa, MALAY.
Budamie, HIND	Ingudi SANS.
	Badam, BENG.

A beautiful large tree, found in gardens, &c, the kernels are eaten and are palatable, the wood is also useful. (Wight No. 54, Hort. Garden 63.)—*M. E. J. R. T. Catappa* has obovate leaves, tapering to the base, pubescent beneath, and glands on the under sides of the midrib. It is originally a native of the East Indies, but has now become naturalised in the West India Islands. Some botanists have described the West India species as distinct from the Asiatic, but there is no good distinctive character. The drupaceous fruit of this tree is about 3 inches long, and contains a large seed, which is eaten, and also yields an oil, in the same manner as the almond. This tree, on account of its thick foliage, is much planted in the tropics for the purpose of forming avenues near houses. The bark and leaves yield a black pigment. Indian ink is manufactured from the juice of this tree.—*Eng. Cyc.* This is probably a Malayan species, but is cultivated in India, and is a valuable timber tree. Drupe three inches long, egg-shaped, grooved; kernel resembles the almond or filbert in taste and composition; yields an excellent fixed oil, and is good nourishing food. The bark and leaves are very astringent, and yield a black paint.—*O'Shaughnessy, page* 341. In the Kotah gardens this is a very handsome garden tree.—*Genl. Med. Top. p.* 193. *Terminalia Catappa* grows commonly in all parts of the Deccan. It is raised easily from seed, and in a good light soil, well watered, will in two years be ten or more feet in height, and give blossom. It is rather a handsome tree, and, from its large leaf (which turns red previous to its falling off,) has a very striking appearance. The fruit is of the size of a coarse plum, and the kernel, contained within the shell, resembles the English Filbert in flavour. It is produced at table with the desert.—*Riddell.* This tree is procurable in Malayalum. The wood, judging from an outside specimen, has a good deal the appearance of beech, showing much silver grain in some sections, but it is more porous and not so close grained.—*Wight.* It attains a large size in Malabar where the wood is much esteemed, it is called by the English, the Almond tree, from the oval shape of the fruit, but the kernel is cylindrical.—*Wight.* It is reckoned a valuable wood by the natives, who generally employ it in making Pikoties.—*Ains. Mat. Med. p.* 206.

The fruit.

Nat Vadomcottay, TAM.	Vadomvittiloo. TEL.
Badam-i-Hindee, DUK.	Hinghoodie, SANS.

This has got the appellation of country Almond, in India, from its resemblance to the Persian fruit of that name in taste and appearance, though it has, perhaps, more the flavor of an English filbert. It is the produce of a very large and certainly one of the most beautiful trees in the world. The tree is the Adoa marum of the Hortus Malabaricus, the Malayas call it Catappa. The kernels of this large and most beautiful tree are recommended by the Vy theans as a light and nourishing diet for weak people.—*Ains. Mat. Med. p.* 92 and 228.

(8114) TERMINALIA CHEBULA. (CHEBULIC MYROBALAN.) Myrobalana Chebula, Gærtn. ii. t. 97.

Pillamarrda, CAN.	Heleiji kabule, ARAB.
Heerda, also Huldah, DUK.	Helileh Kelan, PERS.
	Pilla murdah wood, ENG.
Pilla murda or Kadoo-koy, TAM.	Karaka Chettoo, TEL.
Alali mara, CAN.	Har Hara, Umbed'her, HIND.
Araloo, CING.	Kayoobin, BURM.
Haritaka, SANS.	

This large timber is plentiful throughout the Pegu Teak Forests, wood, red-colored, strong and adapted for house-building.—*McClelland.* In Tenasserim the fruit of the Terminalia Chebula mixed with an iron clay is in common use to form a black dye, which is said to be very good. All the Burmese native ink is made from this fruit, but although black when used, in the course of a dozen years it sometimes fades so that the writing is scarcely legible. The tree is found throughout the Tenasserim Provinces, but is not very abundant.—*Mason.*

It flowers in May. The moochies use the fruit to form a black dye.—*Riddell.* The tender leaves of *Terminalia chebula* are punctured by an insect, and its eggs deposited therein; hollow galls, Huldee Kay, *Tel.* Kadukay, *Tam.* are subsequently formed, these are powerfully astringent,

and make as good ink as oak galls. They also yield to Chintz painters and the Carpet weavers at Ellore the most durable yellow. Mr. Rohdes states that it forms perfect leather, but is too expensive for ordinary tanning purposes.—*M. E. J. R.* The trivial name *Chebula*, is from *Cabul*, where it is very abundant. It is a large tree, native of the forests of India from Cape Comorin to the mountains of Oude &c. The tender leaves are punctured by an insect and its eggs deposited therein becomes enlarged into hollow galls, they are a powerful astringent and make as good ink as oak galls, they also yield the chintz painters, and Carpet weavers their best and most durable yellow. They are called by the Tamuls "kadukay" and by the Telingas aldicoya.—*Rohdes' M.S.S. Terminalia Chebula* is distinguished by possessing opposite leaves which are pubescent beneath. The fruit of this species is more astringent than the others and is used for the purposes of dyeing. A durable ink is made by mixing the salts of iron with an infusion of the outer rind of the fruit. Both this species and others are subject to the attacks of insects producing gall-nuts. These galls possess the astringent principle in abundance, and are also used for dyeing. They are called Cadacay by the Tamuls.—*Eng. Cyc.* This most gigantic tree, furnishes planks 3 feet broad. It has a dark coloured, heavy and hard wood, but very cross grained and difficult to work. It sustained about 400 lbs.—*Wight.* It is common in the Kotah jungles (*Irvine, p.* 193.): also in the forests of Bengal and common in the forests of Western India.

Trunk rarely straight, short, bark ash-coloured, branches numerous and spreading. Fruit very astringent; in its dry state about the size of an olive. With catechu it is applied with great advantage in apthous ulcerations. The *Zengi Har* of Bengal, Singi, *Tamul.* Kurkadaga *Sans.* (Black Myrobalan), is described by Ainslie as the unripe dried fruit, and as a brisk purge. It is deep black, oblong, pointed and slender. It is called *Ahleeluj-asood* by the Arabs, *Helileh-seeah* by the Persians, who give it as a cathartic, in doses of from 1 to 2 drachms with a little honey.—*O'Shaughnessy, page* 320.

(8115) TERMINALIA CITRINA. CITRON MYROBALAN.

Liba, SANS. | Haria, Harra, HIND.

Common in the Kotah jungles. All these Myrobalans are largely collected, and used by the natives in dyeing and in medicine.—*Gen. Med. Tob. p.* 103. Drupe oblong, lanceolate, about two inches long, two in circumference, obscurely five-grooved, dull orange-yellow, smooth; nut oblong, deeply five-grooved, one-celled. Fruit a gentle purgative. It is often made into a pickle.—*O'Shaughnessy, p.* 340.

(8116) TERMINALIA GLABRA. COMBRETACEÆ,

Karai Maroodoo maram, TAM. | Curry murdah wood, ENG.

Icon. 196, nearly represents this species. Dr. Wight speaks highly of this wood, and states that large beams are readily procurable at Coimbatore for house building purposes. It is very hard, heavy and durable under water. (Wight No 16, Travancore 78, 101, 383, Mysore 30, Paulghaut 21, Cleghorn.)—*M. E. J. R.* Inch bars bear from 430 to 450 lbs.—*Wight.*

(8117) TERMINALIA MOLUCCANA. (Sylhet, Moluccas.) Drupe round, ovate, size of a large nutmeg, used as T. bellerica, for which it is substituted.—*O'Shaughnessy, page* 341.

(8118) TERMINALIA NITIDA.

Yella, DUK.

A large tree with oblong fruit, from which an intoxicating liquor is made.—*Riddell.*

(8119) TERMINALIA RUBRICA.

Vibbituka, SANS.	Tandra maram, TAM.
Bahira, BENG.	Tani, RHEED.
Beleyleh, ARAB.	Toondee, TEL.

A native of the mountainous parts of the Circars, growing to be one of the largest trees, with an erect trunk, and very spreading head. The kernel of the fruit is eaten by natives, but is reckoned intoxicating when eaten in any quantity. Wood white, rather soft, durable and seldom used. From wounds in the bark large quantities of insipid gum issues. The flowers have a strong offensive smell.—*Roxb. Rohdes, M. S. S.*

(8120) TERMINALIA VERNIX. One of the trees which affords the celebrated Chinese black lacquer.—*O'Shaughnessy, p.* 341. *Terminalia vernix*, is a native of China, and the Moluccas, and abounds in a resinous juice, which is collected by the inhabitants, and used in the natural state as a varnish. It is also used for the same purpose in China.—*Eng. Cyc.*

(8121) TERMINALIA VIOLATA.

Panjah, BURM.

Both this and *Terminalia belerica*, "Lai-bwai" *Burm.* are very plentiful throughout the Pegu, Tounghoo, and Tharawaddy Forests; the former less plentiful. Both are large timber and would answer for all purposes of house-building. Wood, white colored, adapted to every purpose of house building.—*McClelland.*

(8122) TERMITINÆ, a section of Neuropterous Insects, in which Latreille includes the genera *Mantispa, Raphidia, Termes*, and *Psocus.* These genera however are usually regarded as constituting three distinct families.

(8123) TERMITIDÆ. This family is distinguished by the following characters:—Wings with few transverse nervures, folding horizontally; tarsi 4-joined; antennæ short and moniliform; body depressed.

(8124) TERMES, has the head large and rounded, and, besides the ordinary compound eyes, it has three ocelli, or simple eyes, situated on

the upper surface; the antennæ are as long as the head and thorax, inserted in front of the eyes, and composed of about 18 joints. The abdomen is terminated by two small jointed appendages.

(8125) TERMITES, OR WHITE ANTS.

Anai, MALAY. | Chelloo, TAM.
Dewuk, HIND. | Cheduloo, TEL.

White ants, as they are often called (though they have little affinity with the true Ants), are chiefly confined to the tropics; some few species however extend into the temperate regions. Like the Bees, Wasps, and Ants, which live in society, the Termites are composed of three kinds of individuals—males, females, and what are termed neuters or workers. Their ravages in the warmer parts of the globe are well known. They unite in societies composed each of an immense number of individuals, living in the ground and in trees, and often attacking the wood-work of houses, in which they form innumerable galleries, all of which lead to a central point. In forming these galleries they avoid piercing the surface of the wood-work, and hence it appears sound when the slightest touch is sometimes sufficient to cause it to fall to pieces. The Termites sometimes erect their domiciles on the ground, in the form of pyramids or cones, sometimes with a roof, and these nests are often very numerous, and resemble the huts of savages. The larvæ nearly resemble the perfect insect, excepting that they possess no wings. The pupæ have rudimentary wings. The neuters differ from the males and females in possessing no wings, in having the body stouter, the head much longer, and provided with long jaws crossing at the extremity. They are said to defend the nests, and, stationing themselves near the outer surface, they are the first to make their appearance when their habitation is disturbed. They will attack the party molesting them, and bite with considerable strength. The negroes and Hottentots in Africa and people of India, consider these insects a great delicacy. They are destroyed with quick-lime, or more readily with arsenic, which is thrown into their habitations.—*Eng. Cyc.*

(8126) TERNSTROMIACEÆ, *Theads*, a natural order of Polypetalous Exogenous Plants. It consists of trees or shrubs with alternate coriaceous leaves, without stipules, mostly undivided, and sometimes with pellucid dots. The flowers are generally white in colour, sometimes pink or red, and are arranged in axiliary or terminal peduncles, articulated at the base. The calyx is composed of 5 or 7 sepals, imbricated in æstivation, the innermost the largest; petals 5, 6, or 9, often combined at the base; stamens indefinite, with monadelphous or polyadelphous filaments, and versatile or adnate anthers; ovary superior; capsule 2-7-celled; seeds few, attached to a central axis, with little or no albumen, and a straight embryo, the cotyledons of which are very large, and often filled with oil. This order includes the *Theaceæ* of Mirbel and the *Camelliæ* of De Candolle. Their closest affinity is with the order *Guttiferæ*, from which they differ in their alternate leaves; in the parts of their flowers being 5 and its multiples; in the calyx being distinct from the corolla; in their twisted æstivation, and in their thin inadherent cotyledons. They have also relations with Hypericaceæ and Marcgraaviaceæ. The plants of this order are principally inhabitants of Asia and America and one species of Africa.—*Eng. Cyc.*

(8127) TERU-KUNDLE, the Tamil name of a Ceylon tree which grows to about two feet in diameter, and twelve feet in height. It is used in country vessels, and produces a fruit which is eaten by the natives.—*Edye, Ceylon.*

(8128) TETRAGONIACEÆ, *Aizoons*, a natural order of Exogenous Plants. It includes the Genera *Tetragonia*, *Aizoon*, *Sesuvium*, and *Miltus*, which are generally placed in the order *Ficoideæ*, or *Mesembryaceæ*. The reason given by Dr. Lindley for this separation is the want of petals in these genera, as he considers that the tendency to produce petals in the *Mesembryaceæ* is of too powerful a nature to admit exception. The relation of these apetalous *Ficoideæ* to *Chenopodiaceæ* is so strong, that Dr. Lindley says "there is no character to distinguish them except their ovary being formed of several carpels."—*Eng. Cyc.*

(8129) TETRAGONIA EXPANSA is a native of New Zealand and Japan, and is used by the natives of those countries as a remedy in those forms of cutaneous disease called scorbutic. The *Aizoon Canariense* and *A. Hispanicum* grow on the sea-coasts of the Canary Isles and Spain, and are amongst the plants which yield soda after burning.—*Eng. Cyc.*

(8130) TETRANTHERA, a genus of plants belonging to the natural order *Lauraceæ*. The flowers are diœcious, some hermaphrodite, involucrated. The calyx 6-parted, the segments nearly equal or wanting. The fertile stamens generally about 9, in the petaloid flower than 12 to 21. The leaves are variable, with pinnate veins.—*Eng Cyc.*

(8131) TETRANTHERA MONOPETALA.

Junglee race am HIND. | Nara mamidee TEL.

(8182) TETRANTHERA ROXBURGHII, NESS. *Syn.* SEBIFERA GLUTINOSA, Loureiro. Tetranthera apetala, Roxb. Corom. Pl t. 147. and Fl. Ind. iii. p. 819. Litsea sebifera, *Pers.*

Mueda ka jhar, HIND.

Mountains of India. The wood is the *mueda lukree* of Hindostanee druggists, and a favourite application to bruises and wounds. It is somewhat fragrant, and slightly balsamic and sweet. —*O'Shaughnessy, p.* 548. *Tetranthera Roxburghii* is a variable plant, a native of the mountains of India and China. The fruit is globose, black and about the size of a pea, yielding a kind

of greasy exudation from which the Chinese manufacture candles of a bad quality, and which serves as a basis for salves. This fixed oil is supposed to constitute the principal part of the fruit of *Persea gratissima*, so much esteemed in the West Indies under the name of Avocado Pear.—*Eng. Cyc.* Wight gives in Icones Tetranthera, glabrata, 1838; ligustrina, 1835; monopetala, 1833; Panamanja, 1836; tomentosa, 1834; Wightiana, 1833.

(8133) TETRANTHERA TOMENTOSA. LAURACEÆ, Icon. 1834.

Mussay payattie, TAM.

This is a considerable sized tree, but not described by Roxburgh, though he is the authority for the name, hence, says Wight, I am unable to learn any thing of its properties from his work.—*Wight.*

(8134) TETRAO-PERDIX NIVICOLA, Dr. Hooker says that when he descended, he breakfasted on this, the Himalayan grouse, a small gregarious bird which inhabits the loftiest stony mountains, and utters a short cry of "Quiok, quiok." In character and appearance it is intermediate between grouse and partridge, and is good eating, though tough.—*Hooker. Him. Jour. Vol.* II. *p.* 113.

(8135) TETRAONIDÆ, a family of Rasorial Birds, to which the common Grouse belongs. Mr. Swainson thus defines the "*Tetraonidæ*, Partridges and Grouse:—Bill and tail very short; hallux elevated;" and he comprises under the family the following genera and sub-genera:—

Oryptonyx, Temm.; *Odontophorus*, Vieill.; *Ortygis*, Ill.; *Tetrao*, with the sub-genera, *Tetrao*, Linn., *Lagopus*, Willughby, *Lyrurus*, Sw., *Pterocles*, Temm., and *Centrocercus*, Sw., *Perdix*, of Briss., with the sub-genera *Perdix*, *Chætopus*, Sw., *Coturnix*, Briss., *Ptilopachus*, Sw., and *Ortix*, Stedh.; *Crypturus*, Ill., with the sub-genera *Crypturus* and *Nothurus*, Wagl.

Mr. G. R. Gray, in his 'List of the Genera of Birds,' arranges the *Tetraonidæ* between the *Phasianidæ* and the *Chionididæ*, with the following sub-families and genera:—

1. *Perdicinæ.*

Genera:—*Rhizothera*, G. R. Gray; *Ptilopachus*, Sw.; *Ithaginis*, Wagl.; *Lerwa*, Hodgs; *Pternistes*, Wagl.; *Francolinus*, Briss.; *Chacura*, Hodgs.; *Perdix*, Antiq.; *Arborophila*, Hodgs.; *Coturnix*, Antiq.; *Rollulus*, Bonn.; *Odontophorus*, Vieill.; *Ortyx*, Steph.; *Lophortyx*, Bonap.; *Callipepla*, Wagl.

2. *Tetraoninæ.*

Genera:—*Tetrao*, Linn.; *Lyrurus*, Sw.; *Bonasa*, Briss. (*Bonasia*, Bonap.); *Centrocercus*, Sw.; *Lagopus*, Briss.

3. *Pteroclinæ.*

Genera:—*Pterocles*, Temm.; *Syrrhaptes*, Ill.

(8136) *Pterocles Setarius* the Pin-Tailed Sand-Grouse, Ganga Cata, is an example of the Grouse of Asia. This bird is very numerous on the arid plains of Persia. Not very numerous in France, on the sterile Landes near the Pyrenees, and along the coast of the Mediterranean: less common in Provence and Dauphine, where they occasionally arrive; more common in Spain, Sicily, Naples, and throughout the Levant. Temminck, who gives these localities, states, in the fourth part of his 'Manual,' second edition, that it is common in Provence, in the uncultivated plains of Crau, and says that it avoids cultured tracts, and only inhabits the sterile Landes of the south; but he adds that it is abundant in the Pyrenees, and that it is to be found all the year round in the markets of Madrid. Mr. Gould states that the species is found in the north of Africa. It feeds on seeds, insects, and the young shoots of plants.—*Eng. Cyc.*

(8137) *Cryptonyx*, is a genus which has been variously placed, and by some amongst *Tetraonidæ*. It has the following characters:—Bill strong, stout, compressed, convex above, curved towards the point; nostrils longitudinal, placed in the middle of the bill, and covered by a naked membrane; orbits and lore naked; hind toe without any nail, not touching the ground. Wings short; third, fourth, and fifth quills longest.

(8138) *Cryptonyx cristatus* (*C. coronatus*, Temm.), is the Rouloul de Malacca of Sonnerat. According to Mr. T. C. Eyton, the Malay native name is Bestum ('Catalogue of a Collection of Birds from Malaya,' &c.,) in 'Zool. Proc.,' 1839.

These beautiful birds haunt the great forests of Malaya, Sumatra, and Java. Wild and shy, they avoid the face of man, and are kept in captivity with great difficulty.—*Eng. Cyc.*

(8139) TETRODON, a genus of Fishes of the order *Plectognathi*. These fishes, instead of having distinct teeth as usual in the class, have the jaws provided with a substance resembling ivory, formed somewhat like the beak of a bird, and fitted for crushing crustaceous animals and *Fuci*, upon which they live. Both the Tetrodons and Diodons (*Diodon*, Linn), a very closely allied genus, have the power of inflating the body with wind, or rather a membrane, which extends along the under side of the abdomen, which causes them to float on the surface of the water, without the power, it is said, of directing their course; the membrane, when inflated, gives to the fish an almost spherical form and is usually defended by spines and prickles. The pectoral fins are rather small; and besides these and the tail fin, they have one dorsal and a ventral fin. The Diodons have but one large tooth above and below, and are usually protected by large st rong spines. The Tetrodons are distinguished by the possession of four large teeth, the jaws being each divided by a central suture. These fishes are confined to the

seas of warm climates: some of them are called Globe-Fishes.—*Eng. Cyc.*

(8140) TEUCRIUM (from Teucer), a genus of plants belonging to the natural order *Lamiaceæ*, or *Labiatæ*.

(8141) TEUCRIUM SCORODONIA, Wood Germander, or Sage, has cordate downy petiolate-crenate leaves; the flowers are of a pale-yellow colour, with violaceous stamens, and are arranged in lateral and terminal 1-sided racemose; the stem is erect, hispid, pubescent, or nearly glabrous. It is a native of Europe in woody hilly situations, where the soil is dry and stony. It is not an uncommon plant in Great Britain. The smell and tasste of this plant resemble very much the hop. In Jersey, where it is called Ambroise, the inhabitants use it as a substitute for hops in their beer; and by some persons the bitter given by the Germander is preferred to that of the hop.

(8142) TEUCRIUM SCORDIUM. It is a native of Europe and the temperate parts of Asia in boggy wet places.

(8143) TEUCRIUM CHAMÆDRYS, Wall, or Common Germander, has ovate incisoserrate leaves, tapering into a footstalk; the flowers are reddish-purple, and arranged in axillary whorls of three flowers; the stem is ascending, and most frequently villous. It is a native of Europe and some parts of Asia, on walls and rocks and dry places. It is only rarely found in Great Britain. —*Eng. Cyc.* This is an ingredient in the celebrated Theriaca andromachi, or *treaq farooq*.—*O'Shaughnessy, p.* 488.

(8144) TEXTILE ARTS. The East has, from the earliest times of which we have any record, been famous for its textile fabrics; and India, notwithstanding the great mechanical inventions of the western world is still able to produce her "webs of woven air," which a Manufacturer of the last century attempted to depreciate, by calling them "the shadow of a commodity," at the same time that his townsmen were doing all they could to imitate the reality, and which they have not yet been able to excel.

Cotton Manufacture.—Though the invention and completion of a loom for weaving would indicate a high degree of ingenuity as well as a considerable advance in some other arts, the Hindoos were acquainted with it at a very early period, for in the hymns of the Rig Veda, composed at least 1200 years B. C., "weavers' threads" are alluded to; and in the Institutes of Manu it is directed,—"Let a weaver who has received ten bales of cotton-thread give them back, increased to eleven by the rice-water and the like used in weaving." That cotton was employed at very early periods is also evident from the Indian name of cotton, *Karpas*, occurring in the Book of Esther, ch. i. v. 6, in the account of the hangings in the court of the Persian palace at Shushan, on the occasion of the great feast given by Ahasuerus, were "white, green, and blue hangings." The word corresponding to *green* is *Karpas* in the Hebrew. It seems to mean cotton-cloth made into curtains, which were striped white and blue. Such may be seen throughout India in the present day, in the form of what are called *purdahs*. Vide "Essay on Antiquity of Hindoo Medicine," *p.* 145. The mode in which these are used, and the employment of the same colours in stripes, is still shown in *sutrunjees*, or cotton carpets. That the Hindoos were in the habit of spinning threads of different materials appears, from another part of the Institutes of the same lawgiver, where it is directed that the sacrificial threads of a Brahmin must be made of cotton, that of a shatriya (second caste,) of *sana* (*Crotalaria juncea*) and that of a Vaisya, of woollen thread. The natives of India prepare fabrics not only of cotton, but also of hemp, and of jute, and other substitutes for flax; also of a variety of silks, and of the wool of the sheep, goat, and camel, as well as mixed fabrics of different kinds. But it is for the delicacy of the muslins, especially of those woven at Dacca, that India has so long been famous. It is pleasing to find that these manufactures still continue pre-eminent for fineness combined with softness. From a careful examination of the cottons grown in different parts of India, as well as of those of other parts of the world, we find that it is not owing to any excellence in the raw material that the superiority in the manufacture is due, for spinners, here, say that the Indian cotton is unfit for their purposes, being not only short but coarse in staple. It is owing, therefore, to the infinite care bestowed by the native spinners and weavers on every part of their work, that the beauty of the fabric is due; aided, as they are, by that matchless delicacy of touch for which the Hindoos have long been famous. But this is no small advantage, for, according to one of their authors, the first, the best, and most perfect of instruments is the human hand." Experiments were made for a series of years, at the expense of the Indian Government, to grow American cotton in the Dacca district, but without success, owing, it was thought by the American planter in charge, to excess of moisture, and to the depredations of insects.—*Royle.* The Hindoo weaver is often described as hanging his loom to a tree, and sitting with his feet in the ground. If he did so, his productions would appear more wonderful than they are, as being still more the result of means unsuited to the end. But a late resident of Dacca has given a minute account of the cotton manufacture of that district, and thence we learn positively, what might as certainly have been inferred, that great care is bestowed on every part of the process. The spinning-wheel is usually consi-

dered to be an improvement upon the distaff and spindle as our machinery is upon the inexpensive spinning-wheel. In facilitating work and diminishing expense, the spinning-wheel was, no doubt, a great improvement, and is still employed throughout India for the ordinary and coarser fabrics. But the spindle still holds its place in the hands of the Hindoo woman, when employed in spinning thread for the fine and delicate muslins to which the names of "Dew of Night," "Running Water," &c., are applied by the natives, and which, no doubt, formed the *Tela ventosa* of the ancients; and those called *Gangitika* in the time of Arrian were probably produced in the same locality. Mr James Taylor, late of the medical service of Bengal, in a report which was sent by the Court of Directors to India, gave much interesting information respecting the cotton manufacture of Dacca: and to the Exhibition of 1851, he sent a series of views of the different parts of the process, together with the instruments used in spinning, as well as some specimens of their fine thread. He shows that the Hindoo woman first cards her cotton with the jaw-bone of the *boalee* fish, which is a species of Silurus; she then separates the seeds by means of a small iron roller worked backwards and forwards upon a flat board. An equally small bow is used for bringing it to the state of a downy fleece, which is made up into small rolls to be held in the hand during the process of spinning. The apparatus required for this consists of a delicate iron spindle, having a small ball of clay attached to it, in order to give it sufficient weight in turning, and imbedded in a little clay there is a piece of hard shell, on which the spindle turns with the least degree of friction. Besides these, a moist air and a temperature of 80° is found best suited to this fine spinning, and it is therefore practised early in the mornings and in the evenings, sometimes over a shallow vessel of water, the evaporation from which imparting the necessary degree of moisture. The spinners of yarn for the Chundeyree muslins in the dry climate of North-West India are described as working in underground work-shops, on account of the greater uniformity in the moisture of the atmosphere. The Indian spinning-wheel is looked upon with contempt by those who look to the polish rather than to the fitness of a tool. Professor Cowper, than whom none is a better judge, observing that the wood-work of some of these spinning-wheels was richly carved, inferred that the strings with which the circumference was formed might have some use, and not have been adopted from poverty or from idleness. In making working models of these instruments, he has found that in no other way could he produce such satisfactory results as by closely imitating the models before him, the strings giving both tension and elasticity to the instrument. The spindles, moreover, being slightly bent or the hand held obliquely, the yarn at every turn of the spindle slips off the end and becomes twisted As the different processes are fully described in the work alluded to, I need not, says Dr. Royle, dwell further on this part of the subject, except to mention that the common dimensions of a piece of Dacca muslin are twenty yards in length by one in breadth. There are more threads in the warp than in the woof, the latter being to the former in a piece of muslin weighing twenty tolas or siccas, in the proportion of 9 to 11; one end of the warp is generally fringed, sometimes both. The value of a piece of plain muslin is estimated by its length and the number of threads in the warp, compared with its weight. The greater the length and number of threads and the less the weight of the piece, the higher is its price. It is seldom, however, that a web is formed entirely of the finest thread which it is possible to spin. The local committee of Dacca having given notice that they would award prizes for the best piece of muslin which could be woven in time for the Exhibition, the prize of 25 rupees was awarded to Hubeeb Oolla, weaver of Golkonda, near Dacca. The piece is ten yards long and one wide, weighs only 3 oz. 2 dwts. and may be passed through a very small ring. Though the cotton manufactures of India have so greatly fallen off, from the cheapness of English manufactured goods, it is gratifying, as well as unexpected, to learn from Mr. Taylor, that, as the finest muslins formed but a small portion of the goods formerly exported to England, the decay of the Dacca trade has had comparatively little influence on this manufacture, as these delicate manufactures still maintain their celebrity in the country, and are still considered worthy of being included among the most acceptable gifts that can be offered to her native princes; and he believes that the muslin made at present is superior to the manufacture of 1790, and fully equal to that of the reign of Aurungzebe. He also informs us that a College for the education of the natives, stands on the site of the former English factory. Fine muslins were sent to the Exhibition of 1851, not only from Dacca, but also from Kishengurh in Bengal; likewise from as far south as Collar, in the Rajah of Travancore's dominions, as well as from Chundeyree in the Gwalior territories. Specimens of almost every variety of the cotton manufacture such as the coarse garrhas and guzzees for packing, clothing, and for covering corpses, with dosootees, &c. for tents, canvas for sails, towels, and table-cloths, and every variety of calico, were sent from the islands of the Indian Ocean, from Nepal and Assam, as well as from all along the valley of the Ganges, from Bengal up to the Jullundur Doab, in the Sikh territories; also

from Cutch, Ahmedabad, Surat, and Dharwar, on the western side of India; and from the central territories of the Nizam, and of the Rajah of Nagpore. The finest pieces of calico, and Punjum longcloth, were sent from Juggiapettah, in the Northern Circars, which was formerly the great seat of this manufacture. It is curious that some of these places, noted even for their manufactures, did not grow their own cotton. Dacca, no doubt, grew most of what it required for its muslins, because the thread did not swell in bleaching, but it also imported cotton formerly from Surat, as well as from Central India. Azimgurh imports its cotton chiefly from the same source to which the Northern Circars was also formerly indebted, while Chundeyree imports its cotton from the distant valley of Nimur. Among the fabrics there were a great variety, which proves that the natives are acquainted with every kind of weaving, from guzzees and gauzes, to striped, chequered, and flowered muslins. The last are interesting as specimens of an art which has been long known in the East, and the mode of making which has often puzzled weavers in this country. In manufacturing figured (*jamdanee*) fabrics, Mr. Taylor informs us, they place the pattern, drawn upon paper, below the warp, and range along the track of the woof a number of cut threads, equal to the flowers, or parts of the design intended to be made; and then with two small fine pointed bamboo sticks, they draw each of these threads between as many threads of the warp as may be equal to the width of the figure which is to be formed. When all the threads have been brought between the warp, they are drawn close by a stroke of the ley. The shuttle is then passed by one of the weavers, through the shed, and the weft having been driven home, it is returned by the other weaver." Most of these flowered muslins are uniform in colour but some are in two colours, and chiefly woven in Bengal. Specimens of double weaving in cotton, and showing considerable skill, with a pleasing arrangement of pattern and colours, were sent from Khyrpore, in Sindh. These are also woven in Ganjam. Flax, hemp, and substitutes for them are all well known and extensively cultivated in every part of India; but flax is so solely on account of its seeds, which yield oil and oil cake, though some very good flax has been produced in some parts of Bengal; and the hemp, on account of the intoxicating principles secreted in its leaves and green parts, and which in different forms is known under the name of *Bhang, husheesh, churus*. The fibre of the plant, as grown in the plains is too dry and brittle to be useful either for rope making or for textile fabrics, though in the Himalayas some excellent ropes and canvas are made, and the culture might be greatly extended if there was demand for the produce. Species of crotalaria, of hibiscus, of corchorus and of many other genera, yield fibres which are used for rope-making; but that of the species of corchorus, commonly called *jute*, for making *gunny* bags, used for packing, which are even exported to America for packing their cotton. In the Peninsula these bags are made of *Crotalaria juncea*, or *goni* plant. The Rhea fibre, which is closely allied to, if not identical with, the China grass, is used for making fishing-lines and some kinds of fabric, but its employment may be greatly extended. So also the plantain, the pine-apple, and the sanseviera fibre, of all of which some fabrics have been made and exhibited, but in too small quantities to attract much attention, though some will probably become important articles of commerce.—*Royle, Arts &c. of India, page* 487 *to* 494.

(8145) THALICTRUM (from the Greek θάλικτρον), a genus of Plants belonging to the natural order *Ranunculaceæ*. It consists of herbs which have usually a fetid smell like rue, and hence are called Meadow Rues. The species have perennial roots with annual stems. The flowers are corymbose, panicled, and somewhat racemose, of a green, white, or yellow colour; they have no involucre and no petals; the calyx is composed of 4 or 5 petal-like sepals; carpels 4-15 in number. Upwards of 50 species are enumerated, which are mostly natives of the temperate and colder parts of the world.—*Eng. Cyc.*

(8146) THALICTRUM FOLIOLOSUM, (*Vern.* Peli juree; Shuprak.) This plant is found at Mussooree, and generally on the Himalayas. Specimens of the roots were sent by Dr. Falconer of Seharunpore. Another species of Thalictrum (flavum) is common in France, where it is termed " the poor man's rhubarb", as a substitute for which medicine it is generally employed. The Indian species is easily procurable from the hills, though not known in the bazars of the lower provinces. The root deserves extensive trial, and promises to succeed well as a febrifuge of some power, and a tonic aperient of peculiar value.—*O' Shaughnessy, page* 161.

(8147) THALLOGENS, a class of Plants proposed by Lindley to include those Flowerless Plants which are distinguished by the absence of an axial stem. It includes all the *Cryptogamia*, with the exception of Ferns and Mosses. [ACROGENS.] —*Eng. Cyc.*

(8148) THANICOY. *Tam.* TERMINALIA BELLERICA.

(8149) THANY MARUM, a tree common about Nelamboor and in Coorg; wood much used but not durable, being very liable to be attacked by insects.—*McIvor. M. E. J. R.*

(8150) THATCH. In the Peninsula of India the ordinary thatch in use with the people, is made of Palmyra leaves: This is the best thatch for houses and the most durable. Next to it in Madras, ranks in value a grass which

grows on the banks of rivulets, in the low country, and is called "*Koary*," *Cyperus textilis*. The leaf of the Cocoanut, is a very perishable material and only employed by the very poor. In the Dekhan a long grass is chiefly used. The Karens in Burmah use the large palmated leaf of a tall wild palm, a species of *Livistonia*, but the Europeans and Burmese use the leaves of the "Nipa." The Karens in Amherst province employ the tall grasses "*Imperata Cylindrica*," "*Saccharum Cylindricum*," and *S. Spontaneum. Ed.* Long grasses and Sedges (*Arundo, Saccharum* and *Scleria*,) are cut and stacked along the water's edge of the Burhampooter in huge brown piles, for export and thatching.—*Hooker, Him. Jour. Vol.* II, *page* 373.

(8151) THEA, a genus of Plants belonging to the tribe *Camellieæ* and natural order *Ternstromiaceæ*, which has been so named from the slightly altered Chinese name of the dried herb which now forms the almost universal beverage of the British Isles. Though now so extensively employed, the introduction of tea into Europe is of comparatively recent origin. Tea however must have been used in China from very early times. It is differently named in different parts of China, as Tcha, or Cha, also Tha, whence we have Tsia, The, and Tea. In Persian works in use in India, tea is called Cha-i-Khutai, or Tea of Cathay. The genus *Thea* is characterised by having a calyx which is persistent, without bracts, 5-leaved, leaflets imbricated, the outer ones smaller; petals of the corolla 6 to 9, hypogynous, imbricated, the inner ones the largest, all adhering together at the base; stamens numerous, in several rows, adhering to the bottom of the petals; filaments filiform, anthers incumbent, 2-celled, oblong, with a thickish connectivum, cells opening longitudinally; ovary free, 3-celled; ovules 4 in each cell, inserted alternately into the central angle, the upper ones ascending, the lower pendulous; style trifid, stigmas 3, acute; capsule spheroidal, 2-3-lobed, 3- or by abortion 2-celled, with loculicidal dehiscence, or with the dissepiments formed from the turned-in edges of the valves; seeds solitary or rarely two, in cells, shell-like testa, marked with the ventral umbilicus; cotyledons thick, fleshy, oily; no albumen; radicle very short, very near the umbilicus, centripetal. The genus *Camellia* is usually considered to be very distinct from *Thea*; indeed by Cambesedes the two are separated from each other by several intervening genera: they are however too closely allied to allow of this separation. Distinctions have been made in the fruit of the two genera. That of *Thea* is 3-lobed with obtuse corners, and opening along the middle of the lobes, that is, having the dissepiments opposite to the valves, or, as expressed by modern botanists, having a loculicidal dehiscence. *Camellia*, on the contrary is described as having its fruit obscurely triangular, without any tendency to become deeply 3-lobed, with the margins of the valves turned inwards and forming the dissepiments, which thus alternate with the valves, and have what is now called a septicidal dehiscence. Mr. Griffith, on the contrary, who is well qualified to form a correct opinion, states, from examination of the Assamese tea-plant and of two species of *Camellia* from the Khosiya Hills, that there is no difference between *Thea* and *Camellia*. The dehiscence in both, he says, is of the same nature, that is, loculicidal, and the only difference that does really exist is simply of specific value, consisting in the fruits of the tea-plant being 3-lobed, of the *Camellia* triangular. The species of the genus *Thea* are few in number; some botanists are of opinion that even these are varieties of a single species. —*Eng. Cyc.*

(8152) THEA ASSAMENSIS, the Assam Tea-Plant, which some years ago began to attract so much attention, seems to partake of the characters of both the foregoing. The Calcutta Tea Committee say, in 1835, "We are now enabled to state with certainty, that not only is it a genuine tea, but that no doubt can be entertained of its being the identical tea of China, which is the exclusive source of all the varieties and shades of the tea of commerce." To this it may be replied, that there are considerable doubts whether the teas of commerce are all derived from one species of plant. Mr. Griffith says, in the size both of the plant and of the leaves, as well as in the texture of these last, and in its stations, the Assamese plant approaches to the green tea-plant of China; in its geographical distribution, so far as latitude is concerned, it approaches to the black tea. The inflorescence of the Assamese plant varies, but perhaps its usual state is to have the flowers solitary in the axils of the leaves, but the number of flowers varies from one to five. The plants introduced into England have their leaves much larger and thicker than those of the green tea plant, and Messrs. Loddiges find that it requires a much greater degree of heat, in fact that of the hot-house, while the others are in the open air for a great part of the year.

Two other species, described by Loureiro, are little known, as

(8153) THEA VIRIDIS, a large, strong-growing, almost hardy plant, with spreading branches, its leaves three to five inches long, thin, almost membranous, very broadly lanceolate, light green and wavy, with large and irregular serratures, the flowers large, usually solitary, mostly confined to the upper axil, with 5 sepals and from 5 to 7 petals; fruit nodding. This species is figured by Dr. Lettsom in his account of the tea-plant, t. 1. and by Sir W. J. Hooker, 'Bot. Mag.,' t. 3148, and in Loddiges' 'Bot. Cap.,' t. 227, all from plants which have flowered in England. Kæmpfer

supplies a very good figure, 'Amœn. Exot,' p. 607, from a Japanese plant. This species is found both in China and Japan, and is supposed to be the species which yields the green tea of commerce. It has been long introduced into England, having been first sent from Japan in 1687 to the Cape of Good Hope, and thence into Europe.—*Eng. Cyc.*

(8154) THEA BOHEA—is a smaller plant than *T. viridis*: its branches are stiff and straight, its stem erect, the leaves not above half or two thirds of the size of the former species, elliptical oblong, perfectly flat, more coriaceous, of a dark green colour, with small and even serratures; they are numerous, and have in their axils two or three flowers, of 5 sepals and 5 petals: these are smaller and have a slight fragrance, and flower later in the season than *T. viridis*. The plant is much more tender than the green tea-plant, and unable to stand the cold of an English climate. It is supposed by some to yield the leaves which are converted into black tea, and, notwithstanding contrary statements, leaves similar to those of this plant may be recognised on infusing and spreading out the leaves of some of the black teas of commerce. [TERNSTROMIACEÆ.] A variety of this is sometimes called *T. stricta*. It is figured by Lettsom, ed. 2, p. 41, who considers it only a variety of the former. It is also figured by Loddiges, 'Bot. Cab.,' t. 226, who, as well as Sir W. J. Hooker and Dr. Royle, considers it to be a distinct species.—*Eng. Cyc.*

(8155) THEA COCHINCHINENSIS, about eight feet high, having lanceolate leaves, flowers of three to five sepals and five petals, solitary, terminal; found wild in the north of Cochin-China, where it is also cultivated being used medicinally by the natives as a diaphoretic.

(8156) THEA OLEOSA is also a shrub of eight feet high, found in the fields in the neighbourhood of Canton, and named from its seeds yielding a large quantity of oil, which is used for burning and as an article of diet. The leaves are lanceolate, the flowers of six sepals and six petals, peduncles 3-flowered, axillary; fruit stated to be indehiscent, rather a berry than a capsule.—*Eng. Cyc.* See TEA.

(8157) THEACEÆ, *Mirbel.* CAMELLIEÆ *Dec.* a tribe of TERNSTRŒMIACEÆ.

The genus Thea forms a small group of plants with Camellia, and is remarkable for containing the plant or plants which yield the different kinds of Tea imported from China. The question was long undecided whether all the kinds of Tea are made or can be made, from the same plants, by variations in the process; or whether it is perferable to have different varieties or kinds of plant for the distinct varieties of Tea, as, for instance, the Green and Black Teas; whether these were originally distinct species, or varieties owing to difference in soil, climate, or culture. Dr. Royle has always been inclined to think the latter the more probable opinion, as fully detailed in his "Illustr. of Himalayan Botany," p. 107 to 128, and in his "Productive Resources of India," p. 257 to 311. Two plants are known in the gardens: one called *Thea viridis*, supposed to yield Green Tea, including—1. Imperial. 2. Gunpowder. 3. Hyson. 4. Young Hyson. 5. Twankay. This kind is capable of withstanding a greater degree of cold, and survives through the winter in the open air in Great Britain, as may be seen in Kew Gardens. Green Teas we know are chiefly produced in the more northern districts of China. Some are factitiously coloured with Indigo and Sulphate of Lime, and Mr. Warington has ascertained that of the Green Teas of commerce some are *unglazed*, others *glazed*. The former are of a yellow, brown tint, tending on the ribbed parts to a blackish hue without a shade of green or blue; while the *glazed* are faced or covered superficially with a powder consisting of Prussian Blue and Sulphate of Lime, or Kaolin, with occasionally a yellow or orange-coloured vegetable substance. Indigo with Gypsum is sometimes used, as by the China tea-makers sent to Assam. Even the *unglazed* have a little Sulphate of Lime attached to their surface, either to act as an absorbent of moisture, or to give the bloom chracteristic of the green teas of commerce. The *Thea Bohea* appears distinct as a species from the former, and has been supposed to yield the different kinds of Black Tea, that is, Pekoe, Lapsang, Souchong, Congou, Bohea, &c., the last being the inferior, and the Pekoes the best kinds of Black Tea. Plants collected in Chusan are somewhat intermediate in character. That growing wild in Assam is considered by some botanists to be another distinct species of Thea or of Camellia. But the information is too defective for any decisive opinion to be formed. If we compare the recent analyses as that of Mulder, *v.* Pereira, Treatise on Food and Diet, p. 394, of green and of Black Tea, it would appear that a less degree of heat and younger leaves being employed, would explain some of the differences between Green and Black Tea.

Some Tea has been manufactured in the Government Nurseries in Kemaon from plants grown from China seed, which has been pronounced of the finest quality by the best Judges, and compared with the Oolong Teas of the Ankoy district. Some prepared in August, 1845, in the Tea Nursery in the Deyra Doon, has also been pronounced of fine quality, and compared with Orange Pekoe.

The properties of Tea depend chiefly on the presence of Tannin, of a Volatile Oil, and of principle called *Theine* ($C_8H_5N_2O_2$), which has been found to be identical with *Caffeine* and is a salifiable base. It may be obtained in white silky needles, has a

mild bitter taste, is soluble in hot, but sparingly so in cold water and Alcohol. With sulphuric acid and hydrochloric Acid, it forms crystalline compounds, and is supposed to exist in Tea in combination with Tannic Acid. The quantity of Tannin is stated by Brande, and as appears by the taste, and in the analyses of Mulder, to be greater in Green than in Black tea. Sir. H. Davy and others have stated that Black Tea contains the largest proportion of Tannin. The volatile Oil is in larger quantity in the Green than in the Black Tea. Tea is well known for its astringent and moderately excitant properties, chiefly affecting the nervous system, producing some degree of exhilaration, and of refreshment after fatigue. Its effects are well seen in the wakefulness produced, especially by Green Tea, in those unaccustomed to its use. But it is thought by some to act as a sedative on the heart and blood-vessels ; or, as Dr. Billing explains it, Tea and Coffee are sedatives and relieve the stupor produced by stimulants, or the drowsiness of fatigue, or other plethora, only by counteracting the plethoric state of the brain inducedby the continued stimulation of action—thus merely restoring the brain to its normal state. Liebig (*Anim. Chem.* p. 179) has suggested that *Theine*, as an ingredient of diet, may be useful in contributing to the formation of Taurine, a compound peculiar to Bile. Besides being useful as a diluent, it may often be prescribed as an agreeable and refreshing beverage ; in some cases, especially when made strong, acting as an excitant, and at other times producing sedative and calming effects.—*Royle.*

(8158) THENG-BAN-SHA, a bast of Arracan. Coarse looking, and of a reddish brown colour, but divisible into a number of very thin layers, with a good deal of flexibility and some toughness.—*Royle.*

(8159) THEOBROMA (from θεὸς and βρωμα, the food of gods), a genus of Plants belonging to the natural order *Sterculiaceæ*, (*Byttneriaceæ*, *R. Brown*,) the species of which yield the Cocoa of commerce. They are trees with large simple leaves and with the flowers in clusters. The calyx is composed of 5 sepals ; the petals are 5, lengthened into a strap-like form at the apex ; the stamens are 5, each with double anthers and a horn-like appendage between each filament ; the style is filiform, with a 5-parted stigma ; fruit a 5-celled capsule without valves ; seeds imbedded in a soft pulp ; no albumen, and thick oily wrinkled cotyledons.—*Eng. Cyc.* There are several other species of *Theobroma* yielding seeds possessing the properties of the above, but they are not cultivated or employed to the same extent. They are all of them natives of South America, and used by the inhabitants where they grow as food. *T. Guazuma* of Linnæus, the Bastard Cedar, or Orme d'Amerique, now the *G. ulmifolia*, is a native of the West Indies, and is a handsome tree resembling the elm.—*Eng. Cyc.*

(8160) THEOBROMA CACAO, Common Cacao, or Chocolate Nut-Tree, has entire, elliptic, oblong, acuminate, quite smooth leaves, and oblong smooth fruit. This tree is indigenous in South America, and is generally found at a height of 600 feet above the level of the sea. It is however extensively cultivated in the West Indies, and in the tropical parts of Asia and Africa. The Mexicans call the tree Chocolalt, hence our word Chocolate for the prepared seeds. The capsules of the fruit are large, and contain each about 25 seeds : the pulp in which these are enveloped has a sweet and not unpleasant taste, and is frequently eaten where the tree is grown. The trees are evergreens, and bear fruit and flowers all the year through, but the usual times for gathering the fruit are in June and December. The cotyledons of the seeds contain a large quantity of oily albumen, which has an agreeable flavour, and on this account they are not only used as a principal article of diet by the natives of the countries in which they grow, but are now used for the same purpose throughout the civilised world. The composition of these seeds in which amylaceous matter is combined with oil, and a principle, called Theobromine, similar in its constitution to Thein and Caffein, is well adapted, when combined with sugar, to form a valuable article of diet. The oil contained in the seeds is sometimes obtained separately, and called cocoa-butter. It may be obtained easily by expression, especially if hot water is added. It is said to be very nutritive, and to act as an anodyne It is particularly recommended for making ointments. (Ersch and Gruber, ' Allgem. Encycl.,' art. Cacao.)—*Eng. Cyc.* This plant is described somewhat differently by Dr. Royle. He says, it is interesting in consequence of its seeds being largely employed in diet. The tree is a native of Mexico, but extensively cultivated in the West India Islands, and remarkable for its large and oval, yellow, cucumber-like capsules, hanging from the sides of the trunk and branches. These are divided into 5 cells, each filled with 8 to 10 ovoid seeds, piled one upon another, and covered by a membranous and succulent aril. There are several varieties of these seeds or *nibs*, which are more or less esteemed. The kernels of the seeds yield by pressure about one half their weight of a fatty oil, commonly called *Butter of Cacao*, at one time much lauded for its medical properties. The seeds, pounded, digested, and boiled with water, with the oil skimmed off, and sweetened with sugar and milk, afford a wholesome and agreeable beverage. The Cacao sold in the shops consists either of the roasted kernels and husks, or of the husks only, ground to powder ; it is sometimes made from the cake

left after expressing the oil from the beans. "Much of the cheap stuff sold under this name, is very inferior, being made with damaged nuts that have been pressed for the oil, mixed with potato-flour, mutton-suet, &c." (*Cooley.*) *Flake Cocao* is Cocao ground, compressd, and flaked by machinery. CHOCOLATE (from the Indian name *chocolalt*) is made by triturating in a heated mortar the roasted seeds without the husks, 10 lbs. with an equal quantity of Sugar, and about 1½ oz. of Vanilla, and 1 oz. of Cinnamon (*Cadet*) into a paste, which is put up in various forms. "The mass of the common Chocolate sold in England is prepared from the cake left after the expression of the oil, and this is frequently mixed with the roasted seeds of ground pea, and maize, or potato-flour, to which a sufficient quantity of inferior brown sugar, or treacle, and mutton suet is added to make it adhere together.—*Royle.* The chocolate-nut tree is seen in Tavoy gardens, and it brings its fruit to perfection.—*Mason.* This tree has been introduced into Travancore, where it thrives well, the fruit is round but smaller than that produced in South America.—*Riddell.* It thrives well in the Calcutta Garden. The nutritive properties of chocolate depend on a concrete oil or butter of most agreeable flavour, of which 1000 parts of the seed yield 386.—*O'Shaughnessy, page* 227. See CACAO.

(8161) THERMOMETER. The subjoined Table shews the boiling points of distilled water at different elevations, up to 17,455 feet :—

Thermometer. Degrees.		*Elevation.* Feet.	*Thermometer.* Degrees.		*Elevation.* Feet.
212	=	0	195	=	8953
211	=	529	194	=	9502
210	=	1021	193	=	10,053
209	=	1534	192	=	10,606
208	=	2049	191	=	11,161
207	=	2566	190	=	11,719
206	=	3085	189	=	12,280
205	=	3607	188	=	12,843
204	=	4131	187	=	13,408
203	=	4675	186	=	13,977
202	=	5185	185	=	14,543
201	=	5718	184	=	[illegible]
200	=	6250	183	=	[illegible]
199	=	6786	182	=	16,234
198	=	7324	181	=	16,868
197	=	7864	180	=	17,455
196	=	8407			

O'Shaughnessy, p. 37.

(8162) THESPESIA, a genus of Plants belonging to the natural order *Malvaceæ*. The species are trees with large entire leaves. The calyx is truncate, and girded by a 3-leaved deciduous involucel; the fruit is a capsule with 5 cells and each cell is semi-parted, with 4 seeds at the base.—*Eng. Cyc.*

(8163) THESPESIA POPULNEUS, *Malvaceæ*, Icon. 8.

Poorsha or Pooverisha, TAM.	Gungarauvee, TEL. Bupariti, RHEED.

The Fruit.

Poorsung kai, TAM.	Ghengheravie Kaia, TEL.
Paris KaPhul, DUK,	Poostpa, asvudum, SANS.

The Wood.

Gungarave wood ENG. Gungaravae kurra, TEL.	Pao varasa marum. TAM.

Thespesia populnea, Poplar Thespesia, has roundish, cordate pointed 5-7-veined leaves, with dot-like scales beneath, with the peduncles equal in length to the petioles. This plant is a native of the East Indies, Guinea, and the Society Islands; and is known, where it grows amongst British colonists, as the Umbrella-Tree and Tulip-Tree. It attains a height of about 40 feet, and has large yellow flowers with a dark-red centre. In the tropics it has gained for itself a sacred regard, and is planted about monasteries and convents; hence the name Thespesia (divine). There are two species, natives of South America: they are all trees, with handsome showy flowers.—*Eng. Cyc.* This has been introduced into Tenasserim from the Madras Coast, and is quite an ornamental tree. Linnæus very appropriately named it the poplar hibiscus, for it has the leaves of the poplar with the flower of the hibiscus.—*Mason.* It is much used for avenues, being of quick growth, and yielding good shade This generally grows from the cuttings, and although the timber is strong, hard and durable, but rarely to be met with good, owing to the trees rotting at the heart. The tree abounds in old gardens, and about all European Stations, thriving best near the sea. (Wight, No 79, Mysore 9, Palamcottah 252, Hort. Garden 30.)—*M. E. J. R.* It furnishes a strong, hard and durable timber, but rarely to be met with good, owing to the trees rotting in the heart, it grows best near the Coast.—*Wight.* The juice of the fruit of this tree is said by Ainslie to be used as an external application in certain cutaneous affections and carapangs of children and a strong decoction of the bark is employed as a wash in the same complaints. The powder of the bark is prescribed, internally, as an alterative, *Ains. Mat. Med. p.* 103. &c. it affords a good wood for chairs &c. it is lighter than most woods, good colored, tough and takes a good polish.—*Rhode's M. S. S.*

(8164) THEVETIA NERIIFOLIA, EXILE TREE. Yellow Oleander.—This plant is common in the gardens of the Deccan; grows to the height of ten or twelve feet, with long tapering leaves; it is grown from seed, and blossoms throughout the year.—*Riddell.* It is a common ornamental shrub, in Calcutta. Its juice is acrid. Two grains of its bark has been affirmed to be equal to an ordinary dose of Cinchona. Ind. Ann. No. 6. Of this garden shrub

called the "Exile," the wood is worthless. (Hort. Garden 17.)—*M.E.J.R.*

(8165) THOMBATY. OLEUM CUCUMIS COLOCYNTHIS.

(8166) THORN APPLE. DATOORA.

Jowz-mazel, ARAB.	Gooz-giah, Bunjdeshtie, PERS.
Kala Datoora, BENG.	Kechubung, Roteeu. bung, MAL.
Kaloo-attana, CYNG.	Dutro, PORT.
Kechubooh, EGYPT.	Krishna Dhatura, SANS.
Pommespineuse, FR.	Tatura, TURK.
Stechapfel, GER.	Karoo Oomatay, TAM.
Datoora, GUZ. HIND.	Nulla Oomatie, TEL.
Datura stramonium, LAT.	
Hummatoo, MAL.	
Umana, MALEAL.	

The whole plant (*Datura fastuosa*), has a rank odour, which may be detected at a distance. All parts possess medicinal properties. The seeds are brownish or black, flattened, kidney shaped, without odour, except when bruised, and have a bitter weakish taste. For the purpose of facilitating theft, and other criminal designs, the seeds are frequently given in India with sweetmeats, to stupify merely, but not with the intention of killing: although there is no doubt that for the latter purpose it has also been used. The root, dried leaves, capsules, and seeds of the Datura plants, are recommended by European medical practitioners in India, to be smoked in cases of spasmodic asthma.—*Faulkner.*

(8167) THREAD.

Garen, DUT.	Dagha GUZ. HIND.
Fil, FR.	Fio, PORT.
Zwirn, GER.	Nitki, RUS.
Refe, IT.	Hilo, Torzal, SP.

Thread is formed by twisting together fibres of cotton, silk, or flax.—*Faulkner.*

(8168) THRYSSA. THRYSSA-ANCHOVY. The genus thryssa, says Swainson, "has the general aspect of the anchovy, "engraulis," but the body is broader, the mouth enormous, and opening almost vertical." The species that inhabits Tenasserim waters may be denominated the thryssa anchovy.—*Mason.*

(8169) THUJA, or THUYA, a genus of Plants belonging to the natural order *Coniferæ*. This name is derived from *θύω*, as, on account of the pleasant odour given out by the wood in burning, it was used in ancient sacrifices. The species of this genus are more commonly known by the name of *Arbor Vitæ*. It belongs to the section of *Coniferæ* called *Cupressinæ* by Richard, in which genera, *Callitris*, *Taxodium*, and *Juniperus* are also included.—*Eng. Cyc.*

(8170) THUJA ARTICULATA of Desfontaines is now called *Callitris quadrivalvis*, Four-Valved Callitris. The genus *Callitris* differs from *Thuja* in having the scales of the female catkins, from 4 to 6 in number, opening like the valves of a regular pericarp, and the seeds at the base of these scales winged on the margin. The Four-Valved Callitris has flattened articulated leaves; the female catkin with 4 oval pointed valves, 2 of which have seeds. It is a native of Barbary, and attains a height of from 15 to 20 feet. It was first discovered by Desfontaines on Mount Atlas in 1796. [CALLITRIS.]—*Eng. Cyc.* Thuya articulata, is of middling height, sometimes reaching 15—20 feet; according to Schoust this tree produces the vernix, or sandarac.—*O'Shaughnessy, page* 621. Sandarach occurs in round or elongated tears, whitish or pale citron yellow, brilliant, transparent and limpid, brittle under the teeth, burns with a clear flame, soluble in alcohol and difficultly so in turpentine, odour, agreeable on burning Taste resinous and slightly balsamic used in varnishes, and its powder to prevent ink from spreading through unglazed or eroded paper. In Sweden a sandarac is sold, which is certainly supplied by one of the junipers of that country: indeed M. Fee assures us that the common junipers secrete a similar resin; he therefore considers its reference to the Thuya as extremely doubtful.—*O'Shaughnessy, page* 621.

(8171) THUJA ORIENTALIS, Oriental or Chinese Arbor Vitæ, has 2-edged branchlets; imbricated ovato-rhomboid adpressed leaves, fur rowed in the middle and in 4 rows; the canes elliptic, with the interior scales blunt, and mucronate beneath the apex. It is a native of rocky situations in Siberia and China and on the mountains of Japan.—*Eng. Cyc.*

(8172) THUJA PENDULA, Pendulous or Weeping Arbor Vitæ, has opposite decussating spreadinglanceolate, mucronate keeled, somewhat distant leaves; globose cones; convex, smooth scales; filiform pendulous branches. It is a native of Tartary, and is an elegant shrub.—*Eng. Cyc.*

(8173) THUNBERGIA (in honour of Thunberg the botanist), a genus of Plants belonging to the natural order *Acanthaceæ*. It has a double calyx, the outer one 2-leaved, the inner about 12-toothed. The corolla is campanulate; the capsule beaked and 2-celled. The species are handsome climbing plants with a fragrant odour, (*Eng. Cyc.*) with white, yellow, and blue flowers; they require a free rich sandy soil and plenty of drainage. The large varieties with blue flowers should be planted out and trained upon Pillars, trellises or trees. Nativesof the Tropics; raised from seeds, cuttings, layers, and suckers. —*Riddell.*

(8174) THUNBERGIA ALATA, ACANTHACEÆ.—These climbing plants bear flowers of various colours. The T. Grandiflora hangs in beautiful blue racemes, and is adapted for covering trellis work. The species are grown from seed, in any good soil.—*Riddell.*

(8175) THUNBERGIA FRAGRANS has a climbing stam, with cordate acuminate leaves somewhat angular at the base.

(8176) THUNBERGIA GRANDIFLORA has large flowers with no inner calyx ; the leaves are angular, cordate : the authers bearded and spurred. This and the former species are natives of the East Indies.—*Eng. Cyc.*

(8177) THUNBERGIA, THUNBERGIA. A large creeper with azure flowers belonging to the genus thunbergia is a conspicuous plant in the forests. I do not find the species described in any of the books to which I can refer.—*Mason.*

(8178) THYMELACEÆ, *Daphnads*, a natural order of Plants belonging to the tubiferous group of Incomplete Exogens. The name of this order is derived from *Thymelæa*, a plant spoken of by the ancients, and which some have supposed to be the *Daphne Gnidium*, a plant belonging to the present order. This order consists of shrubs or small trees, very rarely herbaceous, with non-articulate sometimes spiny branches having a very tenacious bark. The leaves are entire, simple, without stipules, and alternate or opposite. The flowers are capitate or spiked, terminal or axillary, occasionally solitary ; the calyx is tubular, coloured, 4-cleft, with an imbricate æstivation ; the stamens are 2, 4, or 8 in number, inserted into the tube with 2-celled anthers, dehiscing lengthwise in the middle ; the ovary is solitary, with a solitary pendulous ovule. The fruit is hard and dry, or drupaceous. The seed has little or no albumen, a straight embryo, with a short radicle and entire cotyledons. This order is related to *Santalaceæ*, from which it differs in its inferior calyx. It is also allied to *Elæagnaceæ* and *Proteaceæ*, from both of which it is distinguished by its pendulous ovules. Lindley refers to this order Partling's *Anthoboleæ*, on account of their superior fruit. The species are found in Europe, but are not common ; they occur in greatest abundance in the cooler parts of India and South America, at the Cape of Good Hope, and in Australia. The most prominent property of this order is their causticity, which resides in their bark. When applied to the skin it produces vesication, and pain in the mouth when chewed. The bark of several of the species is very tough, and may be manufactured into cordage. *Passerina tinctoria* yields a yellow dye, which is used in the south of Europe to colour wool. The various species of *Daphne* possess active properties ; some are used for dyeing, some are poisonous, and the *Daphne Lagetta* is the Lace-Bark-Tree of Jamaica. [DAPHNE.]—*Eng. Cyc.* According to Dr. O'Shaughnessy, this order of plants is very uniform in character, and is formed of shrubs or herbs with simple and alternate leaves, axillary or terminal flowers. Its most remarkable genera are the Daphne, Lagetta, and Dirca, from which some valuable medicines, and the celebrated Nipal paper are derived. Plants of this order are common in the central parts of temperate latitudes, and abound in the mountainous regions of Asia. A few are found in tropical latitudes, as Linostoma in Southern India. On the other hand, species of Daphne are common in the coldest latitudes. An acrid stimulant principle abounds in most of the species hitherto examined, and which possesses very valuable medicinal properties, though not devoid of dangerous powers, if taken in excessive doses. A crystaline substance named *Daphnine* has also been separated from the bark of some species of Daphne.—*O'Shaughnessy, page* 599.

(8179) THYMUS (*θύμος*) the name of a genus of Plants belonging to the natural order *Lamiaceæ* or *Lubiatæ*. It has an ovate bilabiate calyx with 13 ribs ; the upper lip is trifid, the lower lip is bifid with ciliated subulate segments, and throat villous inside ; the corolla with the upper lip erect, nearly plane, notched, lower patent and trifid ; stamens straight, exserted ; anthers 2-celled, styles bifid at apex. All the species are small under-shrubs with usually purplish flowers. Between 20 and 30 species have been described by botanists, most of them inhabitants of Europe, especially the region of the Mediterranean : one only is a native of the British Isles.

(8180) THYMUS CHAMÆDRYS, Wild Thyme, or Mother-of-Thyme, is a suffruticose plant, with whorled or capitate flowers, branched decumbent stems with plain ovate obtuse entire petiolate leaves, more orless ciliated at the base ; upper lip of the corolla ovate, 4-angular ; upper lip of the calyx with short ovate-lanceolate leaves, with subulate ciliated teeth. It is a native of Great Britain, on hills and in dry pastures, and throughout Europe and the north of Asia. This plant has the same sensible properties as the last. One of the varieties is known by the name of Lemon-Thyme, on account of its scent resembling the lemon.

(8181) THYMUS MASTICHINA, Mastich-Thyme, or Herb-Mastich, has ovate or oblong obtuse petiolate leaves, narrowed at the base and not ciliated ; the calyx is villous, with feathery subulate teeth, which are longer than the tube. It is a native of dry sandy uncultivated places in Spain, Portugal, and Barbary. It exhales a sent resembling mastich. It is the Marum Vulgare of older botanists, and at one time had some reputation as an Errhme.—*Eng. Cyc.*

(8182) THYMUS SERPYLLUM, Linnæus, appears to be different from the above, having uniformly hairy prostrate creeping stems distinct from the ascending capitate flower-stems. It is not a native of Great Britain. Thymus Serpillum is mentioned in the Ben. Ph. 228.

(8183) THYMUS VULGARIS, Common or Garden Thyme, Ipar, Hind : is an erect plant, or sometimes procumbent at the base, or clothed with a hoary pubescence ; the leaves are sessile, linear, or ovato-lanceolate, acute, with revolate

edges, fascicled in the axils; the teeth of the upper lip of the calyx are lanceolate, but the segments of the lower lip are subulate and ciliated. This plant is a native of the south-west parts of Europe, in dry plains and on hills, and uncultivated places free from woods. It is very much branched, and has purplish flowers. This species is cultivated for culinary purposes, and many varieties of it are met with in gardens. It has a pungent aromatic odour and taste.

Thymus vulgaris is a delicate plant to rear. Is best performed by seed, but it may be increased by slips, and dividing the root. It requires a rich soil, and the space of six inches between each plant. Best grown in pots. —*Riddell.* It is raised from seed, requires a sandy soil and free drainage, used in soups, &c. —*Jaffrey.*

(8184) TIDES. The usual vertical rise and fall of the tides in the straits of Malacca is from twelve to fourteen feet, while in other parts of the world in the same latitude there is scarcely any variation. The Tides at Singapore correspond in this respect with those in the straits. The vertical rise and fall of the tide upon the coast of Cochin-China varies from six to fourteen feet, and the periods and duration of the ebb and flood are by no means regular. In latitude 12°, on the same shore, there is but one tide in the course of twenty-four hours. It has been said that the tides in the tropics rise and fall very little. Although it is granted that in high latitudes the perpendicular flow and ebb is generally greater than in low, still there are many examples of considerable tides in the latter. At the head of the Gulf of Cambay, in latitude 22°, Horsburg states that the perpendicular depth of the rise and fall of the tides is from thirty six feet at the full and change of the moon. So also, according to the same authority, in Surat road, it is from twenty to twenty-one feet, and from fifteen to seventeen in Bombay harbour, again, in the Gulf of Martaban, which is far within the tropics, the rise and fall of the tide, at the full and change of the moon, is twenty-three and twenty-four feet, and of Rangoon bar about twenty or twenty-one feet. In Gasper straits, within 2½° of the equator, there is occasionally, from local causes, a rise and fall of sixteen or seventeen feet on the spring tide, but this is rare in places so near the equator. These instances, all from Horsburg, show that very considerable tides occur within the tropics.—*American Expedition to Japan, pages* 148 *and* 156.

(8185) TIELLA in Malayala and Tamil, a tree which is not much known in Ceylon. It grows from eight to twelve inches in diameter. It is used by the natives in the frames of country boats; and, from its strength and durability, is found to answer the purpose well.—*Edye, Ceylon.*

(8186) TIGRIDIA CONCHIFLORA. IRIDEÆ. Tiger Flower. These beautiful flowers are grown like other lilies, the flowers open in the morning, and are of a short duration: a second blossom appears on the same stem about the third day after the first has withered.—*Riddell.*

(8187) TIL. SESAMURM ORIENTALE.

(8188) TILES.

Tuiles, FR.	Tegole, Embrici, IT.
Dachziegel, GER.	Tscherepiza, RUS.
Kuprail, GUZ. HIND.	Tejas, SP.

Tiles are made of clay, and baked in an oven or in the open air, to harden them. They are of various shapes and sizes, and are used chiefly for covering roofs, and occasionally also, for paving floors and making drains.—*Faulkner.*

(8189) TILIACEÆ, *Lindenblooms*, a natural order of Plants belonging to the syncarpous group of Polypetalous Dicotyledons. This order consists of trees or shrubs, seldom of herbaceous plants, with simple, toothed, alternate leaves, furnished with stipules. The flowers are axillary. The calyx consists of 4 or 5 sepals, which are valvular in æstivation; the petals 4 or 5, with mostly a little pit at their base; the stamens are hypogynous, mostly indefinite, with oval or roundish 2-celled anthers bursting lengthwise; the disc is formed of glands, which are equal in number to the petals and opposite to them; the ovary is single, composed of from 4 to 10 carpels, with a single style and stigma divided into lobes according to the number of the carpels; seeds numerous, with erect embryo, and abundant albumen. This order is nearly allied to *Sterculiaceæ* and *Malvaceæ*, from which it differs in its glandular disc, distinct stamens, and 2-celled anthers. The species, of which there are about 250, are arranged in 32 genera, and are generally diffused throughout the tropical and temperate parts of the globe.

Tiliaceæ possess no active properties; they abound in a mucilaginous wholesome juice. The fibres of the inner bark are very tough, and are used for a variety of economical purposes. [TILIA.] The wood is generally white, light, and tough; that of *Grewia elastica*, is used for making bows in India. The Trincomalee-Wood used at Madras for making the Massoola boats is the produce of *Berrya Ammonilla*. The *Corchorus olitorius* is cultivated in Egypt for use as a pot-herb.—*Eng Cyc.*

(8190) TIMALIA (Horsfield), a genus of Birds thus characterised:—Bill strong, compressed, deep (altum). Nostrils subrounded. Wings short, rounded. Tail elongated and graduated. Feet strong; hind-claw twice as large as the middle anterior claw.

(8191) TIMALIA PILEATA. Body ovate, rather stout. General colour above, brown with an olivaceous tint; underneath, testaceous inclining to gray. Head capped with saturated chestnut. Throat and cheeks white. Breast white inclining to gray, marked, with intensely black

stripes by the shafts of the plumes. Bill black and shining. Feet brown. (Horsfield.) Dr. Horsfield observes that the species is not unfrequent in the groves and small woods which abound throughout Java. It often, he says, approaches villages and plantations constructing its nest in the hedges; and he speaks of it as one of the social birds that delight to dwell in the vicinity of cultivation. In large forests he did not notice it. He describes its flight as low and interrupted, and adds that wherever it resides it is a welcome neighbour, in consequence of the peculiarity and pleasantness of its note, which consists of a slow repetition of the five tones of the diatonic scale (C, D, E, F, G), which it chants with perfect regularity, several times in succession, and at small intervals of time. Dr. Horsfield further remarked that the sixth tone was sometimes added; but as this required apparently an extraordinary effort, it was by no means so agreeable to a musical ear as the simple repetition of the five notes, which appear to be the natural compass of the bird's organs. ('Zoological Researches in Java.')

(8192) TIMBER TREES, TIMBER AND FANCY WOODS OF EASTERN AND SOUTHERN ASIA.—The preservation of the Forests of India and the search for timbers and fancy woods, suitable for the purposes of the State and wants of the people, have long been objects of attentive interest to the Governments of the several Presidencies in India. Amongst the earliest of the scientific investigators we find recorded the names of Dr. Roxburgh, Dr. Ainslie, Dr. Wallich, Dr. Royle, Dr. Gibson, Dr. Falconer, Dr. McClelland, Mr. Graham, Dr. Wight, and Revd Mr. Mason; while Mr. Edye, Colonel Frith, Captain Dance, and Mr. Rohde, may each be mentioned as having applied a large practical knowledge of the qualities of timber, to ascertain the woods suitable for the manufacturing industries of India. The course adopted by the principal of the scientific inquirers in identifying the plants, has been to endeavour to identify the tree botanically, and then supply the names by which it was familiarly known to the people of the country, and there is no doubt that if not the only proper mode, it is a more correct method than to endeavour to trace out the botanical name of a plant from its native name. In following the latter course, it is impossible but that, from the twenty or thirty languages spoken all throughout the regions of which we are endeavouring to record the products, the same plant must come to be described repeatedly under different names, and true progress will not be made until having properly identified the botanic relations of the plant, the subject be completed by endeavouring to supply all the synonyms by which it is known. The latter is the course that we will try to adopt in arranging the names of the trees producing the Timber and Fancy Woods of India and of Eastern and Southern Asia. One point which practical men should particularly be made aware of is that the vast extent of the regions we are describing, their various climates and physical conditions, render it impossible that the same tree can produce the same quality of timber in every locality where it grows, and this indicates the necessity of not pinning their faith on to any one wood merely because a wood from the same tree, the growth of another district, may have been found highly suitable for the work to which it was put. We would especially ask our ordnance friends to keep this point in view and not to use a wood however lauded, unless the timber have been brought from the same place as it was obtained by those whose praise they act on, or until severe trials has proved that when grown in the new locality, the timber it yields is equal to all that is required of it. As an instance of this, we may cite the majestic teak which grows to an immense height in Malabar, on the Godavery, in Pegu and Tenasserim, proceeds far into the interior of India, and may be seen in the mountains of Bundelcund, but there only in the form of a moderate sized shrub; and even where it presents the same form of a gigantic tree as in Malabar and Pegu, the quality of the timber it yields is essentially dissimilar. The knowledge of this fact renders it necessary that in our observations on the Timber trees, Timber and Fancy Woods of India and of Eastern and Southern Asia, we should not only note the trees generally, but furnish also the names of such as are found useful in certain districts. Our remarks will therefore embrace a few observations on the uses of timber, a list of all the trees known to produce timber in some part or other of the regions we are noticing, and separate lists and notices of the trees of particular districts.

The total annual importation of timber into Great Britain is nearly two million loads, or one hundred million of cubic feet, entered under the several designations of "timber or unsawn wood," "deals and planks or sawn wood;" "teak;" "staves," and "lathwood."

The following Table shows the countries from which wood was chiefly imported in the year 1849.

	Timber.	Deals.	Teak.	Staves.	Lathwood.
Russia,	41,419	173,586	—	825	15,589
Sweden,	28,679	79 843	—	150	1,119
Norway,	28,930	50,805	—	95	103
Prussia,	117,470	35,006	—	19,213	6,169
Hanse Towns,	2,441	68	—	1,013	—
Tuscany,	2,299	9	—	—	—
Papal Territories,	3,106	3	—	—	—
Western Africa,	1	—	9,596	—	—
British India,	1	2	17,459	56	—
Australia,	977	540	1	4	—
British North America,	578,748	468,572	9	45,164	14,813
British Guiana,	4	19	4	103	—
United States,	13,882	839	—	13,309	—
Miscellaneous,	1,002	491	633	36	57
Total Loads ..	817,909	809 783	27,702	79,917	37,800

Of the chief woods employed in shipbuilding seven have long been acknowledged as first-rate by the authorities at Lloyd's; and to this number must now be added an eighth, namely, iron-bark, which has, in fact, only been admitted as a first-class wood since the period of opening the Exhibition in May 1851. These eight woods are,

1 English oak,	5 East India teak,
2 American live oak,	6 Green heart,
3 African oak,	7 Morra,
4 Morung saul,	8 Iron bark.

At the great Exhibition of 1851, the collection of East Indian woods, exhibited by the Honorable East India Company (p. 884) was by far the most extensive series of woods in the whole Exhibition, and constituted a very valuable part of the great collection of Indian raw produce. It was remarkable for the large number of specimens, the excellence of many of them, and the valuable practical information to be gained by their examination. The collection consisted of many hundred specimens, and included several minor or local collections of great interest. Amongst these were the valuable collections of Drs. Roxburgh and Wallich (884,885); an extensive series of the woods of the Malay peninsula, Amherst, Tavoy, Tenasserim, Prince of Wales' Island, Assam, Cuddapah, Madras, Orissa, &c.

Considering the extent and importance of Dr. Wallich's collection, the Jury would certainly have awarded to him a medal had not the fact of his being a member of the jury precluded them from doing so. They awarded a Prize Medal to Mr. Commissioner Blundell (p. 885) for a very valuable collection of Amherst woods. They also awarded a Prize Medal to Messrs. Almeida of Singapore (p. 890) for fine specimens of Lingoa-wood and Kaya-buka.

The smaller series of woods contributed by Messrs. A. P. Onslow, of Ganjam; D. Mayne, of Cuddapah (p. 188); General Tulloch, Madras; Captain Ogilvie of Masulipatam; Major Maitland, and Colonel Balfour, of Madras; Dr. Hunter, of Madras; Dr. Wight, of Coimbatore; Captain Marquart, of Chittagong; and J. R. Colvin, of Moulmein (pp 888,891), were also severally deemed worthy of Honorable mention. The nature and properties of many of these Indian woods was very little known in Britain, and though, for the most part, it is not probable that it would be found worth while to import them into Europe, yet their importance to India is every year increasing, and must necessarily continue to do so, as the demand for timber in India for railways and other engineering works increases. For such uses it is desirable, not only that the wood should be strong and not liable to decay from mere exposure to the weather, but, also, that it should work freely, and be able to withstand the ravages of the various insects to which wood of all kinds is more or less exposed in tropical countries. It is true that even the most porous and spongy woods may be rendered to some extent capable of resisting all such influences, by being impregnated with various solutions, but it is obviously far better, when possible, to select such woods as are naturally saturated with resinous and aromatic substances, as in this latter case all cost of preparation is saved, besides that the preserving matter is far more perfectly disseminated throughout the whole of the wood than can possibly be effected by any artificial process after the tree is felled. In examining the comparative value of different sorts of wood, it is of the first importance to ascertain the nature of the encrusting matter deposited throughout the cells and tubes of the wood. For all practical purposes, those woods appear to be best in which the cells are lined with resinous matter; those filled with hygroscopic gummy matter are, for the most part, of less value; they are seasoned with difficulty, and are always more liable to decay. The best woods are those having a strong fibre protected from all external influences by a coat of resinous matter, or at least of a matter insoluble in water, and one which does not attract atmospheric moisture. It is probable also, that some of the ornamental and other woods of India will become articles of import into Britain when their properties and uses are better known and appreciated by that country's artizans.—*Jur. Rep. of* 1851.

Timber.—The most important application of wood is in the building and repairing of houses and ships, and in the construction of machinery. For this purpose the larger trees, which come under the denomination of timber, are chiefly employed. Though England long supplied its own wants, increasing population, led to an extensive demand on other countries for the supply of timber, which was met chiefly by vast pine forests on the shores of the Baltic and northern Europe, and also from Canada. Timber from the latter country, however, was soon found to be inferior in strength and durability to that of the north of Europe, and fell into disesteem among ship builders; hence arose the practice of introducing the words "Memel fir" in specifications for building.

Conservation.—The preservation of growing timber is an art of considerable importance, and can only be said to be cultivated in countries where timber is comparatively scarce.

The practice of thinning out plantations is of importance not only as affording a supply of wood, but, by admitting an increased supply of air and light to the remaining trees, their growth is greatly promoted. Forest trees are often planted on soil that is unfit for other purposes, and by the annual fall of leaves they accumulate in time a certain depth of soil.

Seasoning.—The proper time for the felling of trees is that in which the largest quantity of hard and durable wood can be obtained

as free from sap as possible. It is a common fault to fell trees before they have attained their maturity. If suffered to complete their growth they would have the heartwood of equal weight and strength throughout, whereas in those cut down prematurely, the centre wood alone possesses this requisite, the outer concentric rings being considerably softer: such timber may be said to decrease in hardness and strength in arithmetical proportion as it approaches the sap wood. Timber is felled during the cold months, when the natural juices are most inactive and the tree is in a measure dormant. But before the timber can be used, the juices must be got rid of from the capillary vessels, or the wood will remain moist or green for a considerable period, and the planks formed from it will, in a confined situation, become stained, and then subject to decay or dry rot: these effects are prevented by free exposure to dry air. It is usual in the royal dock yards to cut out the timbers for ships of the required shape and dimensions about a year before they are framed together, and the skeleton frame is usually left another year to complete the seasoning. Other mischiefs almost as fatal as decay also occur to unseasoned woods; round blocks, cut out of the entire circular stem of green wood, or the same pieces divided into quarterings, split in the direction of the medullary rays, or radially; also, though less frequently, upon the annual rings. Such of the round blocks as consist of the entire section contract pretty equally, and nearly retain their circular form, but those from the quarterings become oval from their unequal shrinking. In general, woods do not alter in any material degree in respect to length. Boards and flat pieces contract, however, in width; they warp and twist, and when they are fitted as panels into loose grooves, they shrink away from that edge which happens to be the most slightly held; but when restrained by mills, mortises, or other unyielding attachments, which do not allow them the power of contraction, they split with irresistible force, and the materials and labour thus improperly employed will render no useful service" The natural juices of the tree must be got rid of by seasoning in order that the wood may become dry and hard. After the tree has been lopped, barked, and roughly squared, it is left for some time exposed to the weather, and may be soaked in fresh running water (as some think) with advantage, or boiled or steamed. This dilutes and washes out the juices, and the more readily evaporates from the wood at a subsequent period, and the colour of white woods is said to be improved thereby. In this way, fir timber, on its arrival at the port of London, is commonly formed into floats on the Thames, and allowed to remain for some time. When removed from the water, it is left to dry thoroughly before it is taken to the pit to be sawn; usually it is blocked up from the ground so as to have a free circulation of air, and if it be cut into boards, they should be piled one on the other with billets of wood between them, or laid in a triangular form, with their ends alternating so as to allow the air to have free access to them. Thin pieces will be seasoned in about a year, but thick wood requires two or three years before it is removed into the house to complete the drying. The warm air of a stove-heated room will then act upon it with benefit. In the stacking of timber for the purpose of seasoning, the pile should be so far raised from the ground as to allow the air to circulate below, as well as around and through it; and if not sheltered from the rain, care should be taken to prevent the wet from lodging in any part. It is now usual in dockyards to have elevated supports of iron or of stone for the stacking of timber, and ships are now built under covered sheds. The drying of timber should be gradual, for if rapid, it suffers a loss in toughness as well as in pliability: the pores at and near the surface become contracted, and prevent the interior moisture from escaping. Plans for the more rapid drying of timber by means of kilns have, however, been tried, as in Price's patent, in which timber destined for building purposes is placed in a room, into the lower part of which hot and dry air is introduced, and this, charged with the moisture of the timber, is allowed to escape at the upper part. By this, timber can be seasoned in one third of the time required in the open air. Oak loses nearly two fifths of its weight by proper seasoning. The timber should be dry before it is cut into planks, or they would be liable to warp and shrink.

Decay.—The presence of air, light, and moisture seems to be necessary to the re-vegetation of timber or the growth of that fungus which leads to its destruction. Mr. Fincham of Her Majesty's dock-yard bored a hole in one of the timbers of an old ship built of oak, the wood being sound, and in 24 hours the admission of air caused the hole to be lined with a white mouldiness due to the growth of a peculiar fungus, which some time after became so compact as to admit of being withdrawn like a stick. Cracks or splits in timber would therefore predispose it to decay in damp situations by admiting the air. There are great differences in woods as to their power of resisting decay; some perish in a year or two, others are sound and even fragrant for centuries. Teak has been found to last six or seven times as long as oak when used in green houses, as boxes for growing plants, the latter wood not existing more than two or three years; but the moist atmosphere, light and heat of a greenhouse form a severe trial for any wood.

Fancy wood.—In addition to timber-trees,

a vast variety of woods are used for ornamental purposes. In a series of papers contributed by Professor Forbes to the Art Journal, on "Woods used for Ornament and Purposes of Art," some clear distinctions, definitions, and descriptions are given, which Mr. Tomlinson, with the permission of the publisher, abridged. The term wood is commonly applied to those portions of the vegetable axis that are sufficiently hard to offer considerable resistance and solidity, so as to be used for purposes requiring various degrees of firmness and strength. Every flowering plant is composed of an axis, and the appendages of the axis; the former consisting of the stem and root, the latter of the leaves and flowers. In trees, shrubs, and under-shrubs, the axis is said to be woody; in herbs it is termed herbaceous. In the former, stems are permanent, and do not die to the ground annually, as is the habit of the latter. A shrub, a tree, an undershrub, a bush, are merely gradations of magnitude in perennial plants; woods valuable for purposes of Art and Manufacture are derived from all of them. But as bulk and dimensions are necessary to make timber available for extensive use, by far the greater part of our ornamental woods are derived from trees. There are, however, some remarkable exceptions. The wood of roots is different in structure from the wood of stems, and the same tree may furnish two very different kinds of ornamental wood, according as they are derived from its ascending or its descending axis. The wood of the inner portions of a stem may be of very different colour and quality from that of its outer parts. In the immediate neighbourhood of the origin of branches, it may exhibit varieties of pattern, such as to render it greatly more ornamental than elsewhere, and in some cases, when under the influence of morbid growth, reveals additional beauties, so as to be prized for qualities which in nature are defects. If we take a number of transverse sections of wood, and compare them one with another, it will soon become evident that there are two principal types or modifications of structure. Compare a cross cutting of Teak or oak or mango with a like portion of Palmyra wood, and you will see the differences between them strongly contrasted. In the former, the layers of wood are ranged in concentric circles round the central pith, and are encased externally in a binding of bark, itself composed of distinct and differently organized portions. In the latter there is an uniform appearance throughout the section, the substance not being disposed in concentric rings, but appearing as if a bed or ground of one kind was studded with specks of another order of tissue. These are not slight dissimilarities, they indicate differences of the greatest structural importance in the economy of the respective trees. Corresponding with them are peculiar modifications of every portion of the plants organization. The external aspect of the plants of either type is altogether unlike that of the other.

The appearance styled silver-grain in wood is dependent on the cellular tissure of the medullary rays, and is, therefore, exhibited by exogenous woods only. It gives the streaks of glancing satiny lustre, that are so ornamental in many kinds of woods. In the oak and beech this appearance is conspicuous. The inner layers of wood, after the tree has become aged, often become compact, and frequently different in colour from the new wood. They are then styled the heart-wood. Botanists term them the duramen and apply the name alburnum to the outer layers or sap-wood. In the former, the tissues have become dry and dense, and charged with solidifying deposits, so as to prevent them aiding in the ascent of the sap. Often, too, they become more or less deeply coloured, so as conspicuously to contrast with pale sap-wood. This difference is especially conspicuous in the ebony-tree, the black portion of which is the duramen, or heart-wood. In the oak, they resemble ebony. Furniture of exquisite beauty has been constructed of yew-wood; indeed it is admirably adapted for fancy cabinet work, either in mass, or inlaid as veneers: the supply is said, however, to be insufficient. The wood of yew was once extensively used in Britain, in the making of bows.

The cedar is a native of the warmer temperate mountainous regions of Asia. The celebrity of the cedar of Lebanon dates from a very high antiquity; and the reputed value of its timber for ornamental and cabinet purposes, has been placed on record from very ancient times. Either, however, more coniferous trees than one have been included under the popular appellation or the qualities of the wood have sadly degenerated, for that of the existing cedar of Lebanon is by no means remarkable for beauty, durability, or sweetness of odour, all of which properties were pre-eminently ascribed to it. The tree itself is as grand as ever; one of the most majestic of arborescent elements in the landscape. It was extensively used among the ancients. Nevertheless, this wood, such as we now know it, is not one to choose for carving or house construction. It is very light and spongy, of a reddish white colour, scented like ordinary pine, and not at all durable. It is possible that other kinds of coniferous trees were confounded by the ancients with the tree cedar. The Himalayan "*deodar*," a tree very closely related to the Cedar of Lebanon, really possesses all the good qualities, for which the latter has been so long celebrated. Travellers in the East, in writing about cedars, often confound various kinds of arborescent juniper under that name.

The numerous race of pines and firs for the

most part are more useful than ornamental, so far as their timber is concerned. Some of them, however, afford wood with many desirable qualities for furniture making.

Among the natural orders that have affinities with catkin-bearing trees, are the Walnut and the Nettle tribes.

The box belongs to the spurge tribe. It produces a warm yellow wood, much used by the turner, and well adapted for the construction of flutes and similar musical instruments. It is the yellow wood which we often use in the shape of rules and scales, and it is also the chief wood employed in wood engraving. It is sometimes beautifully mottled. In Britain we have the box growing wild and luxuriant in Surrey, as at Box-hill, but the chief supply of this wood is derived from the southern parts of Europe, and from Asia Minor. A distinction is drawn between "Turkey" and "European" boxwood. The latter is more curly, softer, and paler than the former. Dr. Royle has called attention to a different species of Buxus, a native of the Himalayas, yielding a wood possessing similar qualities with that in common use, and having the advantage of being found of considerable size and thickness. The ash and the olive are members of the olive family. The former familiar tree yields a timber remarkable for toughness and elasticity, and, excellent for machine and agricultural purposes, but not much used for finer applications. When, however, the grain is zigzag, it is adapted to the making of furniture of considerable beauty. Olive-wood is imported from the Mediterranean countries. It is veined with dark grey, and resembles boxwood in texture, but is softer. The knotted and curled roots are made into embossed boxes. This is done by means of pressure in engraved moulds of metal. The Araliaceæ, a natural order to which the ivy belongs, may be mentioned here incidentally on account of the substance so well known as rice-paper. This was long supposed to be the pith of a leguminous plant; its true nature was not made known until lately, when Sir William Hooker demonstrated that it was the pith of an Araliaceous tree. A living plant had been procured with great difficulty from the Chinese, and was sent to England, but died on the passage. It was said to be exclusively a native of the island of Formosa, but Mr. Fortune found the Aralia growing in other parts, and it was introduced by him into India.

The almond-tree, especially when wild, is said to furnish a valuable wood, but which is little known or used. The great order of leguminous plants, the Pulse tribe, is rich in trees, but not much so in temperate climates, nor is there any ordinary tree of the group upon which stress can be laid. There are now eight descriptions of timber admitted by the English as first-rate for ship-building purposes, and one of these has only been so ranked since the opening of the Great Exhibition. They are :—1, English oak; 2, American live-oak; 3, African oak; 4, Morung saul; 5, East Indian teak; 6, Green heart; 7, Morra; 8, Iron-bark (the newly admitted wood). Of the above the Morung saul is an Indian tree, as well as the better known valuable Teak. The Iron-bark is from New South Wales, and has a density of 1426, and a strength of 1557, (English oak being called 1000).

Wood is very valuable as a fuel: the excess of hydrogen contained in it which, in burning and forming water, requires for equal weights three times as much oxygen as the carbon does in forming carbonic acid, gives out in burning nearly four times more heat than the carbon.—*Tomlinson.*

In all countries most of the woods in general use, have a variety of names, the *local* name varies often in the same district. Many have likewise, a *commercial* name, by which they are known in the Market, as "Trincomallee" wood, "Coromandel" wood &c. These names are sometimes given from the place of export, but often it is impossible to trace their derivafion. Lastly, there is the *Botanical* name, the sure determination of which is a matter of the first importance, and the means of doing this consists of a small shoot, bearing flowers, fruit and full grown leaves, either together or separately, pressed flat and dried, so as to be fixed on a sheet of paper.

Size, &c. of the Specimens.—For a complete collection, there should be several of each wood from various localities. 1st, A horizontal section of the tree with the bark complete, and about 3 inches thick. 2d, A plank about 3 inches thick and about three feet long, cut from the log about half way between the pith and heart, the bark, sapwood, &c. being retained. 3d. Two or three bars about 2 feet 6 inches long, 2¼ inches square (if the plant grows so much) cut from the sound wood. 4th. A turned cylinder of hard or ornamental woods, 1 foot long and 3 inches in diameter.

The value of wood depends much on its age, the young tree possesses strength and elasticity in a greater degree than mature, i. e. when it would shortly cease to increase in diameter; as it increases in age it acquires its maximum of stiffness and durability, in its aged state, it will probably best suit the purposes of the Cabinet Maker. The grain of the wood depends greatly on the nature of the soil, being generally straight and open in a tree growing rapidly, in a rich, and the reverse in a poor soil. In some cases, the root affords wood of great resisting power for furniture, the root of a healthy Oak is prepared for spokes of wheels, and veneers from that of an aged specimen, often bear a high value for Cabinet makers purposes. In collecting specimens of the characters of wood there are points to which attention should be directed. viz:

a. The uses to which the several parts of the tree is applied, and those for which experienced Natives consider it specially adapted.

b. Its distribution in the District, the localities where the best is procurable with the nature of the subsoil, the distance from the nearest seaport, or town of any size : whether water carriage be available ?

c. The extent of supply, whether this is increasing by self sown seedlings of fresh plantations, &c. or decreasing? the average size in height and circumference of the native tree, its character, whether straight or crooked, the average length, &c. of the logs or planks, the times required for seasoning, and the amount of seasoned timber generally procurable.

d. The age at which the tree reaches maturity, i. e. when increasing age brings no further increase of diameter. This is a point of great importance, for on it depends the relative value of trees for planting. Thus, supposing there are two species of trees, of equal value as regards timber, &c., but one attains maturity in 25, while the other requires 35 years, it is obvious that the first is much the more valuable of the two : its money value being realised 10 years sooner.

The following is a List of Woods authorized to be used as Railway sleepers, and, in 1855, under trial on the Madras Line.

1—Teak.....Tectona grandis.
2—Saul.....Vatica robusta.
3—Sissoo.....Dalbergia sissoo.
4—Pedawk.....Pterocarpus Indicus.
5—Kurkuttah.....Zizyphus glabrata.
6—Kurrah Murdah...Terminalia glabra.
7—Maroothy Marum Terminalia alata.
8—Aucha Marum.....Bauhinia diphylla.
9—Vangay Marum...Pterocarpus marsupium.
10—Kadookay Marum Terminalia chebula.
11—Neenee Marum.....
12—Myladee Marum.....
13—Sem Marum.....Soymida Febrifuga.
14—Curroo Vangay or Chella Woongah Marum } Acacia odoratissima.
15—Perumbay Marum....Prosopis spicigera,
16—Erroovaloo Marum...Inga Xylocarpa.
17—VelVangay Marum...Acacia speciosa.
18—Peela Marum.. ... ..Artocarpus integrifolia.
19—Dud Eloopa Marum Bassia longifolia.
20—Karvalum Marum....Acacia arabica.
21—Combadree.....
22—Katoovoye Marum...

From the various sources of information at command, the following list contains the names of the principal trees which are felled for Timber or Fancy woods throughout the various countries in India and in Eastern and Southern Asia.

Acacia amara, Nulla balasoo, *Tel.* Woonja marm, *Tam.*

Acacia Arabica, Curvala, *Tam.* Tuma, *Tel.* Babool, *Hind.*

Acacia catechu, Wodahalay, *Tam.* Sha, also Kwonthee, also Sha-bin, *Burm.*

Acacia cinerea.

Acacia elata, Seet, *Burm.* Tella sopara, *Tel.*

Acacia ferruginea, Ausandra, *Tel.*

Acacia Halkora, Dulchirram, *Tel.*

Acacia leucophlea, Velvaila, *Tam.* Tella tuma, *Tel.*

Acacia odoratissima, Caroovangay, *Tam.* Telsoo, also Shinduga, *Tel.*

Acacia Serissa, Seet, *Burm.*

Acacia Smithiana.

Acacia speciosa, Velvangay, *Tam.* Ped dulchirram, also Dirasa, *Tel.*

Acacia stipulata, Seet, *Burm.*

Acacia suma, Tella Sundra, *Tel.*

Acacia sundra, Currangally, *Tam.* Nulla sundra, *Tel.*

Acacia vera. Andere, *Cyng.*

Adansonia digitata, Papara poolimarum, *Tam.*

Adenanthera pavonina, Kwæ-gyee, also Y-wai-gyee, *Burm.*

Ægle marmelos, Vilvay marum, *Tam*, Oo-Sheet, *Burm.* Maredu, *Tel.* Bael, *Hind.*

Agati grandiflora, Agathy, *Tam.* Pouk-ban, *Burm.*

Agathis loranthifolia.

Aglaia spectabilis.

Ailanthus excelsa, Peru marum *Tam.*

Alangium decapetalum, Alinjee marum, *Tam*, Udugu *Tel.*

Alstonia scholaris, Kori, also Kowun, *Can.* Satween *Mahr.*

Anacardium occidentale, Moontheree Cotty marum *Tam.* Thub-bam-bu, *Burm.* Jidi mamidi, *Tel.*

Anacardium latifolium, at Goalpara. Bheela, *Hind.*

Ancestrolobus carnea. Zoung ali, *Burm.*

Ancestrolobus mollis. yin-bya, *Burm.*

Andrachne apetala.

Anissaphyllum Zeylanicum, Welippiyenna, *Cyng.*

Anogeissus acuminatus. Paussee, also Panchee. *Tel.*

Anogeissus latifolius. Sheriman, *Tel.*

Aponogeton crispum, cocatiye, *Cyng.*

Aquilaria agallocha, Aglay marum. *Tam.* A-Kyau, *Burm.*

Amoora (Aglaia) rohitaca, kha-you also kha-yo, *Burm.*

Antidesma paniculata, By-it-zin, *Burm.* Jana palseru, *Tel.*

Areca catechu, Camoogoo. *Tam.*

Armosia dasycarpa. Thit-wa-jee *Burm.*

Artocarpus integrifolia Peing-nai, *Burm.*

Artocarpus echinata, Toung Peingnai, *Burm.*

Artocarpus hirsuta, Angelly wood.

Artocarpus pubescens, Aludel, *Cyng.*

Artocarpus chaplasha.

Artocarpus *species* of Tavoy. Pyn-ya-the, also Tana-beng, *Burm.*

Artocarpus sylvestris, Row funnus, *Mahr.*

Atalantia monophylla, Cdatyaloo micha marum. *Tam.*

Averrhoa carambola. Zoung-ya, *Burm.*

Azadirachta indica Margosa, Neem Tree; Vaypum marum. *Tam.* Neem ka jhar, *Hind.* Ka-ma-a-pae, also Them-ba. also Kamakah, *Burm.* Yepa, also Yapa, *Tel.*

Bambusa, Bamboo. Baus, *Hind.*

Barringtonia acutangula, Kyai-tha, *Burm.*

Barringtonia speciosa. Kyai-gyee, *Burm.*

Bassia latifolia.

Bassia longifolia. Elooppa marum, *Tam.* Mee, *Cyng.* Ippee, *Tel.*

Bauhinea brachycarpa. Bwai-jin, *Burm.*

Bauhinea parviflora. do.

Bauhinea, *Species.* Pul.i-Shinta, *Tel.*

Bauhinea racemosa. Arree, *Tel.*

Bauhinea diphylla. Pa-lau, *Burm.*

Bauhinea tomentosa. Petan, *Cyng.*

Betula bhojputra.

Berrya ammonilla, Trincomallee wood, *Eng.* Halmilile, *Cyng.*

Bignonia *Species.* Kala-goru also Chinna kala-Goru, also Mokka yepa, *Tel.*

Bignonia chelonoides, Kala-Goru, *Tel.*

Bignonia suaveolens, do. *Tel.*

Bignonia quadrilocularis, Wursus, *Mahr.*

Bignonia xylocarpa.

Blackwellia spirale.

Blackwellia perpinqua.

Borassus flabelliformis. Palmyrah tree, *Eng.* Htan, *Burm.* Tal, *Cyng.*

Boswellia thurifera.

Briedelia montana. Goonjan murral, *Can.* Assuna, *Mahr.*

Briedelia spinosa.

Bruguiera Rheedii.

Butea frondosa. Pouk also Pouk-pin, *Burm.* Calukeale, *Cyng.* Motku also Modugu, *Tel.*

Buxus, Box.

Calamus, Canes, Ratans. Kyeing-nee, *Burm.* Bade, *Hind.*

Calophyllum longifolium, Thar-ra-bee, *Burm.*

Calophyllum acuminatum, wal-dombe, *Cyng.*

Calophyllum calaba, Gorru-keence, *Cyng.*

Calysaccion angustifolium.

Calyptranthes cummini, Mahadan, *Cyng.*

Calyptranthes cariophyllifolia, Batte dombe, *Cyng.*

Calyptranthes jambolana, Alubo, *Cyng.*

Cannarium geniculatum.

Canthium didymum, Nulla regoo, *Tel.*

Canthium parviflorum. Balsu, *Tel.*

Capparis grandis, Reygutti, *Tel.*

Carapa, *species*, Tai-la- oon, *Burm.* of Tavoy.

Careya arborea, Ban-bwæ, or Baub-wai, *Burm.* Buda-darinee, *Tel.*

Carallia zeylanica, Davette, *Cyng.*

Caryota urens, Kittul, also Nepera, *Cyng.*

Carrallia lucida, Keerpa, *Beng.*

Cassia florida.

Cassia nodosa.

Cassia sumatrana, Arramene, *Cyng.* Mayalee, *Burm.*

Casearia pentandra, Tha-byai-ywet-kya, *Burm.* Kahatte, *Cyng.*

Casearia, *Species.* Peda kal mesura, *Tel.*

Cassia cinnamomum, Dawol Kuroendoo, *Cyng.*

Castanea indica, Theet-Khaya. *Burm.*

Castanea martabanica of Tavoy, Norne or Zitha, *Burm.*

Casuarina equisitifolia.

Casuarina muricata, Beef-wood tree, *Eng.* Hten-roo, *Burm.*

Cæsalpinia Sappan, Teing-nyet, *Burm.*

Cathartocarpus Roxburghii, Uskiaman, also Uri-widdee, *Tel*

Cedrela toona, Toon marum, *Tam.* Thit-kado, *Burm.* Toon, Tunga, Poma, Jeea.

Cedrus deodara, the deodar, *Eng.* Kelon, *Hind.*

Chaulmoogra odorata.

Chickrassa tabularis, Aglay marum, *Tam.*

Choecarpus pungens, Hedde woke, *Cyng.*

Cicca disticha, Nelly, *Cyng.*

Cluytia amona.

Cluytia collina, Woadoogoo marum, *Tam.* Koorseya also koorse, *Tel.*

Cocos nucifera, Tenna marum, *Tam.* Cocoanut, *Eng.* Narel ka jhar, *Hind.*

Connarus speciosa, Gwai-douk, *Burm.*

Conocarpus latifolia.

Conocarpus robusta, Bai-byah, *Burm.*

Cordia, *new species.* Botku, *Tel.*

Cordia angustifolia, Chinna Botku, *Tel.*

Cordia myxa, Tha-nat, *Burm.* Irkee also Peda botku, *Tel.*

Cratæva Roxburghii, Ka-dat, *Burm.*

Cupressus torulosa, Cypress.

Cynometra polyandra of Nepaul.

Cynometra, *Species*: Branch flowered, Halmendora, also Galmendora, *Cyng.*

Cyrtophyllum fragrans.

Dalbergia frondosa, Yindike, *Burm.* Peda soopara also yerra patseroo, *Tel.*

Dalbergia lanceolaria, Nedoon or Nander wood, or Nendoon. *Cyng.*

Dalbergia latifolia. Eroopoottoo, *Tam.* Yindike, *Burm.* Jitigee, also yerroo goodoo, *Tel.*

Dalbergia sissoides, Bitty marum, *Tam.* Yindike, *Burm.*

Dalbergia sissoo, Sissoo, *Tam.* Yindike, *Burm.*

Dalbergia Oojeinensis.

Dillenia augusta, Zinbyewn, *Burm.*

Dillenia scabra, Byew, *Burm.*

Dillenia speciosa, Tha-byew, *Burm.* Peda kalinga, *Tel.*

Dillenia pentagyna, Chinna-kalinga, *Tel.*

Diospyros syhrtica, Nulla kaka mushti, *Tel.*

Diospyros chloroxylon, Ulinda also Yelinda, *Tel.*

Diospyros melanoxylon.

Diospyros racemosa.
Dipterocarpus alatus, Aing, *Burm.*
Dipterocarpus grandiflora, Ain or Ain-tha or Kun-nyau-phin, *Burm.*
Dipterocarpus turbinatns, Horre, *Cyng.* Kan-yeen, *Burm.*
Dodonea viscosa.
Dolichampia pomifera, Douk-ya-ma, *Burm.*
Diospyros hirsuta, Calamander or Coromandel, Calu Medirye, *Cyng.*
Diospyros ebenaster, Ebony, Kudum Berye, *Cyng.*
Diospyros melanoxylon, Ebony, Ouk-chin-ya, *Burm.*
Diospyros, *Species.* Muchi twikee, also Wurungul, *Tel.*
Dombeya melanoxylon, St. Helena Ebony.

Echites lanceæfolia, kiri wala, *Cyng.*
Echites scholaris, Rook attene, *Cyng.*
Ehretia lœvis, Yen-yai-myouk-myee, *Burm.* Pal dautum, *Tel.*
Ekebergia, *species* of Goalpara.
Eleocarpus serratus of Ceylon.
Emblica officinalis, *Usarka, Tel.*
Elæodendron integrifolia, Jouk bin, *Burm.*
Embryopteris glutinifera, Timbery, *Cyng.*
Eriochlæna Hookeriana, Nara Botku, *Tel.*
Eriochlæna tilifolia
Eriobotra Japonica.
Erythrina Indica.
Euphorbia tirucalli, Munchee jamudu, *Tel.*
Eugenia pulchella, Khway-tha-byai, *Burm.*
Eugenia myrtifolia, Tha-bai-jeen, *Burm.*
Eugenia caryophyllifolium.
Eugenia mallaccensis.
Eugenia jambolona.
Eugenia nervosa.
Eugenia ternifolia, Thab-yew-tha-byai, *Burm.*
Eugenia pulchella.
Eugenia racemosa.
Eugenia vulgaris, Thab-yai-tha-pan, *Burm.*
Eugenia salicifolia
Eugenia laurina. Wall-boam-boo, *Cyng.*
Execaria agallocha, Agallocha wood.

Fagrœa fragrans. A-nan, also Anan-Beng. *Burm.*
Feronia elephantum, Vella marum. *Tam.* H-man, *Burm.*
Ficus cordifolia. Nyoung-gyat, *Burm.*
Ficus indica. Banyan Tree. Bar-ka-jhar, *Hind. Tam.* Marree, *Tel.*
Flacourtia sapida. Kanuregu, *Tel.*
Flacourtia montana. Sampga, *Can.* Tambut. also Hudkee.

Garcinia Cowa.
Garcinia purpurea, Moorghul mara, *Can.* Kokum, *Mahr.*
Gardenia gummifera, Chitla matta. *Tel.*
Gardenia latifolia, Peda karinga, *Tel.*
Gardenia lucida. Garinda, also Tella Manga, *Tel.*
Gardenia, *Species.* Telega, *Tel.*
Geloxium bifarium, Hsai-than-bayah, *Burm.*
Gmelinia arborea, Coormmy marum, *Tam.* Kyoon-boe, *Burm* Goomar tek, *Tel.*
Gordonia floribunda, Theet-ya, *Burm.*
Gordonia integrifolia.
Guaiacum officinale, *Tam.*
Guatteria longifolia.
Guettardia speciosa,
Grewia floribunda. Myat ya, *Burm.*
Grewia Hookerii. Phet-woon, *Burm.*
Grewia Rothii, Jana, *Tel.*
Grewia spectablis, Phet woon, *Burm.*
Grewia tiliæfolia, Tharra, *Tel.*
Grewia paniculata, Hunu kirille, *Cyng.*
Gyrocarpus Jacquini, Poonkee, *Tel.*
Givotia Rottleriformis, Tella poonkee, *Tel.*

Hæmatoxylon campechianum. Logwood.
Hardwickia binata. Nar yepa, *Tel.*
Heritiera fomes : Soondree.
Heritiera litoralis, Kana zoe, *Burm.*
Heritiera minor, Soondree, *Hind.* Kana-zoe, *Burm.*
Hibiscus macrophylla.
Hibiscus tiliœfolia, Belygobel, *Cyng.*
Holugarna longifolia, Holgen, *Can.*
Hopea odorata. Then-gan, also Then-gan-pha-yung, *Burm.*
Hopea floribunda. Than-the-ya, *Burm.*
Hymenodictyon excelsum, Dudippa also chetippa, *Tel.*

Indigofera, *Species.* Doun-Daloon, *Burm.*
Illecebrum latrum, Nerrelloo, *Cyng.*
Inga dulcis, Coorkapooli marum, *Tam.*
Inga xylocarpa, Iron wood of Pegu, Py-in-ka-doe, *Burm.* Boja also Konda Tangadu, *Tel.*
Inga bijemina, Tau-yew, *Burm.*
Ixora parviflora, Koree, also Koravee Pal. *Tel.*

Jonesia asoca. Deree-ratem-bela, *Cyng.*
Juglans tricocca. Ta-soung-let-wah. *Burm.*
Juniperus excelsa, Cedar of the Himalayas.

Kydia calycinia. Boke-mai-za, *Burm.*

Lagerstræmia microcarpa.
Lagerstræmia reginæ, Jarool. *Hind.* Murute, *Cyng.*
Lagerstræmia Pymmah. Pymmah, *Burm.*
Lagerstræmia parviflora, Chinna ngee, *Tel.*
Laurus camphora, camphor-wood,
Laurus (sassafras). Hman-Then, *Burm.*
Lawsonia inermis. Marooithanay marum, *Tam.* Dan. *Burm.*
Limonia acidissima. Torelaga, *Tel.*

Maba buxifolia, Nulla muddee, *Tel.*
Mangifera attenuata, Taw-sa-tha-yeet, *Burm.*
Mangifera Indica, Maah marum, *Tam.* Tha-yet, *Burm.* Mango tree, *Eng.* Mamadi, *Tel.*
Melanorrhæa usitata, Varnish tree, *Eng.* Ma-yan, also Theet-see, *Burm.*

Melia azadirachta, Malay Vaimboo, *Tam.* Persian Lilac; Pride of China; Pride of India, Bead tree, *Eng.*
Melicocca trijuga, Jo-bin, *Burm.*
Memecylon tinctorium, Surpa, *Mahr.* Iron wood of Canara.
Mesua ferrea, Singalese Iron wood tree, *Eng.* Naga keshura, *Burm.* Naw, *Cyng.*
Metrosideros vera, Iron wood of China.
Michelia Rheedii, Sumpanghy marum, *Tam.*
Michelia champa, Sappoo, *Cyng.*
Millingtonia simplicifolia.
Mimosa polystachia.
Mimusops elengi, Maghudam marum, *Tam.* also Kha-ya-gang, *Burm.* Moone mal, *Cyng.*
Mimusops hexandra. Paloo, *Cyng.*
Morinda citrifolia, Noanay marum, *Tam.* Nyaugyee, *Burm.*
Morinda bracteata, Yai-yoe. *Burm.*
Morinda excerta, Nyau also Mhan-bin, *Burm.* Togaree Mogillee also Mogillee, *Tel.*
Murraya.
Myristica amygadalina, Toung-sag-ga, *Burm.*
Myristica sphærocarpa, Kywai-thwæ, *Burm.*
Myrsine capitellata.

Nauclea cadamba, Vella cadamba, *Tam.* Maoo, *Burm.*
Nauclea cordifolia, Munja cadamba, *Tam.* Puspoo carambe also Bundaroo, *Tel.*
Nauclea orientalis, Kuta murra, *Can.* Kudum, *Mahr.*
Nauclea parviflora, *Helembe, Cyng.*
Nerium andysentericum.
Nerium tinctorium.
Nepheleum, *species* gal morre, *Cyng.*
Nyctanthes arbor tristis. Tree of Mourning. Hseik-ba-la, *Burm.* kar-cheea, *Tel.*

Odina wodier, Oodaya marum. *Tam.* Dumparee, also Goompinee, *Tel.*
Olax zeylanica, Melle, *Cyng.*

Parkia biglobosa,
Pentapterus alata, Kendul, *Can.* Kinjul, *Mahr.*
Pentapterus arjuan, Touk-kyan, *Burm.*
Pentapterus coriacea, Mairtee, *Can.* Aeen, *Mahr.*
Pentapterus glabra, Touk-kyan, *Burm.*
Pentapterus tomentosa.
Photinia serratifolia.
Pierardia sapota, Kana-yoe, *Burm.*
Pinus dammara of Tavoy.
Pinus Latteri, Hten-roo, *Burm.*
Pinus longifolia, of Nepal.
Pinus Webbiana of Nepal.
Poinciana elata.
Poinciana regia.
Pongamia atropurpurea, Lagun, *Malay,* of Martaban.
Pongamia glabra, Poonga marum, *Tam.* Karung. *Cyng.* Kanigu, *Tel.*
Premna hircina, chika gambhari, of Goalpara.
Premna tomentosa, Kolcuttay Teak, *Tam.* Naoo ru also Nagool, *Tel.*
Prosopis spicigera, Parumbay, *Tam.*
Psidium pyriferum, Coaya marum, *Tam.* Ma-la ka, *Burm.* Guava Tree, *Eng.* Jam ki jhar, *Hind.*
Psidium pomiferum, Coaya marum, *Tam.* Ma-la ka, *Burm.* Guava Tree, *Eng.* Jam ka jhar, *Hind.*
Pterocarpus dalbergioides.
Pterocarpus indicus, "Pa-douk." Toung khayai, *Burm.*
Pterocarpus marsupium, Vengay marum, *Tam.* Yeggee, *Tel.*
Pterocarpus santalinus, Sevapoo Sandanum, *Tam.* Chandum, *Tel.* Red sanders wood, *Eng.*
Pterocarpus Wallichii.
Pterospermum, Indicum "Kyabooca."
Pterospermum aceroides, Tha-ma-jam-wai-zoke, *Burm.*
Pterospermum acerifolium, Na-jee, *Burm.*
Pterospermum subacerifolium, Na-jee, *Burm.*
Pterospermum ruberifolium, Velengee, *Cyng.*
Putranjiva Roxburghii.
Pygium acuminatum.

Quercus-Oak, many species. Tha-heik, also Thae-gha, *Burm.*
Quercus amherstiana.
Quercus Tirbbæ.
Quercus fenestrata.
Quercus lanceæfolia.
Quercus semecarpifolia Ghese cusroo.

Randea, *species.* Nulla mauga, *Tel.*
Rhododendron arboreum.
Rhus disipium, Pehim-bive, *Cyng.*
Rhyzophora decandra.
Rhyzophora gymnorrhiza. Pyu, *Burm.* Mangrove.
Ricinus dicoca. Taw-the-din-bin, *Burm.*
Rondeletea tinctoria. Tama-yoke, *Burm.*
Rottlera tetracocca. Kioun-la, *Burm.*
Rottlera tinctoria, Kioun-la, *Burm.*

Salmalia malabarica, Poola marum, *Tam.*
Sandoricum indicum, Theet-to, *Burm.*
Sapindus acuminata.
Santalum album, Shandanum marum, *Tam.* Sanda-koo, *Burm.*
Sapindus emarginatus, Poocheecotay marum, *Tam.* Hseik-khyae, *Burm.* Kankadu, *Tel.*
Sapindus rubiginosa, Hseik-khyæ, *Burm.*
Sapota elegenoides.
Scytalea longa.
Scytalea trijuga.
Semecarpus anacardium, Chai-bin, *Burm.*
Sethia indica, Dewi-daree, *Tel.*
Schleichera trijuga, Kyet-mouk, *Burm.* Poosku, *Tel.*

TIMBER AND FANCY-WOODS OF EASTERN AND SOUTHERN ASIA.

Dr. Wallich is the only other author we shall quote on the subject of the woods of Asia generally, and we give his Catalogue here as furnishing places of growth, the weight per cubic foot nd specific gravity of the principal of the woods of which we have already given the list.

NAME.	Place of growth.	Weight per cubic foot. lbs.	oz.	Specific gravity	REMARKS.
1 Acacia—? (Popeeah),	Tavoy,	23	3	.371	A large tree; wood used in house-building, &c.
2 „ „	do.	23	3	.371	A very large tree; wood used for posts, bows, and rollers and for cotton gins.
3 Ægle marmelos (Bellee),	Ceylon, India,	49	1	.784	
4 Anacardium latifolium (Bhela)	Gualpara,	37	0	.592	Used for making chests and couches.
5 Andrachne apetala,	India,	33	14	.542	
6 Artocarpus chaplasha,	India,	34	12	.556	
7 Artocarpus hirsuta (Angellywood),	Cochin,	36	14	.590	Used in ship-building.
8 Artocarpus integrifolia (Jackwood)	Travancore,	35	10	.570	
9 Artocarpus—? (Pynyathe Tanabeng)	Tavoy,				
10 Aultoovanchee,	Travancore,	31	6	.502	
11 Auyanny,	do.	32	11	.523	
12 Averrhoa carambola,	India,	39	11	.635	
13 Bah-nah-thoa	Tavoy,				Used in boat and house-buildings.
14 Betula Bhojpattra,	Nepal,	35	5	.565	Wood moderately hard, compact.
15 Bignonia chelonoides,	Nepal.	42	8	.680	A large tree.
16 Bignonia—? (Tathee),	Tavoy,	49	8	.792	A very large tree.
17 Bignonia (Thuggainee),	Tavoy,	40	4	.644	A large tree, used in house-building.
18 Cadooca Marum,	Travancore,	38	3	.611	
19 Calophyllum—? (Thurappe : chopee),	Martaban,	43	0	.688	Used for masts and spars, and for pestles to oil presses.
20 Cambagum,	Travancore,	28	11	.459	
21 Canoo,		36	0	.576	
22 Cannal	Travancore,	47	6	.758	
23 Cannao,	do.	58	7	.935	
24 Caragagaloo,	do.	33	0	.528	
25 Carapa—? (Tai-la-oon),	Tavoy,	36	0	.576	Used in house-building.
26 Careya—? (Kaza),	Martaban,	46	0	.736	Timber of large size, used for posts, &c.
27 Careya (Kombo),	Gualpara,	42	12	.684	Wood hard and strong; used for the stocks of matchlocks.
28 Caringosha,	Travancore	45	5	.725	
29 Carivagah,	do.	33	10	.538	
30 Caroogha,	do.	44	10	.714	
31 Caroo Marum,	do.	47	11	.763	
32 Carintha,	do.	34	4	.548	
33 Cassia,	India,	41	9	.661	
34 Castanea indica,	India,	39	0	.624	
35 Castanea tribuloides (Cotoor; chisee, Makoo; shingali),	Nepal,	62	0	.992	Used for pestles
36 Catunguin	Manilla,	42	11	.683	Used in

NAME.	Place of growth.	Weight per cubic foot. lb.	oz.	Specific gravity.	REMARKS.
38 Cedar,	India	25	2	.402	
39 Cedrela Toona (Toon, Tunga, Poma Jeea)	Gualpara,	36	0	.576	Wood very durable, and much used for furniture.
40 Cedrela Toona (Toon, Tunga, Poma Jeea),	India,	32	9	.521	
41 Chambagum,	Travancore,	37	11	.603	
42 Chana,	do.	20	7	.327	
43 Chinchona gratissima (Tungnusi)	Nepal	23	0	.368	Used for posts and rafters.
44 Chorangaree,	Travancore,	29	11	.475	
45 Cæsalpinea sapan (sappan),	do.	60	14	.974	Used for dyeing and sometimes by the turner.
46 Coombool,	Travancore	31	14	.510	
47 Coturnba,	Ceylon,	23	5	.373	Occasionally used in house building in Ceylon, but not esteemed.
48 Cou-moo	Tavoy,				Used in boat and house-building.
49 Cynometra polyandra	India,	52	10	.842	
50 Cynometra—? (Maingya),	Martaban,	48	7	.775	A small tree.
51 Dalbergia lanceolaria (Neddoon, Neddum, Nander-wood	Ceylon,	45	7	.727	Used and valued for house building in Ceylon.
52 Dalbergia latifolia (East India ebony)	India,	66	8	1064	
53 Debool,	Ceylon,	38	3	.615	
54 Diospyros melanoxylon (black ebony)	...	61	2	.978	Used for turnery work, and for inlaying.
55 Diospyros racemosa	India,	34	11	.555	
56 Diospyros—? (Ryamucha choomullo)	Martaban,	50	3	.803	Used in house-building.
57 Dipterocarpus—? (Kunneanphew,	Tavoy,	25	3	.403	Grows to a great size; used for beams and planks.
58 Domba,	Ceylon,	33	3	.531	Used for the outriggers of canoes.
59 Dombeya melanoxylon (St. Helena-ebony),	St. Helena,	71	9	1.145	
60 East India ebony. See Dalbergia.					
61 East India rosewood,	India				
62 Ehretia lœvis,	Botanic Garden, Calcutta.				
63 Ekebergia—? (Jiyakohi)	Gualpara,	39	1	.625	
64 Eleocarpus serratus (Weraloo),	Ceylon,	33	8	.536	
65 Eribotrya japonica (Loquat)	India,	46	11	.747	
66 Eugenia malaccensis (Jamboo),	Ceylon,	30	4	.484	
67 Eugenia malaccensis (Jamboo)	Ceylon,	30	14	.494	
68 Excœcaria	Tavoy,				
69 Fagrœa fragrans (Annah beng, Burm.	Martaban	52	8	.840	Timber large compact, very hard.
70 Ficus—? (Thubboo)	Tavoy,	21	0	.336	Used in house carpentry.
71 Gadeboo	Ceylon	21	3	.339	Used for making charcoal for gunpowder.
72 Galloopah	Travancore,	53	0	.848	
73 Garcinia—? (Pullowa)	Tavoy	45	8	.728	A large tree, used for posts.
74 Garcinia—? (Purrah wah)	do.	45	8	.726	A strong durable wood.
75 Gmelina arborea	India,	32	3	.515	
76 do. do.	do.	32	6	.516	
77 Go-na	Ceylon,	24	8	.392	
78 Gordonia—? (kaza)	Martaban	37	10	.602	Large timber, used for ordinary building purposes.
79 Guacua	India	41	14	.670	
80	...				
81 Gundruey	India,	34	15	.559	Wood with a peculiar odour resembling that of aniseed.
82 Heritiera—? (Soondree)	India,	57	15	.927	Used in ship-building.
„ „ „	do.	49	15	.799	

NAME.	Place of growth	Weight per cubic foot.		Specific gravity.	REMARKS.
		lb.	oz.		
83 Hibiscus macrophyllus	Tavoy	27	13	.445	A middle-sized tree, used for common building purposes.
84 Hibiscus macrophyllus	do.	28	0	.448	
85 Hibiscus	Tavoy,	,,		,,	Used for common building purposes; the bark is made into cordage.
86 Hopea floribunda (Tantheya)	do.	27	11	.443	A very large tree.
87 Hopea odorata (Tengaun, Thacu gong)	Martaban,	38	0	.608	Canoes are made of this tree which produces a valuable resin.
88 do. do. do.	Tenasserim Coast	40	12	.652	Used in boat building, grows to a large size, and is abundant.
89 Hune,	Burmah,				
90 Indian Wood	do.	45	6	.726	
91 Jeenh,	India,	36	11	.587	
92 Juglans pterococca,	India,	39	14	.638	
93 Juniperus excelsa (cedar of Himalaya		34	7	.551	An excellent light wood.
94 Kaantha,	Tavoy,				Small but valuable timber.
95 Kain-tha-phogee. See Symplocos,					
96 Kaunzo-kurro,	Tavoy,	43	0	.688	Used in boat-building.
97 Kaza. See Careya also Gordonia,					
98 Kealnaun,	Tavoy,				
99 Keaza Perroun,	Tavoy,				Used in house building.
100 Kuddoot-alain,	Tavoy,	53	3	.851	Grows to a great size; used in house-building.
101 Kuddoot-nee,	Tavoy,	34	0	.554	An inferior wood; used in boat building.
do. do.	do.	34	3	.547	
102 Kunneen-keunkee. See Bignonia,	do.				
103 Kunneen-keunla. See Symplocos,	do.				
104 Lagerstrœmia reginæ,	India,	46	8	.744	
105 Lagerstrœmia—? (kuenmounee; Peema)	Tavoy,	37	9	.601	
106 Laurus camphora? (Camphor wood,)	China,	35	14	.574	A wood emitting an agreeable aromatic odour,
107					
108 Laurus—? (Kayzai)	Tavoy,	43	3	.691	Used in house carpentry.
109 Laurus—? (Kullowa also kurrowa)		30	0	.480	Produces the sassafras bark Camphor wood of Martaban.
110 do. do.	do.	30	0	.480	
111 Laurus—? (Lumpatch, Chasepoo),	Nepal,	34	0	.544	Used in carpenter's work, and for beams.
112 Laurus—? (Panatha,)	Tavoy,	43	0	.688	Used in house carpentry.
113 Laurus—? (Sassafras),	India,	32	12	.524	
114 Laurus—? (Thuggoo),	Tavoy,				Used for oars and rudders.
115 Manga chapui,	Manilla,	41	15	.671	Used in ship.buildiug.
116 Maroothee,	Travancore,	37	7	.599	
117 Maunthaen or Sassafras,	Tavoy,	36	10	.586	Used in making house furniture.
118 Maymaka,	India	51	12	.828	Used for timber of junks.
119 May rang,	Tavoy,	48	9	.777	Said to be very durable; used for the posts of houses on the banks of rivers.
120 Megeongee	Tavoy,	38	16	.617	A very large tree used in house-building.
121 Melia Azadirachta,	India,	46	1	.739	
122 Metrosideros vera (iron wood),	China,	53	0	.848	Used for anchors by the Chinese.
123 Mimosa odoratissima,	India,	45	6	.726	
124 Mimosa polystachya	Botanic Garden Calcutta,	32	0	.512	
125 Mimusops Elengi,	Tavoy,	46	0	.736	A slow growing tree.

	NAME.	Place of growth.	Weight per cubic foot. lb.	oz.	Specific gravity.	REMARKS.
126	Moluve or Moloba,	Manilla,	51	3	.819	Used in ship-building.
127	Moonga Vallah	Travancore,	38	5	.613	
128	Mootoocorandy,	do.	38	13	.621	
129	Morinda citrifolia,	Botanic Garden,	28	10	.458	The root yields a red dye
120	Morung saul. See Shorea,	Calcutta				
131	Munha cadamboo	Travancore,	38	15	.623	
132	Murraya—? (Maikay),	India,	60	12	.973	A strong tough wood.
133	Myrsine capitellata	Nepal	21	11	.349	Said to be compact and hard.
134	Nar, or sacred wood	Ceylon	55	0	.880	Used by the natives for building temples and royal palaces, an excellent wood.
135	Neerovalum	Travancore	24	5	.389	
136	Nellee	Ceylon	34	8	.552	
137	Netty, or Nelly	Travancore	42	5	.677	
138	Nerium tinctorium	India	39	14	.638	
139	Nun Poungoo	Travancore	56	15	.611	
140	Odina Wodier	India	41	0	.656	
141	Osyris peltata (Phaoun)	Tavoy	29	10	.474	
142	do. do.	India	30	8	.488	
143	Pah-doubh		60	0	.960	
144	Palah	Travancore	14	9	.230	
145	Palai	Borneo	23	13	.381	Used in the construction of canoes.
146	Palm	India	57	9	.921	
147	Palmist	do.	62	7	.929	The wood of one of the palms used for cabinet and marqueterie work.
148	Panacha	Travancore	44	14	.718	
149	Pen lay oun		32	0	.512	Affords good crooked timber
150	Penlaly peen,	Tavoy,				
151	Peroomarum,	Travancore,	27	14	.446	
152	Pienmahne,	Tavoy,				
153	Pienmah-pue,	do				
154	Pierardia? (kunna, also kuzzo)	do	37	12	.604	
155	Pinus dammara,	do	39	0	.627	
156	Pinus longifolia,	Nepal,				Excellent timber.
157	Pinus Webbiana,		21	0	.336	
158	Poomaram	Travancore,	29	8	.472	
169	Poomdroo,	do	40	13	.653	
160	Poonah,	do	50	15	.815	
161	Pothiree,	Travancore,	35	4	.564	
162	Premma hircina (chikagambhari)	Gualpara,	43	0	.691	A strong odour like that emitted by the musk rat, is given out by this wood. Used for musical instruments.
163	Psidium pomiferum (Guava)	Travancore	44	3	.704	
164	Pterocarpus santalinus (Red Sanders)	India,	46	14	.750	
165	Pterocarpus? (Thounkheea)	Martaban,	51	9	.826	
166	Pterospermum indicum (Amboyna).	East India Islands.	39	10	.634	Much used for ornamental work
167	Quercus Amherstiana, Tirbbae, Ryakle	Martaban,	57	10	.922	Used for coarse furniture.
168	Quercus fenestrata,	India.	47	0	.752	
179	Quercus lanceaefolia,	,,	41	10	.666	
170	Quercus lappacea,	,,	51	4	.820	
171	Quercus semecarpifolia (Ghese cusroo)	Nepal.	22	0	.352	Wood light, from a large tree
172	Regal wood,	Thibet,	54	6	.870	A very beautiful wood; much prized and used by persons of high rank only.
173	Rhizophora decandra,	India,	46	0	.736	
174	Rottlera? (keounlae,)	Tavoy,	37	9	.601	A large tree; wood used for rudders, &c.
117	Sandoricum—? (Thittoo,)	Tavoy,	28	6	.454	Used for furniture.

NAME.	Place of growth.	Weight per cubic foot.	Specific gravity.	REMARKS.
		lb. oz.		
176 Santalum album,.....	India.....	47 13	.765	
177 Sapotea ? (Palaepean),.....	Tavoy,.....	41 0	.656	A very large tree; wood used in building.
178 Scytalia longa,.....	India, ...	44 8	.712	
179 Scytalia trijuga,.....	India,.....	60 0	.960	
180 Scytalia—?, ...	do	39 6	.630	
181 Shorea robusta (Indian saul).....	do	52 10	.842	A strong and durable wood; in great repute for ship-building.
182 (Morung saul),.....	Nepal, ...	43 14	.702	
183.....	do	45 14	.734	Much used in India for various purposes, where strength and durability are required.
184 Sonneratia ? (Thaumma)	Tavoy.....	42 0	.672	A small tree.
185 Sophora robusta,.....	India	42 4	.676	
186 Sterculia ? (Kuneenee,.....	Tavoy,.....	.....	.....	Tree of very large dimensions.
187 Swietenia chloroxylon (satin wood Booroota),.....	Ceylon,.....	51 0	.816	Used for furniture &c.
188 Swietenia febrifuga,.....	India,.....	54 14	.378	
189 Symplocos floribunda,.....	Nepal,.....	.....	.....	A large tree.
190 Symplocos ? (kaintha phogee),.....	Tavoy.....	34 7	.551	Affords good crooked timber.
191 Symplocos ? (kunneen keunkee, kunneen keunla),.....	do	34 4	.548	Used for beams, posts &c.
192 Syndesmis tavoyana (keetha), ...	do	.....	.....	Used in house building.
193 Tantheya,.....	Tavoy.....	44 0	.704	Grows to a large size timber strong and good.
194 Taxus virgata, (Dheyn also Lolsi).....	Nepal.....			
195 Tectona grandis (Teak, Taaka, Tekka)	Ceylon.....	47 3	.755	One of the best of the Ceylon woods.
196 „ „ „	Travancore,.....	42 8	.680	A strong and durable wood; much valued for ship building
197 Tectona grandis (East Indian teak)	Malabar coast ...	37 14	.606	The best kind of teak.
198 „ „	Moulmein.	31 9	.505	
199 „ „	do	32 1	.513	This quality of teak is not so good as the Malabar.
200 Terminalia catappa	Botanic Garden, Calcutta	32 0	.480	A noble ornamental tree wood very good.
201 Terminalia chebula	India	42 10	.682	
202 Terminalia citrina	do.	60 2	.962	Very heavy and compact
293 Terminalia—? (Thaphauga ...	Tavoy	50 5	.805	
204 Ternstromia —? Puzzeinzwa ...	do	36 7	.783	A rather large tree, used for posts and rafters.
205 Tetranthera nitida	India	34 4	.548	
206 Teutha	Tavoy... ...	54 0	.864	
207 Thallarwoo	Travancore ...	44 0	.704	
208 Thambuvoo	do	55 6	.886	
209 Thaun-bau po	Tavoy	.....	.....	An inferior light wood.
210 Thau-baunthawlay	do	.....	.....	A strong durable wood, but does not saw kindly
211 Thoun-mynga,...	Tavoy, ...	48 0	.768	Used in house building.
212 Thymboo, ...	Tavoy, ...	17 7	.279	A strong and durable light wood.
213 Thymboo, Thau-baunpo, ...	do.	17 3	.275	Strong durable light wood, used in boat building.
214 Town-pine,...	do.	28 13	.461	Used in boat building and much esteemed.
215 Town-suggah, ...	do.	...	...	
216 Une, ...	do.	...	...	Affords good crooked timber used for boat building
217 Vallathorashel, ...	Travancore, ...	22 1	.353	
218 Vanava, ...	Manilla, ...	42 11	.683	Used in ship-building..

NAME.	Place of growth.	Weight per cubic foot.	Specific gravity.	REMARKS.
		lb. oz.		
219 Vanneemooringa, ...	Travancore, ...	40 10	.650	
220 Vateria lanceæfolia, ...	India, ...	53 15	.863	
221 Vavoolagoo, ...	Travancore, ..	29 4	.468	
222 Vellilagoo,—	,,	28 8	.456	
223 Velty, or Vetty, ...	,,	40 11	.657	
224 Venga, ...	,,	47 1	.753	
225 Vinnee, ...	,,	15 8	.248	
226 Vinny marum, ...	Travancore. ...	11 3	.179	
227 Vyashanthak, ...	,,	41 0	.656	
228 White dammar lout, ...	India, ...			
229 Xanthophyllum—?(Sapheu,Choomuna)	Martaban, ...	33 10	.538	
230 Xylocarpus—? (Keannan,)... ...	Tavoy, ...	46 9	.745	Used for furniture and in house-building.
231 Zizyphus—? (zeethee),... ...	India, ...	35 11	.571	

In our previous observations on Timber trees generally, we endeavoured to supply the names by which they are known to scientific men, but in much of the subsequent remarks attention will be directed to the woods of particular districts and the local names by which they are known.

(8193) *Timber from the province of Amherst, at the Great Exhibition of* 1851. See *Ill. Cat. Vol.* II, *p.* 885.

1 *Anan.* Used for constructing temples. It is a yellowish-white heavy durable wood.

2 *Ban-boay.* It is a strong and useful wood, a kind of Mimosa, employed as house posts.

3 *Ban-kha.* Used for house posts, and other common purposes. It is a peculiar kind of wood, colour grey.

4 *Bep-than.* Used for making handles for spears and sword; it is a superior wood, and looks like white Jarrool.

5 *Bhai-bya.* Used for house posts. White Jarrool.

6 *Bhyeng-tseng.* This is a closegrained, compact, grey wood, fit for general purposes, and seems to be exempt from attacks of insects.

7 *Bijion.* This is used for house posts, rafters, and the like purposes; it is a heavy, compact, grey, close-grained wood.

8 *Daup-yat.* Employed for rafters; it is a beautiful yellowish-white compact wood, but has a tendency to split. The leaves are used asa dye.

9 *Dien-neeung.* Used for rice-pounders; it is a close-grained, strong, compact, brown, hard wood.

10 *Eng.* Wood used for boat-building, and produces oil. It is a strong, heavy, useful, grey wood, suited for beams, piles, and the like.

11 *Eng-gyeng.* Also used for posts of religious buildings. A useful wood, but subject to split.

12 *Gan-gan.* A very strong, tough, hard, crooked grained, fibrous, red wood, which would do for machinery or any purpose requiring the above properties.

13 *Gyo.* Used for house posts, ploughs, handspikes, &c.; it is a close-grained, compact, fine wood.

14 *Ka-theet-nee.* Employed for house posts, boats, and carts. It is a heavy, hard, grey wood, rather liable to injury from insects.

15 *Kha-boung.* A strong wood but small, as strong as oak. The fruit is said to be used for rubbing on buffaloes to keep off flies.

16 *Kiep-dep*, ditto, a kind of Saul.

17 *Kiep-maup.* Employed for cartwheel spokes. Superior wood, free from attacksof insects; the tree is said to have an edible fruit.

18 *Kiep-yo.* A heavy, good wood, but small, used for house posts and rafters.

19 *Koup-ha.* This is a light, soft wood, not subject to injury from insects. It is probably Nauclea cadamba, and is employed for carved images.

20 *Kya-nan.* This is a most hard, close-grained, ebenaceous wood, of dark red colour; used for house posts, musket-stocks, and pear-handles.

21 *Kya-zoo.* This is a very heavy wood, like Saul.

22 *Kyway-thoay.* Is a strong, solid wood, probably will prove to be a kind of Acacia. Used for house posts and rafters.

23 *Kywon.* A kind of Teak wood.

24 *Kywon-bo.* This is used for house-posts, rafters, and oars; it is probably a sort of Teak.

25 *Kywon-gaung-noay.* A close, heavy, compact, tough, yellowish-white wood, of which house posts and rafters, &c. are made.

26 *Lammay* Used for house posts; it

is a red, light, but useful timber, like sandal wood, and is free from attacks of insects.

27 *La-phyan.* A heavy, solid, large-sized timber, but rather liable to injury from a peculiar insect, not white ants.

28 *Lep-dwat.* Used for spear-handles and sword-sheaths; it is a fine grained, white wood, fit for turning purposes and picture-frames; it is probably the same kind of Nauclea which is used for similar purposes in Bengal.

29 *Lieun.* Used for house posts and rafters. It is a most valuable compact wood, homogeneous and very heavy, of deep-brown colour and fine grain, and also exempt from attacks of insects.

30 *Liep-yo.* Used for making carpenter's tools; it is a very compact and heavy, but small-sized timber.

31 *Mala-ka.* This is used for gunstocks and carpenter's tools; it is a close, compact, but small-sized wood, fit for hand-spikes, wheel-spokes, and the like.

32 *Ma-thloa.* Used for house posts; probably Artocarpus integrifolius, or jack-wood.

33 *Maza-neng* or *Maga-neng.* This is a close-grained wood, nearly allied to Teak. It is used for house posts, carts, boats, paddles, oars &c.

34 *Meet-gnyoo*, or *Neet-gnyoo.* Fruit tree. It is a red-coloured, useful, strong, heavy wood, probably a species of Mimosa.

35 *Meng-ba*, or *Ming-ba.* Used for house posts and rafters. The wood looks like a kind of saul, and would answer all the purposes of that wood.

36 *Moma-kha*, or *Morna-kha.* Employed for gunstocks; it is a reddish, softish wood, close and compact, fit for turning purposes, and exempt from attacks of insects.

37 *Mou-tha-ma.* Bark used for blue dye, a fine-grained, compact, red wood, but liable to split; it would answer for hand-spikes. It resembles Myrtus pimenta.

38 *Myaup-loaut.* Cedrela; a kind of superior Toon.

39 *Myaun-ngo.* White sissoo; used for rafters.

40 *Mya-ya.* Hard and close-grained wood, used for rafters; it is strong and durable, and would answer for beams, &c., being exempt from the attacks of insects.

41 *Na-kyeen.* Employed for house posts and rafters. This is the Soondrie wood of Calcutta, (Heritiera minor), where it is so common as to serve for fire-wood, although from its superior qualities for buggy-shafts, hackery or cart axles and wheels and other purposes requiring great strength and toughness, it is highly prized.

42 *Naoo.* Used for house posts: the leaves, flowers, and roots are said to be used for medicine. It is a brown, substantial, solid wood, not liable to the attacks of insects.

43 *Nga-soay.* This is a solid, very heavy, reddish wood, and answers for house posts and rafters.

44 *Nyaung-lan.* Saul, "*Shorea,*" of a peculiar kind, employed for beams, rafters, and boat building. The root is used as umbrella stocks.

45 *Onn-thuay.* A white soft wood, not subject to injury from insects; it is employed for common carpentry.

46 *Pad-dan.* Used for making drums and musical instruments. It is a kind of red Sanders wood.

47 *Pa-ngan.* Used for boats and oars; it is a compact white wood, and is also in use for making musical instruments. It seems to be Gmelina arborea.

48 *Pa-ra-wa.* A hard, red, compact wood, with large fibre, and fit for gun-carriages or other similar purposes. It is exempt from attacks of insects. It is used for spears and arrows.

49 *Peng-lay-oun.* Used for spear handles; it is a most valuable wood, compact homogeneous, and very heavy, of a deep brown colour and fine grain, having no tendency to split, and being exempt from attacks of insects.

50 *Pinnai.* This is said to be a fruit tree; the wood affords a yellow dye, and is a compact, handsome, yellow wood, suitable for common cabinet purposes. It is probably an Artocarpus.

51 *Povin-gunyet.* Used for house posts and rafters. It is a kind of Jarrool, "*Lagerstræmia*" a good serviceable wood, and would do for piles, posts, and beams.

52 *Pyeen-ma.* House posts, carts, boats, paddles, oars, &c., are made from this, which is a capital wood, a kind of saul, and would answer for all the purposes of common Saul. Sp. Gr. 0·920.

53 *Raung-thmoo.* Used for house posts; it is a kind of Teak.

54 *Seet-seen.* Used for the construction of religious houses. It is a red, compact, very ponderous, and highly valuable wood.

55 *Tan-labet.* A heavy, white wood, employed for house posts and other common purposes. It is not liable to injury from insects.

56 *Taup-sha.* Employed for house posts, and would answer for common carpentry, but it is subject to split; the bark is supposed to be medicinal.

57 *Teng-khat.* This is a heavy white wood, solid and fit for turning purpose; used for rice-pounders, &c.

58 *Thaò-ban.* This is used for boat-building and making carts; timber sometimes 70 feet long: it is a kind of Teak, but rather heavier than the usual kind. Sp. Gr. 0·814.

59 *Tha-bwot-gyee.* This is a good heavy valuable timber, somewhat like iron-wood.

60 *Tha-byion.* A useful timber, probably a Eugenia.

61 *Tha-khwot.* This wood is useful for sandals ; it is a kind of white Teak.

62 *Thammai.* A strong, handsome wood, like Ægiceras, or box-wood.

63 *Than-kya.* The fruit of this tree is employed for ring-worm. The wood is like Saul.

64 *Thanna-Dau.* Said to be a fruit tree ; it is a reddish-brown, heavy wood, fit for machinery or other purposes requiring great strength ; it is totally exempt from attacks of insects, but somewhat liable to split

65 *Tha-nat.* It is a kind of grey Teak.

66 *Than-that.* Used for stocks of various intruments ; it is a capital wood, and seems to be a kind of Saul.

67 *Theet-phyion.* This is used for fan handles ; it is a useful white wood ,and would answer for common carpentry ; it resembles Mimosa serissa.

68 *Theng-gan.* Employed for house posts, carts, boat-buildings, paddles, and oars. It is an excellent compact wood, fit for gun carriages.

69 *Theet-to.* This is said to be a fruit tree; the wood is employed in boat building, making carts, &c. It is a dark-brownish grey, hard, heavy wood.

70 *Theet-ya.* Employed for rice grinders or pounders. It is a superior, compact, close, tough, brown wood, fit for any thing requiring great strength and durability.

71 *Theim.* Used as house posts, rafters and general purposes of carpentry.

72 *Thep-yeng.* Said to be a fruit tree: the trunk affords a compact, fine grained wood.

73 *Toung-bien.* Used in boat-building and for making carts. It is a strong, heavy wood, well adapted for handles of tools, &c ; it is probably a kind of Teak.

74 *Toung-tha-khwa.* This is a capital wood for any purpose, gun-carriages or gun-stocks.

75 *Toung-tha-byiou.* Used for house posts ; it is a strong, red, heavy wood, a kind of Mimosa.

76 *Toung-thau-gyee.* A hard, compact wood of dark-brown colour.

77 *Tseet.* Employed as house posts and in boat bulding. Saul of small calibre.

78 *Tsekka-doun.* This is said to be a fruit tree ; the wood is used for house posts, rafters, and boat-building ; it is like Teak, but much disposed to split.

79 *Tshan-tshay.* A useful wood, but liable to attacks of insects, and to split.

80 *Tshaup-yo.* Used for house posts and musket stocks. It is a heavy white wood, exceedingly strong, but liable to attacks of insects.

81 *Tshiet-khyeen.* Used for house posts. A superior kind of crooked-grained Saul.

82 *Tshwai-lwai.* Used for musket stocks and sword sheaths ; it is a hard, red, crooked grained wood, fit for cabinet work.

83 *Tsoay-dan.* Heavy, hard, tough wood, not subject to insects, and, being tough and short, it is suited for wheels, musket-stocks &c.

84 *Tswot-ba-lwot.* This is said to be a fruit tree ; the wood resembles Jarrool, a Lagerstrœmia.

85 *Yammandy.* Used for carving images and making drums. It is a useful and valuable wood.

86 *Yeng-taip.* It is a strong useful wood for posts and common carpentry.

87 *Yetha-byay.* This is used for house posts and boat-building ; it is a strong wood, suited for door-frames and common carpentry.

88 *Yoga-theet.* The wood is used for carved images, and the bark used as soap.

89 *Zee-byion.* This is a compact, close wood like Lagerstrœmia, or white Jarrool. It is used for house posts, and is liable to split, but is free from the destructive influence of insects.

90 *Yeng-bywom.* Employed for house posts. It is a useful wood, equal to Jarrool.

(8194) *Woods from Amherst and Tavoy Provinces, and Mergui Archipelago, recommended for helves, by Captain Dance, Deputy Commissary of Ordnance Tenasserim Provinces.*

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1 *Lagerstræmia Pymmah. Peema Nee.* Red Peema.

Maximum girth 6 cubits. Maximum length 30 feet. Very abundant ; found all over the Tenasserim and Martaban Provinces. When seasoned, floats in water.

Remarks.—A tough wood, very good for helves, already used for such, and for other Ordnance purposes. The great fault of Peema is its liability to shrink and warp when exposed to the sun or to heat. Peema however has not been fairly tried, if killed and left standing as Teak the tendency to warp might probably disappear.

2 *Calophyllum Longifolium. Therapée.*

Maximum girth 3 cubits. Maximum length 22½ feet. Abundant ; found in Mergui, Tavoy, and in lesser quantities near the Attaran River and its branches. When seasoned sinks in water.

Remarks.—Used for masts and yards of Junks excellent for helves but not procurable at Maulmein in sufficient abundance. Strongly recommended to make models.

3 *Tee ka loung* or *Tha* or *Kadat-Ghee.* Burm.

Maximum girth 3 cubits. Maximum length 22½ feet. Abundant ; found at Mergui and Tavoy. When seasoned, floats in water.

Remarks—Used for bedsteads, and for house

building. Recommended as a durable, tough wood for helves or for hammer handles.

4 *Sibia Glomerata. Thayt Pew Tha* or *White Thayat.*

Maximum girth 5 cubits. Maximum length 30 feet. Abundant; found on the sea coast from Amherst to Tavoy, and Mergui. When seasoned, floats in water.

Remarks.—The term, Thayat-pew, should be cancelled from the collection, Thayat Pew, meaning white wood, a name equally applicable to "Calophyllum longifolium," "Dillenia speciosa" and Dalbergia species, and other woods. "Yemam-nee" is often called by this name. The name Pyew is however that of Mangrove in Mason's "Tenasserim," and I cannot succeed in procuring the true Mangrove.

5 *Artocarpus echinatus. Mountain Jack* or *Tong By-ne.* Burm.

Maximum girth 5 cubits. Maximum length 30 feet. Not abundant though to be found here and there over a large expanse of country. Found all over the Tenasserim and Martaban Provinces. When seasoned, floats in water.

Remarks.—This wood, found on seasoning too light and spongy for durability, should be classed as a useless wood.

6 *Xylocarpus Granatum, Penlaypyoung* or *Peng-lay-oun.* The sea cocoanut.

Maximum girth 4 cubits. Maximum length 20 feet. Very abundant; found all along the sea shore from Amherst to Mergui. When seasoned, floats in water.

Remarks.—Used by Burmese for all parts of houses, posts, flooring, walls &c. A very good, fine, strong wood, splits with difficulty. Recommended for handspikes, helves, spokes, and handles of tools, also for shot boxes and packing-cases.

7 *Heritiera Litoralis, Konzozaloo* or *Kanazoe,* from the sea shore.

Maximum girth 4 cubits. Maximum length 30 feet. Very abundant on the Islands; found on Pannat Island and all the Mergui Archipelago, also all along the coast of Amherst province. When seasoned, floats in water.

Remarks.—Used for boats, boxes, planks of houses &c. a very light wood, scented, durable and tough. Recommended for fuzes beyond any other wood in the collection: also for helves, and for gunstocks. Strongly recommended for packing cases of all descriptions.

8 *Heritiera Minor, Kanazoe,* a Forest Fruit tree.

Maximum girth 2 cubits. Maximum length 15 feet. Very abundant, but straggling; found in Martaban, and on both sides of Moulmein river, and all along the sea coast; an unlimited supply of this procurable. When seasoned, floats in water.

Remarks.—Name of this sounded as the other Konnayzow but the wood different. When seasoned also piles of bridges, boats, and many other purposes. Recommended for helves, but should be killed a twelve month before being cut down, or otherwise should be seasoned by keeping after it has been cut down. Both of these "Kanazoe" woods said by Dr. McClelland to resemble Soondree wood in strength and durable qualities.

9 *Kannan Tha* or *Crab Tree.*

Maximum girth, 4 cubits. Maximum length 30 feet. Abundant; found on an Island called Piel Island near Mergui, but scarcely procurable in Moulmein. When seasoned, the red variety sinks and the white floats.

Remarks.—Used for houses, zyats &c. a very durable wood of handsome grain. Of this wood there are two kinds, red and white; the latter lighter than the former, likely to answer for helves; the former too heavy for that purpose. Both woods very good for turning purposes.

10 *Kaya Nan* in Tavoy, *Kaiyah* in Moulmein. N. B. The wood called Kyanan in Moulmein and by Mason, is Tavoy red wood Syndesmus Tavoyana.

Maximum girth 2¼ cubits. Maximum length 15 feet. Very abundant; found on the sea coast from Amherst to Mergui: also on banks of river in the Province of Martaban near the sea. When seasoned, floats in water.

Remarks—One of the best woods in the country for helves; tough, light, very durable plentiful; long in the fibre, neither liable to split nor to warp nor to break readily. Used by Burmese for planes, spears, boats, stocks of guns and all kinds of purposes. This wood is of a most beautiful color, a combination of Pink cream color and red, and bears a very high polish. Recommended for helves, handles of tools, handspikes and spokes of gun carriage, and timber wheels; also for gun stocks and planes.

11 *Parrawah.*

Maximum girth 3 cubits. Maximum length 22 feet. Abundant; found all over Tenasserim and Martaban provinces. When seasoned, sinks in water.

Remarks.—A durable smooth-grained tough wood; used by Burmans for sticks, helves for pickaxes, and hoes, handles of chisels and other tools &c. Recommended for helves and handles of tools generally.

12 *Tha Byke* or *Tha-Bay-Kya.* A kind of Oak.

Maximum girth 1½ cubits. Maximum length 16 feet. Not abundant, but scattered; found in all forests inland, all over the provinces. When seasoned, floats in water.

Remarks.—A sufficiently light, yet durable straight grained, tough wood; used by Burmese for posts, building purposes generally, and various other objects. This wood is recommend-

it could be procured in sufficient quantities, would be unrivalled for shot boxes

13 *Gongee* or *Gangaw*.

Maximum girth 3 cubits. Maximum length 32 feet. Very abundant; found near Mergui, also thence along coast as far as Amherst. When seasoned floats in water.

Remarks.—Used for tables, chairs and miscellaneous articles by the Burmese; a good, hard, tough wood, durable and recommended for helves also for handles of all kinds of tools. Vide Major Simpson's Report.

14 *Ancestrolobus Carnea*; *Toungala* in Martaban Provinces, *Zeengalay* in Tavoy.

Maximum girth 3 cubits. Maximum length 30 feet. Not abundant; widely scattered. Found all over the Provinces in the forests, but in none abundant. When seasoned floats in water.

Remarks.—This wood has a good long fibre, tenacity, durability and sufficient lightness, is very free from knots; used by Burmese for building, for ploughs and for utensils of all kinds. Recommended for helves and for handles of chisels, hammers and tools generally—said by Dr. McClelland to be plentiful in Pegu and Tonghoo Forests, but rarely to exceed 3 feet in girth.

15 *Bong long Tha.*

Maximum girth 3 cubits. Maximum length 22 feet. Said to be abundant, but has not been easily obtained in Moulmein. Found all over the provinces. When seasoned, floats in water.

Remarks.—A durable yet light wood with a very straight grain; used for every purpose by the Burmese, and much recommended for helves.

16 *Tha nat Khee.*

Maximum girth 3½ cubits, Maximum length 30 feet. Said to be abundant, but has not been easily obtained in Moulmein. Found all over the provinces. When seasoned, floats in water.

Remarks.—A durable yet light wood with a very straight grain; used for every purpose by the Burmese, and much recommended for helves.

17 *Tay-tha.*

Maximum girth 3 cubits. Maximum length 16 feet. Scarce in Amherst, but abundant towards Tavoy. Found inland also along sea coast all over the provinces. When seasoned, floats in water.

Remarks.—Found subject to dry rot when seasoned; a useless wood not recommended.

18 *Mai tai Yo.*

Maximum girth 2½ cubits. Maximum length 22 feet. Abundant. Found all over the province. When seasoned, floats in water.

Remarks.—Used for posts and many other purposes by the Burmese, a particularly good wood for helves, being durable, light, and tough.

19 *Kya Mouk*, a kind of Oak.

Maximum girth 4 cubits. Maximum length 22½ feet. Abundant but widely scattered. Found all over the provinces inland. When seasoned, floats in water.

Remarks.—An excellent tough wood, durable and sufficiently light; used for all purposes by the Burmese. Strongly recommended for helves, hammer handles, handspikes, staves of casks, and many other purposes, but too widely scattered to be easily obtained, unless a large quantity be ordered which should repay a search in the forests: much used by Burmese as a pole for cavady baskets.

20 *Pa-ka-thau.*

Maximum girth 2 cubits. Maximum length 12 feet. Abundant but widely scattered. Found all over these provinces inland. When seasoned, floats in water.

Remarks.—Used by Burmese to make paddles, oars, &c, a tough, durable, good wood, but too widely scattered to be easily obtained, unless a large quantity be ordered which would repay a search in the forest.

21 *Dillenia Speciosa. Thee-Bew-Tha.*

Maximum girth 3 cubits. Maximum length 22 feet. Trees abundant, but widely scattered. Found all over the provinces here and there inland. When seasoned, floats in water.

Remarks.—A durable, tough, light, wood, seeming very good for helves. Used by Burmese for building houses and for sundry other purposes; said by Dr. McClelland to afford large and good timber for building houses.

22 *Kye-zai: Laurus, species.*

Maximum girth 2 cubits. Maximum length 15 feet. Scarce, not obtainable at Moulmein. Found along the coasts from Amherst to Mergui; also on the banks of Tavoy river. When seasoned, floats in water.

Remarks.—A very tough wood which has already been often used for helves with great success. Proved of extraordinary strength and tenacity in former experiments. Very durable and not too heavy for helves. Recommended for helves and handles of tools of all kinds, if it could but be procured at Moulmein.

23 *Myouk sho* or *Monkey tree*, (also called *Moulmein Lancewood*, *Dalbergia.—Mason.*) so called because its pole is so straight, so slippery, and to so great a height free from branches that no monkey was ever seen to climb it.

Maximum girth 4 cubits. Maximum length 40 feet. Very abundant. Found in Tavoy and Mergui: also somewhat abundant all over the provinces inland. When seasoned, floats in water.

Remarks.—A wood much praised in Tavoy, as resembling Lancewood in properties but found to split when seasoned, perhaps good specimens have not been obtained. At any rate other woods of unquestionable value are abundant in Amherst.

24 *Careya arborea. Ban Bambbooai.*

Maximum girth 3 cubits. Maximum length 15 feet. Abundant. Found all over the provinces inland. When seasoned, floats in water.

Remarks.—This timber is useful, durable and

tough: used for posts of houses, and for country carts. Recommended for helves though better kinds for that purpose have already been specified. Recommended by Dr. McClelland with other woods as equal in strength to oak and of a promising kind for ship-building.

25 *Kye yo Thoo.*

Maximum girth 2½ cubits. Maximum length 15 feet. Very abundant at Mergui, but not procurable at Moulmein. Found inland up the rivers all over the Provinces. When seasoned, floats in water.

Remarks.—An uncommonly smooth grained, tough, close, yet not heavy wood. Durable and with but one fault, the smallness of its girth, unfitting it for gun carriages. Strongly recommended for helves and handles of tools of all sorts, if it can hereafter be procured at Moulmein; also for handspikes and for spokes. This wood, on careful examination, appears to be identical with Trincomallee wood, though this cannot be positively stated till the flowers of the tree can be procured.

26 *Sow-yew*, or Chisel handle tree, called by the Karens Egg tree, stated by Mason to be of the genus Dalbergia, *species* unknown.

Maximum girth 2½ cubits. Maximum length 10 feet. Not very abundant, but found scattered all over these forests inland; always found in undulating ground only not near water. When seasoned floats in water.

Remarks—Used by Burmese in preference to any other for handles of chisels and tools, also for helves of axes, and hatchets. A very hard, fine grained wood, which is strongly recommended for helves and handles of all kinds of tools. Unequalled for those tools, such as chisels, which are struck with a hammer or mallet. This wood is of a yellowish white in color with patches of black interspersed, looking as if Iron had in some manner been drawn from the soil, and incorporated in the wood. Though widely scattered, it is in such demand as always to be procurable in the markets.

27 *Shorea Robusta. In-Jin* or *Enghyen*, called in India *Saul.*

Maximum girth, certainly 3, said to be 5 cubits. Maximum length, certainly 20, said to be 80 feet. Abundant. Found inland in Amherst and Tavoy provinces. When seasoned sinks in water.

Remarks.—A thoroughly good and valuable wood. One of the most durable in these forests, tough, elastic, large, and extremely heavy. Used for bows and for all kinds of purposes, by the Burmese. Recommended for handles of hammers chisels and other tools, also for sheave blocks, cogs, and machinery in which great strength is required. Also for government buildings, wharves &c, especially for Railway sleepers, from its singular property of petrifying when long exposed to the action of water, as also, from its abundance and large girth. Too heavy for helves, said to strike fire with steel, after having been kept in water for a length of time. Major Phayre stated in a letter his having found several logs of this wood in a creek which is empty in the day season, all of them petrified. This saul appears a closer grained, better, and probably a heavier wood than the saul of India; it seems likely to answer admirably for helves, and for rammer heads, as well as for the other purposes already specified in this report.

28 *Melanorrhea Usitata. Theetsee.*

Maximum girth certainly 3, said to be 4 or 5 cubits. Maximum length certainly 20, said to be 30 feet. Very abundant. Found in Amherst Province. When seasoned floats in water.

Remarks.—A wood of particularly fine close grain, exuding a black gum which repels ants, and is used by the Burmese as a varnish. Very strong, durable, hard and tough, found to answer well for cogs of Machinery. (Vide Artillery Records with report of woods by Captains Simpson and Babington, dated Moulmein 25th May 1842.) Recommended for handles of tools, also of sheave blocks and for machinery generally and for Railway sleepers. Dr. McClelland writes of this wood as follows. "The Lignumvitæ" of Pegu. It is of a dark red color, of a close grain and dense structure. Its great hardness and weight prevents it being employed in house building. It would answer for sheave or block pulleys and other purposes connected with machinery, where great strength and density are required. The anchors of Burmese boats are always of wood to which stones are lashed. The flakes being of Pyeng Khadoe, the stocks of Theetsee or of some other heavy wood. This wood is not brought to Moulmein so heavy as Dr. McClelland describes it. It is procurable at 7 cubits and on high or low ground. Recommended for gun stocks, also for rammer heads, and for helves, *in short* for all purposes as so strong yet not very heavy.

29 *Fagræa. Fragrans, Annan-Tha* or *Annan.*

Maximum girth 4 cubits. Maximum length 20-25 feet. Very abundant. Found in the Provinces of Amherst, Tavoy, and Mergui. Also on islands of the Coast and inland, especially up the Attaran river. When seasoned, sinks in water.

Remarks.—Building houses, kyoungs, zyats, &c., also for piles of bridges, wharves &c., but for the last by the English only, as Burmese think this wood too good for any but sacred purposes: hence Annan wood has been more preserved in these forests than any other valuable wood. It is impervious to the attacks of ants, and of the teredo navalis which will eat all other timber. At Tavoy the posts of a wharf which have for several years been partly dry and partly wet, each day according to the state of the tide, are untouched by the worms. The Burmese

have a proverb about the slow growth of this tree. Annan wood though almost imperishable is not capable of bearing so heavy a strain as some of the other valuable woods of the Province. (Vide Artillery Records for 1844, and experiments therein recorded page 531 of "Selections.") Recommended for Railway sleepers, as neither heat nor moisture will warp or rot it.

30 *Hopea Odorata. Thingan.*

Maximum girth 6 cubits. Maximum length 60 feet. Scattered but abundant. Found in the Provinces of Yea on the coast beyond Amherst, also at Mergui, and in lesser quantity near Moulmein. When seasoned, floats in water.

Remarks.—Formerly considered the most valuable indigenous timber in the southern Provinces. Used at Tavoy and Mergui for building houses. Used also for canoes, junks, &c. A very durable excellent wood when kept under water as in the planks of a boat or under cover on land; but often liable to split when exposed to the sun in a dry state. Recommended for helves.

31 *Inga Xylocarpa. Pyeng Khadoe.*

Maximum girth 3 or 4 cubits. Maximum length 20 or 25 feet. Very abundant. Found all over the Tenasserim province, also at Mergui and Tavoy. When seasoned, sinks in water.

Remarks—This, the Iron wood of these provinces, resists nails, which cannot be driven into it. Used for crooks of ships, posts, piles, bridges, &c. Recommended for handles of chisels, gouges, &c. but too heavy for other ordnance purposes. Excellent for railway sleepers. The only Pyeng Khadoe which I can procure here (and I have had many specimens) has been eaten by worms in seasoning, and proved inferior. I suspect that the real Pyeng Khadoe has not yet reached me.

32 *Hopea Odorata. Thingan Pew*, or White Thingan.

Maximum girth 4 cubits. Maximum length 30 or 40. Scattered but abundant. Found in the same localities as the red Thingan. When seasoned, floats in water.

Remarks.—A lighter variety of the red Thingan. This is a tolerable wood for durability, and would do for helves, but more suitable woods are in the list of those recommended.

33 *Acacia elata. Thaeet-Tha.*

Maximum girth 4 cubits. Maximum length 18 feet. Very abundant. Found all along the sea shore from Amherst to Mergui. When seasoned, floats in water.

Remarks.—Used for posts of building, a very durable wood; abundant and of such girth, might be advantageously employed for packing cases, also, for Government buildings in Burmah. Recommended by Dr. McClelland for cabinet making.

34 *Pet-Than.*

Maximum girth and length not ascertained; abundant in Tavoy, not procurable in Moulmein, found in Tavoy and Mergui. When seasoned, sinks in water.

Remarks.—A very hard and durable wood, used by Burmese for wedges. Not recommended, because only procurable at Tavoy and Mergui.

35 *Mezzale.*

Maximum girth 4 cubits. Maximum length 30 feet. Scattered, not very abundant. Found all over the Provinces. When seasoned, floats in water.

Remarks.—Used by Burmese for rulers, malletts and walking sticks; of very handsome streaked grain like palmyra wood, but not sufficiently durable to be recommended for ordnance purposes.

36 *Meenaban*; *Apocinaceæ*, or Tavoy Lance wood. Classed by Mason as one of the apocynaceæ and called by him Tenasserim Lance wood.

Maximum girth 1½ cubits even in Tavoy and Mergui where largest. Maximum length 12 feet. In moderate quantities. Found from Tavoy, Mergui and adjacent islands; also in smaller scantling and scarce, in Amherst Province. When seasoned, floats in water.

Remarks—Used by Burmese for bows, spears, walking sticks, dhar and chisel handles, &c. an excellent tough, hard, elastic and durable wood, bears a beautiful polish, and makes excellent furniture; when wanted in but small size only, much recommended for handles of screw drivers, hammers, planes, and all kinds of tools; also for all purposes for which a close grained heavy wood is required. (Vide Major Simpson's Report.) Does not seem to stand exposure to the direct rays of the sun well, but under cover is found to be a thoroughly good wood for planes, for which this is especially recommended, also for screw drivers and all kind of turning. This is good for all those purposes for which box is now imported.

37 *Laurus* (*Sassafras*). *Carrawaytha*, or *Sassafras wood.* Maximum girth 3 cubits, rarely 4. Maximum length 20 to 30 feet. Not very abundant but procurable. Found from Amherst to Mergui, all along sea coast at Yea, Henzay and other places. When seasoned, floats in water.

Remarks—Used for interior of junks, also for inside works of drawers, boxes &c. as it has a smell which repels insects. A durable wood found, when seasoned and worked up, remarkably tough and strong, excellent for planes, helves, and handles of tools generally, and would be excellent for almirahs in which to keep serge, hospital clothing &c.

38 *Pouk-Tha* or *Than-Yen.* Dr. McClelland reports probably Inga bijemina.

Maximum girth 3 to 4 cubits. Maximum length 22 feet. Widely scattered but abundant. Found inland all over the Provinces. When seasoned, floats in water.

Remarks.—An excellent and durable wood,

would do well for handles of tools. This wood is of the same nature as Pyeng Khadoe, of which it is said to be a variety, and the same remarks apply to each of these woods.

39 *Maikay*; *Murraya, species.*

Maximum girth 1 cubit. Maximum length 15 feet. Abundant in Tavoy, but scarce near Moulmein. Found in Tavoy and Mergui districts inland. When seasoned, floats in water.

Remarks.—Too scarce for helves, but recommended for handles of planes, chisels, hammers &c. Used by Burmese for handles of knives and other weapons, a strong, tough wood, in grain like Box wood—(Vide Major Simpson's Report). Recommended by the Ordnance Carpenters as the very best wood, in the collection for planes or for any purpose in lieu of Box.

40 *Pterocarpus Dalbergiodes*, Peddowk or Tenasserim Mahogany.

Maximum girth 6 or even 7 cubits. Maximum length 15 to 30 feet, that of great girth always short. Abundant but scattered. Found all over the Provinces. When seasoned, sinks in water.

Remarks.—A wood already used for gun carriages and for other ordnance purposes and too well known to require comment. This wood takes about two years to season; when cut it has a peculiar and fragrant smell. The ordinary Peddowk, as used in the Gun Carriage Manufactory, needs no comment, but a wood called Peddowk is procurable in abundance at Tavoy, It seems very strong but does not sink and is devoid of smell.

41 *Pinatha*. A kind of Jackwood or a Laurus.

Maximum girth 5 cubits. Maximum girth 25 feet. Very abundant. Found all over the Provinces particularly in the old deserted Town. When seasoned, floats in water.

Remarks.—A light wood with a yellow hue which darkens on exposure. Useful from the yellow dye which boiling extracts from it and which is permanent in cloth, and not effected even by boiling water. It is used by Phoongees. This wood has a fine tone when struck, and is used for musical instruments by the Burmese, it is used by English brush makers for the backs of hair brushes, being a handsome wood which takes a good polish.

42 *Ta-Kouk Tha* Tavoy, *Yay Mine.* (Burmese).

Maximum girth ½ cubit. Maximum length 7 feet. Abundant. Found all over the provinces. When seasoned floats in water.

Remarks.—A durable wood, likely to make good helves or to be useful in turning. Too small in size however to be recommended.

43 *Tin Book Tha.*

Maximum girth, 1 cubit, maximum length 8 to 9 feet. Scarce. Found in Tavoy and Mergui districts. When seasoned, floats in water.

Remarks.—A very good, tough, light wood; used by Burmese for many purposes but too small and too scarce to be worth procuring for helves.

44 *Them-Mai-Tha.*

Maximum girth 2½ cubits. Maximum length 12 feet. Very abundant. Found on both sides of Moulmein River, and on sea coast: in fact all over these Provinces. When seasoned, floats in water.

Remarks.—A wood useless except for firewood, but burns with an intense heat, and is therefore used in preparing salt. Apparently an excellent wood for charcoal for the Arsenal forge or for steamers.

45 *Valeria Lanceolata Pantheya* or *Panthit-ya.*

Maximum girth 6 cubits. Maximum length 60 feet. Very abundant in Tavoy and Mergui, but scarcely procurable in Moulmein. Found in Tavoy and Mergui districts: also along the coast near Amherst. When seasoned, floats in water.

Remarks.—This tree is erroneously called white Thingan, but it is of a totally different order from that of the Thingan. This is said in Remarks by Major (then Captain) Simpson to be still closer and heavier than Thingan (Vide Artillery Records for 1842). Excellent for tool handles, and planes, in short in lieu of Box-wood. Like Sow-yew, the Chisel-handle tree, it has a peculiar grain apparently of iron running through it. The Burmese use this wood for all purposes for which Thingan is employed, especially in junks. An excellent wood, but with not sufficient spring for helves. Stated by Burmese, in Amherst, not to be quite so durable or quite so good as Thingan; though this is not accordant with Major Simpson's opinion already quoted.

46 *Kyaitha* or *Itchwood.*

Maximum girth 4 cubits. Maximum length 18 feet. Abundant but scattered. Found up the Attaran, Gyne, and Thoungween Rivers near Moulmein and near Tavoy and Mergui. When seasoned, floats in water.

Remarks.—A very compact hard timber, used for posts of houses, zyats, &c. The fibre liable to start with repeated percussion, and the wood itself subject to dry rot, therefore not recommended. This is called Itchwood because the fruit, chips, or bark produce, when touched, an itching like that caused by Cowitch.

47 *Chee Neb* or *Stinking Wood.*

Maximum girth 4 cubits. Maximum length 22½ feet. Abundant. Found in Tavoy and Mergui. When seasoned, sinks in water.

Remarks.—The flowers of this wood have an intolerably fetid sickening smell, hence its name; used by Burmese for boxes, tables &c. a long fibred tough wood when new, but rots so readily

that with a whole tree in my possession I cannot cut out a decent specimen.

48 *Kyet Thay* or *Theeay Kyay*. Dimensions and extent of supply not known. Found on sea coast from Amherst to Mergui. When seasoned, floats in water.

Remarks —Used for posts of houses, very durable but not recommended as liable to split.

49 *Dagoo Tha*, meaning Crooked Timber. Maximum girth 3 cubits. Maximum length 30 feet. Abundant. Found in Tavoy and Mergui. When seasoned, floats in water.

Remarks.—Used for building boats, for planks of houses, ladders &c. liable to attacks of worms and dry rots.

50 *Kanyeen Tha* or *Wood Oil Tree*. Named by Mason as Dipterocarpus Lævis. Maximum girth 6 cubits. Maximum length 70 feet. Very abundant. Found all over the provinces. When seasoned, floats in water.

Remarks.—Used for rafters and planks, an inferior wood, by no means durable, rots as soon as exposed to water and shrinks readily. Dr. McClelland speaks of this wood most favourably and states it to be of the Saul family. He must mean some other wood, as this is decidedly a bad wood, very porous, and when kept the oil oozes out and stands in globules over it, it warps to a great extent, and though used for cases does not last for more than about two years. (Vide No. 81. page 135 of Dr. McClelland's Report, where this tree is classed as Dipterocarpus turbinatus.)

51 *Ka Meen Tha.*

Maximum girth 2 cubits. Maximum length 25 feet. Abundant. Found all along sea coast near Tavoy and Mergui. When seasoned, sinks in water.

Remarks.—Used for posts and planks of houses; very heavy and durable, but too easily split to be recommended.

52 *Young Tha.*

Maximum girth 3 cubits. Maximum length 30 feet. Found in moderate quantities along sea coast near Tavoy and Mergui. When seasoned, sinks in water.

Remarks.—Used for posts and planks of houses; a heavy and durable wood, not bad for planes or handles, though better woods are already specified.

53 *Neen Tha.*

Very abundant. Found along sea coast near Tavoy and Mergui. When seasoned sinks in water.

Remarks.—Used for rafters of houses; a very heavy wood, but liable to split, therefore not recommended.

54 *Pew Bock.*

Maximum girth 3 cubits. Maximum length 25 feet. Very abundant. Found along sea coast near Tavoy and Mergui. When seasoned, sinks in water.

Remarks.—A strong, tough, durable wood; recommended for helves.

55 *The-La-Bay.*

Maximum girth 3 cubits. Maximum length 20 feet. Not very abundant, obtained from Tavoy, Mergui and Yea. When seasoned, floats in water.

Remarks.—A brittle, useless wood for Ordnance purposes, though employed by Burmese for house posts and to support the shafts of wells.

56 *Mong-dayat nee* or *Red Mong dayat.*

Maximum girth 2 Cubits. Maximum length 15 feet. Not abundant. Found on sea shore from Amherst to Mergui and on Callagouk Island. When seasoned, floats in water.

Remarks.—Used for crooks, and straight parts also of ships, and boats: a light tough wood with a good grain, but too liable to rot to be recommended.

57 *To Dooryan* or *Forest Dooryan.*

Maximum girth 3 cubits. Maximum length 18 feet. Scarce. Found from the sea coast of these provinces and adjacent islands. When seasoned floats in water.

Remarks.— A soft, light, useless timber, liable to rot readily.

58 *Book Tha.*

Maximum girth 1½ to 2 cubits. Maximum length 11 feet. Scarce. Found on the sea coast Amherst to Mergui. When seasoned, floats in water.

Remarks.—Used by Burmese for helves, but rots quickly, and therefore not recommended.

59 *Tay Yo Tha.*

Maximum girth 2 cubits. Maximum length 18 feet. Very abundant. From sea coast and adjacent islands of these Provinces. When seasoned, floats in water.

Remarks.—Used for oars and masts of boats. When this wood is cut, a very acrid caustic juice or sap flies from it which will destroy sight, if it touch the eye or, if it fall on the face, it raises blisters. A wood dangerous to work, and not durable; not recommended.

60 *Thay Yo Tha.*

Maximum girth 5 cubits. Maximum length 25 feet. Very abundant. Found all over Tenasserim and Martaban Provinces. When seasoned, floats in water.

Remarks.—A useless wood; rots very quickly; used for temporary buildings.

61 *Maneeoya*, stated by Burmese to be much used for rice pounders.

Maximum girth 4 cubits. Maximum length 30 feet. Abundant. Found all over Tenasserim and Martaban provinces. When seasoned, floats in water.

Remarks.—Not a good wood, as, when stored, it soon dies and rots; the roots are used for medicine; the fruit is eaten by Burmese, and the wood is well spoken of, though favourable specimens have not been seen, by Captain Dance.

62 *Mak yuh gah.*

Maximum girth 2½ cubits. Maximum length 18 feet. Abundant. Found all over Tenasserim and Martaban provinces. When seasoned, floats in water.

Remarks.—Used for elephant bells; not a durable wood, and therefore not recommended.

63 *Thah Byay Nee.*

Maximum girth 3 cubits. Maximum length 23 feet. Very abundant. Found all over Tenasserim and Martaban provinces. When seasoned, floats in water.

Remarks.—An inferior brittle wood, used by Burmese in short pieces for the props of houses; not recommended.

64 *Thee Khya Tha.*

Maximum girth 1 cubit. Maximum length 12 feet. Very abundant. Found all over Tenasserim and Martaban provinces. When seasoned, floats in water.

Remarks.—A very crooked grained perishable wood; not recommended.

65 *Dow Yat.*

Maximum girth 2 cubits. Maximum length 18 feet. Abundant. Found always inland all over the country. When seasoned, floats in water.

Remarks.—A soft bad wood, useless except for elephant bells.

66 *May-byoung.*

Maximum girth 3 cubits. Maximum length 18 feet. Not abundant. Found near the sea side, and near the mouths of rivers along the coast. When seasoned, sinks in water.

Remarks—Used for anchors of boats, and for the sticks of oil mills; an uncommonly heavy and a durable wood, but not tough enough for ordnance purposes generally, though from its hardness, it makes good planes and turns well.

67 *Pee Ma Pew* or *White Peema.*

Maximum girth 6 cubits. Maximum length 30 feet. Very abundant. Found all our the Tenasserim and Martaban provinces near the red Peema. When seasoned, floats in water.

Remarks.—A tough wood, lighter than Red Peema; does not last for so long a time as Red Peema, and rots in any position when shut out, as in the hulls of ships, in store &c. Not recommended.

68 *Na Pew Gee* or *Let Thouk Gee.*

Maximum girth 1½ cubits. Maximum length 14 feet. Abundant. Found all over the provinces. When seasoned, floats in water.

Remarks.—An useful wood, of inferior grain, and not durable.

69 *Tha Yingee.*

Maximum girth ½ cubit. Maximum length 6 feet. Abundant. Found all over the provinces. When seasoned floats in water.

Remarks.—Utterly useless except for firewood.

70 *Tha Na Thayt Pew Tha.*

Maximum girth 2 cubits. Maximum length 15 feet. Very abundant.

71 *Kha Moung Tha.*

Maximum girth 2 cubits. Maximum length 22 feet. Very abundant.

72 *Ka theet Tha.*

Maximum girth 4 cubits. Maximum length 22 feet. Not very abundant.

73 *In-Jin Pewoo, White Injin.*

Maximum girth 2 cubits. Maximum length 22 feet. Abundant; found all over the provinces. When seasoned, floats in water.

Remarks.—The above last named four woods very light, perishable, and only fit for firewood. The bark of ka theet tha used by Karens as beetel nut, could probably be useful in tanning.

74 *Thah yay Bew.*

Maximum girth 2 cubits. Maximum length 20 feet. Not very abundant. Found inland all over the provinces. When seasoned, floats in water.

Remarks.—Not a durable wood.

75 *Thay kya Ba.*

Maximum girth 3 cubits. Maximum length 24 feet. Very abundant but straggling. Found inland all over the provinces. When seasoned, floats in water.

Remarks.—Used for house posts, but not a durable wood.

76 *Thay Tha.*

Maximum girth 3 cubits. Maximum length 22 feet. Widely scattered. Found inland all over the provinces. When seasoned, floats in water.

Remarks.—A tolerably good and tough wood, liable to rot in store, and therefore not recommended.

77 *Thah Byay Ynel Ghee* (means with large leaves.) Maximum girth 3 cubits Maximum length 22 feet. Widely scattered. Found inland all over the provinces. When seasoned, floats in water.

Remarks.—A tolerably good and tough wood, spoken of by Dr. McClelland as a strong and close grained timber.

78 *Tha Pyke Tha.*

Maximum girth 5 cubits. Maximum length 30 feet. Very abundant. Found along the banks of rivers, all over the provinces. When seasoned, floats in water.

Remarks.—A wood of no durability, not recommended.

79 *Kyai Yew.*

Maximum girth 3 cubits. Maximum length, 22 feet. Rather scarce. Found all along the banks of rivers all over the provinces. When seasoned floats in water.

Remarks.—Used by Burmese to make charcoal, also sometimes for posts of small huts: too brittle to be recommended.

80 *Toung Bye Nay.*

Maximum girth 5 cubits. Maximum length, 30 feet. Scarce. Found along the banks of rivers all over the provinces. When seasoned, floats in water.

Remarks.—A brittle short-grained wood. Not the mountain jack though similar to it in name.

81 *May Shoung.*

Maximum girth 2½ cubits. Maximum length 18 feet. Scarce. Found on sea coast, Amherst to Mergui. When seasoned, floats in water.

Remarks.—A short fibred, brittle, yet soft wood, not durable; called, but erroneously, a kind of Annan by the Burmese. Not a durable wood, and besides too scarce for ordnance purposes.

82 *Tha Bate Kee.*

Maximum girth 3 cubits. Maximum length 18 feet. Scarce. Found all over the Province near the sea and at the mouths of rivers. When seasoned, floats in water.

Remarks.—A short, fibred brittle, yet soft wood, not durable.

83 *Mong-Dayat Pew, or White Mong-Dayat.*

84 *Maximum* girth 2½ cubits. Maximum length 22 feet. Scarce. Found all over the provinces near the sea and in the mouths of the rivers. When seasoned, floats in water.

Remarks.—Not a good wood, being very perishable.

85 *Kab-Ban-Tha.*

Maximum girth 6 cubits. Maximum length 30 feet. Scarce. Found inland in Amherst and Tavoy Provinces. When seasoned, floats in water.

Remarks.—Makes beautiful furniture, and when long buried in ferruginous mud, turns of a *very dark* red. Found to make excellent planes; used in Tavoy jail with great success, for all tool handles, and much recommended for such as do not receive direct percussion, as screw drivers, augers, hammers, handles; in fact for all tools except chisel handles, which are to be struck with a hammer, for which the Chisel-handle tree, "Dalbergia," *Species*, is the best; makes excellent planes; stated by Dr. McClelland to be most plentiful in Tharawaddy district, and to be hard, of fine grain and used in constructing carts. The writer has seen a quantity of this lately sold (in August 1857) for export to Holland as a furniture wood.

86 *Kyee Tha,* named by Mason as *Syndesmus Tavoyana*; and also called *Kyay Mi-shoung*, named by Dr. McClelland as *Barringtonia acutangula.*

Maximum girth 2½ to perhaps 3 cubits. Maximum length 10 or 12 feet Very scarce in Moulmein, but sufficiently abundant at Tavoy. When seasoned, sinks in water.

Remarks.—Same as Kab-ban-tha.

87 *Tha Boug Pew.*

Maximum girth 2 cubits. Maximum length 15 feet. Abundant. Found on the sea coast, Amherst to Mergui. When seasoned, floats in water.

Remarks.—Liable to attacks from worms, rots readily, a brittle inferior wood.

88 *Koung Moo.*

Maximum girth 5 cubits. Maximum length 30 feet. Scarce. Found near Moulmein, also near Tavoy and Mergui on the sea coast and on the banks of rivers. When seasoned floats in water.

Remarks.—Not a good wood, but perishable and liable to rot readily.

89 *Na Yoo-ya.*

Maximum girth 3 cubits. Maximum length 22 feet. Scarce. Found all over the provinces. When seasoned floats in water.

Remarks.—A durable tolerable good wood with a curled grain; used by Burmese for oars, much like English oak in appearance, but deficient in tenacity. Not recommended, being scarce, while equally good woods are abundant.

90 *Khai Yah.*

Maximum girth 2½ cubits. Maximum length 22 feet. Scarce. Found all over the Province. When seasoned, floats in water.

Remarks.—A tolerably good wood, but not recommended because like the "Na-yoo-ya" it is too scarce.

91 *Dalbergia Latifolia, Yendaik; Black wood.*

Maximum girth 2 cubits. Maximum length 10 or 12 feet. Abundant in Tavoy and Mergui, elsewhere scarce. Found all over the provinces, but mostly in Tavoy and Mergui. When seasoned, sinks in water.

Remarks.—This, unlike the Black wood of India, has a fetid smell like that of new Corduroy and a white grain interspersed amongst the black and red. It is not so handsome a wood as Indian black wood, but is far tougher, is not brittle, excellent for spoke shaves, for handles of screw drivers augers, gimblets. Used by the Chinese carpenters for planes, and is excellent for that purpose though heavy; but they use smaller planes than we do. Like others of the hardest woods of Burmah, it is so full of natural cracks, that two feet of timber are wasted for one foot made up after being sawn; but when made up, this wood cracks no more and resists sun or rain admirably. The "Tai" is not Yendaik but Ebony, and is brittle and devoid of smell.

92 *Phyoo.*

Maximum girth 1½ cubits. Maximum length 17 feet. Abundant. Found in Tavoy and Mergui, also in less abundance in Amherst Province. When seasoned, floats in water.

Remarks.—A tolerably good strong wood, but not with much tenacity of fibre.

93 *Tye Yoo Tha or Lan Thah.*

Maximum girth 2 cubits. Maximum length 22 feet. Scarce. Found in Tavoy and Mergui, also in less abundance in Amherst province. When seasoned, floats in water.

Remarks.—A bad brittle wood readily splits and warps.

94 *Phet Honway.*

Maximum girth 3 cubits. Maximum length 22 feet. Scarce. Found at Tavoy and Mergui. When seasoned, floats in water.

Remarks.—A short grained brittle wood, splits and rots readily.

95 *Ouk Guay.*

Maximum girth 1½ cubits. Maximum length 15 feet. Scarce. Found all over the provinces. When seasoned, floats in water.

Remarks.—The root of this tree is used as a medicine by Burmese, the wood perishable, and grain short.

96 *Nyy-soung Tha.*

Maximum girth 3½ cubits. Maximum length 22 feet. Abundant. Found all over the provinces. When seasoned, floats in water.

Remarks.—A wood of no durability or strength; splits readily, with a short grain. Only fit for firewood.

97 *Na Ghee.*

Maximum girth 3 cubits, Maximum length 15 feet. Abundant. Found all over the provinces. When seasoned, floats in water.

Remarks.—A tolerably good wood, used for malletts, but not durable enough to be recommended.

98 *Tayet Khyee.*

Maximum girth 2 cubits. Maximum length 15 feet. Abundant. Found all over the provinces, When seasoned, floats in water,

Remarks.—A pretty wood in grain, but one which rots when it dies: of no durability.

99 *Murrh Neen.*

Maximum girth 2 cubits, Maximum length 15 feet.

Abundant. Found all over the provinces on low grounds. When seasoned floats in water.

Remarks.—A petty wood, looks exactly like deal, but stated to have no durability.

Additional List of Woods, by Captain Dance, Dep. Commissary of Ordnance, T. P. 28th July 1856.

100 *Yemmanee,* Tree not known but Karens say it bears a yellow flower and small plum which is the favorite fruit of the barking deer. Vide Masons Tenasserim, page 213.

Maximum girth 4 cubits. Maximum length 20 to 30 feet. Very abundant. Found inland near the banks of the Gyne and Attaran Rivers and at the back of the Mountains near Moulmein. When seasoned, floats in water.

Remarks.—Very durable; used by the king of Ava for his carved furniture, also by Burmese for boats, a slightly scented wood, the lightest in the collection; free from cracks. Excellent for fuzes and appears quite free from acid or from tendency to rot.

101 *Soway Do.*

Maximum girth 1½ cubits. Maximum length 10 or 12 feet. Very abundant. Found on sea coast and on the banks of rivers in these provinces. When seasoned, floats in water.

Remarks.—A wood much recommended for gun stocks with but one fault; that it is crooked and therefore not more than ten or twelve feet can be procured between the bends. This wood is commonly sold to Burmese for half rupee a piece, large enough to make one gun stock.

102 *Thayet Kya.*

Maximum girth 2 cubits. Maximum length 20 feet. Not very abundant, but occasionally procurable. Found inland near the back of hills near Moulmain, and here and there all over the provinces. When seasoned, floats in water.

Remarks.—Durable and light, a good wood for helves if indented for with other woods for the same purpose.

103 *Chin Zooay.* Meaning Elephants-teeth.

Maximum girth 1½ to 2 cubits Maximum length 10 feet, Abundant on the hills. Found inland, always on rocky barren hard ground in mountainous or hill districts all over the provinces When seasoned, sinks in water.

Remarks.—This wood is believed by the writer to be the hardest and strongest known in these latitudes, perhaps anywhere in the world. It is however only procurable in such rocky spots as no other tree will grow in, so must be sent for on purpose. It cuts up as does yendaik and other hard woods do with huge cracks through it; in fact this is the most wasteful of all known valuable timber in this respect and the original scantling is but small, so that it is not recommended for general purposes, but it is invaluable for the edges of Phillester Planes for spoke shaves and for such purposes in which much scantling is not required.

104 *Than That.*

Maximum girth 2 to 3 Cubits. Maximum length 12 feet. Very difficult to procure. Found inland up the Gyne and Attaran Rivers. When seasoned, floats in water.

Remarks.—Very durable; used by Karens for bows, for shoulder yokes, spear handles and many other purposes. Excellent for hammer handles from its tough fibre.

105 *Yeen Ga.*

Maximum girth 2 cubits. Maximum length 15 feet. Very abundant, found in Moulmein itself, and scattered over the provinces. When seasoned, sinks in water.

Remarks.—Stated to be good for helves, not so strong as Chisel handle tree but possessing its properties in an inferior degree; and good

for helves. Rupees 45 per 50 feet by 1 foot square Used by Burmese for helves, for mamotties, and is a very pretty white wood for furniture.

106 *Moketammatha.* Meaning Martaban wood.

Maximum girth 1 cubit. Maximum length 8 feet. Very abundant; found in Martaban and its adjacent jungles, also all over the provinces especially on the banks of rivers. When seasoned, sinks in water: uncommonly heavy.

Remarks.—Stated to be used for the same purposes as chisel handle tree, but still stronger.

107 *Gyew.*

Maximum girth 2 cubits Maximum length 15 feet. Abundant; found in the jungle round Moulmein and all over the provinces. When seasoned, floats in water.

Remarks.—Stated by Burmese to be equal to chisel handle tree, Dalbergia, species, but if so the writer has not yet seen a favorable specimen.

108 *Pinlay Jallat.*

Maximum girth 2½ to 3 cubits. Maximum length, 15 feet. Tolerably plentiful. Found by the sea side and very near to waters edge, in these provinces. When seasoned, floats in water.

Remarks.—A wood strongly recommended for fuzes, free from oil, and acid, light, yet strong; it is much used for rockets of enormous dimensions and for wooden guns, used for the burning of the dead Phoongees and on other occasions.

109 *Bee-ew*, not identical with *Thee Bew Tha.*

Maximum girth 3 cubits. Maximum length 22 feet. Trees very abundant. Found near the sea or the rivers edge, all over the provinces. When seasoned, sinks in water.

Remarks.—A very hard, strong wood; used in rice mills where great strength and wearing well are indispensably required: recommended for handles of tools.

110 *Kussoo*, not identical with Kye-zai.

Maximum girth 2 cubits. Maximum length 15 feet. Abundant. Found near the sea or the rivers edge, all over the province. When seasoned sinks in water.

Remarks.—A very tough wood, durable, and as good as Kyezai, for helves. The Kyezai is a wood of the colour of oak with a yellowish tinge. The Kussoo is nearly white. This is not the soondree wood, of which latter the Burmese name is nearly the same, and the soondree wood Captain Dance failed to procure hitherto.

111 *Kyai tha.*

Maximum girth 1½ to 2 cubits. Maximum length 7 feet. Scarce. Found on low marshy grounds in these provinces, but widely scattered. When seasoned, sinks in water.

Remarks.—Excellent for planes, or for any other purpose, for which a straight grain, great toughness and strength are required.

112 *Phangah.*

Maximum girth 4 cubits. Maximum length 23 feet. Very abundant. Found in jungles near Moulmein and all over the provinces. When seasoned, sinks in water.

Remarks.—Used by Burmese for poles of carts and by the poorer class for houses; very strong and likely to make good planes, handles, or helves.

113 *Tunyeen* or *Tunyeen Dha.*

Maximum girth 5 cubits. Maximum length 30 or 40 feet. To be procured in moderate quantities. Found scarce near Moulmein and Sittang rivers, more abundant near Tavoy and Mergui. When seasoned, floats in water.

Remarks—Used for construction of those very large boats which go from Moulmein to Tonghoo; hence in much demand here, but not so much so on the sea coast. A wood which when cut, has a peculiar and fragrant smell, is tough and oily, and likely to make excellent planes, handles &c. &c.

114 *Ebony. Diospyros, Tai.*

Maximum girth ½ to 1 cubit. Maximum length 8 feet. Very scarce. Found from the forest in the direction of Shuay Gheen. When seasoned, sinks in water.

Remarks—This wood, much sought for by Captain Dance could not be procured in Moulmein in sufficient abundance for it to be suitable for any ordnance purpose.

Concluding Remarks dated Moulmein 30th September 1857. From all enquiries, it appears that the prices of all the useful woods specified in the above List are about the same, viz: Rupees 45 per ton. This List is in substitution of that before forwarded with letter No 305 dated first May 1856 from Captain Dance to the Military Board; which latter was requested to be cancelled. The three headings of woods for helves, woods too heavy but useful for other purposes, and useless woods, have been retained as first classed, though some of the first class have been found useless, some of the second good for helves, and some of the third (as yendaik) valuable; but fresh numbering would cause confusion, and opposite to each wood is specified, whether it be useful, and if so for what purpose.

(8195) *Archipelago of Eastern Asia.*

Extensive collections of woods from Borneo, New Guinea, and several other of the Archipelago islands, were contributed to the Exhibition of 1851, including sandal wood from Timor, and Lingoa or Amboyna wood, from Ceram, in the Moluccas.

1 *Lingoa* or *Amboyna Wood.* This wood, which is very durable, and takes a high polish, was imported from the Moluccas in considerable quantities at the time when the latter were British possessions; it is very abundant, and may be had in any quantity. Very large circular slabs are obtained from the lower part of the tree by taking advantage of the spurs, or

lateral growths; they are sometimes as large as nine feet in diameter. A circular disk of wood thus obtained, nearly seven feet in diameter, as well as some other specimens, were exhibited by Messrs. Almeida (P. 891), of Singapore, and were deemed deserving of a Prize Medal by the Jury.

2 *Kayu-Buka.* Specimens were also shown of the "Kayu-Buka," which is brought from Ceram, New Guinea, Arru, and the other islands of the Moluccas, to Singapore; it is a knotty excrescence, which forms on the stems of the Lingoa tree, and is much esteemed as a fancy wood for cabinet-work; of late years its estimation seems to have decreased in Europe, but it is still much valued by the Chinese. For a list of the wood from Labuan—see, Timber of Labuan.

(8196) *Canara Timber and Fancy-Woods.*

The forests of Canara continue to furnish large quantities of the best timber produced in Southern India, but, the government authorities seem to have directed their attention principally to preserving the Teak, Sandalwood, Blackwood, Jackwood, Wild Jack and Poon trees of these forests, to the comparative neglect of other valuable woods. In the years 1843-44 to 1851-52 inclusive, the teak supplied from the Canara forests to the Bombay Dockyards and remaining in store amounted to 7831 logs, equal to 26714 candies, and the expenses incurred in delivering the same amounted to Rs 1,47,277-1-8 or about six rupees per candy. There was, also, in addition, 784 logs equal to 2783 Bombay Candies of Jungle wood. In the Fusly years 1251 to 1260 inclusive there was exported from Canara by sea, of Teak 18,187 candies, Poon Spars 6918 in number: of Sandalwood 86 Candies and Blackwood 362 candies. In 1837, Col. Frith gave a list of 29 woods of Canara. In 1844, Dr. Gibson gave another of 32 Woods; both of these lists were merely in their native names, but, some years later, in 1845-46, the latter gentleman gave a list of 64 timber trees and Fancy woods with scientific, Canarese and Mahratta names, which he had found in the forests of Canara and Soonda. It is as follows.

1 Teak. Tectona grandis. At Gond, Barnunbulee. Mawlinga, Berchee, &c., above the Ghats, and in other parts of Yellapore talook. A few trees in Honore, north of foot of Hosul-Mukki Ghats about 18,000 small estimated in Ankolen and Honawur Divisions. The timber most esteemed in India.

2 Sissoo. Dalbergia latifolia. Cano Betee. Abundant and large at north end of Dandelee forest; scanty eslewhere. Used for Gun-carriages and house furniture. For the former so valuable that large plantations have been formed in waste places of the north-western provinces of Hindostan.

3 Kuree Murra. Ebnoos, *Hind.* Diospyros Ebenum. Not common, found near Oopenputam in Canara; also below the Woolwee Ghat. Only used for delicate and costly cabinet work.

4 Mainthee, *Canarese.* Acen Mack. Pentaptera coriacea. The most common tree in the large jungles both above and below. Beams and pillars for houses: also for ships and boats. The heart wood is one of the most durable known; on account of its weight, it is preferred for firewood.

5 Pentaptera paniculata. Kinjul, *Mahratta.* Kondul, *Canarese.* Nearly as common as the last. Qualities similar to the P. coriacea.

6 Belee Waulke, *Canarese.* Arjoon Sadur. Pentaptera arjuna. Only by rivers and streams mostly below the Ghats; reaches an immense size. Timber commonly reported as good, I would judge it to be inferior to P. coriacea and P. paniculata. Bark medicinal.

7 Goonjun Murra, *Canarese.* Asanna, *Mahratta.* Briedelia montana. Found in Canara, common in Dandelee, where it reaches a great size. Many fine logs have been exported by merchants, since the cutting of teak trees was interdicted. Hardly inferior to teak and stands water equally well. If it has not been already tried for naval purposes, it seems well worthy a trial.

8 Bellee Nundee. Nundee Muna. Bondara also Mana, *Mahratta.* Lagerstrœmia parviflora. Most common in the Dundelee forest above; also not uncommon below; reaches a large size. Wood tough and valued for its qualities in standing water. Greatly in use for beams, rafters and boat timber.

9 Saguree Murra, *Canarese.* Koosumb, *Mahratta.* Schleichera Trijuga. Most common below, where it reaches the size of a large tree; not uncommon in Dundelee forest. Wood very tough and valuable: is always preferred for sugar and rice mills. Fruit gives an oil.

10 Mootr Murra, *Canarese.* Pullus, *Mahratta,* Butea Frondosa. Most common below and in Dandelee forest; grows large, but always gnarled. Wood hardly distinguishable from teak and is of similar qualities. Flowers and gum valuable in the arts, and the former also in native medicine.

11 Cheekul Murra. Keenye. Acacia alata. Found above and below, pretty common. Ripe wood; strong and useful for houses.

12 Halee Dasul, *Canarese.* Tannana, *Mahratta.* Lagerstrœmia Reginæ. The Ben Teak of Malabar. Near the banks of rivers below. Here it reaches large size. Wood of same family as Lag. parviflora; qualities similar. Used in houses and boats.

13 Helbulsoo, *Canarese.* Pat Phunnus, *Mahratta.* Artocarpus hirsuta. Above and in the ravines of the Ghats; but mostly in

Honore and Bilgy talooks. Valuable for canoes and for planks.

14 Ran Funnus, *Mahratta.* Artocarpus sylvestris. Dark jungles on and near the Ghats to southward. Wood of quality somewhat similar to last; but inferior to it.

15 Kori Kowan. Satween, *Mahratta.* Alstonia scholaris. Not very common; but found near the Ghats above and below of great size. Wood white, compact and valuable for the turning lathe.

16 Jamba Murra. Jamba, *Mahratta.* Mimosa Xylocarpa. Chiefly above the Ghats in Soopeh and Dandelee, where it grows large. Wood very useful in house building—tough and strong.

17 Soorhunni, *Canarese.* Koolmurra, *Canarese,* Calysaccion angustifolia. In ravines of the Ghats and below in sheltered valleys; not common in north Canara and Soonda. The tree used here for "Poon" spars.

18 Yetega. Yetegal, *Canarese.* Hedoo. Murra, Nauclea parviflora. Rather common below; more rare above. Is valued as affording the best plank for flooring of houses and house beams.

19 Minjul Mara, *Canarese.* Bukool, *Mahratta,* Mimusops Elenji. In the high jungles close above the Ghats; reaches great size. Wood serviceable for houses, not used in ships or boats. Fruit eatable.

20 Hanee Murra, *Canarese.* Beebla, *Mahratta.* Pterocarpus dalbergioides. Common in large jungles; above and below. Wood strong and useful for houses. Gum used in the arts and in medicine.

21 Bel Kambi, *Canarese.* Acacia amara. Above the Ghats not inland and not north of Gungawalli river. Ripe wood, strong and tough. The natives deem it (wrongly) a species of Ebony.

22 Dal Murra, also Dul Murra. *Can.* Pabba, *Mah.* Chikrassia tabularis. In the tall jungles near and on the Ghats, particularly at Gunesh Good. Wood white, but tough and close grained. From its general situation, it is hardly known to the carpenter.

23 Gher Murra, *Can.* Bibooa, *Mah.* Semecarpus anacardium also Semecarpus cuneifolia. Common above and below, but most so above. Wood good for houses and beams. Juice used in the arts and in medicine.

24 Holgeree, *Can. Mah.* In: Holigarna longifolia. Mostly above near the Ghats S. of Nilcoond. Wood of same qualities as the last. Juice dangerously acrid.

25 Burrul Murra, *Can.* Kanta Saeer. 2 Species of Bombax. Most common below; grows to a great size. Hollowed for canoes; planks sought after for light boxes.

26 Kuta Mura, *Can.* Kudum. Nauclea orientalis. Rather rare and found chiefly below. Wood strong and serviceable, used for gun-stocks. Hardly common enough for house or ship purposes.

27 Sampga, *Can.* Tambut. Kudkee. Hocomlia montana. On and close to head of the Ghats; seldom runs large. Wood white, hard and tough; used for agricultural implements.

28 Dodelee Mura, *Can.*: *Mahrata* no name, Sterculia alata. In deep ravines and sheltered places below the Ghats; grows to an immense height. Used here only as a support for pepper vines. The wood is said to be too spongy for spars, for which its height and straightness otherwise well fit it.

29 Yels Kae, *Can.* Berli Mar, *Mah.* Caryota urens. Throughout the forests above and below; but most common above. Affects sheltered valleys. One of the most useful trees in the country. Pith gives fine Sago meal. Trunk in universal use for water conduits. Root hollowed for the bucket used in irrigation. Abounds in Tari or Palm wine. I have heard that the farm of this tree throughout the Yellapore district of Soopeh, yields Rs. 30,000 per annum.

30 Hali Mura, *Can.* Tursee Phul, *Mah.* Chrysophyllum acuminatum, Star apple. Very common in the jungles near the Ghats above, particularly to the south. Reaches a great height. Wood worthless; fruit eaten. The tree seems to contain the new commercial product termed Gutta Purcha. This product is known to be furnished by a tree of this family.

31 Hagin Kae. Hagin Mura. *Can.* Mar tree not found with us. Nauclea, *Sp.* Flower not seen. Frequent in upper third of the Ghats to the south. Wood described as being strong and serviceable for houses and implements.

32 Kulli Kae. Ficus *Spec*: Generally a climber. Abounds in the country from Bilgy to the Ghats. Juice peculiarly abundant and viscid. It is used as a Bird Lime. Well merits a further examination.

33 Andgeree, *Can.* Ind. Yeroo, *Mah.* Sapindus or Nephelium *Sp.* Flower not seen. Above the Ghat chiefly at the Nilcoond and southern jungles. Wood said to be serviceable in house building.

34 Nooskool, *Can.* Char, *Mah.* Buchanania latifolia. Most frequent above the Ghats, particularly north of Dandelee. Wood is strong and tough, but seldom found squaring above four inches. Fruit delicate like almonds.

35 Kowla, *Can.* Koombha. Careya arborea. One of the most common trees above and below. Always seems to run gnarled. Wood said to be superior for edging of wells as it stands water. Part of the fruit medicinal.

36 Kulgul, *Can.* Kurmul, *Mah.* Dillenia Scabrella. Most common below the Ghat. Grows large, long, and straight. Wood seems to be used for boat plank in Canara. With us it is not reckoned a choice wood.

37 Darsoox Mura. Damun, *Mah.* Grewia obliqua. Found mostly below, seldom grows large. Wood used in agriculture, house posts, &c.

38 Bara Nuge, *Can.* Karumbu. Par Jamb, *Mah.* Olea dioica. Most common and near the Ghats above. Wood white, but strong, compact, and useful.

39 Goonun Mura, *Can.* Gootee, *Mah.* Zyziphus xylopyra. Most common below the Ghats. Never grows very large. Wood used for implements. Fruits employed in the arts.

40 Bomle Mura. Ind. Binteki. Below and near the Ghats only. Wood very serviceable for plank. Seems to be used only for this purpose.

41 Koote Legree, *Can.* Khete, *Mah.* Sapindus. In ravines below: high lands in Canara, not common. Wood of average quality for building. Nut used in the arts.

42 Sarul Mura, *Can.* Kunchun, *Mah.* Bauhinia purpurea. Found both above and below; most common near the Gungawallee creek. Wood strong and good for agricultural implements; but seldom large enough for building.

43 Suola Mura, *Can.* Cedrela Toona Toon. I have found this choice tree only in one situation, viz., island of Koorsulee; but it probably exists all along close below the Ghats. A species of Mahogany. Wood is much used in Bengal for furniture and other purposes.

44 Dhoop, *Can.* Dhoop. Googul. *Mah.* Canarium, 2 species. On the Ghats above, and the second species seems to be cultivated near Bilgil; and also at Siddapore, great size. The choice Gum resin afforded by these trees is extensively used in the arts and exported both inland and to the coast. Wood very good.

45 Mudde Doop. Ind. Ailanthus Malabaricus. Near the Ghats above. Dhoop. Wood worthless, gives a resin nearly similar to No. 44.

46 Allikae. Allubikae. *Can.* Heari. Terminalia chebula. Abounds above the Ghats. Wood of average quality for houses, &c. Nuts have of late years become an extensive export, is a dye in place of nut galls.

47 Taree Mura, *Can.* Yehela, *Mah.* Terminalia bellerica. Common both above and below; one of the greatest trees in the forest. Wood serviceable for houses but not first rate; used also for plank.

48 Tuktuka. Keersel, *Mah.* Bignonia chelonoides. Found above and below, but not common. Wood good for building

49 Parul, *Mah.* Bignonia suaveolens. Common in the Dandelee forest above. Wood of quality similar to last.

50 Wurus, *Mah.* Bignonia quadri-locularis. Mostly in the higher valleys of the Ghats. Wood much used for planks to carts, &c. It is tough and durable.

51 Moorgul Mura. Kokeem, *Mah.* Garcinia purpurea. Wild Mangosteen. Mostly below and near valleys. A beautiful tree. Valued for its fruit which is extensively exported as a native condiment. The concrete oil also is much valued. Wood good.

52 Kirceinula, *Can.* Name not known. Flower &c. not seen. Jungles between Bilgil and Nilcoond; said to be choice wood for masts of boats, &c. Worthy of further inquiry.

53 Undi Mura, *Can.* Goolumb, *Mah.* Samus of 2 species. Abundant in the southern Ghat jungles above, large and straight. Wood good as it abounds in an aromatic oil, which preserves it from insects. It is mostly in situations too remote from water for the wood merchant.

54 Kurwul. Diospyros Ind. *Spec.*: Great jungles in the Ghats above, chiefly to the south. Ripe wood particularly good, as it has the ebony heart.

55 Dal Bulloo Geera; unknown. Elevated plateau between Gungawalee and Black rivers, does not reach a great size. Wood very strong and tough, sought after for agricultural implements.

56 Memecylon tinctorium; Surpa, *Mah.* Iron wood of 2 species. On the upper head of the Ghats; wood very tough and strong for cart axles, &c. The beautiful flowers extensively used as a dye.

57 In Jugga. Hoom, *Mah.* Ind Uvaria spec. Jungles east of Kursulee on Black river; runs tall and straight. Wood strong and useful, it is not much known.

58 Nagin Koora, *Can.* Tabernæmontana citrifolia: common on the hills near and below Ghats. Wood white, but tough and strong. Never large.

59 Kakae, *Can.* Bawa, *Mah.* Cassia fistula: Common above and below. Wood of average quality. Pods a rather extensive article of commercial export.

60 Chikakae, *Mah.* Mimosa saponaria. Ghat jungles generally. Pods and bark exported from Canara—the former as a washing material, the latter for dyeing and tanning fishing nets.

61 Bubbe Mura. Calophyllum spurium. Banks of rivers and streams, above the Ghats chiefly. Wood used for canoes. Seeds afford much oil.

62 Mot. Mooshun Hunoo. *Can.* Garcinia, *Spec*: or a Xanthochymus. Above the Ghats only, where common to the south. Abundant. Juice is not used medicinally. Large Wood good: fruit is eaten.

63 Ghan Seng, *Can.* Khurseng, *Mah.* Bignonia Xylocarpa. Mostly above the Ghats. Wood good. Never reaches a large size.

64 Beta Goonda, *Can.* Uvaria, *Spec.* Jungles inland of Nilcoond. Wood of rather superior quality, being straight and tough.

Errors excepted, (Signed) A. GIBSON,
Supt. Conservator of Forests.

CEYLON WOODS.

(8197) *Ceylon.* The late Sir George Anderson sent us the following list of 96 *Timber Trees* in *Ceylon*, drawn up by Mr. ADRIAN MENDIS, Mohandiram of Moorrotto, and Master Carpenter, Royal Engineer's Department.

NAMES. Cynghalese. Botanical.	Locality. Provinces.	Weight per cubic foot.	Durability.	USES, &c.
A		lbs.	years.	
1 Andere. Acacia vera.	Eastern.	71	15	Cross bars of fishing dhonies, and pins for wooden anchors.
2 Madetiye. Adenanthera pavonina.	Western.	56	30	Common house buildings. Produces a red seed which is roasted and eaten.
3 Kebelle. Oblique Euginea.	Northern.	40	20	Common house building.
4 Cottamba. Almond.	W. & Southern.	38	30	Common house building; and fruit eaten for food.
5 Welipiyanna. Anissa phyllum zeylanicum.	Western and Northern.	35	40	Common house buildings.
6 Cocatiye. Aponogeton crispum.	Western.	56	30	Do. do.
7 Puwak. Areca nut.	Western Eastern and Southern.	57	60	Pins for furniture and pinco sticks. The nuts esteemed a luxury are chewed with nuts betel leaves, tobacco and chunam.
8 Patta Del. Artocarpus, sps.	Southern.	34	30	Boats and buildings. Fruit (9×2½ in,) boiled and eaten as food.
9 Cos. Jack. Artocarpus integrifolia.	South Eastern and Western.	42	25—80	Fruit weighing from 5 to 50lb. used in various ways for food. Timber in general use for building boats, and all kinds of furniture.
10 Del. Artocarpus pubescens.	E. S. & Western.	40	25—50	Boats and buildings. The fruit (9 in. × in) is used as an article of food.
11 Aludel. Artocarpus pubescens.	Western.	51	35—70	Fishing boats and house buildings. The fruit (9 in. ×3 in.) is boiled and eaten as food by the natives.
B				
12 Bairiye.	Northern and Western.	57	10—30	Found chiefly near the mouths of the rivers—used for anchors and in house building.
13 Mee. Bassia longifolia.	Northern.	61	25—80	Keels for dhonies, bridges and house buildings. A useful medicinal oil is obtained from the nut of this tree.
14 Petan. Bauhinia tomentosa.	Eastern.	57		Boxes, chests, walking sticks, cornice work &c.
15 Lunu Midelle. Common Bead tree.	Western.	15	8—20	The small sticks and branches used in common buildings, and outriggers for dhonies and fishing boats; the timber for panels of carriages, buoys, targets, &c.
16 Hal Milile. Berrya ammonilla.	Northern and Eastern.	48	10—80	Casks tubs, carts, waggons and house building. The best wood for oil casks in the Island.
17 Tal. Palmira. Borassus flabelliformis.	Northern and Eastern.	65	80	Reepers, rafters. From its leaves the native ola books are made. Toddy is drawn from the flowers, from which jaggery is manufactured. This is used occasionally for hardening mortar, as also for medicinal purposes.
18 Calukeale, Butea frondosa.	Central.	38	30	Common house building.
C				
19 Calu Mediriye. Calamander. Diospyros hirsuta.	Southern and Western.	57	80	A scarce and beautiful wood; the most valuable for ornamental purposes in Ceylon.
20 Waldombe. Calophyllum acuminatum.	Western.	39	20	Common house buildings.
21 Gorrukeenee. Calophyllum calaba.	Western.	44	25	Poles for bullock carts and house buildings.

Names. Cynghalese. Botanical.	Locality. Provinces.	Weight per cubic foot.	Durability.	Uses, &c.
		lbs.	years.	
22 Dombe. Sweet scented Calophyllum.	Western.	40	5—10	Masts, and cross-sticks of yettra dhonies and fishing boats; and poles of bullock carts.
23 Mahadan. Calyptranthes cumini.	Northern and Western.	36	20	Common house building, wheels, &c. The berries are eaten when fully ripe.
24 Battedombe, Clove tree leaved Calyptranthes.	Western.	45	20	Common house building.
25 Alubo. Jambolana Calyptranthes.	Central.	49	20	Common house building.
26 Kahatte. Careya arborea.	W. & Southren.	38	10—20	Axles for bullock bandies, and buildings.
27 Davette. Carallia zeylanica.	Western.	42	25	Roofings for common buildings.
28 Kittool. Nepera. Caryota urens.	W. & Southern.	71	30—90	Reepers and window bars. The toddy drawn from the flowers is a sweet and cooling drink; and is also converted into jaggery.
29 Dawol kuroendo. Cassia cinnamomum.	Central.	39	20	Common house building.
30 Arremene. Sumatra Cassia.	Central.	57	50	Furniture and house buildings.
31 Hedde woke. Choccar pus pungens.	Western.	58	50	Common house building.
32 Burute. Satin. Chloroxylon Swietenia.	Southern and Eastern.	55	10—80	Oil presses, waggon wheels, bullock carts, bridges, cog wheels, buildings and furniture.
33 Mal burute. Flowered Satin, Chloroxylon Swietenia.	Northern and Eastern.	57	80	Furniture. This wood is perhaps the most valuable in Ceylon next to Calamander.
34 Nelly. Cicca distica.	Central.	49	30	Buildings, wheels, &c. Used in wells the wood is said to purify the water. The berries are made use of for sweet-meats, and also for medicinal purposes.
35 Cocoanut. Cocos nucifera.	Sea coast generally.	70	20—50	Buildings, fancy boxes and furniture. The fruit furnishes almost all the staple articles of food in a tropical climate—milk, curry, water, oil:—the flower yields toddy, from which arrack, jaggery and vinegar is manufactured; the husk coir for ropes, mats, &c.; the leaves are woven into cadjans; and every part of the tree is useful in a multitude of ways.
36 Wea warene. Cratæva religiosa.	Central.	62	60	House buildings and pestles.
37 Hal Mendora. Branch flowered Cynometra.	Western.	56	8—20	Bridges and house building.
38 Gal mendora. Branch flowered Cynometra.	W. & Southern.	57	15—60	Bridges and buildings. The best kind of wood for under-ground purposes.
D				
39 Nendoon. Dalbergia lanceolaria.	W. & Southern.	56	60—80	Buildings and furniture.
40 Daminne.	Eastern.	44	40	Gun-stocks and common house buildings.
41 Gode parre. Toothed Dillenia.	Western.	51	60	Roofs for houses.
42 Horre. Turbaned Dipterocarpus.	Western.	45	15	Roofs of common buildings.
43 Doon. Dipterocarpus sp.	Central.	29	50	House buildings.
44 Dive parre.	Western.	44	20	Common house buildings.
E				
45 Caluvere. Ebony.	N. and Eastern.	71	80	A fine black wood, used largely for buildings and furniture.

CEYLON WOODS.

Names. Cynghalese. Botanical.	Locality. Provinces.	Weight, per cubic foot.	Durability.	Uses, &c.
		lbs.	years.	
46 Kadoembeiriye. Bastard Ebony.	Western.	45	40	Furniture. The heart of this wood is occasionally met with of extraordinary beauty.
47 Kiri walla. Lance leaved Echites.	Northern.	35	30	Used principally for inlaying ornamental furniture and cabinet work.
48 Book attene. Echites scholaris.	Western.	26		Coffins.
49 Timbery. Embryopteris glutinifera.	Northern.	45	20	Common house buildings. The juice of the fruit is used to rub over fishing lines for the purpose of hardening and preserving them.
50 Walboamboo. Eugenia laurina.	Central.	36	15	Common house buildings.
51 Naw-Iron wood. Mesua ferrea.	Western.	72	10—60	Bridges and buildings, &c.
52 Kiripelle. Indian fig tree. Ficus indica.	Southern.	30	20—30	Common furniture and house buildings.
53 Hunukirille, Grewia paniculata.	Southern.	44	25	House building.
54 Belygobel. Telia leaved hibiscus.	Western.	38	20	Carriages, palanqueens and hackeries—found near rivers.
55 Nerreloo. Illicebrum latrum.	Central.	56	40	Common house building.
56 Dive ratembela. Jonesia asoca.	Northern.	58	25	Common house building.
57 Katie kale.	Eastern.	42	25—50	Common house building and in the construction of yettra dhonies.
58 Murute. Lagerstræmia reginæ.	W. & Southern.	42	30—40	Water casks and buildings.
M				
59 Hulanhick, Melia sp.	Central.	39	50	House building.
60 Ramenoidelle, Millingtonia sp.	Western.	48	20	Common house buildings. The sticks make excellent fences.
61 Sappoo. Michelia champa.	Central.	42	20—50	Carriages, palanqueens &c. also in buildings.
62 Sooriva Mara. Mimosa.	Central.	42	20—30	Buildings and common furniture.
63 Moone Mal. Mimusops elengi.	Southern.	61	50	House building and furniture.
64 Paloo. Mimusops hexandra.	Eastern.	68	10—70	Oil presses, bridges and buildings. The berries are eaten when ripe.
65 Morre. Eye ball,	Central.	62	25	Common house building. Berries eaten when ripe. Furnishes the best firewood for lime and brickkilns, next to Galmorre, Nephelium.
66 Etteiriye. Ash leaved Murraya.	Eastern.	61	10—70	Handles of mamoties, hammers and billhooks; and rafters for cadjan roofs.
N				
67 Helembe, Nauclea parviflora.	W. & Northern.	42	40	Common house building.
68 Nebede.	Sou. & Western.	51	20	Common house buildings.
69 Gal morre, Nephelium, sp.	Central.	65	30	House building. Berries are eaten when ripe by the natives. Supplies the best kind of fire-wood for brick and lime kilns.
O				
70 Koang. Ceylon Oak.	Southern.	42	5—10	Native oil presses and wooden anchors. Berries are eaten by the natives.
71 Melle. Olax Zeylanica.	Eastern.	64	40	Common house building.
P.				
72 Patkeale,	Western.	42	40	Common house building.
73 Penebarroo.	Eastern.	61	50—90	Rafters, &c. Fences made of the sticks of this tree are the most durable of all.

Names. Cynghalese. Botanical.	Locality. Provinces.	Weight, per cubic foot.	Durability.	Uses, &c.
		lbs.	years.	
74 Sooriya. Persian.	Central and Western.	49	20—40	Admirable for carriages, hackeries, a gunstock;—also useful for blocks a buildings.
75 Velenge. Pterospermum ruberifolium. R.	Central.	36	5—70	Poles of bullock carts, beetel trays, a gunstock.
76 Hirikoddol. Rhizophora. Sp.	W. & Northern.	49	35	Common house building. From t bark a dye is extracted.
77 Cadol. Leafy mangrove. Rhizophora.	Northern and Western.	65	40	Found chiefly near the mouth of the river —the wood is used for common hou buildings, and from the bark a dye extracted for colouring leather, ne sails &c.
78 Pehimbive. Rhus disipium.	Central.	68	50	Buildings.
79 Otte. Rottleria, sp.	Western.	36	10	Common house building.
S.				
80 Lawoloo. Sapota, sp.	Western.	39	10	Common house building. Berries are eat by the natives.
81 Pamburoo. Simonia citrifolia.	Southern.	48	40	House building &c. When variegated is a beautiful wood and is used for fu niture and cabinet works, Buoys f fishing nets, &c.
82 Daanga. Long flowered Spathodea.	N. and Western.	23		Buoys, for fishing nets, &c.
83 Telemboo, Sterculia fœtida.	Central.	26	30	Common house buildings.
84 Suvande.	Western.	56	30	Common house buildings.
85 Siyembela. Tamarindus Indica.	North Eastern and Western.	80	80	Oil presses, furniture and building. T fruit is a well known and agreeab article of diet.
86 Teak, Ceylon. Taikke Ceylemey. Tectona grandis.	Western.	55	15—60	Bridges and buildings.
87 Teak. Cochin. Taikke Cotchive.	Cochin.	44	15—90	Carts and waggons, bridges, building, a arrack casks. The wood of these cas imparts a fine colour and flavour to t arrack.
88 Teak, Maulmein. Taikke Molmine.	Maulmein.	42	15—90	Do. do. do. do.
89 Ukbeiriye.	Southern.	51	80	Common house buildings.
90 Hal. Vateria indica.	Western.	26	10	Packing cases, cielings, coffins, &c.
91 Caha Milile. Vitex trifoliata.	Southern and Western.	56	15—80	Water casks, pade boats, waggon wheel bullock carts, bridges and house buil ing.
92 Mecan Milile. Vitex trifoliata.	Western.	56	20—90	Bridges, pade-boats, carts and wagg wheels, water tubs, and house building
93 Sappoo Milile. Vitex trifoliata.	Western and Southern.	49	10—40	Water casks, cart and waggon wheel pade-boats, bridges and house building
94 Samedera. Vitmannia trifoliata.	Western.	26	60	Buoys, &c.
95 Walukeene.	W. & Southern.	39	10	Masts of dhonies.
96 Tarrene. Webera cerifera.	Northern.	57	30	Roofings, and in the construction fishing boats and dhonies.

(8198) *Chittagong Woods, by Capt. Marquart.*

1. Conocarpus, Buthna.
2. Diospyros melanoxylon.
3. Dipterocarpus, sargotiah.
4. Acacia, sp, koom koyre.
5. Swietenia chickrassia. Chuckrassee.

Circars; Northern Circars and *Godavery.*

The forests on the Godavery and on the mou tainous tracts which run parallel with the coa in the northern parts of the peninsula, furni a great variety of useful timbers and fancy woo of which perhaps only a small portion have be

determined and made known. The following lists from the Reports of the London Exhibition of 1851 and from that of Madras of 1857, enumerate some woods of value.

1 *Odina wodier*, Goompana wood. Goompana kurra.

2 Ganara wood. Ganara kurra.

3 *Feronia elephantum*. Wood-apple wood; Valaga kurra, Koweet, Vella marum.

4 *Pentaptera tomentosa*. Nulla muddi wood, Nulla muddi kurra : Caroomaroodum.

5 *Pentaptera glabra*. Tella muddi wood, Tella muddi kurra Vel maroodum marum.

6 *Cassia auriculata*. Tangada wood, Tangadu kurra, Auvarai marum.

7 Paya wood. Paya kurra.

8 Annen wood, Annen kurra.

9 *Morinda citrifolia*, Togara wood. Togara kurra.

10 Red dye wood, Vizianagrum Zemindary.

11 *Bombax Malabaricum* or *heptaphyllum* Boorooga wood, Buruga kurra.

12 *Strychnos potatorum*, Induga wood, Induga kurra. Thæ than marum.

13 *Cordia myxa*, Muckaroo wood; Mukkera kurra.

14 Tobica wood, Tobica kurra.

15 Tellavoolemara wood. Telloovoolemara kurra.

16 *Diospyros chloroxylon*, Nullavoolemara wood Nullaveloomara kurra Mimosa cinerea. Vulture wood, Vulture kurra.

17 Ficus racemosa Bodda wood, Bodda kurra.

18 Voodaga Voodaga wood.

19 *Pterospermum Heynei*, Lolooga wood Lolooga kurra.

20 *Thespesia populnea*, Gungrane wood, Gungarane kurra. 5. Poovarasa murum.

21 *Æschynomene grandiflora* Aguste wood.

22 *Erythrina Indica* Bandita wood, Bandita kurra

23 *Sapindus emarginatus* Soap-nut, or Koonkoodoo wood,-Koonkoodoo kurra.

24 Camooga wood, Kumoogamurum.

25 Doduga wood.

26 Cumba wood, Cumba kurra.

27 Goomoodoo wood, Goomoodoo kurra

28 Unkoodoo wood, Unkoodoo kurra.

29 Undooroo wood, Undooroo kurra.

30 Iscarawsee wood, Iscarawsee kurra.

31 Ghantha wood, Gantha kurra.

(8199) The following timber trees of the Godavery forests and of the Circars between Bhadrachellum and Condapillay are extracted from a Catalogue by Lieut B. H. Beddome, published in the Juries Reports of Madras Exhibition of 1857.

1 Ausandra, *Tel.* Acacia ferruginea, Wood very hard and useful: this tree is very like "Prosopis spicigera" when only in leaf.

2 Arawee Neem, *Tel.* Sclerostylis atalantioides. This tree I found in the Circars only. Wood yellow and very hard, might be used as a substitute for box : it is always small however.

3 Balsu, *Tel* Canthium parviflorum, A dark colored hard and pretty wood; good for turning.

4 Bare Kala goru, *Tel.* Spathodea Roxburghii. Wood is said to be useless. Roxburgh however says that it is used for various purposes. Buffaloes are very fond of the leaves.

5 Boja, Godavery Forests, Kouda tangedu. (Circars,) *Tel.* Inga xylocarpa. A valuable timber, grows very large on the mountains.

6 Bilugu. *Tel.* Chloroxylon Swietenia. The satin wood.

7 Buta karamee, *Tel.* Nauclea parviflora. Wood close grained and hard.

8 Badama, *Tel.* Terminalia Catappa. Wood very strong.

9 Botku, *Tel.* Cordia, new species. A very beautiful wood. It would answer as a substitute for Maple for picture frames &c. This tree is abundant in the Godavery Forests near Mahadeopore : it does not extend down to the Circars. It is found near Warungul. It also is indigenous to the Jubbulpore forests, where it is called "Deyngan." It is I feel certain the tree described by Dr. Griffiths as "Hemigymna Macleodii." He described it from dried specimens and thought that the leaves were opposite (instead of alternate) otherwise his description and native name agree.

10 Chinta, *Tel.* Tamarindus India. The tamarind tree, a beautifully grained wood.

11 Chilla, *Tel.* Strychnos potatorum, A very hard and close grained wood.

12 Chitla Matta, *Tel* Gardenia gummifera. A small tree. The wood is hard. The natives eat the fruit.

13 Chandam, *Tel.* Pterocarpus santalinus. A hard red wood, not found on the right bank of the Godavery.

14 Chilka dudugu, *Tel.* Guatteria cerasoides. Appears to be a tolerably hard wood and does not seem to warp. The natives however on the Godavery do not use it, and say that it is soft.

15 China nagee, *Tel.* Lagerstræmia parviflora, Wood said to be good.

16 Chinna kalinga, *Tel.* Dillenia pentagyna. A very strong, hard wood, abundant on the Indrawatty and in jungles on the left bank of Godavery ; not known on the right bank.

17 Chinna botku, *Tel.* Cordia angustifolia. Wood used for posts and in house building. This tree is common about villages in the Circars, but I never, I think, saw it in the jungles.

18 Duria maddee also kora maddee and koraman, *Tel.* Briedelia spinosa. Wood appears to be very strong and good. Cattle eat the leaves most voraciously.

19 Dulchirram, *Tel.* Acacia Halkora. An enormous tree. Wood hard and reddish.

20 Dudippa (Godavery Forests), Chetippa

(Circars). *Tel.* Hymenodyction. A large tree. Wood not used in the Godavery forests.

21 Googal, *Tel.* Shorea robusta, Abundant on the banks of the Indrawatty—a valuable timber. This tree yields the dammer.

22 Goomer tek, *Tel.* Gmelina arborea. The large trees of this yield a very hard durable wood. The yoke for Bullocks is made from it.

23 Ippee, *Tel.* Bassia latifolia. A strong wood, but never felled by the natives, the flowers yield a toddy, and an oil is extracted from the seeds.

24 Irkee (Godavery), Pedabotku (Circars), *Tel.* Cordia myxa. Wood never used by the natives in the Godavery forests. In the Circars ploughs are made from it.

25 Jitegee [Godavery Forests] Yeroogoodoo [Circars] *Tel.* Dalbergia latifolia. A valuable mottled black timber.

26 Jana, *Tel.* Grewia Rothii? Wood very hard and much used in the Circars.

27 Jammee, *Tel* Prosopis spicigera. The natives say that this wood is very inferior.

28 Kanregu, *Tel.* Flacourtia sapida. A very hard close grained wood which does not warp—worthy of attention.

29 Karinga (Godavery Forests) [Pella Manga circars], *Tel.* Gardenia lucida. Wood not used on the Godavery but it is in the Circars. It seems to be very hard and close grained and adapted for turning.

30 Koree (Godavery Forests), Korivipal (Circars), *Tel.* Ixora parviflora. A hard wood.

31. Koorseea—Koorsee, *Tel.* Cluytia collina, Wood very hard and reddish.

32 Kala goru, *Tel.* Bignonia chelonoides. A good fancy wood—abundant on the right bank of Godavery. I did not meet with this or B. suaveolens in the Circars.

33 Kalagoru, *Tel.* Bignonia suaveolens. Wood very similar to B : chelonoides, but of a redder hue.

34 Karchcea. *Tel.* Nyctanthes arbortristis. A hard useful wood—does not attain much size.

35 Karaka. *Tel.* Terminalia chebula. A very hard valuable timber.

36 Kanigu. *Tel.* Pongamia glabra. Wood said to be strong, it does not appear to be used.

37 Komee. *Tel.* Stylocoryne Webera. Wood prettily marked and hard—much esteemed by the natives—it is very small however.

38 Kankadu. *Tel.* Sapindus emarginatus. A yellowish prettily grained wood—it is tolerably hard.

39 Koila Mookree (Circars's and lower Godavery jungles) *Tel.* Wrightea tomentosa. Wood not used—it appears close grained. The juice is a permanent yellow dye. Bark given internally for scorpion bites.

40 Lolugu, *Tel.* Ptereospermum bynea? Wood pinkish and hard, it is generally hollow in the centre.

41 Manchee jamudu. *Tel.* Euphorbia tirucalli, Grows to a large tree. Wood seems hard but i not used.

42 Mamari. *Tel.* Mangifera Indica, the Mang tree.

43 Mushtee or Musadee. *Tel.* Strychnos nu vomica. Wood very hard and strong—white ant will not touch it.

44 Maredu. *Tel.* Ægle marmelos, Wood ver strong. The native dhol is often made from thi wood.

45 Marree. *Tel.* Caryota urens. Abundant o the banks of the Indrawatty—it yields a win and also a meal like sago.

46 Makkam. *Tel.* Schrebera swietenoides A very hard valuable wood—it never warps.

47 Marree. *Tel.* Ficus Indica. The drops o this tree yield a heavy hard timber.

48 Muchi twikee (Godavery forests) Warur gul. *Tel.* Diospyros : sp. A very hard light colore wood.

49 Nerar. *Tel.* Syzygium jambolanum. Woo said to be strong.

50 Nar yepa (Godavery). *Tel.* Hardwicki binata Wood red, very hard and heavy ; ofte hollow in the centre.

51 Nulla muddi, *Tel.* Terminalia tomentos also T. coriacea. Valuable well known timbers.

52 Nara botku, *Tel.* Eriochlena Hookeriana A strong hard wood—(something like the Botku a new species of Cordia)

53 Naooru also Nagool, *Tel.* Premna tomen tosa. A pretty looking wood—worthy of atten tion as a fancy wood.

54 Nulla sandra, *Tel.* Acacia sundra. A ver hard wood—on the Godavery the musal is al ways made from this wood.

55 Nulla kaka mushti, (Circars only.) *Te* Diospyros, sp, D. Sylrtica? Wood whitish an very hard.

56 Nalla mauga, (Circars only.) *Tel.* Randia sp Wood very hard and close grained—a good woo for turning—(a good sized tree armed.)

57 Nulla regoo (Godavery Forests) *Tel.* Car thium didymum. Centre wood mottled and of dark color like old seasoned oak.

58 Nakeera, Ximenia americana. Wood onl used for fuel.

59 Nowlee eragoo, *Tel.* Vitex arborea. Woo hard of a yellowish brown color.

60 Nalla muddee, *Tel.* Maba buxifolia. Ver small—but a hard pretty wood.

61 Pashee also Paunchee, *Tel* Anogeissu acuminatus. A very strong hard timber.

62 Peda sopara (Godavery Forests,) Yerra pa seroo (circars). *Tel.* Dalbergia frondosa. A stron useful timber.

63 Porilla sopara (Godavery) Tella patsarc (circars) *Tel.* Dalbergia paniculata. Wood pe fectly useless—it is arranged in rings with soft substance in between layers.

64 Pal dautam (Godavery). Peda pul me

(Circars). *Tel.* Ehretia lœvis, A hard valuable wood, though not of great size.

65 Peda Karinga, *Tel.* Gardenia latifolia, Wood close grained; promises well for turning.

66 Papirree also Papatta, *Tel.* Pavetta tomentosa. Wood hard but very small.

67 Pedda man, *Tel.* Ailanthus excelsa. Wood soft, never used by the natives.

68 Paspoo Karamee (also Bundaroo) *Tel.* Nauclea cordifolia. A yellowish valuable wood; that of the very large trees is very superior—from smaller trees it seems rather soft.

69 Pul i-shinta, *Tel.* Bauhinia: sp. Said to be a good hard wood—not apparently described. Legume filled with a scented pith.

70 Palla, also peda palla, *Tel.* Mimusops hexandra. Wood very hard.

71 Poosku *Tel.* Schleichera trijuga Most abundant in Godavery forests. Wood hard, heavy and strong. The large musal for pressing the Sesamum Oil is always made of it—also ploughs.

72 Peda kalinga, *Tel.* Dillenia speciosa. A very hard wood. In jungles on the N. of Godavary.

73 Peda dulchirram, *Tel.* Godavery, Dirasau, Circars. Acacia speciosa. A valuable timber.

74 Pedda chilka dudugu, *Tel.* Uvaria tomentosa. A very strong yellow wood, much similar but superior to "Nauclea cordifolia." Cowars are made from it—also used in house building—it does not warp.

75 Peda kal mesura, *Tel.* Casearia sp. Wood light yellow, hard, does not warp—worthy of attention. A large tree—leaves ovate, oblong glabrous, serrulate, flowers 8 anthers capsule 3 valved with 3 ridges on the outside of fruit. Fruit used to poison fish.

76 Patcha botku (Circars only) *Tel.* Cordia polygama. Strong close grained wood (small and crooked.)

77 Poonkee, *Tel.* Gyrocarpus Jacquini. Wood soft and light, much used for making cowrie boxes and toys, takes paint and varnish well. Tella poonkee "Givotea Rottleriformis" is used also for the same purposes.

78 Reygutti, *Tel.* Capparis grandis. Wood very hard and good.

79 Renga, *Tel.* Zyziphus jujuba. Wood strong and much used by the natives.

80 Sheriman, *Tel.* Anogeissus latifolius. Wood said to be one of the hardest in the forests. It grows to an enormous size. Axils of carts generally made of this.

81 Soomee, *Tel.* Soymida febrifuga. Wood very hard and valuable—never rots under ground—very much used in building—of a reddish color.

82 Tek, *Tel.* Tectona grandis. The teak tree.

83 Tella Maddee, *Tel.* Terminalia glabra. A well known timber.

84 Torelaga, *Tel.* Limonia acidissima. Wood very hard—worthy of attention.

85 Telega (Godavery forests and Dekhan) *Tel.* Gardenia sp. Wood very hard, would be very good for turning.

86 Tharra, *Tel.* Grewia tiliæfolia. Grows very large on the mountains—a valuable timber—much used for handles of axes, pellet bows, cowars, walking sticks.

87 Tunkee (Godavery) tookee (Circars) *Tel.* Diospyros melanoxylon. The centre wood black and very heavy. The Godavery ebony.

88 Tella motku, *Tel.* Dalbergia Oojeinensis. Wood valuable—it is rather rare.

89 Thabsee, *Tel.* Sterculia urens. Wood soft and useless.

90 Tella sopara. (Godavery forests only) *Tel.* Acacia elata. Wood strong and much valued.

91 Telsoo (Godavery) Shinduga (Circars) *Tel.* Acacia odoratissima. A valuable well known timber.

92 Togaree Mogillee (Godavery) Mogillee (Circars,) *Tel.* Morinda exserta. Wood hard and useful, does not warp.

93 Tella sandra, *Tel.* Acacia suma Wood very good and strong—abundant in the Aukeesah jungles.

94 Tella tuma, Acacia leucophlæa. Wood hard—it is used for various purposes by the natives.

95 Tuma, *Tel.* Acacia Arabica. Wood valuable and well known,

96 Tella Manga, *Tel.* Gardenia lucida. A close grained wood. I think it well adapted for the lathe.

97 Tedla pal, *Tel.* Wrightia tinctoria. A beautiful wood, hard and like ivory—most valuable for turning.

98 Tella kaka Mushtee, (Circars only,) *Tel.* Sponia? Appears to be Celtis Wightii of Wight's Icones. One of the hardest woods I have ever met with—light colored, well worthy of attention.

99 Tellapoonkee (Circar hills only,) *Tel.* Givotia Rottleriformis. A very light soft wood—See remarks under Poonkee.

100 Usarka, *Tel.* Emblica officinalis. A hard valuable wood.

101 Ulinda also Yelinda, *Tel.* Diospyros chloroxylon? A very hard useful wood, grows to a large tree on Circar mountains; it is generally a shrub about the Godavery forests.

102 Uskia Man (Godavery) Uri-widee (Circars), *Tel.* Cratoeva Roxburghii. Wood very hard. The native dhol is often made of this wood.

103 Udugu, *Tel.* Alangium decapetalum. An ornamental, beautiful wood—attains a fair size in the forests.

104 Wodee, *Tel.* Spathodea Rheedii, (Bignonia spathacea Roxburgh.) Wood strong, whitish.

105 Yeggee, *Tel.* Pterocarpus marsupium, A well known timber. The native dhol is often made of this.

106 Yepa also Yapa, *Tel.* Azadirachta Indica. A valuable timber.

107 Sterculia colorata (Godavery forests,) Wood useless.

108 Bignonia xylocarpa. Wood very hard, tree rare in Godavery forests.

(8200) *Coimbatore List* by Dr. WIGHT, of 133 woods procurable in the Coimbatore district.

1. Diospyros ebenaster Ainsl. *Ebenaceæ* Icon. 188. Acha marum. Tam. This name is copied from Ainslie and I am still uncertain whether this is the species that yields the ebony of the Palghaut jungles, as there is reason to believe more than one species contributes wood black enough to pass current for ebony. The plant produced to me, under that tamool name, is Bauhinia tomentosa a widely different tree but having a very dark or black heart-wood.

2 Chickrassa tabularis. *Cedrelaceæ*, Ill. 55. Aglay marum, Tam. This is the Swietenia chickrassa of Roxburgh and Ainslie, the Chittagong-wood of commerce. Here it, in common with one or two other light red coloured woods, currently passes under the general name of cedar and bastard cedar, and all are extensively employed in cabinet making, this has quite a cedar-like smell.

3 Alangium decapetalum. *Alangieæ*, Icon. 194. Alingie marum, Tam. The wood of this small tree is said by Roxb. to be "beautiful" and when tried was found to sustain a weight of 310 lbs., but it wants size. I have never seen a tree that would give a 10 inch wide plank.

4 Artocarpus hirsuta. *Artocarpeæ*. Angelly marum. Tam. This is the Artocarpus pubescens of Willd. and Ainslie, it is scarcely entitled to a place in this list of Coimbatore woods, being a native of the coast and not extending so far inland. It is a large tree used on the coast for making canoes and such like purposes.

5 Odina woodier *Terebinthaceæ*, Icon, 60 Anny currer or woody maram. Tam. Called also oodav and generally supposed a very useless tree. The wood is very difficult to season requiring to be kept, even in planks, 2 or 3 years, but once well seasoned it is a close grained beautiful wood well adapted for cabinet-making pur-poses.

6 Bauhinia racemosa. *Leguminosæ*. Atche marum, Tam. This is B. parviflora of Roxb., not mentioned by Ainslie. The tree is small but the heart wood exceedingly hard and fine. The bark furnishes a kind of natural rope, being merely peeled and slightly twisted when it is ready for use.

7 Ulmus integrifolia. *Ulmaceæ*. Ayah marum. Tam. large sized tree, wood reddish coloured, good for general purposes—said to yield to boiling water a peculiar odour, which when mixed with common arrack gives it the flavour of the more expensive palmira arrack and enables the venders to obtain better prices for their adulterated article.

8 Givotia Rottleriformis. *Euphorbiaceæ*. Bootallie marum. It seems curious that this tree, so common in Southern India, has not yet been named in any work of systematic botany. I have not yet learned any thing regarding the timber, one carpenter here speaks disparagingly of it, but I do not consider him a trustworthy authority.

9 Bauhinia tomentosa, Ains. *Leguminosæ*, Caat Attie (ebony, Ains-) Tam. This like the atche marum is a strong very dark coloured wood, hence I presume, the name *ebony*. Even the younger branches show the heart-wood very dark brown, the bark of this is also employed as extempory cordage. The plant furnished to me under this name is *bauhinia racemosa*.

10 Lagerstrœmia reginæ. *Salicarieæ*, Icon. 413, Cadali pua. Tam. This tree is more celebrated for its large handsome flowers than for its timber, which last however is used for common purposes.

11 Terminalia Belerica, *Combretaceæ*, Ill, 91, Cattoo eloopœ marum. This is a very large tree, the wood white and rather soft, and considered only fit for fuel,

12 Soymida febrifuga. *Cedrelaceæ*, Roxb, D, 17, Choar kullee marum. This is the Swietenia febrifuga of Roxb, and Ainslie, I have not seen the wood and only know of its existence here from Botanical specimens of the tree brought under that Native name. The wood is said to be most durable and strong.

13 Gmelina arborea. *Verbenaceæ*, Icon. 1470. Coommy marum, Tam. A moderate sized tree rather frequent on the Malabar coast. I do not know any thing of the timber. It is the G. Rheedii of Hooker's Bot. Magazine.

14 Putranjiva Roxburghii. *Euphorbiaceæ*, Royle's Illust. 100 Curroopallay maram, Tam. I have not seen this tree, but Roxburgh describes it as a large timber tree with an erect straight trunk. The wood is white, close grained and very hard.

15 Acacia sundra. *Mimoseæ*, Roxb, C. 225, Currengally maram, Tam. A rather large sized tree wood dark coloured, very strong, a one inch bar sustaining a weight of 500 lbs. it is rather abundant in the jungles here.

16 Terminalia glabra, *Combretaceæ*, Icon, 196. nearly represents this species. Curry mardah marum, Tam. A large tree, wood dark coloured very hard, heavy and strong, inch bars bearing from 430 to 450 lbs. of this large beams are readily procurable for house building purposes. See Marudum.

17 Garuga pinnata. *Terebinthaceæ*, Icon. 1594. Curry vaimooo marum, Tam. A considerable sized tree with a round umbrageous head. I am not yet acquainted with the wood.

18 Acacia odoratissima. *Mimoseæ*, Roxb, C., 120, Curry vaugay marum. A dark coloured strong and heavy wood, takes a good polish, can be obtained in considerable abundance and of good size, viz., about 1 foot square beams, is well fitted for naves of wheels, sustained 570 lbs.

19. Acacia Arabica, *Mimoseæ*, Roxb, C. 149, Curvaila marum, Under the name of Babool this

very hard wood is extensively known, but is too small for most purposes, principally used for plough shares and naves of wheels.

20 Lagerstrœmia microcarpa, *Salicarieæ*. Icon, 1169, Venteak, ven bugum ? Cutchay cuttay marum, Tam. This tree attains a large size and for common purposes, where timber of inferior quality is sufficient, is very useful being easily worked. Tested by the scale it only bore 290 lbs., on a second trial however it sustained 374 lbs. were it more strong and durable the length and straightness of the stem would adapt it for spars.

21 Dalbergia sessoides. *Leguminosæ*. Eatty or vitty marum, Tam. This is perhaps the best known in our jungles of the trees yielding black wood, but there are several others as good or perhaps better. It abounds in the Palghaut forests but is rarely met with now of great size, when it and its congener Dalb. latifolia are carried to Madras it becomes one of the rose woods of the furniture shops.

22 Ficus T'siela Roxb. *Moreæ*, Icon. 668. Eichie marum, Tam. I presume, like all the other species of ficus this is of very little value as timber, the people here know nothing of it.

23 Eriodendron anfractuosum, *Bombaceæ*, Icon. 400. Elavum marum, Tam. A soft, almost worthless wood, used by Mootchee men for making toys, and such like purposes.

24 Bassia longifolia. *Sapotaceæ*, Ill. 147. Elooppæ marum, Tam. A light coloured hard and durable wood nearly equal in these respects to teak, but much smaller. Here it is much used in the construction of carts, where great strength is called for. In Malabar, where it attains a large size, it is used for spars.

Enny curray marum. See Curry vaimboo.

25 Dalbergia latifolia. *Leguminosæ*. Icon. 1156. Erooppoottoo marum. Tam. This tree seems less abundant here than the eatty marum, perhaps from being more sought after as yielding more valuable timber; it is very dark, heavy and strong, sustaining a weight of 515 lbs.

26 Inga xylocarpa. *Mimoseæ*. Roxb. c. 100. Eroovaloo marum, Tam. A dark coloured, hard and very strong wood, excellent for naves of wheels and indeed for all purposes demanding great strength, I believe it is abundant in the Walliar forests. An inch bar sustained 550 lbs

Kaduki marum. Tam. See pillay murdah.

27 Euphorbia Tirucalli. *Euphorbaiceæ*. Kulli (milk hedge.) Tam. I have never seen this wood used, but have often heard it spoken of as excellent for gun stocks. To me it seems too light coloured.

28 Atalantia monophylla. *Aurantiaceæ*, Icon. 161, Kat yelloo mitch marum, Tam. A small sized tree, wood white, very fine and close-grained, and but for its want of size well adapted for cabinet purposes.

29 Limonia alata. *Aurantiaceæ*, Ill. 41. Kat yelloo mitch marum. Tam. Tree small but the wood is remarkably close grained, hard and heavy. It is a pale yellow or straw coloured, if procurable of adequate size would be very valuable.

30 Casearia elliptica. *Samydeæ*. Klaare marum. Tam, This is a large shrub rather than a tree, the wood therefore can be of little value except for ornamental purposes. It is smooth, fine grained and yellow coloured.

31 Cassia fistula, *Leguminosæ*. Koannay marum, Tam. On the Eastern side of the ghauts, a small tree of great beauty when in flower, but too small to yield useful timber; in the Malabar forests, however, it attains sufficient size to adapt it for spars for native vessels. The wood, which is close grained, is used for making tomtoms, &c.

32 Zizyphus Œnoplia, *Rhamneæ*, Koattay marum. Tam. Specimens of this were brought as belonging to the class of timbers; but if used at all, it can only be for small ornamental work.

33 Eugenia jambolanum. *Myrtaceæ*: Icon. 535. Koattay naga marum, Tam. Of this wood I have no knowledge, it is said to be brittle and bad, but is described by Ainslie as fit for house building purposes.

34 Chloroxylon swietenia. *Cedre'aceæ*, Ill. 56 bis. Kodawah porsh, Tam. This is the satin wood, so highly esteemed in Ceylon where it attains a large size. Until very lately I have never seen it exceed a good sized shrub in India. I have now planks 15 inches broad from the Annaimmully. The wood is very close grained, takes a fine polish and is fit for all kinds of ornamental purposes. In Ceylon where it is abundant and well known, it is very highly esteemed. Their shell boxes are made of it.

Kola murdah. See villay murdah.

35 Premna tomentosa. *Verbenaceæ*, Icon. 1468. Kolcuttay Teak marum, Tam. A small tree, the wood hard and close grained, of a brownish yellow colour, well fitted for ornamental purposes.

36. Holarrhena Codaga. *Apocyneæ*, Icon. 1292. Kooda pallei marum, Tam. A white small sized wood but very fine grained, employed in cabinet-making.

37 Gmelina asiatica. *Verbenaceæ* Ill. 174. Koomsla, maram Tam. This scarcely merits a place in this list, at least so far as I have ever seen it. The plant rarely attains the size of even a large shrub.

38 Zizyphus glabrata. *Rhamneæ*, Icon. 282. Kurkatta marum, Tam. A moderate sized tree but the timber excellent, hard, close grained and takes an excellent polish. It is of a light brownish colour. I have recently seen trees that would give 12 inch planks.

36 Mangifera Indica. *Terebinthaceæ* Maah marum, Tam. This timber seems but little used here and no wonder, since so many much better kinds are to be had for the cutting and fetching.

40 Mimusops elengi. *Sapotaceæ*, Icon. 1589. Maghidam marum, Tam. The quality of the

wood is unknown to me, and, being so much a cultivated plant, it is not probable that it is much used and is therefore little known.

41 Melia azadirachta. *Meliaceæ*, Icon. 160. Malay vaimboo marum, Tam. A soft reddish coloured, rather loose textured wood, which however takes a pretty good polish, and is much used here for cabinet-making purposes, under the name of bastard cedar.

Malay kongie (See 129 end of list) here.

42 Bauhinia acuminata. *Leguminosæ*. Mandareh, Tam. This is the B. candida Ainslie, which some botanists think a variety of koochnal (B. variegata) a larger and more common tree; both are rare here and I am not acquainted with the quality of the wood.

43 Terminalia alata (Ainslie), Terminalia tomentosa Roxb. *Combretaceæ*, Icon 195. Marudam marum, Tam. A large and useful timber tree, employed on the coast for house building and making canoes. I have not seen it in use here, it only differs externally from curry murdah in being hairy, so that the same plate serves for both species.

44 Randea dumetorum. *Rubiaceæ*, Icon. 580. Madoocarray marum, Tam. This seldom exceeds the size of a large shrub and therefore scarcely merits notice here, the wood is hard and close grained. The fruit is used in Malabar to poison fish.

45 Cratœva Roxburghii. *Capparideæ*. Mavoolinga marum, Tam. This the Cratœva Tapia of Ainslie, not of Linnæus; I am unacquainted with the timber which Ainslie states to be used for many common purposes.

46 Briedelia spinosa? *Euphorbiaceæ*, Roxb. c. 171. Moolloo vengay marum, Tam. Wood not known here, though the tree is not uncommon and attains a considerable size in the alpine jungles.

47 Premna integrifolia. *Verbenaceæ*, Icon. 1469. Moonnay marum, Tam. A common but usually a small tree, so that the timber is only useful for common purposes.

48 Erythrina indica. *Leguminosæ*, Icon. 58. Moorkoo marum, Tam. The mootchie wood of the English; a large tree, but the wood soft and only fit for mootchie work.

49 Nauclea cordifolia. *Rubiaceæ*, Roxb. c. 53. Munja cadumbay or adumbay, Tam. A pretty, close grained, yellow wood, but soft. It is easily worked, attains a rather large size and is much used for common purposes, on trial it sustained a weight of 320 lbs.

50 Morinda citrifolia. *Rubiaceæ*. Munja pavuta marum, Tam. The wood of this tree is a deep brownish yellow and the roots are said to be used in dyeing. The quality of the wood, judging simply from the appearance, is little if at all inferior, to the preceding; but the tree is much smaller.

51 Hydnocarpus inebreans. *Flacourtianeæ*, Icon. 942. Murravuttay marum, Tam. A common tree on the west coast, not so in the Coimbatore jungles. The quality of the wood is unknown to me.

52 Ehretia ovalifolia. *Borragineæ* 1383. Naraga marum, Tam. A common but generally small tree in the Coimbatore district. I am still unacquainted with the quality of the timber said to be useless.

53 Cordea Rothii, Icon, 1379. Cordea obliqua, Icon. 1378. Cordea fulvosa, Icon. 1380. *Borragineæ*. Narvillie marum, Tam. This Tamool name seems to be applied indiscriminately to three or four species of the genus, so that it is impossible to say which is the one meant. Cordea obliqua, C. Rothii and C. fulvosa have all been brought to me under this name. I believe the wood of all is very inferior, the trees being usually small.

54 Terminalia catappa. *Combreteceæ*, Icon. 172. Nat vadom cottay marum, Tam. A beautiful tree which attains a large size in Malabar, where the wood is much esteemed, it is little known here, It is the Almond tree of the English so called with reference to the shape of the fruit, oval and flattened, but the kernel is cylindrical.

55 Eugenia caryophyllefolium. *Myrtaceæ*, Icon. 553. Naurei narvillie or nawel marum, Tam. I suspect this is the same as koattay naga above 33. This is Ainslie's Calyptranthes caryophyllifolia, and his favorable account of the timber is such, as its appearance would lead one to expect.

56 Nauclea parviflora. *Rubiaceæ*, Ill. 123. Neer cuddembay marum, Tam. This is a strong fine grained timber, sustaining a weight of 400 lbs. Beams of considerable size are procurable. The wood is dark colored and close grained, but according to Roxburgh, soon rots if exposed to wet. From the fineness of its grain it seems well fitted for cabinet purposes, and has the advantage of being easily worked.

57 Antidesma alexiteria. *Antidesmeæ*. Nolhæ talie marum, Tam. A common enough jungle tree and a very handsome one, but I know nothing of the timber.

58 Morinda citrifolia *Rubiaceæ*. Nonna marum, Tam. This is the proper Tamool name for the munjee pavuttay, see above No. 50, *Morinda umbellata* is a climbing plant, and hence unfit for use as a timber, but has the same Tamool name.

59 Guatteria cerasoides. *Anonaceæ*, Roxb. C. 33. Noolœly marum, Tam. A moderate sized tree, wood white and close grained, at least as seen in a three or four years old branch, I have not seen it as it appears in the trunk.

60 Gardenia turgida? Nunjoonda marum, Tam. I only know this from small specimens, and am unable to say whether it is a tree or shrub, but believe the former; the wood which

is hard and close grained, is useful in cases where small timber will serve.

61 Balanetes Ægyptiaca. *Rutaceæ*, Icon. 274. Nunjoonda marum, Tam. A small tree, the wood is said to be only good for fuel. These 2 trees though sent to me under the same vernacular name, are most widely different, both as regards economical qualities and botanical characters and relations. I thence infer some mistake on the part of those who gave me these names.

62 Tectona ? Oomy takoo marum, Tam, I am as yet uncertain whether to view this as a variety or distinct species of teak. Specimens tested here proved very inferior in strength to the true teak, breaking with a weight of only 300 lbs., while the other sustained above 400.

63 Stereospermum suaveolens. *Bignoniaceæ*, Icon. 1341. Padrie marum, Tam. A considerable tree, frequent in the Walliar jungles, wood strong and elastic (said to be fitted for making bows), wood dark and good.

64 Artocarpus integrifolia. *Artocarpeæ*. Pillah or peela marum, (jack.) Tam. This is an excellent timber, at first yellow, but afterwards changing to brown, when made into tables and well kept, it soon attains a polish little inferior to mahogany.

65 Careya arborea. *Myrtaceæ*. Ill. 99, Pailæ marum, Tam. Wood said to be bad, the bark however furnishes a ready made cordage.

66 Wrightia tinctoria. *Apocynaceæ*, Icon. 444. Pallay marum, Tam. A common tree in the Coimbatore jungles, where it attains a considerable size, wood white and close grained; in the words of Roxb. "coming nearer to ivory than any I know." It is not however much in use here.

67 Calosanthes indica. *Bignoniaceæ*, Icon. 1337. Pana woodachie marum, Tam. Said to be a very soft and juicy wood, of no value.

68 Garcinia ? glutinifera. *Ainslie*. Panichekai marum, Tam. This is one of the very few trees admitted into this list that I have not myself seen and verified, and is introduced in the hope that some resident on the Malabar Coast, will favour me with specimens to determine its name and botanical relations.

69 Borassus flabelliformis, *Palmæ*. Panna marum, Tam. Old black wood of the palmira, is, next to that of Casuarina, the strongest I have seen tried; one specimen bore upwards of 700 lbs. and 5 of them gave an average of 648, though some were very bad.

70 Hymenodyction utile. *Rubiaceæ*, Icon 1156. Peroonjoly marum, Tam. When I first gathered specimens of this tree, I was informed that it furnished the wood called bastard cedar. This information if correct at all can only be partially so, as I have since found 2 others similarly reported, the tree attains a large size and the heart wood is red, but its qualities I have still to learn.

71 Ailanthus excelsa, *Zanthoxylaceæ*. Ill. 67, Peru marum, Tam. This tree resembles the ash in its general appearance and attains a large size The wood is said to be hard, close grained and heavy, fit for gun stocks. I am told that in Bombay it is much used in cabinet-making, but greatly doubt the correctness of this information.

72 Terminalia chebula, *Combretaceæ*. Pilla murdah marum, Tam. This is a most gigantic tree, furnishing planks 3 feet broad. It is a dark coloured, heavy and hard wood, but very cross grained and difficult to work. It sustained about 400 lbs.

73 Calophyllum inophyllum. *Guttiferæ*, Icon. 77. Pinnay or Poonnay marum, Tam. This tree is rare at this distance from the Coast, the wood is coarse grained, but very strong and durable, and on the Coast is used in ship building. In the alpine forests, it attains a great size and furnishes the poon spars so valuable for shipping; so far as I can learn, there are two or three species of calophyllum used for the same purpose under the general name of poon.

74 Dillenia pentagyna, *Dilleniaceæ*. Pinnay marum, Tam The similarity of native names between this and calophyllum inophyllum leads me to suspect some mistake here. The wood of Dillenia pentagyna is said to be exceedingly strong and very durable even when buried under ground, but as I have not yet succeeded in getting specimens, I cannot venture to offer any opinion either as to the probability of this conjecture or the quality of the timber, which I might have done, had I seen and examined a good sample. Since this paper was written, says Dr. Wight, I have been informed that this, not the preceding, is the tree that furnishes the Poon spars, and judging from the manner of growth of the two trees I feel satisfied that this information is correct. This is a tall, the other a short stumted tree.

75. Sapindus emarginatus, *Sapindaceæ*. Poocha cottay marum, Tam, I suspect this is the same as Roxb. S. detergens. The fruit is used for the same puposes as indicated by the characteristic native name. His S. emarginatus may be a different plant as the fruit does not correspond. I do not know the wood further than that it is white, said to be only fit for fuel.

76 Bombax malabaricum. *Bombaceæ*, Ill 26. Poola marum, Tam. A large tree, but the timber soft and watery, of no value, scarcely fit even for fuel.

77 Tamarindus indica. *Leguminosæ*, Poolia marum, Tam. The wood of this well known tree is little used, perhaps from its liability to become hollow in the centre, so as to prevent good planks being obtained, it is hard, durable and finely veined.

78 Pongamia glabra, *Leguminosæ*. Icon, Poonga marum, Tam. Wood said here to be only

fit for fuel, Roxburgh on the contrary states that it serves for a variety of purposes. An oil is expressed from the seed.

79 Thespesia populnea, *Malvaceæ*. Icon. 8, Poorsung kai marum, Tam. A strong, hard, and durable timber, but rarely to be met with good, owing to the trees rotting in the heart, it grows best near the Coast.

80 Schleichera trijuga. *Sapindaceæ*. Poovoo or poo marum, Tam. Red strong hard wood, generally rather small, used to make pestles, spokes for bandy wheels and such purpose, where much strength in small space is required.

81 Nephelium longanum. *Sapindaceæ*. Poovutty marum. A moderate sized tree having a straight trunk and fine globular head. The wood is white, hard and close grained, but the carpenters here seem to be unacquainted with it.

82 Butea frondosa. *Leguminosæ* Roxb. c. 21. Porasum marum. Tam. I can get no information regarding the wood, but Roxburgh gives some most interesting information regarding the juices of the tree, as a dye and water colour.

83 Dalbergia paniculata. *Leguminosæ*, Roxb. c. 114 Putchalay marum. Tam. This tree attains a considerable size, but I am as yet unacquainted with the timber. It is said to be strong and being of considerable size, is fit for many purposes.

84 Prosopis spicigera. *Mimoseæ*, Roxb, c. 63. Purrembay marum. Tam. This tree attains a considerable size and the timber is strong and hard, used for bandy wheels and other common purposes. A specimen of this wood supported 592 lbs. Is it the same as the vunny marum? The botanical specimens which accompany both, belonged to Prosopis spicigera.

85 Spathodea arcuata. *Bignoniaceæ*. Icon. 1340 Rau-pallay-marum. A medium sized tree frequent in the Walliar jungles. I do not know the wood, but judging from its relations—padre and vadeni coorne, I infer it will be found good.

86 Grewia tiliæfolia. *Tiliaceæ*. Sadachoo or chaduchy marum. Tam. A considerable tree, the wood is soft and easily worked: useful for inferior building and common purposes; said to be unfit for cabinet purposes, for which in appearance it seems well adapted, on account of its hygrometric properties, which causes it to contract and expand, however well seasoned, with every change of the weather.

87 Myristica cinerea? *Myristiceæ*. Saudikai marum. Tam. A tall straight coloured, close, even grained apparently of fine quality.

Sauvady marum. See vadencoornie.

88. Pterocarpus santalinus, *Leguminosæ*. Segapoo Shandanum marum, Tam. I do not know the wood of this tree. It is brought to Coimbatore, in small quantites, from Mysore, and sells at an extravagant price (by weight) as a dye wood. It is certainly a congener of the Vengay which furnishes much of the Malabar Kino, the texture of both is the same, the colour only differs.

89 Acacia odoratissima. *Mimoseæ*, Roxb. c. 120. Sela yoonja marum, Tam. Perhaps there is some mistake in the native name. The specimens which accompany it, are those of acacia odoratissima (curray vaugy) and may not represent the true sela yoonja.

90 Elæodendron Roxburghii. *Celastrineæ*, Ill. 71, Seloopa marum, Tam. This tree is more remarkable for its fine form than the length and thickness of its bole, I do not know the wood, but if good, can only be fit for cabinet making and small sized objects.

91 Cinnamomum iners, Nees. *Laurineæ*, Icon. 122. bis, Sembela or pooli pilla, Tam. A tall tree, rather slender in proportion to its height. The wood is fine, even grained and supposed very good, but apparently has never been used by the carpenters here, as none of them are acquainted with it.

92 Sethia indica *Erythroxyleæ*, Ill. 48, Roxb. c. 88 Semboolinja marum, Tam. This I believe is the *Erythroxylon areolatum* of Ainslie, when largest it is still but a small tree. Ainslie states that the wood is so fragrant, that it is used in Mysore as a substitute for sandal wood,

93 Canthium parviflorum, *Rubiaceæ*, Roxb, c. 51, Sengaray marum, Tam. A small tree or rather moderate size shrub wood, close grained and hard, well fitted for turning small objects.

94 Santalum album, *Santalaceæ*. Roxb, C. Shandanum marum, Tam. This very valuable wood is found in abundance on the Hills which separate this district from Mysore, whence it is brought to Coimbatore for sale, its uses are too well known to require notice.

95 Semicarpus anacardium. *Terebinthaceæ*, Roxb. c. 12. Shayng cottay marum. Tam. The juice of this tree is so acrid, that wood cutters wont cut it until after it has been killed by ringing the bark. Wood reported of no value.

96 Soymeda febrifuga. *Cedrelaceæ*, Roxb. c. 17. Shem marum. This is another name for the Choar Kullie.

97 Michelia Nilagirica, *Magnoliaceæ*. Ill' 5. Icon, 938, Shemboogha marum, Tam. This tree is rare in the Walliar forests, being alpine in its tendencies. It is common on the Neilgherries, wood said to be good as regards strength, but too highly hygrometrical to be useful in other form than rafters or beams, though close and fine grained,

98 Strychnos potatorum, *Loganiaceæ*. Roxb, c, 5, Ill, 156. Taita marum, Tam. The fruit of this is the well known clearing nut. It forms a moderate sized tree, but I am not aware of the wood being used.

99 Terminalia belerica. *Combretaceæ*, Ill. 91. Roxb. c. 198. Tanikai marum or tonda marum. A large tree, wood white and soft, said by Roxburgh to be durable, but not much used. In

Malabar it is hollowed out for canoes, which however are said not to be lasting. It is not uncommon in the Walliar jungles but is considered of no value there. Perhaps the tree so called in Malabar is the Terminalia Berryi, which also attains a large size, and is more nearly allied to the Curry-murdah, as belonging to the same section of the genus,

100 Tectona grandis. *Verbenaceæ*, Roxb. c, 6, Teak marum, Tam. This is the well known and far famed teak. As regards the strength, as shown by the weight it is capable of sustaining, it is inferior to several others tried here. The average of 6 specimens was about, but under 400 lbs.

101 Capparis divaricata, *Capparideæ*. Icon. 889. Toarattie marum, Tam. A small sized tree, wood only fit for fuel.

102 Diospyros melanoxylon. *Ebenaceæ*, Roxb, c, 46, *Toombie* marum (ebony). A very large tree, only the very heart of which is black, all the rest white. The white wood is however used for common purposes.

103 Cedrela toona. *Cedrelaceæ*. Roxb. c. 238. Icon 161. Toona or toon marum, Tam. A valuable timber tree of large size, wood reddish coloured, used for cabinet-making purposes. It, or an allied species, is known here under the name of Wunjoolie marum, which see.

104 Cæsalpinia sappan, *Leguminosæ*, Roxb. c. 19, T'siapangum, Tam. Only used for dyeing. It is cultivated in Palghaut for the purpose of dyeing the straw used in mat making.

Ulloombul marum. See. Vadencoornie,

105 Dichrostachys cinerea. *Mimoseæ*, Roxb. c. 174. Vadatala marum, Tam. A small tree or rather large shrub, wood very hard and strong but too small for any except common purposes.

106 Bignonia xylocarpa. *Bignoniaceæ*, Icon. 1335-36, Vadencoornie marum, Tam. A large tree, wood brownish yellow, rather close grained, employed for cabinet-making, takes a good polish in turning.

107 Feronia elephantum, *Aurantiaceæ* Roxb. c. 141. Vaila marum, Tam. This is the wood apple. The tree attains a large size and the wood is hard and durable, the only specimen tried here bore 360 lbs.

108 Azadirachta indica, *Meliaceæ*, Icon. 17, Vaypum marum, Tam. A generally diffused tree, the wood compact and durable, used for making cart wheels, &c.

109 Vachellia farnesiana. *Mimoseæ*, Icon. 300. Veda vully marum, Tam. Deficient in size, in other respects good.

110 Stereospermum chelonoides. *Bignoniaceæ*, Icon. 1341. Vela pauthrie marum, Tam. Usually pronounced padrie marum, the flowers are very fragrant, and the tree a very handsome one, though not large. It is probable there is some confusion in the specimens, as the proper padrie marum is reddish, and this is called the white padrie, though the specimens seem to be the same as the other. This may easily happen as the trees are very like, being principally distinguished by the colour of the flowers, yellowish on this, brownish purple in that. Hence, perhaps, the two names, black and white pautherie. This is said to be stronger wood of the two.

111 Terminalia Berryi. *Combretaceæ*. Vellay murdah marum, Tam. This, judging from some introduced plants growing in Coimbatore, is a very large tree. The bark is quite smooth, and nearly as green as the leaves. The wood is white described as of ordinary quality, used on the Coast for canoes, and is used for making the broad wooden platters in use among fishermen and ship lascars.

112 Conocarpus latifolia. *Combretaceæ*, Icon. 994. Vellay naga marum, Tam. A tall handsome tree furnishing an excellent and very strong timber. The specimens tried here though not the best, sustained 500 lbs. Roxburgh speaks of it in very high terms.

113 Sterculea urens. *Byttneriaceæ*, Roxb. c. 24. Vellay pootallie marum, Tam. The wood of this very large tree is soft and loose grained, only fit for the most common purposes. The leaves when soaked in water have the property of rendering it ropy and glutinous. The bark yields a gum resembling gum tragacanth.

114 Capparis grandis. *Capparideæ*, Icon. 21. Vellay toarattie marum, Tam. A small tree, but the wood is close grained and hard, too small for general use.

115. Acacia leucophlœa. *Mimoseæ*, Roxb. c. 150. Vel vaila marum. A strong dark coloured wood, but generally rather small. The tree attains a medium size with a fine round head. The bark is a pale yellowish colour whence the specific name "leucophlœa."

116. Acacia speciosa or flexuosa. *Mimoseæ*. Vel vaugay marum. A common tree, frequent by road sides on account of the shade its large head affords. The wood is white at least as compared with the kurry vaugay, but is very strong and durable: in our trials it bore 560 lbs.

117. Pterocarpus marsupium. *Leguminosæ*. Roxb. c. 116. Vengay marum. A large and very beautiful tree, especially when in flower, the wood is dark coloured and strong, sustaining a weight of 370 to 400 lbs., but it is said to require being kept dry. It gives out to wet lime (white wash for example) a dark rusty brown colour which deteriorates it for house building. It yields a resinous substance which is collected in large quantities in Malabar and sent to England under the name of Kino.

118. Lagerstrœmea microcarpa. Ventekoo marum. Another name for cutchay cuttay, which see.

119. Ægle marmalos. *Aurantiaceæ*, Icon. 16, Roxb. c. 143. Vilva marum, Tam. Wood said to be of no value which seems unlikely to be true

as it belongs to a family (the orange tribe) which is remarkable for excellence of its timber, barring its size, which is usually rather small.

120. Nerium antidysentericum. *Apocynaceæ.* Veppalei marum, Tam. I take this name from Ainslie, but suspect it is another name for Kooda pallie, (which see) the Linnæan name belonging to a Ceylon plant, which I have not seen on the continent. The wood is said to be excellent for cabinet making purposes.

121 Diospyros cordifolia. *Ebenaceæ*, Roxb. c. 50, Ill. 148, Vuckana marum, Tam. A hard heavy wood, colour brown, said to be very strong, but difficult to work.

122. Prosopis spicigera ? *Mimoseæ*, Roxb. c, 63. Vunny marum. Tam. The specimens brought to me under this name were not in flower, but seem quite identical with those of the purrembay; this therefore is I believe the Tamool, the other the Malayalum name. The wood, if I have not mistaken the species, is very strong (sustaining nearly 600 lbs., is hard, straight grained and easily worked), but it may be another name for curreugally, the foliage of which is very like that of Prosopis spicigera.

123 Cluytea collina. *Euphorbiaceæ*, Roxb. c. 169, Woadoogoo marum. Tam. A small tree, frequent in the Walliar jungles: wood red coloured, exceedingly hard and durable but of small size: notwithstanding its hardness, being very even grained, it is easily worked, and is from its fine close grain a pretty wood.

124 Acacia catechu. *Mimoseæ*, Roxb. c. 175, Wodahalay marum, Tam. Said to be only fit for fuel. This surprises me as the woods of all the other arboreous species of the order (Mimoseæ) are proverbial for their excellence.

125 Acacia amara. *Mimoseæ*, Roxb, c, 122. Woonja marum, Tam. A pretty large tree, but of rather low stature: the wood dark coloured and hard. I have not yet had an opportunity of properly examining it.

126 Cedrela toona. *Cedrelaceæ*, Icon, 161, Wunjoolie marum. A very heavy and strong wood, hard, said to be admirably fitted for pestles and mortars and other purposes demanding great strength, but not for cabinet purposes; whence I suspect Roxburgh's toona and our Wunjoolie are different trees.

127 Zizyphus jujuba, *Rhamneæ*, Icon. 93, Yellanday marum, Tam. Tree usually of small size, but the wood fine grained and hard, fitted for cabinet-making purposes.

128 Strychnos nux vomica, Roxb, c, 4 *Loganiaceæ*, Icon, 434, Yetti marum, Tam. A small tree, wood white and hard, much used, when procurable, for Native plough shares.

129 Cullenea excelsa, *Bombaceæ*, 1761, Malay konjie marum, Tam. A very large and tall tree, trunk straight, from 60 to 80 feet high. Wood white, rather open grained, apparently not very good, but the outside sap-wood only was examined. Under the microscope its longitudinal section is very peculiar; altogether such as I have not elsewhere observed,

130 Rhus?—Sp? *Terebinthaceæ*. Coongilliya marum, Tam. This is the chloroxylon dupada of Buchanan and Ainslie. An undescribed name and judging from the leaves, one not required, which are clearly those of a rhus very nearly allied to Roxburgh's R. Bucki-amela but distinct. The qualities of the timber is unknown. The outer sap-wood is white, fine grained and heavy, apparently very good.

131. Vitex altissima. *Verbenaceæ*, Icon. 1466 Kat miella marum. This is a large tree, frequent on the lower slopes of the ghaut mountains, but I am not acquainted with the timber except in so far as can be learned from a small outside specimen which seems close grained. It is reported fit for cabinet purposes.

132 Canthium nitens? *Rubiaceæ*. Malay cauray, Tam. The wood of this, like that of the preceding, is unknown to me. The plant is described as a small tree. I only know it from the specimens which accompanied the name, but which were not accompanied with timber.

133 Hymenodyction obovatum. Icon 1159, Yella malakai marum, Tam. A tree, but I am unacquainted with its dimensions or quality of the wood; no specimens having been sent.—*Robert Wight.*

(8201) *Ganjam, Goomsoor, and Kimedy Forests, their timber trees, Timbers and Fancy-woods.*

Several lists of the trees of these forests are in our possession, but the most recent and valuable are from Lieutenant Macdonald from Ganjam and Lieut. Philipps from Kimmedy. In a memorandum which accompanied the list of Ganjam woods it is mentioned that the forests in the northern portion of the district of Ganjam, although not to be compared in size or importance with those in some other parts of the Madras Presidency are nevertheless somewhat extensive and contain many useful trees.

The most important and accessible of these forests are situated in the talook of Goomsur and the Zemindary of Bodogoda both of which are watered by rivers which afford facilities for floating the timber down to the coast during the freshes. The Jungles change their names every two or three miles and a list of them would be so long that it seems sufficient to indicate in general terms the localities in which the largest and finest timber is procurable. In Goomsur these are the Kookooloobah, Gullery, Ootorogodoloto, Poorwagoodoloto, Juggurnauthprasaud, Kurcholy, Bhootapilly and Beerecota Mootahs. In Bodogoda there are three Mootahs below the Ghauts, the Coradakonna, Godo and Jagiree, all three of which are well wooded, but the first contains the largest forests. Above the

ghauts are the Mootahs of Jorraow, Gowdogotho, Morihano, Gokalopoor, Meerecote, Woddobah and Lohagooddee all abounding in timber, which remains uncut chiefly on account of the difficulty of transporting it.

The same remark applies to the forests of Chokapaud and Poomaghur, two hill dependencies of Goomsur. In the former the Cottarikiah, Woollingiah, Mettribiah and Koondopottro Mootahs contain forests which are of little use to any one except the inhabitants of the country —of these forests the largest are the Dodosoroo, Dehenkosoroo, Jhoondasoroo and Saboolodeyee. In the Hill tracts under Poomaghur for the same reason, but little use is made of any of the forests with the exception of those in the Punchagodotolo Mootah which lies at the foot of the ghauts.

I am not in possession of any returns from Soorada, but I know from personal observation that this small talook is most extensively wooded and that it supplies large quantities of fire-wood to the Aska factory, the sum paid for this single item being, I have been given to understand, equal to one third of the revenue collected from the Talook. It is noted for its extensive tamarind topes and orange groves but in other respects probably differs but little from the neighbouring talooks.

Bodogoda is a Zemindary but the Rajah being a minor is at present under the management of Government. The forests belong to the Zemindar, in whose name a variety of small taxes are levied on the products of the jungle. Their amount is however very insignificant and the privilege of collecting them is farmed out to a renter who is styled "Ghoto Bissoye," "Bono Bissoye" and "Bono borilla," (Jungle-ranger), which last name is expressive of the nature of his ordinary duty. He paid this year Rupees 84 for his farm and levies a small sum varying from 4 annas to a Rupee from each village for the general privilege of cutting fire-wood, a tax of 2 annas on every new bandy, of one Rupee on every new boat, of R. 1-8-0 on every tree cut down for a mast, half an anna on every bandy load of fire-wood, 1 anna on every bandy load of bamboos, 2 annas and 6 pice on every bandy load of plank wood, and similar small sums for wood required for ploughshares, oil presses &c. There is also a Zemindary tax termed Pohondee Ghuttum, levied on all sales of honey, rosin, Arrow root, Moholo flowers, Moholo seeds, and Korunjo seeds, but in Bodogoda this tax has apparently merged in the farm of the forest renter.

In Goomsur and the other tracts alluded to, which are all Government talooks, no such taxes are known, and although the forests are almost without exception, Government property, no revenue whatever is derived from them. In the time of the Goomsur Rajahs, it is said that a tax called Bono Cowry of 2 annas was levied on each plough, and that altogether the forests yielded a revenue of about Rupees 2000 a year, but these taxes have been abolished.

Throughout the whole of this part of the District, there is far more timber than is required for the local consumption, but there is no doubt that with the exception of the Hill Tracts, the jungles are all rapidly diminishing—partly owing to the increase of cultivation and partly to meet the demand for timber at Aska, Berhampore, Ganjam and other places. In the time of the Rajahs the felling of timber was systematically discouraged from motives of policy with a view to render the country less accessible to troops. With the exception of an order recently issued by the Collector forbidding the indiscriminate cutting of timber there is at present no system of any kind regarding the felling or the reproduction of trees.

Timber is cut at all times of the year, but most of it seems to be felled between January and May, these being the months during which the Ryots are less occupied with their cultivation. Bamboos and other trees which have little or no heart wood, are cut during the wane of the moon being otherwise, it is said, liable to be attacked by insects, but there is no such belief with regard to the larger kinds of timber. There are however five days in each Hindoo month, which are supposed to be inauspicious and on these no trees are felled.

Large patches of jungle are constantly cleared for the purpose of being brought under cultivation and the destruction of the trees is often, and on the hills it may be said always, effected by fire. This destruction is however not altogether indiscriminate, certain trees being always carefully preserved. Among these are the Mango and date tree, the koeto, the Bovadah and Soondorogoondee, to which, if the cultivators are Khonds, may be added the Solopo palm and the Mohollo, which are especially reserved from destruction on account of the intoxicating liquors which they yield.

Annexed is an imperfect list of the forest trees in this part of the country with their dimensions and remarks on the use to which they are generally applied, followed by a list of the prices of timber and other vegetable products. None of these seem to be subject to any kind of regulation, and it has not been possible to ascertain the extent of traffic which is carried on in them. No exotic trees of any kind have as yet been introduced.

The wild Animals of the country are tigers, black panthers, common panthers, cheetahs, hyenas, jungle cats, bears, elk, spotted deer, bison, neelghye, wild hog, jungle sheep,

wild dogs, porcupines, hog deer, and two kinds of monkeys.

R. M. MACDONALD,
Assistant Agent

Asst. Agent's Office, Russellcondah, 4th Dec. 1854.

Lieutenant Phillips believes that the Kimedy forests cover to the extent of 400 square miles, those of chief consequence and most accessible, lying on both banks of the Vremshadara river, above and below "Butteley," "Barsinghy," Jeranghee; Jeranghe, Giba, Cothoor, Jadoupully and indeed the whole of the hilly tracts abound with fine trees, the only difficulty being their removal when cut. He particularly notices a tree, the "Dhamono," or "*Kurkurra.*" Its extreme height is 39 feet. The circumference its trunk is 8½ feet, and height from the ground to nearest branch 18 feet. It furnishes a very long grained tough wood, plant and light. It is used for dhoolies, cots, bandy wheels, and poles, spear and axe handles, fishing rods and lance handles and other purposes where strength and elasticity are required.

(8202) *Ganjam and Goomsoor.*

1 Salwa or Sorunghee. Extreme height 90 feet. Circumference 6 feet. Height from ground to the intersection of the first branch, 33—38 feet. This is the well known saul or dammer tree and is one of the commonest as well as one of the most useful trees in these jungles. It is used for beams, rafters, posts and for almost every description of wood work required in house building; it is made into masts for native dhonies, is used for bandy wheels and ploughshares and has recently been exported in large quantities to supply the demand for Railway sleepers. The large logs are cut into planks for doors, windows and other purposes. The branches and less useful portions of the tree are burnt for firewood and for charcoal. The tree before being used is usually stripped of its bark; it is then designated Jhora or Jhangherree and is not liable to be attacked by white ants. A well known rosin (bdellium.) termed here Jhoona or sodaloso exudes from the tree when it has attained a large size. This is burnt at the shrines of all the Village goddesses, is used by native jewellers for filling up the hollow portions of ornaments, and is in great request among ship owners and boatmen for their vessels. The leaves of this tree are used for eating rice out of. The seeds are used medicinally and are said to have an astringent property. They are also boiled, dried and pounded into a sort of rice, which is eaten by the Khonds and poorer classes of Oriyas in times of scarcity. This tree abounds every where, the largest specimens are to be found in the Goomsur forests, but the timber of Bodogoda appears to be more highly prized in the native market, not, it is said on account of any intrinsic superiority in the wood, but because large quantities of a uniform size are more easily procurable in that zemindary It forms an important article of traffic in Bodogoda, large quantities of it being annually floated during the rains down the Jhoroo and the Patna towards Soorada, and thence, after the junction of these streams with the Kooshkoolliah to Aska, Pitala and Ganjam, besides which a considerable quantity of timber is carried on bandies to Shergoda, Coorlah and Berhampore.

2 Piasalo. Teriminalia alata. Buchananii latifolia. Extreme height 90 feet. Circumference 6 feet. Height from ground to the intersection of the first branch, 22 feet. This is also a most useful wood and is in great request for doors, windows, boxes and also for house building. It is also used for the flooring of cattle sheds. The supply is hardly equal to the demand and the tree is getting scarcer than it was

3 Sisoowa. Dalbergia sissoo Extreme heigh 45 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 1 feet. This is the material of which tables, chairs couches, bookstands and other articles of furniture are usually made in this part of the country. It i not so plentiful as it was being in great request The wood yields a very useful oil.

4 Kendhoo. Extreme height 60 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 30 feet. A hard wood blacker than the Sisoowa. Boxes &c are made of it. It is tolerably common. The fruit is eaten.

5 Gombharee. Extreme height 50 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 1 feet. A white light wood. Boxes, chairs, bed posts, lamp stands, bullock yokes, bazar measures, toys and other articles are made of it. I is rather scarce and expensive. The bark i said to be used medicinally.

6 Holondho ? Extreme height 75 feet. Circumference 7 feet. Height from ground to the intersection of the first branch, 36 feet. This wood on account of its size and lightness is used for boats which are made of a single log of it by simply scooping out the inside and afterwards shapened in a rough manner. It is also used for the masts of native Dhoneys, and bazar measures, and is cut into planks and made into doors, boxes &c. It is getting scarcer than it was but is still tolerably common

7 Jamo Myrtus cyminum ? Eugenia Jamboo ? Eugenia Jambolana. Extreme height 7 feet. Circumference 7 feet. Height from ground to the intersection of the first branch, 36 feet This is also used for making boats in the same way as the Holondho. Doors, ploughshare and troughs for cattle are made of it. The fruit is eaten. The bark is used medicinally i diarrhœa &c. The tree is not very common either

in Bodogoda or lower Goomsur, but is said to be rather plentiful in the Chokapaud forests. There are two species termed respectively the "Bodo" and "Coojee" Jamo.

8 Sohn. Coronilla sesban? Coronilla picta? Extreme height 50 feet. Circumference 6 feet. Height from ground to the intersection of the first branch, 12 feet. A very heavy wood and of great strength. It is almost exclusively reserved for making posts for pagodas and sacred edifices, the use of it in ordinary house building being it is said forbidden in the shastras. The tree is very common, but owing to this superstition very little use is made of it, the only purposes to which the wood is applied being for making rice pounders and the wooden stands on which the large grain baskets used in this part of the country, are placed. The bark is used for tanning skins and also medicinally by women after childbirth, a sort of fungus or excresence from this tree is applied externally to wounds and sores and is also taken internally in colic and affections of the stomach.

9 Bodoka. Extreme height 35 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 15 feet. A light, white wood, used for scabbards, bazar measures, boxes, bullock yokes, the poles of palanquins and tonjins and for toys. It is tolerably common.

10 Ponoso. This is the common jack tree and does not therefore require to be described. It is not very plentiful.

11 Jhoontiah. Extreme height 45 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 15 feet. A hard, white wood, used chiefly for making hair combs and small boxes. It is tolerably common.

12. Koossoomo. Extreme height 50 feet. Circumference, 4½ feet. Height from ground to the intersection of the first branch, 9 feet. A remarkably hard, heavy wood, and used on that account for oil presses, sugar crushers, and the axletrees of bandies. The tree yields a lac which is in request among native jewellers, an oil used for burning is extracted from the seeds. There are two species of this tree, the "Kola" and the "Ghuntiah" Koossoomo. The former abounds and is large and more useful than the other, which is not so common.

13. Moondomonde. Extreme height 60 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 22 feet. This wood is used occasionally for beams, planks &c. but is not in much request and the tree is not very plentiful.

14. Orjoono. Terminalia alata? T. glabra? Extreme height 100 feet. Circumference 8 feet. Height from ground to the intersection of the first branch, 36 feet. This is used for making boats in the same way as the Holondho and Jamo. The tree is not very common in Goomsur but abounds in the forests of Bodogoda.

15. Mohoollo. Bassia latifolia? Extreme height 15 feet. Circumference 8 feet. Height from ground to the intersection of the first branch, 36 feet. This is also used for boats and the flooring of cattle sheds is often made of this wood, this tree is highly prized by the Hill tribes on account of the intoxicating liquor which they distil from its flower. The latter is made into a sort of sweetmeat by the Oriyas, who mix sugar and rice with it. The fruit in its unripe state is boiled and eaten as a vegetable. The fruit yields an oil termed "Jolo Jelo," this is purchased by the bukals for the purpose of adulterating ghee, which it somewhat resembles in appearance. This tree and the Solopo palm are never destroyed by the koonds when they clear a patch of jungle for the purpose of bringing it under cultivation, and in the time of the Goomsur Rajahs, the rebellion of any of the Hill tribes was often punished by cutting down all their Mohollo and Solopo trees.

16. Achoo. Extreme height 36 feet Circumference 2½ feet. Height from ground to the intersection of the first branch, 10 feet. A light, hard wood, of which the stocks of all the Oriya matchlocks is made. A pink dye is extracted from the root. It is not very common.

17. Ambo. This is the common mangoe tree and requires no description.

18. Kodalo. Extreme height 39 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 8 feet. A light wood used for planks, doors, boxes and scabbards; it is also used for firewood, being tolerably plentiful.

19. Mahalimbo. Extreme height 70 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 22 feet. This wood is not liable to be attacked by insects, and is on that account used for making boxes &c. The fruit and bark are used medicinally for fever and rheumatism. The tree is tolerably common.

20. Limbo. Melia Azedirachta? Extreme height 70 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 22 feet. This is the margosa tree. Idols are usually made of this wood because it is not liable to be attacked by insects. The bark is used medicinally for fever, small pox, and worms. An oil which is extracted from the seeds of this tree, is used for itch and other cutaneous diseases. The tree is tolerably common and is burnt for firewood.

21. Soroopottree Moee. Extreme height 40 feet. Circumference 2½ feet. Height from ground to the intersection of the first branch, 18 feet. Used for planks, doors, boxes, posts, and ploughshares. It is tolerably common.

22. Siddha. Extreme height 45 feet. Circum-

ference 4 feet. Height from ground to the intersection of the first branch, 22 feet. This wood is not liable to be attacked by insects. It is used chiefly for making rafters of and is burnt for firewood, being rather plentiful. The bark and leaves are employed in tanning leather and are also used medicinally.

23. Sahajo. Extreme height 60 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 30 feet. This is one of the commonest trees in these jungles, Cattle sheds are sometimes floored with this wood and rice pounders are also said to be occasionally made of it, it is extensively used for firewood and for making potash. The bark is used for tanning.

24. Kaloochia. Extreme height 25 feet. Circumference 2½ feet. Height from ground to the intersection of the first branch, 12 feet. Used for posts and ploughshares and burnt for firewood. It is not a common tree.

25. Banjhono. Extreme height 45 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 22 feet. Used for bandy wheels on account of its strength. It is rather scarce.

26. Dhamono. Extreme height 35 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 20 feet. Used for cot frames and bandy wheels; the handles of axes, knives, spears, momoties, pickaxes and carpenter's tools are made of this wood, which is also burnt for firewood, being tolerably plentiful.

27. Kosee. Extreme height 50 feet. Circumference 4 feet. Height from ground to the intersection of the first branch, 22 feet. Used for posts, door frames and rafters and burnt for firewood, being tolerably plentiful.

28. Janghany. Cassia Auriculata? Extreme height 40 feet. Circumference 3 feet Height from ground to the intersection of the first branch, 18 feet. Used for posts and rafters, and burnt for firewood. It is tolerably common in Bodogoda, but seems to be scarce in Goomsur.

29. Goubarea. Extreme height 45 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 15 feet. A wood of great strength and used on that account for sugar crushers, bandy wheels, ploughshares and rice pounders. The bark is used for tanning skins. The tree being tolerably common is burnt for firewood.

30. Pitta Kaloochia. Extreme height 36 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 15 feet. Used for the same purposes as the kaloochia (Vide No. 24) but is a larger tree and very plentiful.

31. Khoiro. Mimosa catechu? Extreme height 25 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 6 feet. Used on account of its strength for sugar presses, and rice pounders. The wood is burnt when libations are offered. The gum is mixed with betel nut and gives a red colour to the spittle. This is I believe generally known under the name of Catechu.

32. Dhobo Khoiro. Extreme height 25 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 6 feet. A white variety of the same species. Both trees are very common.

33. Minjharee or Paloodhona. Extreme height 45 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 6 feet. Used on account of its lightness for rafts also for pacottah poles. The fruit and flower are both eaten. The bark and leaves are used medicinally for worms. The tree abounds.

34 Tentoollee or Koyan. This is the common tamarind tree and calls for no remark.

35 Sirisee. Mimosa Serissa? Extreme height 30 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 22 feet. Used for sugar crushers, pestles, mortars and ploughshares. It is tolerably plentiful.

36 Boro. This is the common banian tree and calls for no remark.

37 Phasee. Extreme height 60 feet. Circumference 6 feet. Height from ground to the intersection of the first branch, 30 feet. A light hard wood, used for sugar presses, rice pounders, and bandy wheels, and occasionally for making boats of. It is tolerably plentiful.

38 Oshrosto. This is the ficus religiosa and calls for no remark.

39 Dhoou, Extreme height 45 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 22 feet. This tree abounds and is extensively used for fuel. The wood is of little value.

40 Koombee, Bauhinia spicata? Extreme height 36 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 6 feet. A light, white wood, used for bullock yokes. The common match used by the Oriya matchlock men is a rope made of the fibre taken from the bark of this tree; it is said to be used for this purpose because it burns for a long time. The scanty substitute for ordinary clothing used by Byragees. Visnovas and other persons affecting peculiar sanctity is made of the bark of this tree. It is said to be also used medicinally. The tree abounds.

41 Bouro. Bombax heptaphyllum. This is the common silk cotton tree and calls for no remark

42 Baelo. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 15 feet. This wood is sometimes employed for making bandies, but it is chiefly used for firewood the tree being extremely common, the leaves are used for making

a sort of umbrellah which is worn on the head by the ryots and coolies in this part of the country.

43 Soondorogoondee Koomalagoondee or Bosontogoondee Extreme height 15 feet. Circumference 2½ feet. Height from ground to the intersection of the first branch, 5 feet. The fruit of this tree yields a valuable dye which is extensively used for dyeing silk &c and is exported in large quantities to Calcutta and other places. It is very expensive and is eagerly bought up by the Mahajuns who send their Gumashtahs to purchase it of the Khonds. The tree is very scarce in many parts of Goomsur but is tolerably common in any of the frontier Mootahs such as Juggernathprasaud, Kurcholy and Coocooloobah. It is found in greater abundance in the Bodogodo Jungles, and is said to be tolerably plentiful about Chotapaud, but is far more common on the Bengal side of the frontier and is said to abound in Boad and Duspullah.

44 Korunjo. Galedupa arborea Extreme height 36 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 22 feet. The tree is very common, but no use seems to be made of the wood except for firewood ; an oil extracted from the fruit is used medicinally for itch and other cutaneous diseases and is also employed as lamp oil.

45 Soogondhee Ocimum Caryophillatum? Periploca indica? Extreme height 25 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 7 feet. This tree is tolerably common but no use is made of the wood except for firewood, the leaves are used medicinally for rheumatism and wounds of long standing.

46 Bhayroo Swietenia chloroxylon. Extreme height 40 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 20 feet. Used for axletrees, oil presses, posts, bed posts, rafters and the handles of axes. It is also burnt for firewood, and for charcoal. The leaves are applied to wounds. The tree is not so common in Goomsur as in Bodo godo, and it is said to be still more plentiful in Mohery and other talooks to the South.

47 Bello. Ægle Marmelos. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 10 feet. The wood of this tree is mixed with water and ground into a sort of oily paste, which is poured on the lingum in the temples dedicated to Siva. The leaves are offered to Siva and to the female divinities in the same way that the leaves of the Toolsee are offered to Vishnoo. The fruit is eaten and the juice of it is used in making chunam.

48 Borokolee. Zizyphus jujuba. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch 8 feet. Planks, doors, boxes, matchlock stocks, and Palanquins are made of this wood. The leaves pounded and mixed with turmeric are supposed to be efficacious in curing rheumatism. The seeds are also used medicinally in diseases of infants. The tree yields a lac. The large trees are scarce but young trees are very common.

49 Ollakolee. Emblic Myrobalan Phylanthus Emblica. ? Extreme height 40 feet. Circumference 4 feet. Height from ground to the intersection of the first branch, 15 feet. No use seems to be made of this wood, but the fruit is pickled and the bark is used medicinally.

50 Moee. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 13 feet. Stakes are cut from this tree and planted in hedges where they spring up again. The bark is used in tanning leather. The tree abounds.

51 Behenta. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 10 feet. Used for Axletrees, oil presses and rice pounders. It is also burnt for fire-wood the tree being very common. The bark and leaves are used medicinally.

52 Korada. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 8 feet. A light wood, used for rafters, spinning wheels and door frames. It is also burnt for fire wood the tree being very common. The leaf is used medicinally for itch. The bark of this tree is poisonous and a preparation of it is often used for the purpose of destroying life, particularly by Oriya widows among whom suicide is a frequent occurrence.

53 Dhobee. Extreme height 36 feet. Circumference 3 feet. Height from gronnd to the intersection of the first branch, 15 feet. There are two species of this tree, the "Nongoliah" and the "Pooro," both of which are very common. It seems to be only used for firewood.

54 Charo. Buchanania latifolia. Extreme height 36 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 15 feet. This tree abounds. Bullock yokes are sometimes made of the wood, but it is chiefly used for firewood.

55 Poeechandea. Extreme height 48 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 9 feet. Ploughshares are occasionally made of this wood, but it is chiefly used for firewood. The rosaries worn by Byragees and Vishnoos are made of the seeds of this tree.

56 Grouhonee Kubatee. Extreme height 80 feet. Circumference 6 feet. Height from ground to the intersection of the first branch, 12 feet. The platform of the cars used at the Juggurnauth festival is often made of this wood, but it is chiefly used for firewood being

tolerably common. The bark is said to be used medicinally for diarrhœa.

57 Horedha. Terminalia Chebula ? Extreme height 45 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 20 feet. Used occasionally for beams and rafters but chiefly for firewood, the tree being tolerably plentiful. The bark is said to be employed in tanning and the fruit to be used medicinally. The fruit yields a black dye.

58 Bahadha. Terminalia Belerica ? Extreme height 50 feet. Circumference 4 feet. Height from ground to the intersection of the first branch, 10 feet. A tolerably common tree but the wood is said to be of no use. The fruit is used medicinally.

59 Soonaree, Cassia fistula ? Extreme height 36 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 10 feet. A tolerably common tree. Ploughshares and rice pounders are occasionally made of this wood, but it is chiefly used for firewood. The fruit is used medicinally. Bears are particularly fond of it.

60 Bhalleah, Semecarpus Anacardium. Extreme height 40 feet. Circumference 4 feet, Height from ground to the intersection of the first branch, 20 feet. A tolerably common tree, but no use seems to be made of the wood except for firewood. The nuts are eaten—an oil extracted from the nuts is applied to the sores of cattle and also used for rheumatism. The fruit yields a black dye.

61 Dhimeree, Ficus glomerata ? Ficus guleria ? Extreme height 40 feet : Circumference 4½ feet Height from ground to the intersection of the first branch, 8 feet. Bandy wheels are sometimes made of the wood, but it is chiefly used for firewood, being tolerably plentiful. It is considered sacred and is burnt when libations are offered. The fruit is eaten : a juice extracted from the root is used for rheumatism.

62 Boincho Flacourtia sapida ? Extreme height 15 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 5 feet. A common tree only used for firewood. The fruit is eaten. This wood is burnt when libations are offered for a person who has died on an inauspicious day.

63 Choonokolee. Extreme height 10 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 5 feet. A common useless tree. The fruit is eaten.

64 Brahmonea. Extreme height 15 feet, Circumference 1½ feet. Height from ground to the intersection of the first branch, 7 feet. The bark is said to be used medicinally, but the wood is useless.

65 Sahadha, Trophis aspera ? Extreme height 30 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 6 feet. Bandy wheels and tooth brushes are sometimes made of this wood, but it is chiefly employed for firewood being very plentiful. The bark is used medicinally, the leaves and sap are used for wounds and for a disease of the eye termed in Oriya Jokia, said to be peculiar to children.

66 Gotho. Extreme height 20 feet. Circumference 2½ feet. Height from ground to the intersection of the first branch, 7 feet. Useless except for firewood.

67 Gondhona Phyllanthus emblica ? Extreme height 25 feet. Circumference 7½ feet. Height from ground to the intersection of the first branch, 6 feet. There are two varieties of this tree, termed respectively the " Gona" and the " Moirsea" Gondhona. The leaves are boiled and eaten as a vegetable. The bark is used medicinally. The common mode of obtaining fire in the jungle is by rubbing two pieces of this wood together. The tree is tolerably common, but the wood is only used for firewood.

68 Rayee. Extreme height 30 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 15 feet. Tolerably plentiful, but only used for firewood.

69 Ankoolo Alangium Hexapetalum ? Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 12 feet. The leading bull in a herd of buffaloes has a sort of wooden bell called " Lodoko" attached to its neck. This is heard at a great distance in the Jungle and is always made of this wood, which is said to be peculiarly adapted for producing sounds. The wood seems however to be of no other use except for firewood. The root is used for snake bites.

70 Patonwa. Extreme height 20 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 5 feet. Used chiefly for firewood being tolerably common. The fruit thrown into a pond of water kills all the fish in it and is used for that purpose by the keyouts (fishermen). This mode of catching fish is designated " Macho Mohoneebaro." The fruit is said to be poisonous, but the seeds are used medicinally for fever.

71 Ambaleta. Extreme height 12 feet. Circumference 1½ feet. Height from ground to the intersection of the first branch, 3 feet. The juice of the leaves is mixed with Mercury and taken internally for rheumatism and other diseases.

72 Kotoko. Strychnos potatorum ? Extreme height 40 feet. Circumference 4 feet. Height from ground to the intersection of the first branch, 9 feet. Chiefly used for firewood, though bandy wheels and ploughshares are occasionally made of this wood. The seeds have the curious property of purifying muddy water, and are constantly used for that purpose by the natives who rub the inside of their lotas and brass pots with them. They are also used for killing fish in the same way as the fruit of the Potonwa. The fruit is used medicinally.

73 Porto koorwan. Extreme height 20 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 5 feet. Chiefly remarkable on account of its seeds, called here Indrajebbo, which are used medicinally and held in great estimation. The juice of the leaves is given to young cattle to destroy worms. The bark is also used medicinally. The tree abounds.

74 Patolee. Bignonea Suaveolens? Extreme height 20 feet. Circumference 1½ feet. Height from ground to the intersection of the first branch, 12 feet. The bark is employed medicinally. No use seems to bemade of the wood. The tree is not very common.

75 Pamphoonea. Bignonia chelonoides? Extreme height 20 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 8 feet. The bark and fruit are employed medicinally, but no use is made of the wood.

76 Nooniaree, Looniaree or Noonononea. Extreme height 36 feet. Circumference 4 feet. Height from ground to the intersection of the first branch, 7 feet. A common tree, chiefly used for firewood though ploughshares are occasionally made from this wood. The bark is employed medicinally in fever.

77 Gooroohado. Extreme height 22 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 10 feet. Chiefly used for firewood though rafters are occasionally made of this wood.

78 Hinjolo; Eugenia acutangula? Extreme height 30 feet. Circumference 4½ feet. Height from ground to the intersection of the first branch, 6 feet. Grows in abundance on the banks of rivers. The wood is not affected by damp, and is therefore generally used for the wooden frame work at the bottom of wells. Rice pounders are also made of it. The bark is given medicinally to women after childbirth.

79 Lodhoka sijhoo Euphorbia Tirucalli? Extreme height 20 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 6 feet. Not common. It is said to yield a sort of milk which is made into a cataplasm and applied to boils &c. It is also used for killing fish by the keyouts.

80 Salora. Extreme height 22 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 5 feet. A common tree only used for firewood. The leaves are eaten.

81 Khakodha. Extreme height 30 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 9 feet. A common tree only used for firewood.

82 Khookoondea. Extreme height 30 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 9 feet. A common tree only used for firewood.

83 Killakooroowan. Extreme height 20 feet. Circumference 1 foot. Height from ground to the intersection of the first branch, 6 feet. The fire sticks used by the shikarees for night hunting are taken from this tree. It also yields an oil which is applied to the sores of cattle. The tree is common.

84 Koeto Feronia elephantum. Extreme height 50 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 10 feet. Bandy wheels are sometimes made of this wood. The tree is not very common. The fruit is eaten and the gum which this tree yields is much used.

85 Mosanea. Extreme height 15 feet. Circumference 2½ feet. Height from ground to the intersection of the first branch, 4 feet. Not very common. The bark is used medicinally for wounds and sores. The wood is useless except for firewood.

86 Gongosheolee Dondeepoholo. Extreme height 25 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 7 feet. No use seems to be made of the wood. The flower which has a powerful perfume is offered in all the pagodas to the presiding divinity.

87 Pendoora. Extreme height 20 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 1 foot. The fruit is eaten and the bark used medicinally. The wood is useless except for firewood.

88 Ambhota. Extreme height 20 feet. Circumference 2 feet Height from ground to the intersection of the first branch, 7 feet. Useless except for firewood.

89 Kopassea. Extreme height 20 feet. Circumference 2 feet. Height from ground to the intersection of the first branch, 7 feet. Useless except for firewood.

90 Potoobaolo. Extreme height 45 feet. Circumference 4 feet. Height from ground to the intersection of the first branch, 12 feet. Occasionally used for bandy wheels and ploughshares. The leaves are eaten as a sort of vegetable by the Hill people. Tolerably common.

91 Joree. Extreme height 60 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 8 feet. Bandy wheels are occasionally made of this wood, which is also burnt for firewood. The seeds are eaten by the Khonds. The tree is tolerably common.

92 Chochena. Extreme height 60 feet. Circumference 5 feet. Height from ground to the intersection of the first branch, 9 feet. Chiefly used for firewood, the tree bring tolerably common. The bark is used medicinally in fever. The milk is given medicinally to children in a disease called "Doobellee."

98 Bokmo, Cæsalpinia sappan. Extreme height 36 feet. Circumference 2 feet. Height from

ground to the intersection of the first branch, 8 feet. The common powder used at the Holee festival is extracted from the wood of this tree. It is not very plentiful.

94 Ghunteoh Patoolee. Extreme height 22 feet. Circumference 1½ feet. Height from ground to the intersection of the first branch, 10 feet. Used occasionally for axletrees and rafters but chiefly for firewood, the tree being rather common.

95 Chorayegodee. Extreme height 22 feet. Circumference 1½ feet. Height from the ground to the intersection of the first branch, 6 feet. Used for firewood.

96 Amboodha spondias mangifera ? Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 7 feet. Used for firewood. The fruit is eaten. Tree tolerably common.

97 Kontabaolo. Extreme height 30 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 7 feet. The tree abounds and is chiefly used for firewood, though ploughshares are occasionally made of the wood. The bark is used medicinally.

98 Borodha. Extreme height 30 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common and used for firewood. The leaves are eaten as a sort of vegetable.

99 Ghoralanjea or Tentara ? Extreme height 30 feet. Circumference 3 feet. Height from the ground to the intersection of the first branch, 10 feet. Used for spinning wheels, sugar presses and ploughshares, and burnt for firewood, being tolerably common.

100 Kodumbo Nauclea oriental ? Nauclea cadamba ? Extreme height 80 feet. Circumference 6 feet. Height from the ground to the intersection of the first branch, 32 feet. This is sometimes made into boats in the manner previously described. The flower is offered at the shrines of the Hindoo gods.

101 Rooradea. Extreme height 12 feet. Circumference 1 foot. Height from the ground to the intersection of the first branch, 3 feet. The fruit is eaten; but no use is made of the tree.

102 Hadakonkalee. Extreme height 12 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 4 feet. Useless.

103 Goonaieho Nerium odoratum ? Extreme height 25 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 6 feet. This is the oleander tree and is tolerably common.

104 Gooroobolee. Extreme height 18 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 4 feet. Wood useless. The fruit is employed medicinally.

105 Kodoro. Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 12 feet. Only used for firewood.

106 Gondopolaso. Extreme height 45 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 8 feet. Bandy wheels and ploughshares are occasionally made of this wood, but it is chiefly burnt for firewood, being tolerably common.

107 Sohojo Maree. Extreme height 25 feet. Circumference 1½ feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common in Bodogoda, where it is burnt for firewood but not in Goomsur. The bark is used medicinally.

108 Mohonea Vangueria spinosa ? Extreme height 25 feet. Circumference 1½ feet. Height from the ground to the intersection of the first branch, 8 feet. Used for firewood. The bark is employed medicinally in fever. Tolerably common.

109 Kolee Kouradea. Extreme height 25 feet. Circumference 1½ feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common and burnt for firewood, the leaves are applied to wounds. The fruit is eaten.

110 Dalosingha or Taloosinghee. Extreme height 25 feet. Circumference 1½ feet. Height from the ground to the intersection of the first branch, 6 feet. Abounds, and is burnt for firewood and charcoal. Ploughshares are sometimes made of the wood.

111 Meresingha. Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common, and burnt for firewood. The leaves are used in curry stuff.

112 Konchona, Michelia champaca ? Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common. Ploughshares are occasionally made of the wood. The flowers are offered at the shrines of the Hindoo divinities. There are two varieties of the tree called respectively the "Dhobo" and Rongo.

113 Boroana Capparis trifoliata ? cratæva tapia ? Dyosperos cordifolia ? Extreme height 40 feet. Circumference 5 feet. Height from the ground to the intersection of the first branch, 9 feet. Tolerably common and burnt for firewood. The bark is used medicinally for wounds.

114 Neraso. Extreme height 25 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common and burnt for firewood. Ploughshares are sometimes made of the wood. The bark is used medicinally for wounds.

115 Nagisilvoro Mesua ferrea ? Extreme height 30 feet. Circumference 3½ feet. Height from the ground to the intersection of the first branch, 9 feet. A medicine used for diarrhœa, rheumatism &c. is extracted from the flower. The flowers are worn by the Oriyas and the Ra-

jahs stuff their pillows with them. The tree is tolerably common, but no use seems to be made of the wood.

116 Rahana. Extreme height 30 feet. Circumference 1½ feet. Height from the ground to the intersection of the first branch, 11 feet. Tolerably common and burn for firewood ; wooden pestles and ploughshares are sometimes made of this wood.

117 Pocholoro. Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 6 feet. Tolerably common, only used for firewood and charcoal.

118 Ponposo Komaree. Extreme height 30 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 8 feet.

119 Kola sahajo. Extreme height 50 feet. Circumference 4 feet. Height from the ground to the intersection of the first branch, 18 feet. Abounds and is burnt for firewood and potash. The bark is used in tanning.

120 Pitolo. Extreme height 30 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 6 feet. Abounds but is only burnt for firewood.

121 Choureeona. Extreme height 30 feet. Circumference 3 feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common and burnt for firewood. The bark is used medicinally for rheumatism. The flowers are worn.

122 Chalodhoua Erythrina indica ? Extreme height 30 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 6 feet. Only used for firewood. Abounds.

123 Paneeollo. Extreme height 40 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common and burnt for firewood. The bark is used medicinally.

124 Dharonjo. Extreme height 60 feet. Circumference 4 feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common. No use seems to be made of the wood. The bark is used medicinally by women after childbirth ; the juice of the leaves is supposed to cure itch.

125 Beejee Kooroowan. Extreme height 25 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 8 feet. Tolerably common, and burnt for firewood. The milk is used for wounds.

126 Oshoko Jonesia asoca ? Extreme height 50 feet. Circumference 3 feet. Height from the ground to the intersection of the first branch, 8 feet. Scarce in Goomsur, but abounds in Bodogoda, where it is burnt for firewood. The flowers are offered at the shrines of the Hindoo divinities. The bark is used medicinally for diarrhœa.

127 Korra Strychnos nux vomica ? Extreme height 50 feet. Circumference 5 feet. Height from the ground to the intersection of the first branch, 20 feet. Bandy wheels and ploughshares are made of this wood. The seeds are poisonous but are used medicinally. Iron tools are sharpened on blocks of this wood. The leaves are eaten by Vishnovos. The tree is tolerably common

128 Baygoona. Extreme height 21 feet. Circumference 1 foot. Height from the ground to the intersection of the first branch, 5 feet. The wood is useless except for firewood. The leaves are used medicinally for fever. The tree is tolerably common.

129 Solopo. Extreme height 40 feet. Circumference 3 feet. Height from the ground to the intersection of the first branch, 28 feet. This is a palm held in great estimation by the Khonds on account of the intoxicating liquor which they draw from it, the inside of the tree when pounded forms a sort of flour, which is eaten by the Khonds and also by Hindoos in times of scarcity. The tree is not very common. With regard to trees of this class, it seems sufficient to state that there are two kinds of date trees termed respectively the " Bodo and Sano khojeree :" the latter is very common, the former scarce.

130 Shyalee. Circumference 1½ feet. This is a large creeper which abounds in the jungles, and yields a fibre which is most extensively used. The leaves are used for eating from and for making " tullaries" small umbrellas worn on the head. The Seeds are used medicinally.

131 Polaso, Butea frondosa ? Circumference 1½ feet. A common creeper remarkable chiefly on account of the lac which it yields. The leaves are used for eating from, the flower yields a red dye which is used for the sectarian mark of the worshippers of Vishnoo, and is mixed with the Bokmo, to produce the red powder used at the Holee festival.

132 Contayecoollee. Circumference 1½ feet. This is also a large common creeper. The charcoal used in making country gun powder, is made by burning this tree. The chatty used in pacottahs is placed in a frame work made of this wood.

133 Pichoolee. Circumference 1½ feet. This is a large creeper which is very common. The bark is used medicinally for wounds and contusions.

134 Shalimbobanso. Extreme height 40 feet. Circumference 2½ feet. Two species of bamboo which abound.

135 Conta banso Bambusa spina. Extreme height 80 feet. Circumference 1½ feet. Two species of bamboo which abound.

136 Bolungee banso. Extreme height 25 feet. Circumference ½ foot. Two species of bamboo which are not common.

137 Soondorogoyan banso. Extreme height

30 feet. Circumference 3¼ feet. Two species of bamboo which are not common.

138 Bono Koniaree. Extreme height 50 feet. Circumference 3 feet. Height from ground to the intersection of the first branch, 10 feet. Used for planks, boxes and walking sticks. It is scarce.

139 Baee Dhimeree. Extreme height 30 feet. Circumference 2½ feet. Height from ground to the intersection of the first branch, 8 feet. Burnt for fire wood being tolerably common. The leaves are used for eating from; the fruit is eaten. Not very common.

140 Moddoro goodee. Extreme height 40 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 8 feet. Used for ploughshares and rafters and burnt for fire-wood, not very common.

141 Babolo. Extreme height 25 feet. Circumference 2 feet. Height from the ground to the intersection of the first branch, 8 feet. Used for ploughshares, sugar crushers, and for fire-wood, not very common.

142 Jundamaree. Extreme height 30 feet. Circumference 2½ feet. Height from the ground to the intersection of the first branch, 6 feet. Used for ploughshares, and burnt for fire-wood, being very common.

143 Woon. Extreme height 60 feet. Circumference 5 feet. Height from the ground to the intersection of the first branch, 5 feet. No use is made of the wood, the tree is prized on account of its fruit which is pickled, and eaten in other forms, the leaves are used for eating from; the flowers are eaten. The tree is scarce.

144 Koromonga, Aveorhoa Carambola? Extreme height 36 feet. Circumference 3½ feet. Height from the ground to the intersection of the first branch, 9 feet. No use is made of the wood, the tree is prized on account of the fruit which is pickled. The flowers are given medicinally to children. The tree is scarce.

145 Dhosora Khendhoo. Extreme height 60 feet. Circumference 5 feet. Height from the ground to the intersection of the first branch, 18 feet. Used for ploughshares and bandies. The fruit is eaten. The wood is tolerably common and is burnt for fire-wood.

146 Ambelee toba, Citrus medica? Extreme height 30 feet. Circumference 1 foot. Height from the ground to the intersection of the first branch, 6 feet. Wood useless except for fire-wood. The bark is used medicinally for colic and diseases of the stomach. The fruit is pickled. The tree is not common.

147 Modoroo toba. Extreme height 30 feet. Circumference 1 foot. Height from the ground to the intersection of the first branch, 9 feet. Wood useless except for fire-wood. The tree is common. The fruit is eaten.

148 Kheerokolee, Mimusops Kauki? Extreme height 30 feet. Circumference 3 feet. Height from the ground to the intersection of the first branch, 6 feet. A hard wood, used for ploughs and mallets. It is not common.

149 Naringhee. Extreme height 30 feet. Circumference 3 feet. Height from the ground to the intersection of the first branch, 7 feet. Used for ploughshares and bandies. It is tolerably common and burnt for firewood.

150 Kossaye. Extreme height 22 feet. Circumference 1 foot. Height from the ground to the intersection of the first branch, 7 feet. Useless except for firewood.

R. M. MACDONALD,
Assistant Agent.

RUSSELLCONDAH, Assistant Agent's Office, *4th December* 1854.

(8203) *Hindustan Timber Trees: Dr. Roxburgh's Woods of Hindustan.*

The specific gravities have been calculated from comparatively imperfect data, and therefore can only be regarded as rough approximations.

		Weight per cubic foot. lbs.	oz.
1	Acacia odoratissima	45	6
2	Artocarpus chaplasha	34	12
3	Averrhoa carrambola... ...	39	11
4	Castanea indica	33	0
5	Cedrela Toona	39	9
6	Cynometra polyandra	52	10
7	Diospyros racemosa	34	11
8	Dombeya melanoxylon	71	9
9	Engelhardtia pterocarpa ...	39	14
10	Gmelina arborea	32	3
11	Guacua.	41	14
12	Gundruey	34	15
13	Jeah	36	11
14	Lagerstrœmia Reginæ	46	8
15	Loquat..	46	11
16	Melia Azadirachta...	46	1
17	Nerium tinctorium...	39	4
18	Odina Wodier.	41	0
19	Osyris peltata...	30	8
20	Palm.....	57	9
21	Quercus fenestrata...	47	0
22	„ lanceofolia	41	10
23	„ lappacea....	51	4
24	Red sanders...	46	14
25	Santalum album	47	13
26	Sassafras	32	12
27	Scytalia	44	8
28	„ trijuga	60	0
29	Sophora robusta	42	4
30	Swietenia febrifuga	54	14
31	Terminalia Chebula...	42	10
32	„ citrina.....	60	2
33	Tetrantherà nitida.....	34	4
34	Vateria lancifolia...	53	15

Specimens of the wood of the Indian cedar Cedrus Deodara, and of the cypress, "cupressus

torulosa," from the Himalayas, were shown by Dr Royle at the Exhibition of 1851 : the former has been introduced into England as a beautiful ornamental tree and appears to promise well as a useful timber tree, as the wood works well and freely.

(8204) *Labuan Timber and Fancy-woods.*

			Height.	Diameter.
1	Dadarru,		30 feet	2 feet.
2	Gabar Buto, about		60 do	3 do.
3	Jatichina,		60 do	1½ do.
4	Kalim pupa tandok,		12 to 15 do	1½ do.
5	Kayu Aru, about		60 do	3 do.
6	do	Arang, grows to a large size in Borneo.		
7	do	Arru,	30	2 do
8	do	Benatore bukit	70	3 do.
9	do	Bencoola, about	60	3 do.
10	do	Badak utan. A fruit tree.		
11	do	Bidarru, 30		2 do
		ascented tree.		
12	do	Impas	40	2½ do.
13	do	Gading,	25 to 30	1 do.
14	do	Jamber,	30	2 do,
15	do	Kandis Daham, 30 feet high 2 feet in diameter. A fruit tree.		
16	do	Kalam Pappa,	30	2 do.
17	do	Karye,	20	1½ do.
18	do	Kapur Rangin	90 to 100 do	4 to 5 do.
19	do	Kuing,	70	3 do.
20	do	Kapur,	90 to 120	5 do.
21	do	Koning utan,	40	2½ do.
22	do	Kamuning,		0½ do.
23	do	Limau,		0½ do.
24	do	Laoh. Small tree.		
25	do	Leda Karbau, about 60		3 do.
26	do	Malam		3 do.
27	do	Nasi nasi.	40	2 do.
28	do	Oobah,	40	1½ do.
		bark used to dye red.		
29	do	Plye, (root),		
30	do	Palah Palawan	30	1½ do.
31	do	Petong,	30	1½ do.
32	do	Rask,	40	2½ do.
33	do	Rangas, 30 feet high 1½ feet in diameter. Used for common furniture.		
34	do	Sampilou,	60	1½ do.
35	do	Senangannum bukit, 90 feet high 4 feet in diameter. The fruit yields an oil.		
36	do	Samuck, 30 feet high 2 feet in diamter. Used for dyeing.		
37	do.	Senang Awan,	90 to 120	5 to 6 ft.
38	do.	Sarogan	25	1 do.
39	do.	Tampui pyah. A fruit tree.		
40	do.	Foro	30 to 35	3 do.
41	do.	Tobah tobahutan	30	3 do.
42	do.	Taratang	20 to 30	2 do.
43	do.	Urat Mata	90 to 100	3 to 4 do.
44	do.	Madang sisik	50	2½ do.
45	do.	Madang Iada	30	2 do.
46	Kayu Nilong biuar		90 ft.	A species of Palm
47	do.	Sabadia	90	do. feet.
48	do.	Samala	50	2½ do.
49	do.	Saryiah	30	3 do.

(8205) *Madras Timber Trees, Timber and Fancy Woods*, being a classified list of woods, native, or grown in the Madras Presidency, from the Juries' Reports, Madras Exhibition: 1855 ; Dr. Hugh Cleghorn, Reporter.

1. Acacia arabica, Babool, *Eng.* Baboola. *Hind.* Curvala, *Tam.* Nulla toomma curra, *Tel.* This very hard tough wood is extensively used, but cannot be obtained of large size, and is generally very crooked. It is used for plough shares, naves of wheels, &c., and generally for all purposes, for which a bent hard wood is required. It makes excellent tent pegs.

The tree is found in every district, and is worthy of cultivation on account of its gum, timber, and its seeds, a favorite food of sheep, &c. It is of rapid growth, and requires no water, flourishing in dry arid plains, and especially in black cotton soil, where other trees or rarely met with. The bark is extensively used for tanning, and gives a reddish tinge to the leather.

2. Acacia catechu, Kheir, *Hind.* Wodahalay, *Tam.* The wood of this tree is less hard and durable than that of the other *Acacias*. The tree is small, and occurs more frequently in the Deccan than in the Carnatic. The watery extract (kut) is largely manufactured.

3. Acacia leucophlœa, Velvaila, *Tam.* Tella toomma, *Tel.* Kikar, *Hind.* A good dark coloured wood, but generally small. The specific name is given from the whitish colour of the bark, which is used in distilling arrack. This Acacia is easily distinguished by its panicled globular inflorescence and stipulary thorns.

4. Acacia odoratissima, Caroovangay, *Tam.* A strong and heavy wood of rapid growth, attaining considerable size, and well suited for naves and felloes of wheels. The tree is abundant, and grows in almost any soil. The grain is ornamental but rather open.

5. Acacia speciosa, Dirisana, *Tel.* Velvangay, *Tam.* A very serviceable timber, easily procured at Madras, this is the *A. serissa*, which is extensively planted along the Ganges Canal. The tree is of large size and rapid growth, the wood of light colour, durable and very hard.

6. Acacia sundra, Currangally, *Tam.* A very hard, heavy and durable wood, used for posts and rice pestles. The tree is rather large and abundant, but the wood is not generally to be obtained in the market in planks of any size. At Guntoor, Mr. Rohde states that posts 5 feet long, are procurable, at 12 Rs. per 100, these are well suited for fencing, though the non-elastic nature of the wood is unfavourable to the holding

of nails driven into it. The natives regard it as the most durable wood for posts in house building.

8. Adenanthera pavonina. Wood hard, durable, red, yielding a dye, not procurable generally in any quantity. The tree is of handsome appearance.

10. Ailanthus excelsa, Peddu mau, *Tel.* Peru marum, *Tam.* A large tree, resembling the ash in general appearance, wood light and white, used for making sword handles, &c.

11. Alangium decapetalum, Alinjee marum, *Tam* Anisarooly Mara, *Can.* Akola, *Hind.* The wood is said by Roxburgh to be " beautiful" and Wight found it to sustain a weight of 310 lbs. but he had never seen a ten *inch* plank. The jury had no means of verifying these statements, only one specimen having been forwarded to them.

15. Aquilaria Agallocha—Eagle wood or Aloes wood. Aglay marum, *Tam.* Agar, *Hind.* Contains a fragrant resinous substance. The specimen from Shemogah is green and old, (the two others are yellow, and appear to have been obtained from a different tree.) It remains to identify the tree yielding this odoriferous wood, which is sold by weight, and is reported to have been brought from the Malayan Peninsula.

16. Areca catechu—Betel nut palm, Sooparee, *Hind.* Camoogoo, *Tam.* A palm of remarkably perpendicular growth, attaining a height of 30 or 40 feet with a tuft of feathery leaves at the extreme top, the trunk is only a few inches in diameter, the structure of the wood is like that of palms in general, and might be used in turnery for small objects. The nut is used by the natives with the betel leaf. It is hard and peculiarly streaked, and is used in turnery for small ornamental work. Used in Travancore for spear handles and bows, for which it is well suited, being very elastic.

17. Artocarpus hirsuta. Angelie marum, *Tam.* A large tree used in Travancore for making canoes, &c., the trunk being hollowed out Rheede figures the tree and praises the timber. It is (the jury understand) confined to the Western Coast.

18. Artocarpus incisa—Bread fruit tree. A tree of slow growth, not uncommon in Gardens about Madras.

19. Artocarpus integrifolia—Jack tree, Pillah *Tam.* Panasa, *Tel.* Alasegana mara, *Can.* Excellent timber, at first yellow, changing to brown, much used for furniture in Ceylon, somewhat resembling Mahogany in colour and appearance, but does not bear great alternations of dryness and moisture, suitable for house carpentry in general. The tree grows rapidly, and the fruit is prized. A very brittle wood when dry.

20. Atalantia monophylla, Caatyaloo micha marum, *Tam.* A small tree, wood close grained, hard and heavy. It is pale yellow, and if procurable of sufficient size, would be very valuable for cabinet purposes.

23. Azadirachta Indica, Neem tree, Vaypum marum, *Tam.* Vepa Mannoo, *Tel.* Hard heavy wood, when old, difficult to work, but *beautifully* mottled, as in Mr. Rohde's specimen. The seed affords a valuable bitter oil. The tree is found every where, attaining a large size in some localities, deserving of attention for ornamental work.

24. Bassia longifolia—Mohwa, *Hind.* Elooppa marum, *Tam.* Hippa Mannoo, *Tel.* Good wood for trenails, it is comparatively free from the attacks of the *Teredo navalis*—it is procurable among the logs brought down the Godavery. It is valued for all purposes, in situations where it is not exposed to air, as planking of ships below the water line, frames on which well walls are built &c., (J. R.) Nearly equal to teak but smaller. Much used for construction of carts at Coimbatore, and in Malabar, where it attains a large size, it is used for spars. (R. W.) A valuable fatty oil is obtained from the seed.

25. Bauhinia Richardiana—Introduced from Madagascar, of this wood we have no knowledge. The trees in the country being still young.

26. Bauhinia tomentosa—Caat Attie, *Tam.* A tree of small size, the wood dark brown and hard—not much in use. Bark used as cordage. Several of the Bauhinias yield dark coloured heavy and durable timber. Diphylla is the *Yepi* of Nellore, Guntoor and Masulipatam.

27. Bauhinia variegata—Irkumbalitha mara, *Can.* A beautiful tree with variegated flowers, wood of little use.

28. Berrya ammonilla—Trincomallee wood, *Eng.* Tircanamalay marum, *Tam.* Introduced from Ceylon, the wood is annually imported from Trincomallee, by which appellation it is known in the market. It is highly esteemed for its lightness and strength, is straight-grained—slightly pliant, tough and little affected by the atmosphere, employed in the construction of the Massoola boats of Madras (Wight). Used for spokes of wheels, helves, handles, a pulse, frames, poles and shafts of carriages, it is inferior to *Saul* for spokes, and to the Babool for some other purposes, but it is comparatively light and easily worked (Rohde). The market is still dependent on importation from Ceylon.

29. Bignonia suberosa—A very handsome tree with fragrant flowers and spongy bark, which is a very inferior kind of cork.

31. Borassus flabelliformis—Palmyrah: Panna marum, *Tam.* Tatti chettoo, *Tel.* This tree is very abundant, especially in sandy tracts near the sea. It is used chiefly for rafters, joists and reapers, when of good age, the timber is very valuable for this purpose, the trunk is split into 4 for rafters, into 8 for reapers, these are dressed with an adze. Jaffna Palmyrahs are famous,

and were largely imported in former times. From the structure of the fibres, it splits easily in the direction of its length, but supports a greater cross strain than any other wood: iron nails, however, rust rapidly in it. The fruit and the fusiform roots of the young trees (in the Northern Circars) are used as an article of food by the poorer classes. The leaves are used for thatching and coarse fibre. Jaggery and Toddy are extracted from the tree, the former is extensively used in the manufacture of sugar in Vizianagrum and Rajahmundry. Very neat baskets of Palmyrah leaf are made at Tinnevelly.

32. Briedelia spinosa ? Moolloo vangay, *Tam.* Wood not known in Madras, the tree is not uncommon, and attains a considerable size in the alpine jungles.

33. Butea frondosa, Palas, *Sans.* Dhak, *Hind.* Porasum, *Tam.* Thorus mara, *Can.* Moduga chettoo, *Tel.* A common tree thriving well in many parts of the country ; flower deep red, used as a dye. Many esteem the wood for gunpowder charcoal. The fields of Plassey took its name from this tree.

34. Cæsalpinia coriaria, the Dibi dibi. The tree was introduced from seed supplied by Dr. Wallich, about 20 years ago, the pods are collected with care, being valuable for tanning purposes.

35. Cœslpinia sappan. The Sappan tree, Puttungay. *Hind.* Isiapangum, Vuttunghy, *Tam.* Used for dyeing ; cultivated in Paulghaut for the purpose of dyeing ; the straw used in mat making (Wight), from its high price for this purpose, not used for carpentry.

36. Calophyllum Inophyllum. Alexandrian Laurel, *Eng.* Pinnay marum, *Tam.* Wooma mara, *Can.* Ponna chettoo, *Tel.* A beautiful tree with an appropriate name, very common ; a good lamp oil obtained from the seeds, wood coarse grained, strong, durable and ornamental. The tree is worthy of attention, as it grows well in sandy tracts close to the sea, where few others thrive.

37. Careya arborea. Pailæ marum, *Tam.* Buddadanedi, *Tel.* Cumbia, *Can.* Wood useless, the bark serves as cordage, and is used as slow match for matchlocks in N. Circars.

38. Carcya sphœrica. Wood useless, the bark serves as cordage, and is used as slow match for matchlocks in N. Circars.

39. Caryota urens. Bastard Sago Palm. Ootaly pana, *Tam.* Bhynee, *Can.* A very ornamental palm, furnishes an inferior kind of sago and also toddy. Is extensively used under the name of Napiera in Ceylon for rafters, which are exceedingly hard and durable.

40. Casuarina equisitifolia. This tree was introduced about 50 years ago, and is now well established, growing freely and ripening seed in great abundance. In general appearance, it much resembles the Larch Fir,—it grows in 10 years to the height of about 30 feet. It generally grows very straight, and where the main shoot is broken or lopped off, throws out secondary shoots readily which are usually straight and erect. It thrives best in sandy tracts along the sea shore, and it would be desirable to plant it largely on the sand Hills, North and South of Madras where some numbers have already been grown. The wood is reddish in colour, in density and appearance it somewhat resembles Trincomallee. It bears a great strain, is well adapted for posts, and is said to bear submersion in water very well. The bark contains tannin, and a brown dye has lately been extracted from it by M. Jules L'Epine of Pondicherry. On the whole, this tree well deserves extensive cultivation on the sandy tracts, where it grows so readily.

41. Cathartocarpus fistula, Koannay marum, *Tam.* Rellie, *Tel.* A tree of great beauty, when in flower, but generally too small and crooked to yield valuable timber, wood close grained and used for tomtoms, &c. In the Malabar forests, it attains sufficient size for spars of native vessels. (Wight.) The Bark is one of the best for tanning.

42. Cathartocarpus Roxbürghii. A highly ornamental tree, in form much resembling the weeping ash. It is at present only to be found in gardens, but the wood is hard and handsomely marked, and may hereafter prove a valuable addition to the timbers of India.

43. Cedrela Toona, the Toon tree, Toon marum, *Tam.* Toona, *Hind.* Tundu, *Can.* A valuable tree of large size, wood reddish coloured, used all over India in cabinet making, scarcely inferior to mahogany, but lighter and not so close in the grain, often sold here under the general name of "Chittagong wood." It is the most valuable of the woods known by that commercial name. It is said to be abundant in Travancore. It is very deserving of careful enquiry, as to locality, supply &c. with a view to being brought into more extensive use in this Presidency. The specimen sent by general Cullen shows the grain and polish remarkably well: It is however of a brighter colour, and apparently a denser quality than any met with in the market, inducing a doubt as to its being of the same species. Found in the Mysore and Salem jungles in large quantities, also along the crest of the ghauts from Travancore to Goa.

44. Chickrassa tabularis, Aglay marum. Wood extensively used in cabinet making, also coming under the denomination of "Chittagong wood," being imported from that province, though it is abundant in the mountainous parts of the Peninsula. It makes beautiful and light furniture, but is apt to warp during the season of hot land winds. The wood is well known and easily procured.

45. Chloroxylon swietenia, Satin wood tree, Kodawah porsh, *Tam.* Billu kurra, *Tel.* This tree grows abundantly in the mountainous dis-

tricts of the Presidency, but seldom attains a large size, occasionally planks of 10 to 15 inches in breadth may be procured. The wood is very close grained, hard and durable, of a light orange colour, takes a fine polish, and is suited for all kinds of ornamental purposes, but is somewhat apt to split. For picture frames, it is nearly equal to American maple. The timber bears submersion well, in some instances it is beautifully feathered. There is this peculiarity, satin wood loses its beauty by age, unless protected by a coat of fine varnish.

46. Cicca disticha, Aranelly, Harfaroovri, *Hind.* A small tree bearing a round acid fruit, the country gooseberry, wood inferior.

47. Citrus aurantium, Orange tree, Kolinjee marum, *Tam.* The well known orange tree, wood hard, but not available of any size, or in any quantity.

48. Cluytia collina, Woadoogoo marum. *Tam.* Wodesha, *Tel.* A small tree, wood red colored, exceedingly hard and durable, but little is known of it.

49. Cocos nucifera, Cocoanut tree ; Tennam marum, *Tam.* Narrel, *Hind.* Tenkoi chettoo, *Tel.* Kinghena, *Canarese.* This tree thrives well on the sea coost, its uses and produce are well known, the wood is occasionally used for reapers &c.; for which purposes it is inferior to the palmyrah. In Ceylon, however, and on the Western Coast, hard and durable rafters are procurable The Cochin fibres were sent in a large box of this wood, the planks of which are prettily striped and of remarkable size.

50. Cordia latifolia. Wood very inferior, and of small size.

51 Cyathea arborea, Tree fern. The section of this tree fern displays well the structure of an Acrogenous stem, hollow in the centre, marked on the outside by the scars of the fallen leaves, and showing the elongation of the axis by junction of the petioles. Wood quite worthless as timber.

52 Dalbergia latifolia, Blackwood, Eroopoottoo, *Tam.* Bitti, *Can.* A magnificent tree, from which the well known Malabar black wood is obtained. Planks 4 feet broad are often procurable, after all the external white wood has been removed: it is heavy and close grained, admitting of fine polish, very much used for furniture. One of the most valuable woods of this presidency.

53 Dalbergia sissoides, Bittymarum, kar Itty or Blackwood. This is a smaller tree than D. latifolia, but more common in the forests, both yield a blakwood, and in Madras are indiscriminately called "Rose wood." The wood contains much oil which unfits it for receiving paint.

54. Dalbergia sissoo, Sissu, *Tel.* Introduced from Bengal at the recommendation of Dr. Wallich, grows to a large size, has been planted on the banks of the Toomboodra, and is thriving wonderfully ; it is growing extensively in the cantonment of Masulipatam, as an avenue tree, and has been planted in some places on the banks of the Kistnah Annicut. There are few trees which so much deserve attention, considering its rapid growth, its beauty and its usefulness. Wood hard, strong, tenacious, and compact, whilst its great durability combines to render it one of the most valuable Timbers known. The tree grows rapidly, is propagated and reared with facility and it early attains a good working condition of timber. It is used in Bengal for gun carriages.

55. Dillenia pentagyna. Pinnay marum, *Tam.* A stately forest tree, common on the face of the W. Ghauts. The wood is said to be exceedingly strong and durable, even when buried under ground ; this is believed to be the tree, which furnishes the *poon* spar, so valuable for shipping, though *Calophyllum Inophyllum* has hitherto been so considered.

56. Diospyros cordifolia. Vuckana marum, *Tam.* A hard heavy wood, colour dark brown ; it is difficult to work.

57 Diospyros ebenaster. Acha marum, *Tam.* Ebony of very superior quality is procurable in these districts as well as the Northern circars. Mr. Rohde has received 16 inch planks of a fine uniform black. Ebony is much affected by the weather, on which account European cabinet makers seldom use it except in veneer. The tree bearing the name "Achay" at Madras is Bauhinia tomentosa.

58 Diospyros mabola, (often called "mangosteen") under which name it is cultivated extensively in gardens at Vizagapatam.

59. Diospyros melanoxylon. Ebony, Toombie marum, *Tam.* The species of Diospyros have this peculiarity that the black heart wood is surrounded by white sapwood. There are several fine specimens of the genus, but the jury are unable to determine the species or verify the names. The subject is important and merits careful elucidation.

60 Ehretia lævis. Wood of very small size, the wood seems a good one.

61 Elate sylvestis, wild Date, Eajata, *Can.* Has the general characteristics of the family, but is inferior to the Palmyrah, Cocoanut, &c.

62. Emblica officinalis, Emblic Myrabolan, Aonla, *Hind.* Nelly marum, *Tam.* Nelly mara, *Can.* Usirika, *Tel.* A fruit tree, the wood of which would appear to be of service, for making boxes, &c.

63. Embryopteris glutinifera, Coosbartha mara, *Can.* Toomei, *Tel.* A middling sized tree, the wood is of indifferent quality. The viscid juice of the fruit is used for paying boats, and strengthening fishing nets and lines.

64. Eriodendron anfractuosum, White cotton tree, Elava marum. A soft almost worthless wood used for toys, floats &c. and such purposes.

65. Erythrina indica, Indian Coral tree, Moorkoo marum, *Tam.* Badida chettoo, *Tel.* This is the "Moochee" wood of Madras, soft and only used for toys, light boxes, trays, &c. The varnished toys from the Northern Circars are made of this wood.

66. Euphorbia tirucalli, Milk Hedge, Kulli, *Tam.* Wood light colored, the root of old shrubs is understood to be well adapted for gun stocks, but plants of sufficient age are seldom met with

67. Euphorbia Litchi. A fruit tree, introduced from China, the Litchi attains a height of 25 to 30 feet but does not ripen its fruit at Madras.

68 Eurya longifolia.

69. Feronia elephantum. Wood apple, Koit, *Hind.* Veela marum, *Tam.* Bilvurthitha mara, *Can.* Velluga Chettoo, *Tel.* A large tree, widely diffused in India, yielding a hard strong heavy wood, much used at Vizagapatam in house building. Said to be not very durable.

70. Ficus glomerata. Rulla kith mara, *Can.*

71 Ficus India. Banyan Tree, Ala marum, *Tam.* Ahlada mara, *Canarese.*

72. Ficus infectoria. Bassari mara.

73. Ficus nitida.

74. Ficus racemosa. Atti mara.

75. Ficus religiosa. The Pippul Tree, Arasa marum, *Tam.* Ranghy mara, *Can.* Ray aman, *Tel.* A very poor wood.

76. Ficus virens. Goovee mamoo, *Tel.* Masulapatam. These various species of Ficus are well known, and differ little from each other in their properties, The trees are large and of rapid growth, but the timber is of little value, being light, open and soft, The large drops of the Banyan after being well soaked in water to get rid of the viscid juice are used for tent poles and such purposes, bird lime is prepared from the fresh juice.

77. Gmelina aborea. Coommy marum, *Tam.* Goommedee chettoo, *Tel.* A large timber tree, growing in mountainous districts. The wood is light, of a pale yellow colour, easily worked, and does not shrink or warp; used for picture frames, decking small boats, for making venetian blinds, sounding boards, palankeen pannels, gram measures, &c. This tree deserves notice : it is very commonly used in the Vizagapatam district, for the foundation of wells and other purposes, which require it to be submerged in water, where it is remarkably durable.

78. Gossypium acuminatum, The Peruvian Cotton Plant, a biennial shrub, useless as timber.

79. Grewia tiliæfolia. Chadachey marum, *Tam.* A considerable tree, wood soft, not known at Madras.

80. Grewia Sp. Makes good walking stricks, The wood of Grewia salvifolia ia also good for the same purposes, and the bark of many species yields good fibres.

81. Guaiacum officinale, Lignum Vitæ. This shrub has been lately introduced, and is found to thrive remarkably well, readily flowering and fruiting. Its chief value is for medicinal purposes, but the wood, about 4 inches in diameter, is very hard and close grained, suited for turning. In time a supply may be available.

82. Guatteria longifolia. Thavatharoo, Asoka chettoo, *Tel.* A very handsome erect growing tree, but wood soft and useless.

83. Guazuma tomentosa. A tree, pretty common about Madras, evidently planted, the fruit is tubercled, about the size of a cherry, introduced by Dr. Anderson about 70 years ago.

84. Hibiscus lampas.

85. Hæmatoxylon campechianum, Logwood. This tree has been lately introduced, the largest as yet much resembles a fine hawthorn tree in habit and size. It grows readily and seeds abundantly, but it remains to be seen whether it will attain a large size in this country. It is used only as a dye, and the bark is astringent in a considerable degree. It is a promising tree and deserves attention,

86. Hura crepitans. Sand box. A middle sized tree of rapid growth, the trunk is strongly armed, the wood light and useless. The seeds are poisonous.

87. Hydnocarpus inebrians. Murravuttay, *Tam.* A large tree, little is known of the wood, the berry is used for poisoning fish.

88. Inga dulcis. Sweet Inga or Manilla Tamarind. Seema chinta, *Tel.* Coorkapooli marum, *Tam.* A most valuable hedge plant, is now used along the line of railway, the wood is hard. Isolated trees of 12 to 18 inches diameter are occasionally found, these resemble the hawthorn in general appearance. It is the *Pithecolobia mdulce*, Benih.

The pulp of the fruit is eatable, the seed was brought from Manilla to Samulcottah, hence the name "Manilla tamarind." The Spaniards introduced the tree to the E. Indies from Mexico.

89. Inga xylocarpa, Tangedu mara. Jamboo, *Hind.* This tree grows to a large size, and is much valued for house building, on account of its strength and toughness. It is remarkable for its thick woody legume, and is the *Xylia dolarbri formis* of Benih.

90 Jatropha multifida. Coral plant. A garden shrub.

91. Jonesia asoca. A highly ornamental garden tree, timber not available.

92. Kleinhovia hospita. A garden shrub.

93. Kydia calycina. A middle sized tree, pretty common [illegible] the Western Ghauts. Hort. Gard. 69.

94. Lagerstræmia microcarpa. Benteak. Ventakoo, *Can.* Cutcha cutta marum, *Tam.* A tree of large size with a long straight stem, the timber is of ordinary character, easily worked and suited for purposes where strength and beauty are not required.

95. Lawsonia inermis. Hennah. Mendee, *Hind.* A hedge plant, resembling the English privet, the wood strong and suited for tool handles, tent pegs, &c., the leaves yield the dye used by the natives.

96. Malphigia punicifolia. Barbadoes cherry. An ornamental shrub introduced from the West Indies.

97. Mangifera indica, Mango Tree, Maah marum, *Tam.* Mamadi chettoo, *Tel.* Mavena, *Can.* A tree of large growth, and generally diffused. The mature wood is dull grey, open, yet durable, if not exposed to wet, of the effect of which it is very sensitive. It is the cheapest wood procurable here, and used for packing cases, boarding, and rough work in general, Mr. Rohde says it holds a nail faster than any other wood known to him.

98 Melia azadirach. Margosa. Malay Vaimboo, *Tam.* Taruka vepa, *Tel.* A tree of moderate size and in some localities of large size. The mature wood is hard, durable and handsomely marked. A valuable oil is made from the seed.

99. Mimusops Elengi. Maghidam, *Tam.* Pogada mannoo, *Tel.* Moogali mara, *Can.* A tree of moderate size, cultivated for the oil obtained from its fragrant flowers. The wood is little known.

100 Mimusops hexandra. Pala marum, *Tam.*

101. Michelia Rheedii, Sampanghy marum, *Tam.* A large tree, the wood close grained and very handsomely marked in a mottled manner. It is, the Jury understand, being tried in Bombay for ship building purposes. A remarkably large specimen is exhibited by Captain Cunningham, its dimensions are 11½ feet in length, 4½ feet in breath. and 3 inches in thickness, and is apparently derived from a tree of very great age.

102. Morinda citrifolia, Noana marum, or Munja pavettay, *Tam.* Maddi chettoo, *Tel.* A small tree of common occurrence, the wood and root much used for dyeing red, this is deep yellow, easily worked and used for common purposes.

103. Nauclea cadamba, Cudum, *Hind.* Vella Cadamba, *Tam.* Rudrakshakamba, *Tel.* A noble tree, wood yellow, used for furniture.

104. Nauclea cordifolia, Munja Cadamba, *Tam.* Daduga, *Tel.* A large tree growing abundantly in the mountainons districts of the Peninsula —wood yellow, rather close grained. It is used for common purposes, and easily worked, bnt is best suited for work which is sheltered, bedsteads, &c., being much affected by alternation of dry and wet weather. N. parviflora (peer cadamba) is also frequent in the Western coast, and is valued for yielding flooring planks, packing boxes, &c.

105. Parkia biglobosa. A very elegant tree of large size, introduced from Africa, the legumes are filled with a farinaceous pulp, the wood is hard and promising. Surrounded by an astringent bark. A watery extract has been prepared, the value of which for tanning purposes has yet to be tested. A supply of timber is not yet procurable.

106. Odina Wodier—Ooday marum, *Tam.* Goompina, *Tel.* A large tree, native of mountainous districts, it is grown from cuttings, and planted in avenues, but it yields no shade in the hot weather, being without leaves till June. The wood is difficult to season, but when well seasoned, the central reddish portion is useful for many purposes.

107. Ægle marmelos, Bel, *Hind.* Vilva marum, *Tam.* Maredu, *Tel.* A thorny tree with ternate leaves, the astringent pulp of the fruit is a valuable remedy in diarrhœa; the wood is hard, but from the great medicinal value of the tree, the timber is not at present available.

108. Pavetta indica —Pavetty marum, *Tam.* An ornamental shrub 4 or 5 feet high with white flowers, timber very small.

109. Pimenta vulgaris. The "Allspice" tree, introduced from the West Indies. Several large trees are at Madras, but the climate of the Carnatic does not seem to suit them.

110. Pomciana regia. A large tree with showy coloured flowers. Introduced from Madagascar, and still confined to gardens. The wood seems good.

111. Pongamia glabra—Poonga marum, *Tam.* This large tree attaining a height of 40 to 50 feet is very common in S. India, flourishing equally well in the arid plains of the Carnatic, and on the Sub alpine tracts of Mysore. Oil is made from the seeds. Roxburgh says the wood is light, white and fit for a variety of purposes here it is used chiefly for fuel. The boughs and leaves are extensively used as manure.

112. Premna tomentosa—Kolcuttay teak *Tam.* A small tree. Wood hard and close grained of a brownish yellow colour, well fitted for ornamental purposes.

b 113 Prosopis spicigera—Parumbay, *Tam.* A thorny tree, not uncommon in the black cotton soils, attaining a large size in Mysore. Wood strong, straight-grained, and easily worked. The foliage of the tree and the character of the wood, closely resembles that of its congener *Acacia sundra.*

114. Psidium pyriferum. Guava tree, Coaya marum, *Tam.* Sebe mara, *Can.* The common Guava, found every where in gardens which probably found its way to India from S. America through the Portuguese. Wood small, but very hard, used by Dr. Hunter for wood engraving, and commonly for pegs, mallets, handles of tools &c.

115. Pterocarpus Indicus, *Wall.* Padouk *Burmese.* The "padouk" is a handsome tree with long waving branches and clusters of yellow flowers, which scent the air. It produces very fine timber, and may be considered one of

our most valuable forest trees. This species also yields Gum Kino.

116. Pterocarpus marsupium. Vangay marum, *Tam.* Whonay, *Can.* Yeangasa, *Tel.* A large handsome tree, widely diffused, yielding one of the most abundant and useful timber of S. India, when wet, it gives a yellow stain. Mr. Rohde states, that it is better suited for weather boards, exposed venetians, &c., than any other wood he has tried. It is heavier than teak, and more difficult to work. This tree yields the gum kino of commerce which is exported from Malabar. The timber is now being tried as sleepers on the Madras Railway.

117. Pterocarpus santalinus, Red Sanders, Rutta Sandanum, *Hind.* Savapoo Sandanum, *Tam.* This tree which grows abundantly in the Nagarry Hills, yields the "Red Sandal wood" of commerce. It is sold by weight as a dyewood, and forms a regular article of export. It takes a beautiful polish, but the high price of the wood for dyeing purposes, precludes its use as a timber.

118. Pterospermum Indicum—Kyabooca. This wood is obtained from the knotty excrescences or burrs of Pterospermum Indicum? it is sawn off in slabs—2 to 4 feet long and 2 to 8 inches thick. It resembles the hue of the yew, is very hard and full of curls—the colour being reddish brown, varying to orange. It is very ornamental, and much esteemed in China, India and England, where it is used for making small boxes, writing desks and other fancy ornamental work. The wood is brought to Singapore by Eastern traders, and is sold by weight.

119. Rottlera tinctoria—Cupela, *Hind.* Sarnakasary mara, Chendurapa chettoo, *Tel.* A large tree common in the Deccan and the Northern Circars. The red mealy power which covers the capsules is used in Mysore to dye silk. Wood soft and inferior.

120. Salmalia malabarica—Red Cotton tree, Poola marum, *Tam.* Moollelavoo, *Can.* Booraga, *Tel.* A large common tree, flowers of a beautiful red colour, thewood light, and spongy ; used by Moochees in their work, but very inferior.

121. Santalum Album—Sandal wood, Shandanum, *Tam.* Gandaga mara, *Can.* This very valuable tree, yielding the sandal wood of commerce, is found in abundance in Coorg and Mysore, sparingly in Canara. It is usually cut into billets, and disposed of by weight. The uses are well known. The scent is believed to be much modified by peculiarities of soil and elevation.

122. Sapindus emarginatus—Soap-nut tree, Poochee-cottay, *Tam.* A tree met with about villages all over the country. The fruit used as indicated by the native name and sold in all bazaars. Wood white, only used for fuel. In many situations, this tree yields a more profitable return than any other fruit tree.

123. Schmidelia serrata. A straggling shrub, with ternate leaves. Timber very small.

124. Semicarpus anacardium—Marking nut tree, Shayng cottay, *Tam.* Bhela, *Hind.* Jadi chettoo, *Tel.* This common tree is of no value as timber. A considerable quantity of the nuts are exported from the Deccan, and Mysore, as a mordant. The juice is so acrid, that wood cutters are unwilling to cut the tree.

125. Sethia Indica—Thavadarm, *Tam.* When fully grown, it is still a small tree, the fruit yields an oil, and the wood is esteemed as a substitute for Sandal wood.

126. Soymida febrifuga, Red wood, or Bastard Cedar, Shem Marum or Choar Kullie Marum, *Tam.* Soymeda, *Tel.* A large tree, tolerably abundant, timber most durable and strong, yet light and easily worked, deserving of attention.

127. Spathodea adenophylla. A small introduced tree.

128. Spathodea Sp.

129. Sterculia fœtida. Peenary marum, *Tam.* Gurrapa Badum Chettoo, *Tel.* A large tree, but chiefly found on the W. Coast and Mysore where it is applied to a number of useful purposes. This is one of the trees which are believed to furnish the smaller "Poon spars."

130 Sterculia guttata. A large tree.

131. Stereospermum suaveolens, Padrie marum, *Tam.* Ooloonanthree mara. *Can.* A middle sized tree with pinnate leaves, and panicled inflorescence, very fragrant wood (according to Wight,) strong and elastic, said to be suitable for making bows.

132 Strychnos nux vomica, Nux Vomica Tree, Yetti marum, *Tam.* Musidi, *Tel.* This well known tree is small, wood white and very hard, used for plough shares. The poisonous fruits are the favorite food of the Buceros Malabaricus, Hornbill.

133. Strychnos potatorum, Clearing Nut tree Taita marum, *Tam.* Judapa chettoo, *Tel.* A larger tree than the above, the fruit is well known as possessing the property of clearing water ; wood hard and serviceable, though of small size.

134. Syzygium jambolanum, Jamoon, *Hind.* Nawel marum, *Tam.* Nœrala mara, *Can.* Neradi, *Tel.* A fine large tree of common occurrence, suited for avenues ; the fruit small, and somewhat astringent, sold in the bazaars. The wood is much used for ordinary purposes, but is of little value.

135. Tamarindus indica, Tamarind Tree, Poolia marum, *Tam.* Chinta chetoo, *Tel.* Oonara mara, *Can.* A large and very handsome tree, of slow growth ; the wood hard, durable and fine veined, but apt to be faulty in the centre. The ornamental character of the wood is well shown in the handsome specimen contributed by Mr. Rohde. It is used in the manufacture of oil for its fruit and shade.

136. Tecoma stans. An ornamental garden shrub.

137. Tectona grandis, Teak, *Eng.* Teak marum, *Tam.* Tek chettoo, *Tel.* A native of the mountainous parts of Malabar, and the country bordering the Godavery, the Moulmein and Rangoon forests. This well known and far-famed tree grows straight and lofty, with cross armed panicles of showy white flowers. It seems to require 80 years to attain perfection. The wood is very hard, but easily worked; it is soon seasoned, and being oily, does not injure iron; and shrinks little. It is probably the most durable timber known, hence its value in Ship-building. The Malabar teak is considered the *best*, and is always most valued in our Government dock yards. A valuable report by Dr. Falconer on the Teak forests of the Tenasserim Coast, was published lately among the selection of Records of the Indian Government. The price of Teak wood in 1855, is 3 Rs. per cubic foot, double the ordinary rate. It is matter of regret considering the vast importance of teak timber to England, as a maritime nation, that the preservation of the teak forests was so long disregarded.

138. Terminalia alata, Marudum marum, *Tam.* Kooramarthi mara, *Can.* A very large tree, used on the Western Coast for house building and making canoes.

139. Terminalia belerica, Tanikoi or tandee marum, Cattoo eloopæ, *Tam.* Tadi chetoo, *Tel.* A very large tree with a straight trunk and spreading head; wood white and soft, but not much used. The flowers have an offensive smell. The kernel of the fruit is eaten by the natives.

140. Terminalia Berryi, Vella murda, *Tam.* This tree also attains a large size, especially at the foot of the W. Ghauts, where it is used for canoes, &c.

141. Terminalia catappa, Natvadom cottay, *Tam.* Badum, *Tel.* A beautiful large tree, found in gardens, &c., the kernels are eaten and are palatable, the wood is also useful.

142. Terminalia Chebula, Pilla murda or Kadookoy, *Tam.* Alali mara, *Can.* Heerda, *Duk.* Karaka chettoo, *Tel.* A very large tree, fruit used by harness makers. The leaves are punctured by an insect, and hollow galls are developed, which are powerfully astringent, and answer well for making ink. They also yield chintz painters and carpet weavers, their best and most durable yellow. (Roxb.)

143. Terminalia glabra, Curry murda, *Tam.* A large tree, wood dark coloured, very hard, heavy and strong, Dr. Wight speaks highly of this wood, and states that large beams are readily procurable at Coimbatore for house building purposes. It is very hard, heavy and durable under water.

144. Thespesia populnea, Poorsungkai, *Tam.* Gungarani, *Tel.* A tree much used for avenues, of quick growth, and yielding good shade. Th generally grows from cuttings, and althoug such timber is strong, hard and durable, but rar ly to be met with good, owing to the trees ro ting at the heart. It is procurable, fit for chair &c. The tree abounds in old gardens, and abo all European Stations, thriving best near th sea.

145. Thevetia nerüfolia, A garden shrub cal ed the "Exile." The wood is worthless.

146. Vachellia farnesiana, Jali mara, *Can.* Ved vully, *Tam.* An armed shrub, very common i Mysore and Deccan, exuding much gum like th babool, which it greatly resembles in its timbe the size is very small.

147. Vatica robusta, Saul, *Hind.* Googilan *Tel.* A wood in great repute, belonging to th *Dipterocarpeæ*; it is most valuable for house an ship building, Vats for liquids, door frames, an the rails and battens of doors; it is not suite for planks, it twists, shrinks, and warps, whe ever the surface is removed, even after man years' seasoning. This wood is in general us for building purposes in the Ganjam and Vizaga patam Districts. "From Colonel Baker's excel lent experiments, it appears that, compared wit Teak, its strength is about 1121 to 869. Fro Major H. Campbell's valuable experiments, un seasoned Saul broke with a weight of 1,308lbs. seasoned Saul with 1,319lbs., and teak woo with 1,091lbs. It is unquestionably the mos useful known Indian timber for engineering pur poses," (Jury Reports, Great Exhibition.)

148. Visenia umbellata. A considerable tre of great beauty, with rose coloured flowers an velvetty leaves; introduced from Sumatra, th seeds having been sent to the Horticultural So ciety's Garden, by Dr. Wallich.

149. Vitex alata. A small tree found in th Naggery Hills, leaves ternate, petioles winged.

150. Vitex altissima. A large tree of grea beauty, when in flower, frequent on the slope of the Western Ghauts, reported to be fit fo cabinet purposes.

151. Wrightia antidysenterica. Veppaula *Tam.* Pala chet oo, *Tel.* A small tree of com mon occurrence in Mysore and the Hilly parts its medicinal virtues are worthy of attention, bu the wood is of little value. The bark was former ly in request under the name of *Conessi* and i still esteemed a valuable drug by the natives. It appears to have lost its value in commerce, from not being distinguished from the bark of Wrightia tinctoria which grows in same places.

152. Wrightia mollissima. Introduced from the Naggery Hills; the yellow juice might be turned to account, butthe timber is of no value.

153. Wrightia tinctoria, Palay marum *Tam.* A small tree, the leaves of which yield an inferior kind of Indigo. Wood white and close grained, said to be suited for Turnery.

154. Zizyphus jujuba. Yellandav marum,

Tam. Elanjee mara, *Can.* Gooly mara, *Can.* Ber, *Hind.* Rega, *Tel.* The wild *Ber* tree, common almost every where; wood hard and useful, but of small size. It is used for making sandals.

(8206) *Woods of Malabar Forests* (*J. E. Chapman.*)

These woods were collected, in 1846, by Dr. Gibson, Conservator of Forests in the Bombay Presidency, for Mr. Chapman, in connection with the projected "Great Indian Peninsular Railway."

1 Jamboo; a very heavy wood.
2 Kad kud.
3 Kelaho.
4 Koompoly.
5 Kendel; a heavy, strong, dark wood.
6 Kungance.
7 Kursing.
8 Kumdee.
9 Marlee; a very heavy, brown wood.
10 Ombah.
11 Pood goossa.
12 Ruccuh korurah; a very straight-grained wood.
13 Satannah; a light, soft, close wood.
14 Sarrah.
15 Seerass.
16 Sood beebo.
17 Sawree; a white, soft wood, very light.
18 Teh pully.
19 "Jamboo," or Jambu, Mimosa xylocarpa. This tree grows to a large size: on account of its strength and toughness, it is much valued for house building.
20 "Mairtee," Pentaptera coriacea, a very common tree both above and below the Ghauts The wood is very durable, and is therefore used in house, ship, and boat-building.

(8207) *Martaban Timber trees, being Woods of Martaban* (*Dr. Wallich*).

1 Calophyllum. Thurappe. A large tree; used for masts and spars.
2 Careya. Zaza. Used for posts, &c.
3 Cynometra. Maingga. A small tree.
4 Diospyros (?). Ryamucha. Used in house building
5 Elæococarpus. Very large timber: used for masts and house posts.
6 Fagraea fragrans. Annah-beng. Compact, hard, yellow, and very beautiful wood; little used.
7 Gordonia (?) Zaza. Large common timber.
8 Hopea odorata. Tengaun. An immense tree.
9 Meenaban. A durable pliant wood.
10 Pongamia atropurpurea. Lagun. A noble tree used in boat and house building.
11 Quercus Amherstiana. Tirbbae. A large tree; used in boat building.
12 Tectona grandis. Teak wood.
13 Terminalia bialata.
14 Xanthophyllum. Saphew. A very large tree; used for posts and rafters.
15 *Pterospermum Indicum.* Lingoa wood, or the Amboyna wood of commerce, is from Ceram in the Moluccas. It was imported in considerable quantities into Great Britain during the period in which the Moluccas were British possessions. This wood, which is very durable and capable of a high polish, is abundant at Ceram, New Guinea, and throughout the Molucca seas. It can be obtained in any quantity, if the precaution is taken of ordering it during the previous trading season. The Kayu Buka of commerce is the gnarled excrescence of this tree.
16 Lingoa wood, from Ceram. A circular slab 6 feet 7 inches in diameter. These large circular slabs are obtained by taking advantage of the spurs which project from the base of the trunk, as the tree itself has not sufficient diameter to furnish such wide slabs. They are occasionally met with as large as 9 feet, but the usual size is from 4 to 6 feet.
17 Kayu Buka, from the Moluccas. This wood is obtained from the knotty excrescences which are found on the stems of the Lingoa tree It is brought to Singapore by the Eastern traders from Ceram, Arru and New Guinea, and is sold by weight. It is much esteemed as a fancy wood.

(8208) *Moulmein Timber and Fancy-woods.*

Of the eleven Timbers forwarded to the Exhibition of 1851, from Moulmein, by J. R. Colvin, Esquire, Commissioner of the Province in 1847, under their native names, several have been identified by Dr. Falconer during his visit to the Teak forest of the Tenasserim Provinces in 1848-49:—

1 Lagerstrœmia macrocarpa, pyen-ma, *Burm.* commonly known under the name of jarrool.
2 Carcya sphoerica, Bambooce, *Burm.*
3 Cyrtophyllum fragrans, Anan, *Burm.* One of the Nux Vomica tribe; One of the hardest, most compact, and heaviest woods known.
4 Pyen-ma and kazaret, *Burm.* Undetermined.
5 Pterocarpus indica, Podauck, *Burm.* One of the Leguminosæ, called Rosewood; it is a very beautiful and hard compact timber, closely resembling the Andaman wood.
6 Indike, *Burm.* Ebony.
7 Anan, *Burm.* See above.
8 Hopea odorata, Thengan, *Burm.* Of the Dipterocarpeæ or saul tribe; a very strong but coarse-grained timber.
9 Inga xylocarpa, Pyangadean, *Burm.* belonging to the Acacia tribe commonly called the

iron wood of the Arracan provinces, very hard, dense and durable.

10 Rosewood of the Tanasserim provinces, a very beautiful, hard, compact timber, resembling "Andaman wood," which is occasionally seen in the bazar of Calcutta. Mr. Mason says that the yellow wood of the jack affords beautiful timber for furniture, and in some parts of India it is highly valued. The heart of old tamarind trees furnishes a hard dark-coloured wood, resembling ebony. Roxburgh says the wood is "durable and beautifully veined." *Cassia florida* has wood "not inferior to ebony." *Pongamia glabra*, and *Wrightia coccinea* have light fine wood. The Ceylonese iron wood tree, *Adenanthera pavonina*, *Vachellia Farnesiana*, *Acacia Catechu*, and the jujube tree furnish hard, tough wood. *Cassia fistula*, *Cassia nodosa*, the chestnut tree, *Sandoricum indicum*, *Nauclea Cabamba*, and one or two species of eugenia afford good timber. These are among more than a hundred trees in the Tenasserim Provinces that furnish valuable woods, of which the selection of fifty or sixty would embrace the most useful.—*Mason*.

(8209) *Woods of Paulghaut Jungle.* (*Col. Frith.*)

1 Ab Eney, brown colour. A large tree; used for furniture.

2 Bumboo, yellow colour. A large tree; used for building and for furniture.

3 Benteak, light colour, specific gravity 0.591. Inferior; used for building and common carts.

4 Cedar, reddish colour, specific gravity 0.507. A large tree, wood aromatic; used for furniture.

5 Cedar-root. Very aromatic; used for ornamental furniture.

6 Cautovanga, dark colour. Very strong: used for wheelwright's work.

7 Chadachey, light brown colour. A small tree; used for buildings and carts.

8 Eroopoottooirvolly, brown colour, specific gravity 0.861. Used for buildings and bullock-yokes.

9 Ittee veittee, black colour. A small tree; used for furniture.

10 Kullen teak, dark colour. The best teak; very strong and large.

11 Kur[illegible]agom, light brown, specific gravity, 0·704[illegible] small tree; used for naves of wheels.

12 Kurroomardoo, dark colour. Strong wood; used for wheel wright's work.

13 Kuroongaulee. dark colour. A heavy and hard wood used for furniture.

14 Muroodoo, light colour. A small tree[illegible] used for buildings.

15 Nova, white colour. Used for shafts[illegible] cart-poles, &c.

16 Oome teak, dark brown colour. Third-rate teak.

17 Oodoogoo, red colour. A large tree; used for ploughs and building.

18 Portia, brown colour. A small tree; used for musket-stocks.

19 Teak, light colour, specific gravity 0 852. Second-rate teak.

20 Vangay, light brown colour, specific gravity 0·788. A small tree; used for beams and carts.

(8210) *Pegu Timber Trees, Timber and Fancy-woods.*

Of the Forests generally.

White Woods.—Eighty-five species are soft and useless, being only fit for fuel. Many of them however are valuable, either for their fruit, gums, oil-seed or spices; others, for their close and compact structure, are employed in the manufacture of small ware, as a species of *Nauclea* used for making combs and two species of *Erythrina* yield the light charcoal employed in the manufacture of gunpowder.

These light woods, useless as timber, belong to the families of *Urticaceæ* (including more than twenty species of *Ficus*,) and *Sterculiaceæ*, *Laurineæ*, *Rubiaceæ*, *Myristicaceæ*, *Anonaceæ*, *Spondiaceæ* and *Bignoniaceæ*, with odd species from other families.

The remaining white woods, twenty-five in number, valuable for their strength and closeness of grain, demand a more extended notice. Seventeen of these are fit for house-building, and eight, from the hardness and fineness of their grain, render them valuable as fancy woods for cabinet making.

Red-colored Woods.—These are twenty-five in number, seven of which, from their strength and solidity, are adapted for the various purposes of house-building; seven, from the elegance of their grain and colour, are suited to the various purposes for which mahogany is used, and eleven are suited to the finer purposes of fancy cabinet work.

Yellow Woods.—These are three in number, hard and fine grained, and suited to fancy purposes.

Dark-brown Woods.—These are twelve in number and are all valuable. Eleven are adapted for house-building, and probably for ship-building, and one for special purposes requiring great strength and hardness.

Black Woods.—These consist of four different kinds, all of which are valuable for their strength and hardness.

Light-brown Woods.—There are seven varieties of this colored wood embracing all the timber of most value in the Province, exclusive of Teak.—*McClelland*.

PEGU WOODS.

List of 25 White-Colored Woods.

Nos. 1 to 17 are adapted to every purpose of house-building.

Nos. 18 to 25 are adapted for fancy work and cabinet making.

1. *Hibiscus macrophylla* is very plentiful in Forests of the Pegu and Tounghoo districts. It is a tall slender timber, of three or four feet girth, and would do for boards and house posts. Wood white colour and adapted for every purpose of house-building.

2. *Kydia calycina*. Bokemaiza. *Burm.* Is plentiful throughout the Forests, more especially in the Pegu and Tounghoo districts. The small saplings are used, from their great strength and elasticity, by the natives, for making banghy sticks, but it is large enough to afford timber of three or four feet girth. Wood white color and adapted for every purpose of house-building.

3. *Eriolæna tilifolia*. Let-pan. *Burm.* Grows plentifully throughout the Pegu and Tounghoo districts, attaining a height of fifty feet, with a girth of seven or eight feet sometimes, but usually about six feet. It is a strong tough timber, similar in its properties to Kydia. Wood white colour and adapted for every purpose of house-building.

4. *Connarus speciosa*. Gwai-douk, *Burm.* Plentiful in all the Forests growing scattered with Teak in the Tounghoo district and in the Forests of Pegu. It is a large, heavy and strong timber. Wood white colour and adapted for every purpose of house-building.

5. *Grewia floribunda*. Myat-yah, *Burm.* A very common tree from Rangoon to Tounghoo. It is a good serviceable timber for all ordinary purposes of house-building. There are three other species of *Grewia*—*G. asiatica* is a large tree like *G. floribunda*, but not so plentiful. The other two kinds are small and comparatively scarce. Wood white colour and adapted for every purpose of house-building.

6. *Grewia Specta ilis* and *G. Hookerii*. Phet woon, *Burm.* Both very plentiful, and of a quality like the last mentioned. They attain a girth of about three to four feet and grow up tall and remarkably straight. They are found with Teak in the Forests of Pegu and Tounghoo. Wood white colour and adapted for every purpose of house-building.

7. *Sapindus rubiginosa*. Hseik-kyee, *Burm.* This tree is not very plentiful. It is found in the Pegu district, where it attains a girth of three or four feet, growing tall in proportion and straight. Wood white colour and adapted for every purpose of house building.

8 *Millingtonia Simplicifolia* is also scarce, but found in the Forests of the Pegu Valley. Its properties as a timber are valuable from its weight and strength. Wood white colour and adapted for every purpose of house-building.

9. *Sandoricum Indicum*. Theit-to. *Burm.* This timber is large and plentiful, both in the Rangoon and Tounghoo districts. It is one of those trees which are cultivated by the Burmese for their fruit. It is found near all large villages, but it is scarce in the forests. Wood white colour and adapted for every purpose of house-building.

10. *Amoora* (*Aglaia*) *rohituca*. Chayaukayoe. *Burm.* This tree is scarce, but found in the Tounghoo Forests. Wood white colour and adapted for every purpose of house-building.

11. *Juglans tricoca*. Ta-soung-let-wah, *Burm.* Scarce, but found on the banks of the streams in the Pegu district. It is a hard strong timber. Wood white colour and adapted for every purpose of house-building.

12. *Geloxium bifarium*. Hsai than bayah, *Burm.* Is found in the Rangoon district, it seldom exceeds three feet in girth, and is only fit for house posts. Wood white colour and adapted for every purpose of house-building.

13. *Excecaria agallocha*. Bone-bayaza, *Burm.* Plentiful in the Rangoon and Tounghoo districts. Wood white colour and adapted for every purpose of house-building.

14. *Walsura piscidia*. Joe-boe, *Burm.* This tree is very plentiful in the Pegu and Tounghoo Forests, as well as in the Tharawaddy Forests. The timber is large, heavy and strong. Wood white colour and adapted for every purpose of house-building.

15. *Canarium geniculatum*. This is a large and valuable timber found in the Pegu Valley but it is scarce. Wood white colour and adapted for every purpose of house-building.

16. *Indigofera sp.* Doun-daloun, *Burm.* This tree is four or five feet in girth, found both in the Rangoon and Tounghoo districts though it is scarce. Wood white colour and adapted for every purpose of house-building.

17. *Terminalia belerica*. Pangah, *Burm.* and *T. violata*. Laibwai, *Burm.* The latter very plentiful throughout the Pegu, Tounghoo, and Tharawaddy Forests; the former less plentiful. Both are large timber and would answer for all purposes of house-building. Wood white colour and adapted for every purpose of house-building.

Woods from Nos. 18 to 25 are adapted to fancy work and Cabinet making.

18. *Semecarpus anacardium* [redacted]in, *Burm.* Is a middle-sized tree, common [redacted] Pegu and Tounghoo Forests. Adapted for fancy work and cabinet making.

19. *Sibia sp.* (*glomerata*) Thit-phyew, *Burm.* Very plentiful in Prome, Pegu and Tounghoo, as well as about Donabew; a compact and close-grained wood, seven or eight feet in girth, and is a timber that deserves to be attended to with a view of bringing it into use. Adapted for fancy work and cabinet making.

20. *Casuaria pentandra*. Thabyaiywet-kya,

Burm. Scarce, but found in the Pegu district. Timber strong and close-grained. Adapted for fancy work and cabinet making.

21. *Chaulmoogra odorata.* Taliennoe, *Burm.* There are a few trees of this about Rangoon, and it is also met with on the banks of streams in the Tounghoo Forests, but must be considered scarce. Adapted for fancy work and cabinet making.

22. *Strychnos nux-vomica.* Kha-boung, *Burm.* This is a very common tree throughout the Forests. The timber is strong and close-grained, but never of very large size. Adapted for fancy work and cabinet making.

23. *Conocarpus robustus.* Baib-ya, *Burm.* Very large and strong timber, growing plentifully in the Pegu, Tounghoo and Prome Forests along with Teak. Adapted for fancy work and cabinet making.

24. *Bauhinia parviflora.* also *B. brachycarpa.* Bwai-jin. *Burm.* The former attains three or four feet in girth, the latter is of rather smaller size. The first is very plentiful throughout the Tounghoo and Prome Forests. Adapted for fancy work and cabinet making.

25. *Elæodendron integrifolia.* Jouk-bin, *Burm.* This is a very plentiful, strong, fine timber, and is found throughout the Forests of the Tounghoo and Pegu districts, as well as about Rangoon. Adapted for fancy work and cabinet making.

List of 7 Red-colored Woods.

The following seven sorts, Nos. 26 to 32, are strong and adapted for house-building:—

26. *Heritiera minor* and *H. litoralis.* Kanazœ, *Burm.* These species are common in the Rangoon district, along the creeks and Sunderbunds. They are the Soondree wood so well known in Bengal for its strength and durable qualities. Wood red colour strong and adapted for house building.

27. *a. Eugenia pulchella.* Khway-tha-byai. Very plentiful in the Pegu and Tounghoo districts.

b. E. myrtifolia, Thabaijeen, *Burm.*

c. E. vulgaris. Thabyai-tha phan, *Burm.*

d. E. Ternifolia Thabyew-tha-byai, and *E. jambolana* also occur, but less plentifully than the first-mentioned species. They all afford excellent close-grained strong timber, but subject to the attack of white ants. Wood red colour strong and adapted for house-building.

28. *Sonneratia apetala.* Kambala, *Burm.* A strong hard wood of coarse grain, found throughout the Sunderbunds, under the parallel of Rangoon. It is the timber of which boxes for packing beer and wine are made in Calcutta. Wood red colour strong and adapted for house-building.

29. *Terminalia chebula.* Kayoobin, *Burm.* A large timber, plentiful throughout the Teak Forests. Wood red colour strong and adapted for house-building.

30. *Lagerstræmia Pyminah.* Pymmah. *Burm.* A common and valuable timber, found generally all over the country. It ceases however a little below Tounghoo and Prome, so that at those places it cannot be made available for building purposes; but at all the lower stations from Prome and Tounghoo downwards, it ought to supersede the use of Teak. Wood red colour, strong and adapted for house-building.

31. *Aglaia Spectabilis.* A large tree, met with along the banks of rivers in the Pegu and Tounghoo districts. It affords a light serviceable timber, somewhat stronger than the American Pine, and capable of being wrought with little labour. Wood red colour strong and adapted for house-building.

32. *Ulmus alternifolius* and *U. integrifolius.* Thalai, *Burm.* Two of the largest trees in the province; they are found about towns and villages in the Prome district, but not below that latitude. The elms to which family the trees in question belong afford valuable timber. Wood red colour strong and adapted for house building.

The following seven kinds of red wood, Nos. 33 to 39, are equivalent to mahogany:—

33. *Cedrela Toona,* Thit-kodo, *Burm.* Found on the banks of streams in the Tounghoo district, but it is scarce. Wood red; equivalent to mahogany.

34. *Swietenia chikrassa.* Nga-bai, *Burm.* Found along with Teak in the Pegu district, but it is not very plentiful. Wood red; equivalent to mahogany.

35. *Armosia dasycarpa.* Thitwajee, *Burm.* This is found here and there widely scattered in the Swar and other Forests North of Tounghoo. Wood red; equivalent to mahogany.

36. *Pterocarpus dalbergioides. Padouk.* This is found chiefly as a large tree about the neighbourhood of Prome and habited places to the north of that town, but rarely in the Forests. Wood red; equivalent to mahogany.

37. *Careya arborea.* Baubwai, *Burm.* This is one of the most numerous trees throughout the province. The timber is large, and together with the following, forms the chief material of which the carts of the country are made. Wood red; equivalent to mahogany.

38. *Barringtonia acutangula.* Kyai-tha, *Burm.* and *B. speciosa.* Kyai-gyee, *Burm.* The former most plentiful in the Tharawaddy district and the latter in the Pegu Forests. The wood is hard and of fine grain. It is used in constructing carts. Wood red; equivalent to mahogany.

39. *Castanea indica,* Theet-khya, *Burm.* Is a large tree, plentiful in the Rangoon, Pegu and Tounghoo districts. Wood red; equivalent to mahogany.

The following eleven kinds of Red Wood, Nos. 40 to 50, are adapted to cabinet making :—

40. *Adenanthera pavonina.* Ywaigyee, *Burm.* Found in the Rangoon, Pegu and Tounghoo districts, but widely dispersed and not very plentiful. Red wood and adapted to cabinet making.

41. *Calophyllum longifolium.* Thar-rabee, *Burm.* This is found near towns, together with two other species of the same genus, which are of smaller growth. Red wood and adapted to cabinet making.

42. *Dolichampia pomifera.* Doukyamah, *Burm.* This has been found on the Pymmah Choung in the Pegu Valley. The trees are from three to four feet in girth. Red wood and adapted to cabinet making.

43. *Pygium acuminata.* Scarce, but found on the banks of streams in the Tounghoo district attaining a girth of five or six feet. Red wood and adapted to cabinet making.

44. *Photinia serratifolia.* Doukyat, *Burm.* Found in the neighbourhood of Rangoon and along the banks of the stream in the Rangoon district, in the direction of the Teak Forests. Red wood and adapted to cabinet making.

45. *Acacia stipulata.* Seet, *Burm.* A large heavy timber, found throughout the Forests from Rangoon to Tounghoo. Red wood and adapted to cabinet making.

46. *Acacia catechu.* Shabin, *Burm.* Large and plentiful timber, found in great quantities in Forests of the Prome and Tharawaddy districts, as well as on the Shan side above Tounghoo district. Red wood and adapted to cabinet making.

47. *Acacia serissa.* Seet, Burm. Found throughout the province; timber large and plentiful, particularly in the Tounghoo district. Red wood and adapted to cabinet making.

48. *Acacia elata.* Seet, *Burm.* Plentiful in the Pegu, Tounghoo and Prome districts; timber straight, lengthy and of large girth. Red wood and adapted to cabinet making.

49. *Ricinus diococa.* Tawthedinbin, *Burm.* Scarce and found only on the banks of streams in the Pegu and Tounghoo districts. Very tall large timber. Red wood and adapted to cabinet making.

50. *Antidesma paniculata.* Byitzin, *Burm* Small crooked timber, of close grain, found in the Rangoon, Pegu, Tounghoo and Tharawaddy Forests. Red wood and adapted to cabinet, making.

Yellow Woods.

There are three kinds fit for fancy work, viz.

51. *Gmelina arborea.* Kyoonboe, *Burm.* Plentiful in the Pegu and Tounghoo Forests. It is a large and remarkably strong tough timber. Wood yellow, fit for fancy wood.

52. *Morinda bracteata.* Yaiyoe, *Burm.* and *M. excerta,* Mhan bin, *Burm.* Both are small trees, only found about Phoungyee houses, in a cultivated state. Wood yellow, fit for fancy wood.

53. *Garcinia Cowa.* Toun-tha-tai, *Burm.* Scarce, but found widely dispersed in the Forests. Wood yellow, fit for fancy wood.

Dark-brown Woods.

54. *Pterospermum aceroides,* Thamajamwaizoke : also *P. subacerifolium,* and *P. acerifolium.* Najee *Burm.* Three, species of large timber, found growing along with Teak in all the Forests. The two first are plentiful but the third kind is scarce. This timber is extremely valuable and is as strong as either Teak or Oak. Its durability for purposes of ship-building has never been tested, because it has never been desicated or killed like the Teak. It attains a girth of ten or twelve feet and rises to a lofty height. Wood dark brown.

55. *Pentaptera arjuan* and *P. glabra.* Toukkyan, *Burm.* This is also a valuable timber found growing in all the Teak Forests; it consists of two kinds, both of equal value. The timber is as strong as Teak and usually attains a girth of from seven to nine feet, with height in still more lofty proportion. This timber has never, I believe, been fairly tried for ship-building. Wood dark brown.

56. *Melanorrhœa usitata.* Theet see, *Burm,.* This is the *Theet-see* or *Lignum vitæ.* of Pegu. It is plentiful in the Tounghoo and Prome Forests, especially in the former. It is of dark red colour, of extreme closeness of grain and density of structure, with a specific gravity so great, that it serves in place of iron as anchors for native boats. Its great hardness and weight prevent its being employed in house-building. It would answer for sheaths or block-pulleys and other purposes connected with machinery, where great strength and density are required. The tree is very common above the parallel of Tounghoo and grows to a girth of six feet. Wood dark brown.

57. *Dolichampia pomifera* Doukya-mah, *Burm.* Scarce, only met with on the banks of streams in the Pegu Valley, particularly in the Pymmah Choung. Wood dark brown.

58. *Butea frondosa.* Pouk-pin, *Burm.* Plentiful, but the timber is crooked and only fit for ornamental work. Wood dark brown.

59. *Mangifera attenuata.* Tawsa-thayet, *Burm.* Scarce, but found in the Pegu and Tounghoo Forests. Wood dark brown.

60. *Anacardia occidentalis.* Scarce and only found near large towns Wood dark brown.

61. *Zizyphus jujuba.* Hyee-bin, *Burm.* Scarce, only found near large towns, rarely in the Pegu and Tounghoo forests. Wood dark brown.

62. *Averrhoa carambola,* Zoungya. *Burm,* Scarce, and only fond near towns. Wood dark brown.

63. *Pierardia sapota.* Kanayoe, *Burm.* Plentiful in the Pegu and Tounghoo forests, as well as about Rangoon. Wood dark brown.

64. *Anocatrolobus carnea.* Zoungali, *Burm*, and *A mollis.* Yin-bya, *Burm.* Plentiful in the Pegu and Tounghoo Forests. The timber grows very tall, but seldom exceeds three feet in girth. Wood dark brown.

65. *Rondeletia tinctoria,* Tamayoke, *Burm.* Small timber, which, together with the last seven kinds, are adapted, from the fineness of their grain and elegance of colour, for ornamental work. Wood dark brown.

Black Woods.

66. *Dalbergia.* Yindike, *Burm.* Of this there are four kinds, all yielding a heavy timber, which will not float, similar to Sissoo. These trees are very plentiful in the Tharawaddy and Hlaine districts, also in the lower parts of the Tounghoo district. The timber seldom attains a very large size and is generally found of a girth of three or four feet. Black wood.

67. *Cassia Sumatrana.* Mayalee, *Burm.* plentiful throughout the Hlaine, Pegu and Tounghoo Forests. It is the Bombay blackwood Black. wood.

68. *Inga xylocarpa.* Pyin Kadoe, *Burm.* and *I. bijemina.* Tauyeu, *Burm.* Two species, affording ironwood. The first is called Pin-Ka-doe by the Burmese. It is found in all the Teak Forests. In the Prome Forests it is usually about six feet in girth, but in all the other forests it attains a larger size, frequently eight or nine feet. It is most plentiful throughout the province. The second species is of smaller girth, but grows to a great height. Black wood.

69. *Diospyros melanoxylon.* Ebony or Oukchinya, *Burm.* This tree is found throughout the forests, seldom however of greater girth than three or four feet. It is very plentiful. Black wood.

Light brown Woods.

70. *Dipterocarpus alatus.* Aing, *Burm* This timber is called in Bengal Battee Sal. It is excellent for every purpose of house-building, especially for posts. It is found chiefly to grow on laterite in the Tounghoo and Prome districts. Light brown wood.

71. *Dipterocarpus turbinatus.* Kauyeen, *Burm.* Timber of great size and strength. It is fit for any purpose for which Saul is employed, being of the same family. It is chiefly employed far canoe and boat building. It is found in all the Forest districts, except Prome where it is scarce. Light brown wood.

72. *Shorea robusta* or Saul. Eing-gyeen, *Burm.* This timber is found chiefly on the Shan side of the Tounghoo district, and in the Forests north of Tounghoo. Light brown wood.

73. *Melicocca trijuga.* Jobin *Burm.*, A most valuable timber, called by the Burmese Kobin, and employed by the natives of the country for cart-wheels, oil-mills, and other purposes requiring great strength and solidity. It is found in greatest perfection on the banks of the Sitang in the Kareen Forests above Tounghoo; but it is also found throughout the Pegu and Tounghoo Forests in abundance, more particularly the latter. It is also found along with Teak in Tharawaddy and Prome Forests. Light brown wood.

74. *Dillenia augusta,* Zinbyewn, *Burm.* also *D. scabra.* Byew, *Burm.* and *D. speciosa.* Thabyew, *Burm.* The two first are plentiful in the Forests of the Pegu district, but become scarce to the north of it, and the third species is scarce even there. They all three afford large and good timber for house building. Light brown wood.

75. *Hopea odorata.* Thingan, *Burm.* This timber, which is said to be plentiful in the Tenasserim Forests, is scarce in Pegu, and a few trees are to be found about the vicinity of Rangoon. Light brown wood.

76. *Azadaracta Indica.* Thembau-kamakah, *Burm.* or Neem, is plentiful in the Prome district only; it is a large, but soft timber, only fit for flooring. Light brown wood.

The above list embraces all the useful timber found in the Forests of the Pegu Province, except Teak. Besides timber well adapted for house-building, the list contains several promising kinds that have never yet been fairly tried for ship-building, and which in point of strength are equal to Teak or Oak. The timbers referred to more especially are Nos. 73, 68, 54, 55, 30 and 37, Nos. 25, 23, 19, 14 and 4 are also deserving of trial for ship-building, and No. 56 for any special purposes, where great strength and density are required. Until these trials are decided, the timber employed for house-building purposes should be restricted for other kinds.—*McClelland.*

(8211) *Penang Woods.*

The following Furniture woods grown in Penang or Prince of Wales' Island, were sent by the Singapore Committee to the Exhibition of 1851; viz. Siam wood: ebony; Wild Durian. Uncert[illegible]ngsena wood. Guava wood; Kamuning, Sen[illegible] Baymah or Ansena. Mirlimoh, two kinds. Baloh Bunga. Root of Betelnut tree. Root of Cocoanut tree. Clove wood. Root of Eboeh tree, Timbusu, Ranggas, Penang wood, Kulim Baloh, Ibool wood.

These arranged tabularly are,

1. Angsena, or senna Baymah.
2. Balah Bungah.
3. Balaeh.
4. Baloh.
5. Baloh Bungah.
6. Betel-nut tree root.
7. Clove tree.
8. Cocoa-nut tree root.
9. Durian (wild).
10. Eboeh-tree root.
11. Ebony.
12. Guava wood.
13. Ibool wood.
14. Kamuning.
15. Mirlimoh
16. Penang Wood.
17. Ranggas
18. Siam Wood.
19. Timbusi.

Woods of Penang (Col. Frith).

1 Brantey, Light brown colour. An inferior weak wood; used for building.

2 Bunho. A large tree; occasionally used for building.

3 Bintagon. A large tree; occasionally used for masts.

4 Curupas, dark red colour. Used for beams of houses.

5 Cooran, light brown colour. Used for planks for building.

6 Chinjeritt, brown colour, specific gravity 2.165. A small tree; used for furniture.

7 Cumpas, light brown colour. A large tree; used only for planks.

8 Cawa-Arang, pale brown colour. A very large tree; used for furniture and ornamental work.

9 Canis. A large tree; used for door frames.

10 Chiuracy, brown colour, specific gravity 1.081. Used for beams; does not work kindly.

11 Cawa-Arang, light brown colour. Only used for furniture.

12 Cocoa-nut, brown colour. Cut perpendicularly.

13 China red wood, red colour. Only used for furniture.

14 Ceylon ebony, black colour. Used for inlaying and ornamental furniture

15 Damarlout, brown colour. Used for building and general purposes.

16 Dunorhung, brown colour, specific gravity 1,235. Used by the Chinese for carved images.

17. Drum, light brown colour. A very small tree; used for ornamental furniture.

18 Hama Raja. A very small tree little used.

19 Maddang Kamenhir. Used by the Chinese for making boxes.

20 Miraban, light red colour. Much used for ship-building, furniture, &c.

21 Maddang Tandack, dark brown colour. Not used at all.

22 Maskaw, light brown colour; specific gravity 1 016. Used for plankeens, carriages, furniture &c.

23 Maukadu, brown colour. A species of Damarlout much used for beams.

24 Maliler, white colour. A small tree; used for work boxes and ornamental work.

25 Maribot, purple colour; specific gravity 0.939. A very large tree, difficult to work: used for furniture.

26 Mandara, pale red colour, specific gravity 0.939. A small tree; used for ornamental furniture.

27 Nebong, dark colour. A tall and thin, but straight tree; used for railings.

28 Papisrang, pale brown colour. Six to nine feet in circumference, forty feet long; not good for beams; chiefly used for furniture.

29 Pasa Linija, light brown colour. A large tree; used only for planks; soon decays.

30 Pala. A tall thin tree; used for planks.

31 Pinang Bach, brown colour. A large tree; used for beams.

32 Pala Utan, light brown colour. A large tree; only used for planks.

33 Papisrang, purple colour. A strong wood; used for beams.

34 Penang Teak, brown colour. Scarce now.

35 Penang Jack, yellow colour. Used only for ornamental furniture.

36 Rangha as, light brown colour. Used for furniture.

37 Rokam, light red colour. Used for boxes and furniture.

38 Red wood, red colour, specific gravity 1.000. In general use for furniture.

39 Sankuang, pale brown colour. Used only for ornamental work.

40 Satin wood, straw colour. A beautiful wood for ornamental furniture &c.

41 Siam ebony, black colour. Used only for ornamental furniture inlaying &c.

42 Teak, brown colour. In general use.

43 Tampinnis, light red colour. A fruit tree; used for ornamental furniture, billiard cues, &c.

44 Tija, light brown colour. Used for furniture boxes &c.

45 (No name), purple colour. Not durable; used for all sorts of rough work.

(8212) *Sinde. The forests of Sinde.*

During our sojourn in this Province we have often been struck with the beautiful and magnificent appearance of some of the Forests which are to be found scattered througout the country, particularly those in Lower Sind—the greater number of which are planted—not actual Forest. We need but ask our readers to pass over the Hills from Sonda en route to Jerruck, where beauty in its richest garb awaits them far beyond our description, with the noble river seen at the distance winding its way as it were through these gigantic woods; amazement here stops the traveller to enquire how scenery so transparently beautiful was ever formed for such an arid waste as Sind is supposed to be. We do not mean to say that there are not other parts equally picturesque; we know there are—but we allude to this spot from its proximity as well as to our remembrance of the "first impression" made years gone by, and which have been confirmed by subsequent visits year after year.

These Forests, under the rule of the Ameers, were mere hunting preserves, and were admirably adapted from the thickness of their underwood for the cover of wild animals of every sort, and no one but their keepers were allowed to enter them. No attention whatever was paid to their Timber, in fact they were hunting grounds *in reality*, and death to the man, in those days of oppression and tyranny, found in them, killing the "Lord's game."

From statistical Reports before us we gather that the Forests in number amount to about 72,

including the Forest jungles in Upper Sind (not walled in like those in Lower Sind) of Bhan or Poplar, which spring up spontaneously on the river bank when the inundation subsides. The Forests cover an area of about 1,59,688 acres, in the cultivation about 34,555, wasteland 55,385, and wood area 69,753.

The products of the Forests are Timber, Firewood, Charcoal, Gum Lac, Bark, Baubul Seeds, Grass and Reeds for Mats. The common woods found are Baubul, Bhan, Kunda, Tali, (Sissoo of Upper India) Tree Tamarisk, Jamul, Sirme and Mountain or bitter Neem.

The Baubul is very abundant and grows to a very large size. It is exceedingly hard and weighty. For agricultural implements and all native purposes it is excellent. It is also much used, we are informed, by the Indus Flotilla, for paddle flats, rudders, stanchions and boats' knees—in fact we believe it is used, for every purpose to which wood can be applied. Besides other parts of the Baubul are used, its bark is employed in tanning, its pods form a valuable food for the cattle, its young branches are the favourite food of camels and goats, its bark yields gum and lac, and for all these articles, wood, bark, pods and lac, a sale is always found.

The Kunda or Prosopis is very plentiful and only used as firewood.

The Bhan or Poplar is only used for rafters and turning work. It is nowhere to be found in the Bombay Presidency.

The Sirree or Madras Blackwood, the Tales or Blackwood of Upper India, the guz or Tree Tamarisk, are found in many of the Forests, but in small numbers.

The products of the Forests above enumerated are all consequent on our occupation of the country, and have conferred inestimable blessings on the people.

The grazing alone is much appreciated by the natives from its shade, and brings in a Revenue of between 8 to 9 thousand Rupees per annum. The supply of fuel to the Indus Flotilla must be enormous, 90,000 maunds per annum, and then there are the other products, giving we should say, a gross Revenue of not less than 20,000 Rupees, or thereabout. This in our opinion is underrating the Revenues of the Sind Forests, altho' it is said they are yearly diminishing in size from their being washed away by the encroachments of the river and from the Canals, which runs through them, not being cut as they used to be during the time of the Ameers, to admit water for watering the trees.

The superintendence of the Forests has passed through many hands since the beginning, but we believe none gave so much satisfaction as did Dr. Stock while they were under his management. For works of this description where improvements are so invaluable to the Revenues, men of first rate abilities are necessary. Botanical attainments as well as a general acquaintance with the prevailing Revenue system is desirable.—*Scindian, July* 12. 1856.

(8213) *Singapore Woods, or Malay Woods, being woods from Singapore.*

This collection, at the 1851 Exhibition, consisted of about one hundred specimens, many having no labels; those marked are as follows:

1 Angsanah.	17 Leban
2 Biliong.	18 Meosbon.
3 Biliong Wangi,	19 Medansi Miniak.
4 Bras Bras.	20 Medansi Buah yeah.
5 Bitangor Wood.	21 Medansi Tandoh.
6 Changis.	22 Medansi Kitanahan.
7 Glam.	23 Medansi Konit.
8 Jambu-ayer-utan.	24 Polai wood.
9 Kayau Arang.	25 Peragah.
10 Kamuning.	26 Ranggas,
11 Krautai.	27 Simpoh Ryah.
12 Arangi.	28 Simpoh brekit
13 Arangi Klat.	29 Slumar.
14 Kayu Brombong.	30 Tau Pang.
15 Kledang.	31 Tampinis.
16 Lakah wood.	32 Timbusu.

Of these "Binlangor" wood is the most used especially in ship building, serving for planks, masts, spars, &c. it grows in the greatest abundance round Singapore, and is largely exported to the Mauritius, California, &c.

The "Glam" tree, furnishes a paper-like bark, used in caulking the seams of vessels.

The wood of the "Polai" tree, which is used to make floats for fishing-nets, is a very remarkable light, white wood, and might probably be imported and used with advantage as a substitute for cork, and some similar substances.

(8214) *Tavoy. Timber Trees and Woods of Tavoy. (Dr. Wallich.)*

1 Acacia, Popeeah, *Burm.* A very large tree, used for posts and rollers
2 do Paingadoo, *Burm.*
3 Anacardium, Thubbamboo, *Burm.* A large tree, used in boat building.
4 Artocarpus, Thouenben, *Burm.* Do do do.
5 do A large tree.
6 do Pynyathe or tannabeng, *Burm.* Wood not used
7 Bignonia, Thathee, *Burm.* A very large tree.
8 do (?) Thuggainee *Burm.* A large tree used in building.
9 do Lainbha *Burm.* A middle-sized tree.
10 Calophyllum, Turra-phee, *Burm.* Used for masts &c.
11 Carapa, Taila-oon *Burm.* Used in building.
12 Careya, Kaga, *Burm.* Large timber tree.
13 Castanea Martabanica. Norne or zitha, *Burm.*
14 Cerbera Manghas, Kulloon, *Burm.* Wood not used.

15 Dillenia, Zimboon, *Burm.* Used in building.
16 Dipterocarpus grandiflora. Ain or aintha, *Burm.* An immense tree.
17 Do. Do. Do. Kunnean phin, *Burm.* Used as timber.
18 Euphorbiacea. Yamula, *Burm.* Used for frames of lacquered ware.
19 Eurya. Thaun, *Burm.* Used for fuel only.
20 Excoecaria? Thurrotha, *Burm.*
21 Ficus. Thubboo, *Burm.* Used in house carpentry.
22 Do. Do Do. Thuppan, *Burm.* Large tree; wood not used.
23 Garcinia. Pulloua, *Burm.* Large tree, used for posts, &c.
24 Grewia. Miaya, *Burm.*
25 Heritiera Fomes. Kunnazoo, *Burm.* Very large tree; very hard and durable wood.
26 Hibiscus macrophyllus. Used in building.
27 Do. Do. (?)
28 Hopea floribunda. Tantheya, *Burm.* A very large tree.
29 Lagerstroemia. Kuenmounee or puma, *Burm.* Used in building.
30 Laurus. Kullowa or Kurrowa, *Burm.*
31 Do. Panatha, *Burm.* Used in house-carpentry.
32 Do. Maythen, *Burm.* A large tree, good useful wood, much used.
33 Do. Keemna, *Burm.* Smalltree, used for posts
34 Laurus. Thuggoo, *Burm.* Used for oars, &c.
35 Do. Thitya, *Burm.* Very large tree, used in building, &c.
36 Do. Kayzai, *Burm.* Used in house-carpentry.
37 Mimusops, Thubbae, *Burm.* Used in ship-building.
38 Do. Elengi.
39 Murraya. Maikay, *Burm.* A tough close grained wood, used for handles.
40 Myristica, Thounsanga, *Burm.* A large tree, used in boat-building.
41 Do. Koathoe or Kunneen, *Burm.* A large tree, used in flooring houses.
42 Osyris peltata, Phaoun, *Burm.*
43 Pierardia, (?) Kunna or Kuzzo, *Burm.*
44 Pinus Dammara, *Burm.* A very large tree, used in building.
45 Pterocarpus, (?) Puddow, *Burm.* A large tree, used for furniture, &c.
46 Rottlera, Mimasko, *Burm.*
47 Do. Keoun lae, *Burm.* A large tree. used for rudders, &c.
48 Sandoricum, Thittoo, *Burm.* Used for furniture.
49 Sapotea, (?) Palaepean, *Burm.* A very large tree, used in building.
50 Sonneratia, (?) Thaumma, *Burm.* A small tree.
51 Sterculia, (?) Kununu, *Burm.* An enormous tree.
52 Do. Thikadoo, *Burm.*
53 Symplocos, (?) Kain-tha-phogee, *Burm.* Used in boat-building
54 Syndesmis Tavoy and, Ka-tha *Burm.* A very large tree, used for building, boxes, &c.
55 Do. Do. Kunnun keunka; Kunnun keunla, *Burm.* Used for beams, posts &c.
56 Terminalia. Thuphanga, *Burm.*
57 Ternstroemia. Puzzeen zwa, *Burm.* A large tree, used in building.
58 Uvaria. Thuhbor, *Burm* A large tree, used for boat building.
59 Wrightia antidysentrica. Lathou, *Burm.* Small tree, not used.
60 Xylocarpus. Keannan, *Burm.* Very durable timber.
61 Zizyphus. Zeethee, *Burm.* Hard and durable wood.
62———? Ahnaun, *Burm.* Strong, hard and very durable timber, used in ship-building.
63———? Bah-mah-thoa, *Burm.* Useful timber.
64———? Con-moo *Burm.* Good timber, used for building houses and boats.
65 ——— ? Kaantha, *Burm.* A small but valuable wood.
66———? Kaungo-kurrs A heavy but durable wood, used in boat building: specific gravity 0.690.
67———? Keahnaun, *Burm.* Strong crooked wood, used for stocks.
68———? Kuddoot alain, *Burm.* A large tree, used in house and ship building.
69———? Kuddoot-nu, *Burm.* Inferior wood, used in boat building.
70———? Kummi, *Burm.*
71———? Mainaban, *Burm.* Used for bows, lances, beams, rafters &c.
72———? May-klin, *Burm.* Used for rudders and anchors.
73———? May-maka, *Burm.* Used in ship-building.
74———? May-rang, *Burm.* Said to be very durable.
75———? May-tobek, *Burm.* Used for the bottoms of ships; preferred to teak.
76———? Megeone, *Burm.* A large tree used in building.
77———? Penlay-peen, *Burm.* Used in building.
78———? Pienmahne, *Burm.* Yields very strong knee-timber.
79———? Pienmah pue, *Burm.*
80———? Tantheya, *Burm.*
81———? Tangnet-na, *Burm.*
82———? Teatha, *Burm.*
83———? Thauga-et thittoo, *Burm.* Inferior wood.

84 ———? Thau-baunpo, *Burm.* Inferior wood, used for common canoes.

85 —— ? Thau baun thau-lay, *Burm.* Very flexible wood.

86 ———? Theyah, *Burm.* Inferior wood.

87 ———? Thounmynga, *Burm.* Used in building.

88 ——— ? Thymbro, *Burm* Good strong durable wood, used in boat buildiug.

89 ———? Town pine, *Burm.* Good wood, used in boat building.

(8215) *Tavoy, being Woods of Tavoy (by Mr. Blundell,) Commissioner.*

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1 Annan. A small tree ; used for building.

2 Bep-than. Used for building.

3 Bep-won. Used for building.

4 Bhau-bhway. Used for house posts ; like sisoo

5 Bha-ta-ka. Used for common carpentry.

6 Daup-yan. Used for building.

7 Eng-beng. Strong wood ; used for common carpentry.

8 Kad-wot-nu, Cedrela ? *Burm.* Used for house and ship-building : large timber, 40 to 70 feet ; specific gravity 1.060.

9 Kanna-tso. A very tough close-grained wood.

10 Ka-nyeng kyaung khyay. Used for boat, ship, and house building ; yields an oil ; not attacked by insects.

11 do do do do rather shaky.

12 Ka-nyeng-pyan. A heavy, grey wood; used for handspikes.

13 Katso Like toon ; used in building &c.

14 Kaung-thmoo-ysepsay A rough, strong wood ; used for posts. &c.

15 Kengthep-guyung-ywept A light, inferior wood ; used in building.

16 Kengthep-pheoot-kyay. A sound small wood ; used in building.

17 Khamoung-nee. Heavy wood, not attacked by insects.

18 Khamoung-pyion. Small sized, compact, yellowish-grey wood.

19 Kharaway-nu. Porous, heavy, strong wood, not attacked by insects.

20 Kouk-ko. Employed for bottoms of boats.

21 Kyay-tsay-gyu-khy ay. A heavy, compact, dark wood ; suitable for gunstocks.

22 Kyay-tsay-bayoun. Useful for common carpentry.

23 Kyep-yo A kind of teak.

24 Kywon-bo. A soft wood like the nauclea.

25 Kywon-ma, do do ; a variety.

26 Lienman. A small tree ; heavy, close grained, light colored wood, like terminalia.

27 Mala-ka. Small sized, strong wood ; useful for handles.

28 Ma-yam. An indestructible, strong, heavy, dark red wood.

29 Mee-kyaung-kyay. A heavy wood, not attacked by insects.

30 Meep-thua-ban. A small-sized, compact, grey wood ; used for handles, &c.

31 Miaup-bout. Used for furniture, &c

32 Mya-kamaun. A valuable strong black wood ; used for knife handles.

33 Myeng-ta-bep. A strong, blueish-grey wood ; adapted for handles.

34 Ngoo-beng A strong wood ; used for posts and planking.

35 Noalee-lyeng. A close-grained, strong, heavy wood ; useful for handles.

36 Pan-loun. A close grained red wood ; used for building.

37 Pantheet-ya. A good white rough wood ; useful for boat building.

38 Patseng-tsway. Small sized strong wood.

39 Patseng-ngo. A superior high-coloured aromatic wood, like mahogany.

40 Peng-lay-byun. Small sized tough wood.

41 Peng-lay-oun. Strong, rough, red wood, like Mimosa serissa.

42 Peng-lay-kaboay. A heavy small sized wood ; suitable for handspikes, handles. &c.

43 Pee-daup. Mimosa. *Burm.*

44 Pinnay. Artocarpus. *Burm.* Strong, close grained yellow wood.

45 Pyaung-pyion. A compact, heavy, yellow wood.

46 Pyeng-khado. Small sized, heavy, close-grained, red wood

47 Tag-nyeng. A useful furniture wood.

48 Ta keep-nee. A very strong, close grained, heavy, light coloured wood.

49 Tha-bhan. Used for canoes.

50 Tha byay-nee. A strong, close grained, brownish grey wood ; used for house posts.

51 Tha-byoo. A heavy close-grained wood.

52 Theet-ta-gyee. Suitable for common carpentry.

53 Theet-ya-han. A close-grained teak, used for posts.

54 Theet-ya-nee. A close-grained brown wood ; rather shaky.

55 Theet-ya-pyion. A heavy strong wood.

56 Thiem. A serviceable wood.

57 Thingan-kyaup. A close-grained, heavy, strong wood ; used in ship and house-building, for carts &c.

58 Thmeng-ba. Like red Jarool ; used for posts and cotton-rollers.

59 Thmeny-tshout. A small, heavy, coarse, brown wood ; used for door frames and boat beams.

60 Toung[illegible]aut. Rough, knotty wood ; used for knife and spear-handles.

61 Toung-bhien. A light, porous wood ; used for common carpentry.

62 Toung-byeng. A kind of red saul.

63 Toung-byion. A close grained, brown, shaky wood.

64 Toung-kha-ray. Red Jarool; used in boat building.
65 Tseng byiou. A compact greyish-brown wood; suitable for common carpentry.
66 Tsoay-dau. Used for gun-stocks
67 Wonthay-khyay. A small, strong, compact, yellowish white wood.
68 Yow-ma-lay. A strong, heavy, rough, white wood; used for house-posts.
69 Zoo-lat. A small, heavy, compact, yellowish-white wood.

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* (8216) *Tinnevelly. Woods of Tinnevelly by Colonel Frith.*

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1 Arrava. Pentaptera, Light brown colour. Used for building, handspikes, tools, &c.,
2 Auttee, Red colour. Used for furniture.
3 Augeneepelah, Brown colour; specific gravity 0.484. General work.
4 Cangoo, whitish brown colour. Handspikes and wheel wright's work.
5 Eloopay, Red colour. Building in general.
6 Hill teak, Light brown colour. General purposes.
7 Karootauley, Black colour. Fancy work.
8 Koongheelyara, Light brown colour. Used for building purposes; yields dammer.
9 Kotamaram, Brown colour; specific gravity 0.723. Building in general.
10 Mookersey, Red colour. Building in general.
11 Munjet Kerddumpah, Light straw colour. Building in general.
12 Mathgirie vamboo, whitish brown colour. A strong light wood; used for general purposes.
13 Marootho, white brown colour. Building in general.
14 Mathgirie vamboo, old; Red colour. A strong light wood.
15 Naungoo, Red colour; specific gravity 1.009. Used for building, wheel wrights work, handspikes.
16 Nuffell; Red colour; specific gravity 0.717. Building in general.
17 Nelly, Light-brown colour. Building in general.
18 Nurryveroosoo, Whitish brown colour. Building in general
19 Nagakunny, Whitish brown colour. Building in general.
20 Oonnay, Red colour; specific gravity 0.928 A strong wood, used for wheelwright's work, handspikes.
21 Oosulay, Light brown colour; specific gravity 0·832; building in general.
22 Polava, Light brown colour, Musket-stocks, and building purposes.
23 Paulay, Deepstraw colour. Fancy work.
24 Pooversoo, Red colour; specific gravity 0.860. Used for making bandies.
25 Ponpathera, Whitey brown colour; specific gravity 0.683. Used for building purposes.
26 Poonnay, Deepstraw colour. Used for building purposes.
27 Poovey, Light brown colour; specific gravity 0·840. Used for building purposes.
28 Paselay, Whitey brown colour. Used for furniture.
29 Sammerm, Red colour. Furniture of any description.
30 Sarakontay, Whitey drown colour. Building in general
31 Sampayapaulay, Light brown colour, specific gravity 0·792. Building purposes.
32 Thothakutty, Red colour. Furniture of every description.
33 Thunnaka, Whitey brown colour. Making trunks.
34 Thokay, Red colour; specific gravity 0·950. Building purposes.
35 Yangy, Light brown colour. Wheelwright's work.
36 Yakauley, Light brown colour. Building in general.
37 Vamboo, Light straw colour; specific gravity 0·795. Building in general.
38 Vankay, Light brown colour; specific gravity 0·888. Building in general.
39 Veroosoo, Whitey brown colour. Building in general.
40 Vakanatty, Whitey brown colour, Building in general.
41 Vemmarm, Brown colour; specific gravity 0·786. Building in general.

(8217) *Travancore. Woods of Travancore by (Colonel Frith)*

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1 Ahguilb. Light yellow colour, specific gravity 0.674. Very abundant; used for furniture.
2 Attoo vunjee. Amber colour, specific gravity 0·480. Very cheap; used for firewood.
3 Aranellah. Dark brown colour, specific gravity 0·645. For building common houses.
4 Chinny. Rather dark colour, specific gravity 0·515. From 8 to 16 feet in circumference; used for building canoes.
5 Cherrotimba. Dark colour, specific gravity 0·843. About 3 feet in circumference, used for house building, tools &c.
6 Cherrotanny, Light colour. Firewood.
7 Carcemaradoo Dark brown colour, 2 to 6 feet in circumference; used for carts and building.
8 Chorocadamboo, Yellow colour, specific gravity 0·529. Used for packing cases.
9 Chitta linny. Red colour, specific gravity 0·847, 1 to 1½ feet in circumference; used for furniture.
10 Cherro vunjee, Brown colour, specific gravity 0.644. Used for firewood.

11 Cherro nalampella, Light brown colour, specific gravity 0·483. For making canoes.

12 Cherro canny, Light brown colour. Only for firewood.

13 Cunda lah pallah, Bamboo colour. For making sandals.

14 Channy marm, Brown colour. For building common houses.

15 Channy vengah. Light yellow colour, 1 to 6 feet in circumference. House building.

16 Carrimarriddy, Dark colour, 1 to 4 feet in circumference ; used by wheel wrights.

17 Cherropoona, Dark colour. Building houses.

18 Conjah marm, Red colour. Furniture, &c.

19 Conjee marm, Light red colour, specific gravity 0·650. Furniture, &c.

20 Channee, Brown colour,Used for oil-mills, &c.

21 Dhannee, Dark colour, specific gravity 0·733.Very strong, but knotty, used for common buildings.

22 Ellahneel, Light red colour, specific gravity 0·779. A small tree, used for temples, pagodas, and furniture.

23 Eramboo, Dark brown. For common houses.

24 Jackwood, Yellow colour, specific gravity 0·554, 2 to 4 feet in cirumference, strong wood; used for furniture.

25 Kullentake, Brown colour, specific gravity 0·749. Buldings,wheel wright's work, &c.

26 Karanchilly, Dark colour, specific gravity 0·519. Buildings and small boats.

27 Kyeattee,Ash colour, specific gravity 0·972. Carts and buildings.

28 Kanjarum or nux vomica, Ash colour, specific gravity 0·796. For making cots.

29 Karity, or black wood, Black colour, specific gravity 0·948 ; 2 to 4 feet in circumference, strong wood; used for furniture.

30 Kanjarom, Ash colour. Used for common building.

31 Marya cadamba, Yellow colour. Used for packing-cases.

32 Moolu venga, Copper colour, specific gravity 0·831. Used for common buildings.

33 Masoodah, Ash colour, 2 to 8 feet in circumference ; used for building

34 Myle Ella, Ash colour. Used for carts, buildings &c.

35 Mally velly ravel, Light brown colour, specific gravity 0·664. For building houses only.

36 Munjaddy, Purple colour, specific gravity 0·667. For building houses only.

37 Myle ellah, Light green colour, specific gravity 0·896. For building houses only.

38 Manny marootha, Flesh colour. For carts and building houses.

39 Magadamboom, White colour, specific gravity 0·462. Used for light work generally.

40 Munny martha, Brown colour specific gravity 0·607. 1 to 6 feet in circumference ; used for furniture.

41 Manja cadamboo, Light yellow colour Used for packing-cases.

42 Muttalla, Brown colour. Used for light work.

43 Neelahampellah, Light brown colour Used for house building, ceilings, &c.

44 Nanamboo, Brown colour. Used for common buildings.

45 Neelumpallah, Light brown colour. Used for light work.

46 Nurmanjee, Bamboo colour. Used for light work.

47 Nurmarithy, Brown colour, specific gravity 0·615. Building common houses.

48 Nulampallah, Dark brown colour. 2 to 4 feet in circumference, and 30 feet long ; used for common houses and carts.

49 Odoorah venga, Dark brown colour, specific gravity 0·853. 4 feet in circumference, and 40 feet long ; a strong good wood, used for wheels gun carriages, &c.

50 Oddysaga, Dark brown colour. Used for common building purposes.

51 Oddamarm, Dark colour. 3 feet in circumference, used for tent-pegs, mallets, &c. very strong wood.

52 Paul-teak, Brown colour, specific gravity 0·739. Used for furniture, gun-carriages, &c.

53 Poon. Brown colour, specific gravity 0.623, 2 to 4 feet in circumference and 80 feet long ; used for masts.

54 Pongah. Brown colour, specific gravity 0.988. For building houses.

55 Poolyetty. Black colour, specific gravity 0.858, 2 to 8 feet in circumference, strong wood used for furniture.

56 Poody vaga, Brown colour, specific gravity 0.400, 4 to 10 feet in circumference,40 feet long strong, never splits ; used by wheelwrights.

57 Ponghu, Brown colour ; specific gravity 0.960, 3 feet in circumference,used for building

58 Thevahdarum, or cedar wood, Flesh colour specific gravity 0.457, 2 to 8 feet in circumference used for palanquins, cabin fittings, furniture &c.

59 Tharanchilly, Bamboo colour, 5 to 8 feet in circumference ; used for canoes only.

60 Tekkeer attovye anjelly. Brown colour specific gravity 0.528, 4 to 6 feet in circumference used for house and ship building.

61 Tharanjulla. Bamboo colour, specific gravity 0.576. Used for common building.

62 Tambagum. Brown colour, specific gravity 0.910, 5 feet in circumference; very strong wood ; used for houses, blocks &c.

63 Venpalla. Ash colour. Only used for carved figures, sandals &c.

64 Vatanboo, Brown colour, specific gravity 0,434. Only used for firewood.

65 Vatanboo. Light Brown colour, 2 feet in circumference ; used for railings, fences, &c.

66 Varoodah. Yellow colour, specific gravity 0.855. Used for building houses.

67 Velha ahguill, Light brown colour, 2 to 4 feet in circumference ; used for furniture.

68 Veytty. Light brown colour. Used for making carts, ceilings, &c.

69 Vaimboo, flesh colour, specific gravity 0.483, 2 to 4 feet in circumference ; used for tables &c.

70 Vellah ahguill, White colour, specific gravity 0.602, 2 feet in circumference ; 50 feet long ; used for furniture.

71 Vella carduntha, Brown colour, 3 to 6 feet in circumference, 40 feet long ; strong wood ; used for furniture.

72 Velty marm, Purple colour, specific gravity 0.623. Used only for firewood.

73 Vataloo. Purple colour. Used only for firewood.

74 Velty taddy, Brown colour, specific gravity 0.635. Used only for firewood.

75 Vanpuggalah, Light yellow colour, specific gravity 0.604. Used for light work.

76 Vutty marithy, Brown colour, specific gravity 0.595. Building common houses.

77 Vuddamba, Brown colour, specific gravity 0.750. Building common houses.

78 Vally canjarm, Brown colour ; specific gravity 0.703. Building common houses.

79 Vellaneermaradoo, Light yellow colour ; specific gravity 0.573. Used for furniture.

80 Vellallva, Brown colour. Used for light work.

81 Yuttamba, Brown colour. Used for building houses, and light work.

These Travancore woods as well as collections from Palamcottah, from Paulghaut, from Tinnevelly, from Canara and from Penang, were selected and sent to Britain by the late Colonel Frith ; they were exhibited at the London Exhibition of 1851 by Lieutenant Colonel Bonner, Military storekeeper of the Honorable East India Company.

(8218) TIN.

Reseas, Abruz, Arab.	Timmah Jav.
Yang-seih, Chin.	Stannum, Lat.
Tin, Dut.	Tima, Falagh. Mal.
Ferblanc, Fr.	Urzeez, Pers.
Blech, Weissblech, Ger.	Blacha, Rus.
Kullae Ranga, Kuthail, Guz. Hind.	Trapu, Sans.
Latta, Banda Stagnata, It.	Hoja de lata, Sp.
	Tagarum, Tam.
	Kalai, Turk.

Tin is one of those metals which were earliest known, though it occurs in comparatively few countries. The acquaintance of the ancients with this metal, though it does not occur in the native state, is accounted for by the circumstances that the ore is found frequently near the surface, and is easily reduced by charcoal and a moderate degree of heat to the state of metal. According to Berzelius, Tin is found in England, Saxony, Bohemia, Hungary, the Isle of Banca, the Peninsula of Malacca, in Chili, and Mexico. Malacca furnishes the purest tin, and Cornwall the largest quantity. Tin occurs in two states of combination, the peroxide and double sulphuret of tin and copper : this last is rather a rare subatance, and it is from the former that the metal is almost entirely obtained. The Peroxide of Tin is found in Cornwall in two forms :—1. In veins in primitive countries, where it is intimately mixed with several other metals, as arsenic, copper, zinc, and tungsten : this is common *Tinstone*. 2. In loose rounded masses, grains, or sand in alluvial soil, in which state it is called *Stream-Tin*. The former, when reduced to the metallic state, yields *Block-Tin* ; while the latter yields *Grain-Tin*, which is the purer of the two. The massive varieties of Oxide of Tin are called Stream-Tin. What is termed *Wood-Tin* is found in reniform and botryoidal masses, or in wedge-shaped pieces, which have arisen from their partial destruction : the surfaces are generally water-worn. Wood-Tin exhibits various shades of brown, which sometimes appear in concentric bands, giving it a ligneous appearance, whence its name. Stream-Tin has evidently been derived from the destruction of tin veins or lodes, the lighter portions of stony matter having been carried away by the water, which has rounded the fragments of the ore. —*Eng. Cyc.* Tin is mentioned by Moses under the name Bedel. It was used by the Egyptians, probably obtained from the East by the trade with India. The Greeks and Romans obtained it through the Phœnicians from England. It abounds in Cornwall, and in the Eastern Archipelago, from Mergui to the island of Banca. It is brought into commerce in the form of Grain Tin and Block Tin. Malacca Tin and Banca Tin are the Eastern varieties ; to these Mergui Tin has lately been added.—*Royle.* It exists in large quantities in the Malayan Peninsula, as well as in Banca, Borneo, and many other islands. Tin, we know, was employed by the Egyptians, because it formed an ingredient in some of their metallic compounds ; but its use has long been familiar to the Hindoos for forming various metalurgical compounds, as well as for tinning copper. As it occurs as an oxide, and near the surface of the soil in large quantities, and requires only charcoal for reducing it, we may suppose it would easily have been discovered by a people who forged iron and made steel. As the nations of antiquity employed it for hardening copper, and used the alloy for forming swords and spear heads, so the natives of India form various compounds with copper and tin, which are remarkable for their hardness, and for the fine sounds, which they emit on being struck. Dr. Wight lately found that an alloy of ten grains

of copper to two and a half grains of tin was the best mixture which a native made in his presence. British spear heads are found to consist of one of tin to ten of copper, and a knife, of one of tin to seven and a half of copper. Mr. Aikin, in his experiments, found that eight grains of copper to one of tin formed the hardest alloy.—*Royle, Arts of India, page* 470.

Tin is abundant in the Tenasserim Provinces, commencing from the mountains in which the Tavoy and Henzai rivers have their rise. the northern limit of tin in the Provinces, to the southern boundary of Mergui, Pakchan river. The richest locality in the Province of Tavoy, is nearly opposite the city of Tavoy on the eastern side of the mountains. That large quantities of tin must have been found in Tavoy three hundred years ago, we have evidence in an incidental remark from Mr. Ralph Fitch ; who, says Mr. Hough in the Maulmain Chronicle, " travelled in this part of the world in about the year 1586, or 1587." He says : " I went from Pegu to Malacca passing many of the sea ports of Pegu as Martaban, the Island of Tavi whence all India is supplied with tin, Tenasserim, the island of Junkselon, and many others." Captain Tremenheere found the richest deposit of tin in the Provinces, at Kahan on Mergui Island, about eleven miles above the town, and near the Tenasserim river. " Kahan itself," he writes, " is the highest portion of a low ridge of hills, not more than 200 feet above the level of the river: it is composed of a soft friable white sandstone rock, the upper portions of which are decomposed and irregular. The surface gravel does not contain tin. It is found in the crystallized form interspersed in decomposed granite, forming a vein about three feet wide, which is enclosed by the white sandstone rock, and dips down at a high angle with the horizon. " Large scales of chlorite occur with it, which, as they are generally found where the tin is most abundant, is called by the natives ' the mother of tin.' The face of the hill is in one spot scattered over with these, which appear to have been brought down from the vein with other matter from which the tin has been separated by the usual mode of washing. It will be noticed, that the granite is completely decomposed, and that the crystals would be easily separated by washing. No tin has been raised here since the country came into our possession, but the locality has been known. It was worked during the Burmese rule, and valued as supplying the richest ore of tin. A Burmese residing near the spot, pointed out the place where his operations had ceased. He had followed the direction of the vein alluded to, as well as he was able, and had driven a gallery under ground in an inclined direction upwards, till the bank above fell in, when the mine was abandoned. He stated that he had procured considerable quantities of tin daily, and that he ofte found it in large masses mixed with yello ground. Arriving at the spot where his wor had terminated, I set people to excavate an find, if possible the vein which had been describ ed. It was reached after about two hours digging, at the depth of five feet from the sur face of the cut in the hill in which we stood. I about a quarter of an hour, a few baskets o the decomposed granite were removed down th hill, from which an amount of the crystallize peroxide of tin, equal to 63.176 grains of pur tin, were collected. " The crystallized form i which the ore is here found renders its separa tion extremely easy, and the whole processes o stamping and dressing, which in England ar tedious and expensive operations, can thus b dispensed with. No arsenic or sulphur bein mixed with the ore, it need not be roasted befor it is placed in the furnace." This ore he adds, a quoted by Mr. O'Riley, " contains specimens o macled crystals, which in weight and siz surpass any thing I have ever seen in Cornwall or in cabinet specimens. Specimens have bee extracted of great weight and richness, consist ing of large macled crystals of tin on quartz and containing more tin in proportion to the bulk ing than any specimens I have before seen. Th largest, which measured about fourteen inche square by twelve deep, was so heavy, as t require some exertion to hold it steady in both hands." In another report, Captain Tremen here writes : " With the view of ascertaining its value in the home market, I transmitted, a box of average samples of the ore, to a smelt ing establishment in Cornwall, (Messrs. Bolitho and Co.) having extensive connection with the tin mines of that country. In April 1843 Mr. Thomas Bolitho informed me that—' The samples of once-washed ore produce about 70 per cent. of tin, and the twice-washed yields nearly 75 per cent. The metal is very good being almost free from alloy ; some of the samples which have been sent to me from the Malayan peninsula contain titanium. The ore appears to separate from the matrix very easily The consumption of tin throughout the world increases so slowly, and the supply at present being more than equal to the demand, there is little inducement to speculate in tin mines The produce of Cornwall is 6,000 tons per annum, and we calculate that the quantity produced at Java together with what is raised in the Malayan peninsula, will rather exceed the produce of Cornwall. The average price of tin in Cornwall has been about 72s. per cwt., but it is now as low as 56s., which is the present price of the best Straits tin, and tin mines are suffering greatly from the depreciation in the value of their metal. It may serve for your guidance to know, that at this moment tin ore of the description of the sample twice washed, would fetch in

England about £ 46 per ton.' "The following calculations of the probable result of a shipment of tin ore and of the metal, have been obligingly made by two mercantile gentlemen of Maulmain. They are based on the lowest prices which, according to Mr. Bolitho, were obtainable in the market in April 1843, and show a probable profit on tin ore of 7s. 8d. per cwt.; but a loss on shipment of the metal of 12s. 4d. per cwt. in one case, and 4s. 9d. per cwt in the other.

	£.	s.	d.	£.	s.	d.
45 Rs. per °/₀ viss=per cwt. 14 Rs. or				0	28	0
Charges.	£.	s.	d.			
Duty, ...	0	3	0			
Stout boxes and shipping charges in Maulmain, ...	0	1	0			
Freight home £ 2 per ton, ..	0	2	0			
Insurance 2½ per cent on 40s.	0	1	0			
Commission and London charges 5½ per cent.. .	0	2	2			
Interest commission per 5 cent on purchase, ...	0	1	2	0	10	4
				0	38	4
Sale price per Mr. Bolitho, ...				0	46	0
Leaves a profit per cwt.				0	7	8

July 1843. *Tin* from Maulmain purchased at 77 rupees per hundred viss.

	£.	s.	d.	£.	s.	d.
77 Rs. per cent viss.=23 Rs. 14 annas or per cwt... ...				0	47	9
Charges.	£.	s.	d			
Duty, ...	0	10	0			
In Maulmein shipping, &c. per cwt.	0	0	6			
Insurance 2½ per cent or 6 per cent...	0	1	0			
London charges, viz. commissions 2½ per cent, Ware-house and Dock dues 1½ per cent other incidental expences 1½ per cent ... ... (5½ per cent)	0	3	3			
Interest on Purchase.	£	s.	d.	£	s	d.
Six months @ 5 per cent	0	2	4			
Freight @ £ 3 per ton,	0	3	0	0	20	7
				0	68	4
Sale price per Mr. Bolitho,				0	56	0
Leaves a loss of per cwt.				0	12	4

Another calculation of November 1844.

	R.	A.	P.	
Usual cost of tin in Maulmain, Rs. 77-8 per 365 lbs., or Rs...	23	5	2	per cwt.
Freight to England @ £ 1.10 per ton, ...	0	12	0	
Duty at 10s.	5	0	0	
Shipping charges here and in London, ...	0	8	0	
Commission in London @ £ 2½ per cent.	0	13	0	
	30	6	2	

	£.	s.	d.
Or, ...	0	60	9
Assumed price in London, ...	0	56	0
Leaves a loss per cwt. of.	0	4	9

"The assumed rate for the ore at Maulmain, 45 rupees per 365 lbs, would be, I think, subject to a reduction; but that for the metal, is probably the lowest average. It will be observed also, that the London price of 56s. per cwt. is taken at a period of great depression in the value of the article which had averaged 72s. per cwt.; but it would nevertheless appear, that to send it to England in the state of clean ore would be by far the safest investment" The richest tin locality in the Province of Tavoy is at the base of the eastern mountains, where the vallies are covered with a thick bed of diluvial pebbles and boulders, eight or ten feet thick, below which no tin is found.—*Mason.*

The Malay and Javanese term for tin "*timah*," is a word used in the Archipelago, as a generic term for both tin and lead, the epithet "white," or "flowery,"—"putih" and "*sari*," being given to tin itself, and that of "blank," "*itam*," to lead, a metal with which, being entirely a foreign product, the Malayan nations are but little acquainted. What may be called the Malayan tin district, or tin field, is, beyond all comparison, the most extensive and the richest in the world, for it stretches from Tavoy, in the 14° of north latitude, to Billiton, in the 3° of south latitude, that is, over seventeen degrees of latitude, and ten of longitude. Tin has been found or worked in a great many localities within these wide bounds, as in the British territory of the Tenasserim coast,—in the Siamese island of Junk-Ceylon,—in various parts of the continental territories of the Malayan states, and in several of the islands at the eastern end of the Straits of Malacca. The ore would seem only to become the more abundant as it approaches its termination at Banca and Billiton. The localities richest in tin are ascertained to be those near the junction of the sandstone with the granite, and all the countries rich in tin are also observed to be so in iron. All the ore heretofore worked, it should be noticed, has been found in the alluvium, or detritus of ancient mountains,—what is called in mining language "stream-works,"—obtained, in fact, by washing the soil in the same manner as, for the most part, gold in Australia and California; for no ore has ever been obtained by mining the rock containing veins of it, although it has been traced to them. It must also be remembered that the greater part of the tin district is covered with an immense forest, and has not been explored, so that tin may reasonably be expected to be found

in many situations which have hitherto remained unexamined. The supply of tin from the Malayan countries promises to last for at least as many ages as that of the coal of England. It is produced, in fact, in quantity proportionate to the labour and capital invested in working it, and without restriction from any other cause. With partial exceptions, the Chinese are at present the effectual miners and smelters, and the increase which has taken place in the quantity produced is remarkable. In the beginning of the present century the quantity yielded by Banca did not exceed 560 tons, and at present, increasing yearly, it is not less than 5540 tons. Yet the mines of Banca have now been worked for near a century and a half, being stated to have been first discovered only in the first years of the eighteenth century. The tin mines of Malacca were not worked at all, until as late as 1793, and not effectually by Chinese until 1840, but in 1848 they yielded, paying a seignorage of a tenth to the state, better than 250 tons. The production in the neighbouring Malay states had also greatly increased, so that the whole quantity exported from Malacca amounted in that year to above 960 tons. Mr. Logan estimates the whole quantity produced in the Malay Peninsula at about 2350 tons, exclusive of the produce of the Siamese territory; and when this is added to the produce of Banca, namely, 5540 tons, we have an aggregate annual yield of 7890 tons, or, making but a moderate allowance for the produce of the Siamese mines, of which we have no estimate, probably not less than double the amount of the tin of Cornwall. Probably, not less than five sixths of this amount have been brought into existence in the course of the present century. The price has not fallen with this new supply to the market, and as in the case of the gold of California and Australia, it may be asked how this has happened, and the answer must be the same, that new sources of consumption have been found, increased wealth and population keeping the demand equal to the supply.—*Crawfurd Dict. p.* 435. The *Tin* found in the island of Banca is very abundant and of a pure quality. It is cast into ingots weighing from 20 to 60 lbs; the purity of these bars is superior to those from the mines in Malacca. All that is of a superior quality which is brought to China in bars, is called 'Banca tin,' while the inferior is known as 'Straits tin.' Complaints have been made that both are adulterated with lead. The former sells for about 17 £ and the latter for 14 or 15 £ a pecul; the consumption of foreign tin has decreased during the last few years, and the annual importation does not now reach 5000 peculs. Tin plates are brought from England and America in boxes, containing 112 lbs. or from 80 to 120 plates, and sell for about 10 £ per box.—*Morrison.*

(8219) TINFOIL,

Beggud. Guz. Hind.

Is tin rolled into thin sheets, and employed with the addition of mercury, to cover the surface of glass, thus forming looking glasses, mirrors, &c.—*Joyce's Chem. Min.*

(8220) TIRYAQ FAROOQ.

Tiriyaq Farooq, also Tiriya pharka, Arab.	Treeyaq or Tiriyaq. Hind.

Dr. Irvine states that, as met with in Ajmere, this is a black extract (most likely extract of henbane) of a narcotic odour: imported via Bombay, carefully packed in a small tin box: a powerful stimulant and is given in a sort of convulsive disorder called "seet," (catalepsy): one tola costs six or eight Rupees.—*Genl. Med. Top. p.* 152. It is, however, the celebrated Theriaca Andromachi, of which the *Teucrium chamædrys*, the common Germander forms an ingredient. The words however are merely the Arabic for the best sorts of treacle, and this substance being esteemed in Baghdad as an antidote for snake bites, *Tiryaq* has come to be applied as a general term for antidote. The substance is in much request in Beri-beri.

(8221) TOBACCO. Nicotiana.

Bujjerbhang, Tutun, Arab.	Tabaco, Jap
Tambroca, Bali.	Tambroca, Jav.
Sang-yen, Chin.	Tabacum, Lat.
Doon-kola, Cyng.	Tambracco, Mal.
Tumakoo, Soon-putta, Cash.	Quauryete, Mex.
Tobak, Dan.	Tumbakoo, Pers.
Tabak, Dut.	Tobaka, Pol.
Tabak, Fr.	Tabaco, Port.
Taback, Gr.	Tabak, Rus.
Tumbakoo, Guz. Hind.	Dhumrapatra, Sans.
Tabacco, It.	Tabaco, Sp.
	Tutun, Dokhan, Turk.
	Pogheieley, Tam.
	Poghako, Tel.

Tobacco was introduced to Europe from the New World about the middle of the 16th century, and is now extensively cultivated in most parts of the world.

Tobacco, as it occurs in commerce, is of a yellowish-brown colour, soft and pliable, a little clammy, with something of a honey, mixed with a narcotic, odour; the latter, however, is not obvious in the fresh leaves. The taste is bitter, acrid, and nauseous. Virginian Tobacco, though the strongest, is best adapted for medical use, in order to observe uniformity of strength. Its active properties are taken up by water, Spirit, and Wine, but are destroyed by heat. Tobacco was elaborately analysed by Vauquelin. Most of the Tobacco of commerce, as that of Virginia, is yielded by N. Tabacum, as is that of India. Small Havannah cigars are said to be formed of the leaves of *N. repanda*; the Syrian and Turkish Tobaccos by *N. rustica* and the fine Shiraz Tobacco by *N. persica*, Lind.

In N. tabacum the Root fibrous. Stem erect, branched, and viscid, from 2 to 6 feet high. Leaves sessile, oblong, lanceolate, the lower ones decurrent, very large, a little hairy, viscid. Flowers in terminal panicles. Bracts linear-acute. Calyx tubular, swelling. 5-cleft, hairy, glutinous. Corol rose-coloured, funnel-shaped, throat inflated, ventricose, limb spreading, plicate, with 5-cleft acuminate segments. Stamens 5, declinate. Ovary ovate. Style long. Stigma emarginate. Capsule usually 2-celled, 2-valved opening crosswise at top, valves finally bifid. Seeds numerous, small, kidney-shaped, attached to fleshy placentæ.—Warm parts of America, but now cultivated in most parts of the world.—Nees von E. 194. St. and Ch. 37.—*Royle.*

We refer however to the articles "Nicotiana" for lengthened observations on the several species of this genus, and merely name here those considered as the sources af the Tobacco of Commerce. According to Loudon ("Encyc. of Plants"), there are fourteen species of this genus, besides varieties.

a. N. tabacum a native of several parts of America, but principally known as Virginian tobacco, having a stem rising from four to six feet, or more in height, bearing pink flowers. Of this there are three chief varieties known in America by the popular names of Orinoco, Broad-leaved and Narrow-leaved. Lindley enumerates eight varieties of N. tabacum.

b. N. macrophylla or large leaved tobacco, an ornamental annual, also with pink flowers, native of America, which rises to the height of six feet.

c. N. fruticosa, or shrubby tobacco, an ornamental evergreen shrub, native of China, with pink blossoms, which grows to about three feet.

d. N. undulata, or *suaveolens*, sweet-scented or New Holland tobacco, a green house perennial, native of New South Wales, with white flowers, which is only two feet high.

e. N. rustica.—The common green or English tobacco, an annual plant, native of America, producing white flowers, which seldom grows higher than three feet.

f. N. paniculata, or panicled tobacco, an annual plant bearing greenish yellow flowers, native of Peru, rises to the height of three feet.

g. N. glutinosa or clammy-leaved tobacco, also an annual plant, native of Peru, growing to the height of four feet, with bright scarlet flowers.

h. N. plumbaginifolia, or curled-leaved tobacco, an ornamental deciduous annual, native of America, with white blossoms, rising to the height of two feet.

i. N. pusilla, or primrose-leaved tobacco, an ornamental deciduous biennial, with white flowers, native of Vera Cruz, rising to three feet.

j. N. quadrivalvis, four-valved, or Missouri tobacco, an ornamental annual, native of North America, with white flowers, seldom growing higher than two feet.

k. N. nana, or Rocky Mount tobacco, a curious greenhouse annual, native of North America, with white blossoms, rising only three inches high.

l, N. Langsdorffii, or Langsdorff's tobacco, an ornamental annual, with greenish yellow flowers, native of Chili, reaching five feet high.

m. N. Corinthoides, or honey wort tobacco, an ornamental annual, with greenish yellow flowers, native country unknown.

n. N. repanda, Havanna tobacco, an annual with white flowers, native of Cuba. rising two feet high.

There are a few species, native of the Province of Buenos Ayres, which may be particularised *N. bonariensis*, having white flowers, *N. glauca*, yellowish green flowers; *N. longiflora*, white flowers, and *N. viscosa*, pink flowers.

The important mineral substances present in Havanna tobacco, examined by Hertung, are in 100 parts of ashes,

Salts of potash, ...	34·15
Salts of lime, ...	51·38
Magnesia, ...	4·09
Phosphates, ...	9·04

These substances were for the most part insoluble in earth, and must have been dissolved during the growth of the crop.

ANALYSIS OF FIVE SAMPLES OF TOBACCO.

	No. 1. Grown on argillaceous soil.	No. 2.	No. 3. Grown on calcareous soil.	No. 4.	No. 5.
Potash, ...	29·08	30·67	9·68	9·36	10·37
Soda, ...	2·26	—	—	—	·36
Lime, ...	27·67	24·79	49·28	40·44	39 53
Magnesia, ...	7·22	8 57	14·58	15·59	15 04
Chloride of sodium, ...	·91	·5·95	4 61	3 20	6·39
Chloride of potassium,	.....	...	4·44	3·27	2·99
Phosphate of iron, ...	8·78	6·03	5 19	6·72	7·56
Sulphate of lime,... ...	6 43	5·60	6 68	6·14	9·42
Silica, ...	17·65	18·39	5 54	6·28	8 34
	100·	100·	100·	100·	100·

There is no doubt that the manure which contains the largest proportion of alkaline carbonate, magnesia, lime snd gypsum, is that best adapted for tobacco. I give an analysis taken from Prof. Johnston's "Lectures," (2nd edition) of the ash of the tobacco leaf and the composition of a special manure for tobacco:—

Potash....	12 14	All the ingredients which are necessary to replace 100 lbs. of the ash of tobacco leaves are present in the following Mixture:—
Soda	0 07	
Lime	45.90	
Magnesia.	13.09	
Chloride of Sodium ...	3.49	
Chloride of potassium...	8.98	Bone dust, sulphuric acid 23lbs
Phosphate of iron ...	5.48	Carbonate of potash (dry) 31 „
Phosphate of lime. ...	1.49	Carbonate of soda (dry) 5 „
Sulphate of lime... ...	6 35	Carbonate of Magnesia 25 „
Silica	8.01	Carbonate of lime (chalk) 60 „
	100.00	144 lbs.

The following is the result of an analysis of the fresh leaves of tobacco, by Posselt and Reimann ("Mag. Pharm." xxiv. xxv):—

Nicotine, ...	0·06
Nicotianine, ...	0·01
Extractive matter, slightly bitter, ...	2·37
Gum, with a little malate of lime, ...	1·14
Green resin, ...	0·26
Vegetable albumen, ...	0·26
Substance analogous to gluten, ...	1·04
Malic acid, ...	0·51
Malate of ammonia, ...	0·12
Sulphate of potash, ...	0·04
Chloride of potassium, ...	0·06
Potash combined with malic and nitric acids,	0·90

Phosphate of lime, ...	0·16
Lime in union with malic acid, ...	6·24
Silica,...	0·06
Woody fibre,...	4·96
Water (traces of starch),...	87·21
	100 1

Dr. Covell, in "Silliman's American Journal," vol, vii., shows its components to have been but imperfectly represented in the above German analysis. He found in tobacco by chemical examination—1, gum; 2, a viscid slime, equally soluble in water and alcohol, and precipitable from both by subacetate of lead; 3, tannin; 4, gallic acid; 5, chlorophyle (leaf green); 6, a green pulverulent matter, which dissolves in boiling water, but falls down again when the water cools; 7, a yellow oil, possessing the smell, taste and poisonous qualities of tobacco; 8, a large quantity of a pale yellow resin; 9, nicotine; 10, white substance, analogous to morphia, soluble in hot, but hardly in cold alcohol; 11, a beautiful orange red dye stuff, soluble only in acids; it deflagrates in the fire, and seems to possess neutral properties; 12, nicotianine. According to Buchner, the seeds of tobacco yield a pale yellow extract to alcohol, which contains a compound of nicotine and sugar. M. M. Henery and Boutron Charlard found in 100 parts of

Cuba tobacco.....	8·64 of nicotine.
Maryland.....	5·28
Virginia.....	10·00
Ile et Vilaine.....	11·20
Lot et Garonne.....	8·20

quantities from 12 to 19 times more than were obtained by Posselt and Reimann.—("*Ure's Dictionary of Arts and Manufactures.*") The army of smokers in Great Britain and Ireland consume yearly about six millions of pounds worth of tobacco. The duty alone paid upon snuff and tobacco for the people of Great Britain, averages four-and-a-half millions sterling a year! The quantity consumed—smoked, snuffed, or chewed—during the same period, is about 28 millions of pounds weight, or about four pounds weight per annum for every male adult. Ireland annually pays not less than £800,000 of duty on tobacco and snuff, and only about £30,000 on coffee. For every pound of coffee that the Irish people use, they smoke away about *four pounds of tobacco.* North America produces annually upwards of 200 million pounds. The combustion of the mass of vegetable material used in this kingdom would yield about 340 million pounds of carbonic acid gas; so that the yearly produce of carbonic acid gas from tobacco smoking alone cannot be less than 1,000,000,000 lbs.—a large contribution to the annual demand for this gas made upon the atmosphere for the vegetation of the world. Henceforth let no one twit the smoker with idleness and unimportance. Every pipe is an agricultural furnace,—every

smoker a manufacturer of vegetation,—the consumer of a weed that he may rear more largely his own provisions. In the year 1842, 605,000,000 of cigars were made in the German Commercial Union. In 1839, the revenue on tobacco in Great Britain was about £3,600,000. Of this it has been estimated eleven-twelfths are drawn from the working classes, and one-twelfth from the richer classes. The following is a calculation of the consumption of tobacco per head of the population, estimated from the number of pounds on which duty was paid :—

	Rate of duty.	Consumption per head. oz.
1801	1s. 7 3-10d. England. 1s. 0 7-10d. Ireland.	 17
1811	2s. 2 13-20d.	... . 19½
1821	4s. 0d.	... . 11 45
1831	3s. 0d.	..... 12 35
1841	3s 1 8-10d.	..... 12 45
1851	3s. 1 4 5d.	 21

Thus it will be seen the consumption is materially affected by the rate of duty.

The imports into England of all kinds of tobacco for the five years 1848 to 1852, have been as follows :—

	1848.	1849.	1850.	1851.	1852.
Unmanufactured.....	lbs. 34,090,360	lbs. 41,546,848	lbs. 35,166,358	lbs. 31,061,953	lbs. 33,205,635
Manufacture and snuff,...	1,512,714	1,905,306	1,557,518	2,331,886	2,930,299
	35,603,074	43,452,154	36,723,876	33,393,839	36,135,934
Gross duty received :—	1848.	1849.	1850.	1851.	1852.
On raw tobacco.....	£ 4,267,579	£ 4,328,217	£ 4,337,258	£ 4,386,910	£ 4,466,533
Cigars, snuff, &c.....	97,655	96,814	92,873	98,858	94,298
	4,365,234	4,425,031	4,430,131	4,485,768	4,569,831

The following quantities of unmanufactured tobacco, manufactured called negro-head, and cigars, were imported into the United Kingdom in 1850 :—

Countries from whence imported.	Unmanufactured.	Manufactured.
United States of America, . .	30,173,444	1,191,001
Venezuela, New Grenada and Ecuador	893,623	527
Brazil	12,138	56,802
Peru	8,649	6
Cuba	589,627	153,819
British West Indies, including Demerara and Honduras . . .	26,169	3,242
British Territories in the East Indies.	14,500	25,332
Philippine Islands	12,233	51,210
Hongkong and China . . .	2,706	2,340
Turkey, Syria, and Egypt . . .	140,361	2,882
Malta	13,028	7,818
Italy, Sardinian Territories . .	431,939	17
Gibraltar	7	3,063
Spain	307,641	1,100
France	29,950	1,521
Channel Islands	140	1,342
Belgium	29 922	6,579
Holland	2,418,732	9,078
Hanseatic Towns	50,810	36 680
Other parts	8,930	1,980
Total unmanufactured . . .	35,166,358	1,556,321
Ditto manufactured . . .	1,556 321	
Snuff . . .	1,197	
Total . . .	36,723,876	

Culture in Connecticut.—Seed bed made rich and sown as cabbage as early in April as possible. Land well ploughed and manured and harrowed as for corn, laid out in rows three feet apart, and slight hills in the row about two and a-half feet apart; begin to plant about 10th of June, the ground to be kept clean with hoe and cultivator, and examine the plants and keep clear of worms. When in blossom and before seed is formed, the plants must be topped about thirty-two inches from the ground, having from sixteen to twenty leaves on each stalk, after this the suckers are broken off, and the plants kept clean till cut. When ripe the leaves are spotted, thick, and will crack when pressed between the fingers and thumb. It is cut at any time of the day, after the dew is off, left in the row till wilted, then turned, and if there is a hot sun, it is often turned to prevent burning; after wilting it is put into small heaps of six or eight plants, then carried to the tobacco house for hanging, usually on poles twelve feet long; hung with twine about forty plants to a pole, twenty on each side, crossing the pole with a hitch knot to the stump end of the plants; when perfectly cured, which is known by the stems of the leaves being completely dry, it is then taken in a damp time, when the leaves will not crumble, from the poles, and placed in large piles, by letting the tops of the plants lap each other, leaving the butts out; it remains in these heaps from three to ten days before it is stripped, depending on the state of weather, but it must not be allowed to heat. When stripped it is made into small hands, the small and broken leaves to be kept by themselves; it is then packed in boxes of about 400 lbs. and marked "Seed, Leaf Tobacco." One acre of tobacco will require as much labor as two of corn that produce 60 bags to the acre, and requires about the same quantity of manure If the tobacco can be cured without fire heat the quality will be improved, and if dried in the open air, should have shades of boards to keep off rain and excess of sun. The chief market for Connecticut tobacco is Bremen. In a number of the "Charleston Southern Planter." a remedy is described for preventing the destruction of plants by the fly. The writer says: "I had a bushel or two of dry ashes put into a large tub, and added train oil enough (say one gallon of oil to the bushel of ashes) to damp and flavor the ashes completely: this was well stirred and mixed with the hand, and sown broadcast over certain patches, and proved thoroughly effectual for several years, while parts left without the remedy were destroyed." The best ground for raising the plant, according to Capt. Carver ("Treatise on Culture of Tobacco," &c.), is a warm rich soil, not subject to be overrun with weeds. The soil in which it grows in Virginia is inclining to sandy, consequently warm and light; the nearer, therefore, the nature of the land approaches to that, the greater probabability there is of its flourishing. The situation most preferable for a plantation is the southern declivity of a hill, or a spot sheltered from the blighting north winds. But at the same time the plants must enjoy a free current of air; for if that be obstructed they will not prosper. The different sorts of seed not being distinguishable from each other, nor the goodness to be ascertained by its appearance, great caution should be used in obtaining the seed through some responsible mercantile house, or individual of character. Each capsule contains about a thousand seeds, and the whole produce of a single plant has been estimated at 350,000. The seeds are usually ripe in the month of September, and when perfectly dry may be rubbed out and preserved in bags till the following season.

Culture of Tobacco in the East.—We will now notice the method pursued in cultivating and curing the celebrated Shiraz tobacco of Persia (*Nicotiana Persica*), which is so much esteemed for the delicacy of its flavor, and its aromatic quality. It is thus described by an intelligent traveller. The culture of the plant, is nearly the same; it is only the preparation of the tobacco that forms the difference :—

In December the seed is sown in a dark soil, which has been slightly manured (red clayey soils will not do). To protect the seed and to keep it warm, the ground is coverd with light, thorny bushes, which are removed when the plants are three or four inches high; and during this period the plants are watered every four or five days only however in the event of sufficient rain to keep the soil well moistened not falling. The

ground must be kept until the plants are six to eight inches high, when they are transplanted into a well moistened soil, which has been made into trenches for them; the plants being put on the top of the ridges ten or twelve inches apart, while the trenched plots are made, so as to retain the water given. The day they are transplanted, water must be given to them, and also every five or six days subsequently, unless rain enough falls to render this unnecessary. When the plants have become from thirty to forty inches high, the leaves will be from three to fifteen inches long. At this period, or when the flowers are forming, all the flower capsules are pinched or twisted off. After this operation and watering being continued, the leaves increase in size and thickness until the month of August or September, when each plant is cut off close to the root, and again stuck firmly into the ground. At this season of the year, heavy dews fall during the night; when exposed to these the color of the leaves change from green to the desired yellow. During this stage, of course no water is given to the soil. When the leaves are sufficiently yellow, the plants are taken from the earth early in the morning, and while they are yet wet from the dew, are heaped on each other in a high shed, the walls of which are made with light thorny bushes, where they are freely exposed to the wind. While there, and generally in four or five days, those leaves which are still green become of the desired pale yellow color. The stalks and centre stem of each leaf are now removed, and thrown away, the leaves are heaped together in the drying house for three or four days more, when they are in a fit state for packing. For this operation the leaves are carefully spread on each other and formed into cakes of sorts, the circumference from four to five feet, and three to four inches thick, great care being taken not to break or injure the leaves. Bags made of strong cloth, but thin and very open at the sides, are filled with these cakes, and pressed very strongly down on each other; the leaves would be broken if this were not attended to. When the bags are filled, they are placed separately in a drying house, and turned daily. If the leaves were so dry that there would be a risk of their breaking during the operation of packing, a very slight sprinkling of water is given them to enable them to withstand it without injury. The leaf is valued for being thick, tough, and of a uniform light yellow colour, and of an agreeable aromatic smell.

In *India*, the Surat, Bilsah, and Sandoway (Arracan) varieties of tobacco are the most celebrated. The two first are found to be good for cultivation in the district about Calcutta, but the Cabool is still more to be preferred. Tobacco requires in the East, for its growth, a soil as fertile and as well manured as for the production of the poppy or opium. It is, therefore, often planted in the spaces enriched b animal and vegetable exuviæ, among the huts c the natives. I have tried seed in different soil says Capt. C. Cowles,—namely a light garde mould with a large portion of old house rubbis dug to a good depth, which had a top dressing c the sweepings of the farm-yard and cow-houses a rather heavy loam, highly manured with burn and decayed vegetables, and old cow dung; th third was a patch of ground, which was orgin ally an unwholesome swamp, from being eighteei inches to two feet, lower than the surroundin land; the soil appeared to be a hard sterile clay and covered with long coarse grass and rushes As there was a tank near it, I cut away on side of it, and threw the soil over the ground bringing it rather above the level. Such wa its appearance, (a hard compost marly clay,) tha I expected, no other good from it than that o raising the land so as to throw the water off contrary, however, to my expectations, it pro duced a much finer crop of tobacco than eithe of the other soils, and with somewhat less man ure. The agricultural process is limited to some practical laws founded on experience, and these are subject to two principal agents; viz. the soil and climate. With respect to the former, it is the practice amongst the growers in tobacco countries, such as Cuba, the States of Virginia, North and South Carolina, and the Philippine Islands, to select a high and dry piece of land, of a siliceous nature, and combined with iron, if possible; and with respect to the latter, there are seasons of the year too well known to the planters to need any explanation. The only difference (if there is any) depends on the geographical situation of the place, with respect to its temperature, or in the backwardness or advancement of seasons, and even on the duration of the same—in which circumstances the planter takes advantage of the one for the other.

The influence of a burning climate may be modified by choosing the coolest month of the year, whereas the soil cannot be altered without incurring great expense. I have seen tobacco lose its natural quality and degenerate by transplanting from one soil to another, although of the same temperature, and *vice versa*.

Mr. Piddington has analysed several Indian soils, distinguished for the production of superior tobacco. These are in the table soils from Arracan, (Sandoway,) a soil from Singour, in Burdwan, near Chandernagore, the tobacco of which, though of the same species as that of the surrounding country, sells at the price of the Arracan sorts; and the soil of the best Bengal tobcaco, which is grown at, and about Hingalee, in the Kishnagur district.

The best tobacco soils of Cuba and Manila, are for the most part red soils. Now, the red and reddish soils contain most of their iron in the state of peroxide, or the reddish brown oxide of

iron; while the lighter grey soils contain it only in the state of protoxide, or the black oxide of iron. Mr. Piddington believes the quality of the tobacco to depend mainly on the state and quantity of the iron of the soil, while it is indifferent about the lime, which is so essential to cotton. None of the tobacco soils contain any lime. Their analysis show them to contain:—

	Arracan soil.	Singour soil.	Hingalee soil.
Oxide or iron, (peroxide)	15·65	10·60	6·00
Water and saline matter	1·10	75	1 50
Vegetable matter and fibre	3·75	1·10	75
Silex	76·90	80·65	87·25
Alumina	2·00	4·50	1·50
	99·40	97·60	97·00
Water and loss	60	2·40	3·00
	100	100	100

From which it will be seen that the best tobacco soil hitherto found in India contains about sixteen per cent., or nearly one sixth, of iron, which is mostly in a state of peroxide; and that the inferior sort of tobacco grows in a soil containing only six per cent., or one-sixteenth of iron, which is, moreover, mostly in the state of protoxide, or black oxide. Mr. Piddington thought it worth examining what the quantity of iron in the different sorts of tobacco would be, and found that while the ashes of one ounce, or 480 grains of Havana and Sandoway cheroots gave exactly 1·94 grains, or 0.40 per cent., of peroxide of iron, the ashes of the same quantity of the Hingalee, or best Bengal tobacco, only gave 1·50 grains, or 0 32 per cent; and it appears to exist in the first two in a state of peroxide, and in the last as a protoxide of iron; rendering it highly probable that the flavor of the tobacco to the smoker depends on the state and quantity of the iron it contains! Green copperas water, which is a solution of sulphate of iron, is often used by the American and English tobacconists and planters, to colour and flavor their tobacco; and this would be decomposed by the potass of the tobacco, and sulphate of potass and carbonate of iron is formed. Carbonate of iron is of an ochre-yellow colour. Mr Piddington says he took care to ascertain that this process had not been performed with the tobacco used for this experiment; and adds that Bengal cheroot makers do not know of this method. Mr. Laidley, of Gonitea, dissents from the idea suggested by Mr. Piddington that ferruginous matter in the soil is essential to the successful growth of tobacco. He observes that if we attend only to the iron contained, why every plant will be found to require a ferruginous soil; but tobacco contains a notable quantity of nitrate of potass and muriate of ammonia (the latter a most rare ingredient in plants), and these two salts are infinitely more likely to affect the flavor of the leaf than a small portion of oxide of iron, an inert body. Now as neither of these can be supplied by the atmosphere, we must search for them in the soil, and accordingly he imagined that a compost similar to the saltpetre beds which Napoleon employed so extensively in France, would be a good manure for tobacco lands; namely, calcareous matter, such as old mortar, dung, and the ashes of weeds or wood. He was aware that good tobacco might be grown in Beerbhoom, having raised some himself several years ago from American seed. The plants grew most vigorously, and he further observed, in confirmation of his opinion about the proper manure, that in other districts in which he had resided the natives always grew the tobacco (each for his own use) upon the heap of rubbish at his door, consisting of ashes, cow-dung, and offal of all kinds. While the soils of the Gangetic diluvium almost always contains carbonate of lime, the Beerbhoom soil does not, as far at least as Mr. Laidley had examined it. The following is the mode of culture pursued about the city of Coimbatore. Between the middle of August and the same time in September, a plot of ground is hoed and embanked into small squares; in these the seed is sown, and covered by hand three times at intervals of ten days. To secure a succession of seedlings water is then given, and the sun's rays moderated by a covering of bushes. Watering is repeated every day for a month, and then only every fifth day. The field in which the seedlings are transplanted, is manured and ploughed at the end of August. Cattle are also folded upon the ground. Four or five ploughings are given between mid September and the middle of October, when the field is divided as above into small squares. These are watered until the soil is rendered a mud. Plants of the first sowing are then inserted at the end of September, about a cubit apart, the transplanting being done in the afternoon. At intervals of ten days the seedlings of the other two sowings are removed. A month after being transplanted the field is hoed, and after another month the leading shoot of each plant is pinched off, so as to leave them not more than a cubit high. Three times during the next month all side shoots thrown out are removed. When four months old, the crop is ready for cutting. To render the leaves sweet the field is watered, and the plants cut down close to the surface, being allowed to remain when cut until next morning. Their roots are tied to a rope and suspended round the hedges. In fine weather the leaves are dry in ten days, but if cloudy they require five more days. They are then heaped up under a roof, which is covered with bushes and pressed with stones for five days. After this the leaves are removed from the stems, tied in bunches, heaped again, and pressed for four days longer. They are now tied in bundles partly of the small leaf and partly of the large

leaf bundles, and again put in heaps for ten days—once during the time the heaps being opened and piled afresh. This completes the drying. A thousand bundles, weighing about 570 lbs., is a good produce for an acre.

Ceylon.—In 1760, Ceylon produced a considerable quantity of tobacco, principally about Jaffna, a demand having sprung up for it in Travancore, and on the Malay coast. The cultivation spread to other districts of the island. Negombo, Chilaw, and Matura. Not long after the possession of the island by the British, a monopoly was created by an import duty of 25 per cent, *ad valorem*, and in 1811 the growers were compelled to deliver their tobacco into the Government stores at certain fixed rates. The culture and demand thereupon decreased. In 1843, the duty on the exports of tobacco from this island amounted to £8,386, and in 1836 to £9,514. Ceylon now exports a considerable quantity of tobacco. The value of that exported in 1844 was nearly £18,000: it went exclusively to British colonies. The shipments since have been as follows :—

1848	£17,992		———
1849	22,300		———
1850	20,721		22,184 cwts.
1851	21,422		22,523 ,,
1852	20,531		21,955 ,,

Archipelago, Siam, Philippines, Manilla.—About 96,000 piculs of cigars, of five different qualities, are exported annually from Siam. A good deal of very fine tobacco is grown in the Philippines, and the Manila cheroots are celebrated all over the globe. The quantity of raw tobacco shipped from Manila in 1847 was 92,106 arrobas (each about a quarter of a cwt); manufactured tobacco, 12,054 arrobas; and 1,933 cases of cigars. 5,220 boxes of cigars were shipped from Manila in 1844. 73,439 millions of cigars were shipped in 1850, and 42,629 quintals of leaf tobacco. The manufacture of cigars in Manila is a monopoly of the government, and not only is this the case, but it is a monopoly of the closest description, and any infringement of the assumed rights of the Spanish Indian government is visited by the most severe penalties. Public enterprise, however little of that commodity there now exists in the Spanish character, is thus kept down; and this is not only detrimental to the nation itself, but is also unjust towards those persons who are the purchasers of the article, enhanced in price, as is always the case, by monopoly. The cheroot, which now costs, free of duty, about one halfpenny, could be rendered for half that sum, according to well-authenticated opinions. To protect itself from illicit manufacturers, or smuggling of any kind in connection with cigars, the government is compelled to maintain an army of gendarmes, in order to adopt the most stringent means which despotic states alone tolerate. No person is, therefore, permitted to have even the tobacco leaf in its raw state on his premises, and gendarmes pay, at stated intervals, domiciliary visits to the habitations of the people, in search of any contraband materials. There are several extensive manufactories of cigars and cheroots belonging to the government in and near Manila. Mr. MacMicking, in his recent work on the Philippines, thus describes the mode of manufacture by those employed by the government :—In making cheroots women only are employed, the number of those so engaged in the factory at Manila being generally about 4,000. Beside these, a large body of men are employed at another place in the composition of cigarillos, or small cigars, kept together by an envelope of white paper in place of tobacco; these being the description most smoked by the Indians. The flavor of Manila cheroots is peculiar to themselves, being quite different from that made of of any other sort of tobacco; the greatest characteristic probably being its slightly soporific tendency, which has caused many persons in the habit of using it to imagine that opium is employed in the preparatory treatment of the tobacco, which, however, is not the case. The cigars are made up by the hands of women in large rooms of the factory, each of them containing from 8: 0 to 1,000 souls. These are all seated, or squatted, Indian like, on their haunches, upon the floor, round tables, at each of which there is an old woman presiding to keep the young ones in order, about a dozen of them being the complement of a table. All of them are supplied with a certain weight of tobacco, of the first, second, or third qualities used in composing a cigar, and are obliged to account for a proportionate number of cheroots, the weight and size of which are by these means kept equal. As they use stones for beating out the leaf on the wooden tables before which they are seated, the noise produced by them while making them up is deafening, and generally sufficient to make one not desirous of protracting a visit to the place. The workers are well recompensed by the government, as very many of them earn from six to ten dollars a month for their labor; and as that amount is amply sufficient to provide them with all their comforts, and to leave a large balance for their expenses in dress, &c., they are seldom very constant laborers, and never enter the factory on Sundays, or, at least, on as great an annual number of feast days as there are Sundays in a year.

The *Japanese* grow a good deal of tobacco for their own consumption, which is very considerable. They consider that from Sasma as the best, then that from Nangasakay, Sinday, &c. The worst comes from the province of Tzyngaru; it is strong, of a black colour, and has a disgusting taste and smell. The tobacco from Sasma is, indeed, also strong, but it has an agreeable taste

d smell, and is of a bright yellow color. The bacco from Naugasakay is very weak, in taste d smell perhaps the best, and of a bright own color. The tobacco from Sinday is very od. The Japanese manufacture the tobacco well, says Capt. Golownin, (Recollections of pan,) that though I was before no friend smoking, and even when I was at Jamaica uld but seldom persuade myself to smoke an avana cigar, yet I smoked the Japanese to-acco very frequently, and with great pleasure.

Java.—The culture of tobacco is a very profi-ble article for the laborers, seeing that the pro-uce is obtained from grounds which have ready given the first crop. The qualities of ava tobacco are more and more prized in ie European markets, the preparation and ssortment are not yet all that could be de-ired, but they have progressed in this branch, nd the contracts made with the new adven-urers assure them of a considerable benefit. But efore the Java tobacco can find an assured pening in the European markets, it is necessary hat the cultivators should make use of seed rom the Havana Manila. The residencies of Cembang, Sourabaya, Samarang, Chinbou, and Pagal, present districts suited for its culture; t has been carried on with success for a good nany years in the residencies of Treanger, Paka-ongan, and Kedu, but only for the consumption of the interior, and of the Archipelago.

Celebes.—Tobacco is cultivated in Celebes, but merely in sufficient quantity for local con-sumption. It is exclusively grown by the Bantik population—the mode of preparation s the same as in Java; it is chopped very fine and mostly flavored with arrack. When bought in large quantities, it may be had for thirty cents the pound; but in smaller quanti-ties it costs double that price.

Australia.—Tobacco is cultivated in New South Wales with much success. Australia produces a leaf equal to Virginia, or the most fertile parts of Kentucky, but the great difficulty is to extract the superabundant "nitre." The first crop in New South Wales exceeds one ton per acre, and the second crop of the same plants, yields about half the weight of the first. In 1844 there were about 871 acres in cultivation in New South Wales with tobacco, and the produce was returned at 6,382 cwts. In New England, New South Wales, as fine a "fig" as could be wished for is manufactured under the superintendence of a through-bred Virginia tobacco manufacturer—but the impos-sibility of extracting the nitre by the heating, or any other process, renders the flavor rank and disagreeable. Perhaps cheroots,, or the lower numbers of cigars, manufactured from the Australian leaf, might prove more successful.—*Simmonds, p. 590 to 621.*

Culture of Tabacco in India.—The tobacco of Chunar, on the Ganges, and more especially that of Bhilsa, near Nagpore, are celebrated throughout India, while Dr. Ainslie states, that "the finest kinds in India, and perhaps in the world, are grown near the village of Wood-anum, in the Northern Circars, and in some of those low sandy islands formed at the mouths of the river Krishna, (from this is made the famous Masulipatam snuff,) also in the Delta of the Godavery, where the soil is peculiarly rich and fertile," the product being known as Lunka tobacco. Mr. Ritchie, in his Evidence before the Committee of the House of Commons, in 1831, stated, that Tobacco of very fine quality is produced extensively in Guzerat, and the northern districts of the Bombay Presi-dency. One bale imported, sold higher than any American, as it brought 6*d.* when the latter was sold for 5*d.* a pound; but the average of an experimental exportation was found to be defec-tive in the curing, and did not pay, Excellent Tobacco is grown at Sandaway, in Arracan, and when this was brought to London it was valued at from 6*d.* to 8*d.* a pound. Mr. Piddington mentions the Tobacco of Singour, in Burdwan, near Chandernagur, as selling at the price of the Arracan sort, though of the same species as that cultivated in the surrounding country; and that the best Bengal tobacco is grown at and about Hanglee, in the Kisnagar district. The kinds of Tobacco cultivated, vary according to situation and the mode of culture. Some distinct species are also cultivated in different countries, but Nicotiana tabacum and its varie-ties are so, most extensively. N. rustica is chiefly cultivated in western Africa and Egypt, also near Salonica and Latakia, and likewise in some parts of Europe. Dr. Lindley considers the Persian Tobacco to be a distinct species, which he has named N. persica. The seed of these several species is well worthy of trial in different parts of India, as well as seed from those places which are already celebrated for their tobacco, as Dr. Royle has already re-commended in his article on this subject.

Arracan Tobacco.—One of the results of Dr. Wallich's investigations was the bringing to notice some very superior Tobacco, which obtained the name of Martaban Tobacco. Dr. Wallich states, that 'the sort is from Arracan and not from Martaban;' and describes it as having 'a fine silky leaf: tried by many people, it had been pronounced the very best they had ever tasted, equal to, nay surpassing, the finest imported from Turkey and Persia.' An extensive Tobac-conist says, 'a finer and better-flavoured Tobac-co he never saw or tasted in his life.' One of the first brokers in the City says, 'the sample of leaf Tobacco is certainly of a very fine quality, and appears to have been produced from some peculiar seed and a greatly-improved cultivation

and cure.' By many manufacturers 'it was supposed to be from the seed of Havannah or St. Domingo Tobacco.' For smoking, it is compared with Maryland Tobacco, having the same qualities, 'except the flavour, which is better, and more like Havannah.' The colour and leaf are moreover, pronounced excellent for cigar-making; 'but if anything is against it for that purpose, it is the largeness of the principal stalk, and coarseness of the small fibres in the leaf.'—*Royle's Productive Resources of India.*

Godavery.—For Lanka segars, the *Nicotiana rustica* is grown on the islets of the Godavery, where the cultivation is rapidly increasing; these are a superior article.—*M.E.J.R.* The Tobacco of the Godavery lunkas, or islands of the Godavery, is rather famous. The tobacco generally produced in India is generally complained of as too high dried and fit only for inferior kinds of snuff. The tobacco most celebrated among cigar smokers in the Madras presidency appears to be the Trichinopoly, and the Lanka or that produced on the islands in the Godavery and Kristna: from the latter the Masuli patam snuff is manufactured. A high value was put on specimens of tobacco from American seed produced in Calcutta. There appears the certainty that India can produce as good tobacco as America with the same care in the selection of situation in cultivation, preparation, and packing. It is only necessary to refer to the improvements that have been introduced in the cultivation and production of silk, indigo, cotton, and to be able to appreciate the probable benefit of similar attempts in improving tobacco. The value of good tobacco in the District of Masulipatam is from 10 to 15 rupees a candy of 500 lbs or about ½*d* per lb. The best Lanka tobacco is from the Seetanagram island near Gootala in the Godavery and is sold usually at 40 rupees a candy on the spot. It has increased to this price within two years from 15 Rupees.—*Rohde M.S.S.*

Tenasserim Tobacco is more universally used in Burmah, than it perhaps ever was in its native country. The Karens raise it for their own consumption, and the Burmese both cultivate it, and import it from Rangoon.—*Mason.*

(8222) TOBAGO CANES. This walking stick is a product of a palm, the Bactris minor, *Jacq.*, a native of New Granada and the West Indies —*Seeman.*

(8223) TODACUTTIE WOOD.

Todacuttie marum, TAM.

This beautiful, hard, and compact wood, which is, in some parts of the country, called Nookoo marum, is occasionally employed for making escretoires, cabinets &c. &c.—*Ains. Mat. Med. p.* 207.

(8224) TODDALIA, a genus of Plants belonging to the natural order *Rutaceæ* tribe *Xanthoxyleæ*, which is itself sometimes made into an order. The name *Toddalia* is derived from Toddali, the Malabar name of one of the species. The genus is distinguished by having unisexual flowers, the calyx 5-toothed; petals 5; stamens 5, longer than the petals; stigma almost sessile, peltate; fruit fleshy, 5-furrowed, 5-celled, cells 1-seeded; seed kidney-shaped; embryo arched.—*Eng. Cyc.* An inferior cosmetic wood or cosmestic tubercles, is seen in the Tenasserim market, which is the tubercle of some plant, probably Toddalia aculeata or T. floribunda. The Burmese appear, from their name, to regard them as produced by a species of erythrina, for they call them "erythrina thorns;" but Mr. Mason knows the plant to be a creeper, and suspects that it is of the above genus.

(8225) TODDALIA ACULEATA. *Syn.* Scopolia aculeata, Roxb. vol i. 616.

Kaka toddali, TAM. | Conda cashinda, TEL.

Toddalia aculeata has prickly stems and branches, and extends to 30° N. lat., along the jungly base of the Himalayan Mountains. The bark and root of this species are said to be used as a cure for the remittent fever of such situations; and as many of the allied plants are possessed of bitter with aromatic properties, it is probable that this plant also may be useful for such purposes—*Eng. Cyc.* This is one of the most common bushes on the coast of Coromandel, and Dr. Roxburgh mentions that every part of this shrub has a strong pungent taste and that the roots when fresh cut smell particularly so. The fresh leaves are eaten raw for pains in the bowels; the ripe berries are fully as pungent as black pepper, and with nearly the same kind of pungency; from these the natives prepare an excellent pickle. The fresh bark of the root is administered by the Telinga physicians for the cure of that sort of remittent commonly called the "hill fever." Roxburgh says, "I conceive every part of this plant to be possessed of strong stimulating powers, and have no doubt, but that under proper management it might prove a valuable medicine where stimulants are required." The bark of the Toddalia deserves most careful trial, and will in all probability be found a very valuable medicine.—*O'Shaughnessy, page* 265. A tincture of Toddalia aculeata, is a powerful stimulant and diaphoretic, also considered tonic and febrifuge. Dose, one to three fluid drachms. This bark is a native remedy of high repute in the treatment of the collapse from jungle fever.—*Beng. Phar. p.* 433. The most recent notice of this drug is to be found at page 395 of Indian Annals of Medical science. *Toddalia aculeata* and *Toddalia floribunda.* An inferior cosmetic wood is seen in market, which is the tubercle of some plant. The Burmese appear, from their name, to regard them as produced by a species of erythrina, for they call them "erythrina thorns;" but Mr. Mason knows the

plant to be a creeper, and suspects that it is of the above genus.

(8226) TODDY.

Toddy, Neera Saindee, Maree, Sur Duk. Guz. Hind.	Sura, Tari, Tadi, Sans. Khulloo, Tam. Khulloo Tel.

Toddy is the general name given by Europeans to those sweet, delicious, refreshing liquors, which are procured in the tropics, by wounding the *spathe* &c. of certain palms, when the juice exudes and drops into earthen pots, which are attached to the stem to receive it. Taken fresh from the tree, early in the morning, before the sun is up, it forms a most pleasant and delicious drink. Its chief use, however, is for making the fermented intoxicating fluid, as also arrack, sugar, and vinegar.—*Faulkner*. Toddy, as above stated, is the sap and juices which exude from the trunks or from the fruit stalks of several kinds of palm trees, and is a product peculiar to tropical countries. In the West Indies, it is obtained from the trunk of the Attalea cohune, a native of the Isthmus of Panama. In Eastern Asia, the palms from which it is prepared are the Gomuti palm, the Cocoanut, the Palmyra, the Date and the Kittul or Caryota urens.

The Gomuti Palm, *Arenga Saccharifera*, is fit to yield toddy when nine or ten years old, and continues to yield for two years, at the average rate of three quarts a day. On the first appearance of the fruit, one of the spadices is beaten with a short stick, on three successive days, with the view of determining the sap to the wounded part. The spadix is cut off a little way from its root or base, and the liquor, which pours out, is received in pots of earthen ware, in bamboos, or other vessels. When newly drawn, the liquor is clear, and in taste resembling fresh must. In a very short time it becomes turbid, whitish, and somewhat acid, and quickly runs into the various states of fermentation acquiring an intoxicating quality. In Malacca, the Gomuti termed Kabong, comes in bearing after the seventh year. It produces two kinds of Mayams spadices,—male and female. The female spadix yields fruit, but no juice, and the male *vice versa*.

To procure the Toddy of the Palmyra tree, the Borassus flabelliformis, at the season when the inflorescence begins to appear, and before the spathes have had time to burst, the toddy drawer cuts off all leaves except three or four of the leaves, and all or most of the spathes are effectually encompassed from end to end, by thongs, to prevent the inflorescence from bursting forth. When thus tied for three successive mornings they are beaten or crushed between the wooden battens, with the object of keeping them from bursting and to encourage the flow of sap. On the fourth morning, a thin slice is cut from the parts of the spathes. On the eighth morning a clear sweet liquor begins to flow from the wounded parts, and the toddy drawer then ascends in the morning with chatties, or toddy receivers, in which he places the ends of the spathes, and leaves them until the morning, when they are found to contain a quantity of this liquor. The operation of attracting the juice is repeated every morning or evening until the whole spathe is sliced away. The trees are drained in this manner, for several months of the year, seven or eight spathes yielding at the same time.

The Toddy of the Cocoa-nut Tree (*Cocos nucifera*) is obtained from the flower spathes before the flowers have expanded in a manner almost similar to what has been described for the Palmyra palm.—The spathe is tied with strips of the young leaves, to prevent its expansion; it is cut a little transversely from the top, and beaten either with the handle of the toddy knife or a piece of hard wood, a process which is repeated morning and evening for five or six days, in succession, the under part of the spathe is taken off, to allow of its being bent, in which position it is retained by being attached to a leaf-stalk below. An earthen pot or leaf basket, is a few days afterwards attached to the end, and is every morning and evening emptied of the toddy which exudes into it, the quantity of which greatly varies A little portion of the spathe is daily cut off.

Toddy is also procured from the "*Date Tree*" of India "*Phœnix dactylifera*," during the months of November, December, January and February, during which period each tree is reckoned to yield from 120 to 240 pints of juice. but the mode of its extraction destroys both the fertility and the appearance of the tree. After removing the lower leaves and their sheaths, a notch is cut in the pith of the tree near the top, from which the toddy issues by a small channel, made of a bit of the Palmyra leaf, into a pot suspended to receive it.

Palm Wine is also extracted from the Caryota urens during the hot season. The quantities which are said to flow from it are immense, so much as a hundred pints during the twenty four hours.

The taste of Toddy in its fresh state, probably varies according to the state of the weather and season of the year, which will explain the many comparisons given of it, to Poubon water, mild champagne; cider, ginger beer, perry, &c. In all Eastern countries, the toddy of these several trees is used for the same purposes. It is drank, though rarely, when fresh from the tree, and is then a gentle aperient particularly useful in delicate constitutions. It is boiled down into a sugar called Jaggery or *Goor* which is afterwards refined. It is fermented in the course of a day, into a mildly intoxicating liquor, still known as toddy, of which several pints are partaken before intoxica-

tion comes on. It is also distilled into arrack, made into vinegar, and throughout all Eastern countries it is employed as yeast as it begins to ferment in a few hours after it is drawn. In the peninsula of India the ropes employed by the toddy drawers to help them to climb the tree, are made of cow or buffalo hide, but in other countries the pliant tendrils of plants are sometimes employed. The ropes are sufficiently large to surround the tree and the body of the climber, who by leaning backwards and throwing his whole weight on the rope, is thus enabled to retain the position he has taken up, while by drawing up his feet and shifting the thong in his hand to higher points, he gradually raises himself to the top of the tree. Accidents however are frequent and frightful.

(8227) TOLU BALSAM, SAINT THOMAS'S BALSAM.

Baume de Tolu, FR,	Balsamo de Tolu, SP.
Tolubalsamischer balsam GER.	

The concrete juice of the *Myroxylon toluiferum*, is of a brownish-yellow colour, transparent, with the taste and odour of the white balsam of Peru. It is obtained from America.—*Faulkner.*

(8228) TOMATOES. SOLANUM LYCOPERSICUM. A well known vegetable of easy culture, does not require a very rich soil, succeeds best when trained on horizontal trellises, should be thinned occasionally of superfluous shoots, raised from seed, used in sauces, &c.—*Jaffrey.* See LOVE APPLE SOLANUM.

(8229) TONGLO. Barometrical observations taken simultaneously with those of Calcutta, give the height of Tonglo in Southern Sikkim as 10,078·3 feet. Colonel Waugh's, by trigonometry, 10,070·4 feet—a remarkable and unusual coincidence.—*Hooker, Him. Jour. Vol.* I. *p.* 171.

(8230) TONKIN BEANS. Are oval, oblong, somewhat boat-shaped seeds, from one to two inches long, shining, with an oily surface marked with a network of wrinkles; colour, purple-brown, odour very fragrant; taste slightly bitter, but very burning and almost caustic. They are only employed as a perfume for snuff. The plant (*Dipteryx odorata*), is a native of the woods of Guiana.—*Faulkner.*

(8231) TOOLSEE, [illegible] is the name given in India, to the Ocymum [illegible]osum. Toolsee was a disciple of Vishnu. [illegible]ming to be his wife, she excited the jealousy of Lukshmee, by whom she was transformed into the herb named after her. There are, however, several well known species of the genus Ocymum, to each of which different names are given, viz. the *Ram Toolsee*, is the Ocymum gratissimum; *Babooye Toolsee*, Ocymum pilosum; the *Krishna Toolsee*, Ocymum sanctum; but only the last and the common Toolsee, O. villosum, are held to be sacred to Vishnoo and used in his worship. See OCYMUM.

(8232) TOON-WOOD. CEDRELA TOONA, has already been mentioned under that head, also of Cedar, as being similar to the so-called Havannah cedar, the Cedrela odorata. The toon-tree is C. toona; its wood is of a reddish-brown colour, rather cross grained, but much used all over India for furniture and cabinet-work.—*Holtz* Lieut. Nuthall, as quoted by Captain Munro, mentions "*toon*" as one of the woods of Arracan, under the name of "thit-ka-do." We have, however, the authority of Wallich for saying that thit-ka-do is a species of sterculia, a genus that produces no valuable timber. Still, as it is possible that there may be only a mistake in the name while the thing itself exists, the remark is worth putting on record.—*Mason.*

(8233) TOOTEE, is the long silky hemp like fibre of three species of Abutilon, the A. tomentosum. A. polyandrum and A. indicum.

(8234) TOPAZ.

Poosperagam, TAM.	Topase, FR,
Purperagan, CYNG.	Topas GER.
Pokhraj, HIND.	Topazio, IT.
Zuburjud, PERS.	Topas, RUS.
Topaz, ARAB.	Topacio, SP.

Topaz occurs massive, in imbedded and rounded crystals. Primary form a right rhombic prism. Cleavage easy, parallel to the base of the primary form, more difficult in the direction of its lateral faces. Structure lamellar at right angles to the axis of the prism. Fracture uneven, rightly conchoidal. Hardness; scratches quartz. Electricity; positive by friction; those crystals which possess different faces of crystallisation at opposite ends acquire different kinds of electricity at the two extremities when heated. Colour white, yellow, bluish, and greenish. Lustre vitreous transparent, translucent. Specific gravity 3.499. Fragments exposed to heat emit a blue, green, or yellowish phosphoric light. By the blowpipe on charcoal it does not fuse, but with borax it melts into a transparent glass. Topazes occur generally in primitive rocks, and in many parts of the world, as Cornwall, Scotland, Saxony, Siberia, Brazil, &c. The following analyses have been given of this mineral: (1) Saxon topaz by Klaproth; (2) Brazilian topaz by Klaproth; (3) Saxon topaz by Berzelius; (4) Brazilian topaz by Berzelius:—

	(1)	(2)	(3)	(4)
Silica..	25	44 5	34·24	34·01
Alumina...	56	47·5	57·45	58·38
Fluoric Acid ...	5	7 0	7·75	7·79
Oxide of Iron, ..	—	0·5	—	—
	99	90·5	99·44	100·18

The ancient *Topazion* was found on an island in the Red Sea, which was often surrounded with fog, and therefore difficult to find. It was hence named from 'topazo,' to seek. This name, like most of the mineralogical terms of the ancients, was applied to several distinct spe-

s. Pliny describes a statue of Arsinoe, wife Ptolemy Philadelphus, four cubits high, ich was made of topazion, or topaz, but evi-ntly not the topaz of the present day, nor rysolite, which has been supposed to be the cient topaz. It has been conjectured that it is a jasper or agate; others have imagined it be prase, or chrysoprase. Topaz is employed jewellery, and for this purpose its colour is en altered by heat. The variety from Brazil sumes a pink or red hue, so nearly resem-ing the Balas ruby, that it can only distinguished by the facility with which becomes electric by friction. The finest ystals for the lapidary are brought from inas Novas, in Brazil. From their peculiar npidity, topaz-pebbles are sometimes denomi-ted Gouttes d'Eau. When cut with facets d set in rings, they are readily mistaken, if ewed by daylight, for diamonds. The coarse rieties of topaz may be employed as a substi-te for emery in grinding and polishing hard bstances. Topaz is cut on a leaden wheel, d is polished on a copper wheel with rotten one. It is usually cut in the form of the bril-ant or table, and is set either with gold foil or or à jour.' The white and rose-red are most steemed. (Dana, *Manual of Mineralogy*,)—*Eng. yc.*

Beautiful Topazes of various kinds are found the Burmah dominions and in Ceylon, in hich last mentioned country, a genuine greenish ellow coloured Topaz is improperly called, hunberg tells us, the yellow Tourmalin (Kane-e Turemale, *Cyng*), a light coloured smoky To-az is there as improperly called a yellow crystal Kaha Palingu, *Cyng.*) and a dark coloured smoky Topaz is mistaken for a brown Crystal, and call-Tillia Palingu by the Cyngalese.

Oriental Topazes are a variety of the genuine erfect Corundum and are said by Mineralogists o differ from the Occidental Topaz or that which omes from Saxony and Siberia by the latter con-aining a greater proportion of Silex.—*Ains. Mat Med. page* 167.

(8235) TORENIA, a genus of Plants of the natural family of *Scrophulariaceæ*, found in India, the tropical parts of Australia, and in South America. *T. Asiatica*, a species found in almost every part of India, is described by Rheede as having the juice of its leaves em-ployed as a cure for gonorrhœa on the coast of Malabar.—*Eng Cyc.*

(8236) *Torenia asiatica*, Linn. (Caela dola, *Sans.*) the juice of the leaves is considered in Malabar a remedy for gonorrhœa —*O'Shaugh-nessy, page* 477.

(8237) TORPEDINIDÆ, the Torpedoes, a family of Fishes belonging to the order *Plagios-tomi*, and the sub-order *Raiinæ*.

Torpedo, the principal genus, was founded by Dumeril upon the *Raia Torpedo* of Linnæus, and some other species, distinguished by their having the tail short and moderately thick, and the disc of the body nearly circular, the anterior margin being formed by two produced portions from the head, which, inclining sideways, join the pec-torals: the space between the head, the pectoral fins, and the branchiæ is occupied by small ver-tical hexagonal tubes, which are filled with mucous matter, and largely provided with nerves from the eighth pair. The situation of these honeycomb-like cells, which constitute the electrical apparatus, is indicated on the upper surface by a slight convexity on each side of the head. Cuvier and Risso consider that several species have been confounded under a common name, and the latter of these authors has char-acterised four species of *Torpedo* in his 'Histoire Naturelle del'Europe Meridionale.' They are—

1. *Torpedo Narke*, which he describes as being yellowish-red above, and having five ocel-lated spots

2. *Torpedo unimaculata*. This species has the body above fulvous, spotted with whitish spots, and one oblong ocellated spot in the middle of the back. The tail is more elongated and slender. It is said to have the electrical apparatus scarcely visible, and to give but very slight shocks.

3. *Torpedo marmorata*. Body flesh-coloured, and having brown spots and sinuous markings, producing a marbled appearance: tail thick above rounded.

4. *Torpedo Galvani*. Body fulvous, imma-culate, but margined with black. Fleming refers the British Torpedo to the third of these species *Torpedo marmorata.—Eng. Cyc.*

(8238) TORPEDO. [TORPEDINIDÆ.]

(8239) TORS. By the natural weathering of rocks exposed to atmospheric vicissitudes, the perishable parts are removed and the more resisting portions remain. In rocks which manifest peculiar arrangements of joints or natural divisions, the blocks and masses defined by their intersections often appear in cubical, subcolumnar and other characteristic shapes. To masses more or less characteristic in figure, left by the decay of surrounding parts in pro-minent situations, the name of 'Tor' is applied in the granitic tracts of Devon and Cornwall.—*Eng Cyc.* Tors are of very frequent occurrence in the granitic tracts of Southern India, where, as in Hyderabad in the Dekhan and in the Ceded Districts, the piled up masses often are seen assuming the appearances of artificial structures.

(8240) TORTOISE SHELL.

Ecaille de tortue, FR.	Sisik Kurakura also Sisik panu. MAL.
Schilpad, GER	Scaglia de Tartaruga, IT.
Kachakra, GUZ. HIND.	

The scales of the tortoise; extensively used in the manufacture of combs, snuff-boxes, in in-laying, &c. The goodness of tortoise shell depends mainly on the thickness and [illegible] of the

scales, and partly on the clearness and brilliancy of the colours. Tortoise shell abounds in the seas of the Indian Archipelago, which is considered superior to that obtained from Singapore, the African Coast, the West Indies, and the Laccadive and Maldive Islands.—*Faulkner.* In Ceylon the marginal pieces of tortoise shell are used at Point de Galle in the manufacture of bracelets and necklaces formed of a chain of shell, it resembles amber in appearance; these bear a higher price than such as are formed by the darker shell. In Ceylon there is a great demand for tortoise-shell for the manufacture of Combs which are worn by males as well as females among the Cyngalese. In the numerous excesses into which English costume has been carried the size of the back comb worn by ladies has never attained that of the Cingalese men, who also wear a narrow long bent Comb across the forepart of the head—the lighter coloured shell is most esteemed by them. Five pounds is a moderate price for a tortoise shell back comb, which increases in value according to the size and quality of the shell: hair pins of tortoise-shell are worn by the women: gold and silver being substituted for full dress: these hair pins are among the articles purchased by passengers in the steam-boats.—*Rhode, M. S. S.*

For the Malay Tortoise-shell "*Sisik-panu,*" is literally, "tortoise scales." The only part of the sea tortoises or turtles held of much value by the natives of the Indian islands is the shell. Tortoises are found in all the seas of the Malay and Philippine Archipelagos, but the imbricated kind that yields the finest shell is most abundant in those of Celebes and the Spice Islands, as far as the coast of new Guinea. The parties chiefly engaged in their capture are the Rajahs or Malay sea nomadic hunters, of whom the turtle is the principal game. These people distinguish four species of sea-turtles to which they give the names of kulitan akung, ratu, and boko. The last is the panu of the Malays and the green esculent turtle, of which the carapace is of no use, the animal being valued only for its flesh to sell to the Chinese and Europeans, for among the Mahomedans it is unlawful food. The three first named species all yield a marketable shell. The ratu, which signifies king or royal turtle, is said to be of great size, measuring from five to six feet in length, but is not often taken, and the shell is of inferior value. All the finest shell is afforded by the first, the kulitan, the name, in fact, signifying "shell turtle." A very interesting account of the turtle fishery of Celebes, contained in the 16th volume of the Transactions of the Batavian Society of Arts and sciences, describes the animal as follows. "The first named" (the kulitan) is the kind which, on account of its costly shell, is the most prized. It is the so named *caret* tortoise. The shell or [illegible] of this creature is covered with thirteen shields or blades, which lie regularly on each other in the manner of scales, five in the centre of the back and four on each side. These are the plates which furnish such costly tortoise shell to the arts. The edges of the scales of the back are further covered with twenty-five thin pieces joined one to another, which, in commerce, are known under the appellation of 'feet' or 'noses' of the tortoise. The value of the tortoise shell depends on the weight of each 'head,' by which expression is understood the collective shell belonging to one and the same animal. Such is the article of commerce so much in request, both for the Chinese and European markets. Shells, which have white and dark spots that touch each other, and are, as much as possible, similar on both sides of the blade, are in the eyes of the Chinese, much finer, and, on that account, more greedily brought by them than those which want this peculiarity. On the contrary, shells which are reddish rather than black in their dark spots, which possess little white which are more damasked than spotted; in a word, of which the colours, according to Chinese taste, are badly distributed, are less valued. The caprice of the Chinese makes them sometimes value single heads' at unheard-of prices, such for example, as go under the name of 'white heads,' for the varieties of which they have peculiar names. It is impossible to give an accurate description of these varieties, and their subdivisions, for these depend on many circumstances unappreciable to our senses. It is enough for me to observe that such heads as possess the above named qualities, that is, are very white in their blades, and have the outer rim of each blade, to the depth of two or three fingers, wholly white, and the weight of which amounts to two and a half catties, qualities that are rarely found united, may be valued at 1000 Guilders or even more (above 24£ per pound, avoirdupois). The 'feet' or 'noses' of the tortoise-shell are in demand only in the Chinese market. Whenever the two hinder pieces of these have the weight of a quarter of a catty (between 5 and 6 ounces), which is seldom the case, they may reach the value of fifty guilders, or more. The whole shell of a tortoise seldom weighs more than three catties (four pounds), notwithstanding, it is asserted that there occur 'heads' of four and five catties. Tortoise-shells are sometimes found of which the shell, instead of thirteen blades, consists of a single undivided one. The Bajos call this, which is rarely met with, loyong (brass?) The usual modes by which these people catch the tortoise are the adang (intercepting), the harpoon, and the net. To these we add the simplest of all, namely, falling on the females when they resort to the strand to lay their eggs. This is also the most usual, I may say almost the only way by which the inhabitants of the coast catch this animal. They need nothing

more than, as soon as they have got the creature n their power, to turn it on its back, when nable to recover itself it lies helpless. It ometimes, also, falls into the hands of the wellers on the coast, through means of their shing stakes, into which it enters like the ish, and from which it can find no outlet, but re- nains imprisoned in the innermost cham- er. When the Bajos have caught a tortise, hey kill it immediately by a few blows on the ead. They then take its upper shield, or the ack itself off, being the only thing about the nimal that has value. But as the shells adhere ast to each other there would be danger of tear- ng them, if they at once pulled the plates sunder, they usually wait three days, in which ime, the soft parts become decomposed, and he plates are loosened with very little trouble. he Indian islands furnish, I believe, the largest upply of tortoise-shell for the European and Chinese market, the chief emporia being Singa- ore, Manilla, and Batavia, from which are xported yearly about 26,000 pounds; and one alf of this quantity is from Singapore.—*Craw- urd Dict. page* 439.

Mr. Morrison tells us that, Tortoise-shell is he crustaceous covering of the *Testudo imbri- ata*, a native of the shores of most of the Indian slands; and that the best comes from the Spice slands and New Guinea, but it is collected all over he Archipelago and West Pacific. The common ame is hawk's bill tortoise. The shell is thicker, learer, and more variegated than that of any ther species, and constitutes the sole value of he animal. It is heart-form, and consists of hirteen inner with twenty-five marginal divi- ions. The middle side-pieces are the thickest, rgest and most valuable; the best is in large lates, free from cracks or carbuncles, and almost ransparent. The small, broken and crooked ieces are worthless. The Chinese use large uantities in the manufacture of combs, boxes, oys, &c. During the Company's monopoly, tor- oise-shell was brought to the Chinese market for xportation to England, but it is now carried to ingapore, and very little is brought to Hong-kong he price varies from $ 1000 down to 200 per ecul, according to quality.—*Morrison.*

The Madras Exports of Tortoise Shell was lbs. 08, value Rs. 2,204, in 1854. At the Madras xhibition the epidermoid plates which overlap ne back shell of the Marine Turtles (Chelone) ere transmitted from Travancore, apparently ne plates. Another epidermal production, called ortoise shell, from Madura and other inland ocalities was exhibited, but the specimens were f little value.—*M. E. J. B.*

(8241) TOUR: CAJANUS INDICUS.

Togari, CAN.	Tovare, TA.
Tuvar, HIN.	Kandula. TE.
Turi, MAH.	

(8242) TOUR; BURRIE TOUR—CAJANUS INDICUS, CYTISUS CAJAN. PIGEON PEA.—Large Dhal.

Toor dhal, HIND. | Thovary purpoo, TAM.

This is sown in fields at the commencement of the rains in June and sometimes much later; it is ripe in December. The seeds are sometimes ground into flour or split like dry peas: for the latter they are an excellent substitute. There are several varieties, which sell from 30 to 40 seers for the rupee. Is partly sown along with Ragi like Bullur, and partly in full in dry lands. The quantity of it grown in Mysore is not sufficient for the wants of the people, and it is consequently largely imported into that district from Baramahal and Bellary.

(8243) TOURMALINE (*Schorl*), a mineral occurring crystallised. Primary form a rhomboid; secondary forms, prisms with from 3 to 12 sides, terminated by very irregular summits. Cleavage parallel to the faces of the primary form. Fracture uneven, conchoidal. Hardness: scratches glass easily. Electricity: according to Hauy the transparent varieties when heated become electric; the termination of the prism which presents the greater number of faces becoming positive, while the other end becomes negative. Colour white, brown, blue, yellow, green, red, and black. The blue variety is called *Indicolite* and the red *Rubellite*. *Schorl* is a name formerly given to black tourmaline, Lustre vitreous. Transparent, translucent, opaque. Specific gravity 3.069 to 3.076. Before the blow-pipe all the varieties fuse readily with borax, producing at first slight effervescence.

Tourmaline occurs most commonly in primary rocks, especially in granite, gneiss, and mica slate. The red variety, or rubellite, is found in Siberia; the blue, or indicolite, at Uto; the green in Brazil; the black in Devonshire and many other places. The composition of tourmaline is extremely various. That of the red appears, from the analysis of Vauquelin, to be the simplest, consisting of

Silica	42
Alumina	40
Soda	10
Oxide of Manganese	7
	99

Some varieties contain also potash, lithia, lime, magnesia, oxide of iron, and boracic acid. The proportions of these constituents are extremely variable, and no one variety contains all the enumerated substances. The black tourmaline from Devonshire yields nearly 19 per cent. of oxide of iron, and that of Eibenstock nearly 24 per cent. of the same oxide.

The word Tourmaline is a corruption of the name in Ceylon, whence it was first brought to Europe. *Lyncurium* is supposed to be the ancient name for common tourmaline; and the red variety was probably called *Hyacinth*.

The red tourmalines, when transparent and free

from cracks, are of great value, and afford gems of remarkable beauty. They have all the richness of colour and lustre belonging to the ruby, though measuring an inch across. A Siberian specimen of this variety, now in the British Museum, is valued at 500*l*. The yellow tourmaline from Ceylon is but little inferior to the real Topaz and is often sold for that gem. The green specimens, when clear and fine are also valuable for gems.

Tourmaline on account of its property of polarising light, is used largely in the manufactures of polarising instruments. (Dana, Manual of Mineralogy.)—*Eng. Cyc. p.* 1084

(8244) *Yellow tourmaline.*—Among the Ceylon diamonds that are seen for sale in Maulmain, is a yellow jewel resembling a topaz; but which Mr. Mason finds on examination to be yellow tourmaline.

(8245) *White tourmaline.*—An occasional crystal of white tourmaline is seen among the crystals of the black variety in specimens from the Shan states; but he has never met with it in the Provinces.

(8246) *Red tourmaline.*—Red tourmaline is found in Burmah, though it is not seen at Moulmein Jameson says the king of Ava gave a specimen to Symes which was valued at five hundred pounds in England.—*Mason.*

(8247) *Schorl*, or black tourmaline, is found in Madura, in great abundance, also in quartz near the mouth of Tavoy river on the east side and also at the foot of the eastern mountains, near the head waters of the Dahgyaine, north east of Maulmain. These are the only localities where Mason met with this mineral. In both, the crystals are numerous, and in Tavoy they are large, but not so handsome as seen in foreign specimens.—*Mason.*

(8248) *Green Tourmaline.*—A green jewel that cannot be distinguished by the eye from beryl, is brought with the Ceylon diamonds; it is however, green tourmaline; as may be ascertained by a very simple test, for beryl scratches quartz, but tourmaline is scratched by quartz.—*Mason.*

(8249) *Ceylon Diamonds.*—White jewels of an inferior quality are often offered for sale in Maulmain under the name of Ceylon diamonds, but they are usually made from green tourmaline. White tourmaline, is a rare mineral, but the green variety being common, the jewelers by exposing it to heat expel its color and it becomes white.—*Mason.*

(8250) TOURNEFORTIA, a genus of Plants belonging to the natural order Boraginaceæ, so named by Linnæus in honour of Joseph Tillon de Tournefort. It is characterised by having a salver shaped or rotate corolla, of which the throat is naked; the stamens included within the tube of the corolla; the stigma is peltate, and the fruit consists of a berry which contain 4 1-seeded nuts. The species are about 50 in number, forming small shrubs or herbs, diffused through the hot parts of the world. as the West Indies, South America, Indian islands, and India.—*Eng. Cyc. p.* 1084.

(8251) TOWELS of different sizes are chiefly made in the districts of Cuddalore, Chinglepu and in the outskirts of Madras and of a quality equal to those of English manufactures. At the Madras Exhibition of 1855, there was awarded to Chengalroya Chetty, for the best Towels from Cuddalore, a prize of Rupees 50.

(8252) TOYS.

Speelgoed, Dut.	Rumakra, Guz.
Jouets, Bimbelots, Fr.	Trastulli It.
Spielzeug, Spielsachen, Ger.	Shai-i-bazee, Pers.
Khail, also Killownee Hind.	Igrushki, Rus.
	Dijes, Juguetes de mimos, Sp.

Are playthings, baubles, and trifling ornaments of all sorts, made expressly for the amusement of children.—*Faulkner*

(8253) TRADESCANTIA, a genus of Plants belonging to the natural order *Commelinaceæ*, which was so named in honour of the English botanist John Tradescant, who was gardener to Charles 1. The species are natives of America and of India. Many of them, being of a highly ornamental nature, are cultivated in flower-gardens; a few are used medicinally in the countries where they are indigenous. Thus *T. axillaris*, according to Rheede, is used in India as an application to the abdomen in cases of tympanites; and Martius describes the stem and leaves of *T. diuretica* as being employed in Brazil as emollient applications in rheumatic pains, intestinal derangements, and in retention of urine; while in North America *T. Virginica* is employed in cases of bites of venomous spiders, as well as some other species, whence it has obtained the name of Spider-Wort, but it is doubtful whether they possess any other than simple emollient properties. The hairs of the stamens of this plant exhibit a circulation, in the cells of which they are composed.—*Eng. Cyc.*

(8254) TRAGACANTH, Gum Dragon.

Samagul-kateera, kaseera, Katira, Arab.	Kattera, Guz. Hind.
Gommi astraganti, Fr.	Tragacantha, Lat.
Traganth, Ger.	Vadomocottay pisin, Tam.

A gum produced, according to some authors, by a species of *Astragalus*, growing in Persia and Turkey. It is more costly, and extremely different in many of its properties from Gum Arabic. The finest kind occurs in twisted, vermicular, rounded or elongated pieces, almost transparent, whitish, brittle, inodorous, with slightly bitter taste. It is also found in large tears of a vermicular form, a reddish color, and mixed with impurities. It is

used in topical dyeing, and in pharmacy for making powders into troches, &c. (*Waterston*). —*Faulkner*. The source of this product however, seems to be several plants, according to the different colleges it is the Gummy exudation of Astragalus gummifer, *Lab.* and other species, E., A., verus, *Olivier*, L. and E., A. creticus, *Lamarck*, D. The τραγάχανδα of Dioscorides was no doubt a plant of the same genus as that which now yields Tragacanth. Sibthorp considers *Astragalus aristatus*, L'Hert, to be the plant. Arab authors describe it by the name *kusera* or *kutira*, for which, in India, *kuteera* is substituted. A substance known by this name is produced both in the North-west and in the Peninsula of India by *Cochlospermum Gossypium* and in Pegu according to McClelland by several species of Sterculia. Tournefort adduced *A creticus* of Lamarck, a native of Mount Ida in Crete, to be the plant yielding Tragacanth. Labilladiere describes *A. gummifer* a native of Mount Libanus in Syria, as one of the plants; while Olivier states his *A. verus*, inhabiting Asia Minor, Armenia, and northern Persia, as yielding the largest quantity of Tragacanth. Dr. E. Dickson, Physician to the consulate at Tripoli, when travelling in Koordistan, collected specimens of the plants which he ascertained to yield Tragacanth. These he gave to Mr. Grant, British Consul at Erzeroum, by whom they were sent to Dr. Lindley, who determined that the white or best variety of Gum Tragacanth is yielded by *Astragalus gummifer*, and the red or inferior kind by his *A. strobiliferus*. Dr. Dickson, when in England, favoured Dr. Royle with the following observations: " Besides the two last-named species, I observed also a third variety that gave gum Tragacanth, which unfortunately I lost when my things were robbed at Hassan-kaleh. From the Koordish mountains being covered with many species of Astragalus, I should think it not unlikely that other varieties of this genus may hereafter be discovered yielding the gum."

(8255) *Astragalus Dec. Diadelph. Decand.* Linn. Calyx 5-toothed. Corolla with an obtuse keel. Stamens diadelphous. Legume 2-celled, or half 2-celled in consequence of the dorsal or lower suture being turned inward, *Dec.*

Sectio Tragacanthæ.—Petioles permanent, thornlike. Stipules adhering to the petioles.

(8256) *Astragalus Verus. Oliv.* L. E. Flowers yellow, axillary, in clusters of 2 to 5, sessile. Calyx tomentose, obtusely 5-toothed. Leaflets 8 to 9 pairs, linear, hispid. A native of Anatolia, Armenia and Northern Persia, yields Tragacanth, which is collected from July to September. Used in Persia, exported to Europe and also to India.—Oliv. Voy. 3, t. 44; Nees von E. 329.

(8257) *Astragalus Gummifer. Labill.* E — Flowers 3 to 5 axillary, sessile. Calyx 5-cleft, together with the legumes woolly. Leaflets 4 to 6 pairs, oblong, linear, smooth. A native of Mount Lebanon, also, of Koordistan, where it yields white Tragacanth, but which Labilladiere represents as vermicular in form.

(8258) *Astragalus Creticus. Lam.*—Flowers axillary, sessile, aggregate. Calyx 5-partite, with feathery setaceous lobes rather larger than the corolla. Leaflets 5 to 8 pairs, oblong, acute, tomentose. Mount Ida in Crete, where it yields a little Tragacanth.

(8259) *Astragalus Aristatus. L'her.*—Peduncles very short, usually 6-flowered; calycine teeth long and setaceous; leaves with 6—9 pairs of oblong, linear, mucronate, pilose leaflets; legumes scarcely half bilocular. A native of the Alps of Europe, also of Greece. Sibthorp states that this species yields a gum called τραγοχανδα in Greece, which was exported to Italy. Landerer has lately ascertained that Tragacanth was yielded by this species on the hills near Patrass, and exported to Venice and Trieste, or as Levant Tragacanth to Marsellies and Ancona: (c)

(8260) *Astragalus Dicksonii. Royle.* (*A. strobiliferus, Lindley*, not of Royle, Him. Bot. p. 199)—Flowers capitate in an ovate, sessile, axillary strobile. Bracts imbricate, pinnated, tomentose. Calyx feathery, 5-cleft. Segments of the corolla equal. Leaflets 3-paired, woolly, oval, awned at the apex, narrow at the base, *Lindley*. As Dr. L. has inadvertently named this species *A strobiliferus*, there being already one of that name, Dr. Royle named it after the discoverer of the plant, who also found that it yielded a reddish coloured Tragacanth. Tragacanth exudes from the above plants either naturally or from wounds, and hardens in various forms. It is imported into England from Smyrna, the Levant, and also from Greece. It is found in commerce either of a white or a reddish-yellow colour, in broad thin flakes, or in tortuous vermicular pieces; the former is the best, and most common there. It is white or greyish, semitransparent, tough, horn-like, and tasteless, and being a little elastic, is with difficulty reduced to powder, unless heated to 110°. In contact with cold water, it absorbs a certain portion, swells, becomes adhesive and diffused. It does not dissolve except in boiling water, when some change is supposed to take place, a great portion, however, separating again. It is insoluble in Alcohol. Tragacanth appears to consist of two distinct gummy principles. Bucholz and Guerin Varry found of common Gum or Arabin from 53 to 57 per cent., and of Bassorin 33 to 43 parts, with water and a little starch, the presence of the latter producing a blue colour with Iodine. The *Arabin* rather resembles than is identical with Gum Arabic, for, as first pointed out by Dr. Duncan, its mucilage is not precipitated by Silicate of Potash. The *Bassorin* is like that found in Gum Bussorah, and other imperfectly soluble

gums. It is sometimes called *Tragacanthine*, is solid, colourless, without odour or taste, insoluble in water, but absorbing it and swelling up. Nitric acid converts it into Oxalic and into Mucic acid. Sulpluric acid changes it to a saccharine substance, which is not susceptible of Alcoholic fermentation. Guibourt, however, considers Tragacanth to consist of a peculiar Mucilaginous principle, with a little Starch and Ligneous fibre.—*Royle.*

(8261) TRAGIA, a genus of Plants belonging to the natural order *Euphorbiaceæ*, named after Tragus, a German botanist, whose real name was Bock. The species are found in India and in America, are climbing in habit, and some are remarkable for stinging as violently as nettles. *T. cannabina* is so named from its leaves resembling those of the *Cannabis*, or Hemp, and of which the roots given in infusion are considered diaphoretic and alterative. *T. involucrata* is a small plant without taste or smell, but the native physicians of India consider it calculated to strengthen the system in cachectic states of the constitution and in chronic cases of syphilis. *T. volubilis*, which is a stinging climber, and has a very acrid juice, is employed in conjunction with common salt for the destruction of some kinds of ulcers.—*Eng. Cyc.*

(8262) TRAGIA CANNABINA, Lin. ROOT OF THE HEMP LEAVED TRAGIA.

SirrooCanchorie vayr, TAM.	Tsinna Doolagendie vayree, TEL.
Kanchkoori ke jurr, DUK.	Casaghinnie, SANS.

This root sometimes called in Tamul "*Coorundootie vayr*," has in its dried state but little taste or smell, though in its more succulent condition, it is said to have an agreeable odour. It is considered as diaphoretic and alterative, and is prescribed in decoction together with other articles of the same class to correct the habit. An infusion of it is also given as a drug in ardent Fever.—*Ains. Mat. Med. p.* 114.

(8263) TRAGIA INVOLUCRATA. Roxb. iii. p. 576.

Bichittee, BENG	Canchorie Root. ENG.
Canchorie vayr, TAM.	Doostparisha, SANS.
Doolaghondi vayroo, TEL.	

Hairs sting violently; roots given by the Vaidas as alterative in cachexia and venereal diseases. (*Ainslie.*)—*O'Shaughnessy, page* 562. This small root has in its dry state no sensible taste or smell; the Vyteans however reckon it amongst those medicine which they conceive to possess virtues in altering and correcting the habit in cases of Mayghum, (Cachexia) and in old venereal affections attended with anomalous symptoms, and Rheede, in speaking of the same root, has these words "Conducit in febre ossium, ac servit pro pruritu corporis." He further adds in decocto data, urinam suppressam movet.—*Ains. Mat. Med. p.* 75.

(8264) TRAGOPOGON (from τράγος, a 'goat,' and πώγων, beard), a genus of Plants belonging to the natural order *Cichoraceæ*, which is usually considered only a tribe of the great order of *Compositæ*. The genus *Tragopogon*, or Goats Beard, is so named from the long silky beard or pappus of the seeds. The genus is distinguished by having a simple involucre of many leaves. Receptacle naked. Pappus stalked, plumose. Achenia longitudinally striated. The species are found in the temperate parts of Europe and of Asia. One, *T. gracilis*, is found in the Himalaya Mountains, of which the leaves are eaten by the natives as lettuce is in Europe, but without being blanched. The best-known species however is *T. porrifolius*, or Salsify, which is occasionally cultivated in England but frequently in France and Germany. The English *T. pratensis* may be cultivated for the same purpose. The roots of Salisty are the parts esteemed: they are long and tapering, their flavour mild and sweetish, and are boiled or stewed like carrots. The stalks of year-old plants are sometimes cut in the spring, and when similarly dressed, taste like asparagus.—*Eng Cyc.*

(8265) TRAGOPOGON PORRIFOLIUS, SALSAFY. An excellent vegetable cultivated for its white roots which are mild and sweet flavoured, requires culture similar to carrots, held in high estimation by the French. The young shoots are sometimes used as asparagus, which in flavour they resemble. A native of England. Raised from seed—*Jaffrey.*

(8266) TRAP. This geological term, one of most general use and comprehensive signification, seems to have been originally employed by Bergman and the German and Swedish miners, in the sense of the word 'trappa,' Swedish, or 'treppe,' German, meaning stairs, and the aspect of the rocks now called Trap, in successive terraces on hill sides, is such as often to justify the use of the word. In modern works on topographical geology a very great proportion of the ancient rocks of fusion are familiarly called Trap, not because they have any certain mineral composition, but because, whether granitic, sienitic, prophyritic, or hornblendic, they appear under particular relations of position or geological age. In this sense the term is purely geological, and we have as distinctive designations Eruptive Trap, Contemporaneous Trap, Overlying Trap, Interposed Trap, &c. By other writers the term is restricted so as to leave out such massive and generally deep-seated rocks as granite, or even contracted to the hornblendic and felspatho-hornblendic rocks, which appear as dykes, interposed beds, and overlying masses. It thus appears to be a collective term more convenient than precise. In a geological sense it may be replaced by descriptive words, such as Irruptive,

nterposed, Overlying, &c, and in a mineralogical sense it is advantageously changed for Basalt, Greenstone, Felsparite, Sienite, Serpentine, Diallage Rock, &c.—*Eng. Cyc.*

The greatest outburst of Trap in the world, s perhaps that described by Colonel Sykes, as he Trap formation of the Dekhan, the Editor as (*Barometrical Sections of India* page 4) remarked thus:

Volcanic trap is visible, however, in the bed of the Jumna, near Allahabad, in latitude 25° north, and in the ascent to Mussoorie, by Kuerkoolee, the granite re-appears and it makes a great eruption at the Chur Mountain, above 12,000 feet high, on the southern slopes of the Himalayas. But near Gungotri, at the source of the Ganges, is described to be the grand granitic axis of the Himalayas, and one of the greatest and most magnificent out-bursts of granite in the world. It traverses these mountains in numerous veins—westwards towards the Barenda pass, and eastwards towards Kamet, Nandadevi and Nandakot, upraising the metamorphic schists which form the highest peaks of the snowy range. Lower down, on the southern slopes of those mountains, from 8,000 to 1,500 feet in height, uplifted stratified rocks rest on the gneiss and granite, consisting of hornblende rock and slate, limestone, sandstone, great beds of quartz, clay, mica, chlorite, and talc slates, and lower still, at latitudes of 3,000 to 2,500 feet above the level of the sea, gravel, boulders, marl with coal, recent clays and sandstones from the Sewalik or Sub-Himalayan Mountains. It is in these hills that the extensive fossil remains were discovered, and the low alluvial tract, known as the Terai, is the valley formed by the junction of the Sewalik with the Himalayan inclined rocks. To the south of this the highest parts of Central India occur along the Arravalli Mountains and the Vindhya range and are from 2,000 to 3,000 feet in altitude. There are, here, three inclinations, the one declivity sinking from the Arravalli Mountains towards the valley of the Indus, another falls from the Vindhya range northwards to the Ganges, and the third is southwards to the Nerbudda. Granite is here, also, the upraising rock, it bursts out at Oudeypore, Kaunmore, Banswarrah, and Rajpoor, through the gneiss, and mica, and chlorite slates, limestone and sandstone. It was to the east of this central tract that the first great deposit of coal was found lining both banks of the Damoodah, though it has, since then, been discovered in numerous other provinces of our eastern empire. It is in Central India, also, that the volcanic rocks to any extent, are first observed as they spread east and west from Neemuch in the form of basalt, basaltic greenstone, greenstone and greenstone amygdaloid, and southwards by Oujein and Saugor across the Vindhya, assuming the structure of columnar basalt in their steep descent to the Nerbudda. The trap crosses this river and spreads over all the Aurungabad province down through Candeish and the Concan to Bombay, and southwards to Malwan in latitude 60° north, its southern limits being observed south of Punderpoor, through Bejapoor to the right bank of the Kistnah, in the valleys near Hoonnabad, where it is found between and beneath but never penetrating the laterite hills south and east of Beder and at Maharajahpettah, thirty miles west of Hyderabad. The eastern edge of this vast tract of trap rocks, after crossing the Nerbudda to the south, skirts the town of Nagpore in Berar, passes Nandier and to the westward of the city of Hyderabad to its southern limit, just mentioned. South of this as well as to the eastward, the trap only appears as great dikes, from fifty to a hundred yards broad, which run east and west parallel with each other. These dikes can often be traced for a hundred and fifty miles together, bursting through the granite and other rocks, tearing the highest of the hills asunder and filling the chasms and crevices with its dark and compact structure. In these dikes the elements of the trap rock assume a variety of appearances, greenstone, porphyritic greenstone, basaltic greenstone, hornblende rock, and basalt; they are particularly numerous in Hyderabad, the Balaghaut Ceded Districts, the Carnatic and Mysore almost to the southern Cape of the Peninsula, and, with very rare exceptions, run due east and west.—*Barometrical Sections of India.*

(8267) TRAPA, a genus of Plants belonging to the natural order *Onagraceæ*. The fruit of *Trapa* is furnished with spines, and the species are commonly called Water-Caltrops, from the plants floating on the surface of lakes, and on that of slow-running waters. They are found in the temperate parts of Europe and of Siberia, in Cashmere, India, Cochin China, and China. The genus is characterised by having a 4-parted adherent calyx; petals and stamens 4; ovary 2-celled, with solitary pendulous ovules. The fruit is hard, indehiscent, 1-celled and one seeded. The seed is large and exalbuminous; the two cotyledons very unequal. The floating habit and clustered leaves easily distinguish these plants. The leaves under water are cut into capillary segments, and the petioles are tumid in the middle.—*Eng. Cyc.* The fruit of *Trapa natans* and *T. bispinosa*, is called *singara*; these are sold in all the bazars, and form a considerable part of the food of the inhabitants of Cashmere, where it yields the Government 12,000*l.* of annual revenue. Mr. Moorcroft mentions that Runjeet Sing derived nearly the same share. From 96,000 to 128,000 loads of this nut are yielded annually by the lake of Ooller alone. The nut abounds in fecula, and is armed with two singular projecting spines. In China the kernel is used as an article of food, being roasted or boiled like

the potatoe. (*Royle*, p. 211.)—*O'Shaughnessy, page* 331.

(8268) TRAPA BICORNIS is distinguished from T. bispinosa by its two horns being recurved and very obtuse. It is carefully cultivated in lakes, ponds, and other receptacles of water.

(8269) TRAPA BISPINOSA. TWO-SPINED WATER CALTROPS.

Singhara, HIND.

Much cultivated in tanks during the rains. The seed is much eaten boiled or roasted.—*Genl. Med. Top. p.* 180. *T. bispinosa*, Roxb. ('Corom. Pl.,' ii. 234), has the nut with two opposite, straight, barbed, spinous horns, noticed by Sir W. Jones under the Sanscrit name of Sringata: it is commonly known all over India by the name Singara, both names having reference to its horned appearance. It is also found in the Lake of Cashmere. In India the nuts are sold in all the bazars, as their farinaceous kernels are much esteemed by the Hindoos. A species called by the same name, Singhara, forms a considerable portion of the food of the inhabitants of Cashmere.—*Eng. Cyc.* The Singhara is a water plant, and is cultivated in many of the tanks. There are two kinds,—one with a hard thick shell, and the other with only a soft skin. The former, when ripe, has the appearance of a bullock's head, from two sharp spear-like processes growing from it. The fruit when boiled resembles a chesnut, and is sold in the bazar. The seed is also made into a coarse flour, and cakes are made from it; both fish and tortoise feed upon the thin-shelled kind. In some parts of the country, great care is taken to preserve the seed for planting the following season, which is done by treading it into the beds of tanks and such places. The fruit is fit to be taken at or about the close of the rains.—*Jaffrey.*

(8270) TRAPA NATANS, the European species, is remarkable for its fruit with 4 spines, being of a blackish colour and large size, and its seed, which nearly fills it, being farinaceous, and good to eat, whether raw, roasted, or in soups, and is somewhat like a chestnut in taste. It was known to the Romans by the name Tribulus. Pliny says (lib. xxi., c. 58), "About the rivers Nilus and Strymon the inhabitants gather it for their meat"—*Eng. Cyc.* In China where the water is very shallow, a great part of it is covered with the *Trapa bicornis*, a plant called "*ling*" by the Chinese. It produces a fruit of a very peculiar shape, resembling the head and horns of a bullock, and is highly esteemed in all parts of the empire. Fortune saw three distinct species or varieties, one of which has fruit of a beautiful red colour.—*Fortune, page* 27.

(8271) TRAP TREE, a species of *Artocarpus*, which furnishes the Gutta used as birdlime. The fibre of the bark is used for fishing lines, cordage, and nets at Singapore.—*Royle.*

(8272) TRAVANCORE. At the Madr Exhibition of 1855, the most valuable of tl drug collections in regard to extent, variety ar careful method in which they had been put u was forwarded by E. Waring, Esq., Res dency Surgeon, Travancore. It consisted of 24 specimens, accompanied with a descriptive cat logue of the drugs, and well dried specimens c the plants—the numbers being attached, corres ponding with the vegetable products. This col lection contained *Star Aniseed*, some remarkabl *Galls*, *Wood Aloes*, *Butea Kino*, *True Kinc Mutty Pal*, &c., also the root of a *Smilax* which is reported to be a good substitute for Ja maica sarsaparilla, *Cocculus Indicus*, *Nux Vomica Zedoaria*, &c. *Croton Tiglium*, *Aristolochia Indica Curcuma Montana*. The series was admirably arranged, was a source of much attraction during the Exhibition, and the Jury awarded Mr. Waring a 1st Class Medal.—*M. E. J. R.*

(8273) TRIANTHEMA, a genus of Plants of the natural order *Portulaceæ*, so named from τρεῖς, three, and ἄνθος, a flower, in consequence of the flowers growing in threes, in the axils of the leaves. The species occur as weeds in every part of the plains of India. *T. obcordata*, like the plants of the family, to which it belongs, is employed by the natives of India as a pot-herb; but the nauseous and bitter roots of *T. monogyna* are said by Dr. Ainslie to be employed as a purgative by the inhabitants of Hindustan.—*Eng. Cyc.* Dr. Wight gives Trianthema decandra 296; obcordata 288.

(8274) TRIANTHEMA DECANDRA.

Beeskhopra, DUK. | Sweet punarnavi, SANS.

Root size of small finger, light brown out side, white within, aperient. "Four pagodas weight of bark of the root made into a decoction with 1 lb. water and boiled down to ½ a lb. will open the bowels." (*Ainslie.*)—*O'Sh. p.* 353.

(8275) TRIANTHEMA OBCORDATA, Roxb. formerly his *T. Monogynia*. Ainslie, vol. ii, p. 370.

Nusurjinghi ke jur, HIND. | Sharvalay Kceray, TAM.
Punarnavi. SANS.

The root is found in bazars; colour pale; much wrinkled, bitterish, and rather nauseous to the taste, considered cathartic, and given in powder to the extent of two tea-spoonful twice daily with a little ginger.—*O'Shaughnessy, page* 353. A troublesome weed, springs up every where; the young leaves used as spinach, when somewhat old mixed with others and used as greens. —*Jaffrey.*

(8276) TRIAS OBLONGA. Many of the mango trees have a species of trias growing on them, the smallest plant of the orchid tribe that is seen in the Tenasserim Provinces.—*Mason.*

(8277) TRIBULUS (τρίβολος, three spiked or pointed), a genus of Plants belonging to the

natural order *Rutaceæ*, the fruit of which is armed with prickles. It has a 5-parted calyx ; petals 5, spreading ; stamens 10 ; ovary superior ; capsules 5, gibbous, spiny, many-seeded. The species are found in the south of Europe and the subtropical and tropical parts of the world, with diffuse, often procumbent stems, with solitary white or yellow flowers in the axil of the leaves. *T. terrestris* is sometimes cultivated in the gardens of the West Indies on account of the sweet scent of its flowers. This, as well as *T. cistoides*, has some aperient properties ascribed, and is therefore sometimes used medicinally in the countries where it is indigenous. [TRAPA.]—*Eng. Cyc.*

(8278) TRIBULUS AQUATICUS vegetates at Lahore and Cashmere, and affords a considerable revenue, principally to the Cashmerean government The waternuts are boiled, and so sold, in bazars. A poultice of Trapa natans is recommended to resolve indolent tumors probably Trapa bispinosa would serve the same ends. *Thirty-five years in the East by Dr. Honig. p.* 359.

(8279) TRIBULUS LANUGIONOSUS.—WOOLLY CALTROPS.

Gokooroo, Gokru, HIND.

Very universal over the ground in Rajwarra. The seeds and capsules are highly mucilaginous. —*Gen. Med. Top. p.* 193. It is a common annual flower with yellow flowers and angular thorny fruit.—*Riddell.*

(8280) TRIBULUS TERRESTRIS. SMALL CALTROPS Lin.

Niringie, also Nerringee-keeray, TAM.	Gokoroo, DUK.
Pulléroo, TEL.	Khussukee sagheer, ARAB.
	Soodumstra, SANS.

A procumbent annual weed with thorny capsules, yellow flowers, leaflets are eaten mixed along with others ; seldom used but in time of scarcity.—*Jaffrey. Tribulus terrestris*, is used in Cochin China as an astringent, in the South of Europe as an aperient and diuretic.—*Eng. Cyc.*

(8281) TRICHILIA, a genus of Plants belonging to the natural order *Meliaceæ*. The species are found in the tropical parts of America, and a few in Africa and in Australia. Indian species, *T. spinosa*, is not well known, but the oil of its seeds is said to be a useful remedy in chronic rheumatism and paralytic affections. Several are possessed of active properties. Forskal found the fruit of one species in the mountains of Yemen used as an emetic, and called Jouz-al-Cai, or the Emetic Nut, whence he named it Elcagi, now called *T. emetica*. The seeds bruised are used for washing the hair, as well as an application in itch. *T. trifoliata*, a native of Curacoa, has an unpleasant smell in all parts, and is said to possess active properties. *T. cathartica* is described by Martius as having great bitterness, and as employed in Brazil as a cure for fevers, &c. *T. moschata* is remarkable in Jamaica for the odour of musk which it diffuses all around, on which account it is called Musk-Wood.

(8282) TRICHILIA EMETICA. ELCAJA, is an Arabian Plant, whose fruit is said to possess emetic properties. Botanists call it *Trichilica Emetica*. Forskahl describes it as a large tree, with villous shoots, pinnated leaves, with entire ovalo-oblong pedicellate leaflets, clustered flowers with 5 greenish-yellow petals, 10 monadelphous stamens, and a downy capsular fruit about an inch long, with 3 valves, 3 angles, and 3 cells, having 2 plano convex seeds in each cell. The tree is said to be called Roka, and to be common on the mountains of Yemen. The fruit is sold at Bei el fakih, for mixing with fragrant materials with which the Arab women wash their hair. The fruit called 'Djous el kai' is reputed an emetic. The ripe seeds mixed with Sesamum oil are formed into an ointment as a cure for the itch.—*Eng. Cyc* Common on the mountains of Yemen and in Senegal. The fruit is used by the Arabs under the name *Djous el kai*, and in powder mixed with oil is employed against the itch.—*O'Shaughnessy, page* 245.

(8283) TRICHILIA SPINOSA. Willd. THORNY TRICHILIA,

Caat Koorundoo, TAM.

From the berry of this thorny plant is prepared a warm oil, which the Native Practitioners consider as a valuable application in chronic rheumatism and paralytic affections.—*Ains. Mat. Med. page* 74.

(8284) TRICHODESMA. Royle states that the species of Trichodesma are deemed diuretic, and are supposed cures for snake bites.—*O'Shaughnessy, page* 467.

(8285) TRICHOSANTHES, a genus of plants belonging to the natural order Cucurbitaceæ. Many of the species are edible, and from the long often sinuous-formed fruit they have been named Snake-Gourds ; the Anguina of some botanists. The fruit of many of the species is eaten in India whilst that of others contains a purgative principle.—*Eng. Cyc. page* 1092.

(8286) TRICHOSANTHES AMARA, St. Domingo, seeds bitter and astringent, sometimes emetic.—*O'Sh. p.* 209.

(8287) TRICHOSANTHES ANGUINA, SNAKE GOURD.

Chichinga, Chichuda HIND.	Petala Ular, MALAY.
Pondalungai, TAM.	Purwar, HINDOOS.
Chichonda, DUDK.	Pottola, SANS.
Pottlakaia, TEL.	

This is the produce of a plant of the class Monœcia and order Syngenesia : in shape resembles a long snake and is made into curries and other dishes.—*Ainslie, p.* 243. The Snake Gourd is cultivated by the Natives grown

from a very remote period, been regarded with superstitious reverence.

"The holy trefoils charm"

was supposed to be very "noisome to witches," and to keep those who wore it from the influences of evil spirits of all kinds.. *Trifolium Suffocatum, Trifolium Glomeratum, Trifolium Subterraneum, Trifolium frugiferum*, all are British species.—*Eng. Cyc.*

(8306) TRIGLA, a genus of Acanthopterygious Fishes, popularly known as Gurnards, and belonging to the family *Loricati* in the arrangement of Cuvier. The head of *Trigla* is mailed and angular; the opercle and shoulder-bones armed with spines; the body is scaly; there are two distinct dorsal fins; beneath the pectorals are three detached rays the branchiostegous membrane has seven rays; both jaws and the front of the vomer are armed with fine velvety teeth. The Gurnards are fishes always remarkable for singularity of form, and often for brilliancy of colouring. They derive their popular appellation from a grunting noise which they make when taken out of the water. In the British seas the commonest species are the Gray Gurnard (*Trigla Gurnhardus*), a silvery gray fish more or less clouded with brown and speckled with black; the Red Gurnard (*Trigla Pini*), of a bright rose-red colour; and the Sapphirine Gurnard (*Trigla Hirundo*), a large and handsome fish remarkable for the vivid green and blue hues of the inner surface of its large pectoral fins. The two last are most abundant on the western coast. Several other rarer species are also inhabitants of the British seas. There are some beautiful small species in the Mediterranean where also lives the Flying-Gurnard (Dactylopterus volitans), which differs generically from Trigla in having the fine rays of the pectorals connected by membranes, by means of which the fish is enabled to support itself for some time in the air in the manner of the flying-fish. It is a handsome species, above a foot long. Another Flying-Gurnard (Dactylopterus orientalis) lives in the Indian ocean.—*Eng. Cyc.*

(8307) TRIGONELLA (from Τρεῖς, three and γωνία, an angle) a genus of Plants belonging to the natural order Leguminosæ. It consists of strong scented herbs with trifoliate leaves; the calyx is 5-parted and 5-toothed; the keel of the corolla is obtuse; the stamens are diadelphous; the style is smooth; the fruit a legume; unilocular, compressed, linear and containing six or more seeds. The known species of this genus are upwards of thirty. Only five of them are European, and only one is found in Great Britain.—*Eng. Cyc.*

(8308) TRIGONELLA CORNICULATA, is given by Dr. Wight, in Icones.

(8309) TRIGONELLA FÆNUM-GRÆCUM, The common Fenugreek, has the stem erect simple; the leaflets obovate, slightly toothed; the stipules lanceolate, falcate, entire, the calyx hairy, the teeth awl-shaped, of the length of the tube; the legume is falcate, many seeded; the seeds large, ovate, wrinkled from dots; radicle of cotyledons, prominent. This plant is a native of the south of Europe. Dr. Sibthorp found it in abundance on the shores of Asia Minor. This plant or one of the genus was known to the Greeks under the name, Τῆνοδαρον, and to the Romans as Fænum—Græcum, Greek *Hay and the seed was held in great esteem as a medicine.* The scent of the seeds is very strong and it was undoubtedly this circumstance that recommended them to notice as medicinal agents. —*Eng. Cyc.*

The seed.

Shemlit, Pers.	Helbh, Arab.
Metha and Moothe, Duk. Hind. Sans.	Methee-bhak, Beng.
	Vendee-kerray, Tam.

This plant is a native of the South of Europe and cultivated in Asia Minor and in India.

Mucilage, starch, fixed oil, and colouring matter, constitute the greater part of this seed; it is used by the native practitioners in dysenteric affections, and the Arabs employ it in poultices and fomentations. (*Ainslie.*)—*O'Shaughnessy, p.* 291. It is cultivated for a pot herb, considered very wholesome, imparts a very strong odour and taste to curries, the seeds are said to be slightly tonic.

(8310) TRIOSTEUM HIMALAYANUM. Has been discovered by Dr. Wallich's people at Gossainthan in Nepal.—*O'Shaughnessy, page* 377.

(8311) TRIOSTEUM PERFOLIATUM. United States; called 'fever root,' and 'wild ipecacuan.' "The bark of the root is emetic and purgative, leaves diaphoretic, their efficacy impaired by age; they should be preserved in closely stopped jars, and changed annually."—*Lindley Fl. Med. p.* 445.)

(8312) TRIPHASIA. A genus of Plants belonging to the natural order *Aurantiaceæ* of which the species are found in the East Indies, Cochin-China, and China. The calyx is 3-cleft; petals 3; stamens 6, rarely 5-8; filaments awl-shaped, flat; anthers cordate, oblong; fruit baccate, 1-3-celled; seeds 1 in each cell. The species form thorny shrubs with simple or trifoliate leaves. The fruit of *T. trifoliata* is acid in taste, something like the orange, and is both preserved and eaten as a fruit.—*Eng. Cyc.*

(8313) TRIPHASIA TRIFOLIATA, Three-Leaved Triphasia. The three-leaved triphasia which bears a small berry like [illegible]range in minature, often found in Chinese p[illegible]ves, is raised in European Gardens.—*Mason.*

(8314) TRIPOLI. A Mineral, occurring massive, with a coarse dull earthy fracture. It is meagre and rough to the touch, and yields readily to the nail. Colour, various shades of gray, yellow, and red. It imbibes water, which softens it; when burned it becomes white and is

hardened; it is very difficult of fusion. It was first brought from Tripoli in Africa, but has since been found in France, Italy, and Germany. It is employed in polishing metals, marble, glass, &c. It consists of silica, alumina, and oxide of iron.

(8315) TRIPTOLOMEA. A genus of Plants belonging to the natural order *Fabaceæ*, or *Leguminosæ*, and to the sub-order *Papilionaceæ*. The species are natives of warm climates, and yield the Rose-Wood of commerce.—*Eng. Cyc.*

(8316) *TRITICUM*, a genus of Plants yielding the various kinds of wheat, and belonging to the natural order *Graminaceæ*. It derives its name, according to Varro, from "tritum," ground or rubbed, because the fruit in its preparation as a food for man undergoes the process of grinding or trituration. The various kinds of wheat have been known from a very early period, and mention is made of wheat as a food in the earliest records of the history of man. Both the Egyptians and Jews made use of wheat as an article of diet, and this food is early mentioned in the Bible. It was also used by the Greeks and Romans, and Theophrastus and Pliny make frequent mention of it. On account of the early cultivation of many of the kinds of wheat as articles of diet, it is impossible to tell where the most common species are really indigenous. All the species of *Triticum* are however found most abundantly in temperate climates, and there take the place of the foods used in the hotter parts of the world. Wheat is in northern climates what rice and maize are in warmer ones. The part of the plant of *Triticum* which yields so large a proportion of the food of man is the fruit, seeds, or grain. This fruit, although small in itself, generally forms a large proportion of the plant. When the fruit is ground, the testa, or seed-coat, is separated from what is called the flour. This flour consists of the powdered albumen and embryo of the seeds. The proximate vegetable principles which this flour contains are starch and gluten. The starch is a highly carbonized vegetable principle, whilst the gluten is characterised by possessing nitrogen. Foods that contain carbonaceous matters are fattening, whilst those that contain nitrogen are strengthening. It is thus that wheat-flour has become to be the staple article of diet of the finest races of men in the world. The other cereal grasses contain the same principles, but the gluten or azotised principle is not in so large a quantity as in wheat, as the following analysis of 100 parts of the organic matter of wheat, rice, and barley will show:—

	Starch.	Gluten.
Wheat... ...	70.00	23.00
Rice...	85.07	3.60
Barley... ...	79.00	16.00

The starch is often separated from the gluten and used for various purposes in domestic economy. [STARCH.] Gluten is identical with Fibrine, and is a form of Protein. [PROTEIN.] The straw of wheat, and the chaff, or the culm, and the flowers, also contains 79 per cent. of organic matter. This consists principally of unazotised vegetable matter, and may therefore be used as an article of diet for cattle. The culms of wheat are also used for the purpose of making plait from which straw hats and bonnets are made, a manufacture of considerable importance in some parts of Europe. *The genus Triticum* is known by possessing solitary spikelets, with the glumes 2-valved and many-flowered; the valves carinate, acute, or mucronate; the paleæ 2-valved; the valves lanceolate, the external one acuminate, the internal one bifid at the extremity. The genus consists of about 40 species; of these 16 are European, and only 5 are natives of Britain. The species are divided into two groups—the *Cerealia*, yielding edible fruits; and the *Agropyra*, which are merely grasses. The latter group is by some writers, as Beauvois and Lindley, made into a distinct genus. It includes all the species that are natives of Great Britain. The *Cerealia* are known by their spikelets being more or less ventricose and turgid, and the valves are ovate or oblong. These are again divided into the *Frumenta*, or True Wheats, in which the seeds fall out from the chaff; and the *Speltæ*, or Spelts, in which the seeds remain attached to the chaff. The most important species belonging to the former division are the following:—

(8317) TRITICUM ÆSTIVUM. WHEAT.

Godumbay arisee, TAM. | Gawn, GUZ.
Gehoon, DUK. | Godoomaloo, TEL.
Gendoom, MALAY.

(8318) TRITICUM DURUM. True Beard-Wheat, has the prominent carinæ of the last wheat, with the valves ventricose, oblong, and three times longer than broad. It is a native of Switzerland. It has several varieties, all of which produce summer wheats, and are better known in Italy, Sicily, and Spain than in this country.

(8319) TRITICUM JUNCEUM, Sea Rushy Wheat-Grass, *T. caninum*, Bearded Wheat-Grass, and *T. cristatum*, Crested Wheat-Grass, are other species of the *Agropyra*. (Metzger, *Die Getreidearten und Wiesengraser in Botanischer und Ökonomischer Hinsicht*, 1841; Koch, *Flora Germanica*; *Cyclopædia of Plants*; Sinclair, *Hortus Woburnensis*; Pouchet, *Traite de Botanique*; Babington *Manual.*)—*Eng. Cyc.*

(8320) TRITICUM POLONICUM, Polish Wheat, has the spike irregularly 4-cornered or compressed; the spikelets 3-flowered; the valves subventricose, oblongo-lanceolate, herbaceous, with many nerves. It is found native in some parts of Europe, not however in the country which gives it its name. In cultivation it yields summer wheats, which are adapted for warmer climates than Great Britain.

The Spelts include the following species:—*T. spelta*, Spelt-Wheat; *T. dicoccum*, Two-Grained, or Rice-Wheat; and *T. monococcum*, One Grained Wheat.

The *Agropyra* do not possess ventricose-turgid spikelets, and the valves are lanceolate or linear-oblong. This division includes the wheat-grasses, some of which are only known as troublesome weeds. The most remarkable instance of this is *T. repens*, Creeping Wheat-Grass Couch-Grass, or Spear Grass. The difficulty of getting rid of its creeping underground stem, the smallest portion of which if left in the ground sends up fresh buds, is the cause of this plant being so great a pest to the farmer. The *T. maritimum*, a native of sea-coasts, seems to be only a variety of this plant.

(8321) TRITICUM SATIVUM. WHEAT.

Gahoon Gioon, Gom, BENG. HIND.

This is now cultivated, with success in many parts of our Indian dominions.—*Ainslie*. Two sorts of this are grown in Mysore. They are called Hot-te Godhi and Jeve Godhi. The difference between them is that the latter is covered with husks like paddy; and the former is without them. Jeve Godhi is only grown in the lands bordering on the Pennar, and the gardens in the Bangalore Division. The Hot-te Godhi is largely cultivated in dry lands in the Chittledroog Division, and the vicinity of Hurrihur. This is the wheat usually employed for making European bread. It is exported to the Neilgherries, and its usual price at Bangalore is a Rupee for ? seers.

(8322) TRITICUM TURGIDUM, Turgid, Cone, or English Wheat, is known principally by its prominent carinæ. About 10 varieties of this species are known to agriculturists, half of which are summer and half winter wheats. Of these the Clock, Great or Revel Wheat, and the Russian, or Blue English Wheat, are the best.

(8323) TRITICUM VULGARE, Common Wheat, has a 4-cornered imbricated spike with 4-flowered spikelets, the valves ventricose, ovate, truncate, mucronate, compressed under the apex, the nerve somewhat prominent. This species includes the *T. æstivum* and *T. hybernum* of many botanists. They appear however to be only varieties of this species, differing in their periods of growth. The native country of this species is not well ascertained: it has been found wild in some districts of Persia, also of Siberia, apparently removed from the influence of cultivation. The *T. hybernum* is the Lammas, or Winter-Wheat, and embraces by far the greater number of varieties which are cultivated as the food of man. The wheats known in Great Britain and on the Continent as Fox, Kentish, Talavera, Bohemian or Velvet, Red, White, and Red-Eared Bearded Wheats, are varieties of *T. hybernum*.

(8324) TRIUMFETTA ANGULATA. See Wight's Icones p. 320.

(8325) TRIUMFETTA LOBATA.

Phetwoon, BURM.

This *Fibrous Plant* is annual and grows to a height of five or six feet, presents a small yellow flower in December, consisting of five petals, and in February presents a small round capsule covered with stiff bristles.—*McClelland*.

(8326) TROCHIDÆ, a family of Turbinated Gasteropodous *Mollusca*. The genus *Trochus* of Linnæus was placed by him between *Murex* and *Turbo*, in his last edition of the 'Systema Naturæ,' and comprized 26 species. M. De Blainville observes that all the species of this family are phytiphagous, marine, and live upon the rocks on the shore of the sea. He divides the group into *Solarium* and *Trochus*.

(8327) *Solarium*.—Animal unknown. Shell orbicular, rolled up (enroulee) nearly on the same plane, or planorbic; spire very much lowered (surbaissee); a large conic umbilicus, with its edges denticulated or not at the entrance; aperture not modified by the last whorl of the spire, which is entirely flat; no columella. Operculum unknown (Blainville). The number of recent species recorded by Woodward is 25, and of fossil 56. The species of this genus hitherto found have occurred in the seas of the warmer climates. The Mediterranean, the Indian Ocean, the coasts of Tranquebar, the South Seas, and those of Australia are the localities recorded by Lamarck. The specimens have been found near the shore—it seems to be a littoral genus—on rocks and weeds.

(8328) *Solarium perspecticum*. Shell orbiculate-conoid, longitudinally-striated, whitish-yellow, with articulated belts of white and brown or chestnut near the sutures; the notches of the umbilicus small. (Lamarck.) Animal with a large foot widened in front, and having a very strongly developed marginal furrow, yellowish on the sides, marked with a black stria above. The head presenting a large escutcheon. The tentacles short, stout, and marked with two longitudinal black bands on the sides. At their base are placed the eyes on very short pedicles. The branchial cavity appeared to be partially divided in two, lengthwise, by a sort of fold. The intestine describes two rather considerable circumvolutions before it passes the liver. Operculum large, oval, membranous, and strongly but sparingly spiral at one of its extremities. The colour is yellowish like that of the whole animal. Messrs. Quoy and Gaimard, who have given this description of the animal in the 'Zoologie' of the Astrolabe, state that they know nothing of the habits of the species, which was brought to them nearly dead by a Malay of Amboyna.

(8329) *Trochus*.—Animal well known, and as characterised above. Shell thick, ordinarily nacreous, trochoid, with the spire sometimes

lowered (surbaissee), and at others rather lofty (elancee) and pointed at the summit; trenchant or carinated on its circumference, umbilicated or not; aperture depressed, angular or subangular, with disunited borders, the right lip trenchant; the columella bent, twisted, and often projecting in front. The number of recent species of *Trochus* given by Woodward is 150, and fossil forms 360. The fossil forms are found in the Devonian rocks.

(8330) *Trochus obeliscus*. Shell conico-pyramidal, nodulous and granulous, coloured with green and white; the whorls tuberculato-nodose, and girt with many granose circles; the last whorl, as it were, removed or taken away (dempto); the lower surface planulate; the lip sinuated at the base. Lamarck gives the Indian Ocean as the habitat of his species. Messrs. Quoy and Gaimard, who captured the individual above described at Tonga, remark that in colour it is *T. obeliscus*, but that it tends to *T. acutus* in its suddenly-pointed spire. Dr. J. E. Gray makes the *Trochidæ* the second family of his *Podophthalma*, the first section of the order *Phytophaga* in his arrangement. The *Trochidæ* are immediately preceded by the *Turbinidæ* and followed by the *Stomatellidæ*. Dr. Gray's *Trochidæ* consist of the genera *Pyramis*, *Cardinalia*, *Trochus*, *Polydonta*, *Ciangulus*, *Phorcus* (*Phorus*?) *Ziziphinus*, *Cunthiridus* (*Cuntharidus*?) *Thalotia*, *Monodonta*, *Gibbium*, *Gibbula*, *Rotella*, *Livona*, *Talopia*, *Cumitia*, and *Delphinula*. ('Synopsis Brit Mus., 1840.) In Woodward's 'Manual,' *Solarium* is referred to *Chitonidæ*, and *Trochus* to *Turbinidæ*.—*Eng. Cyc.*

(8331) TROGON (APALODERMA) REINWARDTII, Temm., is a native of Java and Sumatra, where it was discovered by Professor Reinwardt, whose name it bears. This, Mr. Gould observes, is a scarce bird in cabinets of natural history; and he attributes its rarity to its being very local, remarking that the vast collections brought to this country by Sir T. Stamford Raffles and Dr. Horsfield did not contain an example.—*Eng. Cyc.*

(8332) TROGONIDÆ, a family of Insessorial or Perching Birds, remarkable for the beauty of their plumage. Mr. Gould's splendid 'Monograph of the Trogonidæ' was finished in 1838; and in the 'Introduction' to that work he observes, that those birds, as their general structure and their habits sufficiently indicate, belong to the fissirostral tribe of the *Insessores*. "Greatly insectivorous," says Mr. Gould, "they seize the flitting insect on the wing, which their wide gape enables them to do with facility; while their feeble tarsi and feet are such as to qualify them merely for resting on the branches, as a post of observation whence to mark their prey as it passes, and to which, having given chase, to return. As in all other groups, however, we shall find modifications of the type constituting the ground of generic or subgeneric divisions... If not strictly elegant in form, the Trogons in the brilliancy of their plumage are surpassed only by the *Trochilidæ*: their splendour amply compensates for every other defect. Denizens of the intertropical regions of the Old and New World, they shroud their glories in the deep and gloomy recesses of the forest, avoiding the light of day and the observation of man: dazzled by the brightness of the meridional sun, morning and evening twilight is the season of their activity." The Trogons are described as solitary birds, extremely jealous of their freedom, never frequenting inhabited or open tracts, and delighting in the silence of deserts. "The interior of the thickest forests is their chosen abode for the entire year. They are sometimes seen on the summit of trees; but in general they prefer the centre, where they remain a portion of the day without descending to the ground, or even to the lower branches. Here they lie in ambush for the insects which pass within reach, and seize them with address and dexterity. Their flight is lively, short, vertical, and undulating. Though they thus conceal themselves in the thick foliage, it is not through distrust; for when they are in an open space, they may be approached so nearly as to be struck. They are rarely heard to utter any cries, except during the season of reproduction, and then their voice is strong, sonorous, monotonous, and melancholy. They have many cries, from the sound of one of which their name is derived. All those whose habits are known nestle in the hollows of worm-eaten trees, which they enlarge with their bills so as to form a comfortable and roomy residence. The number of eggs is from two to four and the young are born totally naked, but their feathers begin to start two or three days after their birth. The occupation of the male during incubation consists in watching for the safety of his companion, bringing her food, and amusing her with a song, which, though we should call it insipid, is to her without doubt the expression of sensibility. Some of the Couroucous express the syllable 'pio,' repeated many times in succession with a powerful yet plaintive tone. Their accent almost reminds one of the wailings of a child who has lost its way, and it is thus that they cry to each other amidst the silence of the forests. As soon as the young are able to provide for themselves, they separate from their parents to enjoy that solitude and isolation which appear to constitute the supreme happiness of the species. Their aliments are composed of larvæ, small worms, caterpillars, coleoptera, and berries, which they swallow entire. The male, at various ages, the female, and the young differ in their plumage, which has given rise to the institution of more species than are really in existence." (Griffiths, 'Cuvier's Animal Kingdom.') With regard to the geographical distribution

of the Trogons, Mr. Gould says that they appear, on general survey, to be divided between America, including its islands, and the islands of the Indian Archipelago; two or three species only having yet been discovered on the continent of India, and those principally inhabiting the countries bordering the Indian Seas. The great nurseries for these birds in the Old World are, he observes, the islands of Ceylon, Sumatra, Java, Borneo, &c.; while over the whole continent of Africa only a single species has yet been discovered. The total number of species known when Mr. Gould finished his monograph was 34, 23 of which are inhabitants of America and its islands, 10 of the Indian Islands and India and one of Africa; but he states in the preface that he has reason to believe that many will yet be discovered, both in the Old and New World particularly in those remote regions which civilised man has seldom, if ever, visited.—*Eng. Cyc.*

(8333) TROLLIUS, a genus of Plants belonging to the natural order *Ranunculaceæ*. It has a calyx of 5 or more coloured sepals, 5 or more small petals, which are linear, with an obscure depression above the contracted base; the capsules, or follicles, are numerous, and filled with obovate-angular polished seeds. The species are perennial; they are not numerous, and are found generally in the temperate parts of the world.

(8334) TROLLIUS EUROPÆUS, European or Mountain Globe-Flower, has 10 to 15 sepals involuted in the form of a globe; the petals the same length as the sepals, or a little shorter; the leaves 5-parted with the divisions cut and serrated. The plant is diffused throughout the north of Europe, in moist pastures in sub-alpine districts. It is abundant in the whole chain of the Alps, and is also found in mountainous districts in the north of England, Ireland, Wales, and Scotland. The flowers are large and handsome: in Scotland they are called Luckengowans, or Cabbage Daisies. In some parts of England as well as on the continent of Europe, they are gathered on festive occasions for making garlands and decorating the cottages of the peasantry. There are two species, *T. Asiaticus* and *T. Americanus*, which are found in Asia and America,

(8335) TROPÆOLACEÆ, *Indian Cresses*, a natural order of Plants. The plants belonging to this order are smooth, tender, and herbaceous with diffuse or twining stems, and alternate petiolate peltate leaves; the flowers are irregular, axillary, and solitary; the calyx has 5 sepals, the upper one with a long distinct spur; the petals are unequal and irregular the two upper are sessile and remote, arising from the throat of the calyx, the three lower stalked, and smaller, sometimes abortive; the stamens, 8 in number, perigynous, the filaments distinct; the anthers minute, erect, 2-celled, dehiscing longitudinally: ovary consisting of 3 carpels; style 1, stigmas 3, acute; ovules solitary, pendulous; the fruit is indehiscent, separating into three pieces which surround a common axis; the seeds are large, having no albumen, and filled with the embryo, the cotyledons of which are thick and consolidated together into a single body; the radicle lies within the projections of the cotyledons. The species of this order differ from *Balsaminaceæ* in their more regular flowers, and in the juicy fruit not having a bony lining to the cells. They resemble *Geraniaceæ* in the possession of a spur. The genera belonging to this order are *Tropæolum*, *Magallana*, and *Chymocarpus*, all of them natives of South America.

(8336) TROPÆOLUM. This flower is very common—the colours are yellow, light yellow, and deep orange; and as the plant is a creeper, it is well adapted for trellis work. The leaves are eaten with sallad, and the seed when green sometimes pickled. Is propagated by slips, or seeds, in any good soil.—*Riddell.* Tropæolum is (from τρόπαιον), a genus of Plants, the type of the order *Tropæolaceæ*. It has a 5-parted calyx the upper lobe being furnished with a spur; 5 petals, unequal, the three lower ones smallest or altogether absent; 8 stamens, free from the base; 3 carpels, some what erose, kidney-shaped indehiscent, furrowed, roundish; the seed large filling the cell. The species of this genus, which derives its name from the petiole being inserted into the centre of the leaf, giving it the form of a buckler, are all of them inhabitants of South America. They are all climbing plants.—*Eng. Cyc.*

(8337) TROPÆOLUM ADUNCUM, Hooked Indian Cress or Nasturtium, is a native of both Mexico and Peru.

(8338) TROPÆOLUM AZUREUM, Purple Indian Cress or Nasturtium, has the leaves 5-parted, with linear unequal laciniæ; equal entire bilobed petals, much longer than the calyx, with a spur shorter than the petals. This plant was discovered by Mr. Miers, and first described in his 'Travels in Chili' and had been previously seen by Mr. Bridges on the Carycam de Quillota, 4000 feet above the surface of the sea. It is remarkable for its blue flowers.—*—Eng. Cyc.*

(8339) TROPÆOLUM MAJUS. Great Indian Cress or Nasturtium, has the leaves peltate, nerved, orbicular, somewhat 5-lobed; nerves mucronate; petals obtuse. This plant is also a native of Peru. It was introduced into England, according to Peter Collinson, says Smith, in the year 1616. It has much larger flowers than the preceding, but having the same colour and general appearance. The fruit of this, when green, like the preceding species, is made into a pickle, for which its warm biting character renders it very fit.—*Eng. Cyc.*

(8340) TROPÆOLUM MINUS, Small Indian Cress or Nasturtium has peltate-nerved orbicular leaves, the nerves mucronate at the apex; the petals each ending in a bristle-like point. This plant is a native of Peru. It is one of the species of the genus that was earliest brought to Europe, and was cultivated in England by Gerarde. It has deep yellow flowers streaked with orange and red. The whole plant possesses an acrid flavour and odour which are peculiar to this order and the *Cruciferæ*. It is on this account that all the species of *Tropæolum* have obtained the common name of *Nasturtium*, which is the name of a genus of plants belonging to *Cruciferæ*. The fruit of this plant is pickled, and eaten in the same way as capers; the flowers and leaves may also be eaten as a salad. There is a variety in gardens with double flowers.—*Eng. Cyc.*

(8341) TROPÆOLUM PENTAPHYLLUM, Five-Leaved Indian Cress or Nasturtium, has 5 leaflets which are ovate or ovato-lanceolate, entire, and stalked; only 2 petals, which are sessile, acute, quite entire, shorter than the calyx. It is a native of Buenos Ayres, Monte Video, and Brazil in the province of Cisplatine.—*Eng. Cyc.*

(8342) TROPÆOLUM TRICOLORUM, the Tricolor Indian Cress or Nasturtium, is a native of Chili at Coquimbo. It has a calyx of an orange-scarlet colour, and tipped with black, whilst the petals are yellow. It is the most showy and handsome of the species.—*Eng. Cyc.*

(8343) TROPÆUM, Mr. Sowerby's name for a genus of *Ammonites*, apparently identical with *Crioceratites*, and consisting of those species which have their whorls disconnected, such as *Crioceratites Duvallii*.

(8344) TROPHIS, (from τρέφω,) a small genus of Plants belonging to the natural order *Artocarpeæ*. The species are found both in the East and West Indies. The flowers are dioecious; spike lax, axillary; male, perigone 3 leaved, spreading, stamens 4; female, perigone 3-leaved; ovary ovate, 1-celled, 1-seeded; stigma bifid. The species form milky trees with alternate entire leaves.

(8345) TROPHIS AMERICANA, the Ramoon-tree, is 23 feet high, and a native of the West Indin Islands, where the leaves and twigs make a wholesome fodder for cattle in the inland woody parts of Jamaica. The drupes are about the size of grapes, and have a pleasant flavour.

(8346) TROPHIS ASPERA, is a native of and common in all parts of India; sometimes shrubby, but it also grows into a small crooked tree. Its leaves are oblong, unequally serrate, and so scabrous as to be employed by the natives in polishing ivory. The berries are greedily eaten by birds.

(8347) TROPHIS SPINOSA, another Indian species, less common, is thorny; leaves oblong lanceolate, grossly serrate towards the apex, smooth; female calyx twice the length of the ovary, and eaten by the natives in their curries.—*Eng. Cyc.*

(8348) TROWSER CHECK, is chiefly manufactured in the district of Cuddalore and in the out skirts of Madras, they are of various kinds.

(8349) TRUBU. This is the name of a fish, the scientific appellation of which Crawfurd had not ascertained, but of which the salted and dried roes form a very considerable article of trade in the western parts of the Malayan Archipelago. It seems to be local, and like salmon and some other fish, to frequent rivers for the purpose of spawning. Its favourite resort is the muddy eastern coast of Sumatra, and more especially the narrow strait which divides Bancalis and some other low islands from the main land, and into which the river of Siak disembogues. At a place called Bukit-batu (rock-hill), a considerable fishery of the trubu is carried on, which is thus noticed by Mr. Anderson:—"The river of Bukit-batu is a very small stream, close to the mouth of which stands the town of Bukit-batu, which is a place of considerable trade the grand staple being roes of the trobo-fish, or telur-trobo (trubu, roes, or eggs), as they are called. There there is a very extensive fishery, and three or four hundred boats, with two and three men in each, often go out at a time to the fishery, which is outside the straits of Tanjung-Jati." (Teak tree promontory.)—Anderson's mission, p. 335. The fishery of the trubu is of immemorial antiquity, and is referred to by De Barros as existing on the arrival of the Portuguese just as it does at present." "The rivers" (of Sumatra), says he "contain a great variety of fish, and in some of them, such as that of Siaca (Siak) they catch small shads (saves) of which the people of the country use the roes only, and of these they have a greater abundance than we have of the fish themselves." Decade 3, Book 5, chap. 1.—*Crawfurd Dictionary, page* 440.

(8350) TRUFFLE. A delicate fungus (*Tuber Cibarium*), esteemed a great deli-cacy. They are procured in France, Italy and other countries.—*Faulkner.*

(8351) TRUMPET FLOWER. VIDE BIGNONIA.

(8352) TUBERACEÆ, a section of the sub-order *Gasteromycetes*, of the natural order *Fungi*. It is known by its sporangia being membranaceous, and scattered on a serpentine vein-like hymenium, and included in a concrete uterus. The sporidia are at first pulpy. This section includes the genus *Tuber*, the Common Truffle, and *Rhizopogon*, the White Truffle. The species of these genera are not numerous, and are found very generally diffused throughout the temperate parts of the world, and growing buried beneath the soil. The genus *Tuber* has a closed uterus

marbled internally with veins; the sporangia are pedicillate, and confined to the veins.—*Eng. Cyc.*

(8353) TUBER CIBARIUM, the Common Truffle, is known by its surface being warty and of a black colour. It is found buried in the soil of woods, especially beech-woods, sometimes at the depth of ten or twelve inches or more. It is a native of Europe, and is also found in Japan and the East Indies. It grows abundantly in some parts of England. This is one of the few species of the natural order *Fungi* that is used as an article of diet. For this purpose they appear to have been used by the Greeks and Romans; the latter especially considered them a delicacy. It may be however a question as to whether the Roman 'tuber' is really the common truffle. There can, however, be no doubt that it had a similar form, origin, and use. The truffle when gathered for eating is about the size of a large walnut, and has a very peculiar smell. The flavour is not remarkable, and resembles in some measure that of the mushroom and morel.—*Eng. Cyc.*

(8354) TUBER MOSCHATUM, Musk-Scented Truffle, has a roundish smooth blackish appearance, and is a much rarer plant than the last. It has been found in Great Britain, and is characterised by the musky odour which it gives out.

The genus *Rhizopogon* has a sessile uterus, bursting irregularly, and marbled internally with anastomosing veins and sessile sporangia. The *R. albus* of Bulliard is the *Tuber albus* of older botanists, and is called White Truffle, and by some writers, from its Greek appellation, Root-Beard.—*Eng. Cyc.*

(8355) TUBICOLIDÆ (Lamarck), a family of Conchiferous *Mollusca*. Lamarck observes that the *Tubicolidæ* are undoubtedly conchifers, but of such great singularity, that some among them have been referred to other classes by modern naturalists; and he adds that it is singular to find a bivalve shell inclosed in a testaceous tube, and still more singular to see it incrusted in or built into the wall of that tube, and concurring to complete such wall. The singularity of the *Tubicolidæ*, as well as that of the *Pholades* has, he further remarks, caused a misconception of the real essentials of the shells which belong to the family, namely, two similar, equal, regular valves, articulated by a hinge. As in the shells of the *Tubicolidæ* there are some which have accessory pieces apart from these valves; so, as one sees in the *Pholades*, some naturalists have taken them for multivalve shells, a notion which has given rise to very odd associations. The animals of this family are borers, burrowing in stone, wood, and even in thick shells; but some, nevertheless, live in the sand.

The following six genera are arranged by Lamarck under this family:—*Aspergillum, Clavagella, Fistulana, Septaria, Teredina*, and *Teredo*.

(8356) *Aspergillum Clavagella* and *A. Fistulana*.

(8357) *Aspergillum Javanum* is a native of the East India Ocean. The animal of *A. vaginiferum* has been found by M. Ruppel, and it appears to bear much analogy to that of *Pholas*. It is a native of the Red Sea.

(8358) *Fistulana*. This genus has the sheath tubular, most frequently testaceous, more convex and closed posteriorly, attenuated towards its anterior extremity, open at its summit, containing a free and bivalve shell; the valves equal, and gaping when they are closed. Animal having at its anterior part two cyathiferous calamules. (Lam.) *Fistulana clava*, is a native of the East Indian seas. The *Fistulanæ* inhabiting a free tube have been found in sands or hard mud with the small end of the tube uppermost.—*Eng. Cyc.*

(8359) TUBULIBRANCHIATA, an order of Gasteropodous *Mollusca*, consists of the genera *Vermetus, Magilus*, and *Siliquaria*.

(8360) *Vermetus* (Adanson), has a tubular shell, the whorls of which, in the early age of the animal, form a kind of spire, but afterwards are prolonged into a tube more or less twisted or bent, like those of the tubes of *Serpulæ*.

(8361) *Vermeti* have been found at depths varying from near the surface to twelve fathoms, in sponges, under stones, on shells, in coral-sand, and sand.

(8362) *Siliquaria* (Brug,) resembling *Vermetus* in the head, in the position of the operculum, and in the tubular irregular shell, which has, however, throughout its length a slit which follows all its windings, and which corresponds with a similar slit in the mantle which covers the branchial cavity. Along the whole length of this slit adheres a branchial comb, composed of a great quantity of foliations, distinct and, as it were, tubular. Linnæus placed them with the *Serpulæ*, and Cuvier observes that in these later times some have believed that they belong to the class of Annelids. Thus Lamarck supposed *Siliquaria* as well as *Vermilia* to be approximated to the *Serpulæ*.

Seven recent and ten fossil species have been recorded.

(8363) *Siliquaria muricata*, a native of the Indian Seas, may be taken as an example.—*Eng. Cyc.*

(8364) TUGAR. TIRAIMUN; UPAOON TABERNÆMONTANA CORONARIA. The sweet-scented wood and root are imported from Delhie and Kotah considered and used as a stimulant; but chiefly used in scents.—*Gen. Med. Top. p.* 152.

(8365) TUKHM-GANDAH. A seed from Delhie, considered astringent.—*Gen. Med. Top. p.* 152.

(8366) TUKM-KURPUS. Seed of a plant from Delhie, astringent, and stimulating, given in flatulent indigestion, two Rupees a seer,—*Gen. Med.-Top. p.* 159.

(8367) TUNG OIL TREE, of China. "This," said he, "is the Tung-oil tree, which yields a valuable oil, much used by carpenters; this is the Lew-san tree (Cryptomeria Japonica), valued for its ornamental appearance and fine timber." —*Res. among the Chi. p.* 184.

(8368) TUNICATA, a family of Acephaloid mollusca. Forbes and Hanley, in their 'History of British Mollusca,' describe three genera of *Tunicata*:—

1. *Ascidia*,—Body sessile, covered with a coriaceous or gelatinous tunic; branchial orifice 8-lobed and 6-lobed. There are 16 species of this genus found on the British coasts.

2. *Molgula*, E. Forbes.—Body more or less globular, attached or free, with a membranous tunic, usally invested with extraneous matter; orifices on very contractile and naked tubes; the branchial 6-lobed, Two species are British.

3. *Cynthia* of which there are 13 species.—*Eng. Cyc.*

(8369) TUPAIA, Sir T. Stamford Raffles's name for a genus of *Mammalia* which Dr. Horsfield places among Cuvier's Insectivorous Carnassiers, the *Feræ* of Linnæus, and the *Fulculata* of Illiger. It has the following generic characters:—Head oblong depressed. Snout long, equally attenuated; nostrils lateral, semilunar. Eyes very large, and rather prominent. Ears large and oblong. Body cylindrical, covered with close fur and soft hairs. Tail longer than the body, linear, compressed. Feet plantigrade and pentadactyle, the soles naked the toes compressed and the claws falcular. In the Malayan language the name of *Tupai* is a general term for various small animals which have the external form and agility of the squirrel.

(8370) TUPAIA JAVANICA; Bangsring, or Siusring, of the Javanese. Dr. Horsfield says that this species has the appearance of a sprightly animal, a character with which its manners, as far as they are known, perfectly agree. "Its body," says Dr. Horsfield," is graceful and handsomely formed, and its limbs are slender and fitted for great agility: its size and exterior habits so nearly resemble the individuals of that family which Illiger has denominated *Animalia Agilia*, that, on a superficial view, it has been considered to belong to it. Our animal agrees with one of the most numerous sections of this family, the Squirrels, in the form of the body, the proportional length of the extremities, the breadth of the tail, and the faculty of carrying it on the back as a plume; but the succeeding details will show that its structure and organisation are essentially different."

Dental Formula —Incisors, $\frac{2}{6}$; Canines, $\frac{2}{2}$; Molars $\frac{14}{12}$.

Dr Horsfield describes the claws as sharp, compressed, and curved; and, in comparison with those of *Sorex* and several other genera of this order, of considerable strength: they are, he observes, individually supported by a small protuberance similar to that which is found in the *Tarsi*; and the construction of the claws in the Bangsring is adapted, he remarks, to the same food and habits as those of the other species of *Tupaia*. The linear tail, of the same length as the body, is compressed, with the hairs spreading far on each side; but, adds Dr. Horsfield, it is less full and ornamental than in the Squirrel. The fur of the Bangsring is close, silky, and delicate, with a few longer, more rigid, and darker-colored hairs dispersed among the long and straight hairs closely applied to the skin, with which the back, neck, sides, tail and extremities above are furnished. The upper parts are brown slightly diversified with gray of different shades; the lower parts dirty white, with a slight tint of grayish: the tail agrees with the upper parts; and the scapular line, is nearly an inch long.

The Bangsring fell under Dr. Horsfield's observation during an early period of his researches in Java. In traversing the province of Blambangan, in 1806, he discovered it in the extensive forests which almost entirely cover the eastern extremity of the island; and he thinks that its range, though it may not be confined exclusively to that province, is extremely limited.

Sir Stamford Raffles states that a tame *Tupaia ferruginea* [illegible] suffered to go about at perfect liberty, ranged in freedom over the whole house, and never failed to present himself on the breakfast and dinner table, where he partook of fruit and milk.—*Eng. Cyc.*

(8371) TURANJ-BIJ, Turanjabeen, Saccharine grain imported from Bombay used in purges; one seer costs ten rupees.—*Genl. Med. Top. p.* 153.

(8372) TURBANDS, COTTON. The principal site of this manufacture formerly was the Town of Arnee in the Chingulput district, but they are now made at Oopada in the Rajahmundry district and also in the district of Madras.

(8373) TURBANDS, SILK. The principal site of the manufacture of these silk Turbands was Seringapatam in Mysore. They are of a pink colour and are sold at from Rupees 10 to 25 Rupees each.

(8374) TURBINIDÆ, a family of Gasteropodous *Mollusca*. Linnæus places his genus *Turbo*, in his last edition of the 'Systema Naturæ', between *Trochus* and *Helix*, with the following characters:—Animal a *Limax*, or Slug. Shell univalve, spiral solid. Aperture narrowed, orbiculate, entire. In Woodward's 'Manual of the Mollusca' the

Turbinidæ are thus defined ;—Shell spiral, turbinated or pyramidal, nacreous inside; operculum calcareous and paucispiral, or horny and multispirial. Animal with a short muzzle; eyes pedunculated at the outer bases of the long and slender tentacles; head and sides ornamented with fringed lobes and tentacular filaments (cirri); branchial plume single; lingual ribbon long and linear, chiefly contained in the visceral cavity; median teeth broad; laterals 5; denticulated; uncini very numerous (sometimes nearly 100), slender, with hooked points. The shells of nearly all the *Turbinidæ* are brilliantly pearly, when the epidermis and outer layer of shell are removed. Many of them are used in this state for ornamental purposes. The following genera are embraced in the family thus defined.—*Eng. Cyc.*

(8375) *Turbo.* Shell turbinated, solid; whorls convex, often grooved or turberculated; aperture large, rounded, slightly produced in front; operculum shelly and solid, callous outside and smooth, or variously grooved and mammillated, internally horny and paucispiral. In *T. sarmaticus* the exterior of the operculum is botryoidal, like some of the tufaceous deposits of petrifying wells. Animal with pectinated headlobes. There are 60 recent species which are found principally in tropical seas. The fossil species amount to 360, found in the Lower Silurian rocks.

(8376) *Phasianella.*—Shell elongated, polished, richly coloured; whorls convex; aperture oval, not pearly; inner lip callous, outer thin; operculum shelly, callous outside, subspiral inside.

The *Phasianellæ* are always smooth. This polish, and still more their continual movements, prevent them from being covered with *Serpulæ*, *Flustræ*, and other parasites which encrust sluggish shells. This agitation makes it difficult for them to preserve the contour of their aperture perfect, for it is very frail. Woodward records 25 recent and 70 fossil species.

(8377) *Imperator* has the shell trochiform, thick, with a flat or concave base; whorls keeled or stellated; aperture angulated outside, brilliantly pearly; operculum shelly. The species, about 20 in number, are found in South Africa, Australia, and New Zealand.

(8378) *Trochus.* [TROCHIDÆ]

(8379) *Rotella.*—Shell lenticular, polished; spine depressed; base callous; lingual teeth 13; uncini numerous, subequal. There are 10 species found in India, the Philippines, China, and New Zealand.

(8380) *Monodonta.*—Shell turbinated, few-whorled; whorls spirally grooved and granulated; lips thickened internally and grooved; columella toothed, more or less prominently and irregularly; operculum horny and many whorled. There are 10 species found in West Africa, the Red Sea, India, and Australia.

There are 80 fossil species.

(8381) *Stomatella.*—Shell ear-shaped, regular; spire small; aperture oblong, very large and oblique, nacreous; lip thin, even-edged; operculum circular horny, multi-spiral. They are found on reefs and under stones at low-water.

Twenty species are recorded from the Cape, India, North Australia, China, Japan, and the Philippines.

(8382) *Broderipia*, Gray.—Shell minute limpet-shaped, with a posterior submarginal apex; aperture oval, as large as the shell, brilliantly nacreous. Three species are found in the Philippines, Grimwood's Island, and the South Seas. (Cuming).

(8383) TURBITH, (MINERAL). The name given by chemists to the sub-sulphate of mercury.

(8384) TURBITH, TURPETH. The cortical part of the root of a species of *Convolvulus* brought from different parts of the East Indies. It is a longish root, about the thickness of the finger, resinous, heavy, of a brownish hue without; and whitish within. It is used in medicine —*Lewis's Mat. Med.*

(8385) TURBOOZ —CUCURBITA CITRULLUS.—Water Melon. This is grown in the bed of rivers in the hot season, but may be cultivated in gardens during the rains.—*Riddell.*

(8386) TURBOT. RRACHIRUS: A small flat Tenasserim fish with the aspect of the turbot, with two pectorals, the dorsal, caudal and anal united, and of a dark grey colour on the upper or right side, is sometimes in market.—*Mason.*

(8387) TURDUS. THRUSH. M. Homeyer has discriminated the Missel Thrush common in the W. Himalaya from *Turdus viscivorus* of Europe and has designated it *T. Hodgsoni:* it certainly does appear to be somewhat larger than the European bird, with more of the albescent hue on the outer tail-feathers; and these differences must be admitted to be appreciable, however trivial, and whatever may be the value to be rightly attached to them: that, however, is a subsequent consideration, in which zoologists are never likely to concur; but all will admit that every appreciable difference should be noted, whether or not it be desirable that a new specific name should be imposed in every such instance.—*Cal. Rev.*

(8388) TURMERIC.

Zur-wood, Tam.	Curcuma, LAT.
Arsina, CAN.	Zard-choobeh, PERS.
Tumr, EGYPT.	Kurkum, HIN.
Keang-whang, CHI.	Haridra, SANS.
Hulhad Huldee, [illegible]	Munjil, TAM.
Hullud (an [illegible] kind), [illegible]	Passapeo, Pambi, TEL.
Turtumagi [illegible]	Mangellacua, MAL.

The dried roots or bulbs of a tropical plant (*Curcuma longa*), are oblong, tough, externally yellowish-gray, and internally of a deep yellow

colour, with an aromatic smell, and a bitterish acrid taste. In India turmeric is used as an ingredient in curries, in dyeing, in medicine, and in some of the religious ceremonies of the Hindoos. It is produced in Bengal, Java, China, Malabar, and other places.—*Faulkner.* This article of commerce is furnished by the branches of the rhizome, or root-stock of the Curcuma longa, and C. rotunda, plants which are natives of Eastern Asia, but have been grown in England and the West Indies. They thrive well in a rich light soil, and are readily increased by offsets from the roots. In the East Indies, where it is known as Huldee, turmeric is much employed in dyeing yellow principally silks, but the color is very fugitive. It is also used medicinally as an aromatic carminative and as a condiment it enters into the composition of curry sauce or powder, and many other articles of Indian cookery. It is cordial and stomachic, and considered by the native doctors of India an excellent application in powder for cleansing foul ulcers. It is grown in and exported chiefly from Bengal and Malabar, Madras, Java, and China. The turmeric of Java is in high estimation in the European markets, ranking next to that of China and being much superior to that of Bengal The price of turmeric in London is from 32 s. to 20 s. per cwt., according to quality. The entries for home consumption are about 4,000 to 5,000 cwts. annually. It is better shipped in casks or cases than in bags. A kind of arrow-root is prepared from C. angustifolia another species of this tribe of plants. Amaranthus gangeticus, and another species, are much cultivated by the Hindoos for their stews and curries. The quantity and value of the curry stuff imported into Ceylon chiefly from India has been in the last few years as follows ;—

Quantity.

Years	cwt	Package.	Value.
1847	.....	.....	6,866
1848	.....	.....	9,981
1849	29,347	109	9,664
1850	24,399	300	7,267
1851	31,550	.....	9,446
1852	.....	.....	9,036

"Curry stuff" was imported to the extent of 32,000 cwt. in 1852. There are two varieties of turmeric usually sent into Europe from the East (whence all the turmeric imported into Europe is obtained), the "long" turmeric (*Curcuma longa*), and the "round," or as it is better known the "Chinese turmeric." The latter description is very rare, the former is the common article of commerce. According to one correspondent, Mr. Hepburn, chemist, of Falmouth, Jamaica, the common or long turmeric is indigenous in rather damp, soils, its locality being in the vicinity of rivers, watercourses and sporings. In this respect it differs from ginger, which requires a rather dry soil for its culture. Simmonds is not aware that this plant possesses the property of impoverishing the soil like the ginger. From the general habits of the plant in its natural state, we may gather the following rules for our guidance in its culture. The plants should be laid down in rows of five or six inches distant from each other, in a soil moderately damp, of an aluminous or clayey nature, and free to a great extent of the more soluble alkalies, potash and soda, as these, by absorption, may destroy the coloring matter of the plant, and so diminish its value as a dye-stuff. Finally, in preparing the roots for exportation, they should be cleansed from all earthy practicles, exposed for drying in the shade, and without any further preparation bagged for shipment. The coloring matter of turmeric is of an orange yellow color, exceedingly delicate and capable of change, either from the action of light or of alkalies, which turn it to a dark brown color. It is slightly soluble in water, and readily soluable in an alkaline solution, becoming dark brown. Alcohol extracts the coloring matter. The uses to which turmeric is applied are two : as an ingredient in the curry powder and paste, and as a dye for silk. It was some time ago used as a medicine ; but though retained in the "Pharmacopœias" of the present day, it is entirely discarded by the practitioner as a curative agent. The best Bengal and Malabar turmeric fetches a price nearly as high as that of ginger, and there is no reason why the West India planter could not send it into the British market quite as cheap as the East India trader. According to Dallas, 397 bags of turmeric were exported from Jamaica in 1797. Turmeric is grown about the city of Patna and Behar. It is much cultivated about Calcutta and all parts of Bengal. One acre yields about 200 lbs. of the fresh root. It is also grown on the central table land of Affghanistan. The exports from Calcutta in 1841 were 11,000 Indian maunds, and 28,137 in 1842. The value of that exported from Madras in 1839 was 40,000 rupees, or £4,000 ; in 1840 £4,200. The quantity shipped from that Presidency in 1850 was 6,877 bags. In the neighbourhood of Dacca about 200 lbs. of seed is sown to the beegah, measuring 80 cubits by 80, and the yield is from 640 to 800 lbs. 140 tons were imported into Liverpool in 1849, for dyeing and for curries ; 414 tons in 1850 ; 11,554 bags and packages in 1851 ; and only 3,595 ditto in 1852. The price in January 1853 was, for Bengal, 10s. to 12s.; China, 12s. to 14s., and Malabar 9s. to 11s. the cwt. The imports into London were 18 tons in 1248, 191 tons in 1848, 260 in 1849, and 870 tons in 1850, In China turmeric is used with Prussian blue in coloring and facing tea.—*Simmonds.*

Specimens at the Madras Exhibition of 1855. were exhibited as a root from Trichinopoly,

Tinnevelly, Madura &c. and in a prepared state from Goa. The root affords a yellow dye which is brilliant, but not permanent. It enters into curries and is largely used by native females as a paste to colour their faces. Dr. Pereira considered Madras Turmeric "as the most showy of all kinds of Turmeric," and the Jury observe the tubers are very large and the colour a bright yellow.—*M. E. J. R.* Turmeric is now imported into England to the extent of upwards of 800 tons, a portion of this is used in dyeing. Besides using turmeric for both food and medicine, the Burmese and Karens dye with it a bright yellow, but it is not very permanent.—*Mason.*

Turmeric, its adulterations.—From what has been shown above it will have been seen that Turmeric powder consists of the ground tubers of Curcuma longa, a plant which is extensively cultivated in the neighbourhood of Calcutta, in Bengal as also in China and Cochin China. The bulbs are small and furnished with numerous long palmate tubers, internally of a deep orange colour. There are two descriptions of tubers the one round, the other long; but both are yielded by the same plant. The first are round, oval or ovate, about two inches long, and one inch in diameter, pointed at one end, and marked externally with numerous annular wrinkles. The second are cylindrical, not exceeding in thickness the little finger; two or three inches long, somewhat contorted, tuberculated. Both kinds are yellowish, externally more or less orange yellow, passing into reddish-brown. The fractured surface has a waxy appearance. The odour is aromatic, somewhat analogous to ginger, but peculiar; the taste is aromatic. When chewed, it tinges the saliva yellow. Its powder is orange yellow. The tubers are frequently worm-eaten. The following varieties of turmeric are known in the English markets, and are thus described by Dr. Pereira:—

1. *China Turmeric.*—This sort consists of smooth, plump, round, and long tubers, of a greenish hue extenally. They yield a bright powder, and on that account are much preferred for medical purposes. Thence they fetch a higher price than any other sorts of turmeric. Probably if much of it were brought to market it would not fetch more than the Bengal sort.

2. *Bengal Turmeric.*—This sort consists of thin or narrow long tubers which are moderately smooth externally, and of a greyish dull yellow colour. They break with a deep reddish fracture. Although from the dull appearance of its narrow tubers, it is not a very inviting sort to the inexperienced eye, yet it fetches a higher price than the Madras sort, on account of its being a much stronger dye.

3 *Madras Turmeric.*—This is the most showy of all the kinds of turmeric. It consists principally of large long tubers, but mixed with transverse sections of round tubers. Externally the tubers are marked by longitudinal wrinkles, the surface of which is rubbed and bright yellow, internally the colour is that of a fresh fractured surface of gamboge.

4 *Malabar Turmeric and Bombay Turmeric.*—The sort is not constantly found in the market. It consists principally of long tubers, the round tubers being few, and of a very inferior quality. This sort of turmeric is smaller and more shrivelled than the Madras sort, but otherwise somewhat resembles it.

5 *Java Turmeric.*—Not frequently found in the English market, in a general way it may be said to resemble the China sort. It consists of both round and long tubers, but chiefly the latter. They have a greenish-yellow hue. Under the name of bulbs of Batavian Turmeric, Dr. Hassall received a sample of round tubers, said to be from Java. Dr. T. Martius notices this sort as having been brought, for many years, from Batavia, and adds that it contains much colouring matter, and is probably the produce of Curcuma viridiflora.

The composition of Turmeric is shown in the following Analysis.

John's Analysis.

Yellow volatile oil	1
Curcumin,	10 to 11
Yellow extractive	11 to 12
Gum,	14
Woody fibre,	57
Water and loss,	7 to 5
	100

Vogel and Pellitier's Analysis.

Acrid volatile oil.	Starch.
Curcumin.	Woody fibre.
Brown colouring matter.	Chloride of calcium.
Gum (a little)	Turmeric.

The wood curcumin is applied to the resinous colouring matter of turmeric, which is soluble only in ether. The cheapness of turmeric-powder and the comparatively small quantity of it used explain the reason of its having hitherto not reached the hands of the adulterator. Turmeric is free of duty. Wholesale price, 6 s. to 14 s. per. cwt. —*Food and its Adulterations, p.* 296.

(8389) TURNIPS.—Brassica Rapa. In general grow indifferently at Madras, require a free light soil; for growing this vegetable, the manure applied to the soil ought to be kept near the surface, there is one variety, the yellow Maltese worthy of a trial on the plains; raised from seed sown broad cast, when the plants have formed a few leaves they should be thinned to about 6 inches apart; used in soups, stews, &c. —*Jaffrey.*

(8390) TURNIPS, ANNUAL, are cultivated in all parts of the Deccan at the commencement of

the rains and the cold weather. They continue until the latter end of February, and go to seed easily. The soil should be rich and light, and they may be sown broad-cast, and then transplanted, either in rows or ridges, and a space of at least six fingers' breadth allowed between each. In the rains a small caterpillar is bred on the leaves, which, if not removed, will destroy the whole. The sorts are white, and red; one species grows above the ground.—*Riddell.*

(8391) TURPENTINE.

Ratenuj-roomie. Butum, Arab.	Teebinthina, Lat.
Terebenthine, Fr.	Kota, Nep.
Turpentin, Ger.	Zungbarie, Pers.
Turpintine, Guz. Hind.	Terpentyna, Pol.
Trementina, It.	Skipidar, Rus.
	Kelon ka tel, Hind.

A name for several juices of trees, chiefly of the pine tribe. They agree in most of their properties, being originally fluid and transparent, of strong and rather pleasant odour, and a pungent taste; inflammable, and soluable in oils, alcohol, and ether, but not in water. Turpentine is largely employed in the arts, especially in painting and varnishing, also in surgery —*Waterston.* The sources are as under.

(8392) *Larix* (or Cedrus) *Deodara* (Deodar and Kelon), or Himalayan Cedar, is an elegant and lofty tree, hardy as the Larch, and yielding valuable timber. It has been extensively introduced into England by the East India Company, and is interesting as having been long employed in medicine by the Hindoos, and known even to Avicenna. (*Hindoo Med.* 36.) Its Turpentine, known by the name *kelon-ke-tel*, is in great repute in the North-west of India, from its stimulant properties and power of healing deep-seated ulcers, as in elephants and camels.—*Royle.*

(8393) *Turpentine. Common. Terebinthina Vulgaris.* L. D. Resina liquida, L. Fluid Resin of Pinus sylvestris, *Linn.*, of various species of Pinus and of Abies, E. Common Turpentine either exudes naturally or from incisions from most trees of the Pine tribe, as also from *Pistacia Terebinthus* (*page* 333). It consists of Resin intimately mixed with a Volatile Oil, known in its separated or distilled state as Oil of Turpentine. In time, all Turpentines become converted into Resins, from the evaporation of the Oil and by its oxidation. They all soften by heat, burn readily, are soluble in Alcohol and Ether, unite with the fixed Oils, and resemble each other very closely in taste and smell; but differ in being more or less white or dark-coloured, and in the odour and taste being more or less agreeable. Water acquires only a little of their properties, but they may be made into an emulsion with eggs or vegetable Mucilage. Common Turpentine used to be procured from *Pinus sylvestris*, as it still is in many parts of Europe, and also from *P. maritima*, which yields the Bourdeaux Turpentine, and in winter the *galipot* of the French But Dr. Pereira has shown that almost the whole quantity of Turpentine imported to England is from America. This is procured chiefly from *P. palustris*, partly also from the *P. Tæda*. This Turpentine is viscid, semifluid, of a dull light yellowish colour, with a warm, acrid, rather bitter taste, and a moderate terebinthinate odour. When fresh, it yields 17 per cent. of Oil of Turpentine. (*W.* and *B.*) The Bourdeaux Turpentine is whitish, turbid, separates upon standing into a transparent liquid and into a granular honey-like semifluid. It is acrid and nauseous in taste, and of a disagreeable smell; yields about 20 per cent. of Oil. M. Faure discovered that it might be solidified by the aid of a 32nd part of Magnesia. Common Turpentine yields Oil of Turpentine and Resin, q. v., and is a constituent of Ung. Elemi (p. 345) and of Emp. Galbani (p. 424). —*Royle.*

(8394) *Venice Turpentine. Terebinthina Veneta* E. D. Fluid Resinous exudation of *Larix europæa.* Venice Turpentine. This, when genuine, is a thick tenacious fluid, usually of a cloudy appearance, of a yellowish-green tint, acrid and bitter in taste, of a strong peculiar odour. It is sold in Paris as Strasburgh Turpentine, and is distinguished by being less liable than others to solidify. (*Guibourt* and *Pereira.*) Dr. Thomson stated long since that the Venice Turpentine of the shops was imported from America: this is therefore only a substitute. What is usually sold is a mixture of Oil of Turpentine with common Resin. Venice Turpentine is intended to be a constituent of Emp. Cantharidis, E. and of Ung. Infusi Cantharidis, E.—*Royle.*

(8395) *Canada Balsam. Terebinthina* (Balsamum, E. D.) *Canadensis* L. Fluid Resin of Abies (Pinus, L. D.) balsamea. Canada Balsam is procured by breaking the vesicles which naturally form upon the trunks and branches, and then collecting their fluid contents. It is often called Balm of Gilead. When fresh, it is nearly colourless, of light yellow colour, transparent like thin honey; solidifies slowly; is of a strong, rather agreeable odour, and a bitterish, rather acrid taste. It is also obtained by making incisions into the tree. Strasburgh Turpentine is sometimes substituted for it.—*Royle.*

(8396) *Abietis Resina.* L, Thus, D. Resin of Abies excelsa, E. (*Pinus abies*, Linn.), L. D. The Resin of the Norway Spruce Fir may be arranged with the Turpentines as being a spontaneous exudation, and with the Resins as having lost by evaporation most of its Volatile Oil. It used to be called *Thus*, or Frankincense, as it still is in the D. P. It is collected in the form of concrete tears, which are hard and brittle, but soften readily at the temperature of the body. It is of a light yellowish or brownish-yellow colour externally, lighter within; slight terebinthinate odour and acrid bitter taste. This Resin

is intended to be employed in making Pix Burgundica, Emp. Aromaticum, D. p. 541, Emp. Opii, L. E. D., Emp. Thuris, D. p. 129, Emp. Galbani, L. D., and Emp. Picis, L. E. The substance which the French call *galipot*, or *barras* is the concretion produced on the Pine of the Landes, late in the year or in winter, when the collection of Bourdeaux Turpentine has ceased.

(8397) *Pinus morinda.* A very fine Resin is spontaneously yielded by the Himalayan *Pinus Morinda.*—*Royle.*

(8398) *Pix Abietina, L. Pix Burgundica*, E D. Burgundy Pitch is the Resin *Abies excelsa* melted in water immediately after being scraped from the tree, and strained through a cloth. It is thus freed from mechanical impurities, with a loss of little of its Volatile Oil. In all other respects it corresponds with it. But most of that which is sold is a factitious compound of Resin rendered opaque by the incorporation of water, and coloured by Palm Oil, or made from concrete American Turpentine. (*Pereira.*) This is used for making a Plaster as well as the Emp. Calefaciens (*v.* Cantharidis Comp. E.)

Action. Uses. The above Resin and Pitch are both Rubefacient.

(8399) TURPENTINE OIL. SPIRITS OF TURPENTINE.

Eau de raze, FR.	Acqua di rasa, IT.
Turpentinol, GER.	Aguarras, SP.
Turpentine, GUZ. HIND.	

The essential oil drawn from turpentine by distillation. There are two sorts; the best, red, and the other white. Turpentine oil is extensively used in the manufacture of varnishes, &c.—*McCulloch.* The Oil of Turpentine, distilled from the Turpentine of the common long-leaved Fir, of the Himmalayas is considered 'in a letter from Mr. Hutchinson, to be of 'very superior quality.'—*Royle's Productive Resources of India.*

(8400) TURQUOISE.

Turquoise, FR.	Turchina, IT.
Turkiss, GER.	Turquesa, SP.

A precious stone, in considerable estimation. Its colour, which is its principal recommendation, is a beautiful celestial blue, which migrates into pale blue, and is sometimes tinged with green. It is destitute of lustre, opaque, and does not admit of a very high polish. It is much worn in necklaces, and every part of ornamental jewellery, and contrasts beautifully with brilliants or pearls, set in fine gold.—*Mawe on Diamonds. Turquoise (Calaite, Odontalite)*, a Mineral occurring in botryoidal or mammillated masses. Colour greenish-blue, of various shades. Fracture conchoidal, rough, and uneven. Commonly opaque; sometimes translucent on the edges. Streak white. Hardness 5-0 to 6-0. Specific gravity 2-8 to 3-0. It occurs in alluvial clay in Persia. It has been found to consist of—

Phosphoric acid	30.90
Alumina	44.50
Oxide of Copper	3.75
Oxide of Iron	1.80
Water	19.00
	99,95

The Occidental Turquoise, found near Simon, in Lower Languedoc, is stated to be merely bone coloured by phosphate of iron. According to La Grange, it consists of—

Phosphate of Lime	80.0
Carbonate of Lime	8.0
Phosphate of Iron	2.0
Phosphate of Magnesia	2.0
Alumina	1.5
Water	1.6
	95.1

(8401) TURRÆA, a genus of Plants belonging to the natural ordea *Meliaceæ*, named in honour of an Italian botanist, G. Turra of Padua. Many of the species are highly ornamental forming trees or shrubs in the interior of the Cape of Good Hope, in Madagascar, Mauritius, and in the eastern parts of India.

(8402) TUSBEEH, rosary or chaplet of beads, made of date stones: fish bones: cornelian: Mocha stones: pearls: mother of pearl: coral: the seeds of the Canna Indica or Indian shott, olive stones, onyx, ebony; ocimum pilosum basilic basil; Agati: the seeds of the Corypha umbraculifera, the Earth of karbillah, Sandal: and the stones of the Cicca disticha, chlulimilli or churmayla.—*Herklots.*

(8403) TUSSAH, *Tam.* DASARI. A species of silk goods prepared from a wild Silk, in some districts in Bengal, of a fine description much used for ladies and children's dresses, and in most parts in India for Native use being worn by them for certain ceremonies and while bathing: it has lately become an article of export. *See Silk.* In an account published by Dr. Walker (Journal As. Soc. No. 31) the following history is given of the production and preparation of the tusser silk. The tusser breeders are a class quite distinct from the weavers, and are either Telingas of low caste or Gonds; the former reside principally at Chilpore, Madapore, and Chinnore. At Madapore, which may be regarded as the centre and head quarters of the tusser breeders there are at least seventy families. The tusser breeder never thinks of keeping up the breed of the insect throughout the year. When the leaf is off the tree about the middle of March he deems his occupation gone, and he leaves the object of his former excessive care to shift for itself thinking of nothing but the present ease which may be summed up in a few words, sloth, a bare subsistence and an occasional debauch in his nectar, palm toddy. But with the rains returns his toil, and some

little difficulty is experienced in procuring insects for a fresh campaign. If he can gather a dozen of promising cocoons which his experience tells him are of females, he is quite satisfied. Carefully does he watch the bursting of the cocoon, and much care does he take of its winged inmate, having previously prepared for it a house of teak leaves dried. The male is not tardy in approaching. Impregnation takes place, the male dies, and in four days after laying her eggs, the female also. The eggs are in number about sixty: of these one half prove abortive while the others are hatched in ten days. The small insect is fed on the tender leaves of the Careya sphærica, and in six weeks spins its cocoon; the first brood are spared and allowed to burst their cocoons to supply a sufficient quantity of ova for the tusser harvest, the same process is described as again gone through, with this exception, that the young worms are are this time fed on the leaves of the Pentaptera tomentosa, as those of the Careya sphærica are by this period of the season, supposed to have acquired some influence noxious to the insect. It is during the progress of the worm from the egg to the formation of the cocoon that every energy of the Tusser breeder is called into action for the preservation of his charge. Every animal footed, winged and creeping, is said to be the enemy of the tusser grub. Ants destroy them, kites and cows prey on them, snakes devour them, and squirrels are said to make a repast of them. To protect them first from their insect enemies, the tusser breeder, ascends the muddy tree (Pentaptera tomentosa) the leaves of which are the insects food, every branch he carefully clears of the different species of ants by which they may be infested preventing the access of others by surrounding the trunk of the tree at its foot with ashes. The other enemies are kept off by shouting, throwing stones, firing guns &c. Their life at this time would appear by their own account, to be one of the most unremitting toil, to devote themselves to which they forswear not only every indulgence but evey comfort, and it rouses the apathetic peasant of Telingana to eloquence when he recounts what privations he undergoes, what pleasure he derives himself, and what incessant labour he incurs, while watching the rearing of the worm, and the perfecting of its work. The tusser butterfly is a species of Saturnia, probably the aphia, described by Dr. Helfer as the most common of the native species. From four to five hundred of the cocoons are sold to the Banyas and weavers for one rupee: the moth is killed by means of heat. There are three tusser harvests one at the end of the rains, the other two in the cold season. The winding of the silk is accomplished by boiling the cocoons, separating the floss, of which no use is made; and twisting eight or ten filatures from as many cocoons on the middle of the thighs with the left hand of the workman and to be wound on the instrument; this instument, the middle bar of the wood, is held lightly in the hand of the workman and made to move in a semicircle. An ounce and a quarter of silk is the average daily winding of a single workman, his wages are at the common rate of one pice for winding the silk of fifty cocoons, about three pice a day, as he cannot wind more silk than from a hundred and fifty cocoons. The pice, however, are large, and go there by eight to the rupee. The only dyes used for the tusser silk, as far at least as my observation or inquiry has gone, are the flowers of the palas, *Butea frondosa*, and turmeric; by the former the usual familiar colour is produced; by the latter a golden yellow is brought out after the threads are for sometime immersed in a solution of ashes. The warp threads are stiffened with rice congee.—*Rohde, M. S. S.*

Tusser or Jungle Silk, the produce of a Saturnia, is made into sarees, punchees and scarfs, at several towns of the Sircar of Warungul. But the chief seat of the Tusser manufacture is the town of Mahdapore—on the right bank of the Godavery in the Ramgheer Sircar, where the moth that yields it is carefully reared, and from whence raw tusser silk is sent to other parts to be woven into cloth. The insect in its grub state is first fed on the tender leaves of the Careya sphœrica, and when more grown, on the leaves of the Pentaptera tomentosa—much watching and attention are bestowed in rearing the animal, subject as it is to destruction from birds, insects, and squirrels. The Tusser cloths produced at Mahdapore are in durability and fineness very inferior to the cloths of the same kind manufactured in Bengal—they are dyed the same colour, and with the same materials as the silks of which they are about one half the price. At Mahdapore there are seventy to eighty families employed in rearing the insect and the manufacture of the cloth, which is prepared principally for the Hyderabad market. Cuth. Davidson, Assistant Resident. At the Madras Exhibition of 1855, Cocoons, from which this description of silk is obtained, were exhibited from several localities. They are formed by caterpillars of several species of moth, belonging to the genus Saturnia. That which is most commonly met with in Southern India, appears to be S. Pahia. The caterpillar feeds on the leaves of the country Almond tree (*Terminalia catappa*) where it is often called the almond moth. It is also found on the leaves of the Ber tree, (*Zizyphus jujuba,*) the Casuarina, &c. The cocoons are ingeniously attached to the twiggy branches of the Ber, by a long stalk terminating in a ring, encircling the branch. In the thicker foliage of the Casuarina, the silk is woven among the leaves without the above provision. It does not appear, that silk in any

quantity has been obtained from this source in the Madras Presidency. Considerable quantities of the small silk cloths worn by Brahmins at their meals are imported into the Northern Circars, from Cuttack. The only use to which the cocoons appear to be turned is that of a ligature for native matchlocks. They are cut spirally into long narrow bands, with which the barrels are tied to the stocks. Dr. Roxburgh in the 7th vol. of the Linnean Transactions, has described the preparation of the Tussah silk of Bengal, which is derived from two different species of Saturnia. One called *bughy* by the natives of Beerbhoom, appears to be the same as the Madras species, (S. Paphia,) and is stated to feed on the Ber tree and on the Asana (*Pentaptera glabra*). The other termed *jarroo* by the natives of the same province, is the S. Cynthia, and is domesticated. The caterpillars are fed on the leaves of the castor oil plant (Ricinus) whence it is called the Arrundy, or Arundi silk worm, but it also eats the leaves of the Ber and Asana. Colonel Sykes has a paper in the 3d vol. Trans. Roy. As. Socy. Lond. on the cocoons of S. Paphia found by him in the Deckan under the designation of the *kaliswar* silk worm, which he states is met with on the Ber tree (*Pentaptera glabra*), Teak tree and common Mulberry. The Chinese Tussah is said to be obtained from *Saturnia Atlas*, which is also to be met with in Southern India. Another species of Saturnia (*S. Selene*) the posterior wings of which are prolonged into a tail-like process is common in Southern India. The caterpillar may be observed, feeding in considerable numbers on the Odina wodier, or Besharm tree in February and March. Its chrysalis is enveloped in a silky covering, so like that of S. Paphia that it would probably be found to yield a strong and useful thread. It may be worth while to direct attention to the silk spun by several smaller specimens of Bombyx moths, found on different species of Cassia, Acacia and Phyllanthus. A gregarious caterpillar (a species of Lasiocampus) may be observed clustering in great numbers on the stem of the Guava, the Jamoon (Syzygium jambolanum,) and probably other trees: the silky covering of these also seems deserving of examination. Lieut Colonel F. Cotton sent some of the cocoons gathered by him when exploring the Godavery.—*Jury. Reports, Madras Exhibition of* 1855.

Saturnia, this alluded to, is a genus of insects belonging to the order *Lepidoptera* and the family *Bombycidæ*. The antennæ are fringed in the male; the head is small the wings are very broad and entire; the palpi and trunk are wanting.—*Eng. Cyc.*

Saturnia Pavonia minor, the Emperor Moth, is one of the handsomest of the British species of Moths. It is about 3 inches wide. The colour is grayish-brown, faintly tinged with purple; the hinder margin of all the wings has a band of pale brown and purple the hinder band being much waved. The centre of each wing has a large spot or ocellus which is placed on a light ground: it consists of a black pupil, with a yellow or gray iris and partly surrounded by a light blue crescent. The larva is of a green colour having a black band on each segment adorned with pink tubercles bearing a whorl of six hairs diverging like a star. It constructs a curious cocoon, the extremity not being closed, but terminated by a converging circle of very stiff hairs, which enables the insect to make its escape from within but completely prevents all ingress.—*Eng. Cyc.* To the genus *Saturnia* some of the largest of the *Lepidoptera* belong.

Saturnia Atlas, the Giant Atlas Moth, has wings measuring 7 or 8 inches across. This species also with *S. Cecropia* and *S. Luna*, have their wings produced into a tail The cocoons of *S. Cynthia* and *S. Mylitta* are used in India for the production of silk. Latreille states that these are the wild species of silk-worm of China. *S. Cynthia* is the Arrindi Silk Worm of India (Roxburgh, 'Linn. Trans,' vol. vii.) *S. Promethea*, a North American species, forms its cocoon within the leaf of a sassafras-tree, having previously fastened the stalk of the leaf to the stem by a strong silken web, whereby it is prevented from falling with the other leaves (Westwood.)—*Eng. Cyc.* At the Universal Exposition held in Paris, in 1855, samples of Indian silk were exhibited with the cocoons of the different species of the Bombycidæ from the Bombyx Mori. pat Saturnia Mylitta, tussah; Saturnia assamensis, monga; Attacus Cynthia, eri or eriah.—*Rapport du Jury mixte international, page* 54.

(8404) TUSSILAGO FARFARA, *Linn.* Leaves and Flowers of Coltsfoot. Coltsfoot has a creeping root-stock. Leaves, which make their appearance after the flowers, on channeled footstalks, roundish, cordate, angular, sharply toothed, of a glaucous green above, cottony beneath. Flower-heads appear in early spring, of a bright yellow colour, solitary, drooping while in bud, erect when in flower and seed; flower-stalk covered with smooth, scale-like, reddish bracts, many flowered, heterogamous. Florets of the ray female, narrow, ligulate, ray spreading. Florets of the disk male, tubular, with a campanulate 5-cleft limb. Receptacle naked. Involucre of one row of scales, oblong, with membranous margins. Styles of the disk inclosed, abortive; of the ray bifid with taper arms. Achenium of the ray oblong, cylindrical, smooth, of the disk abortive. Pappus of the ray of in many rows, of the disk in one row consisting of very fine setæ.—Chalky soils in England, found in many parts of

Europe, extending to Persia and the Himalayas. St. & Ch.t. 20.

Action. Uses; This plant is mucilaginous and slightly bitter, and may be employed as a demulcent possessed of a little tonic property. It may be prescribed in the form of an Infusion or Decoction (one or two ounces to a pint of water) *ad libitum.—Royle.*

(8405) TUTENAGUE or CHINA SPELTER. This is an alloy of iron, copper and zinc. It is harder than zinc, though less so than iron, sonorous, compact, and has some malleability. The fresh fracture is brilliant, but soon tarnishes. Till superseded by spelter from Silesia it was clandestinely exported in large quantities (more than 50,000 cwt. annually) to India, but is now seldom or never shipped; spelter being on the contrary imported to compete with it in China. For boxes, dishes, household utensils, and other similar purposes, tutenague is well adapted. The art of making it is not known to Europeans. Its export price used to be about 14 dollars a pecul. —*Comp. Desc.*

(8406) TWEEDIA. ASCLEPIACEÆ. Tweedia Cœrulea.—These plants bear blue flowers, and succeed well in a sandy peat soil, and are readily grown from seed.—*Riddell.*

(8407) TYLOPHORA, a genus of plants belonging to the natural order *Asclepiadaceæ*. *T. asthmatica* is very common in the peninsula of India, and called in Telinga 'kaka-palla.' Dr. Roxburgh describes it as being frequently employed there as a substitute for ipecacuanha.—*Eng. Cyc.* Dr. Wight gives figures of Tylophora asthmatica, 1277; carnosa. 351; fasciculata, 248; Iphisia, 1276; mollissima, 1275; parviflora, 1274; and tenuissima, 588.

(8408) TYLOPHORA ASTHMATICA. ASCLEPIAS ASTHMATICA.

Untamol, HIND. | Kaka palla, TAM.

The Cynanchum ipecachuana of Willdenow, by many writers is supposed to be the same as this species, and is common in Bengal. The root is of many long, thick, whitish fleshy fibres, issuing from a small woody head. The dried roots of this article are of very great value, and according to the experience of Drs. Roxburgh and Anderson, confirmed fully by Dr. O'Shaughnessy's own trials, afford an excellent substitute for ipecachuana, if given in rather larger doses.—*O'Shaughnessy, page* 455.

Tylophora Asthmatica, affords a good substitute for flax. It is the Koorinja fibre of Tanjore *prepared* from the Tylophora asthmatica; this is of fine quality, white, strong and silky. The plant grows abundantly in Southern India, and is used medicinally. The Jury of the Madras Exhibition of 1855, considered it deserving of Honorable Mention, as a new discovery. The Koorinja, (*Tylophora Asthmatica*) yields a strong white Silky fibre resembling Flax, a small sample of it was then exhibited by the Tanjore Local Commitee.—*M. E. J. R.*

(8409) TYLOPHORA BARK. UNTAMOL. Bark of root of Tylophora asthmatica must not be confounded with ununtamul, the root of Hemidesmus Indicus.—*Ben. Phar.*

(8410) TYPHA. The genus *Typha* is known by the male and female flowers being uppermost; the stamens are setose, and united by the filaments; the ovarium is surrounded by setæ (*fig.* 4) and the style is persistent. There are three species of this genus, inhabitants of the temperate parts of the globe, and all are found in Great Britain. The name *Typha* is derived from Τφος a marsh, because these plants grow in marshy places. In English they are called Cat's Tail and Reed-Mace, the former from the resemblance of their spikes to the tail of a cat. They are frequently called Bullrushes, but this name is restricted to another genus, the *Scirpus.—Eng. Cyc.*

(8411) TYPHA ANGUSTIFOLIA. Lesser Cat's-Tail or Reed-Mace, has linear leaves grooved below, with the sterile and fertile flowers removed at a little distance from each other. It is less frequent than the last species, but is not uncommon in the neighbourhood of London.—*Eng. Cyc.*

(8412) TYPHA ELEPHANTINA AND TYPHA ANGUSTIFOLIA; Bulrushes, *putera* and *reree*; their leaves are employed in making mats and baskets, in North West India and they are called *pun*. The pollen, like Lycopodium, is inflammable, and is collected in Sind, and there called *Booree.—Royle.*

(8413) TYPHA LATIFOLIA, Great Cat's-Tail or Reed-Mace, has linear nearly plane leaves, with the sterile and fertile flowers continuous. This is a very handsome European aquatic, and grows abundantly in damp marshy places, the leaves three feet in length and an inch in width. When the densely crowded spike is brushed and a lighted candle applied near it, a sudden flash is produced. This arises from the firing of the pollen that is diffused in the air. On the Continent the down of the flowers is used for stuffing pillows, &c. Cattle are fond of the leaves, and the roots are sometimes eaten as a salad. In common with *Sparganium* and *Scirpus* the leaves are used by coopers for filling up the interstices between the wood of their casks; also for making mats, chair-bottoms, baskets, &c. It is this plant which many of the Italian painters have put in the hand of Christ when he was mocked by the Roman soldiers as a king.—*Eng. Cyc.*

(8414) TYPHA MINOR, Dwarf Cat's-Tail or Reed-Mace, has linear-setaceous leaves, with barren and fertile flowers at a great distance. This plant, on the authority of Dillenius, has been placed in the list of British plants. It is found in the south of Germany and Switzerland. Kock calls it *T. minima*. [SPARGANIUM.]—*Eng. Cyc.*

(8415) TYPHACEÆ. Bulrushes.

Pun, Booree, Sindee.

Typhaceæ, *Typhads*, or *Bulrushes*, a natural order of Plants belonging to Lindley's spadicose group of Monocotyledons. The order includes two genera—*Typha* and *Sparganium*. They are herbaceous plants, growing in marshes and ditches, having stems without nodi and perennial rhizomata; the leaves are rigid, ensiform, and with parallel veins; the inflorescence is spicate or capitate, without a spathe; the flowers are unisexual; sepals 3 or more, sometimes merely a bundle of hairs; no petals; the male flowers have 3 or 6 stamens; the female flowers have a single, superior 1-celled ovary; the fruit is dry, 1-celled, and 1-seeded; the embryo is in the centre of the albumen. The species of the two genera are abundant in the northern parts of the world,—*Eng. Cyc.* Bulrushes, so conspicuous in the marshes of Europe, extend also to similar situations in most parts of India. The leaves are in some parts of Europe employed in making mats and winter coverings for plants, as well as for stuffing chairs, the leaves of *putera* and *reree* (or *Typha elephantina* and *T. angustifolia*) are employed in making mats in North-West India. Dr. Stocks informed Dr. Royle that in Sindh the former is called *pun*, and its leaves employed for making mats and baskets. The pollen, like that of Lycopodium, is inflammable, and used as a substitute for it in Europe. It is also collected in Sindh, and there called *booree*.—*Royle Fib. Pl. p.* 35. Bulrushes in Europe are used for putting between the staves of barrels, also for chair bottoms and matting. Typha bread is prepared in Scinde from the pollen of the flowers of the *Typha elephantina*, and in New Zealand from another species of bulrush (*Typha utilis*.)—*Simmonds*.

At the Madras Exhibition of 1855 the Trichinopoly Local Committee exhibited a large collection of figures and Architectural Models, carved in the Pith of the Typha. The attitudes of the figures were stiff but the draparies were characteristic. The figures introduced into the model of the Trichinopoly Fort were out of proportion being far too large, for the scale of the buildings. There were pith Models of Pagodas of Trichinopoly and Salem. Pith work made from the rushes, called "Nultee" in Tanjore. Model of the Pagoda. —*M. E. J. R.*

(8416) TYPHONIUM, a genus of plants belonging to the natural order *Aroideæ*. The spathe is convolute at its base. Spadix interruptedly androgynous below, with rudiments of the sexual organs below the stamens, naked, with a subulate apex. Ovaries with a single ovule, affixed at the base, erect. The species are all stemless herbs, indigenous to India.—*Eng. Cyc.*

(8417) TYPHONIUM ORIXENSE, is described by Dr. Roxburgh by the name of *Arum orixense*, and is common in the shady mango-groves near Samulkota, where the soil is dry and fertile. It is called Ghekool by the natives. Like many other of the *Aroideæ*, this plant is exceedingly acrid.

(8418) TYPHOON.

Ti-fan, Chin.	Bagui, Philippine.
Tufan, Arab.	

This is the European name of the frightful equinoctial gales which vex sea and land about the tropics in the Eastern seas, and down as far as to 10° from the equator. The whole Malayan Archipelago is excluded from their sphere, while the whole of the Philippine is within it, the island of Mindano alone excepted.

U.

(8419) ULMACEÆ, *Elmworts*, a natural order of Exogenous Plants. The flowers are hermaphrodite or polygamous, never in catkins; calyx divided, campanulate, inferior, irregular; stamens definite, inserted into the base of the calyx, erect in æstivation; ovary superior, 2-celled ovules solitary, pendulous; stigmas 2, distinct. Fruit 1-2-celled, indehiscent, membranous or drupaceous. Seed solitary, pendulous; albumen none, or in very small quantity; embryo straight or curved, with foliaceous cotyledons and superior radicle. (Lindley.) This order consists of trees or shrubs, which have scabrous alternate simple deciduous leaves and stipules. The genera belonging to it are *Planera*, *Abelicea*, *Ulmus*, *Celtis*, *Sponia*, and *Mertensia*. The species are natives of the north of Asia, the mountains of India, of north America, China, and Europe. This order is by most botanists made a section of the natural order *Urticaceæ*. It was however separated by Mirbel, and he has been followed by Lindley. They differ from *Urticaceæ* in the possession of a 2-celled fruit and hermaphrodite flowers. In all other respects they resemble *Urticaceæ*, and their affinities are the same. [Urticaceæ]

Most of the species of this order are trees, the timber of which is often very valuable. The bark of the Elm is used as medicine. [Ulmus.] The genera *Planera* and *Celtis*, like the Elm, have species which are handsome ornamental trees, and yield useful timber.—*Eng. Cyc.*

(8420) ULMUS, a genus of Plants, the type of the natural order *Ulmaceæ*. The flowers are small and the leaves are alternate. In most of the species the flowers appear earlier than the leaves; they are disposed in groups, and seated on short peduncles. The calyx is of a reddish colour, distinct from the ovary, imbricated in æstivation, with 4-8 segments, which remain until the fruit falls. The stamens are as numerous as the segments, and are inserted opposite to them. The ovary is elliptical, compressed, cloven at the summit, 2-celled, and 1 ovule in each cell. The fruit is a samara, the wing-like appendage being broad and present all round, except in a notch. Only one of the cells of the ovary develops its seed, so that the fruit is 1-seeded. The embryo has no albumen, and its radicle is straight and uppermost. The leaves are stalked, and unequal at the base, serrated, and generally rough to the touch; the axil of the primary nerves beneath are tufted with fine hairy filaments. The various species of elm are wild in Europe, North America, India and China. Nearly 20 species have been enumerated by various writers, but it is not at all certain that these are true species. This uncertainty arises from the fact which is now generally recognised by the cultivators of the elm, that the seeds of the elm do not produce plants precisely like their parents, and that the amount of difference in the elm is greater than amongst most other species of trees. It is on this account that there are so many recorded varieties of the species which are cultivated for ornament or timber.

(8421) ULMUS ALTERNIFOLIUS AND U. INTEGRIFOLIUS

Thalai, BURM.

Two of the largest trees in the Pegu province; they are found about towns and villages in the Prome district, but not below that latitude. The elms to which family the trees in question belong afford valuable timber,—red-colored wood, strong and adapted for house-building.—*McClelland.*

(8422) ULMUS INTEGRIFOLIUS.

Tambachi marum, also Ayah marum, TAM. | Nullee, TEL.

A large timber tree, a native of Circar mountains, it flowers during the cold season, leaves deciduous about the close of the wet season, they come out again in March. The wood of this tree is reckoned of a good quality by natives and is employed for a variety of uses (*Ross*)—*Rohde M.S.S.* A large sized tree, wood reddish coloured, good for general purposes—said to yield to boiling water a peculiar odour, which when mixed with common arrack gives it the flavour of the more expensive palmira arrack and enables the venders to obtain better prices for their adulterated article.

(8423) ULTRAMARINE.

Bleu d'outremer, FR. | Ultramarin, RUS.
Ultramarin, GER. | Ultramar, SP.
Oltramarino, IT. | Lajvurd, GUZ. HIND.

A very fine blue powder, made from the *Lapis Lazuli* (*Gaz. Hind.* Lajvurd-ka puttur) and highly prized by painters. Owing to the dearness of the *Lapis Lazuli*, this pigment is now artificially imitated in various ways.—*Faulkner.*

(8424) UMBELLIFERÆ, a natural order of Exogenous Plants. This is one of the best marked families of plants, so much so, that Jussieu says the whole order may be looked upon as a genus, and the various sub-divisions and genera as arrangements of the species. All the species are well marked, and have good distinguishing characters, and their inflorescence is always that of the umbel. The possession of an umbel was early made the combining character of this plant by systematic botanists, and they were called *Umbellatæ* on this account. In addition to this distinguishing character, they have also others, as the possession of 5 stamens and 2 stigmas, by which they were all brought under the class *Pentandria* and order *Digynia* of Linnæus. Most of the species are herbs, seldom shrubs, with fistular furrowed stems. The leaves are, in most cases, divided; sometimes they are simple; they are alternate, and all of them embrace or clasp the stem by a sheathing petiole. The flowers are white, pink, yellow, or blue, and are seated on umbels, which are either simple or compound, and these are with or without bracts at their base, which are called involucre, or involucellum, as they surround the umbels, or umbelules. The calyx is superior, either entire or 5-toothed. The petals are 5, and are inserted on the outside of a fleshy disc, which is placed on the top of the ovarium; they are usually inflexed at the point, and have an imbricate, rarely valvate æstivation. The stamens are 5, and are seated alternately with the petals, and are incurved during æstivation. The ovary is inferior, 2-celled, having solitary pendulous ovules, and is crowned by the disc, on which the petals are seated; the styles are two distinct, with simple stigmas. The fruit, which is ordinarily called the seed, consists of 2 carpels, which are united by a common axis, the part by which they unite being called the commissure; the external part of each carpel is traversed by elevated ridges, which are divided into primary and secondary; there are 5 of the latter, and 4, between them, of the former; the ridges are separated by channels, below which are often placed, in the covering of the fruit, little receptacles of coloured oily matter, which are called vittæ. The seed, which is pendulous, usually adheres to the sides of the cell of the fruit, and this has led to the confounding the seed and fruit together. The embryo is minute, and is seated in the midst of a horny albumen, with the radicle pointing to the hilum. The order agrees with *Ranunculaceæ* in its sheathing leaves, as well as its large albumen and its acrid properties. Other relations have been pointed out, as with *Saxifragaceæ*, *Geraniaceæ*,

also with *Araliaceæ*, from which it differs little, except in the number of the parts of the flower. The following conspectus will show the sub-orders and tribes into which numerous genera of this order have been distributed by DeCandolle :—

Umbelliferæ.

- Sub-Order I. *Orthospermeæ*.—Albumen of seed flat on inner surface, neither involute nor convolute.
  - Hydrocotyleæ.
  - Mulineæ,
  - Saniculeæ.
  - Ammineæ.
  - Seselineæ.
  - Angeliceæ.
  - Peucedaneæ.
  - Tordylineæ.
  - Silerineæ.
  - Cumineæ.
  - Thapsieæ.
  - Daucineæ.
- Sub Order II. *Campylospermeæ*.—Albumen rolled inwards at the edges.
  - Eloœoselineæ.
  - Caucalineæ.
  - Scandicineæ.
  - Smyrneæ.
- Sub-Order III. *Cœlospermeæ*,—Albumen curved inwards from base to apex.
  - Coriandreæ.

Tausch has more recently proposed another arrangement, and objected to the albumen being made the basis of the primary divisions of the order. The genera include above 1000 species. These are principally inhabitants of the northern temperate zone, and the greater number of them are found in the Old World. The proportion of species in the southern half of the world, compared with the northern, is as one to four; that of the New to the Old World, as one to three. Very few of the species are found in the tropics, and about 50 are enumerated as inhabitants of Australia. The properties of this order are variable, and very important. One of distinguishing characters of the order is the possession of an acrid principle which finds its development in such plants as the Hemlock [CONIUM], *Œnanthe*, *Helosciadium*, *Æthusa*, &c. This renders the whole order suspicious, more especially, the vegetation, in which the poisonous principle is most developed. The acrid properties of these plants seem to depend upon the possession of a peculiar principle, which in as far as it has been examined in some of the species possesses alkaline properties. This is the case with Conia, a principle obtained from the Hemlock [CONIUM] which has been examined with the most care, although other plants of the order have been found to yield similar principles, but not possessing so much activity. Conia is remarkable amongst the vegetable alkaloids, for being fluid, volatile, and easily decomposed; and it is probable that most plants whose poisonous properties are dissipated by heat possess a principle of a similar nature. In this respect there is also another analogy between the *Umbelliferæ* and *Ranunculaceæ*, the poisonous qualities of the species of the last order being in a great measure annihilated by heat. It is not improbable that all the *Umbelliferæ* may possess a principle similar in nature though not in intensity, to the Conia, and that it may contribute in some measure to render such plants as the parsley, samphire, and celery, desirable as articles of diet. Another important secretion of the *Umbellifer* is a volatile oil. This secretion is found in all the species, with the exception of *Conium*, deposited in the canals of the pericarp, which are called vittæ. In some of the species it is more abundant than in others; and on this account the fruit, which is commonly called the seeds, is used frequently in diet as a condiment, and in medicine as an aromatic and carminative. Of these the carraway, the anise, the dill, the cumin, and coriander are best known. A third secretion of these plants is a gum-resin. This probably, like the last two secretions, is common to the whole order, but is fully developed in only a few species. The gum-resins produced by this order have had a great reputation in medicine, and many of them are still looked on as valuable remedies. The Laser, or Silphion, of the ancients, is secreted by plants belonging to this order, and assafœtida, galbanum, gum-ammoniacum, oppoponax, and sagapenum are much used as stimulant medicines in nervous diseases at the present day. Many of the species when wounded exude in small quantities a gum-resinous matter. A fourth secretion, which also on account of its occasional excess renders this order important to man, is starch. This secretion, which forms so large a portion of the food of animals, is deposited in largest quantities in the roots of the carrot, the parsnep, the skirret, and the artacacha of the South Americans, and on this account these plants are extensively cultivated. Most of the roots however contain this principle, and might be used as articles of diet, but they also contain the poisonous principle of which we have before spoken.

Heat will dissipate this, and some of the roots which are deadly poisonous when raw, it is said, may be eaten with impunity when cooked. The roots of some of these plants resemble that of the horse-radish, and in winter, when the leaves are gone, may be dug up in mistake for it. Fatal consequences have in some cases ensued from such a mistake. Many of the *Umbelliferæ* are much affected in their secretions by climate and cultivation. Thus, the deadly hemlock in Russia is an inert and eatable plant, while the celery of English gardens, if cast on the roadside, becomes, an active poison. The properties of all plants are more or less affected by climate and cultivation; but it is much more obvious where poisonous secretions are increased or diminished, as in the hemlock, or changed, as in the case of the celery. *Jussieu, Dict. des Sciences Naturelles*;

Lindley, *Vegetable Kindom*; Don; Hiller, *Dictionary*; Burnett *Outlines*; Christisen, *Dispensatory* Bischoff, *Lehrbuch der Botanik*.) *Eng. Cyc.*

(8425) UMBER, an Ore of Iron and Manganese, employed as a brown pigment. It occurs massive, amorphous. Structure earthy. Fracture conchoidal. Soft. Opaque. Dull. Meagre to the touch; adheres strongly to the tongue, and falls to pieces in water. Colour blackish, reddish, or yellowish-brown. Specific gravity 2.206. It occurs in beds with brown jasper, in the Isle of Cyprus. It consists of iron, manganese, silica, alumina, and water.

(8426) UMBRELLAS.

Parapluie, FR. | Kettisols (paper umbrellas), CHIN.
Chutree, GUZ. HIND. |

Are well-known articles, employed as a covering against the heat of the sun and rain; a smaller kind, the *parasol* being used chiefly by ladies either while walking, or riding in open conveyances. The *kettisol*, or paper summer head, is extensively manufactured in China, whence it is largely exported to various parts of the world.—*Faulkner.* The Umbrella of the Lepcha in Sikkim consists of a frame work of Bamboo enclosing broad leaves of Phrynium.—*Hooker, Vol.* I, *page* 131. Umbrella, in Malay and Javanese, "paying," and in the latter, also, "songsong." To use an umbrella at all, amongst Malays, or rather to have it carried over one, for no native carries an umbrella himself, is a mark of rank and its quality implies the degree of that rank. The sovereign alone uses one which is gilt throughout. In Java, a small umbrella, called a "bawat," is the special badge of the higher nobility, called by the Sanscrit title of bopati. This is not made use of to screen from sun or rain, but carried by a retainer before the party. —*Crawfurd Dict. p.* 442.

(8427) UNCARIA a genus of Plants belonging to the natural order *Rubiaceæ*. *Uncaria* is sometimes considered only as a sub-genus of *Nauclea*. The flowers are aggregate on a globular receptacle; calyx tubularly urceolate, 5-cleft; corolla funnel-shaped, with a slender tube and naked throat; stamens 5; ovary 2-celled; capsules pedicellate, clavate, attenuated at the base: seeds imbricated, winged; embryo inverse and furnished with a perisperm. The species are chiefly natives of India, but a few are found in America. They are permanent cirriferous ramblers, hanging to different trees by the hooked old peduncles.

(8428) UNCARIA GAMBIER, Roxburgh, the Gambier Plant, is a native of Penang, Sumatra Malacca, &c, The substance called Gambier by the Malays is prepared from it, and it is known in commmerce by the names of *Terra japonica* and Catechu.

This plant was first described by Rumphius, 'Herb. Amb.,' v., p. 63, t. 34, f. 2 and 3, by the name of *Funis uncatus angustifolius*, but the process of preparing the extract was first fully described by Dr. C. Campbell, one of the early medical officers of the station of Bencoolen who paid considerable attention to the useful plants of the neighbourhood. He states that it is chewed by the Malays mingled with betel-leaf and areca-nut in the same way that catechu is used on the continent of India, and was solicitous that a trial should be made of its power in tanning. The preparation he describes as simple:—"The young shoot and leaves are shred and bruised in water for some hours, until a feculum is deposited; this inspissated in the sun to the consistence of a paste, is thrown into moulds of a circular form and in this state the gambier is brought to market."—*Eng. Cyc.*

(8429) UNGKA-ETAM, the Asiatic name for *Hylobates Rafflesii*, Geoffroy. [HYLOBATES.]

(3430) UNGKA-PUTI, an Asiatic name for *Hylobates agilis*. [HYLOBATES]

(8431) UNGUICULATA. Linnæus divided the *Mammalia* into the following sections: —*Unguiculata*, *Ungulata*, and *Mutica*.

(8432) UNKOODOO. NAUCLEA GAMBIER. Hunter.

Unkoodoo kurra, TEL. | Gambier, MALAY.

This is a substance which is sometimes though rarely brought from Malay countries to the Coromandel coast. The Malays chew it with the betel-leaf, as the Indians do the areca-nut. It is prepared from the leaves of the shrub and somewhat resembles catechu. Its taste is exceedingly astringent.—*Ainslie's Mat. Med. p.* 264. The water extract of *Nauclea Gambir*, forms a good leather of a red or orange colour.

(8433) UNONA, a genus belonging to the natural order *Anonaceæ*, so called from 'unus' one, the stamens being united with the germens, The generic character is, slpals 3; petals 6, the 3 inner the smallest; stamens numerous; carpels numerous, one or many celled; seeds in a single row. The species consist of trees, large shrubs or climbing plants, found in hot parts of the world, as India and its islands, Africa, and south America. The bark and fruit of many of the species are aromatic, with some degree of acridity, and are employed as stimulating medicines or as condiments.—*Eng. Cyc.*

(8434) UNONA MUSARIA has been so called from its bark being used for making musical instruments, as is indeed also that of another species. This is a rambling shrub, a native of Amboyna, &c., the roots and bark are also used medicinally. *U. tripetala*, *U. uncinata*. *U. odorata*, &c., natives of the Indian islands, are remarkable for the sweet scent of their flowers. *U. esculenta*, a native of the Indian peninsula, has fruit which is edible. Some species, as *U. sylvatica*, are valued for their timber. *U. longifolia* is an elegant tree, with smooth, pointed, and undulate leaves, which is much cultivated in some parts of India to form avenues and to

afford shade. It is sometimes called Deodara, which is properly the name of the celebrated Himalayan Pine, *Pinus* or *Cedrus Deodara*.—*Eng. Cyc.*

(8435) UNONA NARUM is one of the climbing species, a native of Malabar, which Rheede describes as possessed of medicinal properties, the roots being so used, as well as the sweet-scented greenish-coloured oil obtained from them by distillations.—*Eng. Cyc.* In Malabar, a greenish sweet smelling oil is obtained, by distillation, from the roots of *Unona Narum*, an evergreen climber which is used medicinally as a stimulant.—*Simmonds.*

(8436) UPAS ANTIAR, ANTIARIS TOXICARIA (Leschenault) Ipo toxicaria, *Pers.*

Upas tree, ENG. | Anchar, MALAY.

A native of Java. The juice of this tree is one source of the half fabulous Upas poison. The tree is often over 100 feet in height, its bark pale and smooth, its leaves oval, coriaceous, hairy, juice viscous, bitter, white or yellow, flowing abundantly from incisions, and concreting into a gummy resinous mass. The *Upas antiar* poison is prepared in an earthen vessel with this juice, which is mixed with the seed of the Capsicum frutescens, and various aromatics. This poison at first acts as a purgative and emetic, then as a narcotic, causing death by violent fits of tetanic convulsions. The *Upas tiente* poison is prepared from a strychnos, and differs from this substance.—*O'Shaughnessy, page* 579. Upas, in Javanese, "poison," or "venom," is the sap of some plants of the Malay and Philippine Islands yielding poisonous juices, which, by concentration, produce a poison of considerable activity which has been sometime employed by the ruder natives to render their weapons deadly. The most potent of these plants in Java are the Anchar, the Antiaris toxicaria, a large forest tree and the Cheteak, Strychnos tiente, a climbing shrub. In all these cases, the poison, even when fresh, is far less active than that of the cobra snake, for the most powerful will take an hour to kill a dog, which the venom of the hooded snake would certainly accomplish in half the time. To effect a fatal purpose, too, it is necessary that the poisoned weapon should be left in the wound and not withdrawn, so that the probability is that few human beings have ever lost their lives by means of these poisons.—*Crawfurd, Dictionary, page* 442. The Upas Tree, Antiaris toxicaria, is a poisonous tree grown in Java, in a valley filled with Carbonic acid, highly dangerous therefore to enter.—*O'Shaughnessy.*

(8437) UPUCUTI.

Upucuti, MAL.

Upucuti is the Malabar name of a bush common in Malayalum. It contains a juice which is very tenacious and is used by the Natives for sealing their letters.—*Ains. Mat. Med. page* 204.

(8438) UPUPIDÆ, a family of Insessorial or Perching Birds. Linnæus placed the genus *Upupa* between *Merops* and *Certhia* [CERTHIADÆ], among his *Picæ*, in his last edition of the 'Systema Naturæ:' the species of *Upupa* recorded by him are *U. epops*, *U. promerops*, and *U. paradisea*.—*Eng. Cyc.*

(8439) UPUPA EPOPS, the Hoopoe. This is the "Εποψ of the Greeks (Aristotle, 'Hist. Anim.,' i. 1; ix. 11; ix. 15. 49; Aristophanes, 'Birds.' 228, et seq.; Pausanias, x. 4); Upupa and Epops of the Romans (Pliny, 'Nat. Hist.' x. 29; xxx. 6; Ovid, 'Metam.,' vi.). In Ovid's lines descriptive of the transformation of Tereus, the bird is drawn to the life :—

"*Tereus*, through grief, and haste to be reveng'd,
Shares the like fate, and to a bird is chang'd.
Fix'd on his head the crested plumes appear,
Long is his beak, and sharpen'd as a spear."—*Crexall.*

Two parallel rows of long feathers form an arched crest upon the head; these feathers are of a ruddy buff colour, terminated with black; This bird is found as far north in the summer as Denmark, Sweden, and Russia: and southward in continental Europe, in Germany, Holland, France, Spain, and Italy. It has been seen both at Gibraltar, Ceuta, and in Eygpt (where it breeds): it is probably an inhabitant of the whole of North Africa. It has been also observed at Madeira, and at Trebizond, in Asia Minor, from which last locality it has been sent to England and it is abunbant in India.—*Eng. Cyc.*

(8440) *Epimachus*, Cuv. Bill resembling that of *Promerops*, but the margins are obtuse and somewhat inflected; wings, tongue, and feet unknown; tail very long; side-feathers of the body greatly developed.

(8441) *Epimachus magnus* (*Upupa magna*, Gm., *U. superba*. Lath.). Body generally black or brownish-black; tail graduated, thrice as long as the body (Lesson says three feet in length, French); feathers of the sides elongated, raised, curled, glittering on their edges with steel-blue, azure. and emerald-green, like precious stones; the head and the belly lustrous also with steel-blue, &c. In truth, language fails to convey any just idea of the magnificence of this species. It inhabits the coasts of New Guinea.—*Eng. Cyc.*

(8442) URANIA, a genus of Plants belonging to the natural order *Musaceæ*. The name which the plant bears in Madagascar is Ravenala. This genus has but one species, *U. speciosa*, which is a native of Madagascar. It has a superior coloured perianth, consisting of 3 petals; a 2-leaved nectary, and one of the leaves bifid; a 3-celled many-seeded capsule, and the seeds in two rows covered with an aril. The flowers are arranged upon a spadix, which are nodding,

very similar to the bananas which belong to the same family. The leaves are arranged in a fan-shape. The seeds of this plant are said to constitute a wholesome food.—*Eng. Cyc.*

(8443) URANIA SPECIOSA. MUSACEÆ. HANDSOME URANIA. The yard of a Burmese merchant in Tavoy, is often visited by Europeans to look at what is deemed the most curious tree in the Provinces. It is frequently amusing to listen to the observations of the spectators that may not unfrequently be seen gathered around it on a fine evening. "It is a kind of a palm," says one, "do you not see that its trunk is precisely that of a palm?" This settles the question so long as the eyes are kept on the trunk; but another looks up and cries out, "No such thing! Look at its leaves. They cannot be distinguished from the leaves of a plantain tree." It belongs to the natural family of the plantain, but it has the trunk of a palm, and the leaves are not arranged around the stem like those of the plantain, but in two opposite rows, so that the whole head has the form of a gigantic fan. It is the only tree of the species that Mr. Mason has seen on the Coast, and it was brought up by its owner from Penang. It is well worthy of cultivation for a curiosity.—*Mason.* The Plantain Leafed Palm is an elegant tree, a native of Madagascar: spreads its leaves out like an open fan, forming a semicircular head. It has a short solid trunk, with leaves like a plantain; and in a border, or at the end of a walk, when growing, forms a perfect screen: its peculiar appearance strikes a person immediately when seen for the first time. It bears a small fruit like the drupe of a plantain, which is of a blueish colour. Roxburgh says—"The plant has the property of rendering water or milk, either hot or cold, mucilaginous, without altering the taste, colour, or smell, of the liquid in its former state." Butter-milk and water is often thickened with the juice of this plant and then sold as an unadulterated article of the richest and best description. Is propagated by seed and suckers. Fifteen feet space should be allowed between each tree.—*Riddell.*

(8444) URCEOLA. A genus of Plants belonging to the natural order *Apocynaceæ*, so named by Dr. Roxburgh from urceolus, 'a pitcher,' in consequence of the form of its corolla. The genus *Urceola* is confined to the Malayan peninsula and the islands of Sumatra and Penang; but as it is by some botanists considered not to differ from the *Vahea* of Madagascar, the genus may have a wider distribution. It has the calyx small, 5-partite. Corolla urceolate; tube elongated, ventricose, 5 cleft. Stamens 5, anthers sagittate. Follicles 2; numerous, glabrous.—*Eng. Cyc.*

(8445) URCEOLA ELASTICA, or Caoutchouc-Vine, is shrubby and twining, climbing over trees to a great extent, sometimes as much as 200 paces; with oval opposite leaves, and terminal panicles. From wounds made in the bark of this plant there oozes out a milky fluid, which on exposure to the open air separates into an elastic coagulum, and watery liquid apparently of no use. After the separation takes place. This coagulum is not only like American Caoutchouc, or Indian-Rubber, but possesses all the same properties as first ascertained by Dr. Roxburgh ('Asiat. Res,' v. 171.) He states that a ball of it externally has the appearance of American Caoutchouc; when cut into, it is of a light brown colour, till the action of the air darkens it. This ball, measuring 9½ inches in circumference, and weighing 7¼ ounces in simply falling from a height of 15 feet, rebounded about 10 or 12 times, which is of itself an indication of the goodness of the Caoutchouc. Dr. Roxburgh also found that slips of it were capable of bearing a greater degree of extension and contraction than the American. When they broke, the elasticity was so great, that each end returned to its respective mass. The least pressure with the finger and thumb united different portions as perfectly as if they had never been separated: this property of Caoutchouc has been considered a much more modern discovery. [INDIAN RUBBER.]—*Eng. Cyc.* A plant grows in the forests, east of Chittagong, the milk of which flows in a continuous stream resembling caoutchouc (it is probably the *Urceola elastica*, which yields Indian-rubber.)—*Hooker. Him. Jour. Vol.* II. *page* 350. *Urceola Elastica.* Roxb. As. Res. v. 169. Sumatra and Pulo Penang. A large woody climber, yields caoutchouc of the finest quality, in great abundance.—*O'Shaughnessy, page* 449.

(8446) URENA, a genus of Plants belonging to the natural order *Malvaceæ*. Like other Malvaceous plants, the species of *Urena* abound in strong and serviceable flax-like fibres, which are well fitted for conversion into cordage. *U. lobata* and *U. sinuata* are specially mentioned as employed for this purpose in India.—*Eng. Cyc.*

(8447) URENA LOBATA. URENA HEMP.

Bun-ochra, BENG. HIND.

This weed, which abounds all over the Tenasserim Coast, serves in the place of hemp in Amherst Province and appears to afford a valuable article.—*Mason.*

(8448) URENA LOBATA. BUN-OCHRA.

Wet-khyœ-pa-nai, also, Kat-sai-nai, BURM.

A weed, common in most parts of India, abounds in a strong fibre, which is a tolerably fine substitute for flax. The Urena lobata abounds along the [illegible] of province Amherst; and affords a valuable hemp.—*Mason.*

This *Fibrous Plant* is also an annual, flowering in December, but though in other respects resembling *Triumfetta*, the flower is of a light pinkish colour, and the capsules are a little larger

than those of Triumfetta lobata and differ still more in their presenting from three to five grooves, marking the detriscence, or the number of valves or parts of which the capsule is composed; but in other respects the two plants appear alike to ordinary observation, and alike also as to the value of their fibre. They are both generally found growing together, and are two of the most plentiful weeds which are to be found in Pegu. They take possession of all ground recently cleared of tree jungle about Rangoon, and extend without interruption to the Pegu and Tounghoo districts, but become scarce or only occasionally met with in the Prome and Tharawaddy districts. —*McClelland.* Both of the above are common in most parts of India, the bark yields a strong and tolerably fine substitute for flax. Roxb. III. 182.—*Rhode M. S. S.*

(8449) URENA SINUATA.

Uren, Rheede.	Kangooga, Beng. and Hind.
Palia mankena, Tel.	
Kungia, Hind.	

A weed common in most parts of India; abounds in strong fibre, a tolerably fine substitute for flox —*Royle.*

(8450) URGUJJA, a yellowish coloured perfume, made of several scented ingredients, sandal wood, wood aloes, rose water, atter of roses, civet cat perfume, and oil of Jessamine. -*Herklots.*

(8451) URJUNA BARK. A stringent bark of Terminalia alata.—*Beng. Ph. p.* 229.

(8452) URTICA (from 'uro'), a genus of Plants known under the common name of Nettle. Nettle is the same word as the anglo-Saxon 'netel' or 'nædl,' a needle, which is applied to these plants on account of their possessing small bristles or prickles which have a stinging property. This genus is the type of the natural order *Urticaceæ*. The flowers are either monœcious or dicœcious. The staminiferous flowers have a single perianth of 4 leaves, containing the rudiment of a pistil. The pistilliferous flowers have a single perianth of 2 leaves; a sessile stigma, and a dry fruit containing a single seed. Most of the species are herbaceous plants or under shrubs, and are found in Europe, Asia, and America. Three of the species, of which there are about 40, are British. The woody fibres of other species of *Urtica* are employed in making linen. The *U.* (*Bochemeria*) *nivea* yields a remarkable fine fibre, with which delicate fabrics are made in India.—*Eng. Cyc.*

On the island of Chusan, there is a species of Urtica. Both wild and cultivated, which grows about three or four feet in height, and produces a strong fibre in the bark, which is prepared by the natives and sold for the purpose of making ropes and cables.—*Fortune.*

(8453) URTICA ARGENTEA, a nettle of the Society Islands, the fibres of which are converted into cord: and of U. Japonica in Japan, its bark is made into lines, cordage and cloth. See "China Grass, Caloee."

(8454) URTICA CRENULATA. Roxb. Oman Putta, or Surat, a gigantic stinging nettle, a native of the hills and valleys on the east of Bengal; Luckipore, Pundua Hills and Assam. This nettle affords a quantity of fine white fibre of great strength, and not durable. The Hill tribes fabricate it into coarse cloths —*Royle Fib. Pl.* It grows in the Calcutta Botanic Gardens, it stings so terribly that it has sometimes occasioned very formidable sypmtoms. Another urtica, the *Daoun setan*, or demon nettle of Timor, is still more dangerous in its effects.—*O'Shaughnessy, page* 578. Where the ground is swampy, dwarf *Bandanus* abounds, with the gigantic nettle, *Urtica crenulata* ("Mealeem-ma" of Sikkim,)—*Hooker. Him. Jour. Vol* II *p.* 339. This plant is a native of the hills and valleys on the east of Bengal. Dr. Roxburgh obtained it first near Luckipore. It has since been found near the Pundua Hills. Major Hannay enumerates it among the fibrous plants of Assam. It has an erect shrubby stem, with oblong acute leaves, having the margins crenulate or slightly dentate, both sides alike, the bark armed with acute burning hairs. The sting produces great pain, extending to the armpit; abates after two or three days, but does not disappear entirely for nine days. Major Hannay says of this and another, which he enumerates as Nos. 3 and 4, and calls gigantic stinging Nettles, that they afford a quantity of fine white fibre, but apparently of no great strength, and, by report, not very lasting. Some of the Hill tribes use the fibre for fabricating coarse cloths.—*Royle Fb. Pl. p.* 66.

(8455) URTICA HETFROPHYLLA. Neilgherry nettles, Horoo Surat at Assam.

Herpha or Serpah, Bhootea.	Theng Mah, Chin.

Is the most widely diffused of the large Indian Nettles, being found in south Concan, along the Malabar Coast; the Mysore, the Neilgherries the valleys of the Himalayas; in Assam, and Burmah: It is an annual plant, the sting of which produces intense pain. The bark abounds in fine, white, glossy silk like fibres, but these probably differ with the locality in which the plant is grown, Dr. Wight describes that of the Neilgherries, as a fine soft flax like fibre, and fitted to compete with flax for the manufacture of even very fine textile fabrics. The Todavers extract it by boiling the plant, and use it as a material for making thread. Mr. Dickson passed it through his machine and liquid, which rendered it like a beautiful, soft, silky kind of flax. He calls it a wonderful fibre, of which the two would be useful for mixing with wool, as has been done with the China grass.

The *Horoo Surat* of Assam, said to be the *Urtica heterophylla* of Dr. Roxburgh, is the most widely diffused of the large Indian Nettles,

inasmuch as it is found in the Southern Concan, on the Malabar coast, and specimens of fibre of what was called *Neilgherry Nettle*, produced by *Urtica heterophylla.* were sent by Dr. Wight to the Exhibition of 1851. It is also found in Burmah and in Assam ; and along the foot of the hills extends to the Deyra Doon. It may be seen even in the northern valleys of the Himalayas. It is an annual, with erect angular stems, marked with small white specks, in which are inserted stiff, most acute bristles. The leaves are long, petioled, caudate at the base, variously lobed, and towards the top of the plant almost palmate; all are grossly serrate, armed with the same bristles as the stem and branches, from four to eight inches long and nearly as broad. Dr. Roxburgh says of it, that it is the most ferocious looking plant he has seen, and it acts up to its appearance : the least touch of any part producing most acute pain, but fortunately of short duration. The bark abounds in fine, white, glossy, silk like, strong fibre. Major Hannay says of it, that it is the *Horoo Surat* of the Assamese, and known to the Bhoteeas as the *Serpah* or *Herpah*,—that the fibre is extensively used by them in the manufacture of cloth. It was recognized by the Chinese as the *Theng Mah*, and said to be prized for the softness of its fibre, as well as for its strength. As the seeds are quick of vegetation, the cultivation of this plant, can be carried to any extent. The fibre of this Nettle, sent from the Neilgherries, is very long soft, white, and silky, and has been much admired by many of the best judges of fibres. The specimens were sent by Dr. Wight, and prepared in a rude way by boiling by the Todawars of the Neilgherry Mountains. Dr. Wight says of it, that " it produces a beautifully fine and soft flax-like fibre, which the Todawars use as a thread material, and if well prepared fitted to compete with Flax for the manufacture of very fine textile fabrics." This fibre could of course be equally well prepared in a multitude of other places, some near, others distant from the sea. Mr Marshall did not consider it well suited for his purpose. At Dundee, it was thought a very good fibre, but rather dry. Mr. Dickson, who has passed it through his machine and liquid, has rendered it like a beautiful, soft, silky kind of Flax, and calls it a wonderful fibre, of which the tow would be useful for mixing with wool, as has been done with the China-grass, and the fibre used for the finest purposes. If this should be proved to be the case on trial, it might no doubt be produced abundantly, and, with some improved process of separation, very cheaply, at easily accessible places on the Western Coast of the Indian Peninsula.—*Royle Fib. Plants, p.* 67.

The *Fibre of the Neilgherry Nettle* is supposed to be still unknown in commerce. As yet it is only obtainable in small quantity, but if called for the supply might be largely increased as the plant is abundant and widely distributed over the Indian Peninsula. It is separated by boiling the stalks.—*M.C.C.* With regard to the strength of the Nettle fibres, it has already been stated that Dr. Roxburgh found the Rami or caloee bore 240 lb., when Hemp bore 158 lb., and sunn 150 lb v. Table, Messrs. Sharpe, in 1815, found a cord bore 252 lb., when Russian Hemp was only required to bear 82 lb.; So in Dr. Royle's experiments with these fibres in an untwisted state, Petersburgh Hemp bore only 160 lb., when China-grass bore 250 lb., the Rheea 320 lb., and the Wild Rheea 343 lb., Mr. Henley had previously found the Kunkhoora or Rheea to bear about three times the weight of Russian Hemp. The Urticaceæ is a family of plants which prefer localities where there is considerable moisture of soil or climate. They grow to a gigantic size in the hot moist parts of Asia, and extend from its warm tropical islands, all along the Malayan Peninsula, along the foot and in the vallies of the Himalayas, near to the Sutlege, many of the species and genera have long been famous for the tenacity of their fibre. See CHINA-GRASS : BOEHMERIA.—*Royle.*

(8456) URTICACEÆ. Some of the fibres in the Sikkim Himmalaya of the various nettles ; are twisted for bowstrings, others as thread for sewing and weaving ; while many are eaten raw and in soups especially the numerous little succulent species.—*Hooker. Him. Jour. Vol.* I. *p.* 293.

(8457)URTICA INTERRUPTA.URTICACEÆ. This Nettle, a large annual plant, grows during the rains. The whole plant is covered with stinging hairs, like the common nettle. It grows wild : there are several indigenous species. —*Riddell.*

(8458) URTICA NIVEA is abundantly grown in the western part of one province and in the adjoining province of Kiangse. Fabrics of various degrees of fineness are made from this fibre and sold in these provinces, but Fortune had not seen any so fine as that made about Canton : it is also spun into thread for sewing purposes, and is found to be very strong and durable. There are two very distinct varieties of this plant common in Chekiang—one the cultivated, the other the wild. The cultivated variety has larger leaves than the other ; on the upper side they are of a lighter green, and on the under they are much more downy. The stems also are lighter in colour, and the whole plant has a silky feel about it which the wild one wants. The wild variety grows plentifully on sloping banks, on city walls, and other old and ruinous buildings. It is not prized by the natives, who say its fibre is not so fine, and more broken and confused in its struc-

ture than the other kind. The cultivated kind yields three crops a year. The last great crop which he observed was that of a species of juncus, the stems of which are woven into beautiful mats, used by the natives for sleeping upon, for covering the floors of rooms and for many other useful purposes. This is cultivated in water, somewhat like the rice-plant, and is therefore always planted in the lowest part of these valleys. At the time of his visit, in the beginning of July, the harvest of this crop had just commenced, and hundreds of the natives were busily employed in drying it. The river's banks, uncultivated land, the dry gravelly bed of the river, and every other available spot was taken up with this operation. At grey dawn of morning the sheaves or bundles were taken out of temporary sheds, erected for the purpose of keeping off the rain and dew, and shaken thinly over the surface of the ground. In the afternoon, before the sun had sunk very low in the horizon, it was gathered up again into sheaves and placed under cover for the night. A watch was then set in each of the sheds; for however quiet and harmless the people in these parts are, there is no lack of thieves who are very honest if they have no opportunity to steal. And so the process of winnowing went on day by day until the whole of the moisture was dried out of the reeds. They were then bound up firmly in round bundles, and either sold in the markets of the country, or taken to Ningpoo and other towns where the manufacture of mats is carried on on a large scale.—*Fortune.*

Hemp is cultivated in the provinces north of the Meiling, but the plant also grows in Fuhkien; the grasscloth made from it is not so much used for common dresses as cotton and silk. There are three Chinese plants which produce a fibre made into cloth known under this name, viz., the *Cannabis sativa* or hemp at Canton, the *Urtica nivea*, a species of nettle grown about Sucham, and the *Sida tiliæfolia* near Tientsinfu.—*Williams' Middle Kingdom, page* 106.

(8459) URTICA PULCHERRIMA. The Hill Nettle. Affords very fair samples of fibre. The plant from which this fibre is taken is deserving notice. It yields the latter long in staple and of considerable strength. On the Neilgherry Hills it is known and appreciated by both Todawers and Berghers.—*M. E. J. R.*

(8460) URTICA TENACISSIMA, like some of the other nettles, as well as the hop and the hemp, belonging to the same natural family, abounds in ligneous fibre, which may be converted into very strong cordage. This is the Caloee of Marsden, Rami of the Malays, a native of Sumatra, also of Rungpore, where it is called Kunkamis, and which Dr. Roxburgh found one of the strongest of all the vegetable fibres which he subjected to experiment. Nettle Hemp, viz., the *Urtica tenacissma*, Burmese "*Goun*" is diffused in the Neighbourhood of Ava.

It was cultivated for several years by Major Macfarquhar at Tavoy, who endeavoured to induce the natives to foster it, but it has not yet been brought into general culture. Colonel Burney said that the Burmese at Ava called it goun. —*Mason.*

(8461) URTICA VIRULENTA. a nettle occurring near Gurhwal and Simla abounding in fibre.

(8462) URTICACEÆ, *Nettles* or *Nettleworts*, a natural order of Plants. The plants belonging to this order are trees, shrubs, and herbs, yielding in some instances a milky juice. The leaves are alternate, and usually covered with asperities or with hairs furnished with a stinging secretion; the stipules are membranaceous, and are deciduous or convolute in vernation. The flowers are monœcious or diœcious, either scattered or collected together in catkins or in close heads. The calyx is membranous, lobed, or persistent. The stamens are definite in number, not united, and inserted into the calyx opposite its lobes; the anthers during æstivation are curved inwards, but are turned backwards with elasticity after bursting. The ovary is superior, containing a solitary erect or suspended ovule with a simple stigma. The fruit is either a simple indehiscent nut, surrounded by a membranous or fleshy calyx, as in *Boehmeria*; or it is a fleshy receptacle, either covered by numerous nuts lying among the persistent fleshy calyxes, as in *Dorsteina*, or the nuts are inclosed in the cavity of the receptacle, as in the Common Fig; or it may consist of a single nut covered by a succulent involucre. The embryo is straight, curved, or spiral sometimes without albumen; the cotyledons are flat, and the radicle points to the hilum. The order, as thus defined, includes several groups of plants which are frequently separated, as the *Artocarpeæ* of Robert Brown, the *Batideæ* of Martius, and the *Moreæ* of Endlicher. This order brings together plants growing all over the world, possessing very different properties, and yielding very various and useful products. The Stinging Nettles [Urtica] form the type of the order. To it belongs also the deadly Upas. [Antiaris.] The wholesome Fig, the celebrated Banyan, and species yielding deadly poisons belong to the genus *Ficus*. [Ficus.] The Bitter Hop [Humulus], the Acid Mulberry [Morus], and the Narcotic Hemp [Cannabis], and famous Cow-Tree [Cow-Tree], all belong here. The sap of many of the species, especially those belonging to the division *Artocarpeæ* is milky. [Artocarpaceæ; Moraceæ; Artocarpus; Bœhmeria; Dorstenia.]—*Eng. Cyc.*

(8463) USNEA, a genus of Plants belonging to the natural order of Lichens. The *Usnea*

plicata, in common with the *Roccella tinctoria* and other Lichens, is used as a dye.—*Eng. Cyc.*

(8464) UVARIA GRANDIFLORA ? UVARIA FRUIT. This fruit has the taste and appearance of the North America pawpaw, and they are members of the same natural family. It is the produce of a scandent shrub abounding in the Tenasserim jungles.—*Mason.*

(8465) UVARIA ODORATA. ANONACEÆ. Sweet scented Uvaria. A small tree, flowers white, delightfully fragrant, introduced from China. Native cottages on the Tenasserim Coast are often overshadowed by the sweet uvaria, whose yellow-green petals almost blend their colouring with that of the leaves.—*Mason.*

(8466) UVARIA TOMENTOSA. A tree, the fruit of which is about the size of a Nutmeg; flowers of purple colour, and hang in clusters.—*Riddell.*

V.

(8467) VACCINACEÆ, *Cranberries*, a natural order of Exogenous Plants. The species of this order are shrubby plants, with round irregularly angled stems and branches; simple entire alternate coriaceous leaves, with a solitary or racemose inflorescence. The calyx is superior and entire, or with 4, 5, or 6 lobes, sometimes deciduous. The corolla is monopetalous, and its lobes correspond to those of the calyx, and are alternated with them. The stamens are free, and are generally double the number of the lobes of the calyx, and are inserted into an epigynous disc; the anthers are terminal, 2-celled, bursting by pores, and furnished with two horns. The ovary is inferior, surrounded by the epigynous disc, 4-5-celled, with one or many seeds in each cell; the style and stigma are both simple. The seeds are very small, with a straight embryo in the midst of a fleshy albumen; the cotyledons are very short, and the radicle is long. This order is made by many botanists a section of *Ericaceæ*. It differs from *Ericaceæ* in possessing an inferior ovary and a succulent fruit. It was placed by Richard in *Escalloniaceæ*, but it differs from this order in being monopetalous.—*Eng. Cyc.*

(8468) VACCINIUM, a genus of plants, the type of the natural order *Vaccinaceæ*. This genus consists of shrubby plants with alternate membraneous leaves, often beset with resinous dots, and are either permanent or deciduous. The flowers are seated on pedicels, and are either solitary or arranged in simple racemes, generally drooping, without any odour, and tainted with various shades of red or pink. The calyx is 4-5 toothed; the corolla urceolate or campanulate, more or less deeply 4-5 cleft, with the limb reflexed; the stamens are 8 or 10 not attached to the corolla, with 2-horned anthers dehiscing at the summits, and sometimes furnished at the back with two spreading spurs or bristles; the style is longer than the stamens, and the stigma obtuse; the fruit is a berry, globose, depressed at the tope, 4- or 5-celled, many-seeded, of a black purple, bluish, or red colour, generally eatable though not always plessant or wholesome in an uncooked state. The genus consists of about 50 species, which are known by the common names of Bilberries, Whortleberries, Bleaberries, &c.—*Eng Cyc.* Dr. Wight in Icones gives Vaccinium, 1179; affine, 1190; arboreum, 1188; Donnianum, 1191; Dunalianum, 1194; Griffithianum, 1192; hirsutum, 1182; Leschenaultii, 1188; Malacca, 1186; Neilgherrense, 1189; obovatum. 1193; odontocerum, 1187; serpens, 1183; serratum, 1184-6; setigera, 1181: venosum, 1185; verticillatum, 1181; Wallichianum, 1180.

(8469) VACHELLIA, a genus of Plants belonging to the natural order *Leguminosæ*. *V. Farnesiana*, a native of the East and West Indies, exudes from its bark a considerable quantity of gum. The flowers when distilled yield a delicious perfume.—*Eng. Cyc.*

(8470) VACHELLIA FARNESIANA. Mimosa Farnesiana, Roxburgh.)

Veda vully marin, TAM.	Urimeda, SANS.
Jali mara, CAN.	Gooya.babula, HIND.

Flowers very fragrant.—*O'Shaughnessy, page* 303. An armed shrub, very common in Mysore and Dekhan, exuding much gum like the babool, which it greatly resembles in its timber, the size is very small.—*M. E. J. R.*

This pretty, tall shrub is sometimes called gum arabic tree in Calcutta, though not the true gum arabic plant, it is a favourite with the natives on the Tenasserim Coast, and it grows rapidly from seeds. The flowers are deep yellow, small, in globular heads, like the mimosa, and powerfully fragrant.—*Mason.* The true gum-arabic tree is not in the Tenasserim Provinces, but the vachellia-tree produces a gum with all the properties of the gum-arabic of commerce; and the cashew-tree, which grows all over the Provinces, "annually exudes," says Voigt, "from 5—12 pound weight, of a fine white transparent gum, like gum arabic, and not inferior to it in virtue or quality." —*Mason.* The wood is deficient in size, in other respects good.—*Rohde.*

(8471) VAGHEY, the Tamil name of a Ceylon tree which grows to about twelve inches in diameter. It is a strong wood, and is used by the natives for wheels of carts, &c.—*Edye Ceylon.*

(8472) VAHEA GUMMIFERA, of Madagascar, yields caoutchouc.—*O'Shaughnessy, page* 449.

(8473) VALERIANA, a genus of plants, the type of the natural order *Valerianaceæ*. The species of this genus are herbs or undershrubs, with very variable leaves, and mostly reddish-white corymbose flowers. The limb of the calyx is involute during flowering, but it at last unfolds itself in the form of a feathery pappus, which is seated on the inferior ovary; the corolla is infundibuliform, gibbous at the base, and 5-cleft; the stamens are 3, and the fruit is indehiscent, 1-celled, and 1-seeded. This genus presents many diversities of form, although its species are obviously closely related —*Eng. Cyc.* Wight gives Valeriana Arnottiana, 1045-6: Brunoniana, 1045; *Hookeriana*, 1045; and Leschenaultii, 1044.

(8474) VALERIANA JATAMANSI. INDIAN VALERIAN.

Balchur, HIND.

Valeriana Jatamansi, the Jatamansi valerian of the Himalayas is an efficient substitute for the European article, and is a very useful stimulant and antispasmodic remedy chiefly employed in hysteric cases. Dose, one to two ounces three times daily.—*Beng. Phar. p.* 305. See SPIKENARD; also NARDOSTACHYS.

(8475) VALERIANACEÆ, Valerian Worts, a natural order of Exogenous Plants, belonging to Lindley's Aggregose group of Monopetalous Exogens. The order is composed of annual or perennial herbs or undershrubs with opposite stipulate leaves. All the perennial species have roots more or less strongly scented, the annual are mostly inodorous. The flowers are either corymbose, panicled, or in heads, sometimes changing from one form into the other; the calyx is superior, the limb either membranous or forming a feathery pappus; the corolla is tubular 3-6-lobed regular or irregular and sometimes spurred at the base; the stamens vary in number from 1 to 5 and are inserted into the tube of the corolla alternately with its lobes; the ovary is inferior and 1-celled, with sometimes 2 imperfected and aborted cells, the ovule is solitary and pendulous: the style simple and from 1 to 3 stigmas; the embryos straight and without albumen with a superior radicle. These plants are most nearly allied to Dipsaceæ from which they are distinguished by their looser inflorescence, sensible properties, want of Albumen and the absence of an involucellum. They are remotely related to Rubiaceæ. They are natives of temperate climates or elevated positions in both the Old and new World. They are more abundant in the North of Asia Europe and South America than in Africa or North America. Valerianella; Spikenard. Nardostachys.—*Eng. Cyc. page* 1179.

(8476) VALLARIS, a genus of Plants belonging to the natural order *Apocynaceæ*. The species consist of a few twining shrubs, which are found in China, the Indian Islands, and the plains of India. Of these *V. Pergulana*, called *Echites hircosa* by Roxburgh, and common in the Indian Peninsula and Archipelago, is remarkable for its offensive goat-like smell; while *V. dichotoma*, indigenous in the North-Western Provinces, is remarkable for its agreeable odour. Its leaves are employed there as poultices.—*Eng. Cyc.* Wight gives, Vallaris dichotoma, 438; and Pergularia, 429.

(8477) VALLEY, LILY OF THE, a common name for the *Convallaria majalis*. The genus *Convallaria* has a bell-shaped 6-parted deciduous perianth; a 3-celled 2-ovalled ovary; a blunt trigonous stigma; berry with 1-seeded cells; flowers jointed to the pedicel.—*Eng. Cyc.*

(8478) *Convallaria majalis*, the Lily of the Valley, is about a foot high, with two ovate, lanceolate radical leaves. The flowers are racemose, nodding, pure white, globose, bell-shaped, and fragrant.—*Eng. Cyc.*

(8479) VALLISNERIA, a genus of Plants belonging to the natural order *Hydrocharaceæ*. The species of this genus are all water-plants. They are dicœcious: the male flowers are seated on a spadix; the corolla is monopetalous with three segments. The female flowers are included singly in a spathe, and are seated upon a spiral peduncle; the calyx is composed of a single leaf; the corolla is polypetalous; the capsules are 1-celled, many-seeded; the seeds parietal. Several species of *Vallisneria* have been recorded in Europe, Australia, and America. The economy of these plants is exceedingly interesting in a physiologieal point of view. They are plants growing at the bottom of the water, and yet the male and female flowers are separated, and the mode by which they are brought together affords a singular instance of adaption. These plants generally grow in running waters, and thus render the difficulty of the contact of their flowers greater. This is effected by the elongated peduncles of the pistilliferous flowers reaching the surface of the water when the staminiferous flowers are floating along. The *V. spiralis* is found in Italy, in ditches near Pisa, and in the Rhone. There are two Australian species, and also an American and East Indian species. The latter is the *Hydrillus* of Dr. Hamilton, and is used in Hindustan, under the name of Jangi, for the purpose of supplying water mechanically to sugar during the process of refining.—*Eng. Cyc.*

(8480) VALONIA consists of the acorn-cups of *Quercus Ægilops*, or prickly cupped oak,

growing in the Morea. As soon as the acorns are gathered, they are dried and conveyed by mules to Symrna for shipment. They are here stored in warehouses for some months in layers from 8 to 5 feet in thickness. The cups undergo a slight fermentation, and in drying, the long spreading scales which confined the acorn contract, and allow the acorn to fall from the cup. The acorns which contain no tannin are separated from the cups, and those of the latter which are damaged are also picked out. The diameter of the cups including the scales is little under 2 inches. A small kind of valonia, *camata*, bears a higher price than the common : it is somewhat richer in tannin, and is chiefly used by the silk dyers. Good valonia is thick, full grown, and bright in colour. If exposed to rain after being gathered the cups lose a portion of their tannin and become of a deeper colour. About 2 lbs. of valonia are required for the production of 1 lb. of leather, which is said to be less permeable to water than that made with oak-bark, and so heavy as to make valonia the cheapest of all tanning materials, except catechu or terra. A mixture of valonia and oak-bark may be used with good effect.

(8481) VAMPIRE. The common Vampire-Bat. [CHEIROPTERA.]

(8482) VANANGU. The Tamil name of a Ceylon tree which grows to about eighteen inches in diameter, and twelve feet in height. It is used by the native carpenters in house-work, &c; and produces a fruit which the natives eat.—*Edye, Ceylon.*

(8483) VANDA, a genus of plants, the type of the tribe *Vandeæ*, of the natural order *Orchidaceæ* Wight gives Vanda pulchella, 1671 Roxburghii, 916 spathulata, 915 Wightiana, ? 1670.

(8484) VANDA CŒRULIA. Writing of this plant Dr. Hooker says that near the village of Lernai on the Jyntea Hills, oak woods are passed, in which *Vauda cœrulea* grows in profusion, waving its panicles of azure flowers in the wind. As this beautiful orchid is at present attracting great attention, from its high price, beauty, and difficulty of culture, Dr. Hooker points out how totally at variance with its native habits is the cultivation thought necessary for it in England. The dry grassy hills which it inhabits are elevated 3000 to 4000 feet: the trees are small gnarled, and very sparingly leafy, so that the Vanda which grows on their limbs is fully exposed to sun, rain, and wind. There is no moss or lichen on the branches with the Vanda, whose roots sprawl over the dry rough bark. The atmosphere is on the whole humid, and extremely so during the rains; but there is no head, or stagnation of the air, and at the flowering season the temperature ranges between 60° and 80°, there is much sunshine, and both air and bark are dry during the day : in July and August, during the rains, the temperature is a little higher than above, but in winter it falls much lower, and hoar-frost forms on the ground. Now this winter's cold, summer's heat, and autumn's drought, and above all, this constant free exposure to fresh air and the winds of heaven, are what of all things we avoid exposing our orchids to in England. It is under these conditions, however, that all the finer Indian *Orchideæ* grow, of which we found *Dendrobium, Farmeri, Dalhousianum, Devonianum* &c., with *Vanda cœrulea*, whilst the most beautiful species of *Cœlogyne, Cymbidium, Bolbophyllum*, and *Cypripedium*, inhabit cool climates at elevations above 4000 feet in Khassia and as high as 6000 to 7000 in Sikkim. We collected seven men's loads of this superb plant the Vanda cœrulia for the Royal Gardens at Kew ; but owing to unavoidable accidents and difficulties, few specimens reached England alive. A gentlemen who sent his gardener with us to be shown the locality, was more successful : he forwarded one man's load to England on commission, and though it arrived in a very poor state, it sold for 300*l.* the individual plants fetching prices varying from 3*l.* to 10*l.* Had all arrived alive, they would have cleared 1000*l.* An active collector, with the facilities I possessed, might easily clear from 2000*l* to 3000*l.*, in one season, by the sale of Khasia orchids.—*Hooker Him. Jour* : *p.* 321.

(8485) VANDELLIA CRUSTACEA, is given in Wight's Icones.

(8486) VANDELLA DIFFUSA, a native of Brazil, thought to be found also in the peninsula of India. It is the Caaetaica of Pison, and described by Dr. Hancock as emetic, and its decoction as useful in fevers and liver complaints. —*Eng. Cyc. Vandellia diffusa* of the Isle of France, Brazil, and Yuagana, is considered of great value as an emetic and febrifuge, and in the treatment of dysentery.—*O'Sh. p.* 477.

(8487) VANGUERIA, a genus of Plants belonging to the natural order *Rubiaceæ*. The species are few in number of which the principal are *V. edulis* of Madagascar, and the Indian *V. spinosa*. Both species form small trees or shrubs, having ovate or oblong petiolate leaves, with lanceolate stipules, solitary on both sides. The fruit of *V. edulis* is eaten by the natives of Madagascar and of Mauritius, where it has been introduced, as well as into the peninsula of India. *V. spinosa*, the Mayna of the natives of Bengal, but which is found in many parts of the plains of India, is a distinct species, though united to the above by Sprengel in his ' Syst. Vegetabilium.' It is said to be also found in China. The fruit is eaten by the natives of India.—*Eng. Cyc.*

(8488) VANELLUS. [CHARADRIADÆ.]

(8489) VANGA. [LANIADÆ.]

(8490) VANGUERIA SPINOSA. THORNY VANGUERIA.

Bungaree kee lakree, also Mayna Mainphul, HIND. | Pedda munga, TEL.

Grows in the Kotah and Mewar jungles; the dried berries are given to cattle, and the fresh berries are sometimes eaten by the inhabitants.—*Genl. Med. Top. p.* 182.

(8491) VANILLA, a genus of Plants, the type of Lindley's natural order *Vanillaceæ*. The name is derived from 'vaynilla,' a diminutive of 'vayna,' which in Spanish signifies a knife or scissor-case, the fruit being long and cylindrical, and like the sheath of a knife. The species are generally supposed to be confined to Brazil, Guyana, and the West Indies, but several have been described by Schiede from Mexico. Species have also been found in Penang, Singapore and Java. The species of this genus are climbing plants, but are not epiphytic, as many of the *Orchidaceæ*, although in climbing up trees they put forth roots as holdfasts, which are capable of absorbing nutriment for the plant when other modes of supply are cut off. The leaves are fleshy, subcordate at the base, and articulated with the stem; the stem is square, and frequently climbs to a height of 20 or 30 feet; flowers are fleshy; the perianthium is articulated with the ovarium, and frequently caliculated; the sepals and petals are nearly equal, conformed and three at the base; the labellum is entire, connate with the column, concave and barbed in the middle; the column is elongated and apterous; the anthers are terminal and opercular; the pollen-masses are two bilobed and granulose; the fruit is siliquiform, fleshy, and dehiscing at the side; the placentæ, from 3-6, covered with seeds; the seeds are globose, and covered with a closely adnate testa. Lindley enumerates eight species as belonging to this genus, two of which have been found in Asia and six in America. The fruits of most of them are aromatic, and on this account have formed a considerable article of commerce from their consumption as luxury.—*Eng. Cyc.* Wight gives Vanilla aphylla, 931; Walkeriæ, 632; *Wightii*, 931.

(8492) VANILLA AROMATICA. Aromatic Vanilla, has ovate-oblong acuminate sessile leaves; perianth companulate, with five undulated acuminated laciniæ; the labellum acuminate, cucullate at the base, with an elevated naked middle line. This species is the *Epidendrum Vanilla* of Linnæus, and is a native of Brazil, and was supposed at one time to yield all the vanilla of commerce. Under this name have been included two or three species of *Vanilla*, one of which is probably the only species that yields vanilla. The vanilla which is added to chocolate, custards, and many kinds of confectionary to give them a pleasant flavour is the produce of V. aromatica.—*Eng. Cyc.*

(8493) VANILLA. sp. Dr. Falconer discovered, while on his visit to the Tenasserim Provinces in 1849, a new species of vanilla, but its specific name and description have not yet transpired. —*Mason.*

(8494) VARANIDÆ, *Varanians*, a family of Lizards, designated by Messrs. Dumeril and Bibron as Platynote or Broad-Backed Saurians and thus characterised by them:—Body very much elongated, round, and without a dorsal crest, supported on strong legs and feet, with distinct and very long but unequal toes. Tail slightly compressed, at least twice longer than the trunk. Skin furnished with enchased scales, which are tuberculous, pojecting, rounded upon the head as well as upon the back and sides, always distributed in rings or circular bands, paralled under the belly and round the tail. Tongue protractile, fleshy, similar to that of the serpents that is to say capable of elongation and of being withdrawn into a sheath, narrow, and flattened at the base, and deeply divided and separated into two points which can be divaricated as in the Ophidians. Linnæus arranged these Saurians under the great genus *Lacerta*. Daudin separated the larger portion of the species under the generic appellation of *Tupinambis*. Dr. J. E. Gray, in his 'Synopsis' (1827), arranged under his family *Varanidæ* the genera *Varanus* and *Draceæna* of Merrem, which he very well characterised. No such family as the *Varanidæ* appears in Dr. Gray's Table, published in the British Museum Synopsis (1842), and the British Museum Catalogue (1845); but the *Monitoridæ* (which are the first family of the *Leptoglossæ*, the first group of his *Sauria*) consist of the genera *Psammosaurus*, *Monitor*, *Polydædalus*, *Empagusia*, and *Hydrosaurus*. [MONITORIDÆ.] Next to the *Crocodilidæ*, the *Varanidæ* attain the greatest size of any of the Saurians; indeed Herodotos, Ælian, and others regarded them as terrestrial crocodiles. The *Varanidæ* are divisible into two distinct groups: the eminently terrestrial group, whose abode is far from the waters, in desert and sandy places; and the aquatic group, consisting of those which inhabit the banks of rivers and lakes. America claims one only,—that on which the genus *Heloderma* is founded. In Asia there are four *Varani* properly so called; three in Africa; and four in Oceania. Of these four, two have been observed in Australia, one in the isles of the Papuan Archipelago, and the fourth in the Isle of Timor. —*Eng. Cyc.*

(8495) VARNISH. A varnish is a solution of a resin or of a gum-resin in a liquid, which being spread over a surface, evaporates, and leaves the solid in the form of a brilliant, transparent film. The principal substances used in varnishes are the following:—

Solvents.	Solids.	Colours.
Oil of Nuts.	Amber. Elemi	Gamboge. Annotto.
„ Linseed.	Anime.	Dragon's blood. Red Saunders
„ Turpentine.	Copal. Benzoin	Aloes. Cochineal.
„ Rosemary.	Lac Colophony	Saffron. Indigo.
Alcohol. Ether.	Sandarach. Arcanson.	Tumeric.
Wood-naphtha or pyroligneous ether.	Mastic.	
	Damar.	
	Common resin.	

The resins, or as the Varnish-maker calls them, *gums*, may be used either singly or combined, and the same remark applies to the solvents. One of the most desirable qualities in a varnish is durability, a quality which depends greatly on the comparative insolubility of the resin employed, its hardness, toughness, and permanence of colour.

Amber is most distinguished in these respects: it resists the action of ordinary solvents, and reqnires to be fused at a high temperature, for making varnish: it is hard, and moderately tough, and its colour is scarcely acted on by the air. The objections to amber are its costliness and the length of time required for amber-varnish to dry; it does not become full hard under many weeks. [See Amber]

Anime is imported from the East Indies in chests weighing from 3 to 5 cwt. Those which contain the palest and largest gum fetch the highest price. It should be scraped by hand before being sold, but a good deal of it is *pickled* that is, cleaned from its rust-like colour, by being steeped for several days in a strong alkali, well washed with a broom and then rinsed with water. This kind sells for about one-third less than that which has been scraped with a knife. The varnish maker picks out the large, pale, transparent pieces, or they are sold separately as *body-gum*; the next best in quality is separated from the third and worst quality which is used for gold-size or japan-black. Anime is almost as insoluble and hard as amber, but not so tough: the varnish made with it dries quickly, but is liable to crack, and the colour deepens by exposure to air and light. Anime is largely used in oil varnishes, and there is a large proportion of it in *copal varnishes* on account of its drying quickly.

Copal is produced in India, America, the West Indies, Sierra Leone &c. Dr. Lindley says that "the copal of Madagascar, and probably of the East Indies generally, is furnished by *Hymenæa verrucosa*," that "*Vateria Indica* furnishes the resin called in India *copal*, (in England known by the name of *gum animi*,) and very nearly approaching the true resin of that name: in its recent and fluid state it is used as a varnish, (called *Piney* varnish,) in the south of India, and, dissolved by heat, in closed vessels, is employed for the same purpose in other parts of India; it is extremely tenacious and solid, but melts at a temperature of 97½° Fahr. Dr. Wight tells us that the natives obtain it by the simple process of cutting a notch in a tree, sloping inwards and downwards: the resin collects there, and soon hardens. ["The Vegetable Kingdom," 1846. On the Malabar coast, this resin, under the name of *Piney Dammar*, is made into candles, "which diffuse in burning an agreeable fragrance, give a clear bright light with little smoke, and consume the the wick so as not to require snuffing. Some of these candles that were sent home were highly prized and sold for very high prices." (*Wight.*) Their importation was stopped by the high duties that were levied on them.] Copal is generally imported in lumps about the size of small potatoes, of as slightly yellow tint, and often including insects and animal remains. It is often covered with a clay-like substance, from which it is freed by the dealers by scraping. The finest and palest lumps are selected for what is called *body*-gum; the next best form *carriage-gum*, and the remainder being freed from wood and stones, forms what is called *third*, or *worst quality*, and is used for gold-size or japan-black. Copal has a conchoidal fracture; it is transparent, inodorous, and tasteless. Its density varies from 1.045 to 1.139. It softens by heat without becoming viscid, and at a higher temperature fuses, partly decomposes, and gives off an aromatic odour. Copal is next in durablity to amber: the pale specimens, when made into varnish, become lighter by exposure. It is an excellent material for varnishes, and attempts have been made to use it as the basis of a spirit varnish; it is, however, so little soluble in alcohol, that when boiled therein, only a small portion dissolves, and the remainder swells and softens. It is said, however, that by reducing copal to an impalpable powder, and exposing it for about 12 months to the action of the air, it becomes soluble in alcohol, and may be used for preparing varnishes. The addition of a small quantity of camphor increases the solubility of copal in alcohol; the same effect is produced by fusing it, setting it on fire, and allowing it to burn a few minutes: these, and similar plants, however produce a very inferior varnish. Oil of rosemary is said to be one of the best solvents of copal: ether is probably the best solvent, but it evaporates so rapidly that the varnish cannot be spread equally. The oils of spruce and lavender have also been used as solvents. The three resins, amber, anime, and copal, either separately or mixed in certain proportions, are converted into varnish by fusion and the addition of linseed-oil heated nearly to its boiling point: the combination of the resin and the oil is promoted by stirring and boiling, and the required degree of fluidity in the varnish is attained by the addition of oil of turpentine. These are the most important of the *oil varnishes*;

they are the most durable, they are hard enough to bear polishing, and they possess considerable brilliancy They are used for works of the best quality, such as are exposed to the weather or to much friction, as coaches, japan-work, and house decorations.

Lac and *sandarach* form the basis of *spirit varnishes*; these resins are more soluble than amber, anime and copal; they are dissolved in spirit of wine, or pyroligneous spirit, which is cheaper. In France, where alcohol is very cheap and abundant, spirit varnishes are largely employed. [Dumas, in the seventh volume of his "Traite de Chimie," has a large collection of recipes for spirit varnishes.] They are used for cabinet and painted works not exposed to the weather. [See LAC—SANDARACH.] Lac is harder than sandarach, and is the basis of most lackers [see LACKER], and also of French polish [see FRENCH POLISH]. Sandarach is used for making a pale varnish for light-coloured woods: it may be hardened by the addition of shell-lac or of mastic if required to be kept pale; and when required to be polished, Venice turpentine is added to give it body.

Mastic is a soft resin: dissolved in spirits of wine or oil of turpentine it makes a very pale varnish: it is brilliant, works easily, and flows better on the surface than most other varnishes. It can also be removed by friction with the hand, hence its use as a picture varnish and for other delicate works. See MASTIC.

Damar is softer than mastic: it forms an almost colourless varnish with turpentine: mixed with mastic it forms a moderately hard, flexible, and almost colourless varnish adapted for maps and similar purposes.

Common resin, dissolved with the assistance of heat in turpentine or linseed oil, makes a hard, brittle, brilliant varnish, which is employed for common purposes, as in house painting, toys, cabinet work, &c. It improves the brilliancy of other varnishes, but renders them brittle unless used sparingly.

The *linseed oil*, used as the vehicle for the harder resins, should be pure, pale, well clarified, and combined with the resin at as low a temperature as possible. Unless these conditions be attended to, a dark varnish is produced which becomes darker by age. This oil gives softness and toughness to the resin, but produces a slowly drying varnish. It is clarified for the best varnishes by being gradually raised to near the boiling point in a copper pan. Fig. 2221.

Turpentine is in extensive use for varnishes, either as a vehicle for the resins or for thinning oil varnishes, in which case it is used hot The turpentine should be of the best quality, clean and limpid; it is greatly improved by age, and should be kept for months or even years. Turpentine varnishes are cheap and flexible; they dry more quickly than oil varnishes, and are of a lighter colour, but not so tough or durable. Mastic, damar, and common resin may be dissolved in oil of turpentine either cold or at a gentle heat.

Alcohol or *spirits of wine* is used as the vehicle for sandarach and shell-lac, as in the *white* and *brown hard spirit varnishes*. Spirit varnishes dry more quickly, harder and more brilliant than those made with turpentine. The spirit must contain very little water or it will not dissolve the resins; and in applying the varnishes a moderately moist atmosphere is sufficient to occasion such a precipitation of the resins as to produce a dull, cloudy, or milky effect on the varnished surface: in which case the varnish is said to be *chilled*. The varnish-maker ascertains whether the spirit is strong enough by steeping a piece of writing paper in it and setting it on fire; if the flame consume the paper the spirit is judged to be sufficiently strong; if not, it contains too much water.

Naphtha or pyroligneous ether is objectionable on account of its smell, but is used for cheap varnishes. It dissolves the resins more readily than ordinary spirit of wine, but the varnish is not so brilliant.

Copal varnish for fine paintings, &c.—Fuse 8lbs. of the cleanest pale Africa gum-copal, and when completely run fluid, pour in 2 gallons of hot oil: let it boil until it strings strongly; and in about 15 minutes, while still very hot pour in 3 gallons of turpentine obtained from the top of the cistern. There may be much loss of turpentine during the mixing, but the varnish will be so much the brighter, transparent, and fluid, and will work freer, dry quickly, and be very solid and durable when dry. If the varnish be too thick after being strained, hot turpentine is to be added before the varnish is quite cold.

Artist's virgin copal.—From a select parcel of scraped African gum-copal, before it is broken, pick out the very fine transparent pieces, which appear round and pale like drops of crystal; break these very small; dry them in the sun, or by a very gentle fire. When cool, bruise, or pound them into a coarse powder. Next, boil some broken bottles or flint glass in soft water and soda, and pound the glass into a coarse powder; boil it again, strain off the water, and wash it in 3 or 4 waters, that it may be perfectly free from grease, dry it before the fire, or in an oven. Mix 2 lbs. of powdered glass with 3 lbs. of powdered copal; put them into the gum-pot and fuse the gum, stirring all the time: the glass will prevent the gum from adhering together, so that a very moderate fire is sufficient to fuse the gum. When the gum is sufficiently run, pour in 3 quarts of very hot clarified oil. Let the varnish boil until it strings freely between the fingers. Mix it rather hotter than if it were body-varnish, for, as there is but a small quantity, it will be sooner cold. Pour in 5 quarts of old turpentine, strain it immediately,

and pour it into an open jar or large glass bottle; expose it to the air and light, but keep it from the sun and moisture until it is of sufficient age for use.

Cabinet varnish.—Fuse 7lbs. of very fine African gum-copal, and, when well run, pour in half a gallon of pale, clarified oil: when clear, mix it with 3 gallons of turpentine, and strain. This, if properly boiled, will dry in 10 minutes; but if boiled too strongly it will not mix with the turpentine; and sometimes, when boiled with the turpentine, it will mix, but will not combine with any other varnish that has been less boiled than itself. This varnish is used by japanners, cabinet, and coach painters. Animé is however generally used for cabinet varnish.

Best body copal varnish, for the body parts of coaches and other objects intended for polishing, is made by fusing 8 lbs. of fine African gum-copal, and adding 2 gallons of clarified oil. It must be boiled very slowly for 4 or 5 hours until quite stringy, and be mixed off with 3½ gallons of turpentine.

The foregoing varnishes are made of the finest copal without the addition of driers; they are the palest and best of their kind, and have great fluidity and pliability. They are, however, slow in drying, and it requires months for them to become hard enough to polish well. If the varnish is not required to be very pale, gum of second quality is used, and if required to dry quickly, sugar of lead or white copperas, singly or together, are used in the proportion of ½ lb. to 1lb. to each of the quantities given in the recipes; but the brilliancy, colour, and durability of varnishes are injured by the introduction of driers. If the varnish be required to dry and harden quickly without the use of driers, anime may be used instead of copal, but it does not form so durable a varnish, and it becomes darker by age. Anime varnish may be mixed with copal varnish in certain proportions, while both are hot. A moderately quick drying body-varnish may be made by mixing 1 part of anime with 2 parts of copal; for an inferior varnish, drying more quickly, 2 parts of anime to 1 part of copal may be mixed.

Carriage varnish for the wheels and under frame-works of coaches and other objects not requiring to be polished is made like common body-varnish, only that to 8lbs. of gum of second quality are used about 2½ gallons of oil and 5½ gallons of turpentine, with driers. This varnish is boiled until it becomes very stringy. Its quality is intermediate between body-varnish and

Wainscot varnish, which is made of 8 lbs. of animé of second quality, 3 gals. of clarified oil, ¼ lb. of litharge, ½ lb. of sugar of lead, ¼ lb. of copperas. These ingredients must be well boiled until the varnish strings very strong, and it must be mixed with 5½ gals. of turpentine. This varnish, which dries quickly, is used chiefly for house painting and japanning. It may be darkened by the addition of a small quantity of gold size.

Spirit and *turpentine* varnishes are prepared by mixing the resins and the solvent together, and agitating the whole with a stick with a number of pegs or nails driven in near the lower end until the solution is complete. The resins should be dry, and in small pieces, with the impurities picked out: the finest and clearest pieces of the gum are set aside for superior varnishes. Turpentine varnishes are made in quantities of 10 or 12 gallons: spirit varnishes from 4 to 8 gallons. In making the latter, the ingredients are sometimes put into a cask of 8 or 16 gallons' capacity, and mounted so as to revolve upon bearings at the ends. An alternating motion is given to the barrel by passing round it a cord terminating in a cross handle. When the operator pulls this cord towards him the barrel rotates, and winds the cord up in the other direction so as to be ready for a second pull, which, in like manner, winds the cord in the opposite direction, and so on. Agitation must be kept up, or the resin will agglutinate. After 3 or 4 hours, or when the solution is complete, the varnish is left for a few hours to deposit solid impurities, and is then strained through muslin or lawn into bottles. Coarsely pounded glass is sometimes added to prevent the agglutination of the resin. When heat is employed in making spirit-varnishes, the source of heat should be a water or a sand bath, and a still and worm may be used to prevent loss by evaporation, the resins and solvent in the still being kept in motion by a stirrer passing through a stuffing-box in the head. Shell-lac contains a little wax, which is apt to get diffused through the varnish when heat is applied. The inflammable nature of the ingredients will of course suggest the necessity for caution in making spirit-varnishes. The utensils employed must be quite clean and dry.

Best white hard spirit varnish, such as will bear polishing, is made by adding 2 lbs. of the best picked gum-sandarach to 1 gallon of spirits of wine, and agitating for 4 hours, until the solution is complete. 18 ozs. of Venice-turpentine, (or 9 ozs. if the work is not to be polished,) are to be moderately heated in a water-bath until quite fluid, and added to the varnish to give it body. Agitate for an hour, strain and put into bottles, which must be kept well corked. After remaining undisturbed for a week, the varnish is fit for use. If the clearest and palest pieces of gum be selected, this varnish will be pale enough for white work.

White hard varnish.—(No. I.) 3½ lbs of gum-sandarach to 1 gallon of spirits of wine, and when the solution is complete add 1 pint of pale turpentine-varnish, and shake the whole well together. (No. 2.) 2lbs. of gum-sandarach, 1 lb. of gum-mastic, and 1 gallon

of spirits of wine. *White spirit-varnish for violins.*—2 lbs. of mastic to 1 gallon of spirits of wine and 1 pint of turpentine-varnish.

Brown hard spirit varnish is similar to white hard varnish, only shell-lac is used instead of sandarach. Dissolve 9 lbs. of shell-lac in 1 gallon of spirits of wine, and then add 18 ozs. of Venice-turpentine, warmed. This varnish will bear polishing. Or, 2 lbs. of shell-lac, 1 lb. of sandarach, and 2 ozs. of mastic dissolved in 1 gallon of spirits of wine. A lighter colour is produced with 2 lbs. of sandarach, 1 lb. of shell-lac, and 1 gallon of spirit. When the solution is complete add a pint of turpentine-varnish, and agitate the whole well together. If a pale lac-varnish be required, *white* or *bleached lac* may be used. Lac-varnish may be bleached by Mr. Leming's process :—"Dissolve 5 ozs. of shell-lac in a quart of rectified spirits of wine ; boil for a few minutes with 10 ozs. of well-burnt and recently heated animal charcoal, when a small quantity of the solution should be drawn off and filtered ; if not colourless, a little more charcoal must be added. When all colour is removed, press the liquor through silk, as linen absorbs more varnish, and afterwards filter it through fine blotting-paper." [Transactions of the Society of Arts, vol. xlv. In the same volume is a recipe by Mr. G. Field for bleaching lac-varnish by means of chlorine. Dr. Hare has also published a method as follows: —" Dissolve in an iron kettle 1 part of pearlash in about 8 parts of water, add one part of shell or seed-lac, and heat the whole to ebullition. When the lac is dissolved cool the solution and impregnate it with chlorine gas till the lac is all precipitated. The precipitate is white, but the colour deepens by washing and consolidation ; dissolved in alcohol, lac bleached by this process yields a varnish which is as free from colour as any copal varnish." The application of the chlorine must be made by a person acquainted with chemistry. Hence chloride of lime is safer as a bleaching agent, the lime being afterwards dissolved out from the precipitate by the addition of muriatic acid. The precipitate is to be washed several times, dried and dissolved in alcohol with the addition of a little mastic. This varnish is very pale, but rather thin. When copal is added to spirit-varnishes in order to increase their toughness and durability (although the advantage of adding copal may be questioned), the copal should be in fine powder, the spirit very strong, and a gentle heat of about 120°, with frequent agitation, should be used. A light-coloured varnish may be made with ¼lb. of shell-lac, ¼lb. of copal, to 1 gallon of strong spirit.—*Tomlinson.*

(8496) VARNISHED WARE OF THE BURMESE. The process of making this ware has been minutely described by Major Burney, who witnessed every branch of the manufacture at Amrapura, and the museum of the Asiatic Society in London contains several specimens of various kinds, as well as a set of cups in every state from the first weaving of a few strips of bamboo to the complete formation of an elegant article of domestic economy. A description of each specimen will best explain the whole process. The first is a wooden frame of wood covered with strips of bamboo woven together so as to form a basket, which is the frame work of the intended cup ; the weaving is like that of a lady's work basket, and care is taken, that it shall be as thin and light as possible, as upon this matter the beauty and delicacy of the ware will depend ; towards the edges, the weaving is of a coarser nature, and the bamboo is made as fine as hair.

2 The basket is covered on the outside with varnish laid on with a brush, made of the husk of the cocoanut. The varnish is the essential part of the manufacture, without which nothing can be done, it is named thit-tsi (wood oil) and is procured from a tree of which there are extensive forests in the northern parts of the Burmese empire. The varnish may be gathered at all times but if taken during the flowering season which is at the beginning of the year, it does not harden well. It appears to be in many of its properties analogous to China varnish, and it affects in a similar way the health of those who prepare it : not apparently to such a degree as in China, but still enough to be very unpleasant to those unaccustomed to it who frequently find their hands blistered and their arms and faces swelled with its effects. All who use it take certain precaution against accidently swallowing any portion and they are careful to touch it with the right hand only while they take their food with the left. Some persons are more seriously affected by the varnish than others and its injurious effects appear in blotches so much resembling leprosy that the other Burmese refuse to hold intercourse with the affected person. The varnish as before remarked, is laid on with a brush, to spare the hand as far as practicable: but in all future operations on the same vessel it is laid on with the hand both in order to procure a fine surface and to enable the workman to discover and reject the minutest particles of dust. When first laid on, the varnish looks of a light brown colour, but rubbing with the hand turns it to a fine black. When the cup is varnished, it must be carefully shut up in a box to exclude the dust, and then deposited in a deep cold vault. This is said to be essential to its proper setting and with one of which every manufactory is provided. The cup is kept in the vault at least three days.

3 The third cup is advanced another step towards completion, it is covered over with a thick black paste which is intended to stop up all holes in the baskets and to give the ware a

body. Different pastes are used for this purpose but all agree in being composed of some fine powder mixed up with thit-tsi, in one sort, the powder is that of calcined bones; in another the fine saw dust of teak wood; in all cases the paste is dabbed on with the fingers, so as to hide the basket as far as the workman is able to do. The specimen under description looks black and rough, and the basket appears in several places through the paste, after this process as well as after every other in which the varnish is used in any shape, the cup is returned to its concealments in the vault, where it must remain at least three days before any subsequent operation can be proceeded.

4 The next specimen is the cup ground smooth inside. The operation is performed in a clumsy lathe, one of which is in the Asiatic Society's museum, it is more like the roller on which a jack towel is hung behind a kitchen door than the instrument we call a lathe. This roller is turned backwards and forwards with a stick and leather string like the drill bow of our workmen, and a hollow cylinder. The workman inserts the rough cup, and if it is not large enough to stick tight in it, he fixes it there by slips of bamboo, he then smears the inside of the cup with water mixed with an ochrey red earth, turns the lathe rapidly with his right hand, and presses a piece of pumice stone held in his left hand, against the inside of the cup, this process soon rubs down the rough surface of the paste, and is continued until it is quite smooth. The specimen is smooth on the inside the paste is rubbed down quite level with the basket work which appears through it, but without injury to the smooth surface. The outside of the basket is unaltered.

5 The fifth cup has undergone precisely the same operation on the outside, the only differences in the manipulation being that the cup was fastened upon a form or chuck, so as to leave the outside open to the workman, instead of being put into a basket to expose the inside.

6 This cup is covered on the inside with an additional quantity of paste of finer quality which was laid on by the workman after the outside was ground smooth, and dried in order that it might receive an additional polish on a subsequent day.

7 This specimen is covered with fine paste on the outside as well as on the inside. Its appearance is rough and black. In this stage the cup has been ground outside and in, and has also received a coat of fine varnish. This is the result of the two successive operations with the interval of at least three days between them, the grinding is performed on the lathe, as in No. 4 and 5 but instead of pumice stone, the workman employs first a piece of smooth sandstone then a rag with charcoal and water, and lastly a piece of moist cloth. The cup is dried well in the sun before the varnish is laid on, which is done with the finger.

8 This cup has received a second coat of varnish and is quite black and glossy, but not even on the surface. Thus far all the Burmese ware goes through the same processes whatever may be the style in which they are to be finished, whether black or red, plain or figured. The remaining specimens show the various modes, in which the manufactures furnish off their work, according to their own state or that of their employers.

9 The next cup is simply polished in the lathe, this is performed by turning first against a piece of smooth stone as in No 7 then by moistened rice husks, held in the hollow of the left hand against the cup while turning; thirdly by a rag dipped in well pulverised teak wood, and lastly by the hand smeared with a peculiar polishing powder, said to be made of the petrified wood of a tree. The ware thus furnished is like the black japaned ware used in Britain.

10 The ware in this specimen is red like sealing wax, not so fine as British red japanned ware, but still clear and bright. The colour is manufactured at Ava, and is said to be superior to the best Chinese vermillion, it is moistened with an oil called shazi, extracted from the *kunyen* (*Dipterocarpus turbinatus*) and then mixed ed with thit-tsi varnish. The mixture is laid upon the cup, after it has gone through the two first operations of No. 9 and nothing more is required than giving it a polish with the hand unless extraordinary lustre is desired when a mixture of shauzy and thit-tsi is applied.

Specimens 11 and 12 are engraved cups executed in the Shan or Siamese style. The engraving is done with great ingenuity and rapidity, although the only tool is a needle tied to a stick and whetted on a bit of slate. The artist holds the cup on his knees with his left hand and keeps his graver almost motionless in his right, he then dexterously turns the cup by the help of his knees to meet the graver. The Shan style consists in engraving a piece of black ware as No. 9 and filling up the hollows with vermilion, if any figures are represented they are left in relief, in the manner of wood engraving. Some grotesque figures done in this way are seen in number 12. In specimen No. 11 the hollows are not yet filled in, and the cup has a greyish appearance, arising from the light brown lines left by the graver in the polished black varnish. The vermillion is laid on as in No. 10, and after drying several days is rubbed off in the lathe with wet bran held in the hollow of the hand. The operation is generally repeated to ensure a complete filling up of all hollows and the cup is afterwards varnished and polished.

A more expeditious method called the Burman style, consists in engraving upon a red cup left as in No. 10 and filling up the hollows

with different colours, usually yellow or green, specimen 13 is engraved with grotesque Chinese looking figures, and 14 is a similar one with the lines filled with yellow or primrose, The engraving is first prepared by being varnished over, the colour is immediately rubbed in with the finger until it is quite dry, when the cup is finished sometimes a small quantity of indigo is mixed with the orpiment, which produces a green colour, several articles in the Society's museum are very finely executed in this way, some of which have both colours in the same specimen. The beauty of the engraving consists chiefly in the contrast of bright colours, and the regular interlacing of minute lines in which some specimens resemble our engine turning ; taste or drawing is totally out of the question.—*Rohde. M. S. S.*

There are other modes of preparing the varnished ware : the finer sorts are sometimes, finished with gilding or with raised figures or mouldings. These are formed of the teak wood paste mentioned in specimen 3 which is pressed when soft, into tin moulds and when dry it becomes as hard as the wood of which it was originally made. Europeans have found this paste an excellent material for making the raised work on picture frames and similar objects. Some articles are diversified by leaving portions of the basket work uncovered by the varnish, in this case the weaving is of the finest quality, and the open parts being of different patterns the effect is very good. Larger works are made of wood, joined together with teak paste, and afterwards covered in the same way as the basketwork, the only difference between the process being, that in the wood work, the first varnishing is omitted, the solid and flat surface of the wood taking the paste at once without preparation. —*Rhode M. S. S.*

(8497) VARNISHED WARE OF CHINA. RHUS VERNIX or VERNICIA, CHINESE VARNISH TREE. When Mr. Fortune prepared to take up his late residence in China, his attention was directed by the Calcutta Agricultural Society, to the Chinese varnish tree, *Rhus* species, the wax insect tree, *Fraxinus* species, and to the soap bean tree, *Cæsalpinia* species : to the various trees valuable for their fruit or timber and ornamental plants ; but above all to the green indigo (so called), *Rhamnus* species, which yielded a dye that was at that time attracting much attention in France. He says, the tree which yields the Chinese varnish is a species of Rhus which although producing an article of great value is extremely dangerous to use. The varnish is largely used in the country for giving a fine polish to tables and chairs used in the houses of the wealthy. The beautiful lacquer ware so extensively exported from Canton to foreign countries, and which is so well known and justly admired, is produced by this tree. It has the valuable property of being less liable than French polish to be injured by a heated vessel which may be placed upon it, but it is very poisonous and requires to be handled with great care by the workmen who use it. Indeed after furniture is dry it is very unsafe for certain constitutions until it has been in use for some time and the smell entirely gone. A friend of his Mr. Jones, American Consul at Foochowfoo, used some furniture which had been laquered some time and was apparently quite dry and yet he was very ill for a long time from its effects so ill that he thought he should be obliged to leave the country and go home. And this is no solitary instance, for he has known several persons suffer most severely from the same cause. —*Fortune's Residence, p.* 146. Williams, however, says the beautiful appearance of the lacquered-ware of China owes its lustrous coloring to a composition of lampblack and the clarified juice obtained from a species of sumach, called *Rhus Vernix* or *Vernicia*. Wood oils are obtained from other plants of the same family, and the different qualities of lacquered-ware are owing to the use of these inferior ingredients. The real varnish tree is described by De Guignes as resembling the ash in its foliage and bark, it is about fifteen feet in height, and furnishes the sap when seven years old, which is carefully collected from incisions in the trunk opened in the summer nights. The body of the ware is wood partially smoothed, or pasteboard, upon which two or three coats of a composition of lime, paper, and gum are first laid and thoroughly dried and rubbed. The surface of the wood is also hardened by rubbing coarse clay upon it, and afterwards scraping it off when dry. Two coatings of lamp black and wood oil, or in the finer articles, of lamp black and varnish, are laid upon the prepared wood, and after drying, the clear varnish is brushed on, one coating after another, with the utmost care, in close and darkened rooms, allowing it to dry well between the several coats. The articles are then laid by to be painted and gilded according to the fancy of customers, after which a last coating is given them. The varnish is brought to market in brownish cakes, and reduced to its proper fluidity by boiling ; it is applied to many purposes of both a varnish and paint, when it is commonly mixed with a red or brown color. A beautiful fabric of lacquered-ware is made by inlaying the nacre of fresh and saltwater shells in a rough mosaic of flowers, animals &c. into the composition and then varnishing it. Another kind, highly prized by the Chinese, is made by covering the wood with a coating of red varnish three or four lines in thickness, and then carving figures upon it in relief. The great labour necessary to produce this ware renders it expensive. A common substitute for the true varnish is the oils of the Dryandra, Jatropha, Croton, and other members of the

Euphorbiaceous family, expressed from their seeds by a variety of simple machines, consisting for the most part of different applications of power to cylinders and pestles by which the seeds are pressed or pounded. The oil, after pressing, according to De Guignes, is boiled with Spanish white in the proportion of one ounce to half a pound-of oil; as it begins to thicken, it is taken off and poured into close vessels. It dissolves in turpentine, and is used as a varnish, either clear or mixed with different colours: it defends woodwork from injury for a long time, and forms a good painter's oil. Boiled with iron rust, it forms a reddish brown varnish. In order to prevent its penetrating into the wood when used clear, and to increase the lustre a priming of lime and hog's blood simmered together into a paste is previously laid on.—*Williams' Middle Kingdom, Vol.* I. *p.* 121.

(8498) VARNISHED WARE OF INDIA. In Peninsular India the varnish used by Moocheemen for Palanquins &c., is prepared by melting *Sundaris* (a kind of *Copal* or *Anime* called by by Ainslie *Sandarach*, and mixing it with boiled linseed oil rendered drying with litharge; they do not usually add spirits of turpentine in the way prescribed for making Copal varnish in England. Mr. Rohde knows of no better or more durable polish, for Teak and Chittagong wood particularly, than may be prepared by melting three or four bits of Sundaris of the size of a walnut or small egg, and pouring upon it a bottle full of boiling linseed oil, (*Avisha noona* Tel.,) previously rendered drying by boiling litharge or other drier and after boiling them together for an hour gently adding while cooling a tea-spoonful of Venice turpentine. If too thick it may be thinned with spirits of turpentine. It should be rubbed on the furniture and after a little time, during which it may be exposed in the sun, rubbed off, the rubbing should be continued daily, and the polish should not be again applied for eight or ten days, after which it may be slightly applied every one or two months. Water does not injnre this polish and any stain or scratch may be rubbed over with the polish which cannot be done with French polish. To give the appearance of gold to silver leaf used by the Condapilly Moochies for ornamenting boxes, palanquins &c. a little aloes is dissolved in the varnish which is laid over it. A very good varnish is prepared by Moochies with shell lac and wood oil heated in small quantities.—*Rohde M. S. S.*

(8499) VATERIA, a genus of Plants belonging to the natural order *Dipterocarpaceæ*. It is characterised by having the calyx 5 cleft; segments at length at length reflexd; petals 5, oval, emarginate, twisted in the bud: stamens 40 to 50, short, inserted between the petals and the base of germ; anthers long, linear; capsule 3-valved, 1-celled, and 1-seeded; cotyledons stalked.

The species are two in number, V. *Indica*, which grows all along the Malabar coast and in Canara; and *V. lanceæfolia*, which is common in Silhet. Both species form large trees with entire smooth coriaceous leaves, and terminal panicles of white flowers; and both are valuable not only as timber-trees, but for yielding valuable, almost unique products. *V. Indica* grows to the height of about 60 feet, and yields valuable timber, which is much employed in ship-building, and is not liable to be attacked by the teredo. When the bark is wounded, a pellucid, fragant, acrid, bitter resinous fluid exudes, which in the rays of the sun becomes yellow and fragile like glass. This resin is well known in commerce, and is usually called Copal in India, but when imported into England receives the name of Gun Anime. The fluid resin also makes a good varnish, which is callee Pundum, or Liquid Copal; on the Malabar coast it is often called Piney Varnish, and the tree Piney Varnish-Tree, or Piney Marum. The dry resin, boiled with more or less oil, is used for the purposes of tar and resin; it is also employed by the natives instead of frankincence, Besides these, another valuable product is yielded by this tree, and that is a fatty substance, which is known by the name of the Piney Tallow, or Vegetable Tallow, of Canara. This is obtained by boiling the seeds, when the fatty substance floats to the surface, and on cooling down becomes of the consistence of tallow. In colour the different specimens vary from pale yellow, or fawn, to perfect white. Its general properties, such as its hardness, colour, combustibility, and fusibility, place it between wax and tallow; but it is far superior to the latter, having no disagreeable smell either when burning or at common temperatures.

(8500) VATERIA INDICA. Linn. CHLOROXYLON DUPADA. Buch. Ham.

Piney marum, TAM.	Chadacula, TEL.
Dupa marum, CAN.	Payanee, MALABAR.

This is a very large and stately tree, a native of Malabar, and lately found also in Mysore. The young shoots and all tender parts except the leaves are covered with fine stellate pubescence, leaves alternate, petioled, oblong, entire, from emarginate to obtuse, pointed, smooth, coriaceous, from four to eight inches long and two to four broad, petioles round, about an inch long; stipules oblong, panicles terminal, ramifications rather remote; flowers rather remote, pedicelled, pretty large; bractes oblong, one flowered; calyx five, cleft to the base, divisions oblong, obtuse, villous on the outside, corolla five petalled petals oval, emarginate, broader but very little longer than divisions of the calyx, filaments from 40 to 50, short, broad inserted between the petals and the base of the germ, anthers linear with a single filiform beak; germ superior, conic downy, three celled, cells containing 3 ovules

each, attached to the top of the axis, style longer than the stamens, stigma acute, pericarpium acoriaceous, fleshy, oblong, obtuse, one-celled, three-valved capsule, general size about 2½ inches long and 1½ in diameter, seed solitary of same shape as the capsule.—(*Roxb. Fl. Ind. p.* 601).

The Oil.

Piney Tallow or Doopada Oil, Eng. | Piney Yennai, Tam.

This most valuable tree, which, besides the product under consideration, yields a resin nearly equal, and furnishes an excellent building wood, grows plentifully in the jungles of the Western Coast. The oil which is perfectly solid even in hot climates, is prepared by cleaning the seeds, then roasting and grinding them into a mass. To 5 seers of seed, add 12 seers of water and boil until the oil rises to the surface. Remove the oil, stir the contents of the vessel, and allow it to stand until the following day, when more oil will be observed on the surface, which may be collected and the process repeated. The oil is principally used for lamps, but is very suitable for soaps and candle making.—*M. E. J. R.*

Doopada Resin. The Resin—exudes from the *Vateria Indica*, and constitutes piney varnish. The resin is used as a fragrant insense in Temples, the quantity procurable is very considerable.—*M E. J. R.*

No. 2. White Dammer or Piney resin (*Vateria Indica* and allied species) of Linnœus and Wight. *Choloroxylon Dupada* of Buchanan and Ainslie the *Doopada* resin of Mysore and the *Payanee* or *Piney* of the Malabars.

Variety 1. Piney resin having exuded spontaneously from the tree. Occurs in large lumps of all shapes and varying in color on the outside from a bright orange to a dull yellow, bearing evident marks of having adhered to the bark of the tree. It has a shining vitreous fracture, is very hard and bears a great resemblance to amber.

Its color (internally) is of all shades from a light green to a light yellow, the green tint predominating in the generality of specimens—It is more soluble in alcohol than the Black dammer and burns with less smoke and a more agreeable odour. It is easily distinguishable from all other Indian resins by its superior hardness, its color and amber-like appearance.

Variety 2. *White dammer or Piney resin, obtained by wounding the tree* Occurs either in small lumps or in large masses, generally of a shining appearance and balsamic smell. Has a very cellular structure which is attributable to the mode of collection. Notches being cut in the trunk of the tree sloping inwards and downwards the resin collects in the cavity and is either permitted to dry on the spot or is collected and dried by the application of heat. It is of all shades from light green to light yellow or white and is usually translucent. Specimens are sometimes seen in which from the dessication having been improperly conducted the resin is more opaque, of a dull green color, and full of air bubbles, presenting the appearance of having undergone a partial fermentation. This resin may be recognised by its cellular appearance and balsamic smell—this latter however (which is of course due to the volatile oil it contains) is gradually lost by long keeping or constant exposure to the air, what is called "East Indian copal" and sold in England as gum *anime* exudes abundantly from this tree. It occurs of all shades of color between pale green and deep yellow, the finest pieces are called *kahroba*, Arabic, Amber, and sold as *amber* in the bazars of Bengal; the resin before it hardens is the Piney varnish of Malabar. Besides the uses already alluded to, candles are made of this resin in Malabar, which Dr. Wight informs us, diffuse in burning an agreeable fragrance, give a fine clear light with little smoke, and consume the wick without snuffing. These candles were at one time introduced into England, but a very high duty having been imposed the trade ceased.

(8501) VATERIA LANCELOTA ? Vateria. A species of vateria is a common timber tree in the Provinces of Tavoy and Mergui. The timber is whiter than hopea, and equally good. Indeed, it is often called white thengan, or white hopea, the woods being only distinguished in commerce by their colour. Wallich in his list of Indian woods mentions *Hopea floribunda* as known at Tavoy by the Burmese name of *tantheya*. The tree called at Tavoy pantheya, is certainly not a species of hopea. Its flowers, in white fragrant panicles, are often seen in the Tavoy bazar, and are very unlike the yellow secund flowers of the Hopea.

(8502) VATERIA LANCEÆFOLIA is the other species, which was described by Dr. Roxburgh from Silhet, where it is called Moal. Like its congener, this also exudes a clear liquid from wounds, &c., in the bark, which soon hardens into an amber-coloured resin. From this the natives distil a dark-coloured and strong-smelling resin called Chooa, and Chova and Gond by the Brahmins, who use it as incense.—*Eng. Cyc.*

(8503) VATERIA ROXBURGHII. Indian gum anime tree. In Hindustan, *Vateria indica* produces a resin which is sometimes called copal in India, and gum anime in England; but it does not appear to be known that in the Tenasserim Provinces, another species of the same genus yields almost a precisely similar resin. When in bloom the tree is quite ornamental, and diffuses the fragrance of its flowers for a great distance around.—*Mason.* Dr. Wight gives figure Vateria Roxburghiana, 26.

(8504) VATICA ROBUSTA.

Saul Hind. | Googilam, Tel.

A wood in great repute, belonging to the *Dipterocarpeæ;* it is most valuable for house and ship building, Vats for liquids, door frames, and the rails and battens of doors; it is not suited for planks, it twists, shrinks, and warps, whenever the surface is removed, even after many years' seasoning. This wood is in general use for building purposes in the Ganjam and Vizagapatam Districts. "From Colonel Baker's excellent experiments, it appears that, compared with Teak, its strength is about 1121 to 869. From Major H. Campbell's valuable experiments, unseasoned Saul broke with 1,391lbs. It is unquestionably the most useful grown India timber for enginering purposes," (Jury Reports Great Exhibion.) broke with a weight of 1308 lbs.; seasoned saul with 1319 lbs. An another in Tenasserim refers all the species of *Vatica* to the mountains, but they have one that drops its curious winged fruit from cliffs that overhang the sea.—*Mason.* Two or three species are found in Goomsur forming extensive forests and affording to the inhabitants incense, dammer and wood oil. Judging from the imperfect specimens collected by Dr. Maxwell and Capt. McPherson, one of them belongs to Roxburgh's genus *Shorea* apparently *S. robusta.* Both these gentlemen mention *Chloroxylon dupada* as being one of them, but this is thought to be a mistake originating in a statement of Dr. Ainslie that this is the botanical name given to the Indian dammer tree by Dr. Buchanan, but which was an error of his arising from his not being aware that several trees produce dammer and that his *Chloroxylon Dupada* was already described by Linnæus under the generic name of *Vateria.* The Shoreas (Roxb.) or Vaticas (Linn) and Vaterias yield the solid product called dammer and Pinay whilst the produce of the Dipterocarps retains its fluidity and is the "wood oil" of the bazars. The Camphor tree of Sumatra is a species of *Vateria* (*Shorea camphorifera,* Roxb) The Vateria Indica (chloroxylon dupada of Buchanan and Ainslie and the Piney marum of the Hindoos) produces a resin resembling Copal, much finer than that procured from other species, natives of India, the finer specimens of which are as transparent as amber and nearly colorless. It is procured by the very simple process of cutting a notch in the tree sloping inwards and downwards. This is soon filled with the juice, which in a short time hardens by exposure to the air.

(8505) VEGETABLE IVORY, is occasionally seen in India as the knobs of walking sticks. It is imported into Europe and North America from the river Magdalina, and in some years no less than 150 tons of it were imported into England, where the nuts may be purchased for a few pence each and even at a cheaper rate, for in August 1854, 1000 were sold for 7 shillings and 6 pence. The Ivory plant is confined to the continent of South America, where it grows between the 9th degree of North and the 8th degree of South latitude and the 70th and 79° of West longitude, and is found in narrow valleys and damp localities from the coast to 3000 feet above the sea. From the kernels or albumen of the fruit, the American, as well as European turners fashion the knobs of walking sticks, the reels of spindles and little toys which are whiter than animal ivory, and equally hard when dry, but soften when placed into water. The plant is supposed to belong to Endlicher's class Spadiciflora and Lindley's alliance Arales, but Martius regards it as the type of a new natural order named Phytelephanteæ. It is called the Ivory Palm.—*Seeman.*

(8506) VEGETABLE KINGDOM. This term is applied collectively to the various forms of Plants, as the terms Animal and Mineral Kingdoms are applied to Animals and Minerals. Several methods have been proposed by DeCandolle and others for giving an idea of the distribution of vegetation over the surface of the globe. In the following remarks we have followed that of Professor Schow, in his 'Notes for a Course of Lectures on the Distribution of Plants.'

1. Region of Saxifrages and Mosses, or the Alpine Artic Flora: temperature 1·75 to 41° Fahr. This corresponds with the hyperborean region of De Candolle and other writers, and comprehends all countries within the polar circle, namely Lapland, the north of Russia and Siberia, Kamtchatka, Labrador, Greenland, and Iceland, and also part of the Scottish and Scandinavian mountains, as well as the mountains of the southern and central parts of Europe, with sufficient elevation to possess an alpine vegetation. This region is characterised by the abundance of mosses and lichens, and of the families *Saxifragaceæ, Gentianaceæ, Alsinaceæ, Saliceæ,* and *Cyperaceæ.* There is an entire absence of tropical families, and only a few plants of the temperate zone. The beech and fir occur in forests, or there is a destitution of trees. Annuals are also scarce, and the blossoms of the flower are large in proportion to the root of the plant, and of a pure colour.

2. Region of the *Umbelliferæ* and *Cruciferæ*: temperature 27·5° to 56·75°. This comprehends the whole of Europe, except those districts which belong to the preceding region, from the Pyrenees, the mountains of the south of France, of Switzerland, and the north of Greece, to the greater part of Siberia, and the country about Mount Caucasus. This region is particularly distinguished from that of the same parallel in north America by the presence of cruciferous and umbelliferous plants. It is not easily distinguished

from the next region, but the *Fungi* abound more, and it approaches the last region in the abundance of *Cyperaceæ* Nearly all its trees are deciduous, and its meadows are exceedingly flourishing. There is a division of the *Compositæ*; the plants belonging to the Cichoraceous division of that order, being found in the northern districts, whilst those belonging to the Cynarocephalous are found in the south of it. The prodominating trees are the Scotch Fir, the Alder, the Beech, the Birch, the Poplar, the Elm, and Lime. The shrubs are the Heaths, the Sloe, &c. The principal cultivated plants are the Wheat, Barley, Oats, Maize, Potatoes, &c; Apple, Pear, Gooseberry, Currant, Vine, Strawberry, Cucumber, Melon, the Cabbage, Turnip, Peas, Beans, and other forms of *Leguminosæ*; Carrots, Hops, Hemp, Flax, &c.

3. The Region of *Labiatæ* and *Caryophyllaceæ*, or the Medieterranaan kingdom: temperature 54·5° to 72·5°. This includes the region of the Mediterranean Sea, limited on the north by the Pyrences, the Alps, the Balkan, the Caucasus; on the south by the Atlas and the deserts of North Africa; on the east by Taurus. It contains more or less of the orders belonging to the last region; but *Labiatæ*, *Caryophyllaceæ*, *Boraginaceæ*, *Cistaceæ* and *Liliaceæ* abound. A few tropical plants now and then appear amongst them, belonging to the orders *Palmaceæ*, *Terebintaceæ*, and *Lauraceæ* *Solanaceæ* and *Leguminosæ* are more abundant than in the last, evergreens increase, and the vegetation never entirely ceases; but verdant meadows are more rare than in the last. Madeira, Azores, and the Canary Islands, belong to this region, and their Flora approaches to that of tropical Africa. The cultivated plants are similar to the last, to which are added the Olive, Orange, Lemon, Mulberry, Fig, Rice, &c.

4 The region of *Asteraceæ* and *Solidaginaceæ*, or northern North-American kingdom: temperature 9.5° to 59°. It embraces North America from the southern limits of the first kingdom to 36°. N. lat. There are a greater number of *Coniferæ* than in the second kingdom, and there are but few *Umbelliferæ*, *Cruciferæ*, *Cichoraceæ*, and *Cynarocephalaceæ*. There is but little cultivation: where there is any it resembles that of the second kingdom. Whortleberries, Oaks, Firs, Michaelmas Daisies, and Golden Rods are its great characteristics.

5 The Region of *Magnoliaceæ*, or Southern North-American kingdom, between 36° and 30° N. lat: temperature 59° to 72·5°. There is here an approximation to tropical vegetation, as seen in the frequent appearance of the genera *Canna*, *Chamærops* *Yucca*, *Zamia*, *Laurus*, *Bignonia*, *Passiflora*, *Cassia*, *Sapindus*, &c. There are comparatively few plants that are characteristic of the two preceding kingdoms. The Magnolias predominate, and are accompanied with other genera bearing broad shining leaves and large flowers. The cultivated plants are those of the third region, with the exception of the Olive: Rice is more abundant, and in the southern districts the Sugar-Cane is grown.

6. The Region of Camellias, and *Celastraceæ*, or Chino-Japanese kingdom. It embraces Japan and Northern China from 30° to 40° N. lat.: temperature 54-5° to 68°. Too little is known of this region to enable us to state positively what are its characteristics. Its vegetation is more tropical than European. With Zamas, Ginger, Bananas, and Custard-Apples, are found Buckthorns and Honeysuckles, thus giving this region a mixed character. Its cultivated plants, in addition to those of the previous regions, are the *Cycas* for Sago, the Tea-plant, the Caladium, &c.

7. The Region of *Zingiberaceæ*, or Indian kingdom: temperature 65·75° to 81·5°. This includes the Indian peninsulas east and west of the Ganges, together with the islands between India and Australia. Tropical orders are numerous in this region, as *Palmaceæ*, *Araceæ*, *Euphorbiaceæ*, *Bignoniaceæ*, *Bytlneriaceæ*, &c. Very few plants belonging to *Cyperaceæ*, *Coniferæ*, *Labiatæ*, *Rosaceæ*, *Ranunculaceæ*, or *Cruciferæ* are seen. The trees never lose their leaves, and produce large magnificent flowers, and are covered frequently with climbing and parasitical plant. Ginger, Zedoary, Cardamom, Arrowroot, Catechu, Cassia, Cinnamon, Caoutchouc, Tamarinds, Sago, Rice, Cocoa-Nut, Coffee, Cubebs, Cloves, Pepper, Oranges, and Gamboge, are the cultivated and natural productions of this prolific region.

8. The Regions of the Himalaya: temperature 36·5° to 65·75°. It includes the highlands of India, or the mountain terraces lying on the south of the Himalayan range, Kumaon, Nepaul, Bootan, having an elevation of from 4000 to 10,000 feet. The tropical forms of the last kingdom decrease manifestly here, such as *Scitaniaceæ*, *Palmaceæ*, *Cycadaceæ*, &c. European forms are not unfrequent, as *Cyperaceæ*, *Amentaceæ*, *Coniferæ*, *Primulaceæ*, *Rosaceæ*, *Cruciferæ*, &c. The Ferns and *Orchidaceæ* are abundant. The cultivated plants are the corn and fruit of Europe, varying with more tropical productions according to elevation.

9. The Region of *Polynesia* includes the islands between Hindustan and Australia, and has a temperature from 65·75° to 83·75°. This region is similar to the Indian kingdom, and is sometimes included in it. The cultivated plants, in addition to those of the Indian kingdom, are the Bread-Fruit-Tree, the Nutmeg, the Camphor-Tree, and the Cotton-Tree.

10. The Region of Java is little known, and has a vegetation probably similar to the Himalayan region.

11. The Oceania Region, or South Sea Is-

land kingdom, includes all the islands of the South Sea within the tropics, and has a temperature of 72·5° to 81·5°. The flora of these islands is poor, and approximates more closely to that of Asia than to that of Africa, and has some relation to that of Australia. The bread-fruit is the most characteristic production of these islands, but is not confined to them.

12. The region of *Balsomodendra*, or the Arabian kingdom, includes the south westerly mountainous part of the Arabian peninsula. The temparature cannot be stated, but the character of its vegetation is generally tropical, assuming the forms of that of India. The cultivated plants are also principally those of India.

13. The Desert Region includes North Africa south of the Atlas, and the Mediterranean Sea between 15° and 30° N. lat, and the northern part of Arabia. The mean temperature is 72° to 86° It has necessarily a very poor flora, having but few even characteristic genera. It is only cultivated in the oases, where the *Phœnix dactylifera*, the *Sorghum vulgare*, with Wheat and Barley, and some of the fruits of Europe and India, constitute the prominent plants.

15. The Region of tropical Africa includes Africa from 15° N. lat. to the tropic of Capricorn. Temperature 72°5 to 86°. This flora is neither rich nor rare ; it abounds in *Leguminosæ*, *Rubiaceæ*, and *Cyperaceæ*. The *Adansonia* is the characteristic genus.

15. The Region of *Cacti* and *Piperaceæ* includes Mexico and South America to the Amazon River, and to a height of 5000 feet above the level of the sea. Temperature 68° to 83°74. The orders which characterise this region are *Bromeliaceæ*, *Piperaceæ*, *Passifloraceæ* and *Cactaceæ*. The orders which are mostly tropical are here less numerous, whilst extra-tropical orders are more abundant. The most abundant genera are *Phytelephas*, *Kunthia*, *Thoninia*, *Theobroma*, *Guazuma &c.* The cultivated plants of this district are the Maize, *Sorghum vulgare*, *Dioscorea*, *Convolvuln* ; also the Plantain, Cocoa-Nut, Pine-Apple, Tamarind, Cacao, Vanilla, Coffee, Sugar, Tobacco, Cotton, &c.

16. The Region of the Mexican Highlands includes the mountains of Mexico above 5000 feet elevation. Temperature from 65°·75 to 79°·25. In this district the more tropical forms of vegetation, as the Tree-Ferns, the Palms; Passion-Flowers, Euphorbiums, and Pepper, decrease or altogether disappear. The extra tropical forms are more numerous, as the Willow, Oak, Fir, Cypress, Sago, Horehound, Whortle berry, Heath, and various forms of *Umbelliferæ*, *Rosaceæ*, *Caryophyllaceæ*, and *Ranunculaceæ*. The cultivated plants are maize, the European *Cerealia*, and fruits. In the highest mountain-ranges the vegetation has an alpine aspect.

17. The Region of *Cinchonaceæ*. This embraces the Andes from 5000 to 9000 feet in elevation, and between 20° S. lat., and 5° N. lat., having a temperature from 59° to 68°. The extra-tropical forms become very frequent in this region, and only a few tropical forms remain. Some of the most common genera are the *Cinchona*, *Gay-Lussacia*, *Loasa*, *Lilæa*, *Cervantesia &c.* The cultivated plants are very seldom tropical. Maize and coffee are sometimes grown, with European *Cerealia*, and fruits, Potatoes, and *Chenopodium Quinoa*.

18. The Region of Escallonias and Calceolarias includes the Andes at more than 9000 feet above the level of the sea, between 20° S. lat. and 5° N. lat. Temperature 34.25° to 59°. Tropical plants almost entirely disappear in this region, only now and then a straggler appearing ; whilst the forms which distinguish the colder and polar regions become frequent, such as the Lichens, Mosses, Sorrels, Plantagos, Gentians, Currant, Brambles, &c. The most prevalent orders are the Grasses, Heaths, and *Synantheraceæ*. There are no large trees, and a great many shrubs.

19. The West Indian Region, including the West India Islands, with a temperature of 59° to 79.25°. The vegetation of these islands bears the same relation to the continent which that of the Polynesian islands does to China. It is chiefly distinguished by the greater quantity of Ferns and *Orchidaceæ*. The cultivated plants are the same as those of Mexico.

20. The Region of Palms and *Melastomaceæ*, or Brazilian kingdom, including Brazil, or South America, on the East of the Andes, between the equator, and the tropic of Capricorn ; temperature 56° to 83·7°. This region is remarkable for the number of its genera and species, the size of individual trees, the dense forests, and the numerous climbing and parasitical plants. Vegetation seems here to attain its greatest activity and energy. The orders which abound most are *Palmaceæ*, *Homaderaceæ*, *Gesriaceæ*, *Melastomaceæ*, *Sapindaceæ* and, altogether confined to this region, *Vochyaceæ*. The cultivation is very similar to that of Mexico.

21. The Region of Woody *Compositæ*. In South America, on the east of the Andes from the tropic of Capricorn to 40° S. lat : temperature 59° to 74·75°. There are but few tropical plants in this region, and extra tropical plants, especially European forms, are abundant, more than half being common to this region and Europe. The Woody *Compositæ* abound. This region consists chiefly of plains (pampas), which for hundreds of miles present almost the same vegetation, consisting chiefly of Thistles and Grasses. Wheat, the Vine, and the Peach, are cultivated.

22. The Antarctic Region includes the south-westerly part of Patagonia, Tierra del Fuego, between 50° and 55° S. lat. : temperature 41° to 47·5°. In this region there are no tropical plants, and its vegetation resembles in a great

measure the North-European flora (region 2). In some of the genera there is an approach to the South African and Australian flora.

23. The Region of Stapelias and Mesembryanthemums. This embraces South Africa from the tropic to 35° S. lat.: temperature 54·5° to. 72·5°. The vegetation of this region is not luxuriant, but it is very rich in forms. There are no dense forests nor climbers, but many succulent plants. The orders *Restiaceæ*, *Iridaceæ*, *Proteaceæ*, *Ericaceæ*, *Ficoidaceæ*, *Bruniaceæ*, *Diosmaceæ*, *Geraniaceæ*, *Oxalidaceæ*, and *Polygalaceæ*, embrace its characteristic vegetation. On the sandy coasts the genera *Stapelia*, *Mesembryanthemum*, and *Diosma*, are found, and on the mountains *Protea*, *Erica*, and *Brassula* The cultivated plants are those of Europe, with the *Musa Paradisiaca*. *Convolvulus Batatas*, the Tamarind, and *Sorghum Caffrorum*.

24. The Region of *Eucalypti* and *Epacridaceæ*. It includes extra-tropical Australia and Van Diemen's Land: temperature 42°25 to 72°·5' Vegetation is not abundant in this region; but this deficiency is compensated by the variety and peculiarity of its forms. The most abundant of the trees are the *Eucalypti*, which form three-fourths of all the woods. Next come the genera of *Proteaceæ*, *Banksia*, *Hakea*, *Dryandra*, *Grevilleæ*, &c.: and next to these follow *Epacridaceæ*, *Diosmaceæ*, and *Casuaraceæ*. Its cultivated plants are all European.

25. The Region of New Zealand includes the two New Zealand isles: temperate, One-half of the species are European. The vegetation is not characterised by the prevalence of large groups. Some of the genera approximate the South African flora, and some the Australian. (The following works should be consulted on the geography of plants:—Linnæus, *Stationes Plantarum*; Humboldt and Bonpland, *Essai sur la Geographie des Plantes*; Humboldt *De Distributione et Geographica Plantarum*; Brown, *General Remarks on the Botany of Terra Australis*; Schouw, *Grundzuge einer Allgemeinen Pflanzen-Geographie*; Meyen, *Grundriss der Pflanizen-Geographie*; Bischoff, *Lehrbuch der Botanik*; Hooker, *in* Murray's *Dictionary of Geography*; De Candolle, art. *Geographie des Plants—Dict. des Sciences Naturelles*; Lindley, *Int. Bot.* 2nd, ed.; Meyen, *Geography of Plants*, translated for Ray Society by Miss Johnston; Balfour, *Class-Book of Botany*; Johnston, *Physical Atlas*.

(8507) VEGETABLE MARROW, or SQUASH.

Suppara Roomro, Hind.

This is a very delicate vegetable of the gourd species. The crooked-necked, when about six inches long, is well flavoured, but soon gets hard and stringy. The pear-shaped is the best of any, but must be dressed when young. Propagation only by seed, and the plants should never be removed, but remain where sown, only thinning the weakly ones. The soil should be a rich loam, the same as for cucumbers. Train the plant on sticks. It is often necessary to fertilize the female blossoms, by approaching the anthers of the male flower when charged with pollen.—*Riddell.*

(8508) VEGETABLES OF SOUTHERN INDIA. Mr. Jaffrey gives the following list.

Abelmoschus esculentus.
Achyranthes aspera.
Æschynomene aspera.
Agati grandiflora.
Alternanthera sessilis
Amarantus tenuifolius.
,, spinosus.
,, campestris.
,, tristis.
,, frumentaceus.
,, polygamus.
,, oleraceus.
,, atropurpureus.
Amorpophaluscampanulatus,
Andropogon esculentum.
Æruа lanata.
Artocarpus integrfolius.
Asystasia Coromandeliana.
Atriplex heteranthera.

Batatas edulis.
Bauhinia albida.
,, purpurea.
Bergera Kœnigii.
Boerhavia procumbens.
Bryonia coccinia,....
Byttneria herbacea.

Caladium esculentum.
Capsella bursa-pastoris.
Capsicum frutescens.
,, minimum.
Capparis brevispina.
Caralluma adescendens.
Carica papaya.
Cleome pentaphylla.
Cocos nucifera.
Commelina communis.
Coriandrum sativum
Cucurbita maxima.
,, citrullus.
,, ovifera.
Cucumus usitata
Cyamopsis psoraloides.
Cynodon dactylon.

Dillenia speciosa.
Desmanthus natans.
Dioscorea purpurea.
,, aculeata.
Dolichos ensiformis.

Erythroxylon areolatum.
Euphorbia pilulifera,
Emblica officinalis.

Ficus racemosa.
Foeniculum vulgare.

Glinus trianthemoides.
Gisekia pharnaceoides.

Hibiscus sabdariffa.
,, surattensis.
Hoya viridiflora.

Ipomœa separia.
,, reptans.
,, reniformis.

Lablab vulgaris.
Lagenaria vulgaris.
,, pipo.
Leptadenia reticulata.
Leucas aspera.

Mangifera Indica.
Momordica charantia var. muricata.
Momordica charantia.
Morinda umbellata.
Moringa pterygospermum.
Musa sapientum.

Nelumbium speciosum.

Ocymum villosum.
Oxalis corniculatus.

Pisonia morindifolia.
Portulacca oleracea.
Portulacca quadrifida.
Premna integrifolia.
,, serratifolia.
Psophocarpus tetragonolobus.

Rivea fragrans.
Rothia trifoliata.
Rumex vesicaria.

Salsola Indica.
Solanum incertum.
,, melongena.
,, Lycopersicum.
,, torvum.
Sonchus oleraceus.
Spinacia oleracea.
Spondias mangifera.
Stellaria media.
Suæda Indica.

Tamarindus Indica.
Trianthema obcordata.
Tribulus terrestris.
Trichosanthes anguina.

Vitis quadrangularis,

Webera tetrandra.

Zizyphus jujuba.

Jaffrey, p. 63.

There is a great variety of vegetables indigenous or cultivated in the Tenasserim Provinces; but the best are scarce, and rarely for sale in the bazars. Nearly every plant produces a vegetable for the natives. The Burman books say, there are ten kinds of vegetables, or pot herbs, corresponding to the parts of a plant that furnish them.—*Mason.*

(8509) VEGETABLE PRODUCTIONS OF COMMERCE. Professor Solly, in one of the series of Lectures on the results of the Great Exhibition, delivered before the Society of Arts, early in 1852, made some practical remarks bearing on the subject:—

"If (he said) you were to place before any manufacturer specimens of all the substances which could be employed in his particular manufacture, and if you could tell him from whence each could be procured, its cost, the quantities in which he might obtain it, and its physical and chemical properties, he would soon be able to select for himself the one best suited for his purposes. This, however, has never happened in relation to any one art; in every case manufacturers have had to make the best of the materials which chance or accident has brought before them. It is strange and startling, but nevertheless perfectly true, that even at the present time there are many excellent and abundant productions of nature with which not only our manufacturers, but, in some instances, even our men of science, are wholly unacquainted. *There is not a single book published which gives even tolerably complete information on any one of the different classes of vegetable raw produce at present under our consideration.* The truth of these remarks will be felt strongly by any one who takes the trouble to examine any of these great divisions of raw materials. He will obtain tolerably complete information respecting most of those substances which are known in trade and commerce; but of the greater number of those not known to the broker, he will learn little or nothing. Men of science, for the most part, look down upon such knowledge. The practical use of any substances, the wants and difficulties of the manufacturer, are regarded as mere trade questions, vulgar and low—simple questions of money. On the other hand, mere men of business do not feel the want of such knowledge, because, in the first place, they are ignorant of its existence, and secondly, because they do not see how it could aid them or their business; and if it should happen that an enterprising manufacturer desires to learn something of the cultivation and production of the raw material with which he works, he generally finds it quite impossible to obtain any really sound and useful information. In such cases, if he is a man of energy and of capital, he often is at the cost of sending out a perfectly qualified person to some distant part of the globe, to learn for him those practical details which he desires to know. This is no uncommon thing; and many cases might be stated, showing the great advantages which have arisen to those who have thus gained a march upon their neighbours."

That quaint old English poet, Herbert, who flourished in the fifteenth century, in a short poem on "Providence," has graphically described, in his unique vein, the sentiment which forces itself upon us in view of the numerous discoveries of the age in which we live:—

"All countries have enough to serve their need.
* * * *
——The Indian nut alone
Is clothing, meat and trencher, drink and can,
Boat, cable, sail, and needle, all in one."

"The addition (it has been well observed) of even a single flower, or an ornamental shrub, to those which we already possess, is not to be regarded as a matter below the care of industry and science. The more we extend our researches into the productions of nature, the more are our minds elevated by contemplating the variety as well as the exceeding beauty and excellence of the works of the Creator."-*Simmonds.*

(8510) VEGETABLE WAX was sent from Shanghae in China, from St. Domingo in the Northern parts of which the plant is indigenous, and a remarkable specimen from Japan. This substance from its high melting point and other physical characteristics has of late attracted a good deal of attention, it is admirably suited as a material for the manufacture of candles.—*Simmonds' Commercial Products, p.* 540.

(8511) VEKKALI TREE WOOD.

Vekkali maram, TAM.

A serviceable variegated hard close-grained wood employed by the Natives in house-building and also for making doors, windows, handles of instruments, &c. &c.—*Ains. Mat. Med. p.* 206.

(8512) VELASSALU. The Tamul name of the Ceylon White Iron-wood, which grows to about fourteen inches in diameter, and ten feet high. It is used by the natives for huts, poles, &c. and where strength and durability are required.—*Edye, Ceylon.*

(8513) VELATTE, the Tamul name, Ballangu, in Portuguese, of a Ceylon tree, which grows to about fourteen inches in diameter, and eight or ten feet in height. It is remarkably strong, and is used by native carpenters in vessels. It produces a fruit which is eaten by the natives.—*Edye, Ceylon.*

(8514) VELEANA; the Tamil name of a Ceylon tree which grows to about twelve inches in diameter, and eighteen feet in height. In appearance it resembles English oak. The native carpenters use it in boats and vessels' frames, knees, &c.—*Edye, Ceylon.*

(8515) VELLE AERE, the Tamil name of a Ceylon tree which is white Aere. It grows to

about twelve or eighteen inches in diameter, and twenty feet in height. It is a light wood, and is generally converted into catamarans, being considered useful for that purpose only.—*Edye. Ceylon.*

(8516) VELLE NEALEA, the Malayala name of a Ceylon tree which grows to about ten inches in diameter, and ten feet in height. The branches of this tree are very strong, and are used for the frames of native vessels.—*Edye, Ceylon.*

(8517) VELL VIEN, the Tamil name of a Ceylon tree which is about fourteen inches in diameter, and eight feet in height. Its strength and durability lead the natives to prefer it to other wood for the purpose of supports to huts.—*Edye. Ceylon.*

(8518) VELLUM. A fine, white, smooth, kind of parchment, made of calfs-skin.—*Faulkner.*

(8519) VELVET.

Velours, Fr.	Mukhmull, Guz. Hind.
Sammet, Ger.	Velluto, It.

A beautiful silken fabric, having a soft shag or pile on the outside. Velvet is also made of cotton, a strong kind of which called *Velveteen*, is used for men's apparel.—*Faulkner.*

(8520) VENDELLIA, a genus of plants belonging to the natural order *Scrophulariaceæ*. The species are natives of warm parts of the world such as India, Burma, China, and Brazil, forming smooth or hairy herbs, with tetragonal stems; leaves opposite, usually toothed.

(8521) VENERIDÆ, a family of Conchiferous *Mollusca*.

The genus *Venus* of Linnæus was arranged by him in the second section (*Bivalvia: Conchæ*) of his *Testacea Mollusca Simplicia, obtecta Testa Calcarea*, between *Donax* and *Spondylus*.

Dr. J. E. Gray places the *Veneridæ* as the first family of his order *Phyllopoda*, with the following genera:—*Artemis, Cytherea, Meroe, Gratelupia, Trigona, Chione, Circe, Dosina, Mercenaria, Anomalocardia, Cypreia, Venus, Tapes, Venerupis*, and *Clementia*.

The *Veneridæ* are immediately followed in Dr. Gray's arrangement by the *Cyrenidæ*, which comprise the following genera:—*Cyrena, Gelonia, Velorita, Cyclas*, and *Pisidium*.

The *Cardiadæ* immediately follow. Woodward, in his 'Manual,' places the *Veneridæ* between the *Cyprinidæ* and *Mactridæ*, and includes in it the following genera:—*Venus, Cytherea, Meroe, Trigona, Artemis, Lucinopsis, Tapes, Venerupis, Petricola*, and *Glaucomya*. Our limits will only permit the illustration of this family by the notice of a few Asiatic genera.

(8522) *Cyrena.*

(8523) *C. fuscata* is brownish-green, with numerous transverse subimbricate furrows; violet within and at the umbones; the lateral teeth very much elongated transversely and dentilated. It is a native of the Chinese rivers and those of the Levant.

(8524) *Megadesma.*

(8525) *M. radiatum* (*Galathea radiata*, Lam; *Potanophila radiata*, Sow.) Under the epidermis milk-white, marked with violet towards its base, and ornamented with violet rays, generally from two to four in number. It is found in the rivers of Ceylon and of India.

Cytherea occurs fossil below the Chalk.

Venus.—Shell equivalve, inequilateral, transverse, or suborbicular. Three cardinal teeth, approximated in each valve; the lateral ones diverging at the umbo. External ligament covering the external anterior fissure.

The number of species recorded by M. Deshayes in his Tables is 11 recent and 43 fossil (tertiary.) Of these *V. verrucosa, V. plicata, V. gallina, V. decussata, V. radiata, V. Brongniarti, V. dysera, V. geographica*, and *V. paphia*, are noted as recent and fossil (tertiary).—*Eng. Cyc.*

(8526) VENGA MARAM.

Yepi; Vriksha, Can.	Yapa Chettoo, Tel.

This is reckoned by the Natives of the Circars a very useful wood, it is of a reddish colour and is employed in making doors and windows and other common purposes. It is in common use both for building and for furniture in the Masulipatam district, it is a very heavy wood but not strong, when used for rafters, it should be cut very broad in comparison to its thickness.—*Rohde, M.S.S.*

(8527) VENGULA CYAM, the Tamil name of a Ceylon tree of little value. It grows to about twelve inches in diameter, and six feet high; and produces a fruit which is not made use of.—*Edye, Ceylon.*

(8528) VENTILAGO, a genus of Plants consisting of only a single species, belonging to the natural order *Rhamnaceæ*. The calyx is 5-parted; the corolla 5-petalled; stamens 5; germ 2-celled, hid in the crenulated flat disc; style 2-cleft. Samara half superior, globose, long-winged, 1-seeded; embryo erect with perisperm. The species *V. maderaspatana* is common in different parts of India, from the peninsula to the north-western provinces; it is also found in the Indian islands, as it is figured and described (Rumph., 'Herb. Amb.,' 5. t, 2) by the name of *Funis viminalis*. It forms a large climbing shrub with stiff branches; is often dicœcious, with flowers having an offensive smell, not unlike that of *Sterculia fœtida.—Eng Cyc.*

(8529) VERAETAL, the Tamil name of a Ceylon tree which grows to about fourteen inches in diameter, and eight feet high. It resembles mahogany, but is capable of a more brilliant polish; the natives use it for superior purposes. It produces a kind of fruit which is of little use.—*Edye, Ceylon.*

(8530) VERAM PELOW, the Malayala and Tamil name of a Ceylon tree known by that of Jackwood. This tree is common throughout India, and is of great value to the natives, its fruit and nuts forming a considerable part of their food. The wood when cut is yellow, but, when exposed to the air, turns as dark as mahogany, to which it is superior in brilliancy. It is generally used in articles of furniture for the Europeans, and for house-work, and is considered handsome : the largest tree of this kind which I have seen was about three feet in diameter, and from thirty to thirty-five feet high. In Canara, this was the wood which Tipu Sultan used for his vessels at Honore, where his naval depot was formed.—*Edye, Ceylon.*

(8531) VERATRUM NIGRUM. MELANTHACEÆ. This genus takes its name from the dark colour of its roots. The flowers are mostly white, dark purple, and green. It is cultivated in a rich garden soil by seed, or dividing the roots, which contain powerful medicinal properties.—*Riddell.*

(8532) VERBENACEÆ, *Verbens*, a natural order of Exogenous Plants. The species are trees or shrubs, sometimes only herbaceous plants, with generally opposite, simple, or compound leaves without stipules. The flowers are in opposite corymbs or spiked alternately, sometimes in dense heads, and very seldom axillary or solitary. The calyx is tubular, persistent, inferior ; the corolla is hypogynous, monopetalous, tubular, deciduous, generally with an irregular limb ; the stamens 4, didynamous, seldom equal, occasionally 2 ; ovary 2-4-celled ; ovules erect or pendulous, solitary or twin ; style 1 ; stigma bifid or undivided ; fruit nucamentaceous, sometimes berried, composed of two or four, nucules in a state of adhesion ; seeds erect or pendulous, albumen none, or in very small quantity ; embryo always erect. (Lindley.) The great difference between these plants and those of *Lamiaceæ* or *Labiatæ* consists in their concrete carpels, terminal style, and the absence of oil-glands from their leaves.

(8533) VERBENA, a genus of Plants, the type of the natural order *Verbenaceæ*. Most of the species of this genus are weeds, and are generally inhabitants of Europe and North America. The genus is known by a tubular calyx with 5 teeth, one of them generally shorter than the rest ; a tubular corolla with the limb rather unequal, 5-cleft ; the stamens included, and sometimes only 2 ; the seeds 2 or 4, inclosed in a thin evanescent pericarp.—*Eng. Cyc.*

These pretty little flowering plants do not endure the heat, require shelter and good drainage during the hot months. Propagated by layers and cuttings.—*Jaffrey.*

(8534) VERBENA AUBLETIA, Rose-coloured Vervain, is a native of North America, in Georgia and the Carolinas, and was first brought to Europe in 1774. It is known by its fine pink or crimson flowers.—*Eng. Cyc.*

(8535) VERBENA OFFICINALIS. Common Vervain, has 4 stamens with an erect somewhat hispid stem ; the leaves lanceolate, inciso-serrate, or trifid, with the segments cut rough ; the spikes filiform, somewhat panicled, and the flowers rather remote. This plant is common in England. It is not found in Ireland. It is an inhabitant also of Australia. This is the 'holy herb,' of Dioscorides, who ascribed great powers to it, especially in incantations, In most countries where it grows it seems to have been invested with extraordinary powers. It at one time entered into the composition of various charms and love-philters, and has even now a popular reputation for predisposing persons favourably towards those who administer a dose to them.—*Eng. Cyc.* It is a native of the warm parts of Europe, this plant is described as astringent, febrifuge, &c. but has fallen into just neglect. Still among the ancient Greeks and Gauls it held the highest place in popular estimation ; it was used to purify the altars, and formed the crowns of heralds and ambassadors. The Druids gathered it with the same marks of veneration as the misseltoe, next to which it was revered. Formerly employed extensively as a medicine it was also the base of numerous philters, or love potions, and hence derived its name of *Veneris vena*, or source of love.—*O'Shaughnessy, p.* 484. It is well known for its strong aromatic lemon scent. It grows from cuttings or layers, and no doubt would also from seed, as it blossoms freely.—*Riddell.*

(8536) VERBENA TRIPHYLLA. THE LEMON SCENTED VERBENA.

Peela-Bhungara DUK.

Lemon-Scented Vervain, has panicled spikes with minutely distantly-toothed leaves, three in a whorl ; stem shrubby. This plant is a native of Chili. It is used on the continent for making an infusion, which, when cold, is administered as a cooling drink in fevers, slight catarrhs, &c. *Eng. Cyc. Riddell.*

(8537) VERDA CANARA, the Tamil name of a Ceylon tree which grows to about twenty inches in diameter, and from forty to sixty feet high At times some of the country vessels get their masts from this tree : it is not durable or strong.—*Edye, Ceylon,*

(8538) VERDIGRIS. SUB-ACETATE OF COPPER.

Zungar, ARAB.	Zungar, PERS.
Jingal, CASH.	Jar, RUS.
Vert-de-gris, FR.	Cardenillo, Verdete, Verdegris, SP.
Grunespan, GER.	Pittalata, SANS.
Chungal, GUZ. HIND.	Vungalap-patchci, TAM.
Verderame, IT.	Zenghalie-patse, TEL.
Cupri-subacetas, LAT.	
Sennang, -MAL.	

A kind of rust of copper, of a beautiful bluish green colour, formed from the corrosion of

copper by fermented vegetables. It is extensively used by painters, and in dyeing; and to some extent in medicine —*Faulkner.*

(8539) VERDITER. A blue pigment, generally made by decomposing a solution of sulphate of copper, with the addition of chalk.—*Faulkner.*

(8540) VERJUICE.

Verjus, Fe.	Agresto. It.
Agrest. Ger.	Agraz, Sp.

A kind of harsh vinegar, made of the expressed juice of the wild-apple or crab. The term is also applied to the expressed juice of unripe grapes.—*Faulkner.*

(8541) VERMICELLI.

Meelneepen, Proppen, Dut.	Save, Guz. Hind.
Vermicelli, Fr.	Vermicelli, Tagliolini, It.
Nudeln, Ger.	Alterias Sp.
	Seme Tam. Tel.

A thready paste, formed of flour and water used in soups, &c. Indian vermicelli is eaten in a boiled state, mixed with sugar and milk.—*Faulkner. Vermicelli, or Vermichelly* is an Italian composition of various edible articles, reduced to a paste, and formed into slender wormlike pieces, from whence its name. *Locksoy* is a kind of Vermicelli, prepared from rice at Cochin China, and thence exported in considerable quantity to Japan and China, where it is much esteemed. It is transparent, and gives a consistence to soup. *Chinese Locksoy* is opaque, and less esteemed.—*Des. Comp.*

(8542) VERNANGU, the Tamil name of a Ceylon tree which is also named mast-wood. It is light, and is used by the natives for the masts and yards of small vessels. It grows to about twenty inches in diameter, and from twenty to forty feet in height. It produces a fruit or seed similar to that of the Peon.—*Edye, Ceylon.*

(8543) VERNICIA, a name applied by Loureiro to a Plant of Cochin-China, which is well known as yielding an oil, and which belongs to the same genus as another plant, also yielding an oil, in China and Japan. By Thunberg the latter plant was called *Dryandra*, but that name being appropriated to a genus of *Proteacea*, these oil-trees are now referred to the genus *Elæococca* of Commerson. This genus belongs to the natural order *Euphorbiaceæ*. *E. verrucosa* the *Dryandra oleifera* of Lamarck, and the *D. cordata* of Thunberg, is a native of Japan, where, he states, it is called Abrassin: the oil expressed from its seeds is used both as an article of diet and for affording light. The Chinese are said to call the oil Mouyeou, and the fruit from which it is obtained Mouyou. The tree cultivated in Bourbon is there called Arbre d'Huile, where an oil is likewise obtained by submitting the almonds of the seeds to pressure. *E. montana*, the *Vernicia montana* of Loureiro, is a native of China and Cochin-China: it yields a clear yellowish fatty oil, which is employed to protect wood from the influence of air and water. It is sometimes mixed with the real varnish of those countries, which it makes more liquid, but less valuable as a resin.—*Eng. Cyc.*

(8544) VERNONIA, named after W. Vernon, a genus of Plants belonging to the natural order *Compositæ*. *Vernonia* (*Serratula*, Roxb.) *anthelmintica* is a pretty, large, erect, annual species, common on dry uncultivated ground and rubbish in different parts of India, flowering during the cold season. The dark-coloured seeds are extremely bitter, and considered powerfully anthelmintic. They are also employed as an ingredient in compounds prescribed in snake-bites.—*Eng Cyc.* Dr. Wight gives Vernonia conyzoides, 829, 1376; multiflora, 1084; Neilgherrensis, 1078; pectiniformis, 1077; salviæfolia, 1072; and *Wightiana*, 1079.

(8545) VERNONIA ANTHELMINTICA, Purple Fleabane, Linn.

Caat Siragum, Tam.	Adivie Zeelacara, Tel.
Kalie Zeerie, Duk.	Kanana Zeeraka, Sans.

The Oil.

Wild cummin seed Oil, Eng.	Caat seeragum yennai, Tam.

The seeds are extremely bitter, small, and dark coloured. They are considered as powerfully anthelmintic, and are also an ingredient of a compound powder which is occasionally prescribed in cases of snake bites. Rheede tells us that an infusion of them is given on the Malabar coast, for coughs and in flatulencies. See Hort. Mal. part 2d. p. 40.—*Ains Mat. Med. p.* 74. Amongst new fibres appears a sample of Vernonia anthelmintica. It is rather hard but this may possibly be the result of bad cleaning. —*M. E. J. R.*

(8546) VERNONIACEÆ, a tribe of Plants belonging to the natural order *Compositæ*. They are distinguished from *Lactuces* by their corolla, which is not ligulate, and from every other tribe by their style, which is the same as that possessed by *Lactuceæ*. There are several genera of plants belonging to this tribe, which are chiefly inhabitants of America: there are a few in Asia and Africa, but none in Europe.—*Eng. Cyc.*

(8547) VERONICA, a genus of Plants belonging to the natural order *Scrophulariaceæ*. The species consist of herbs, undershrubs, or shrubs, with opposite, alternate, or verticillate leaves. The flowers are of a blue, white, or red colour and are arranged in spikes or racemes; calyx is campanulate or compressed, 4-5-parted; the corolla rotate, with a very short tube, a 4-parted spreading limb; all the segments entire, the upper one the broadest; the stamens are 2, situated at the sides of the upper segment of the corolla, diverging: anthers 2-celled; stigmas hardly thickened. The fruit a capsule, with a septum in the middle or bipartible. The species of the genus are exceedingly numerous; they are distributed over all parts of the world, and are

specially abundant in temperate climates. The flora of Great Britain contains about 20 species. —*Eng. Cyc.*

(8548) VERONICA. The species of this genus, are common pretty annuals, with blue flowers —cultivated in any good garden soil by seed, or division of the roots.—*Eng. Cyc.*

(8549) VERONICA BECCABUNGA. SPEEDWELL. A favourite popular remedy in Europe in coughs, chronic visceral affections, and dyspepsia. It contains a little tannic acid and mucilage, but no more remarkable ingredient. It is no longer employed in regular medical practice. —*O'Shaughnessy, p.* 478.

(8550) VERONICA OFFICINALIS. A similar plant, is officinal in the French Codex. There are several Indian species.—*O'Shaughnessy, page* 478.

(8551) VERONICA SPICATA, Spiked Speedwell, has its flowers on a spiked raceme.—*Eng. Cyc.*

(8552) VESPA MAGNIFICA, *Sm.* An enormous hornet nearly two inches long was brought to Dr. Hooker at Choongtam in Sikkim alive in a cleft-stick, lolling out its great thorn-like sting, from which drops of a milky poison distilled: its sting is said to produce fatal fevers in men and cattle, which may very well be the case, judging from that of a smaller kind, which left great pain in his hand for two days, while a feeling of numbness remained in the arm for several weeks. It is called "*Vok*" by the Lepchas the common name for any bee: its larvæ are said to be greedily eaten, as are those of various allied insects.—*Hooker, Him. Jour. Vol.* II. *p.* 26.

(8553) VESPIDÆ, a family of Insects belonging to the order *Hymenoptera*. It comprises the species of the genus *Vespa* of Linnæus, of which the common Wasp and the Hornet are familiar examples. They were formed into a family by Latreille, under the name of *Diploptera*, afterwards changed into *Diplopteryga* by Kirby. They form the third and last division of the first sub-section (*Prædones*), of the second section (*Aculeata*) of *Hymenoptera*, in Westwood's revision of Latreille's arrangement. When at rest they fold their wings throughout their entire length, whence their distinctive appellation. The wings of all the insects of the family have a similar neuration, their eyes are lunate, and there are glands at the extremity of the labrum. The four wings have one marginal and three perfect submarginal cells, with an incomplete terminal submarginal cell. Among the Wasps are insects of the most dissimilar habits; some solitary, others living in societies, some phytophagous others carnivorous. Such as are social rival the bees in the complicated instincts which regulate their societies. At first sight these great differences of manners would seem to point to a classification superior to that founded on such unimportant characters as the folding of the wings, &c. But when we find on further inquiry that the latter apparently insignificant distinctions correspond to essential modifications of structure common to all the insects of the family, we are led to conclude that among the Wasps, structure, and not economy, is the real source of essential character.

The Solitary Wasps, each species of which comprises males and females only, constitute the family *Eumenidæ*. The genera *Eumenes* and *Odynerus* belong to it. The habits of the Solitary Wasps are intersting. Reaumur informs us that the *Odynerus murarius* (*Vespa muraria*) of Linnæus makes a hole several inches deep in the sand, or in the sides of walls, constructing a tube of earthy paste, at first straight, and then curved at its entrance. In this burrow it constructs its cells, and deposits in the cavity of the interior cell from 8 to 12 little green caterpillars arranging them spirally in layers above each other. In the midst of these it deposits its eggs, then closes the mouth of the hole with the materials of the tube, which it had used as a sort of scaffold. The larvæ when hatched feed upon the caterpillars. The Social Wasps constitute the restricted family of *Vespidæ* of Westwood, the *Polistides* of Saint Fargeau. They live in numerous societies, consisting of males, females, and neuters, which are temporary, being dissolved at the approach of winter. The mandibles of the *Vespidæ* proper are not longer than broad, and are broadly and obliquely truncated at their extremities.—*Eng. Cyc.*

(8554) VIBURNUM, a genus of plants belonging to the natural order *Caprifoliaceæ*. The species consist of shrubs with opposite petiolate leaves and corymbose flowers. The limb of the calyx is 5-cleft, permanent; the corolla rotate, subcampanulate, and tubular; the fruit a berry, ovate or globose, with 1 seed by abortion, and crowned by the calycine teeth. The species are natives of Europe, America, and Asia, and are of easy culture in British gardens. Some of them were known to the Greeks and Romans, though the species have not been always identified.—*Eng. Cyc.* All the varieties of Laurustinus are hardy shrubs, are evergreen, and bear the climate of Great Britain well; most of them blossom from November till April, and sometimes during May and June.—*Eng. Cyc.* Dr. Wight gives Virburnum acuminatum, 1021; capitellatum, 1022; hebanthum, 1023; *lantana*, 1024; *opulus*, 1024; Wightianum, 1024.

(8555) VIBURNUM PLICATUM, and *V. macrocephalum* two gorgeous Chinese plants were sent to Chiswick in 845.—*Fortune's Tea districts, page* 17.

(8556) VICIA, a genus of Plants belonging to the natural order *Leguminosæ*. The species are usually climbing herbs with abruptly pinnate leaves, with many pairs of leaflets; the common petiole terminating in a tendril at the apex,

which is mostly branched; the stipules are semi sagittate in form, and the peduncles axillary, 1- or many-flowered; the calyx is tubular, 5-cleft or 5-toothed, the two upper teeth shortest; the corolla papilionaceous: the stamens diadelphous; the style filiform, being at right angles with the ovary, villous on the upper side, and on the under side beneath the apex; the legume 1-celled, many-seeded, oblong; the seeds with a lateral oval or linear hilum. The species of this genus are very numerous.—*Eng. Cyc.*

(8557) VICIA BIENNIS, Biennial Vetch, has about 12 lanceolate glabrous leaflets.

(8558) VICIA BITHYNICA, Rough Podded Purple Vetch, has stalked mostly solitary flowers.—*Eng. Cyc.*

(8559) VICIA CRACCA, Tufted Vetch.

(8560) VICIA LUTEA, Rough-Podded Yellow Vetch, has sessile solitary flowers.

(8561) VICIA PISIFORMIS, Pea-like Vetch is a quite smooth plant

(8562) VICIA SATIVA, common Vetch, or Tare, has leaves with tendrils.

(8563) VICIA SEPIUM, Bush-Vetch, has flowers mostly in fours, somewhat stalked.

(8564) VICIA SYLVATICA, the Wood Vetch, has many flowered peduncles longer than the leaves

(8565) VICOA, a genus of Plants belonging to the natural order *Compositæ*, and sub-tribe *Inuleæ*.—*Eng. Cyc.* Dr Wight gives Vicoa Indica, 1148

(8566) VICTORIA REGIA. NYMPHÆACEÆ.—"This beautiful water lily has been successfully raised in the Botanical garden at Calcutta from seed sent by Dr. Wallich from England on the 9th of September 1851. It was received and sown in the garden on the 6th of November following, where it lay in a dormant state until the 23d of April 1853. On the 13th of May same year, the seedling had made a healthy growth and was transferred on that date to the mound prepared for it in the tank. The largest leaf when planted out was little more than three inches in diameter. The total number of leaves produced up to the 5th of September were forty-four, fifteen of which were on the plant in different stages of development, when the first flower had made its appearance on the surface of the water, the largest leaf produced up to that time measured 4 feet 5½ inches in diameter. The first flower-bud appeared partly above the water on the morning of the 6th September and by sunset the same evening had partly expanded the flower which closed up the next morning, and finally opened again at sun-set the same evening."—*Journal of the Agri Horticultural Society, Cal. Vol.* 8, 1853. *Riddell.*

(8567) VILLARSIA, a genus of Plants belonging to the natural order *Gentianaceæ*, named after Villars, a French botanist. It has a 5-parted calyx: a subrotate corolla with spreading limb, the segments with a flat disc; 2-lobed stigmas, the lobes toothed; 5 hypogynous glands; a 1-celled 2-valved or valveless capsule; seeds naked, or girted with a membranous margin. There are about 16 species of this genus. These are either aquatic or marsh plants, with alternate entire leaves and yellow flowers. They are inhabitants of all parts of the world. One only is a native of Europe—*Eng Cyc.*

(8568) VILLARSIA INDICA, aristata, and nymphæoides occur in every part of India, and afford a good bitter.—*O'Sh. p.* 450.

(8569) VILLARSIA NYMPHÆOIDES, Nymphæa-like Villarsia, is a floating plant, with orbicular-cordate leaves; the peduncles single-flowered, and aggregate; the segments of the corolla ciliate. It is a native of Denmark, Holland, Sweden, Germany, Piedmont, and of Siberia. It is found in ditches and slow-running streams. It is also a native of Great Britain, though compratively a rare plant. It is found in the Thames, in the recesses of the shores near Waltom Bridge, near Botley Bridge, Godstow Bridge, and Hinksey Ferry. It occurs also in the fens of Lincolnshire and in Yorkshire. It is a beautiful plant, and may be easily cultivated. It has a large yellow flower, which is curiously plaited. It is a very abundant plant in Holland, frequently covering large tracts of the canals with its beautiful yellow flowers and dark-green leaves. —*Eng. Cyc. Vellarsia Nymphæoides* grows in every part of Hindoostan; in Cashmere it vegetates on the lakes, and is given, as food, to cows, in the belief that it increases their milk.—*Thirty five years in the East by Dr. Honig. p.* 364.

(8570) VINCA (from 'vinco,' to bind), a genus of Plants belonging to the natural order *Apocynaceæ*. It has a salver-shaped corolla, with the tube longer than the calyx, and the throat bearded; the segments of the limb flat, oblique, 5-lobed, truncate at the apex; 5 stamens inserted in the throat inclosed with short filaments. Five or six species of this genus have been described; they are creeping, suffruticose, or herbaceous plants, with smooth shining opposite leaves, with blue, purple, or white flowers, seated on solitary axillary alternate peduncles. They are natives of Europe, in shady places.—*Eng. Cyc.*

(8571) VINCA MAJOR, Greater Periwinkle. Its flowers are of a fine purple-blue colour, and are larger than those of any other species. The English name, Periwinkle, seems to be derived from the French, Pervenche. In Chaucer's time it was called Perwinke:—

> "There sprang the violet al newe,
> And fresh perwinke rich of hewe."

In olden times great virtues were attributed to the Periwinkle; amongst other things, Cul-

pepper says, "the leaves of the Periwinkle eaten by man and wife together do cause love between them." In Italy this plant is called Fiore di Morte, from the practice of making garlands of it in sorceries and incantations, hence the French still call it Violette does Sorciers.—*Eng. Cyc.*

(8572) VINCA MINOR, Lesser Periwinkle, has procumbent stems; the flowering stems usually erect. It is a native of Europe, in the same situations as the last, and is often found in Great Britain.

(8573) VINCA PUSILLA. *Syn.* V. parviflora. Roxb. Fl. Ind. ii. p. 1. Common in the East Indies. A small erect annual, stem smooth. Applied in India as an external stimulant in lumbago. *Royle.—O'Shaughnessy, p.* 448.

(8574) VINEGAR.

Khull, ARAB.	Chooka, MAL.
Tsoo, CHIN.	Sirka PERS.
Kadidia, CYNG.	Vinagre PORT.
Azyn, DUT.	Ukzus, RUS.
Vinaigre, FR.	Vinagre, SP.
Essig, GER.	Ganchica SANS.
Sirka GUZ. HIND.	Kadi, TAM.
Aceto, IT.	Polla neeloo, TEL.
Acetum, LAT.	

Is an impure Acetic Acid, of which several varieties are known in commerce, such as, wine, malt, sugar, toddy &c., vinegar. It is extensively employed for pickling, in domestic cookery &c.—*Faulkner*. Acetic Acid is the volatile principle to the presence of which, diluted with variable proportions of water, vinegar owes its aroma and pungency. This acid exists, ready formed, in notable quantity in certain plants, as Sambucus niger or black elder Phœnix dactylifera or Date tree, and Rhus typhenus. It may be readily generated by the fermentation of various vegetable and animal substances, especially the former. For commercial purposes it is made from certain vegetable and spirituous infusions, as those of the grape, malt, and the sugar cane; but any vegetable infusion capable of yielding alcohol will also, when exposed to the necessary conditions furnish vinegar. In most cases, and indeed whenever vinegar is manufactured on a large scale, and the vinous or alcoholic fermentation precedes the acetous the vinegar is formed entirely at the expense of the alcohol. But the conversion of alcohol into acetic acid it is said, ought not to be regarded as essential to acetification, since some vegetable and animal infusions become sour, from the formation of acetic acid, without any previous generation of alcohol. Acetic acid may be formed directly from the vapour of crude alcohol or spirits of wine in communication with the atmosphere, through either an ignited platinum wire, or by means of the black powder obtained by boiling protochlorine of platinum and potash with the alcohol. In Germany where the price of alcohol is very low, vinegar has been manufactured on a large scale on this principle.

The process is thus described by Dr. Ure. Under a large case, which for experimental purposes may be made of glass, several saucer-shaped dishes of pottery or wood are to be placed in rows upon shelves over each other, a few inches apart. A portion of the black platina powder, moistened, being suspended over each dish, let as much vinous spirits be put into them as the oxygen of the included air shall be adequate to acidify. This quantity may be inferred from the fact that 1000 cubic inches of air can oxygenate 110 grains of absolute alcohol, converting them into 122 grains of absolute acetic acid, and sixty four grains and a half of water. The above simple apparatus is to be set in a light place (in sunshine if convenient), at a temperature of from 68° to 86° Fahr, and the evaporation of the alcohol is to be promoted by hanging several leaves of porous paper in the case, with the bottom edges dipped in the spirit. In the course of a few minutes a most interesting phenomenon will be perceived. The mutual action of the platina and the alcohol will be displayed by an increase of temperature and a generation of acid vapours which condensing on the sides of the glass case, trickle in streams to the bottom. This striking transformation continues till all the oxygen of the air be consumed. If we wish then to renew the process we must open the case for a little and replenish it with air. With a box of twelve cubic feet in capacity and with a provision of seven or eight ounces of platina powder, we can in the course of a day convert one pint of alcohol into pure acetic acid, fit for every purpose culinary or chemical with from twenty to thirty of the platina powder, which does not waste, we may transform daily nearly 300 pounds of bad spirits into the finest vinegar. Though English revenue laws preclude the adoption of this elegant process upon the manufacturing scale in that country it may be regarded as one of the greatest triumphs of chemistry where art has rivalled nature in one of her most mysterious operations. It is therefore evident that much of the success of any process adopted for the manufacture of vinegar will depend upon the manner in which the mother liquor is exposed to the atmosphere, that is upon the constant renewal of the air and the extent of surface exposed to its action the conversion of alcohol into acetic acid taking place only on the surface of the liquid. The knowledge of the fact that atmospheric air is indispensable to acetification explains why wine and beer which when inclosed in air-tight vessels undergo no change as soon as they are exposed to the air rapidly pass into the acetous fermentation. A second necessary condition is the presence of a substance capable of exciting fermentation, that is a ferment. In vegetable infusions as those of the grape and malt, the nitrogenised principles contained in them chiefly gluten, act as the fer-

ment. Vinegar itself, vinegar yeast, lees beer yeast, leavened bread, and many other similar matters all of which contain gluten are capable of exciting fermentation and so promoting the generation of acetic acid. Experience has shown that the best ferment for inducing the transformation of alcohol into acetic acid is a portion of ready-made vinegar itself. A third condition which though not like the former essential yet greatly hastens the conversion is an increased temperature varying considerably in different cases but sometimes reaching as high as 100 Fahr. When any spirtuous liquor is exposed under the conditions requisite for acetification the following phenomena are observed to occur in succession. However clear the liquid may have been at first it quickly becomes turbid, currents or movements are soon visible in it, it is said in common language to be on the work. Slimy particles collect on the surface gradually forming a scum and which after a time falls as a sediment to the bottom. The Germans call this scum, vinegar mother, since it is capable of exciting acetification in fresh portions of liquid. During the process the temperature of the liquid rises and the peculiar aroma of vinegar becomes diffused in the surrounding air. As soon as all the alcohol has become converted into acetic acid the temperature falls to that of the atmosphere, the motion ceases, the liquid becomes clear and bright and its conversion into vinegar is complete. The four principal kinds of vinegar met with in commerce are wine vinegar, malt vinegar, sugar vinegar, and wood vinegar. The first three of these depend upon fermentation and result from the change of alcohol into acetic acid, while wood vinegar is obtained without the intervention of fermentation by the destructive distillation of wood. The principal adulterations of vinegar are, Dilution with water, the addition of sulphuric acid, the substitution of pyroligneous for acetic acid, the use of burnt sugar as a colouring agent, and occasionally the addition of acrid substances as chillies and grains of Paradise. The presence of sulphuric acid in British vinegar is not in itself to be regarded as an adulteration, since the addition of one part to a thousand is permitted by law. It is only when the quantity present exceeds this that it is to be considered as constituting an injurious and illegal adulteration. Dr. Hassall found,

1st. That the amount of acetic acid, the most important constituent of vinegar, varies greatly in different samples, the highest per-centage being 5.10 and the lowest 2.29 or less than half the first amount.

2nd. That since the standard No. 24 vinegars submitted to analysis range for the most part considerably over four per cent, vinegar to be deemed good ought to contain certainly not less than four per cent of real acid.—*Food and its adulterations, p.* 368.

(8575) *Acetum*, L. Acetum Gallicum, E. Acetum Vini, D. Vinegar, L. French or Wine Vinegar. E. D. Though the L. C. does not distinguish Foreign from British Vinegar, yet as by their tests thay required only pure Vinegar to be used, it may treated of with the Foreign Vinegar.

L. Yellowish; of a peculiar odour; f ʒ 1 saturates *Carbonate of Soda* gr. lx. and *Sol. Chloride of Barium* produces in this quantity not above 1·14 gr. of Sulph. of Baryta. Its colour is not altered by Sulphuretted Hydrogen. the Sulphate of Baryta is equivalent to the quantity of Sul. (1 part in 1000) which is allowed by the excise laws to be added. The Sulph. Hydrogen will indicate the presence of Lead. The colour and odour are indications of purity, and the Soda will prove its strength. Wine Vinegar, according to the E. P., has a Sp. Gr. of 1.014 to 1.022 Ammonia in slight excess causes a purplish muddiness, and slowly a purplish precipitate. In f ʒ iv. complete precipitation takes place of all the Sulphuric acid present with *Sol. of Nitrate of Baryta* ♏ xxx. E.

(8576) *Acetum Brittanicum*, E. British Vinegar. British Vinegars are usually much paler, but sometimes much darker, from the presence of extractive and other matters, than the White Wine Vinegar, and are deficient in aroma. They often contain a much larger than the recognised proportion of Sulphuric acid, besides some Lime. The E. P. gives as tests of its being sufficiently pure, that it has a Sp. Gr. of 1·006 to 1·0019. Sulphuretted Hydrogen does not colour it; complete precipitation takes place in f ʒ iv. with *Sol. of Nitrate of Baryta* ♏ xxx.

(8577) *Acetum Distillatum*, L. E. D. Distilled Vinegar. *Prep.* Take of *Vinegar* (French by preference, E.) Cj. (10 parts, D.), distil in a glass retort, from a sand-bath, and into a glass receiver, Ovij. (Dilute the product if necessary with *Aq. dist.* till the Sp. Gr. is 1·005, E. Reject the first tenth, and preserve the next seven-tenths, of which the Sp. Gr. is 1·005. D. By distillation, the Colouring Matter, Sulphuric acid and other impurities, being left behind, the Vinegar becomes a colourless diluted Acetic Acid, and used to be called Acetous Acid. With the acid and water rises a little of the Mucilage, and also the Ethero-Spirituous substance (or Acetic Ether ?), which characterizes all good Vinegar, and is the source of its peculiar aroma, that is, if the first part has not been unnecessarily rejected. The odour and taste of the distilled are less agreeable than that of good Vinegar.

L. "It should be entirely dissipated by heat. Nothing should be precipitated from it on the addition of Acetate of Lead, or Nitrate of Silver, or Iodide of Potassium (showing the absence of Sul and H Cl, as well as of Lead). Neither

Sulphuretted Hydrogen nor Ammonia alter its colour (showing absence both of Lead and of Copper). Silver being digested with it, nothing is precipitated on the addition of H Cl (showing absence of Ni'). 100 grs saturate Carb. of Soda grs. xiij (100 minims saturate grs. viij. Sp Gr. 1·005, E.) The Sp. Gr. of the L. distilled Vinegar is 1·007 or upwards, according to Dr. Christison. The E. C. order dilution because distilled Vinegar is often above 1·005. Vinegar of India is made from the sediment of Toddy, and is coloured artificially. The juice of the *Gomuti palm, Arenga saccharifera*, put into a jar for five days, is converted into excellent vinegar, equal in strength to that produced by the vinous fermentation of Europe. Large quantities of the palmyra toddy is converted into vinegar, in Ceylon, and used for pickling gherkins, limes, the undeveloped leaves of the Cocoa-nut and palmyra trees, and other substances.—*Royle.*

(8578) VIOLA, a genus of Plants, the type of the natural order *Violaceæ*. The sepals are unequal, 5, all more or less drawn out downwards into ear-like appendages, erect after flowering; petals 5, unequal, convolute in æstivation, with 3-nerved claws, the lower one drawn downwards into a hollow spur; stamens 5, approximate or coaretate, inserted on the top of the teeth or a pentagonal 5-toothed torus; the filaments dilated at the base, oblong or triangular, bearing the anthers low down; lobes of anthers spreading at the base; the two anterior stamens bearing on their back two nectariferous lancet shaped round or linear appendages, which are drawn within the spur. The species of this genus are exceedingly numerous.—*Eng. Cyc.* Dr. Wight gives Viola odorata, 943; Wightiana, 943; (P.) glaucesens, 1825.

(8579) VIOLACEÆ, *Violet-Worts*, a natural order of Exogenous Plants. It has the following essential characters:—Sepals 5, persistent, with an imbricate æstivation, usually elongated at the base. Petals 5, hypogynous, equal or unequal, usually withering, and with an obliquely convolute æstivation. Stamens 5, alternate, with the petals occasionally opposite them, inserted on a hypogynous disc, often unequal; anthers bilocular, bursting inwards, either separate or cohering, and lying close upon the ovary; filaments dilated, elongated beyond the anthers; two in the irregular flowers, generally furnished with an appendage or gland at their base. Ovary 1-celled, many-seeded, or rarely 1-seeded, with 3 parietal placentæ opposite the three outer sepals; style single, usually declinate, with an oblique hooded stigma. Capsule of 3 valves, bearing the placentæ in their axis. Seeds often with a tumour at their base; embryo straight erect in the axis of fleshy albumen. (Lindley.) The species are herbs, undershrubs, or shrubs with alternate rarely opposite leaves, simple, usually involute before expansion, and all furnished with stipules. The flowers are erect or drooping, axillary, seated on peduncles, which are 1-flowered, solitary, or numerous, sometimes branched.

Violaceæ are related to *Polygalaceæ*, *Dorseraceæ*, and *Passifloraceæ*. The order is divided into two tribes, *Violeæ* and *Alsodineæ*. The former chiefly inhabit Europe and America; the latter, with the exception of the genus *Pentaloba*, are natives of South America and Africa. This order embraces 11 genera and 100 species.

All the *Violaceæ* possess in a greater or less degree emetic properties, which reside principally in their roots; the principal on which this property seems to depend has been separated by Boullay from some species of *Viola*, and has been called Violina. *Viola odorata* is admitted into the Edinburgh and Dublin Pharmacopœias for the purpose of making a syrup of the flowers.

(8580) VIOLA ODORATA. Banopsha. The plant in the dry state is sold in the bazars, and is prescribed in infusion by the Hakims as a diaphoretic in the treatment of fever. It nauseates slightly, owing to its containing a very minute quantity of the principle termed *violina*, closely resembling the emetine, on which depend the virtues of the ipechacuana of Brazil. The Viola odorata, as sold in the bazar, has dry, thready, fibrous roots, a pale yellow colour, knotty, some as thick as a quill. The leaves are heart-shaped; flowers blue. The entire plant retains slightly the delightfully sweet smell characteristic of this tribe. Under the name of Begbanopsha, or violet root, and having precisely the smell of the fresh flower of our article, is sold in the bazar the well-known "orris root" or Iris florentiana. Excellent issue peas are made from this root. To obtain violina the alcoholic extract of the plant is treated with ether to dissolve some fatty and green colouring matter. The residue is boiled in water, acidulated with sulphuric acid, and the solution is precipitated by hydrated oxide of lead. The precipitate contains *violina* and oxide of lead. The mixture boiled with alcohol, and the solution evaporated, yields the violina as a pale yellow matter, which may be rendered white by washing with cold strong alcohol. The root of this violet separated from the plant and reduced to powder, proves emetic in doses of from two to four drachms made into a decoction by boiling water. The emetic operation is preceded by much nausea, and is often followed by purging. Dr. O'Shaughnessy's experience on the whole leads him to prefer as an emetic the *Crinum toxicarium*, previously described. The infusion of one drachm of the root in half a pint of water, is a very good nauseant and diaphoretic. He did not succeed in his attempt to substitute the violet root or ipecacuanha in the preparation of Dover's powder, or of Twining's antidysenteric pills. Several species of violet possess similar

properties. Royle has figured three Himalayan species, V. serpens, V. reniformis, and V. kunawurensis, the first of which is found in Mussooree, the second on the Choor mountain, the last in Kunawur.—*O'Shaughnessy, page* 208. Sweet scented violet requires a good rich soil, shelter from the sun and plenty of water, succeeds at Madras and flowers freely. Plants to be had on the Neilghery Hills. —*Jaffrey. Viole Odorata,* becomes quite acclimated in the Deccan, they are best grown in pots, and require to be moderately shaded, the morning sun being sufficient for them: the plants must be protected from the hot winds, and divided out into small bunches when transplanted. The white violet is not known in the Southern part of India, but in England the finest are generally found in calcareous soils; in India the violet seldom blossoms if grown in garden beds.—*Riddell. Viola Odorata,* Common Sweet Violet, has no stem; a hooked naked stigma; crenated smoothish roundish-cordate leaves; ovate obtuse sepals, the two lateral petals with a hairy line; the spur very blunt; the capsules turgid, hairy; seeds turbinate, whitish; the stoles creeping, long, rooting. This plant is a native throughout the whole of Europe, and in Siberia and China. It is common in England, but is a rare plant in Scotland and Ireland. Wherever this plant grows its delicious scent has made it a great favourite.—*Eng. Cyc.*

(8581) *V. Hirta,* the Hairy Violet.
(8582) *V. Canina,* Dog's Violet.
(8583) *V. Palustris,* the Marsh Violet.
(8584) *V. Lactea,* Cream-Coloured Violet.
(8585) *V. Tricolor,* Three-Coloured Violet, Heart's-Ease, or Pansy.

(8586) *V. Lutea,* Yellow Mountain Violet, or Yellow Pansy.

In the following table the distribution of 75 species, according to the form of their nectaries, is exhibited:—

Nectaries.	Europe.	Asia.	Africa.	America: North.	America: South.	Australia.	Total.
Lancet Shaped.	19	4	1	22	1	1	48
Rotund . . .	2	0	0	1	0	1	4
Linear. . . .	12	4	1	6	0	0	23

(8587) VIOLA TRICOLOR, HEARTSEASE or PANSY. The flowers of this species of violet vary much in size, some only are odorous. The colours are, as its name indicates, mixed and numerous, being from deep purple and yellow, to blue and white, crimson, &c. They are not so common in India as the Viola Odorata, although easily raised from seed which is chiefly procured from Europe.

Propagation.—By seeds and cuttings. In Europe this flower has been brought to great perfection from the mode of continual offsets. The flowers are not generally scented, but some are found so on the Neilgherry Hills. The seed should be taken as soon as the seed vessels appear round and full; they may be dried in the house and the seed preserved; if left on the plant the capsules dry and open of themselves, fresh plants springing up from the seed that drops out. Requires a light loamy vegetable soil.—*Riddell.*

(8588) VIPENIE, the Tamil name of a Ceylon tree which grows to fourteen inches in diameter, and from twelve to fifteen feet high. It is used for boat-work and house furniture. —*Edye. Ceylon.*

(8589) VIREY, the Tamil name of a Ceylon tree which grows to about twenty inches in diameter, and twelve feet high. This is very handsome, hard wood. It produces a kind of seed which is very mealy, and which the poorer classes of the natives eat as a substitute for rice. —*Edye. Ceylon.*

(8590) VIROLA SEBIFERA, a large tree of Guyana, which belongs properly to the genus *Myristica,* and is in fact by some called Nutmeg of Cayenne, and has the same properties as many of the other species of that genus. When incisions are made into the bark, a reddish glutinous juice exudes, which, when fresh, is used as a caustic, and which concentrates in time. The mace is of a red colour, and within it the kernel is of a whitish colour, which, when powdered and put into boiling water, yields a yellowish-coloured fatty substance which swims on the surface; it is caustic in taste, and has a slight odour of nutmeg. In the country candles are made of it; hence Europeans call the tree Porte Suif.—*Eng. Cyc.*

(8591) VISCUM, a genus of Parasitical Plants belonging to the natural order *Loranthaceæ,* of which one species is found wild in England. *V. album,* the Mistletoe, is in many respects a production of great interest to the physiologist. The seeds in germination seem to offer an exception to a general law, that the radicle of the embryo shoots downwards, and the plumule upwards; for it is found that the radicle of the Mistletoe invariably turns itself down upon the body to which it is attached, whatever may be the position of the surface of that body with respect to the earth. For instance, if a cannon ball, to which mistletoe-seeds are glued on all sides, be suspended by a cord some distance from the earth, both the upper and under seeds, as well as those at the sides, all direct their radicle to the surface of the ball. This property ensures their growing upon the branches of trees, to whatever side they may happen to stick. In fixing itself upon a branch, the embryo of the Mistletoe curves its radicle down upon the bark, and then adheres firmly to it, and it is a twelvemonth before the plumule begins to extend; this may be to give the radicle time to pierce the bark and introduce itself below the liber, where it expands and acts

the part of a root by attracting thence the fluids which are necessary for the support of the parasite. It is not a little remarkable that in the structure of its ovary this plant, and others of its order, should offer the singular fact of the ovule not existing at the time of impregnation, nor appearing till from six weeks to two months later. The fruit, which is covered with a viscid pulp, is made by the Italians, and even in Herefordshire, into a kind of birdlime; and as it is a favourite food of the large or Missel Thrush, it is thought to have given rise to the proverb; 'Turdus malum sibi cacat.' The plant is not of any known use to man, and is of popular interest chiefly as having been connected with Druidical superstitions. The Mistletoe of the Druids was exclusively that found upon the oak, and was possibly so much valued because of its rarity; for its appearance on that tree is now so rare, that many persons have believed the Mistletoe of the Druids either to have been some other plant or to have had no real existence. Dr Wight gives Viscum B coralloides, 1019; moniliforme, 1018; orbiculatum, 1016; ramosissimum, 1017.

(8592) VISCUM MONOICUM. No medicinal properties of any importance had been observed in the natural order of plants the Loranthaceæ until it was accidentally discovered in 1836, that the Viscum found on the nux vomica trees of Cuttack possessed all the properties of the supporting tree. As the occurrence attracted attention, and was of considerable interest in botanical physiology, the particulars in detail are as follows; In 1837, Lieut. Kittoe, then with his regiment at Cuttack, received information of the existence of a parasite on the nux vomica trees, to which extraordinary medicinal powers were attributed by the natives. They called it *Kuchila ke mulung*, held it to be an extremely powerful *narcotic*, and poisonous in small doses, and they used it in the treatment of agues and rheumatism. Mr. Kittoe having procured specimens of the leaves sent them to Dr. O'Shaughnessy, for experiment. Given in three grain doses to dogs and kids, tetanic spasms set in, in the course of from five minutes to a quarter of an hour, recurring at intervals, and proving fatal by fixing the diaphragm, and causing asphyxia.—*O'Sh. p.* 375.

(8593) VISENIA UMBELLATA. A considerable tree of great beauty, with rose coloured flowers and velvetty leaves; introduced from Sumatra, the seeds having been sent to the Horticultural Society's Garden, by Dr. Wallich.—*M. E. J. R.*

(8594) VITEX, a genus of Plants belonging to the natural order *Verbenaceæ*. It has a short campanulate 5-toothed calyx. The corolla is irregular, somewhat labiate, divided into 5 lobes. Stamens 4, didynamous, inserted into the corolla. Ovary superior, roundish; style the length of the stamens; 2-pointed and diverging stigmas The fruit is a globular berry, a little hard, with its base covered by the calyx, and divided into four single-seeded cells.—*Eng. Cyc.* Dr. Wight gives Vitex altissima, 1466; *arborea*, 1465; leucoxylon, 1467; negundo, 516; pubescens, 1465.

(8595) VITEX AGNUS CASTUS. The seeds are inodorous when entire, but when bruised their odour is acrid and disagreeable. The taste acrid and pepperish, very persistent. They are very rich in essential oil, and possess powerful stimulating properties. At Smyrna the powder strewed over sliced onion and applied to the stomach is deemed a certain remedy in colic (*Lindley*) —*O'Shaughnessy. page.* 485. In the month of February, in the tropical region below Darjeling the air is scented with the white blossoms of the *Vitex agnus castus*, which grows in profusion by the road-side.—*Hooker, Him. Jour page.* 374. *Vitex Agnus-Castus* is the longest-known species, and a native of the south of Europe, has digitate leaves of 5 or 7 nearly entire leaflets, something resembling those of the hemp-plants, and it forms a shrub of about 12 feet in height. The flowers are arranged in spiked whorls, and have an agreeable fragrance. The fruit is globular, rather smaller than black pepper, with an acrid and aromatic taste, whence it is called Petit Poivre Sauvage in the south of France. It was well known to the ancients, and forms the *Piper agrestis* of some authors. In India the fruits of the species *V. triphylla* and *V. Negundo*, which are indigenous there, have the same properties ascribed to them, and are called Filfil Burree (Wild Pepper). The ancients considered the *Vitex* anti-aphrodisiac, but the berries, from their warm aromatic taste, must be possessed rather of stimulant properties.

(8596) VITEX ALATA. A small tree found in the Naggary Hills, leaves ternate, petioles winged.—*M. E. J. R.*

(8597) VITEX ALTISSIMA. MAGELLOO.
Kat miella, TAMIL.

A large tree of great beauty, when in flower, frequent on the slopes of the Western Ghauts, reported to be fit for cabinet purposes.—*M. E. J. R. of* 1855. It is thus described by Dr. Wight. "This is a large tree frequent on "the lower slopes of the ghaut mountains, but "I am not acquainted with the timber except in "so far as can be learned from a small outside "specimen which seems close grained. It is re-"ported fit for cabinet purposes." It would be desirable to learn more of this tree. A specimen formerly grew in Dr. Anderson's garden near the College bridge in Madras. Roxburgh describes the wood of one of its congeners V. arborea, common in the Northern Circars, as of a chocolate color, when old, exceedingly hard and durable.—*M. E. J. R. of* 1857.

(8598) VITEX ARBOREA.
Boosi, TEL.

A native of the mountainous parts of the Circars,

Chittagong &c. where it grows to be a very large tree, flowering time the hot season: the seed ripens during the rains. The wood of this tree when old is of a chocolate colour exceedingly hard and durable which renders it useful for various purposes (Roxb.)—*Rohde M S.S.* This species of vitex is very common at Maulmain, and produces a valuable small timber. Roxburgh says: "Wood when old, chocolate coloured, very hard, and durable."

(8599) VITEX LEUCOXYLON.

Karril, RHEED.

A native of Ceylon, Coromandel and the mountains of Chittagong, flowering time April.—*Rhode, M.S.S.*

(8600) VITEX NEGUNDO.

Noochie, TAM.	Nisinda, HIND.
Nergundi, BENG.	Wayalakoo, TEL.
Shumbali DUK.	Sinduya. and
Fenjengisht, ARAB.	Sindhooka. SANS.

In India a decoction of the aromatic leaves is used as the warm bath for women after delivery. (*Roxb.*) In medicinal qualities it is similar to, but weaker than V. Agnus castus. The decoction of the root is a pleasant bitter and is given in cases of intermittent fever. The warm leaves are stated by Mr. Sherwood to be a useful application in rheumatism or sprains. The Mahomedans are in the habit of smoking the dried leaves in cases of head-ache and catarrh. Fruit considered vermifuge in Behar.—*O'Shaughnessy, page* 435.

(8601) VITEX, *Species.* A tree of considerable size, a native of the forests in the interior parts of Coromandel.—*Rohde, M.S.S.*

(8602) VITEX TRIFOLIA. Roxb. Fl. Ind. iii. p. 69.

Neer nochie, TAM.	Neela vavilie, TEL.
Panee ke shumbalie, DUK.	Caranosi, RHEEDE.
Ussel ke abee. ARAB.	Jala nergundi and Sinduvara, SANS.
Nisindha also Seduaree, HIND.	Neergoonda. DUK.

Young shoots round and villous. Leaves slightly bitter, but of delightfully aromatic taste and smell; are deemed powerful external applications in rheumatism, sprains, &c. The powdered leaves are said to cure intermittent fevers. The fruit in powder is given usually in electuary, or decoction, for amenorrhœa and several other diseases. It is a common Indian plant. Sir William Jones in the 4th vol. Asiatic Researches, p. 293, states that the leaves are used to stuff pillows, to cure catarrh and headache. The flowers, according to Dr. Hamilton, are prescribed in Behar with honey in fevers attended with vomiting and much thirst (*Ainslie*, ii. p. 238.)—*O'Shaughnessy, page* 484. This in the Deckhan is a common shrub with pretty blue flowers, generally to be met with growing in patches, in moist places appearing in April and May, but more or less throughout the year. *Riddell* The chaste tree, is a shrub much cultivated by the Burmans, it bears a handsome little blue flower. Both leaves and flowers are "rather agreeably heavy scented."—*Mason.*

(8603) VITIS, a genus of Plants, the type of the natural order *Vitaceæ*. It possesses the following characters:—Calyx usually 5-toothed; petals 5, cohering at the top, resembling a calyptra, separating at the base and deciduous; 5 stamens; style none; berry 2-celled, 4-seeded; cells and seeds often abortive. The species are climbing shrubs, with simple lobed, cut or toothed, rarely compound leaves, the thyrsoid racemes of small greenish-yellow flowers. They are found principally in Asia and America. The best known of the species of *Vitis*, and perhaps one of the most extensively cultivated and useful of plants, is the *V. vinifera*, the Common Vine or grape-Vine. It is characterised among the other species by possessing lobed, sinuately-tooth, naked or downy leaves. A multitude of varieties of this plant have been recorded, both occurring wild and resulting from its very extensive cultivation.

Like most extensively cultivated plants, it is very difficult to ascertain of what country the vine is originally a native. It is among the plants of which we have the earliest records in the books of Moses, and from which it appears to have been made use of in the same manner as at the present day. Although the vine is found in many places wild, it may still be doubted whether it is indigenous there, on account of its frequent cultivation. There can be little doubt of its being truly indigenous in the East, in the district between the Black and Caspian seas. In the forests of Mingrelia and Imiretia it flourishes in all its magnificence, climbing to the tops of the highest trees, and bearing bunches of fruit of delicious flavour. In these districts no cultivation of the vine exists, and the inhabitants seldom harvest the abundance of fruit that is produced. In many spots in France, Germany, Portugal, and Italy, the vine is found wild, but the fruit is very generally of an inferior kind, and it may be doubted whether it is truly indigenous in any parts of Europe.

The cultivation of the vine extends from near 55° N. lat. to the equator, but in south latitudes it only extends as far south as 40°. It is cultivated at various elevations. In middle Germany it ceases from about 1000 to 1500 feet above the level of the sea. On the south side of the Alps it reaches 2000 feet; in the Apennines and Sicily 5000 feet; and on the Himalayas as high as 10,000 feet above the level of the sea. The point of the greatest importance in the ripening of the fruit of the vine is the length of the summer. Thus, although the maximum of summer heat is as great at Moscow as in Paris, yet the vine will not ripen its fruit in the former place, and this arises from the fact that although the greatest

heat of the months of June and July are as great as that of Paris, the months of August and September are several degrees below. Nor will the mean temperature serve as a rule to indicate where the vine may be cultivated. England has a mean temperature as high as many parts of the world, where the vine flourishes in the greatest perfection; but it will be found that although England is warmer than these countries in the winter, it is not so warm in the months of September and October, at which time the vine is ripening its fruit.

The fruit of the vine is used as an article of diet in several ways. Its agreeable sweet acid flavour when ripe has always rendered it a very desirable food when fresh. The ancients also, there can be little doubt, were in the habit of drinking the expressed juice of the grape before fermentation. Grapes are also dried and used under the name of raisins. The drying is generally effected by cutting half through the fruit-stalk whilst they are suspended on the tree. Grapes thus dried are called Muscatel raisins, and are principally brought from Spain and the Levant. There is another dried grape used much in England, called currants, or Corinths, but which are very different things from the common currant of our gardens, and are the produce of a vine which grows in Zante and Cephalonia. Dr. Wight gives Vitis adnata, 144; angustifolia, 176; auriculata, 145; carnosa, 171; lanceolaria, 28; lanceolaria, 177; muricata, 740; Neilgherrensis, 965; pallida, 50; quadrangularis, 51; setosa, 170.

(8604) VITIS CARNOSA, Wall. *Syn.* Cissus carnosa, R.

Kusar. HIND. | Kanapa tiga. TEL.

Remarkably acrid, roots used in native medicine; it is common in hedges and forests in Bengal, and it flowers in the rainy season.

The Cissus setosa is in all its parts excessively acrid, and Roxburgh states that the leaves toasted and oiled are applied to indolent tumors to bring them to suppuration. The young tender and succulent stems of Vitis (Cissus) quadrangularis are very generally eaten in India. When old this plant is deemed acrid, and a useful medicine; in arabia it is used as an external application in rheumatic pains of the back and loins. The Cissus arborea of Forskahl is the Salvadora persica of modern writers, and possesses some remarkable and valuable properties—see art. *Salvadora.—O'Shaughnessy, page* 245.

(8605) VITIS INDICA (Andhouka, DUK.) produces beautiful clusters of round purple berries and a large grape which is very fair eating; it is not the common vine of Europe, which nevertheless is probably this Himalayan plant, the *Vitis Indica*.

The origin of the common grape being unknown, it becomes a curious question to decide whether the Himalayan *Vitis Indica* is the wild state of that plant: a hypothesis strengthened by the fact of Bacchus &c., having come from the East.—*Hooker, Him. Jour. Vol.* II. *p.* 187. A wild shrubby climbing plant, common throughout the Deccan.—*Riddell.*

There are three or four species of grapes in the Tenasserim Provinces. This one is seen creeping over every hedge and bush, which has sometimes been mistaken by Europeans for the true grape vine, but the fruit is acrid, like all the indigenous species, and not edible even to a native.—*Mason.*

(8606) VITIS QUADRANGULARIS.

Perrunday, TAM.

This trailing, and creeping plant with 4 angled and winged stems is used by the Natives as greens, and in the preparation of chatney; cultivated about villages.—*Jaffrey.*

(8607) VITIS VINIFERA. Lin. THE WINE GRAPE.

Booangoor, MALAY.
Ungoor, PERSIAN and DUK.
Draksha, SANS.
Dakh. HIND.
Inub. ARAB.
Kodimoondrie pullum, also Dividatsi, TAM.
Dracha pundoo. TEL.

A native of the south of Asia Minor, now universally cultivated. The common Grape fruit is cultivated in the greatest perfection in all parts of the Deccan, and the finest flavored are found in the gardens in then eighbourhood of Dowlatabad, about seven miles N. W. of Aurungabad. The mode of culture is as follows:—the trees are reared from slips taken at the time of first cutting after the rains, and when ready to be removed are put about seven or eight feet apart. They are for the first twelve months trained on dry sticks; after that, a large straight branch of the pangrah, with a fork left at the top to support the vine, is placed about twelve inches from it; if put at a greater distance it is apt to give a bend to the vine which is hurtful. The vine cannot be too straight, and the length of the prop should be about five feet. —*Riddell.*

(8608) *Raisins, Uvæ passæ*, are Grapes in their dried state and well known, being prepared by being dried in the sun or in ovens, or by steeping them in a weak alkaline ley formed from the ashes of the burnt tendrils. Some are prepared by partially cutting the stalk of the bunches before the grapes are quite ripe, and allowing them to dry upon the vine. They are chiefly prepared in Spain and in the Levant, hence called Valentias and Smyrnas; also in Affghanistan, whence they are taken to India. The best are the Muscatels, from the grape of that name. The Sultanas, like the *Bedanas* of the East, are without stones. The Malaga Raisins are large and fleshy, of a purplish-brown colour. Those of Calabria are similar. The Smyr-

rna Raisins are of a yellowish-brown colour, slight musky odour, less sweet and agreeable than the former.

Raisins differ from Grapes in containing less water and acid, and more Sugar. The Lees of the Wine, yield Tartar, that is impure Cream of Tartar. As the Saccharine matter disappears and becomes converted into Alcohol, this salt, being insolnble in the Spirit formed, is deposited in the casks, and is well known by the name of *argol* or *tartar*. This is chiefly composed of Bitartrate of Potash with a little Bitartrate of Lime. Besides its own particular uses (*v.* p. 86), it is important as the salt from which Tartaric acid is obtained.

Must is the expressed juice of the ripe grape. It readily undergoes fermentation. Fermented Must gives two products, *wine* and *vinegar*.

Wine. Wine is a white, rosy or red liquid, according to the kind of grape used, and the process followed. It is fluid, limpid, and more or less alcoholic, &c. Sugar is present in some kinds. The smell and taste vary indefinitely. The wines chiefly employed in Hospital practice are two—port (Oporto) and sherry, (Xeres)

Port is red, approaching to crimson, slightly astringent. The extract consists of tannic and gallic acid, sugar and colouring matter. By distillation port wine of best quality yields of alcohol 23 per 1000.

Port is very much employed in disease of debility, scurvy, typhus fevers, cholera, the last stages of dysentery, consumption, &c.

Sherry (Vin de Xeres) is light amber coloured, sweetish, 100 parts contain 18 of alcohol. There is no astringent matter, but traces exist of citric and malicacid. Sherry is employed as a stimulant but is apt to produce an aperient and even cathartic effect. Various fraudulent substitutions are daily used in the preparation of wines, to detect which M. Fee gives the following rules, which have been found to be correct.

The alcoholic solution of caustic potash changes	
Pure wine, ...	*Green.*
If coloured with mulberries, ...	*Violet.*
——— with logwood, ...	*Violet Red.*
——— with Brazil wood or beet root...	*Red.*
Acetate of lead precipitates	
Pure wine....	*Green.*
Wine adulterated with elder berries, logwood, or myrtle berries,...	*Deep blue.*
—— with red sandal wood, beet root, or Brazil wood, ...	*Red.*
Alum precipitates,	
Wine coloured with litmus,....	*Clear violet.*
——————— logwood,.	*Deep violet.*
——————— Brazil wood,...	*Red.*

Lead sometimes exists in wine, and is detected by adding carbonate of soda; carbonate of lead is thrown down, which will be turned black by sulphuretted hydrogen gas. Alum, which is often present, is detected by the wine affording a precipitate with ammonia, carbonate of potash, and acetate of baryta.

The manufacture of wine is carried on, on a very simple plan. The ripe grapes are trodden by men or cattle in a vat, and the juice which is thus forced out is called *Must*. The *Marc* or solid parts being mixed with the Must again in wooden tanks, fermentation soon takes place, much heat is developed, and carbonic acid gas is copiously disengaged; the Marc now rises to the surface of the tank, and when the effervescence ceases, the subjacent wine is drawn off from below, and the Marc subjected to strong pressure.

If the wine be bottled before the fermentation has terminated, it has the property of foaming in the glass in consequence of the sudden liberation of carbonic acid; champagne is thus manufactured. In the preparation of white wines the Marc is removed before fermentation.

According to Humboldt, the conditions of climate essential for the manufacture of good wine are, a range of temperature from 62 to 50° or even 47°, provided the winter heat is not lower than 38°, nor that of summer below 66° or rather 68°. At a higher mean temperature the juice passes too rapidly into the acid fermentation. The manufacture of wine thus becomes impracticable in the plains of India; moreover the rains set in so soon after the ripening of the grape, that the manufacture of raisins by sun-dryiug is equally impossible. Mr. Royle informs us of the existence of luxuriant vineyards in Kunawur, bstween N. lat 31° and 32° (or nearly that of Madeira) at an elevation of 9000 to 10,000 feet, the grape being of delicious flavour, and the climate exactly suited for both the wine and raisin manufacture. Grapes are also abundant in Cashmere, Cabul, and Bokhara, and afford both raisins and wine. The most celebrated of eastern wines however is the *Shiraz* perpared in the districts of Khol-lar, near the village of Bend Emir. There are two varieties, red and white, the former containing 15½, the latter nearly 20 per 100 of alcohol.

The different kinds of raisins called *Monuka*, *Kishmish* and *Bedana*, are, Mr. Royle states, brought chiefly from Istaulik.—*O'Shaughnessy, pages* 251-254.

(8609) VIVERRIDÆ, a family of Carnivorous Animals, embracing the genus *Viverra* of Linnæus. This author thus defines his genus *Viverra*:—Dentes primores vi: intermediis brevioribus. Molares plus quam tres. Lingua retrorsum, sæpe aculeata. Ungues exserti.

The species comprised under this genus, in the twelfth edition of the 'Systema Naturæ,' are *Viverra Ichneumon*, *V. nasua*, *V. narica*, *V. putorius*, *V. Zibetha*, and *V. Genetta*.

The *Viverrina*, Dr. J. E. Gray's third family of *Felidæ*, is the first of his second subdivision of that family, named, *Necrophaga*.

The *Viverrina* comprise the following genera; —*Viverra*, *Proteles*, *Prionodon*, *Genetta*, *Galidia*, *Galictis*, *Herpestes*, *Mungos*, *Atilax*, *Ichneu-*

VIVERRIDÆ.

mia, *Uva*, *Crossarchus*, *Ryzœna*, *Hemigale*, *Paradoxurus*, *Paguma*, *Arctictis*, *Cynogale*, *Cryptoprocta*, and *Bassaris*.

(8610) *Viverra* (Cuv.).—The deep pouch situated between the anus and the sexual organs, is divided into two bags filled with an abundant concretion of the consistence of pomade, exhaling a strong musky odour, secreted by glands which surround the pouch. Pupil of the eye round during the day. Claws only half retractile. Dental Formula:—

$$\text{Incisors}\frac{6}{6}, \text{Canines}\frac{1-1}{1-1}; \text{Molars}\frac{6-6}{4-4} = 36.$$

(8611) *Viverra Civetta*. The Civet. Length of the elongated body from two to three feet; tail about half as long as the body. Height from ten inches to a foot. Hair of the body long, brownish-gray, with numerous interrupted transverse black bands or spots of the same colour. The hairs on the ridge or middle line of the black from between the shoulders are longer; and can be raised or depressed at the pleasure of the animal. Legs and most part of tail black; upper lip and sides of the neck almost white. Eyes surrounded each by a black patch. Two or three black bands pass from the base of the ears obliquely towards the shoulder and neck, which last has a broad black patch. It is a native of the north of Africa. The Civet approaches in its habits nearest to the Foxes and smaller Cats, preferring to make its predatory excursions against birds and smaller quadrupeds in the night, although, like these *Carnivora*, it will occasionally attack its prey in the day time. In a state of captivity it becomes in a degree tame, but never familiar, and is dangerous to handle. The young are fed on farinaceous food, millet-pap for instance, with a little flesh or fish: and, when old, on raw flesh. Many of them are kept in North Africa to obtain the perfume which bears the name of the animal, and brings a high price. The civet is procured by scraping the inside of the pouch with an iron spatula at intervals about twice a week. If the animal is in good condition and a male, especially if he has been irritated, a dram or thereabouts is obtained each time. The quantity collected from the female does not equal that secreted by the male. Civet, like most other articles of this nature, is much adulterated, and it is rare to get it quite pure. The adulteration is effected with suet or oil to make it heavier.

(8612) *Genetta*, Cuv.

(8613) *Viverra Rasse* is a species found in Java. Dr. Horsfield says "it supplies in Java the place which the *V. Civetta* holds in Africa, and the *V. Zibetha* on the Asiatic continent from Arabia to Malabar, and in the large islands of the Indian Archipelago. I have endeavoured to show that, by its form and marks, it is essentially distinct from the *V. Zibetha*; and it differs as much in its natural disposition as in external characters. The *V. Zibetha* is an animal comparatively of a mild disposition; it is often found among the Arabs and Malaya who inhabit the maritime parts of Borneo, Macassar, and other islands, in a state of partial domestication; and by the account of the natives, becomes reconciled to its confinement, and in habits and degree of tameness resembles the common domestic cat. The Rasse, on the contrary, preserves in confinement the natural ferocity of its disposition undiminished. As the perfume is greatly valued by the natives, it is frequently kept in cages; but as far as I have observed, must always be obtained for this purpose from a wild state, never propagating in a state of confinement. "The Rasse is not unfrequently found in Java, in forests of a moderate elevation above the level of the ocean. Here it preys on small birds and animals of every description. It possesses the sanguinary appetite of animals of this family in a high degree, and the structure of its teeth corresponds strictly with the habits and modes of life. In confinement it will devour a mixed diet, and is fed on eggs, fish, flesh and rice. Salt is reported by the natives to be a poison to it. The odoriferous substance is collected periodically: the animal is placed in a narrow cage, in which the head and anterior extremities are confined; the posterior parts are then easily secured, while the civet is removed by a simple spatula." The substance obtained from the Rasse agrees with the civet afforded by the *V. Civetta* and *V. Zibetha* in colour, consistence, and odour. It is a very favourite perfume among the Javanese, and applied both to their dresses and, by means of various unguents and mixtures of flowers, to their persons. Even the apartments and the furniture of the natives of rank are generally scented with it to such a degree as to be offensive to Europeans; and at their feasts and public processions the air is widely filled with this odour. ('Zoological Researches.')

(8614) *Paradoxurus* (F. Cuv).—Has the character generally of the Civets and genets.

(8615) *Paradoxurus Typus*, the Paradoxure.

(8616) *Mangusta*, Olivier. [Ichneumon.]

(8617) *Mangusta Javanica*, has the ear bearing considerable resemblance to that of man. Pouch very extensive. Hair long on the body and tail, but short on the head and extremities, rigid and glossy. Length, including the tail, about 2½ feet. Rumphius gives a curious account of this species, which is the Garangan of the natives, who greatly admire its agility. It attacks and kills serpents with the greatest boldness; and Rumphius speaks of its value in performing this service and its method of encountering those reptiles. The Javanese nobles, he says, pay a considerable price for it, that they may amuse themselves with the sport of these fights, when

the two enemies are opposed to each other, the serpent endeavours to twine round the quadruped and kill it. The latter submits to this, but inflates itself to turgescence; and when the serpent enfolds it and advances its head to give the deadly bite, the Mangouste contracts his body, slips out of the folds, seizes the serpent by the neck and kills it. Dr. Horsfield states that the *Mangusta Javanica* is found most abundant in the large teak-forests and that it is very expert in burrowing in the ground in pursuit of rats. "It possesses," says our author in continuation, "great natural sagacity; and from the peculiarities of its character, it willingly seeks the protection of man. It is readily tamed, and in a domestic state it is docile and attached to its master, whom it follows like a dog; it is fond of caresses. and frequently places itself erect on its hind legs, regarding everything that passes with great attention. It is of a very restless disposition, and always carries its food to the most retired place in which it is kept to consume it. It is very cleanly in its habits. It is exclusively carnivorous, and very distructive to poultry, employing great artifice in the surprising of chickens. For this reason it is rarely found in a domestic state among the natives, as one of their principal articles of food is the common fowl, and great quantities are reared in all the villages. The Javanese also, like the Mohammedans in general have a great partiality for cats, and they are unwilling in most cases to be deprived of their society for the purpose of introducing the Garangan. It has also been observed that its sanguinary character shows itself occasionally in a manner that renders it dangerous in a family as a domestic animal, and it indulges at intervals in fits of excessive violence."

(8618) *Ryzæna*, Ill.

(8619) *Nasua*, Storr.

(8620) *Cercoleptes caudivolvus*, the Potto, or Kinkajou, is referred by some writers to *Ursidæ*, but by others to the *Viverridæ*. It has the following dental formula:—

$$\text{Incisors, } \frac{6}{6}; \text{ Canines, } \frac{1-1}{1-1}; \text{ Molars, } \frac{5-5}{5-5} = 36.$$

Eng. Cyc.

(8621) VIVERRICULA MALACCENSIS. MALACCA CIVET.

SYN. Viverra malaccensis, Gmelin.
" Rasse, Horsfield.
" Gunda, Buchanan Hamilton MSS.
" indica, Geoffroy.
" bengalensis, Gray: Illustr.
" pallida, Gray: Illustr.
Genetta manillensis, Eydoux.

The Indian civet-cats secrete an odoriferous substance identical with civet, though not the civet of commerce. This species is not infrequently found in the Tenasserim villages, and its secretion enters into the Burmese Materia Medica.—*Mason*.

Viverricula Malaccensis (V. indica Sykes) is a little civet like beast, with a sharp nose. It is the Gandogokul of the Bengalis.—*Blyth*.

(8622) VIVERRA ZIBETHA. ZIBETHCIVET.

SYN. Viverra Zibetha, Linne.
" undulata, Gray.
" melanurum, Hodgson.
" orientalis, "
" civettoides. "

This is another species of civet-cat, not so abundant as the preceding, which the Burmese call "the horse-cat," from the mane on its neck.—*Mason*.

(8623) VOLKAMERIA FRAGANS. VERBENACEÆ.

Irun, HIND.

A large common shrub with ovate cordate dentate leaves; white fragrant flowers (in the cold weather) terminal panicles.—*Riddell*.

(8624) VOLKAMERIA INERMIS.

Shangam coopy, TAM. | Kundali, SANS.
Sangkoopee, HIND. | Bunjoma, BENG.
Nalla Opie, TEL.

A scandent ramous shrub, pure white flowers, blossom nearly throughout the year, hedges are made with it.—*Riddell*. The juice of the root and leaves is bitter, and given as an alternative in venereal, and scrofula. Dose a table spoonful, The plant is common in the jungles, and is very beautiful. Nine species are described by Roxburgh, but he gives no account of their supposed medicinal virtues.—*O'Shaughnessy, page* 486.

(8625) VOLUTIDÆ, a family of Gasteropodous *Mollusca*, whose shells are prized by collectors above most others for their beauty and rarity; and which, from their numbers and carnivorous habits, are powerful agents in keeping the *Mollusca* and *Conchifera* within due limits—*Eng. Cyc.*

(8626) VOLUTA ÆTHIOPICUS (Broderip) *Æthiopicus* has the shell obovate, ventricose, of an orange-cinnamon colour. the spire coronetted with thick-set shore, vaulted spines; pillar 4-plaited This shell is native of the African Ocean and the East Indian seas.

(8627) VOLUTA VESPERTILIO, has the shell turbinated, armed with strong distant acute tubercles, white, yellowish, or reddish, painted with angularly flexuous spots; spire muricated, the apex with small tubercles; lip with a sinus above; pillar 4-plaited. It is found in the Indian Seas, Amboyna, Moluccas, &c. The species of *Voluta* have been found at depths ranging from 7 to 14 fathoms. The species are very numerous and very beautiful.

(8628) *Mitra*, Mitre Shells, have the shell fusiform, thick; spire elevated, acute; aperture small, notched in front; columella obliquely plaited; operculum very small. The animal has a very long proboscis; it emits a purple liquid, having a nauseous odour, when irritated. The eyes are placed on the tentacles, or at their base. Three hundred and fifty recent species and ninety fossil have been described.

(8629) *Mitra episcopalis*, Bishop's Mitre Shell. The animal has a narrow foot, compressed and channelled, at its root, nearly square and slightly auriculated in front with a marginal furrow, and pointed behind. The head is very small, rounded, with two tentacles, which are scarcely a line and a half in length; the eyes sessile at their base. An enormous proboscis, which is sometimes double the length of the shell. The respiratory siphon does not project beyond the canal; it is marked with black at the point: the rest of the animal is yellowish, The proboscis is white.

Shell turreted, smooth, white, spotted with bright red; pillar four-plaited; outer lip denticulated at its lower part; epidermis thin. It is found in East Indian seas and islands of the South Sea, Tongataboo.

(8630) *M. adusta*, has the shell fusiform, turreted, albido-lutescent, ornamented with longitudinal rufous-brown spots; the striæ transverse, impressed, rather remote, and dotted; the sutures crenulate; the pillar five-plaited. It is found at Timor, Vanikoro. There are at least two varieties,

(8631) *M. corrugata*. The shell is ovate-fusiform, longitudinally plicated, transversely rugous, whitish; bands and belts brown; whorls angulated above; the last whorls with a submuricated angle; pillar four-plaited. It is found in the Indian Ocean and New Guinea.

(8632) *Imbricaria* and *Cylindra* are subgenera of *Mitra*.

(8633) *Volvaria* has the shell cylindrical, convolute; spire minute; operture long and narrow; columella with 3 oblique plaits in front. The species, five in number, are all fossil.

(8634) *Marginella* has the shell smooth, bright; spire short or concealed; aperture truncated in front; columella plaited; outer lip (of adult) with a thickened margin. Animal similar to *Cypræa*.

(8635) *Oliva*, which is sometimes referred to *Buccinidæ*, has the following characters:—Animal involved, compressed, with a small head terminated by a proboscis; tentacles approximated, enlarged at their base and subulate at their extremity, carrying the eyes on small convexities about their middle part externally; foot very large, oblong, and slit transversely anteriorly; mantle with a single lateral lobe covering the shell in great part, with two tongue-like processes at the side of the branchial opening, and forming in front a very elongated siphon; a single branchial pectination; male organ very voluminous, on the anterior part of the right side. Operculum horny, elongated, very small with a marginal spex.

(8636) *Oliva textilina* has the shell cinereous white, subreticulated with flexuous dotted lines, with two brown bands inscribed as it were with characters; the callus of the canal prominent It is found in the Antilles and New Guinea.

(8637) *Oliva mausa* has the shell cylindrical, the apex retuse, black; lip subplicate externally: aperture white. It is found in the East Indian Ocean, Australia, and Amboyna.

(8638) *Oliva sanguinolenta*, has the shell cylindrical, very delicately reticulated, with rufous brown small lines, girt with two brown zones; the pillar orange-red. It is found in the East Indian Ocean and on the coast of Timor.

The species have been found at depths varying from the surface to twelve fathoms, on mud, sandy-mud, coarse sand, &c. The species are fond of flesh, but they only suck the juices; and at Mauritius they are taken with that bait in the following manner, according to Lieutenant Harford, who was for some time there, brought home some very fine Mauritian shells, and gave the information to Mr. Broderip. The fishery was carried on by means of a line made to run parallel with the bottom of the sea, to which line small nooses, each containing a piece of the arms of a cuttle-fish (*Sepia*), were appended so that the bait touched the bottom. To one end of the line a shot was attached by way of mooring; and over it were a buoy and a flag. The other end of the line swung with the tide, and that end was also marked by a buoy and a small flag. The sport was carried on in deep water over sand-banks, and the best times were the morning and the evening. The apparatus was occasionally cautiously drawn up and the Olives which were found adhering to the bait were taken into the boat in which the fishermen were.

Olivella, and *Scaphula*, Sowerby, and *Agaroma*, Gray, are sub-genera; 117 fossil and 20 recent species have been described. (Woodward, 'Manual of the Mollusca.')

(8639) VULOCAL, or Vulvaylum Maram, the Tamil name of a strong Ceylon wood which is used by the natives in making farming utensils. It grows to twenty inches in diameter, and twelve feet in height. The bark of this tree, with the Marandum bark and ginger, is used by the natives for cleaning and preserving the teeth.—*Edye, Ceylon.*

(8640) VULPES, Brisson, the generic name for a species of that sub-division of the great genus *Canis*, which has the pupils of the eyes elliptical or almost linear by day, though they become round or nearly so in the hours of darkness.

(8641) VULPES BENGALENSIS (Shaw) is brown above, with a longitudinal black band The space round the eyes is white, and the tail is terminated with black. It is the Fox of the Dukhun (Deccan), Kokree of the Mahrattas, *Canis Kokree* of Sykes, which the Colonel considers to be new to science, although it much resembles the descriptions of the Corsac, and is

described by him ('Zool. Proc.,' 1831) as a very pretty animal, but much smaller than the European Fox.

(8642) VULPES VULGARIS (Brisson), the Common Fox; *Canis vulpes*, and *C. alopex* (the latter the variety it may be called, with the tip of the tail black?) of Linnæus; Volpe of the Italians; Raposa of the Snapish; Rapoza of the Portuguese; Fuches of the Germans; Vos of the Dutch; Raff of the Swedes; Rev of the Danes; Tod of the Scotch; Llwynog, fœm. Llwynogs of the Welsh, is too well known to require description. The time of gestation may be taken at from 60 to 65 days, and the birth of the young takes place in April. In a year and a half they attain their full size, and have been known to live 13 or 14 years; but as this can only have been ascertained, observes Mr. Bell, of individuals in confinement, it is very probable that, in a state of nature, it considerably exceeds that period. Of its cunning much has been said, and a great deal of it is true. The reader will find some interesting remarks on the habits and economy of the Common Fox by Dr. Weissenborn in the number of 'Loudon's Magazine' (R. S.) for October 1837. The Common Fox inhabits, according to Linnæus, Europe, Asia, and Africa. Cuvier mentions it as reaching from Sweden to Egypt, both inclusive. Mr. Strickland notes it as occuring near Smyrna. The Fox named Melanogaster by Prince Bonaparte in his 'Fauna Italica' is probably a variety only The strong smell proceeding from the anal glands and urine of the Common Fox is very offensive.

(8643) *Canis Himalaicus*, The Hill Fox of the Europeans in the Doon, in Kumaon, and the more western and elevated parts of the mountains, agrees with the common European and American foxes (*C. vulpes* and *C. fulvus*) in the black marks on the backs of the ears, and in front of the hind and fore legs. The coat consists of long, close, rich fur, as fine as that of any of the American varieties, and of infinitely more brilliant and varied colours, (Royle, 'Flora Himalaica.') The following species of *Vulpes* are given in the 'List of the Specimens of Mammalia in the British Museum:'—*V. vulgaris*, the Fox; *V. flavescens*, the Persian Fox; *V. Azaree*, the Agouarachay; *V. Niloticus*, the Sabora; *V. Lagopus*, the Arctic Fox, or Peszi; *V. cinereo-argentatus*, the Kit-Fox; *V. fulvus*, the American Fox, or Makkeeshew; *V. Bengalensis*, the Kokree; *Magellanicus*, the Culpeo; *V. Corsac*, the Corsac; *V. Caama*, the Asse; *V. dorsalis*, the Senegal Fox; and *V. Zaarensis*, the Fennec. —*Eng. Cyc.*

(8644) VULTURIDÆ, a family of Raptorial Birds, whose geographical distribution is confined to warm climates, where they act as scavengers to purify the earth from the putrid carcasses with which it would otherwise be encumbered. It has been matter of dispute whether they are directed to their fetid food, for they seldom prey on living animals, by the eye or by the nasal organ. There can however, in our opinion, be little doubt that both the senses are made to contribute to the discovery of the carcass. The lofty flight and telescopic eye are well adapted to detect any dying or dead animal, and as the action of one vulture may be, in all probability is, watched by another, a sort of telegraphic communication as to the position of the object is kept up. [BIRDS; CONDOR.]

The *Vulturidæ* of Mr. G. R Gray from the first family of his first sub-order (*Accipitres Diurni*) of his first order (*Accipitres*). The following sub-families and genera are placed by Mr. Gray under thie family:—

Sub-family 1. *Gypaetinæ*.

Genus:—*Gypaetos*.

Sub-Family 2. *Cathartinæ*.

Genera:—*Neopliron*, *Cathartes*, and *Sarcoramphus*.

Sub-Family 3, *Vulturinæ*.

Genera:—*Gyps* (Sav.); *Vultur*; and *Otogyps* (G. R. Gray).

Sub-Family 4. *Racaminæ*.

Genus:—*Gyphoieraæ*, Rupp.; *Racama*, J E. Gray—*Vultur* (*Gyphoieraæ*) *angolensis*. We now proceed to give a few illustrative species:—

(8645) VULTUR AURICULARIS. The great African *V. Auricularis* has been observed in Greece, and has once been killed in France (in Provence): this resembles *V. Ponticerianus*, the so called 'King Vulture' common over the plaines of India, but is much larger, equalling *V. Monachus* in size: while the latter has also an analogous diminutive in Africa, in the *V. Occipitalis*.

(8646) VULTUR CINEREUS appears to be the Vautour Arrian and Vautour Noir of the French; Cinereous or Ash-Vulture and Bengal Vulture of Latham; and Grauer Gier of the Germans. It is a native of Europe. It is found in lofty mountains, and the vast forests of Hungary, the Tyrol, and the Pyrenees; the south of Spain and Italy; accidentally in Dalmatia; more frequently in Sardinia; in Sicily; rarely in Italy, and never in the forests; very accidently in Germany. Its food consists of dead animals and carrion, but never of living animals, of which it shows fear; the least animal, says Temminck, terrifies it. This is the genus *Gyps* of Savigny. Mr. Gould, in his great work on the 'Birds of Europe,' notices a deviation in this species from the true or more typical vultures, manifested in the partially bare neck, open ears, curved claws, and powerful beak.

(8647) VULTUR INDICUS, the Indian Vulture, has the head and neck denud-

ed of feathers; all the upper plumage Isabella-ash colour varied with brown and whitish; lower parts spotless very bright yellow; a slight short deep brown down, close set and very smooth, covers the breast; bill black, but the point lighter; naked skin of the head rusty ash. It is about the size of a turkey Total length 3 feet 3 inches. It is found in India and Ceylon. It is very voracious. It lingers all day near the sea-shore to prey on the dead fish thrown up by the waves. The species lives generally on carrion, and is said to disinter corpses. The flight of these vultures is heavy, and, like their congeners, they sometimes assemble in vast numbers on the battle-field.

(8648) VULTUR KOLBII, Kolbe's Vulture. This is the Stront-Jager of Kolbe, and the Chasse-Fiente of Temminck. The head is covered with downy ferruginous feathers, which are whitish on the back of the neck; a ruff of loose ferruginous or dirty white feathers round the back of the neck; cere blackish; iris black; back and wings ferruginous or gray-brown; quills black; belly rather lighter ferruginous; feet brownish; claws black. Size less than that of the Griffon Vulture, but in general aspect and plumage very like that species. It is however easily distinguished. In Kolbe's Vulture the feathers of the wings and of the lower parts are all rounded at the end. In the Griffon Vulture they are long and acuminated. In Kolbe's Vulture the ruff is neither so long nor so abundant as in the Griffon, and the adult is nearly entirely of a whitish-Isabella colour. The adult Griffon is uniform bright brown throughout. It is found in Barbary, and different parts of Africa, India, and Java.

(8649) *Gypaetus barbatus*—This is the celebrated Lammergeier. It is the Avoltoio Barbuto of the Italians; the Weisskopfige Geier Adler, and Bartadler of the Germans; and Bearded Vulture of the English. Head and upper part of the neck dirty white; a black stripe extends from the base of the beak, and passes above the eyes; another, arising behind the eyes, passes over the ears; lower part of the neck, breast, and belly, orange red; mantle, back, and wing-coverts, deep gray-brown, but on the centre of each feather is a white longitudinal stripe; wings and tail feathers ashy-gray, the shafts white; tail long, very much graduated; beak and claws black; feet blue; iris orange; eye surrounded by a red lid. Length about four feet seven inches. According to the age of the bird the plumage varies as follows:—there are brown feathers more or less on the top of the head; those of the lower part of the neck, breast, and belly often terminated with black; the whole white on the middle of the feathers of the back and the coverts of the wings more or less developed; the belly often of a gray brown or variegated with white; iris of a more or less deep orange colour. The young in the first two years have the head and neck of a brown-black; the lower part of the body gray-brown with spots of dirty white; on the upper part of the back are great white spots; the mantle and the wing coverts are blackish with brighter spots; quills blackish-brown; iris brown; feet livid. It inhabits the highest mountains of Europe, Asia, and Africa, the chain of the Pyrenees, and the Helvetian, Alps, Sardinia, Greece, and the Tyrol. In Asia, the chain of the Caucasus, the Himalaya Mountains, the Siberian and Persian Mountains. It is also found in the lofty mountains of Central Africa and towards the borders of the Red Sea, principally in the most inaccessible parts of those mountains, and where there is plenty of the larger sort of game. "Unlike the typical vultures," says Mr. Gould, "which are distinguished by their bare necks, indicative of their propensity for feeding on carrion, the Lammergeyer has the neck thickly covered with feahers, resembling those of the true eagles, with which it also accords in its bold and predatory habits, pouncing with violent impetuosity on animals exceeding itself in size; hence the young Chamois, the Wild Goat, the Mountain Hare, and various species of birds find in it a formidable and ferocious enemy. Having seized its prey, the Lammergeyer devours it upon the spot, the straight form of their talons disabling them from carrying it to a distance. It refuses flesh in a state of putrefaction, unless sharply pressed by hunger; hence nature has limited this species as to numbers: while, on the other hand, to the Vultures, who are destined to clear the earth from animal matter in a state of decomposition, and thus render the utmost service to man in the countries where they abound, she has given an almost illimitable increase."

(8650) *Neophron percnopterus*. This is the Vautour Ourigourap of Le Vaillant, the Rhachamah or Pharaoh's Hen of Bruce and others, Avoltoio Aquilino and Caporaoccajo of the Italians, and Maltese Vulture of Latham. Head and only the front of the neck covered with a naked skin of a livid yellowish colour; the whole plumage pure white, except the great quill-feathers, which are black; feathers of the occiput long and loose; cere orange, iris yellow, mandibles blackish; feet livid yellow, claws black, tail very much graduated. Length two feet and a few inches. According to age, the bird varies in its plumage, being either deep brown spotted with rusty, or bright gray-brown varied with white and yellow feathers. In this state the naked part of the head is livid, the cere white slightly tinged with orange, the iris brown, and the feet livid white. The young in the first year have the naked part of the head livid, covered with a thin gray down; cere and feet gray ash; the whole plumage deep brown varied with yellowish-brown spots; greater quill-feathers black; iris brown.

It is found (very rarely) in the north of Europe, in Switzerland in the neighbourhood of Geneva. Very common in Spain on the Pyrenees, Portugal, Malta, Turkey, and in the Archipelago. No where so abundant as in Africa. Russia as far north as Astracan, Arabia, Persia; the Deccan (Col. Sykes).

(8651) VULTUR LENCONOTUS, the Chinese Vulture. This bird is brownish-black; lower part of the back white, as are the wings beneath and the inside of the thighs; when the wings are closed the white on the back is not seen; head brownish-black with short dark hairs; back of the neck covered with whitish down, the front of it livid flesh-colour and bare; at the bottom of the back of the neck is a dirty white ruff; on each side white feathers lap over the bottom of the neck and the crop; the cere is blackish; the bill horn-colour, black at the tip; iris dark; legs dirty brown-white with black scales; claws black. It is the size of a turkey.

(8652) VULTUR PONTICERIANUS, the Pondicherry Vulture. The adult is about the size of a goose; a long loose naked membrane or wattle takes its origin about an inch below the meatus auditorius, and widens into a rounded form in the middle; the whole head and neck naked and flesh-colour, but there are some short scattered hairs thereon; crop covered with a small brown down, and round it is a longer white down The young with the head and neck more or less clothed with short down. (Temm.) It is a native of Bengal (probably spread over the continent of India), Java, and Sumatra.

(8653) *Vultur Fulvus*, the Griffon Vulture, is Le Griffon of the French; Weisskopfiger Geier of the Germans; Avoltoio di Color Castagno of the Italians. Head and neck covered with close-set, short, white, downy feathers; lower part of the neck surrounded with a ruff of long, slender, white feathers, sometimes with a slight tinge. On the middle of the breast a space furnished with white down. The whole of the body, the wings, and the origin of the tail yellow-brown or Isabella colour; quills and tail-feathers blackish-brown; beak livid-yellow, cere darker [Temminck describes it as flesh coloured;] iris hazel; feet gray or light-brown. Total length exceeding four feet. The female is larger than the male. The young have a whitish down varied with brown on the head and neck; the rest of the body very bright yellow, marked with great spots of gray or white. It is a native of the mountainous parts of the north of Europe, Silesia, the Tyrol, Dalmatia (where it is very numerous), Spain (abundant near Gibraltar), the Alps, the Pyrenees, Turkey, the Grecian Archipelago, the north of Persia, and the north of Africa. The nest of this Vulture is generally formed upon the most elevated and inaccessible rocks but it often builds on the highest forest-trees, and in Sardinia on the loftiest oaks, where the nest of brushwood and roots is more than three feet in diameter. The eggs, which are generally two in number, though some state that it occasionally lays as many as four, are of a dull-greenish or grayish-white, slightly marked with pale reddish spots, and with a rough surface. Like all the other *Vulturidæ*, it feeds principally upon dead carcasses, to which it is frequently attracted in very considerable numbers. "When it has once made a lodgment upon its prey, it rarely quits the banquet while a morsel of flesh remains, so that itis not uncommon to see it perched upon a putrefying corpse for several successive days. It never attempts to carry off a portion even to satisfy its young, but feeds them by disgorging the half-digested morsel from its maw. Sometimes, but very rarely, it makes its prey of living victims, and even then of such only as are incapable of offering the smallest resistance; for in a contest for superiority it has not that advantage which is possessed by the Falcon tribes, of lacerating its enemy with its talons, and must therefore rely upon its beak alone. It is only however when no other mode of satiating its appetite presents itself, that it has recourse to the destruction of other animals for its subsistence. After feeding, it is seen fixed for hours in one unvaried posture, patiently waiting until the work of digestion is completed, and the stimulus of hunger is renewed, to enable and to urge it to mount again into the upper regions of the air, and fly about in quest of its necessary food. If violently disturbed after a full meal, it is incapable of flight until it has disgorged the contents of its stomach; lightened of which, and freed from their debilitating effects, it is immediately in a condition to soar to such a pitch as, in spite of its magnitude, to become invisible to human sight. In captivity it seems to have no other desire than that of obtaining its regular supply of food. So long as that is afforded it, it manifests a perfect indifference to the circumstances in which it is placed." (Bennett.)

(8654) VUNDOOROO WOOD.

Vundooroo kurra, TEL.

(8655) VUTTOMS. In Southern India pieces of cast steel, as they come from the crucible.

W.

(8656) WALAN, the name of a tree in Amboyna, which was first described and figured by Rumphius, in his 'Herbarium Amboinense,' and called by him *Ichthyoctonos montana*. It is a large tree, and much valued by the natives of the island in which it grows. It is very rare, and the description of Rumphius is too imperfect to allow at present of its being assigned to any particular division of the vegetable kingdom.

The inhabitants of the isle of Amboyna use the bark of the roots for catching fish. Before it is used for this purpose it is powdered, and the process by the natives is always attended with a peculiar ceremony. The bark of the root is the part of the tree employed, and when it is collected for fishing, a large party attends. It is powdered by a single individual with a large stone, and whilst this process is going on, the rest lie round the stone in a circle; when all is over, a signal is given by one of them crowing like a cock; they then arise and collect the powder into little baskets which is reserved for use. In catching the fish other ceremonies are employed The party goes in the morning early, and after throwing the powder upon the water and mixing it till it foams, they cast a net over the river, and then retire from the river, maintaining a death-like silence till the poison has acted on the fish In the course of an hour the net is generally found full of half-dead fish. The fish will recover from the effect of the poison if thrown into fresh-water, and are quite wholesome as food, although they will not keep so long as fish caught by other means. Rumphius procured some of the bark, and, omitting the ceremonies, found it a very successful mode of fishing.—*Eng. Cyc.*

(8657) WALKERA, a genus of Plants named after Richard Walker, D. D., founder of the botanic garden at Cambridge. It belongs to the natural order *Ochnaceæ*, and is known by possessing 5 petals, 5 stamens with ovate anthers; an obovately kidney-shaped fruit, which is a drupe; an inverted embryo with a hooked beak. There are two species of this genus known. *W. serrata* has serrate crenate leaves, racemes of flowers somewhat corymbose, and the lobes of the calyx lanceolate. It is a native of Malabar and Ceylon, and has yellowish flowers and reddish fruit The roots and leaves are very bitter, and are used in decoction by the inhabitants of Malabar as a tonic and anthelmintic. *W. integrifolia* is a native of French Guyana, and has entire leaves. —*Eng. Cyc.*

(8658) WALL FLOWER, CHEIRANTHUS.

(8659) WALLICHIA, a genus of Plants belonging to the natural order *Byttneriaceæ*, named in honor of the late Dr. Wallich, superintendant of the East India Company's Botanical Garden at Calcutta.—*Eng. Cyc.*

(8660) WALLICHIA OBLONGIFOLIA, the Ooh of the Lepchas, a palm which grows in Sikkim. It affords an admirable fodder for horses, who prefer it to any other green food to be had in those mountains.—*Hooker Vol.* I. *p.* 143.

(8661) WALNUTS.

Akroot Jowz, Khusif, ARAB.	Char-mughz, Geerdighan, Jouz-i-roomie, PERS.
Noix, FR.	
Akroot, GUZ, HIND.	Okher. NEP.

The fruit of a large tree (*Juglans regia*), indigenous to Persia, and the countries bordering on the Caspian Sea. It has long been introduced into Great Britain. The fruit is a pretty large, smooth, ovate nut, containing an oily kernel, divided into four lobes. They are made into pickle and ketsup; and the dried ones are served up, in a bruised state, at desserts. Persian walnuts are the most esteemed, and are the only sort met with in India.—*Faulkner.* See JUGLANS.

(8662) WALNUT INDIAN.-Vide ALEURITES TRILOBA.

(8663) WALNUTS, UKROT, grow on the Himalayas and Cashmere. Walnuts are occasionally brought from Rangoon; but it is not certain that they are the produce of the indigenous walnut *Juglans aryuta* tree of Tenasserim.—*Mason.*

(8664) WALSURA PISCIDIA.

Wallursi, TEL.	Joe-boe, BURM.
Walsura, TAMUL.	

A native of the Circar mountains; flowers during the cold season. Roxburgh informs us that the bark thrown into ponds intoxicates the fish, which are consequently very easily taken. The fish are not deemed unwholesome. —*O'Shaughnessy. Walsura piscidia* is very plentiful in the Pegu and Tounghoo Forests, as well as in the Tharawaddey Forests. The timber is large, heavy and strong. Wood, white colored, adapted to every purpose of house-building. —*McClelland.*

(8665) WALSURA ROBUSTA. Another species of Walsura, (Robusta) exists in Sylhet, but the bark is not employed as a fish poison. —*O'Shaughnessy, page* 247.

(8666) WANEDILE. A rather hard, fine, close even-grained, heavy Ceylon wood.

(8667) WATCHES.

Montres, FR.	Guryall, GUZ. HIND.
Uhren Taschenuhren, GER.	Sahut. PERS.
	Karmannue taschasn, RUS.

' Oriuoli da tasca, o da saccoccia, It. | Relojes de faltriquera, Sp.

Are pocket time pieces composed of wheels and pinions,—a regulator to direct the quickness or slowness of the wheels, and a spiral spring which communicates motion to the whole. *Waterston.—Faulkner.*

(8668) WATER CRESS. NASTURTIUM. The leaves, loot putha. The seeds, hurufs, Herb (recent) and seeds of Nasturtium officinale. The Water Cress is a native of Great Britain. Is generally raised from slips. It thrives best in running streams, and is to be had all the year round. It is grown from seed in beds near a water course, and the supply may be kept up for any length of time. A small black caterpillar is very destructive to it : the only remedy is flooding the plants for a short time.—*Jaffrey.*

(8669) WATER FOWL. An enormous quantity of water fowl breed in *Tibet* including many Indian species that migrate no further north. The natives collect their eggs for the markets at Jigatzi, Giantchi, and Lhassa, along the banks of the Yaru river, Ramchoo, and Yarbru and Dochen lakes. Amongst other birds the Sara, or great crane of India (see "Turner's Tibet," p. 212), repairs to these enormous elevations to breed. The fact of birds characteristic of the tropics dwelling for months in such climates is a very instructive one, and should be borne in mind in our speculations upon the climate supposed to be indicated by the imbedded bones of birds.—*Hooker, Him. Jour. Vol.* II. *page* 161.

About two days journey from *Delhi* is the Nujjufghur jheel, a great marsh covered with water fowl. The method of capturing them there, accords with the practice that obtains in other parts of India. Earthen vessels, wide enough to admit a man's head into them and perforated with small holes, are allowed to float about for days on the surface of this "Jheel," until the ducks, teals, and water-fowl in general, seeing them daily, become quite accustomed to the sight and fearlessly swim around and even approach and peck at them. This preparatory step, is followed by the fowler supplying himself with a wooden float, strong enough to support him. Using it like a hobby-horse under him, he launches himself into the swamp with an earthern vessel over his head, of a similar size and kind and similarly perforated as those indicated above. The float is dispensed with in many parts of the marsh that are shallow. The fowler likewise supplies himself with a bag of net work, which is tied round his waist, and thus equipped he silently paddles himself along with his hands under water, until he gets among the earthern vessels and fairly amid the birds. He commences his task by quietly and patiently pulling them down one by one by their legs, and putting them into the bag, which is so well adjusted round his person, that the struggles of the birds do not scare away the rest. Some use small baskets of wicker work with a lid of the same material which answer the purpose better. When the bag or basket is full, the fowler recedes to the spot whence he set out on his aquatic expedition and there empties the contents into a basket large enough to contain about four or five times the number of the small one and then begins anew. Large nets are also laid out on favorable sites, towards which the ducks &c., are driven and are thus taken in great numbers. Mr. French was not aware if the decoy-bird is known among the natives or if they adopt one as a means of entrapping others of its species. These helpless creatures are sold at from 25 to 30 for a Rupee which itself is an indication of their being very numerous and numerously caught.—*Tour of India by French, Page* 193.

In *China*, the fenny margins of lakes and rivers and the marshes on the sea-coasts, afford both food and shelter to innumerable flocks of water-fowl. The banks along the wide delta of the Pearl river and the islands in it, are frequented by immense flocks of geese teal, ducks and other birds; and they are likewise very abundant and tame along the inland water-courses. Ducks are sometimes caught by persons who first cover their heads with a gourd pierced with holes, and then made into the water, where the birds are feeding ; these previously accustomed to empty calabashes floating about on the water, allow the fowler to approach and are pulled under without difficulty. The wild goose caught on the shores of the Pearl river and the common goose of Chinese farm-yards do not differ much, both of them being a plain ashy grey color with a large knob at the base of the upper mandible, the domesticated species is almost too gross for the table from the ease with which it fattens. This bird and the mandarin ducks are both considered as emblems of conjugal fidelity and a pair of one or the other usually form part of wedding processions. The epithet mandarin is applied to this beautiful fowl, and also to a species of orange simply because of their excellence and beauty over other species of the same genus and not as some writers have inferred, because they are appropriated to officers of Government.—*Williams' Middle Kingdom, page* 263. The yuen-yang, as the Chinese call this duck is the native of the central provinces and is reared chiefly for its beauty. It is one of the most variegated birds known, vying with the humming birds and parrots in the diversified tents of its plumage. if it does not equal them for brilliancy.—*Williams' Middle Kingdom, page* 264.

(8670) WATER-LILY, the common name for the species of the family *Nymphæaceæ.* [NYMPHÆADEÆ.] One of the most beautiful and the largest of the tribe is the *Victoria Regia.* This splendid plant, in the dimensions of its leaves, their varied tints, the colour, size, and

fragrance of its flowers, may deservedly be called the queen of flowers. The following is the account of its discovery by Sir Robert Schomburgh: "It was on the 1st of January, while contending with the difficulties nature opposed in different forms to our progress up the river Berbice, that we arrived at a point where the river expanded and formed a currentless basin. Some object on the southern extremity of this basin attracted my attention; it was impossible to form any idea what it could be, and, animating the crew to increase the rate of their paddling, we were shortly afterwards opposite the object that had raised my curiosity—a vegetable wonder. All calamities were forgotten; I felt as a botanist, and felt myself rewarded;—a gigantic leaf, from five to six feet in diameter, salver-shaped, with a broad rim, of a light green above and a vivid crimson below, resting on the water. Quite in character with the wonderful leaf was the luxuriant flower, consisting of many hundred petals, passing in alternate tints from pure white to rose and pink. The smooth water was covered with the blossoms, and as I rowed from one to the other I always observed something new to admire." The leaves are very large, measuring five or six feet in diameter. They have an orbicular form, the upper surface is bright green, and they are furnished with a rim round the margin from 3 to 5 inches in height; on the inside the rim has a green colour, and on the outside, like the under surface of the leaf, it is of a bright crimson; they have prominent ribs, which project an inch high, radiating from a common centre; these are crossed by a membrane, giving the whole the appearance of a spider's web; the whole leaf is beset with prickles, and when young is convolute. The calyx is 4-leaved, each sepal is 7 inches in length and 4 inches broad; the corolla covers the calyx with hundreds of petals; when first opened it is of a white colour, but subsequently changes to pink; it is very fragrant. Like all other water-lilies, its petals and stamens pass into each other, a petal often being found surmounted with half an anther. The seeds are numerous, and imbedded in a spongy substance. This plant has by some botanists been placed in the genus *Euryale*, whilst Lindley thinks it is nearer *Nymphæa*, from which it differs in the sepals and petals being distinct, the papilla of the stigma being prolonged into a horn, and the changing colour of its petals. This splendid plant has now been successfully cultivated in many of the hot houses of England. Beautiful specimens are to be seen in the Royal Gardens at Kew, and at the Cyrstal Palace, Sydenham.—*Eng. Cyc.*

(8671) WATER LILY. Vide NELUMBIUM AND NYMPHÆA.

(8672) WATERS, MINERAL. Mineral waters derive their distinctive characters from the formations or strata through which they flow. Those of the primitive formations are almost all thermal, and generally possess a high temperature. Those of the older secondary formations are generally of a lower temperature. The newer, secondary, and the tertiary strata, give forth cool mineral waters. The chemical contents—sulphuretted hydrogen, free carbonic acid, carbonate of soda, other salts of soda and of lime, silica, sulphate of magnesia, oxide of iron, free sulphuric and muriatic acids—vary in almost every individual case; but there is a general tendency in mineral waters from the primary formations to a sort of similarity of chemical contents, and so likewise in respect to the secondary and tertiary formations. Leaving out *thermal* waters, which are not designated mineral waters unless for some additional quality besides their high temperature, mineral waters are often classed into *saline*, *alkaline*, *chalybeate*, and *sulphureous*. Most of the celebrated Spas belong to one or other of these four classes,—the Cheltenham, Leamington, Harrogate, Carlsbad, Marienbad, Kissingen, Wiesbaden, Seidlitz, and Baden Baden waters are saline-aperient, some hot and some cold; or, rather, it should be said that *some* of the springs at these places are saline-aperient; for there are other springs at the same towns possessing very different qualities. Alkaline waters are met with at Bath, Cheltenham, Leamington, Harrogate, Scarborough, Carlsbad, Marienbad, Kissingen, Toplitz, Wiesbaden, Vichy, and many other places. Among the places at which chalybeat waters, or water in which the iron is associated with much free carbonic-acid gas, are met with, are Tonbridge, Harrogate, Brighton, Peterhead, Aix-la-Chapelle, Spa, Pyrmont, Schwalbach, Marienbad, and Seltzer. Sulphureous waters are found at Moffat, Askern, Harrogate, Aix la Chapelle, and other places. It will be seen that Harrogate possesses a large variety of these mineralized waters. A small number of springs contain iodine, and are on that account useful in certain maladies. There are springs of this kind at Tewkesbury, Cheltenham, Gucester, Leamington, Builth, Llandrindod, and Kreuznach. Some others contain a little bromine, and a few contain both iodine and bromine.—*Tomlinson.* See HOT SPRINGS; MINERAL WATERS; SPRINGS and THERMAL SPRINGS.

(8673) WA-WEI. A vegetable poison used by the natives of the Somali Coast and others in the interior of Africa, for poisoning their arrows. It is an inspissated decoction of the root of a tree which is not determined, but is supposed by Dr. Cleghorn to be one of the Laganiaceæ or Apocynaceæ. It is used both in hunting and in war, and is said not to be poisonous if swallowed.—*Madras Museum, Captain L. Playfair.*

(8674) WAX, BEES WAX.

Shuma, ARAB.	Cera-alba, LAT.
La, CHIN.	Lelin, MAL.
Miettie, CYNG.	Moom, PERS.
Wasch, DUT.	Wosk, RUS.
Cire, FR.	Siktha, SANS.
Wachs, GER.	Cera, SP.
Mome, GUZ. HIND.	Melloogoo, TAM.
Cera, IT.	Minum, TEL.

Wax, an organic product of considerable importance, is obtained from different sources, the chief of which is the bee-hive, where it is used by the bees in the formation of their cells. It has long been a matter of dispute among naturalists, whether the bee collects wax already formed in plants, or secretes it from sugar in the mechanism of its body. The latter view of the case, in accordance with the originial observations of Huber, is that which is now generally adopted. It appears that those working bees, to which the manufacture of wax is assigned, take a quantity of honey or sugar into their stomachs, suspend themselves in a festoon, by each insect attaching the claws of its fore-legs to those of the hind pair of the insect above it, and in this way, forming a number of festoons crossing one another in all directions, they appear like a dense curtain. They remain in this position for 24 hours, during which the secretion of wax takes place. The secretion is formed in certain membranous bags in the body of the bee; and, as the secretion goes on, the wax oozes through the membrane, and forms in thin plates on the outside. The process being complete, one of the insects detaches itself from the rest, proceeds to the top of the hive, and begins to build. It grasps one of the plates of wax by means of a pincer, formed at one of the joints of the leg, and draws it forward, when it is conveyed by one of the fore-claws to the mouth. The insect, with its mandibles and proboscis, reduces the plate to a riband of wax, softening it with a frothy kind of liquor, which makes it white and ductile. The other insects proceed in a similar manner, and with such celerity, that in a new hive, a comb 20 inches long by 7 or 8 inches broad, will be constructed in 24 hours, and in five or six days the hive will be half filled. The wax thus produced is more or less yellow in colour, and has an odour resembling that of honey. The beautiful geometrical form in which it is arranged in the honeycomb is well known. When the wax has served its purpose in the domestic economy of the hive, it is collected for manufacturing purposes, by first allowing the honey to drain off, or to be pressed out, and then boiling the combs in water, with frequent stirring, that the wax may not burn. In this way the combs are completely melted, and the liquid is then poured through hair-bags, which are pressed as long as any wax continues to pass through. The sediment remaining in the bags is also boiled over again, and more wax extracted from it. During the operation, the wax from each bag is received in a vessel of cold water placed beneath it, and answering the double purpose of cooling the wax, and preventing it from sticking. The wax is melted a second and a third time, and passed through bags of increasing fineness on each occasion. Lastly, it is melted once more without water, and poured into pans or moulds wider at the top than at the bottom, and wetted with cold water to prevent sticking. The conical shape of the cake thus produced is advantageous in two ways; it is more easily disengaged from the pan, and it has all its sediment or dross collected into a small space at the under surface, and there is consequently less waste in removing it. The moulds are kept in a warm room until the wax has solidified, otherwise the cakes are apt to crack across the middle. This method, though commonly employed, is tedious, consumes much firing, and wastes a considerable amount of wax; for these successive meltings and removal of dross cannot be effected without loss. Attempts have been made to expedite the process; and those of Mr. Bagster "The Management of Bees," by Samuel Bagster, jun. London, 1834, recommend themselves by their simplicity. This gentleman gives directions for obtaining a marketable wax from the combs by a single operation, without either straining or pressing, in the following manner. In an earthen vessel, much narrower at bottom than at top, is placed water and *aqua fortis*, in the proportion of 1 ounce of the latter to every quart of the former. When these are well blended, as many good wax-combs are put in as will reach, when melted, to within a finger's length of the top of the pan. The pan is then set on a clear fire, and stirred while the wax is melting, and until it has boiled long enough to liqueify the whole completely. It is then removed from the fire, and allowed to cool gradually. The wax then forms into a cake at the top, and the impurities are underneath: these arrange themselves in two layers, the lowest of which consists almost entirely of dross, but the next contains a certain amount of wax. When the cake of wax is turned out of the pan, both these drossy layers are removed, leaving the cake pure; but the upper drossy layer is boiled over again with more combs, and with any scrapings which it may have been necessary to make from the upper surface of the wax in order to leave it quite free from extraneous matters. Old combs that have wax in them, or other descriptions of refuse that have been pressed, but yet retain a considerable portion of wax, are pressed down in a close tub or vessel in a house for five weeks. This causes the impurities to ferment and rot, without affecting the wax, which may then be treated as above described, and will

yield a fine yellow wax, little inferior to that of the best combs. Where very great purity is required, the best empty virgin combs are put into the same kind of vessel employed in the preceding process, but with only a quarter of a pint of water, to keep the wax from burning. The pan is then set over a clear fire, and stirred until it boils. At this time a clear yellow froth begins to rise up, which froth is to be skimmed off into a pan placed close at hand. The fire must be so managed that this froth shall continue to rise without boiling over, and a succession of skimmings are thus obtained which form a very pure description of wax. When no more froth will rise, the residue is turned out into a vessel of cold water, and can be boiled up again with other combs. This method is only available with a fine comb. By the above processes, bees-wax is freed from impurities, but is not deprived of its natural yellow colour. For the greater number of uses to which the substance is appropriated, it is, however, necessary that the wax should be rendered perfectly white. This is effected by exposing it in thin ribands on a bleaching ground, where it is subjected to the action of light, air, and moisture, and loses both colour and odour. Similar substances, but obtained from the vegetable world, are of far less importance than the product of the bee, yet they are deserving of notice. Several species of myrtle (*Myrica*) yield the product called *Myrtle-wax*. This is especially obtained from *Myrica cerifera*, which flourishes in Louisiana, the berries of which are incrusted with wax. By boiling these in water, a quantity of hard brittle wax of a pale green colour is obtained, of the specific gravity 1·015, the fusing point being 110°. A somewhat similar wax is obtained from *Myrica cordifolia*, a shrub which grows at the Cape of Good Hope. The stems and leaves of palm-trees also secrete the substance called *Palm-wax*. Such is the hard brittle greenish yellow wax which we obtain from Rio de Janeiro. It is soluble in boiling alcohol and ether; it fuses at about 163°. A white and crystaline wax, resembling spermaceti, is obtained from a kind of sumach, *Rhus succedaneum*, and is known in commerce as *Chinese* or *Japan wax*. It is soluable in naphtha, but scarcely so in alcohol and in boiling ether. It forms a soluble soap when boiled in a solution of caustic potash. It fuses at about 180°. Another wax, having the same fusing point, is found upon a hard and ligneous variety of the sugar-cane, and is known as *sugar-cane wax* and *cerosine*. This is soluble in boiling alcohol, but sparingly so in boiling ether. By boiling the bark of the cork-tree, *Quercus suber*, in alcohol, and distilling off the alcohol, a quantity of yellow crystals are obtained which form *cork-tree wax*, which may be purified by repeated solution and crystallization. Nitric acid converts this substance into a peculiar acid, called *cerinic acid*. The demand for wax is great in Roman Catholic countries, where gigantic candles of this substance are required for the service of the several altars; but the great improvement in the manufacture of composite candles has reduced the demand for wax candles as an article of domestic use. For the manufacture of wax candles and tapers, see CANDLE. The amount of wax produced in England is very large, but a considerable quantity is likewise imported from abroad. In 1840, nearly 4,000 *cwts.* were imported from the western coast of Africa, nearly 2,000 *cwts.* from Tripoli, Tunis, &c., and more than 1,000 *cwts.* from the East India Company's territories. This was at a time when the very heavy duty of 10*s.* per *cwt.* was laid upon this article. In 1842, the duty was reduced to 1*s.* and 2*s.* the *cwt.* The adulteration of this substance was great during the existence of the heavy duties, and is still practised to a less extent. The adulterants of yellow wax are earth, pea-meal, resin, &c. Those of white wax are white oxide of lead, white tallow, and potato-starch. Oxide of lead may be detected by simply melting the wax in water, when the oxide falls to the bottom; tallow is discovered by the dull opaque white which it gives to the wax, and starch is detected by means of sulphuric acid, which carbonizes the starch without acting on the wax. —*Tomlinson. In India*, Wax is obtained from West Coast of Africa, Barbary, Malabar, Zanzibar, and in small quantities from the West Indies, United States, Germany, France, &c. —*Waterston.* In 1851, Vegetable wax was sent from Shanghae, in China; from St. Domingo, in the northern parts of which the plant is indigenous; and a remarkable specimen from Japan. This substance, from its high melting point and other physical characteristics, has of late attracted a good deal of attention; it is admirably suited as a material for the manufacture of candles.—*Simmonds.* The wax-insect tree of China, says Mr. Fortune, is no doubt a species of ash (fraxinus). It grows abundantly on the banks of ponds and canals in the province of Chekiang; and a small quantity of wax is also produced in this province. I was indebted to Dr. McCarter of Ningpo, for some beautiful specimens of the fresh insect upon the branches of this tree. This insect has been named *Coceus pela* by Mr. Westwood. When fully developed on the trees it has a most remarkable appearance; they seem as if covered with flakes of snow. The wax is an article of great value in Chinese commerce, and a small portion is exported.—*Fortune's Residence, p.* 146,

(8675) WAX CANDLES. Various descriptions of wax candles were formerly made in India.

(8676) WAX FLOWER. VIDE TABERNÆMONTANA.

market. The hard wheat is preferred by the natives of India to the soft. Wheat is grown largely in Burmah, but Mr. Mason had never seen it under culture in the Tenasserim Provinces, although Commissioner Durand made an attempt to introduce it. No doubt, on the Karen mountains the cultivator would reap an ample harvest.—*Simmonds. Mason.*

(8688) WHEAT-MIDGE (Cecidomyia Tritici), a fly and its caterpillar, infecting wheat.—*Hassell.*

(8689) WHITE COPPERAS, White Vitriol, Sulphate of Zinc. Sal Vitrioli.

Sulfate de zinc, Fr.	Zinci-sulphas, Lat.
Schwefelsaures, Zinkoyd, Ger.	Caburnic, Sans.
	Vulley-tootum, Tam.
Suffeid-Tootia, Guz. & Hind.	Tootum, Tel.

A salt formed by the union of sulphuric acid, with the oxide of zinc. It is found native in the mines of Goslar, and other places.—*Faulkner.*

(8690) WHITING FISH. Indian Whiting. Sciena. Lin.

Kullengan mutchie also Darya ka Shaikra, Duk.	Kellunga meen, Tam.

(8691) WHITE LEAD (Carbonate) of, Ceruse.

Asfeidaj, Arab.	Plumbi Carbonas, Lat.
Plom Carbonate, Fr.	Suffeidah, Kash, Pers.
Bleiweiss, Ger.	Istibedsh, Turk.
Cerussa, It.	Moothoo Vullay, Tam.
Suffeidah, Guz. Hind.	Seebaydoo, Tel.

Is usually made by suspending thin plates of lead over heated vinegar, the vapour of which corrodes the metal, and converts it into a heavy white powder. Mixed with oil it forms a common paint; it is also employed in medicine.—*Faulkner.*

(8692) WHITE PEPPER.

Piper-album, Lat. | Suffeid-Mirch, Guz. Hind.

The fruit of a slender climbing plant (*Piper nigrum*), gathered after it is fully ripe, and freed of its dark coat by maceration in water. It is smooth on the surface; and is milder than the black-pepper. The plant is extensively cultivated in Malabar, Sumatra, Siam, Malacca, &c. —*Faulkner*

(8693) WIGHTIA. At Tonglo, in Sikkim, at an elevation of several thousand feet, Dr. Hooker found great scandant trees twisting around the trunks of others, and strangling them: the latter gradually decay, leaving the sheath of climbers as one of the most remarkable vegetable phenomena of these mountains. These climbers belong to several orders, and may be roughly classified in two groups.—(1.) Those whose stem merely twine, and by constricting certain parts of their support, induce death.—(2.) Those which form a net-work round the trunk, by the coalescence of their lateral branches and aerial roots, &c.: these wholly envelope and often conceal the tree they enclose, whose branches appear rising far above those of its destroyer. To the first of these groups belong many natural orders, of which the most prominent are—*Leguminosæ*, ivies, hydrangea, vines, Pothos, &c. The inosculating ones are almost all figs and *Wightia:* the latter is the most remarkable, for its grasping roots.—*Hooker Him. Jour. Vol.* 1, *page* 163-164.

(8694) WILD ALMOND OIL. Terminalia Catappa. A specimen of oil said to be obtained from the fruit of this tree was exhibited in the "Madras Tariff." At the Madras Exhibition of 1851, a sample labelled "Almond oil" from Tanjore is the product of this species of Terminalia.—*M. E. J. R.*

(8695) WILLOW. Salix. A species of willow, is one of the most abundant forest trees of Tenasserim on the banks of inland streams; and as many of the willows are medicinal, it is very probable that this also possesses medicinal properties, but they are as yet unknown.—*Mason.* A species of willow, Roxburgh describes as "a native of banks of rivulets and moist places among the Circar mountains," but a species of willow on this Coast is met on every stream before the influences of the tide ceases to be felt.—*Mason.*

(8696) WILLUGHBEIA, a small East Indian genus of plants belonging to the natural order *Apocynaceæ*, named after Francis Willughby F. R. S.—*Eng. Cyc.*

(8697) WILLUGHBEIA EDULIS: Roxb. Fl. Ind. ii. p. 67.

Lutian, Hind.

Forests of Chittagong and Sylhet. A very large climber: every part of the plant on being wounded discharges an abundance of fluid caoutchouc. The fruit is pulpy, soft, and yellow, and esteemed by the natives,—*O' Shaughnessy, page* 448.

(8698) WILLUGHBEIA MARTABANICA, There is a species of Willughbeia in the forests that produces a fruit as large as an apple, which Europeans sometimes call "a kind of fig." It has an agreeable taste but abounds in a milky juice.—*Mason.* Its colour is yellow, and it is about the size of an orange.—*Eng. Cyc. page* 1256.

(8699) WINE.

Khumr, Arab.	Mei, Pers.
Vin, Fr.	Vinho, Port.
Wein, Ger.	Wino, Wino-grandnoe, Rus.
Ungoor-ka-Shrab, Hind.	Madira, Sans.
Vino, It.	Vino, Sp.
Vinum, Lat.	

The fermented juice of the grape. There are a great many varieties of wines; and this circumstance, combined with differences of soil, climate, mode of preparation, &c., occasions an extreme variety in the species of wine—the chief of which are Port, Sherry, Claret, Champaigne, Madeira, Hock, &c.—*Faulkner.*

(8700) WINTERACEÆ, a natural order of Exogenous Plants. This order is characterised by possessing hermaphrodite or unisexual flowers; from 2 to 6 sepals, which are sometimes not to be distinguished from the petals; the petals are from 2 to 30 in number, and, when more than 5, in several rows; the stamens are hypogynous, short, indefinite, and distinct, arranged in a single whorl, 1-celled; the embryo is very small and straight, and situated at the base of a fleshy albumen. The order consists of small trees or shrubs, with alternate, dotted, coriaceous, persistent leaves; convolute deciduous-stipules; and solitary, sweet-scented, brown or chocolate-coloured flowers.

This order has obtained its name, given it by Brown, from *Winteria*, the old name of the *Drimys Winteri*. This name was given in honour of William Winter, a captain in the royal navy, who sailed round the world with Sir Francis Drake. It contains four genera—*Illicium, Temus, Drimys, and Tasmannia.*

These genera constitute the section *Illicieæ* of the order *Magnoliaceæ* of De Candolle, and the section *Wintereæ* of Lindley in the same order. They differ from *Magnoliaceæ* in their dotted leaves, and also in their aromatic qualities. There are about ten species, of which two are found in Australia, two in the hotter parts of America, two in South and two in North America, one in China and Japan, and one in New Zealand.—*Eng. Cyc.*

(8701) WINTERS BARK. A spice resembling *Canella alba*, contained from the *Wintera aromatica*, and on account of its aromatic and stimulant properties, has been used as a substitute for cinnamon. It is now seldom employed. —*Faulkner.*

(8702) WISTARIA, a genus of Plants belonging to the natural order *Leguminosæ*, named after Caspar Wistar, professor of anatomy in the University of Pennsylvania. It has the following characters:—The leaves are unequally pinnate, and without stipules. The flowers are arranged in terminal racemes, and are of a blue lilac colour: when young they are accompanied by bracts which fall off as the flowers expand. The calyx is campanulate, somewhat bilabiate, the upper lid has two short teeth, the lower lip three teeth, which are subulate; the corolla is papilionaceous; the stamens diadelphous; a nectariferous tube girds the stipe of the ovary; the legume is coriaceous, 2-valved, 1-celled, and rather torulose. The species are deciduous twining shrubs, natives of North America and China. They grow vigorously in Great Britain, and form in flower the handsomest ornaments of our gardens.—*Eng. Cyc.*

(8703) WISTARIA CHINENSIS, Chinese Wistaria, has the wings of the corolla each furnished with one auricle; the ovary villose; the flowers large. This plant is a deciduous twiner, and a native of China, and was introduced into England in 1816. It flowers in Great Britain in May and June, and sometimes produces a second crop of flowers in August. This species was originally called *Glycine Chinensis*, a name which in some places it still retains.—*Eng. Cyc.* In China Mr. Fortune saw a specimen of *Wistaria chinensis* in a dwarfed state, growing in a pot. The tree was evidently aged, from the size of its stem. It was about six feet high, the branches came out from the stem in a regular and symmetrical manner, and it had all the appearance of a tree in miniature. Every one of these branches was then loaded with long racemes of pendulous lilac blossoms. These hung down from the horizontal branches, and gave the whole the appearance of a floral fountain. *Page* 334.

(8704) WOAD.

Weede, Dut.	Guadone, Guado, Glasso,
Pastel, Guede, Vouede, Fr.	It.
Waid, Ger.	Pastel, Glasto, Sp.

A plant (*Isatis tinctoria*), indigenous to most parts of Europe; from the roots and leaves of which, a blue dye is obtained. Woad is now entirely superseded by the use of Indigo.—*Faulkner.*

(8705) WOMEN'S CLOTHS, COTTON. In Southern India, this description of cloth is chiefly manufactured at the town of Arnee in the Collectorate of North Arcot; they are of various colours with borders; chiefly used by Brahmin women: they are of ordinary qualities and sold at from 2 to 12 Rupees each.

(8706) WOOD. See Timber. The most important application of wood, is in the building and repairing of houses and ships, and in the construction of machinery. For this purpose the large trees, which come under the denomination of *Timber*, are chiefly employed. The conservation of growing timber is an art of considerable importance and inattention to this duty has allowed nearly every forest in India to be denuded of its principal trees. —*Tomlinson.* The value of wood and timber in India, is not to be measured by the estimation in which they are held, in temperate climates. In India they are not only applied to those economic uses with which all are familiar, but they also furnish fuel to all classes, supplying the place of that valuable mineral, coal. Besides this, the influence of trees on climate is very considerable tending as they do, to prevent the too rapid withdrawal of moisture from the soil, a point of great importance in a country, where the heat of the sun is intense, and the supply of water is dependent only upon periodical falls of rain. The value of timber would be best shown by the vast extent, to which it is employed in the various purposes of life. It is impossible to ascertain the amount used in India, but the quantity of firewood alone imported by sea into Madras during 5 years is given below, that for 1849-50

being estimated by the Military Board to be equal to 12,000 tons.

Years.	Billets.	Value Rs.
1845-46	63,61,816	32,536
1846-47	42,77,013	22,746
1847-48	56,78,794	31,974
1848-49	104,75,590	58,026
1849-50	98,51,050	66,101

The above is exclusive of imports by Cochrane's Canal, and the trunk roads which the Military Board estimated at upwards of 85,000 tons per annum.

The trade Reports of the Madras Presidency show that the exports of the following 5 woods alone, amounted in value to 3,84,000 Rupees in 1854, viz :—

Sandalwood, cwt.	11,684	137,944
Redwood, ,,	47,431	59,570
Sappanwood ,,	5,248	15,350
Ebonywood, ,,		4,859
Teak, ,,		216,368

The imports of timber into Great Britain alone in 1850, amounted to ten millions of cubic feet. See TIMBER.

(8707) WOOD APPLE GUM. Obtained from the *Feronia elephantum* is very abundant, and forms the well known "East India Gum Arabic." Mr. Rohde mentions that from its ready solubility without residue it gives the best mucilage for making Black ink.—*M. E. J. R.*

(8708) WOOD ENGRAVING. The following woods can be prepared for engraving upon.

Guava Psidium Pyriferum, (the best.)

Palay. Mimusops hexandra. A good wood but liable to be attacked by insects.

Veppaley. Wrightia antidysenterica. A fine close grained wood not quite so hard as the guava, but improving with age

Jujube or bayr fruit tree. Zizyphus jujuba, rather soft.

Wood apple tree. Feronia elephantum, too coarse in the grain.

Satin wood. Swietenia chloroxylon. A close grained wood but apt to split.

(8709) WOOD OILS. This class of oils is obtained for the most part from the Burmese coast and the Straits. These are usually procured by tapping certain trees of the order Dipterocarpeæ, and applying heat to the incision. The oil which flows from the wound, is a mixture of a balsam and volatile oil, and when applied as a varnish to wood or other substance the oil evaporating deposits a hard and durable coat of resin. They are chiefly used as natural varnishes, either alone, or in combination with coloured pigments, also as a substitute for Tar in paying the seams of shipping, and for preserving timber from the attacks of white ants. They are said also to be useful as an ingredient in Lithographic inks.

Owing to the little frequented countries from which they are brought, and the imperfect knowledge we yet possess of the country whence they are imported, the names of the trees from which these valuable substances are derived, are involved in some degree of obscurity. The oils, therefore, generally receive the names of the localities from which they are imported. Some of them differ considerably in colour and consistence, but they all possess the same balsamic odour, and are derived from various of the noble family of Dipterocarpeæ. At the Madras Exhibition of 1855, in this section, were three good samples of wood oil from Canara : also, a very interesting series of ten oils from various parts of the Madras Presidency and Burmah. Lieut Evans 51st Regt. N. I., in addition to other contributions, exhibited a bottle of wood oil from Malacca in its natural state as procured from the tree. The mode of extraction is as follows :—about the end of the dry season, that is in March or April, several deep incisions are made with an axe into the heart of the wood, and a good sized piece scooped out, into these holes fire is placed, and kept burning until the oil begins to run, when it is received into a bamboo, and allowed to run slowly drop by drop."

(8710) WOOD OIL, as obtained from the tree without any preparation. This was obtained from Malacca, from a large tree of the Dipteraceous family, which is very common in the dense jungles of the Malayan Peninsula, and grows to a great height. When not tapped too soon, the base of the trunk is often of immense girth—the wood is reddish brown and has a smell not unlike that of English fir, the bark is smooth, the leaves alternate, pinnate and exstipulate, fruit a one seeded drupe, seed angular and anatropal. The oil when permitted to remain at rest divides itself into two layers, the upper consisting of a clear chesnut colored liquid balsam and the lower being in appearance like flakes of granulated sugar and consisting probably of the surplus resin deposited by the action of the atmosphere.

(8711) WOOD OIL, GURJUN BALSAM.

Telia Gurjun, BENG. GUZ HIND.

As found in the bazars, this substance generally occurs as a brown, oily-looking, semitransparent liquid ; in odour strongly resembling a mixture of balsam of capaiba with a small portion of naptha. One kind is yielded by the *Dipterocarpus laevis*, a native of Chittagong, Pegu, Assam, &c. It has been successfully used as a substitute for balsam copaiba, to which it bears a great resemblance in its physical and chemical properties,—*Dr. O'Shaughnessy*. Gurjun Oil, is, however, the product of several species of Dipterocarpus and known, generally, as wood oil. Gurjun balsam contains fixed resin, essential oil, and water. If the latter be not separated, it boils with explosive violence. The separation

is effected by the dried muriate of lime. A small portion of the essential oil may be obtained by distillation with water in the common way. Gurjun oil is a good substitute for copaiba balsam in the treatment of gonorrhœa, given diffused through almoud mixture or gum water. Dose ten to fifteen minims repeated thrice, daily, or as often as necessary.—*Beng Phar. p.* 378.

Compound Tincture of Gurjun, is an efficient substitute for "Franks" well known specific for the treatment of gonorrhœa. Dose, twenty to thirty minims, in a little milk or sugared water. —*Beng. Phar p.* 427.

Wood oil, Kurra noona. TEL. The following is taken from Captain Halsted's account of his visit to the island of Chedooba. The wood oil tree was the most conspicuous in growth and size of the larger trees of these summits. One was felled on the west hill which measured in diameter, at the respective ends of a 60 feet length, 4 feet 6 inches, and 3 feet 6 inches; and another is left standing as a mark, on the summit which measures 21 feet 4 inches in girth at 6 feet from the ground. The wood of this tree will not, I fear, be found valuable as timber, but its produce, the wood oil, has yet to be better appreciated than at present. This substance is produced by cutting a hole into the body of the tree, and kindling a fire in it; the flat floor as it were, of the hole, has a grove cut in it, which receives the oil as it exudes from the wound, whence a split bamboo conducts it to the pots placed for its reception, the quantity thus yielded from a large tree is surprisingly great. In felling the above mentioned individual the oil ran in a stream from it, and it must have contained seven tons. The strict propriety of designating it an oil may be doubted. It has always seemed to me more like a varnish; it speedily forms a highly polished surface on wood, and has a fine aromatic scent, not unlike that of cedar: mixed with reeds and dried, it makes a brilliant and a fragrant torch. The color of the wood is a dull pink. —*Rohde M.S.S.*

(8712) WOOD OIL FROM CHINA. this valuable produce merits notice as being one of the substances of which the well-known and much prized China lacquer is made. It is used in Singapore for painting the beams and woodwork of Native houses, and may also be mixed with paint when not exposed to the sun.

(8713) WOOD OIL FROM GHITTAGONG. This substance much resembles the "Teak wood oil" and the "Wood oil from Pegu," above mentioned. It is less liquid than the latter, but is used for the same purpose; procurable in all large bazars.

(8714) *Sissoo-wood Oil—Dalbergia sissoo.* An empyreumatic medicinal product.

(8715) *Camphor-wood Oil—Dryobalanops Camphora.*—This belongs to the class of "Volatile oils," but may be here noticed. The specimen exhibited by Lieut. Hawkes was forwarded to him from Singapore through Lieut. Heath of the 38th Regiment N. I., and another excellent specimen which was exhibited by Second Dresser Pulneandy was brought by him from Labuan. It is used largely in Singapore as a substitute for turpentine, and sells at from 15 to 20 cents a bottle.

(8716) *Deodar or Shemanatahu Oil.* Tam. Erythroxylon Areolatum. An empyreumatic medicinal oil.

(8717) WOOD OIL FROM PEGU. The Botanical names of the trees yielding this wood oil cannot with any certainty be ascertained. The oil which is generally known by this name is a very clear and liquid substance forming a natural varnish when applied to wood or other substances.

(8718) WOOD OIL FROM RANGOON. This appears to differ very considerably from any other specimen of "wood oil," it is quite white and almost solid—but has the usual resinous smell of this class of oils.

(8719) WOOD OIL FROM TINNEVELLY. An empyreumatic product similar to tar, chiefly used medicinally by Native Practitioners.

(8720) *Teak Wood Oil.* A dull ash colored oil under this name, is procurable in most of the large bazars of India; when allowed to rest for some time, it separates into two layers, the one an upper dark colored clear stratum and a lower and more solid deposit. Its chief use is for applying to wood work of all sorts, either alone as a natural varnish, or in combination with certain resins.

(8721) WOOD SORREL. OXALIS.

(8722) WOOL.

Uld, DAN.	Pushm, Put, PERS.
Wol, DUT.	Welna, POL.
Laine, FR.	La, Laa, PORT.
Wolle, GER.	Wolna, Scherst, RUS.
Oonn, GUZ. HIND.	Lana, SP.
Lana, IT.	Wull, SW.
Lana, LAT.	

The fleecy covering or pile of the sheep. Wools are distinguished by their length of staple, and by the fineness of their filaments. It is an important article of commerce, and accordingly much attention is paid to the rearing of sheep in all civilized parts of the world, so as to render their wool as perfect as possible. Wool is largely imported into Bombay from the Persian Gulf, Kurrachee, Sonmeanee, Cutch, &c., and is re-exported to England.—*Faulkner.*

India.—The table-land of the Peninsula, commencing with the Neilgherries, and proceeding along Mysore to the Deccan, Candeish, and Guzerat, presents large tracts of country affording a favourable climate, and abundant pastures for numerous flocks of sheep. If from thence we proceed in a north-east direction, passing Marwar, Malwa, Rajapootana, to the

district of Hurriana, and the province of Delhi, we shall see, supported on the natural pastures of the country, immense herds of cattle, and numerous flocks of sheep. The latter affording Wool employed by the natives for making blankets (*Kumlees*), of different degrees of fineness, which form a considerable article of the commerce of these provinces. Again, the Himalayan mountains, on their Southern face, present a European-like climate, remarkable however for being influenced by the periodical rains. The temperature varies according to the elevation; but they afford everywhere rich pastures, and support a fine breed of ship, of which the Wool is employed by the Mountaineers to form their clothing. The Northern face of these mountains is as remarkable for its dryness, as the Southern is for its moisture; the cold is excessive, and the animals which are pastured there are covered with shaggy hair, or with long Wool, and a fine down. It is here that the Shawl Wool Goat finds its most congenial climate. Mr. Moorcroft, who was deputed in 1814, to that part of Little Tibet, in Chinese Tartary, where the Shawl Goat is pastured, for the purpose of opening to Great Britain the means of obtaining the materials of the finest woollen fabric, found that the Hooneas were obliged to send all their best Wool to Cashmere. He mentions that "this is caused by strict injunctions to all the owners of flocks, not to sell any shawl-wool except to the Cashmerians or their agents, in consequence of a representation having been made to the Government, that the Jouaree merchants had bought some last year, and that the Cashmerians would suffer if any of this kind of wool were to pass into other hands." —*Moorcroft's Journey to Lake Manosarouara—Asiatic Res.* vol. lxii. In the year 1819, considerable advantage was anticipated from importing this wool into England; as a gentleman who was consulted, and who professed to have a practical knowledge of the English Wool Market, valued it at eight shillings per pound. The Byragee Wool, however, when imported was found to be unsaleable; as of 189 bales of Shawl and Bhyragee Wool, imported in the years 1821, 1822, and 1823, costing exclusive of freight and charges, £5,444, the gross sale proceeds amounted only to £809. This Wool was bought from the Hooneas, who keep sheep with the Shawl Wool Goats, by the people of Kunawur, and brought by them to Rampore, the capital of Bissehur, on the Sutlej. Specimens of the same kind of Wool, procured by Mr. Hodgson from the Booteas who visit Nepal, were forwarded to the Court of Directors of the East India Company, in 1835, by Dr. Wallich. Of this the sorted Wool was valued in London, at from 10*d.* to 11*d.* per pound; some in the unsorted state at 5*d.* to 7*d.*; and some was sold in the London market in 1834, at from 2*d.* to 7*d.* per pound; the low price was chiefly owing to its dirty and mixed state. Attention was turned in England to the subject of Indian Wool, by Mr. Southey, of Coleman Street, addressing a letter, 24th November 1836, to the Committee of Agriculture of the Royal Asiatic Society, respecting some Wool imported from Bombay. He suggested more attention being paid to the assortment of the Wool, and improvement in the breed of the sheep; and stated that last year there were imported into London 773 bags, and into Liverpool 624 bags of Indian Wool which were sold by Public Auction at 4½*d* to 1*s.* 2½*d.* per pound. The Wool was chiefly white but with black hairs occasionally interspersed; and he understood that it was produced in the province of Guzerat. In the following year, Mr. Southey again called attention to the subject, stating that the quantity exported from Bombay had enormously increased; but that what came to England was entirely of middling and secondary quality, and had, consequently, realized no higher prices than from 4½*d.* to 11½*d.* per pound. The great and rapid increase of the exports of Wool from Bombay is evident from an inspection of the following extract from the official Report of the Commerce of Bombay, for 1836-37.

"In the official year ending 30th April.

1834	.....	69,944 lbs.
1835	.....	486,528
1836	.....	1,196,664
1837	.....	2,444,019."

The report of 1837-38, goes on to say, "The quantity of Wool exported has increased from 2,444,019 lbs. to 2,700,086 lbs., valued at 98,564 rupees."

Sir A Burnes writing on wools of Cabool and Bokhara, says—1. The wool of Toorkistan, is obtained chiefly in the neighbourhood of Bokhara and Samarcand, and is more celebrated than that of Cabool. This is sent to Umritsir in the Punjab, where it is used to mix with the Shawl Wool of Tibet, in making what are called Cashmere shawls. It is the produce of the Goat of Bokhara and not of the Sheep of Toorkistan, and is called *put*, in contradistinction to *pushm*, which is used to express the fleece of the Sheep. 2. The wool or Put of the Goat of Cabool is not at present exported being entirely consumed in the Native Manufactures. It is procured from Goats, and chiefly from the Hill Country of the Huzaras to the West of Cabool, and between that city and Herat, which has an elevation of about 6,000 or 8,000 feet above the level of the sea. 3. The countless flocks of flat-tailed Sheep in Cabool, produce an abundance of Wool. The fleece is of a glossy white colour, and is in Cabool called *pushmi burra*, and the fabrics prepared from it *burrak*, in contradistinction to *puttoo*. It sells at from two and a half to two

Cabool Rupees the seer, or sixteen pounds. It is brought in from all directions for sale in Cabool, and Sir A. Burnes states that he "can scarcely put a limit to the supply, since the extent of pasture land in these countries is not over-rated at four-fifths of the whole surface of the country, and a very large portion of the population, such as the Lohanees and Ghilgees, are shepherds, who remove from pasture to pasture, and rear their flocks with great care and attention. Nature, however, does as much as the people; for aromatic plants, in which sheep delight, are exceedingly abundant, and it is universally believed that they have considerable effect on the quality of the Wool."

Good Ewes appear to be obtained in Coimbatore and Baramahal; but Jalna and Beder are mentioned as the best places whence to obtain the white-wooled breed. The results obtained both at Bangalore and on the Neilgherry Hills, from crossing the white-wooled sheep of the country, with Saxon, Merino and South-down rams, are stated to be most satisfactory, both as to quantity and quality of Wool, and size of carcase.—*Royle's Productive Resources of India.* At the Madras of Exhibition of 1855, of specimens of Woollen Manufactures, the most remarkable were those from Hoonsoor, comprising white and colored blankets of various textures made in the Native loom, some being imitations of English Articles, and a decided improvement upon the country cumbly, and cheap in price. Among them was the description of blanket furnished to Invalids and time-expired men proceeding to England. These are not manufactured for the European Troops, being too thick, heavy and unsuited to the climate. English blankets are therefore provided instead; the comparative cost is as follows:

1	Hoonsoor Blanket.	...	1	12	0
1	Europe do.	red ...	4	8	0
1	Do. do.	white	5	8	0

The Jury considered this manufacture worthy of encouragement, and observed that means should be devised to improve the Manufacture especially as wool is abundant. The description of wool from which these were manufactured is of recent introduction. In the Mysore country "Sheep "thrive well, but the wool is coarse, and little "used except for the manufacture of Native "Blankets. About 10 years ago, General Cubbon took charge of a flock from the Madras "Government, which had been collected the "year previously for the purpose of introducing Merino wool into the country; but that "flock was useless, it having been attacked with "rot. He then collected one at a farm about "60 Miles West of Bangalore, and imported 3 "or four Rams annually from Sydney, these amalgamate so well with the country sheep, both in "figure and size, that in the 4th cross it is not "possible to distinguish farm bred from the "imported Ram. There are now about 6000 "sheep in Mysore, with merino blood in them. "Rams from the farm have been distributed to "the Collectorates of North Arcot, Bellary, "Salem and Coimbatore. During last year 25 "Rams were sent to the Punjaub, by order of "the Government of India. The wool has been "very highly reported on by Messrs. Southey "and son, and several parcels have been sold in "London as high as 1 shilling and 6 pence per lb. "while the country wool, and that imported "from Bombay, averages only 4*d.* to 5*d.* per lb, "There can be no doubt that when the Merino "sheep is naturalized, wool will become a valuable article of Export. A mercantile firm in "Bangalore, has recently exported the wool of "the Mysore country to England, in considerable quantity, and has realized a very fair profit. Eventually the Merino will be produced as "cheaply as ordinary wool." The quantity and value of wool annually exported from Madras is lb. 1,28,413, value Rupees 15,816. A very large black cumbly from Kurnool was considered an excellent specimen closely woven, fine and soft in texture, and to this the Jury awarded, as the best specimen of the ordinary woollen manufactures of the country, a second Class Medal. A check Cumbly, from Chittledroog, was found deserving of honorable mention. The best specimen of woollens was found in the Tariff, being a blanket made of corded wool of excellent quality and reasonable in price. A red cumbly of Mysore, was exhibited in this collection and was of good quality. (Sd. W. E. Underwood, *Reporter.*)

At the great Exhibition of 1851, some fine merino wool was exhibited from the table-land of Mysore, and indigenous wools from the hilly country of the north-west frontier. Some from Lahore, and other kinds from the dry and cold elevated climate of Tibet. Of the last, were some very fine specimens from Lieut. Strachy. Many of the animals there being furnished with a fine down or hair-like wool under the coarse common outer wool. It is this which is chiefly employed for the shawls and the shawl wool cloth. Though woollen fabrics of superior quality are not likely to be fabricated in a hot country like India, yet as there are great diversities of climate in the different parts of Eastern and Southern Asia, some very substantial woollen cloths and blankets are made in different parts, amongst others, fine shawl-wool cloth in Cashmere; also the kind called Puttoo; a fabric, named *Pursepuz*, the pile of which, on one side, is formed of loops. Felted blankets and cloaks have been manufacted from the table land of Mysore, as well as from the north-west frontier, and from Nepal and Tibet.—*Royle, Arts &c. of India, page* 498.

China. The only woollen fabrics produced by the Chinese are felts for the soles of shoes

and winter hats, and a sort of rag or carpet. It is not woven in looms from the yarn, but is made in small pieces by a fulling process which mats the fibres together. The consumption of it by shoe-makers is very great, and nearly as large for winter hats among the common people. The rags are woven with colored threads in rude imitation of figures, and are extensively used in the northern provinces; the pieces are a few feet square, and sown together for carpets or bedding. Hair and wool are both employed in their construction. The art of knitting is unknown, and of course also the fancy designs and worsted work which are made by ladies in the west.—*Williams' Middle Kingdom, Vol.* II *page* 126.

(8723) WOTAY KOROSHANUM.

Wotay Koroshenam, TAM. | Wontay Koroshnam, TEL.

This is a bright yellow, biliary concretion, found in the gall bladder of certain camels. It is highly prized as a beautiful yellow paint, but is very expensive.—*Ainslie.*

(8724) WOOTZ OR INDIAN STEEL. The ore from which it is made is the magnetic oxide which is combined with quartz, generally in the proportion of 48 parts of quartz to 52 of oxide of iron. It is found in many parts of the south of India, but Salem is the chief seat of the manufacture, and there the ore is prepared by stamping and separating the quartz either by washing or winnowing. The furnace in which the ore is smelted is from three to five feet high from the surface of the ground, and the ground is hollowed out beneath it to the depth of eight inches or a foot. It is somewhat pear shaped, being about two feet diameter at the ground and tapering to about one foot diameter at the top: it is built entirely of clay, two men can finish one in a few hours, it is fit for use the next day; the blast is furnished by a pair of bellows each being a goat skin with a bamboo nozzle: a semi-circular opening about a foot and a half high and a foot in diameter at the bottom is left in the furnace and before each smelting it is filled up with clay: the furnace is then filled up with charcoal, and kindled, a small quantity of ore, previously moistened to prevent its receiving the charcoal, is laid on the top of the fuel, and charcoal is thrown over it to fill up the furnace: in this manner ore and fuel are added and the bellows plied for four hours or thereabouts when the process is stopped, and the temporary wall in front of the furnace having been broken down the bloom is removed by a pair of tongs from the bottom of the furnace and is then beaten with a wooden mallet to separate as much of the vitrified oxide as possible: and, while still red hot, it is cut through with a hatchet and in this state sold to the blacksmiths who perform all the subsequent operations of forging it into bars, and making it into steel. The process of forging into bars is performed by sinking the blooms in a small charcoal furnace and repeated heatings and hammerings to free it as much as possible from the vitrified and unreduced oxide of iron: it is thus formed into bars about a foot long, an inch and a half broad and about half an inch thick. In this state it is full of and exceedingly red short. These bars are cut into small pieces to enable them to pack in a crucible. A quantity amounting to a pound and a half to two pounds is put into a crucible along with a tenth part by weight of dried wood of the Cassia auriculata chopped small; these are covered with one or two green leaves of the calotropis (asclepias) gigantia or cow obulas laurifolius and the mouth of the crucible filled up with a handful of tempered clay which is rammed so as to exclude the air perfectly. As soon as the clay is dry twenty to twenty four of the crucibles are built up in form of an arch with their bottoms inwards, in a small furnace urged by two goat skin bellows, charcoal is heaped up over them, and the blast kept up without intermission for about two hours and a half when it is stopped and the process is considered complete. The crucibles are removed from the furnace and allowed to cool, they are then broken and the steel which has been left to solidify is taken out in a cake having the form of the bottom of the crucible. When the fusion has been perfect the top of the cake is covered with striæ, radiating from the centre but without any holes or rough projections on it: When the fusion has been less perfect the surface of the cake has a honey-combed appearance, caused probably by particles of scoriæ and unreduced oxide in the bar iron, and often contains projecting lumps of iron still in the malleable state. The natives prepare these cakes of steel for being drawn into bars by annealing them for several hours in a charcoal fire actuated by bellows, the current of air from which is made to play upon the cakes whilst turned over before it at a heat just short of that sufficient to melt them, by this means the excess of carbon is detached (*Mad. Lit. Journ*) The process of smelting iron differs according to circumstances in different parts. In some, the ore is collected in the form of sand from the beds of rivers; the iron stone is collected either from the surface or from mines.—*Rohde, M.S.S.*

(8725) WORMWOOD, INDIAN. ABSINTHIUM WOOD.

Afsunteen ARAB.	Domolo, JAV.
Gundmar, CASH.	Dona, SANS.
Wael-kolundoo, CYNG.	Buranjasif kowhei, PERS.
Dhowna, Mustaroo, Murwa, GUZ. HIND.	Mashipattiri, TAM.

A perennial herb (*Artemisia Absinthium*) indigenous to Britain, celebrated for its intensely bitter tonic, and stimulating qualities. The wormwood met with in the bazars in India, is chiefly the produce of Persia, whence it is largely imported into Bombay by way of the Persian Gulf.—*Faulkner.*

(8726) WRIGHTIA, a genus of plants belonging to the natural order *Apocynaceæ*, named after Dr. William Wright. It has a 5-parted calyx, a salver-shaped corolla with the throat crowned by ten divided scales; the stamens exserted, attached to the throat of the corolla, and the anthers sagittal, cohering by their middle to the stigma; the ovaries two, cohering; the style single, filiform, dilated at top; scales five to ten in number, seated at the base of the calyx outside the corolla: the follicles distinct or combined with adnate placentas. Dr. Wight gives Wrightia coccinea, 442; *piscidia*, 472; Rothii, 1319; tinctoria, 444; Tomentosa, 443; Wallichii, 1296.

(8727) WRIGHTIA COCCINEA. APOCYNACEÆ. A large tree; flowers externally green, internally deep orange red, having something of the perfume of the pine-apple.—*Riddell.*

(8728) WRIGHTIA MOLLISSIMA. Introduced from the Naggary Hills; the yellow juice might be turned to account, but the timber is of no value.—*M. E. J. R.*

(8729) WRIGHTIA ANTIDYSENTERICA. NERIUM ANTIDYSENTERICUM. Echites antidys: Roxb.

Veppaula, TAM.	Inderjan, HIND.
Pala chettoo TEL.	

Found in the hill jungles of Kotah and Mewar, and a small tree of common occurrence in Mysore and the hilly parts. A native of the coast of Malabar, of Ceylon, and the Isle of France, and common in many parts of India. Tiwaj and Lisan ul-asafeer, *Arab.* Anduraroon, *Greek.* Seeds called *Indurjuo-i-shereen*, or the mild, to distinguish them from seeds of *Holarrhena pubescens*, and *Antidysenterica*, called *Indurjuo-i-tulkh*, or the bitter. A small shrub, leaves ovate oblong, or exactly oblong, shortly acuminate, smooth, bright green on each side.

The bark (*conessi bark*) is astringent and bitter, and also deemed febrifuge. The seeds, *Indurjuo*, are intensely bitter and used as a vermifuge.

Conessi bark has been given with much alleged advantage in chronic dysentery. The infusion seems the best form, 4 drachms of the dried and powdered bark being infused in 8 ounces of hot water for an hour:—dose one ounce thrice daily.—*O'Shaughnessy, p.* 445. Its medicinal virtues are worthy of attention, but the wood is of little value. The bark was formerly in request under the name of *Conessi* and is still esteemed a valuable drug by the natives. It appears to have lost its value in commerce, from not being distinguished from the bark of Wrightia tinctoria which grows in the same places. —*M. E. J. R.*

The Wood.

Palavarance or palay wood, ENG.	Doodheei ke lakree, HIND.
Palava renoo, TEL.	Veppallay, TAM.

The tree has sweet-scented flowers with a form resembling those of the Jasmine. The wood is white, of a fine grain, and susceptible of polish, and is used by the turner and cabinet-maker. The bark of this shrub, which goes by the name of Conessi bark in Great Britain, and Palapatta in India, is asserted to be specific in dysentery and of use in most disordered states of the bowels. Its milky juice is also used as a vulnerary.—*Eng Cyc.*

The Bark.

Conessie, FR.	Corte-de-pala, PORT.
Curayia, Curaija, GUZ. HIND.	Cheeree, Kutaja, SANS.
Palapatta, MALEAL.	Veppalei, TAM.
Codaga pala, MAL-	Pala codija, Manoopala, TEL.

Conessi bark is the produce of a plant belonging to the natural order *Apocynaceæ*, a native of the Western coast of Hindustan. It is the *Wrightia* (Nerium) *antidysenterica*, and is a valuable astringent.—*Engl. Cyc. page* 122. Mr. Faulkner describes it as a native of Ceylon, Mauritius, the Malabar Coast, and many other parts of India. It is astringent and bitter, and is considered febrifuge; it has also been given with alleged advantage in chronic dysentery. The seed of the plant are termed *Indrojow*. —*Faulkner.*

The Seed.

Lisan ul assafeer, ARAB.	Indrayava, SANS.
Indrajow, GUZ. HIND.	Veppalei arisee, TAM.
Abir, PERS.	

The seed of Wrightia antidysenterica (*Nerium antidysentericum*), are covered with a kind of downy tuft, somewhat resembling the down of the thistle Two kinds of Indurjuo seeds are distinguished, the *sweet* and *bitter*. The former, *Wrightia*, has a pleasant taste not unlike that of oats, which they also resemble somewhat in appearance; but are longer and more slender. An infusion of this roasted seed is given as a safe and gentle restrainer in bowel complaints; the decoction is employed in fever cases. The latter, *Holarrhena*, are intensely bitter, and used as a vermifuge.—*Faulkner.*

According to the Ind. Ann. Med. Sci. for Apl. 1856, p. 397. The bark of this tree, which was once introduced in the London Ph. as Conessi bark and was greatly lauded more than a century ago by Geoffroy, known also as Codaga and as Koorchee has long been a popular remedy on the Malabar and Coromandel Coasts, and also in Bengal in dysentery, and from a somewhat extensive trial which was made of it in that disease, of which it is hoped to be able to publish the results, it appears to be a remedy of no mean value. It has however been also known on the Malabar Coast and among the Portuguese there as a febrifuge, under the name of corte de palla. Dr. Cleghorn informs that several Medical officers in the Northern Circars have been administering it of late. We have no knowledge of its febrifuge virtues, but it seems to have fallen into disuse from carelessness in selecting the bark, and it may deserve a further trial. An infusion

of the seeds called indrijau has been called febrifuge but is only demulcent. The most common and convenient way of administering koorchee is to give 1½ to 2 oz. of decoction three times daily.

(8730) WRIGHTIA TINCTORIA. Apocynaceæ, Icon. 444.

Pallay marum, TAM. | Kala Kooda, HIND.

A small tree with pale green soft leaves; deciduous in the cold weather. On being bruised, a kind of Indigo exudes from them. Flowers in March and April; white follicles in pairs, from twelve to eighteen inches long, which as they ripen the ends of each pair curiously join. Th wood is used by turners and cabinet-makers.—*Riddell.* It is a common tree in the Coimbato jungles, where it attains a considerable siz wood white and close-grained; in the words Roxb. "coming nearer to ivory than any I know. It is not however much in use here.—*Wight.*

(8731) WRIGHTIA WALLICHII, Wig states, is found on "the slope of the Neilgherrie from about the middle of the ascent to the el vation of between 4000 and 5000 feet;" but "th original specimens of this species were collecte in the Tenasserim provinces."—*Mason.*

X.

(8732) XANTHOXYLACEÆ, *Xanthoxyls*, a natural order of Exogenous Plants. The flowers are unisexual and regular; the calyx in three, four, or five divisions; the petals usually of the same number as the divisions of the calyx, usually longer than the calyx, and sometimes absent: the æstivation is generally twisted and convolute; the stamens are equal in number to the petals, or twice the number, and arise from around the base of the stalk of the abortive carpels; in the female flowers they are either absent or very imperfect; the ovary is made up of the same number of carpels as there are petals, or of a smaller number; the carpels are either distinct or more or less combined; there are mostly two ovules in each cell, sometimes four: the styles are more or less combined, according to the cohesion of the carpels; the fruit is either membranous or in the form of a berry, sometimes having from 2 to 5 cells, and sometimes consisting of several drupes or 2-valved capsules, of which the sarcocarp is fleshy, and is easily separated from the endocarp; the seeds are solitary or twin, peduncles usually smooth and shining with a testaceous integument; the embryo lies in the midst of a fleshy albumen, radicle superior, and the cotyledons ovate or flat. The species of plants belonging to this order are trees or shrubs, with exstipulate, alternate, or opposite leaves furnished with pellucid dots. The flowers are either axillary or terminal, and coloured gray, green, or pink. The plants in this order were included originally by Jussieu in his *Terebinaceæ*. They were first separated by Martius and Nees under the *Xanthoxylaceæ*, which was subsequently adopted by Adrien de Jussieu. The species of *Xanthoxylaceæ* are found chiefly in America, especially in the tropical parts. A few of the species are found in Africa, in Mauritius and Madagascar, in India and China. One only is a native of Australia. All this order, to a greater or less extent, possess aromatic and pungent properties. The species which are best known and used on account of these properties belong to the genera *Xanthoxylum*, *Brucea*, *Ptelea*, *Toddalia* and *Ailanthus*. The species of *Ailanthus* are large trees, and their timber is used for various purposes in the countries in which they grow. *A. glandulosa* is a native of China and the Moluccas, where it is called Ailanto. It attains a height of 60 feet. When the bark is wounded it gives out a resinous juice which hardens in a few days. The wood is hard and heavy, and is susceptible of a very fine polish. It grows well in England. *A. Malabarica* is a large tree, a native of Malabar. The wood is used for making sheaths for spears, &c. A resinous juice flows from the bark when wounded. The fruit is triturated with maize and mixed with rice in decoction, and used as an application in ophthalmia.—*Eng. Cyc.* The Cosmetic Wood of Mergui is from one of the *Xanthoxylaceæ* and is a fragrant cosmetic wood sold in the bazar, which is said to come from Mergui, but Mr. Mason never saw the tree.—*Mason.*

(8733) XANTHOCHYMUS, a genus of Plants belonging to the natural order *Guttiferæ*. Of these the *X. pictorius* is the most important. This plant is the *X. tinctorius* of Linnæus. It has lanceolate acuminate leaves, wrinkled petioles, and fruit 1-4-seeded. It is a native of the East Indies, in valleys among the Circar Mountains.—*Eng. Cyc.*

(8734) XANTHOCHYMUS PICTORIUS.

Eeswara mamede, CING. | Dampel, TEL. Rata, GHORKA.

A beautiful tree of the Mountainous districts of India, yields a green fruit and a large quantity of indifferent gamboge.—*Rohde, M. S. S.*

(8735) XANTHOCHYMUS. YELLOW MANGOSTEEN. Roxb.

Malay Chucan pullum, TAM. | Bryonia SPEC. Geeri Gotoomba, SANS.
Pedda Boodumalapindoo, TEL. | Malay Poollie pullum, TAM.

Ainslie says he met with this fruit at Quilon

where he was told that it was brought from the distant woods. It is in appearance like a Mango, but flatter and two or three large seeds (or stones) are contained in each, somewhat resembling jack stones. The fruit itself has an acid but pleasant taste and when cut, there exudes a yellow juice like liquid Gamboge. It appeared to be very little known to the European inhabitants of Travancore. They have on the Malabar coast a variety of the real Mangosteen (Garcinia Mangosteena); it is however very inferior to that of the Eastern islands and affords a yellow gum-resin, which is not soluble in water.—*Ainslie, page* 227.

(8736) XANTHOXYLON ALATUM. (Roxb. El. Ind. 768.)

Durmur. HIND.

A native of Nipal, and the hilly countries north of Bengal, Rohilcund, and Oude, flowering in Calcutta in the hot and rainy seasons. Roxburgh states that every part of the plant possesses a peculiar aromatic pungency, and that the seeds are used medicinally by the natives.

(8737) XANTHOXYLON AVICENNÆ, (*Fagura A.*) a native of China, is a powerful stimulant, and used as an antidote against poisons.

(8738) XANTHOXYLON BUDRUNGA.

Toung-than; also Young-thaujee, BURM.

Is a native of the East Indies, in Silhet, and is called Budrung; and the natives use the seeds, which have a warm spicy flavour, medicinally. The fruit is about the size of a pea, and the outer coat contains an exceedingly fragrant balsam.—*Eng. Cyc.* It is a small thorny tree, the dry capsules of which are found in the bazars of India, under the name of Kek-ka-la. The seed abounds in a rich aromatic oil. The bark and large thorns of the trunk are the Tejbul of India. The tree is about twenty feet high in the Pegu and Southern parts of the Tounghoo districts, where it grows upon the banks of streams. —*McClelland.* This plant, found in the Pegu and Southern parts of the Tounghoo districts, affords a plentiful supply of oil-seeds, which has not, as yet, he believes, been taken advantage of as it deserves.—*McClelland.*

(8739) XANTHOXYLON HOSTILE. XANTHOXYLUM AROMATICUM, is a tree found in the Himalayas and in the mountains of Cashmere. Its branches are as thick as a finger, serve the natives as tooth-brushes; thicker branches are used by the faqueers as walking sticks, also to triturate the hemp plant, in preparing their beverage. In using a triturator possessing pepper like aromatic qualities, they save the pepper which is usually added to the hemp plant. The capsules and seeds are employed for intoxicating fish, and are chewed as a remedy in toothache (Royle). Besides the seeds, Honigberger used the bark, together with the sharp prickles which are attached to it by large bases.—*Thirty five years in the East by Honig. page* 365. The capsules and seeds of X. hostile, called Tejbul by the natives, are used in India for intoxicating fish and are supposed to be the Faghureh of Avicenna.—*Eng. Cyc.*

(8740) XANTHOXYLON PIPERITUM. In Japan the capsules of X. piperitum are used as a substitute for pepper. The fruits of many of the species are also held to be antidotes to the action of poisons on the system, and there can be little doubt that the secretions of these plants would be found valuable stimulant remedies in many diseases.—*English Cyclopædia, page* 1263. *Xanthoxylon piperitum*, is a powerful aromatic, used by the Chinese in the room of ginger and pepper. The active principle resides chiefly in the fresh leaves, the dry bark, and the pericarp. The physicians of the country apply a poultice made of the bruised leaves and rice flour in sore throats. For the preceding details Dr. O'Shaughnessy was indebted to Lindley's Flora Medica, p 215. Royle further informs us, p. 157, that in India *X. Budrunga, Rhetza alatum*, and *hostile*, are used wherever indigenous for the warm, spicy, pepper-like pungency of their capsules, a property which is participated in by their bark and other parts. The capsules and seeds of X. hostile, called *tejbul* by the natives, are employed in Northern India for intoxicating fish, and chewed as a remedy in toothache. They are also described as the Faghureh of Avicenna.—*O'Sh., page* 642.

(8741) XANTHOXYLON RHETSA, is a native of the mountainous parts of the coast of the East Indies, and in the Tamul language is called Rhetza-Marm, which means Council-Tree, as it is under the branches of this tree that the hill people assemble to discuss all matters of public interest.—*Eng. Cyc. page* 1863.

(8742) XANTHOXYLON TRIPHYLLUM. A resin is obtained from this tree. Judging from the specimens it appears to be produced in too small quantities to be useful in a commercial point of view.

(8743) XIMENIA ÆGYPTIACA.

HINGEN; HINGOT HIND:

Grows in the Kotah district: the nut shell is used to make crackers in fireworks.—*Gen. Med. Top. p.* 109. Wight gives *Ximenia olacioides*, 1861.

(8744) XYLOBALSAM. An inferior quality of opobalsam, obtained from the fruit and twigs of the (*Amyris Gileadensis*), that yields the superior quality.—*Faulkner.*

(8745) XYLCOCARPUS (from ξύλον, wood, and καρπός, fruit), a genus of plants belonging to the natural order *Meliaceæ*. The genus, with *Persoonia*, has been referred by Aublet and other botanists to the genus *Carapa*.—*Eng. Cyc.*

(8746) XYLOCARPUS GRANATUM: CARAPA MOLUCCENSIS, (Lamarck). Roxb. Flora Ind. ii. 240 *Beng.* Pussoor—a native of the Sunderbuns. Fruit ripens in June and July.

The Carapa of Guiana was first described by Aublet. It yields fruits, the almonds of which are white, solid, oily, and bitter. The oil he described as being used by the Galebi savages to anoint their skins and hair, in order to keep off insects. Rumphius described a similar but smaller tree in the Moluccas, under the name of "Madahul," or "*Granatum litoreum.*" This Willdenow described as Xylocarpus granatum. The Xylocarpus is mentioned as a tree with elegantly veined wood, used in India in cabinet work, and its bitter root being employed in bilious fevers. A starchy substance, used as an article of food, is also found beneath the bark of the capsule.—*O' Shaughnessy, page* 246. This the sea-cocoanut of Tenasserim, *Xylocarpus Granatum*, is not the famous *Cocos des mer* of the Seychelles, so long the wonder of the world; but a tree very common in the mangrove swamps; and growing near the shore, its fruit falls into the water and floats out upon the sea, which gives rise to its name. The fruit is not edible, but is exceedingly astringent, and regarded by the natives as a specific in cholera. —*Mason.*

(8747) XYLOPHYLLA ANGUSTIFOLIA, EUPHORBIACEÆ. This is a small shrub growing to the height of three feet, the color of the flowers is yellow and red.—*Riddell.*

(8748) XYRIDAGEÆ, *Xyrids*, a natural order of Endogenous Plants. The species are herbaceous plants with fibrous roots. The leaves are radical, sword-shaped, scarious, dilated and equitant at the base. The flowers are arranged in terminal naked imbricated heads; the calyx is glumaceous, 3-leaved; the corolla petaloid coloured, with 3 petals; the stamens 6; 3 fertile inserted upon the claws of the petals; 3 sterile alternate with the petals; the anthers 2 celled and turned outwards; the ovary single, the style bifid; the stigmas multified or undivided; the capsule 1-celled, 3-valved, many-seeded, with parietal placentæ; the seed with the embryo on the outside of the albumen, and at the end most remote from the hilum. As at present constituted, this order comprises only the genera *Xyris* *Abolboda.* The species of these genera are found generally in the hotter parts of the world, chiefly in the tropics of America, Asia, and Africa. Some of the species of *Xyris* are found in the southern states of North America. *X. Indica* is said by Agardh to be used as a remedy in itch and leprosy.

(8749) XYRIS INDICA. A species of Xyris with conspicuous yellow flowers on imbricated scaly heads, is often seen in the Tenasserim paddy fields.—*Mason.*

Y.

(8750) YAK. The yak is a very tame domestic animal, often handsome and a true bison in appearance. It is invaluable to the mountaineers of Northern India, from its strength and hardiness, accomplishing at a slow pace, 20 miles a day, bearing either two bags of salt or rice, or four to six planks of pine wood slung in pairs along either flank. Their ears are generally pierced and ornamented with a tuft of scarlet worsted, they have large and beautiful eyes, long silky black hair, and bushy tails: black is their prevailing colour, but red, dun, party coloured and white are common. In winter, the flocks graze below 8000 feet, on account of the great quantity of snow above that height; in summer they find pasturage as high as 17,000 feet consisting of grass and small tufted carices, on which they browse with avidity. Much of the wealth of the people in East Nepal consists in its rich milk curd, eaten either fresh or dried, or powdered into a kind of meal. The hair is spun into ropes, and woven into a covering for their tents, which is quite pervious to wind and rain, though in the dry climate of Tibet this is of little consequence. The bushy tail forms the well known chowree or fly flapper of the plains of India, and its hair is greatly esteemed by the women of the plains to add to their back hair. The female drops one calf in April, and the young yaks are very full of gambols, tearing up and down the steep grassy and rocky slopes. Their flesh is delicious, much richer and more juicy than common meat, that of the older yaks is sliced and dried in the sun, to form jerked meat, called schat-t-chew dried meat, which is eaten raw, and is a palatable food. The yak loves steep places delighting to scramble among rocks, and to sun its black hide perched on the glacial boulders which strew the Wallanchoo flat, and on which these animals always sleep. Their average value is from two to three pounds. The yak though indifferent to ice and snow, cannot endure hunger so long as the sheep. Neither can it bear damp heat. The yak is ridden and its pace is easy. The wild yak or bison (D'hong) of Central Asia, the superb progenitor of the domestic yak is the largest native animal of Tibet, in various parts of which country it is found. It is untameable and horridly fierce, falling on the hunter with horns and chest, and if he rasps with his tongue it is so rough as to scrape the flesh from the bones. It is hunted by large dogs,

and shot with a blunderbuss, the horn is used as a drinking cup in marriage feasts and other grand occasions.—*Hook. Him. Jour. Vol.* I *p.* 215.

(8751) YAMANEE. There is a tree on the hills of Tenasserim which furnishes a remarkably light, white timber, resembling mootchee wood, of which the natives often make canoes. The Karens say it bears a yellow flower, and a small plum, which is a favorite food with the barking deer.—*Mason.*

(8752) YAMS. The different species of yams have a wide range. In the West Indies there are several varieties, having distinctive names, according to quality, color, &c., as the white yam, the red yam, the negro yam, the creole yam, the afoo yam, the buck yam, (*Dioscorea triphylla*), which is found wild in Java and the East; the Guinea yam, the Portuguese yam, the water yam, and the Indian yam, &c. The last is considered the most farinaceous and delicate in its texture, resembling in size the potato; most of the other sorts are coarse, but still very nutritive and useful. The common yam (*Dioscorea sativa*) is indigenous to the Eastern Islands and West Indies. The Guinea yam *D. aculeata*, is a native of the East. The Barbadoes or winged yam (*D. alata ?*) has a widely extended range, being common to India, Java, Brazil. *Yams* of Western Africa. The yam species are climbing plants, with handsome foliage, of the simplest culture, which succeed well in any light, rich, or sandy soil, and are readily increased by dividing the tuberous roots. The Indian, Barbadoes, and red yams are planted in the West Indies early in May, and dug early in the January following. If not bruised, they will keep well packed in ashes, the first nine, and the second and last twelve months. The Portuguese and Guinea yams are planted early in January and dug in September. Creole yams and Tanias are dug in January. Sweet potatoes from January to March. In most of our colonies large crops of the finest descriptions of yams, cocos &c., could be obtained, but the planting of ground provisions is too much neglected by all classes. From the tubers of yams of all sorts, and particularly the buck yam, starch is easily prepared and of excellent quality, Some varieties of the buck yam are purple fleshed, often of a very deep tint, approaching to black, and although this is an objection, because it renders more washing necessary, yet even from these the starch is at last obtained perfectly white.

As an edible root the buck yam, especially when grown in a light soil, is equal to the potato, if not superior to it. It does not, however, keep for any length of time, and therefore could not be exported to Europe, unless the roots were sliced and dried. Yams and sweet potatoes thrive well in the northern parts of Australia; indeed the former are indigenous there, and constitute the chief article of vegetable food used by the natives. The yam was introduced into Sweden, where it succeeded well, and bread, starch and brandy, were made from it: but it prefers a warmer climate. Yams are occasionally brought to England. When cooked either by roasting or boiling, the root is even more nutritious than the potato, nor is it possessed of any unpalatable flavor, the peculiarity being between that of rice and the potato. Dressed in milk, or mashed, they are absolutely a delicacy, and from the abundance in which they are cultivated in the West Indies, and other parts, they promise to become a most economical and nutritious substitute for the potato. The yam frequently grows to the enormous size of forty or fifty pounds weight, but in this large state it is coarse flavored and fibrous. An acre of land is capable of producing 4½ tons of yams, and the same quantity of sweet potatoes, within the twelve months, or nine tons per acre for both, being nearly as much as the return obtained at home in the cultivation of potatoes; and we have the authority of all analytical chemists for saying that in point of value, as an article of food, the superiority is as two to one in favor of the tropical roots. The kidney rooted yam (D. pentaphylla), is indigenous to the Polynesian islands, and is sometimes cultivated for its roots. It is called Kawan in the Feejee islands. D. Bulbifera, a native of the East, is also abundantly naturalised in the Polynesian islands, but is not considered edible. There are seven or eight kinds of yams grown in India. Two found in the Tartar country are of a remarkable fine flavour, one weighing as much as eighteen pounds the other three pounds.—*Simmonds' Comml. Product, p.* 363 & 4. See Cocos or Eddoes, also Dioscorea.

(8753) YANG-TSE-KIANG RIVER. The rise and fall in the Yang-tse-Kiang averages about ten feet and vessels are obliged to find their way hap hazzard into the channel or perchance run upon one of the silted sands.—*American Expedition to Japan, p.* 166.

(8754) YARN. Twist.

Garen, Dut.	Filato, It.
Fil, Fr.	Fio. Port.
Garn, Ger.	Prasha, Rus.
Soota, Guz. Hind.	Hilo, Sp.

Wool, Cotton, Flax, &c. spun into thread. Its quality is expressed in English by numbers denoting the number of hanks in an avoirdupois lb. weight; reckoning the length of the hank of cotton yarn at 840 yards, or 7 leys of 120 yards each.—*Faulkner.*

(8755) YARVINEY, in Tamil and Crawn in Portuguese and Dutch. This Ceylon tree grows tall and straight, from twenty to forty-five feet high, and from twelve to thirty inches in diameter. It may be obtained in great quantities, and answers many purposes in ship and house-work.—*Edye. Ceylon.*

(8756) YASHM. The Messrs. Schlagentweit found the quarries of this mineral at Gulbagashen

in the valley of Kara kash, in their Journey from Ladak to Khotam.—*Mag. Survey* 1857.

(8757) YAVY.

Yavayloo, Tam. | Yeva Sans, Tel.

This grain grows in some of the more northern provinces, and has an appearance something like that of blighted wheat, it is not very valuable.—*Ainslie page* 220.

(8758) YEAST, Barm. A product of the fermentation by which beer is made; upon the surface of which it swims from involving bubbles of carbonic acid gas. It may be obtained in the form of a firm paste. Mixed with moistened flour, it excites the panary fermentation, and is thus used for baking bread.—*Waterston.* The substance known as Yeast, is in reality a plant, belonging to the Tribe of Fungi in the state of sporules or thallus: or the true aerial tufts or heads of sporules, of a multitude of minute oval or circulating bodies or sporules, endowed, under certain favourable circumstances, with extraordinary powers of growth and multiplication. In Britain, three kinds, viz. brewer's yeast, German yeast, and patent yeast, are employed in the manufacture of bread; In India, the yeast employed, is the fermented juice of the Palms, known as Toddy. The vitality of yeast is destroyed by falls, blows, bruises or rough mechanical injuries, as also—heat, cold, and chemical re-agents. The presence of yeast in a substance containing sugar, or starch convertible into sugar and nitrogenised matter, induces certain chemical changes comprehended under the term vinous or alcoholic fermentation. These changes in the making of bread consists in the conversion of sugar of flour into alcohol and carbonic acid gas; the latter, in its efforts to escape from the dough with which it is mixed, distends it, forming vesicular spaces in its interior, and so causing it to become porous and light.

Yeast is found on the surface of fermenting liquids, and when removed capable of producing fermentation in other liquids susceptible of this action. On placing Yeast under the microscope it presents a number of cells immersed in a mass of amorphous matter. The cells are sometime single, and at other times several are united together in a kind of chain. These cells are supposed to partake of a fungoid character, and they have been called the Yeast-Fungus, or Ferment-Cells. A genus and species have been constituted for the reception of this organism, under the name of *Saccharomyces Cerevisæ*. This plant has been supposed to be the active cause of fermentation, and the carbonic acid given off during that process has been regarded as the result of the growth of the plant. This seems to be a misinterpretation of the phenomena, as the plant is probably the result of the carbonic acid given off during the process of fermentation rather than its cause. Schleiden supposes that these ferment-cells originate in liquids, independently of other cells, and are truly instances of the formation of cells in a free fluid. He observes however that they have no power of reproducing other cells. The whole subject of the nature of these cells, their mode of production, and the history of their development, as well as the phenomena of fermentation in general, require further elucidation. (Schleiden, *Principles of Scientific Botany*; *Micrographic Dictionary*, articles 'Fermentation,' 'Torula,' 'Yeast.'

(8759) YELLOW-HAMMER, the common name for the *Emberiza citrinella*. Linn. Pennant quotes the Bruant of Belon (L'Histoire de la Nature des Oyseaux,' p. 366) as this species, and the description seems to warrant the quotation. Belon considers the bird to be the Ἀνθος of Aristotle ('Hist. Anim,' ix. 1), and remarks that the Greeks of his time did not call it by the ancient appellation in their tongue, but by the Latin name *Florus*, "car ils ont este dominez par les Latins, dont ils ont retenu telle diction." It is the Bruant of the French generally; Serramolle and Zivolo di Testa Gialla of the Italians: and, according to the 'Portraits d'Oyseaux,' Hortolano, Cia, Megliarina, Verzerot, Paierizo, and Spaiarda of the same people. It appears to be the Groning and Golspink of the Swedes; Goldammer, Ammering, and Goldammering of the Germans; Geel-Gerst of the Netherlanders; Yoit, Yellow-Yoldrin, Yellow-Yowley, and Yellow-Yeldrock of the English: and Lilnos Felen of the Welsh. These birds are caught and fatted for the table with the Ortolan in Italy, whence probably one of the Italian names above noticed.

(8760) YELLOW-WOOD. There is a fine East India wood thus called, it appears to be larger and straighter than box wood, but not so close grained. I should think it would be found to be a valuable wood for the arts—*Halt.*

(8761) YEPY TREE. This name is applied in the Madras territories to two species of Bauhinia. *B*: *diphylla* and *B. Vahlii* the fibres of which are made into cordage: the *B. racemosa* "Malfhum" "Maljum" or "Maloo" grow in the hot valleys of the Himalayas, in the forests of the Sewalik Hills, from the doons of the North West to Assam. It is a magnificent climber and its product is known as "Patosa" or "bawal" fibre. *B Scandens*, grows not uncommon, about Gowhatti and common in Silhet: its fibre is equal in strength to that of Sunn Hemp and is made into cordage and cloth.

(8762) YEPY TREE BARK, Bauhinia Diphylla and B. Vahlii. These trees have a coarse brown bark of which the natives of India form a temporary rope for securing thatch, matting or fences. The Barks of several Bauhinias are used for similar purposes the Ara Na

is the bark of the B. parviflora, of which the matches of guns are made.

(8763) YEZAIEMAN, The most abundant supply and the best coal comes from Kinsin. I do not know how much there is in Nippow but there is none in Sikok.—*American Expedition to Japan, p.* 397.

(8764) YUCCA, a genus of Plants belonging to the section *Asparageæ*, of the natural order *Liliaceæ*. The corolla is inferior, bell-shaped, its segments without nectaries; stamens club-shaped; style none; berry hexagonal, of six cells; seeds numerous, flat. *Y. gloriosa*, Common Adam's-Needle, is a caulescent plant, with lanceolate straight furrowed leaves, their edges smooth and entire. This handsome plant is a native of Peru and North America. It grows on the shores of Caroline, where it blossoms in July and August its panicle of elegant flowers attaining a height of 10 or 12 feet. In British gardens the stem of this plant does not attain a height of more than 2 or 3 feet. *Y. aloifolia*, Aloe-Leaved Adam's-Needle, has linear-lanceolate even straight leaves, with the edges bordered by fine callous notches. This plant is a native of North and South America. *Y. draconis*, Drooping-Leaved Adam's-Needle, and *Y. filamentosa*, Thready Adam's-Needle, are cultivated in this country. The latter grows in the open air, and blossoms in the autumn. Its flowers are panicled and pendulous, and of a cream-colour. The leaves have their edges beset with long recurved threads.

(8765) YUCCA. Several species quite hardy They only require to be grown in places where water does not stagnate in winter; *Y. gloriosa*, *Y. filamentosa*, *Y Draconis*, *Y. flaccida*, and *Y. superba*, are the handsomest species.

(8766) YUCCA GLORIOSA, OR ADAM'S NEEDLE. *Adam's Needle*, or *Yucca gloriosa*, like others, seems sometimes to be called an Aloe The species of *Yucca* are natives of the southern provinces of the United States, and being there exposed to extremes, are capable of living in the open air, both in Europe and India. They are conspicuous for their noble show of lily-like white flowers, as well as for their long sword-shaped leaves terminated by a thorny point They, no doubt, all abound in fibre, as some of a fine quality and strong in nature, has been sent from Madras, separated from the leaves of the *Yucca angustifolia*. Other species flourish as far north as in the Botanic garden at Saharunpore. The fibres also take colour, as in the specimens sent from Madras, dyed red, orange, purple, and green. Fibre has also been separated from other species of Yucca, as *Y. aloifolia* and *Y. filamentosa*. These are amongst those which have received the name of silk-grass. Those sent from India are from two to four feet in length, and are rather wiry, or resemble those of the Agave more than they do the fibres of Bromelia.

The fibre of *Yucca gloriosa*, is Adam's needle, a strong, fine but rather stiff fibre, suited for the manufacture of cordage, it very soon becomes discolored by steeping, but is not so liable to rot as some of the other fibres of this kind. Very good specimens were exhibited by Dr. Riddell, Dr. Kirkpatrick and Revd. P. Methuselah; the plant does not appear to be abundant in Southern India, but grows easily and might be propagated to a great extent.

(8767) YUCCA ALOEFOLIA, produces a white, pliant and strong fibre, resembling that of the Agave in all respects, but is apt to be discolored by steeping, which the Agave is not.—*Royle. Riddell. M. E. Juries' Report.* Dr. Hunter has proved that the so called Aloe Plants, yielding fibres, are of great value, for a bundle bore 160 lbs when a similar one of Petersburgh hemp broke with the same weight. The fibre is two feet long, white and of fine quality, and readily takes colours. It was made from the A. perfoliata, *Kalabuntha*, which Dr. Royle supposes to be the same as his A. indica.—*Juries Reports M. E.*

(8768) YUNX TORQUILLA. This is the Ἴυγξ of the Greeks. Aristotle has well described the bird, its long tongue, its power of protruding and retracting it, and the writhing snake-like motion which it can impart to its neck without moving the rest of the body. ('Hist. Anim,' ii. 12.) It has been made familiar to most literary readers by the adjuration in the second Idyll of Theocritus ('Pharmaceutria'). It is also the *Iynx* of the Romans. (Pliny, xl. 47) *Yunx* in the form used by Linnæus and zoologists generally, but it ought to be *Iunx*, or *Iynx*. The Wryneck is the Torcol of the French, and also the Tercou, Torcou, Turcot, Tercot, and Torcot of the same, according to Belon; Torcicollo, Collatorto, Stortacoll, Capetorto, Vertilla, and Formicula, of the Italians; Gjoktyta of the Swedes; Bende-Hals of Brunnich; Natterwindl, Wendhals, Wendehals, and Dre-Hals, of the Germans; Long-Tongue, Emmet-Hunter, Snake-Bird, Cuckoo's-Mate, Cuckoo-Maid, Cuckoo's-Maid, and Cuckoo-Fool (two last Gloucestershire) of the English; Gwas y Gog and Gwddfdro of the Welsh; Arizui of the Japanese.

The male has the ground-colour of the plumage of the upper parts rusty ash-colour, irregularly spotted and speckled with brown and black; a large brown streak extends from the occiput to between the scapulars; on the external barbs of the wing-feathers rusty squared spots; tail-feathers bounded with black zig-zags; throat and front of the neck pale rusty, with small transverse black lines; bill and feet olive-brown: irides hazel or yellow-brown. Total length 7 inches. It is found in Denmark, Sweden (May), Germany, Holland (where it is rare), France

Spain, and Italy (summer); England, and Wales, Scotland (rare in the last and in the north of the first—summer); Kamtschatka (Viellot), Japan, Himalaya Mountains. Winter residences, North Africa and warm parts of Western Asia.—*Eng. Cyc.*

Z.

(8769) ZAFFER. ZAFRE. An impure oxide of cobalt, prepared by calcining its ores, and mixing the product with about twice its weight of finely powdered flint. It is used for communicating a blue colour to glass, porcelain, and earthenware; and when roasted with potashes, washed, and pulverized, forms *smalts*. (*Waterston.*)—*Faulkner.*

(8770) ZALACCA. A genus of palms with an edible fruit occurring in Malacca, Penang, Assam, and the Tenasserim Provinces, this species is known as "Salac koombar" in Penang, and "Salac Batool" also "Rungun" in Malacca, Assam Koombar and Assam Paiah. The leaves employed as thatch and for baskets &c.—*Seeman.*

(8771) ZALACCA EDULIS. EDIBLE ZALACCA Selung boat timber. A red scaly fruit produced by this species of zalacca may be often seen in bazar, but it is eaten by the natives only. The Selungs of the Mergui Archipelago shoot over their waters with remarkably light boats, and they owe their buoyancy to the materials that form their sides, which are the stems of the edible zalacca. These stems are as light, and of the consistency of cork, for which they are often substituted; and the Selungs are skilful in uniting them together to serve instead of planks, so as to make an unequalled sea boat, that floats on the waves like a swan.—*Mason.*

(8772) ZAMIA, a genus of Plants belonging to the natural order *Cycadaceæ*. The species of this genus are trees with a single cylindrical trunk, increasing by the development of a single terminal bud, and covered by the scaly bases of the leaves; the wood consists of concentric circles, the cellular zones between which are exceedingly loose, the ligneous tissue having the tubes marked by circular discs; the leaves are pinnated, not articulated, and have a gyrate vernation. The flowers are diœcious; the male flowers are arranged in tessellated catkins with abrupt scales, the anthers oval, sessile at the under side of each scale. The female flowers are in tessellated catkins, the scales peltate, drupes two at the under side of each scale. The species are found in the tropics of America and Asia, and also at the Cape of Good Hope and in Australia.—*Eng. Cyc.*

(8773) ZANONIA, a genus of Plants belonging to the natural order *Cucurbitaceæ*, named after James Zanoni. The only species belonging to this genus is *Z. Indica*, the Climbing Indian Cucumber. The fruit is described by Rheede as obscurely triangular, and having the flavour of the cucumber.—*Eng. Cyc.*

(8774) ZANTHOXYLEÆ, made up chiefly of genera placed by De Candolle in *Rutaceæ* and in *Terebinthaceæ*, are distinguished by their flowers being usually unisexual, by the calyx being free, petals hypogynous, equal in number to divisions of the calyx, ovaries subdistinct or united, each with two ovules, fruit indehiscent, carpids opening by a vertical suture, embryo in the axis of albumen. Many of the Zanthoxyleæ are remarkable for secreting a bitter principle, *Xanthopicrine*, and also a volatile oil of aromatic pungency. Thus several species of Zanthoxyleæ are employed as stimulants: one formed the *Faghureh* of Avicenna. Species of Ptelea and Toddalia are bitter and febrifuge. Both the species of Brucea are likewise bitter and tonic. *B. antidysenterica*, the Woginos of Bruce, is most celebrated, because it was long supposed to yield the Bark which was known as false Angustura, and from which the alkali *Brucia* was obtained; but the former is now well ascertained to be the bark of Strychnos Nux Vomica.—*Royle.*

(8775) ZANTHOXYLON RHETSA. RUTACEÆ. A large tree armed with sharp prickles; capsules have a strong aromatic taste; the seeds are used instead of pepper.—*Riddell.*

(8776) ZAPORNIA, Leach, a genus of Birds belonging to the family *Rallidæ*. The beak is slender, shorter than the head, acuminated, compressed, acute; upper mandible gradually incurved; nostrils linear, lateral, placed at the base of the beak. Legs long, slender, cleft, with three toes in front; the hinder toe elevated from the ground at its base; the tibiæ half naked. (Gould.)—*Eng. Cyc.*

(8777) ZAPORNIA PORZANA, the Spotted Crake. This is the Petit Rale d'Eau, Caouchouan, and Marouette of the French; Porcellana, Porzana, Grugnetto, Porciglione, and Gallinella, of the Italians; Punktiertes Rohrhuhn and Kleines Gesprenkeltes Wasserhuhn, of the Germans; Speckled Water-Hen and Skitty, of the English; and Dwfriar Fannog of the Welsh.

Adult and Old Male.—Forehead, eyebrows, and throat leaden-gray; sides of the head ash marked with black; upper parts olive-brown, but all the feathers black in the centre and variegated with small spots and stripes of pure

white; breast and lower parts olive, shaded with ash and marked with white spots—these spots are rounded on the breast, but disposed on the sides in transverse bands; middle tail-feathers bordered with white; lower tail coverts pure white; bill greenish-yellow, red at the base; feet greenish-yellow: iris brown. Length about 9 inches.

Adult Female.—Ash-colour of the throat and neck less extensive; sides of the head with brown spots; base of the bill with rather less red. It is found in Sweden (summer visitor, rare); Southern Russia; north of Germany and Holland (rare); France, Provence, and to the Mediterranean (more common). It is of most frequent occurrence in the south and east of Europe; it has been seen at Smyrna in the winter, and is stated to extend to India. It is a summer visitor in England, Scotland, and Wales, but is not common; and is occasionally found in Ireland in the summer.

The fine flavour of this bird is well known and appreciated in France. Few, if any, of the aquatic, or indeed of any tribe, can match it in autumn as a rich morsel for the table, especially if it be young. Colonel Hawker, speaking of the Common Water-Rail and this species, truly says, "Notwithstanding these two are seldom regarded by sportsmen, yet there is scarcely a greater delicacy than either the one or the other." Both are indeed first-rate, but the Spotted Crake for choice.—*Eng. Cyc.*

(8778) ZEA, a genus of Plants belonging to the natural order *Graminaceæ*. The name is identical with the Greek *Zeid*, but the Greek plant was a species of *Triticum* or *Hordeum*, and not at all agreeing with the present genus, which is entirely American.

The plants belonging to this genus are monœcious. The male flowers are in distinct spikes; the calyx consists of a 2-flowered blunt glume; the corolla of a blunt glume. In the female flowers the calyx in a 2-valved glume; also the corolla; the style is single, filiform, pendulous; the seeds solitary, immersed in an oblong receptacle. There are two species.—*Eng. Cyc.*

(8779) ZEA MAYS. INDIAN CORN, Lin.

Mukka Cholum, TAM.	Jaggon, MALAY.
Mukka Jooarie, DUK.	Yavanala, SANS.
Mokka Zonaloo, TEL.	Mokka, BENG.
Bhoottah HIND.	

Zea mayz, Common Maize, or Indian Corn, is known by its entire leaves. It is a native of America, and is cultivated there, as in most countries of Southern Europe. Like the species of *Triticum*, those of this genus present almost innumerable varieties, from the cultivation to which they have been submitted. As an article of food the fruit is much inferior to that of the *Triticum*, nor will it ripen its fruit fully in high northern latitudes.—*Eng. Cyc.* A native of South America, Hindostan, &c. cultivated extensively in Europe. The uses of Indian corn for alimentary purposes are too well known to need description here. The flour makes an excellent cataplasm. The stalks of the plant contain a considerable quantity of sugar, which has been economically manufactured in the crystalline state in several of the South American provinces.—*O'Shaughnessy, page* 636. Maize, or Indian corn, is more generally grown than millet, and "green corn" is a common article in market, but it is hard and insipid, decidedly inferior to American corn.—*Mason.*

(8780) ZEDOARY.

Zerukbad, ARAB.	Zedoaria, IT.
Shoothee, BENG.	Bengley, JAV.
Hinhooroo-pecallieulla, CYN.	Zerumbad, PERS.
Kutchoor, DUT.	Karchura, SANS.
Zedoaire, FR.	Cedoaria, SP.
Zittwer, GER.	Pulang-Kilungga, TAM.
Capoor-cachery, Kakhur, GUZ. HIND.	Keechlie-gudda, TEL.

The root of a plant which grows in Malabar, Ceylon, Cochin-China, &c. of which there are three distinct species. It is met with in pieces of various sizes, externally wrinkled, and of an ash colour, but internally of a brownish red. The odour of Zedoary is fragrant, and somewhat like that of camphor; the taste biting, aromatic, and bitterish, with some degree of acrimony. It was formerly employed in medicine, but is scarcely ever used by modern practitioners. (*Milburn's Oriental Commerce.*) Zedoary is imported into Bombay from China and the Malabar Coast; the former kind is preferred.—*Faulkner.* Mr. Colebroke applied this term to the roots of Curcuma Zedoaria, on account of the Persian and Arabic synonyms being Judwar and Zudwar. Clusius gives a plate of this Zedoary, the roots of which strikingly resemble those of A. atees. The Persians describe five kinds of Zedoary—Chinese, Nipalese, Tibetan, Dukunee, and Spanish. There can be little doubt but the Nirbisi is the true Zedoary of ancient writers, but its source is as yet unknown.—*O'Shaughnessy pages* 167-68.

(8781) ZEERA. CUMINUM CYMINUM, Cummin Seed; black and white. This is grown in beds the same as the coriander; the seeds are used for seasoning curries. Much is brought from China and the Persian Gulph.—*Riddell.* See ZIRA.

(8782) ZEOLITES, a family of Minerals, so named because the species generally melt and intumesce before the blowpipe, the term being derived from the Greek ζέω, to boil. They consist essentially of silica, alumina, and some alkali, with more or less water. The most of them gelatinise in acids, owing to the separation of the silica in a gelatinous state.

They occur filling cavities in rocks, constituting narrow seams, or implanted on the surface, and rarely in imbedded crystals; and never disseminated through the body of a rock, like crys-

tals of garnet or tourmaline. All occur in amygdaloid, and some of them occasionally in granite or gneiss. *Heulandite*, *Laumonite*, *Apophyllite*, and *Stilbite* have a strong pearly cleavage, and do not occur in fine fibrous crystallisations; when columnar, the structure is thin lamellar. Excepting *Laumonite*, these species dissolve in the strong acids, but do not gelatinise. The species *Natrolite*, *Scolecite*, *Stellite*, and *Thomsonite*, are often fibrous, and the crystallisations generally slender. The remaining species, *Harmotome*, *Analcime*, *Sodalite*, *Hauyne*, *Lapis-Lazuli*, and *Chabazite*, occur in short or stout glassy crystals, and are seldom fibrous. Some of these minerals are described under their proper names.—*Eng. Cyc.*

8783) ZEPHYRANTHES TUBISPATHA.

In Tenasserim, one or two species of zephyranthes of the amarylis tribe which were introduced from Dr. Carey's garden at Serampore, grow very well, and form handsome border flowers.—*Mason*

(8784) ZEUS. Russel.

Carrameen, Tam.

A Fish, Palankeen Boys Fish.—*Ains. Mat. Med. page* 155.

(8785) ZIMB, an Insect translated Hornet in Scripture (Exodus, chap. xxiii., ver. 28; Deut. vii. 20; Joshua xxiv. 12). The Hebrew name is 'tzirah,' and probably expresses its loud buzzing noise The account which Bruce has given of the 'zimb,' or Dog-Fly, of Abyssinia, offers such striking analogies to the insect specifically termed 'tzirah,' and included in the more general term 'zebub' of the Hebrew Scriptures, that very little doubt exists regarding the identity of the two. It is difficult to conceive that Isaiah could have had in view any other insect when he says—"The Lord shall hiss for the fly that is in the uttermost part of the rivers of Egypt" (Isaiah vii, 18). The original word rendered 'fly' in our translation is 'zebub,' and, as Bruce observes, "The Chaldee version is content with calling this animal simply 'zebub,' which signifies the fly in general, as we express it in English. The Arabs call it 'zimb' in their translation, which has the same general signification. The Ethiopic translation calls it 'tsaltsalya,' which is the true name of the particular fly in Geez, and was the same in Hebrew." Bruce has given a graphic account of this fly, and there can be little doubt that this insect is related to the family of *Astridæ*.

The Latin *Asilus* and the Greek οἶστρος were probably only different pronunciations of the same term 'ha-tsirah,' as this fly is called both by Moses and Joshua. Mr. Bracy Clark, in the 9th volume of the 'Linnæan Transactions,' part ii., 1843, refers the fly alluded to by Moses (and said to "hiss and make a noise") to *Œstrus bovis*, and remarks on Bruce's figure, that it has no resemblance to the genus of flies the *Cuterebra*, but is rather, though with something fictitious about it, allied to the genus *Stomoxys*, or perhaps *Tabanus*, both of which genera are certainly silent flies in their attacks on cattle.

There can be no doubt that the οἶστρος was a perfectly distinct insect from any of the modern *Æstrid*. (Kirby and Spence, *Introduction to Entomology.*) *Eng. Cyc,*

(8786) ZINC. Zincum.

Tootanagum, Tam. | Sungbusrie, Duk.

Zinc. This metal, in commerce frequently called *Spelter*, was first mentioned by Paracelsus, in the 16th century, under the name of *Zinetum*. It does not occur in the native state, but is obtained from its ores, which are chiefly the Sulphuret and Carbonate of Zinc.

A native sulphate of zinc, or blende was discovered by Mr. W. Mainwaring in the Madura province, but whether the brown yellow, or black blende, Ainslie had not been able to learn.—*Ains. Mat. Med. p.* 58. Zinc is considered to have been known as a distinct metal only since the time of Paracelsus. It has long been imported from China into India. The name *Tutenague*, by which Chinese Zinc was known in commerce, is evidently derived from the Tamul, *tutanagum* (Essay Hind. Med. p. 100), and it was at one time called Indian Tin (*Stannum Indicum*). The ores of Zinc were no doubt employed by the ancients in making Brass. Zinc (Zn=32) is found in the state of an Oxide, but principally as a Sulphuret (*Blende*), and an impure Carbonate (*Calamine*). From both ores it is first converted into an Oxide by the process of roasting, and then reduced to the metallic form by the aid of Carbonaceous matter, when it may either be fused or sublimed. Until purified by a second distillation, it contains as impurities small portions of other metals, as Iron, Copper, Arsenic, &c.—*Royle.* In a broken boulder that a native brought to Tavoy, was a large vein of some ore, that was judged to be black blende, or black sulphuret of zinc. Mr. Mason, was never able however to ascertain the locality whence it was brought. Dr. Helfer reported the existence of ores of zinc on the Mergui Islands. He says: "The other ores discovered are of less importance. They are arsenic and zinc. The latter may contain some silver.—*Mason.*

(8787) ZINCI SULPHAS, L. E. D. Sulphate of Zinc. *Sal Vitrioli. White Vitriol.*

Schwefelsaures Zink-oxyd, Ger. | Sulphate de Zinc, Fr.

This salt is found native in some places. It is known in India by the name of *suffed toota*, or white vitriol. (*v.* p. 149.)

Prop. Sulphate of Zinc (Zn O, S O_3—7 Ap.= 143) is a colourless salt, without odour, but having a disagreeable astringent and metallic taste.

(8788) ZINGIBERACEÆ, *Gingerworts*, a natural order of Endogenous Plants. The plants belonging to this order are herbaceous, possessing a creeping and often jointed rhizoma. Their

stem is formed of the cohering basis of the leaves, and is never branched. The leaves are simple and sheathing, the blade being often separated from the sheath by a taper neck; they have a single midrib, from which diverge at an acute angle numerous simple crowded veins. The flowers are arranged in a dense spike or raceme, or a sort of panicle, which is either terminal or radical. The flowers are supplied with spathaceous membranous bracts, which usually lie in pairs. The calyx is superior, tubular, 3-lobed, short. The corolla is tubular, irregular, with six segments in two whorls; the outer whorl is 3-parted, nearly equal; the inner is also 3-parted, and represents three stamens, the intermediate segment is larger than the rest, and called the labellum, and is often 3-lobed; the lateral segment is sometimes nearly abortive. The stamens are three, distinct, of which the two lateral are abortive, and the intermediate one fertile; this is placed opposite the labellum, and arises from the base of the intermediate segment of the outer series of the corolla; the filament is not petaloid, and often extends itself beyond the anther in the shape of a lobed or entire appendage; the anther is 2-celled, and opens longitudinally, the lobes often embracing the upper part of the style. The pollen is light, granular, globose, and smooth. The ovary is 3-celled; the ovule attached to a placenta in the axis; the style filiform, and the stigma dilated and hollow. The fruit is usually a 3-celled capsule, and sometimes from abortion 1-celled. The seeds are roundish or regularly angled, and sometimes with an aril; the albumen flowery; the embryo enclosed within a peculiar membrane called Vitellus, and Membrane of the Amnios by Brown. This order of plants has been mostly placed with *Marantaceæ*. It was first constituted by Brown, who pointed out the difference between it and *Marantaceæ*. The distinguishing characters of *Zingiberaceæ* are—first, the structure of the seed, in which a fleshy body is interposed between the embryo and the albumen, entirely enveloping the former. This body is called Vitellus by Brown, and is the remains of the innermost integument of the ovule, which is unabsorbed during the progress of the seed to maturity. A second peculiarity consists in the 2-celled anthers; and with this structure is combined decidedly aromatic properties. But the distinction between *Marantaceæ* and *Zingiberaceæ* depends, as pointed out by Lindley, on more important considerations than these. "In true *Zingiberaceæ*," he says, "as Brown has observed, the stamen is always placed opposite the labellum, or anterior division of the inner series of the corolla, and proceeds from the base of the posterior outer division; while the sterile stamens, when they exist, are stationed right and left of the labellum. But in *Marantaceæ* the fertile stamen is on one side of the labellum, occupying the place of one of the lateral sterile stamens of *Zingiberaceæ*. This peculiarity of arrangement indicates a higher degree of irregularity in *Marantaceæ* than in *Zingiberaceæ*, which also extends to the other parts of the flower." It contains 29 genera and 247 species. Nearly all the species are tropical plants, and by far the greater number inhabit various parts of the East Indies; they are also found in Africa and America. The plants belonging to this order possess great beauty, on account of the development of their floral envelopes and the rich colours of their bracts. They are also employed to a considerable extent in medicine and as condiments, on account of their aromatic stimulating properties. [CURCUMA; AMOMUM; ALPINIA.] *Zingiber* is known from the other genera by the inner limbs of the corolla having but one lip, and the anther having a simple recurved horn at the end.—*Eng. Cyc.*

(8789) ZINGIBER CASSUMMUNAR. YELLOW ZEDOARY.

Bun ada, HIND. and BENG.

Rhizoma much larger than that of common ginger, smell camphor-like, taste hot and bitterish (*Roxb. Fl. Ind* vol. i p. 49.) Now very little used.—*O'Shaughnessy, page* 643

(8790) ZINGIBER OFFICINALE. *Syn.* AMOMUM ZINGIBER, Linn. Narrow-leaved Ginger. Root—*O'Shaughnessy, page* 647.

Adrak, Ada, BENG. and HIND.

Zingiber Officinalis, the narrow-Leaved, or Common Ginger, has subsessile, linear-lanceolate, smooth leaves, elevated oblong spikes, acute bracts, and a 3-lobed lip. The root-stock of this plant is the ginger of commerce. It is imported into England from various quarters of the world, but more especially the East and West Indies. This plant is now grown in almost all parts of the globe in tropical climates, but it seems to have been originally indigenous in the East Indies. Ginger is one of the most agreeable of the hot aromatics, and is consequently much used as a condiment. It also enters into the composition of many medicines, where it acts as a carminative.—*Eng. Cyc.*

(8791) ZINGIBER ZERUMBET. *Syn.* AMOMUM ZERUMBET.

Butch. Mahaburee Butch, HIND. and BENG.

Found in the woods about Calcutta; the taste of the root resembles that of ginger, but is bitter as well as aromatic. It is not used in medicine by European practitioners.—*O'Shaughnessy, page* 648. *Zingiber Zerumbet*, the Broad-Leaved Ginger, is a native of the East Indies, and has delicate stems; bifarious, sessile lanceolate leaves; broad obovate bracts, and 3-lobed lip. This plant is much used in the East for cataplasms and fomentations, but is not taken internally.—*Eng. Cyc.*

(8792) ZINNIA, COMPOSITÆ. Zinnia elegans, alba, crocea and various others, may be all sown at the commencement of the rains, either

separately or in beds. The flowers are pretty and ornamental, and require very little care: the seed as it falls, springs up immediately, and from its profusion, almost becomes a weed in the garden.—*Riddell.*

(8793) ZIRA SUFAID. CUMINUM CYMINUM. CUMIN SEED. Plentiful about Ajmeer: much used in food and mesalihs.—*Gent. Med. Top. p.* 153. See ZEERA.

(8794) ZIRCON. Some of the best of the Ceylon jewels are probably zircon, the pale variety of which supplies the diamonds used in the jeweling of watches; and Jameson says, it is often sold as an inferior kind of diamond.—*Mason.*

(8795) ZIRCON. HYACINTH, JARGOON. A Mineral occurring in attached, imbedded, and loose crystals. Primary form a square prism. Cleavage parallel to the lateral planes, indistinct. Fracture conchoidal, undulating, brilliant. Hardness, scratches quartz. Brittle. Colour white, gray, red, reddish brown, brownish-orange, yellow, pale-green; streak white. Lustre adamantine. Doubly refractive in a high degree. Transparent; translucent; opaque. Specific gravity 4·505. Before the blow-pipe infusible, but loses its colour; with borax fuses into a transparent glass. It is found at Expailly, in France; Ceylon; at Friedrichsvarn, Norway; Greenland, the United States, &c. It contains—

Silica	33 3
Zirconia	66·7
	——100 *Eng. Cyc.*

(8796) ZIZYPHUS, *Ζίζυφον*, a genus of Plants belonging to the natural order *Rhamnaceæ*. It has a 5-cleft spreading calyx; 5 obovate unguiculate convolute petals; pentagonal flat disc, expanded and adhering to the tube of the calyx; a 2-3-celled ovary immersed in the disc; the styles 2 3: the fruit fleshy, containing a 1-2-celled nut; the seeds sessile, compressed, and very smooth. The species of this genus are shrubs, with alternate 3-nerved leaves, spiny stipules, and mucilaginous fruit, which is eatable. About 40 other species of *Zizyphus* have been described; amongst them the Z. *lotus*, which is the Lotus of the ancients. [LOTUS.] Many of them are natives of the Himalayas. Wherever they grow, they produce a fruit which may be eaten with impunity, although it varies much in its grateful and nutritious properties. *Z. Napeca* grows in Ceylon; *Z. xylophorus*, in Coromandel; and *Z. Jujuba* in China yield edible fruits. Dr. Wight gives Zizyphus glabrata, 282; Jujuba, 99; and Rugosa, 839.

(8797) ZIZYPHUS GLABRATA. RHAMNEÆ Icon. 282.

Kurkutta wood, English. | Kurkutta marum TAM.

A moderate sized tree but the timber excellent, hard, close grained and taking an excellent polish. It is of a light brownish, colour, and trees are met with that would give a 12 inch plank.—*Wight.*

(8798) ZIZYPHUS JUJUBA. *Syn.* RHAMNUS JUJUBA.

Vadari, SANS.	Gooly mara, CAN.
Usslie Suddir, ARAB.	Bér, HIND.
Kool, BENG.	Rega, TEL.
Yellanday marum, TAM.	Hyee-bin, BURM.
Elanjee mara, CAN.	

The wild *Ber* tree, is common almost every where; wood hard and useful, but of small size. It is used for making sandals. Wight No 127. Mysore 14, Bangalore 37.—*M.E.J.R. Ainslie.*

A small tree, a native of various parts of the East Indies and China, and common in gardens, where by grafting and cultivation it affords a large and very pleasant fruit called *Ber*. In Hindostan it is called *Berree* and *Jaree*, in Persia *Kinar* and *Kial*, in Arabia *Nebbek* and *Sidr*. Mr. Royle mentions that the fruit of the wild kind is dried and powdered, as was done with the lotus of the Lotophagi. This powder in Arabic is called *Sure koon nebek*, in Persian *Arud i kinar*, in Hindee *Ber choonee*. A lac insect inhabits the latter kind, and its produce is used for dyeing leather, cotton, and silk. The bark is used in the Moluccas as a remedy for diarrhœa; the root with some warm seeds in infusion in fever. The lozenges, and thickened mucilage called *jujubes* by the confectioners, are prepared from this and the Z. vulgaris, a native of Syria, Persia, and Hindostan.—*Royle's Illustr.* p. 17. A variety with long fruit, described by Dr. Walich, is called in Bengal *Narikeli kool.* —*O'Shaughnessy, page* 273.

The Fruit.

Elandei pullum. TAM.	Unab, ARAB.
Boyrkapull, DUK.	Budderie, SANS.
Regoopundoo, TEL.	

This is a pleasant tasted reddish colored fruit about the size of a large olive, but round. It grows in the woods and (*Ainslie*) is used in chatnies and pickles, being a very common tree n Madras. The Natives are very fond of the fruit when nearly ripe, it tastes like a Crab Apple. *Jaffrey.* The jujube from which the famous jujube lozenges are made, is this small sour berry, a great favorite with the Burmese and Karens. The tree is of middle stature, and is often found apparently growing wild.—*Mason.* This wood is used by the Natives for common purposes: it is that usually employed for making sandals.—*Ains. Mat. Med p.* 207. Tree usually of small size, but the wood fine grained and hard, fitted for cabinet making purposes. Nalla Regu is occasionally brought down the Godavery and answers to this description, but the Z. Jujuba is understood to be the common *Regu*, or Hind *Ber*, of which natives make sandals.—*Rohde.* In Pegu,

Zizyphus Jujuba, is scarce, being only found near large towns, rarely in the Pegu and Tounghoo forests; dark-brown wood.—*McClelland.*

(8799) ZIZYPHUS LOTUS, a native of Africa. This is the tree celebrated in ancient poetry as the Arbor Lotophagorum, the fruits of which were said by Homer to be as sweet as honey, and when eaten to destroy the love of country. The fruits, Polybius states, constituted the staple food of the districts in which they grew, and also yielded a delicious wine.—*O'Shaughnessy, page 272.*

(8800) ZIZYPHUS NAPECA, Willd.

Tsoora pullum, TAMIL.

This fruit, says Ainslie, I have never seen, but am led to suppose that it has not much to recommend it. It grows in the woods, near the mountains.—*Ainslie, p.* 233.

(8801) ZIZYPHUS ŒNOPLIA. *Syn.* Z. NAPECA, Roxb. Flora Ind. i. p. 13.

Koattay marum, TAMIL.

Common all over India, fruit eaten by the natives, its taste being pleasantly acid. A decoction of the bark of the fresh root is said to promote the healing of recent wounds.—*Roxb. O'Shaughnessy, page* 273.

Specimens of this were brought as belonging to the class of timbers. But if used at all, it can only be for small ornamental work. There are several of the tribe used as timber in the Circars, that called *Nalla Regu* is a useful straight grained timber, well suited for ordinary furniture.—*Rohde.*

(8802) ZIZYPHUS SPINA-CHRISTI, Christs Thorn, has ovate-toothed smooth leaves, pubescent beneath; prickles twin, one straight, the other incurved; the peduncles, corymbose; the drupe ovate-globose. This plant is about eight feet high, and is a native of the north of Africa of Palestine, Ethiopia, and Egypt. The flowers are yellowish-green. The fruit is oblong, about the size of a sloe, and much eaten in Egypt and Arabia, This plant has pliant branches, and is covered with thorns; and being not uncommon in Palestine, has been supposed by Hasselquist to have afforded materials for the crown of thorns with which Our Lord Jesus Christ was crowned. The *Paliurus aculeatus* however is the more common thorny plant in that country.—*Eng. Cyc.*

(8803) ZIZYPHUS TRINERVUS, CAROOKOOVA LEAF, Rottl.

Carookoova elly. TAMIL | Vatadella, SANS.

The leaves of this species of Zizyphus have but little taste or smell. A decoction of them in conjunction with others of the same nature, is occasionally prescribed to purify the blood in cases of Cachexia, and in Venereal complaints of long standing. The Telingas call this tree Kakoopala.—*Ains. Mat. Med. p.* 76.

(8804) ZIZYPHUS VULGARIS.

Ber, HIND.

The Common Jujube, has ovate-refuse toothed smooth leaves; prickles absent or twin; and an ovate-oblong drupe. This plant is a native of Syria, whence it has been introduced into Europe. It is now cultivated in many parts of the south of Europe, where its fruit is known by the name of Jujube. It has yellow-greenish flowers, two or three of which grow together. The fruit is of a blood-red or saffron colour, and has a sweet granular pulp. In Italy and Spain it is eaten as a dessert when fresh, and in the winter season as a dry sweetmeat. It is also sold in great quantities in the markets of Constantinople. The Jujube is commonly planted by the Turks of Constantinople before their coffee-houses for the sake of its shade,—*Eng. Cyc.* In India, this is a common wild fruit tree, and grows in almost every jungle. The fruit is astringent, but sometimes of a pleasant subacid flavor—eaten chiefly by the poorer classes, and wild animals. It is more especially cultivated by Mussulmans round their tombs. The fruit is oblong, containing a stone, and bears twice in the year, the best crop about January: after this is over, the tree is pruned, by cutting off nearly all the smaller branches. A second crop succeeds on the new wood in the rains, but, from being full of maggots, is not eatable: even in the cold weather very few of the fruit are free from this insect. The natives pretend that they have a remedy, which prevents the fruit from being attacked, but, says Dr. Riddell, I have never known it succeed. The flavour is somewhat that of a fresh apple, and the fruit when large and fine is by no means to be despised. He succeeded best by budding from a good tree on a common stock raised from seed. It will bear well in two or three years, but requires care and watering at first. A fine gum-lac is produced from this tree; the cocoon of the wild silk worm is often found attached to it.—*Riddell.*

(8805) ZIZYPHUS XYLOPYRA, RHAMNEÆ.

Gotti, TEL.

A small thorny tree, fruit round, used by the moochies for blackening leather.—*Riddell.* It is common in every forest on the coast of Coromandel. In a good soil it grows to be a pretty large tree, with a tolerably erect trunk, but in general it is found in the state of a large straggling shrub. Cattle eat the leaves, young shoots, and fruit. The kernels taste like filberts, and are eaten by the natives. The wood of the largest trees is much esteemed by the natives, being yellowish or orange colored, very hard, and durable, and at the same time not very heavy.—*Rohde M.E.S.*

(8806) ZOANTHARIA. ('Animal Flower.' from the Greek ζῶον and ἄνθος), the third class of true Zoophytes, in the arrangement of De Blainville, and defined by him thus:—"Body regular, flower-shaped, more or less elongated, free or fixed, very contractile, furnished with an intestinal canal, without distinct walls, having a single large terminal opening surrounded by variously-shaped tentacula, which are always tubular and

in communication with the musculo-cavernous parenchyma of the skin." The terms of this definition are in part incorrect, there being no intestinal canal properly so called, but a large bag-shaped stomach having distinct walls.

The *Zoantharia* may be grouped under four very natural families, namely :—

I. *Lucernariadæ*, the animals included in which are soft and simple, fixed by a small base or free, and having the tentacula in groups at regular distances on the margin of a campanulate disc, in the centre of which is the mouth.

II. *Actiniadæ* : animals all soft and simple, fixed or free ; when fixed, adhering by a broad base ; the tentacula in most species developed and surrounding the margin of the oral disc.

III. *Zoanthidæ* : animals coriaceous, simple or compound, fixed ; tentacula marginal, surrounding the mouth.

IV. *Madreporidæ* (including the *Madrephylliæa* of D. Blainville : animals forming a solid calcareous polypidom ; in other respects they resemble the *Actiniadæ*.—*Eng. Cyc.*

(8807) ZONURIDÆ, a family of Saurain Reptiles possessing the following characters :—Head pyramidal or depressed, covered with regular many-sided shields. Tongue flat, nicked at the tip. Scales of the back and tail large, rhombic. Sides with a distinct longitudinal fold, covered with small granular scales. Ears distinct. Eyes with two valvular lids. Limbs four, strong, or rarely entirely wanting or hid under the skin.

(8808) *Tachydromus sexlineatus*, the Tachydrome, is a tropical form of this family, and is found in Cochin-China, China, Borneo and Java.

(8809) ZOZYMUS (Leach), a genus of Brachyurous *Crustacea*, placed by M. Milne-Edwards in the division of Cryptopod Cancerians, between the genera *Carpilius* and *Lagostoma*.

Zozymus is hardly distinguishable except by the form of the claws, the extremity of which is enlarged and deeply hollowed out into a spoon-shape, a disposition which most influences the habits of the animal. It tends also, in his opinion, to establish the passage between the genera *Cancer* and *Xantho* ; for he finds no character sufficiently precise to separate from it certain species, the general form of which is slightly less oval than that of the crabs properly so called, and the latero-posterior borders of whose carapace are nearly as long as the antero-posterior borders, which become strongly dentilated.—*Eng. Cyc.*

(8810) ZOZYMUS ÆNEUS has the carapace moderately large, convex, very unequal, strongly embossed, and nearly tuberculous at its posterior part ; front slightly advanced and indistinctly divided into four lobes ; latero-anterior borders of the carapace not prolonged beyond the level of the genital region, and armed with four very wide teeth, compressed and united after the manner of a crest ; anterior feet tubercular externally ; the succeeding feet hollowed with furrows on their external surface. Length from about 2 to 3 inches : colour yellowish with reddish spots. It is found in the Indian Ocean.—*Eng. Cyc.*

(8811) ZUR-DOZEE OR EMBROIDERY : (ZUR-DOZEE) is an art, in which the Mahomedans of India display a great degree of skill almost equal to that exhibited by the Hindoos in weaving. They embroider Cashmere Shawls and Scarfs, also Muslins, and Net fabrics with silk, gold and silver thread. These fabrics are much esteemed in Great Britain and are probably still unrivalled by similar productions in any part of the world.

Another branch of needle-work allied to embroidery, which is carried on there, is that of flowering or ornamenting Cloths with Cotton thread (Chickan-kavi.) The dresses of Mahomedans are frequently worked in this manner, and two descriptions of it called Tartor and Sumunderludur, in which the texture of the cloth is broken down with the needle, and converted into network, are held in the highest estimation.—*Dr. Taylor.*

(8812) ZURUMBAD.—CURCUMA.—Zerumbet.—Zeodary ; 4 sorts. See HULDEE.

THE END.

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OPINIONS.

From the Madras Journal of Literature and Science, of the Madras Literary Society and Auxiliary Royal Asiatic Society.

(Vide p. 314 New Ser. Vol., ii. No, vi. Old Series, Vol. xviii. No. 43.)

"The Library of the Society has been furnished by Government with a copy of the *Cyclopædia of India and Eastern Asia*, By Edward Balfour, L. R. C. S. E., Surgeon, Madras Army. It is issued in Nos. of 100 pages each. Four Nos. have already appeared, containing in all 2,755 words, which reach as far as C in the Alphabetical arrangement.

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Extract from the Minutes of Consultation of the Right Hon'ble the Governor of Madras in Council, under date the 18*th June*, No. 812, 1857.

The work offers to supply much useful information, and is in the opinion of Government, worthy of encouragement.

HE INFLUENCE EXERCISED BY TREES ON THE CLIMATE AND PRODUCTIVENESS OF A COUNTRY;

BY EDWARD BALFOUR, L. R. C. S. E.,

MADRAS, 1848. 8vo.

FROM SIR HENRY CONYNGHAM MONTGOMERY, BART., *Secretary to Government Fort St. George.*

Revenue Department, Fort St. George, 8th September, No. 982 of 1848.

To E. G. BALFOUR, ESQ., *Assistant Surgeon.*

SIR,—I am directed by the Right Honorable the Governor in Council to acknowledge the receipt of your letter dated 31st March 1848, transmitting copy of Notes taken by you on the "Effect of Trees on the Climate and Productiveness of a Country. The Right Honorable the Governor in Council has perused with much pleasure and satisfaction the valuable and very interesting information contained in this paper, and in transmitting for your information the resolution passed on the occasion, desires to convey the thanks of this Government for your communication.

(Signed) H. C. MONTGOMERY, *Secretary to Government.*

Revenue Department, No. 981, Extract from the Minutes of Consultation, under date the 8th September 1848. Read the following letter from Assistant Surgeon Edward Balfour. (Here enter 31st March No. 701, 1848.)

Para 1. The Right Honorable the Governor in Council has perused with much pleasure and satisfaction the valuable and very interesting report furnished by Assistant Surgeon Balfour on the "Effect of Trees on the Climate and Productiveness of a Country, and deeming it of importance that the Local Revenue Officers should be in possession of information so intimately connected with the welfare of the Districts under their respective charges, he resolves to direct that copies of the same be printed at the Fort St. George Gazette Press for general distribution and for transmission to the Government of India and the Government of Bengal, Bombay, and Agra, and the Honorable the Court of Directors. * * * * The Governor in Council resolves to furnish to Assistant Surgeon Balfour a copy of the foregoing proceeding and to convey to him at the same time the thanks of Government for his interesting communication.

(Signed) H. C. MONTGOMERY, *Secretary to Government.*

Letter from Major (now Colonel) REID, C. B., *Secretary to the Madras Agri-Horticultural Society*; To the Secretary to the Board of Revenue.

3. The Committee are happy to have it in their power to forward a very ably written paper on this subject (*vide Printed Report already before the Government of India*) from the pen of Assistant Surgeon Edward Balfour of the 5th Regiment N.I. This document was originally intended by Mr. Balfour to have been sent direct to Government; but; changing his mind, he forwarded it to the Secretary of the Horticultural Society to be finally sent through them to its original destination. The Committee would beg the Board to bring this document to the especial notice of Government. * * *

(Signed) F. A. REID, *Secretary.*

STATISTICS OF CHOLERA,

BY EDWARD BALFOUR, L. R. C. S. E.,

MADRAS, 1849, 8vo.

Madras Medical Board, to Madras Government, in letter dated 9th August, No. 171, *of* 1849.

"By Assistant Surgeon Balfour of this establishment, and to state that, in the "opinion of the Board, the performance is highly creditable, and testifies to the abi- "lity and zeal of that officer; it is a paper in every point of view, well worthy of "publication."

Extract from the Minutes of Consultation of the Right Hon'ble the Governor of Madras in Council, dated 21st August, No. 3055 of 1849.

"Grants authority for printing the work, by Assistant Surgeon Balfour, submit- "ted with the foregoing letter." * * * "The Right Hon'ble the Governor in Council, notices the favourable testimony borne by the Medical Board, to Assistant Surgeon Balfour's ability and zeal."

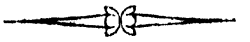
The Hon'ble the Court of Directors in letter dated, 9th April No. 39, 1850. "These proceedings have our sanction. We notice with satisfaction the testimony borne to Assistant Surgeon Balfour's zeal and ability."

Lancet, London, April 20, 1850.

* * "As a contribution to the statistics of Cholera the pamphlet of Mr. Balfour is the most important work that has appeared for a long time."

Register General's Report on Cholera, London, 1852.—p. xcix.

"The fact is placed beyond doubt by the statistical analyses of Assistant Surgeon "Balfour. * * * See some good observations on the movement of troops in the "Statistics of Cholera by Assistant Surgeon Edward Balfour."



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THE GOOLDUSTEH-I-SOOHN, BEING SELECTIONS FROM THE PERSIAN AND HINDUSTANI POETS, MADRAS, 1851.

BY EDWARD BALFOUR, L. R. C. S. E.

From Madras Athenæum, January 16.

We have received a grateful present of a curious and pretty book. It is a collection of passages from the Hindostance and Persian poets all in the Persian character, so long and so universally admired for its great beauty and engraved on richly ornamented pages. The origin of this fine volume is due to Dr. Balfour the Government Agent at Chepauk. Having for some years past, employed his leisure hours in collecting what appeared to him to be the finest passages in Eastern poetry, Dr. Balfour resolved to have the collection published in an Eastern style. He therefore gave copies of the verses which he had gathered to the Mussulman Syed Hoosain, known as "Koosh Navees," or "the beautiful writer," by whom they were copied into the elegant and flowing hand-writing of Persia. The whole work lithographed by the Hakeem Syed Mahomed consists of two hundred and fifty-two octavo pages, luxuriantly ornamented by two Hindoos, Rung Rajoo and Wakand Rajoo, after Mussulman fashion, with designs of flowers and fruits, and such other illustrations as a follower of the Arabian Prophet—forbidden to draw the likeness of any living creature, for fear of furnishing a hint or seduction to idolatry,—may indulge his pencil in pourtraying. Each page has its own distinct design, and both the position and the space occupied by the writing, are regulated by the form and profuseness of these fanciful and beautiful illustrations. We have here then a

pure specimen of Eastern ornamental writing, the designs being left to the taste of the writer and the ornamentors, lithographed by a Mussulman and bound up after Mussulman fashion. The title of the work is Gool-Dustah-i-Soohn, or "the Bouquet of Language." We learn that parties desirous of possessing themselves of copies of this volume, which is valuable both as a great curiosity and on account of its real merits as a work of art, will have an opportunity of supplying themselves at the *Athenæum* Office.

From Madras United Service Gazette, January 17,

We have been favoured by Dr. Balfour with a copy of his Selections from the Persian and Hindostani poets, being a collection of the finest passages in Eastern Poetry, compiled by this accomplished Orientalist in the course of his reading, and now published in a volume appropriately entitled Gooldusta-i-Sukhoon or the "Persian Anthology." The work does infinite credit to Dr. Balfour's taste as an Oriental Scholar. It is in the Persian character from the pen of Syed Husseiyn; known as "Khoosh Nuvees," lithographed by Syed Mahomed, the pages richly ornamented with Arabesques of infinitely varied design, and appropriately bound in the Mahomedan fashion. To Oriental Students we commend this volume of "Elegant Extracts," as such in the truest sense of the word, and acquaint them that it is procurable at the *Athenæum* Library.

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CONQUEST'S OUTLINES OF MIDWIFERY, IN DIGLOT HINDUSTANI AND ENGLISH, Madras, 1850.

BY EDWARD BALFOUR, L. R. C. S. E.

Persian and Hindustani Translator to Government.

Extract from the Minutes of Consultation, dated 13th June, No. 500 of 1850. Read the following letter from the Secretary to the Medical Board. Here enter 4th May 1850.

Para 1. The Right Honorable the Governor in Council observes that very favourable testimony is borne, both by the Council of Education in Bengal and by the Principal of the Delhi College, to the merits of Dr. Balfour's translation into Hindustani of Dr. Conquest's Outlines of Midwifery and * * * it is a work calculated to promote the extension of much useful knowledge among Hindustani students in an important branch of the Medical Department. * * *

True Extract. (Signed) H. C. Montgomery, *Chief Secretary.*

From the Secretary Council of Education (Bengal); To J. P. Grant, Esq., Secretary Government of Bengal, Fort William, 1st December 1849.

2. The Council are of opinion that the work would be most valuable to the Hindustani students of the Medical College and to the Native Doctors generally throughout the country, and beg strongly to recommend that it be published upon the terms mentioned by Dr. Balfour.

5. The Council are of opinion that great credit is due to Dr. Balfour for the ability with which he has executed a very difficult task. The diffusion of sound principles connected with the practical departments of medicine cannot fail to be most useful when made known in a vernacular language current among so large a portion of the population of Hindustan. All such attempts to be useful as that of Dr. Balfour are therefore deemed by the Council to be most deserving the patronage and encouragement of the Government of India. *Vide letter from the Secretary to the Council of Education of Bengal to the Secretary to the Government of Bengal, dated 1st December* 1849.

From Dr. A. Sprenger, Principal Delhi College, To F. J. Mouat, Esq., Secretary Council of Education.

"Considering that this is the first attempt of translating a work on Midwifery into Oordoo, the manner in which it is executed reflects the highest credit on Dr. Balfour. It is everywhere intelligible and many passages are elegant as far as the subject admits, and every friend of Native Education will be delighted to see so useful a book published." *Letter from Dr. A. Sprenger, Principal of the Delhi College to the Secretary to the Council of Education of Bengal, dated 18th October* 1849.

From Dr. F. J. Mouat, Secretary Council of Education, To J. P. Grant, Esq., Secretary to the Government of Bengal, Fort William, 4th February, No. 238, of 1850.

The difficulty of procuring such works may be estimated from the fact that although they have for some years been sanctioned by Government the only one in progress is the Manual of Anatomy by Dr. Mouat: a mere fragment of the Treatise on Medicine and Surgery having been prepared at Delhi.

(Signed) F. J. MOUAT, M. D., *Secretary Council of Education.*

From the Medical Board, Madras, in Letter from Dr. Lorimer, Secretary, dated 13th September 1852.

* * * Assistant Surgeon Balfour's Hindustani translation of Dr. Conquest's Midwifery, is a work which is highly creditable to him as a Medical Officer and a Hindustani scholar.

(Signed) A. LORIMER, *Secretary, Medical Board.*

FORT ST. GEORGE, 13*th September* 1852.

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BY EDWARD BALFOUR, L. R. C. S. E.

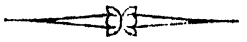
MADRAS 1853.

The objects and aim of the above publication will be gathered from its preface. The publication of these Barometrical Sections has been undertaken with the hope of assisting the inquiries of the Geologist, the Engineer, and the Statesman, and

it has been thought desirable to bring them into a connected form, for the benefit of the English public, by an outline of the physical features of this country and a short description of its Military and Civil divisions: an Index Map is likewise given to allow the eye to catch, at a glance, the different Sections in the volume. It is hoped that this outline may ultimately be filled in by detailed descriptions of Provinces, for the vast Empire of British India will not receive justice until the examination of its various features be undertaken on a scale commensurate with their magnitude. Its climate, and its Agricultural and Manufacturing Industries have had some attention paid to them, and a few scientific men have described parts of its animal, vegetable and mineral productions: but its geology, its flora and fauna, as a whole, have yet to be attended to, and its hydrography is a great want. No general description has ever been given of the many nations, races and wandering tribes that we rule over, here, nor of their varied manners, their dwellings and physical character: nor of their languages, dress or food; though the value of any one, or all of these, if treated as a whole, would be inestimable, and it is to be hoped that, in addition to their immediate advantages, the Barometrical Sections may assist those who have leisure to undertake inquiries from which so much general benefit would result.

Proceedings of the Geographical Society, Bombay.

"It was remarked on Dr. Balfour's Barometric sections, which gave rise to these observations,—the Bombay Government having requested the opinion of the society as to their merits,—that they furnished a very valuble contribution to Physical Geography for which the Meteorologist and Geologist must feel most grateful. The Society were not in a postion to test their accuracy, but from the fame of Dr. Balfour, there could be no doubt that every precaution had been taken to render them correct."—Proceedings Bombay Geographical Society, of 21st, as published in *Bombay Times*, 27th, August 1856.



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THE LOCALITIES IN INDIA EXEMPT FROM CHOLERA,

BY EDWARD BALFOUR, L. R. C. S. E.

MADRAS, 1856.

From the Witness, Edinburgh, Wednesday, December 3, 1856.

Dr. Balfour, an able Surgeon at Madras, has just published a curious volume of Reports on Cholera. He started some years ago a theory that there were many places absolutely exempt from the scourge. Investigation has confirmed this opinion. In Madras alone there are thousands of villages which have never felt the visitation, though surrounded by infected districts. Minute lists are supplied and each place is to be separately examined.

* * *

From the Friend of India.

We require, however, further facts and it is to their collection that the attention of Doctors and Statists all over the earth should be directed. One volume of such data has reached our hands. It has been prepared by Dr. Balfour of Madras, one of the Surgeons who show us what the Company's Service under favourable circumstances might become. With an industry none the less creditable from the sameness of the task, he has hunted up the facts of the case from every Zillah of his own Presidency. Mysore furnishes a most valuable mass of statistics, and even Scinde and the Dekhan contribute a few figures not without their value. We have not space or indeed time to condense the mass of tables furnished by Dr. Balfour, but * * * the enquiry is of the highest importance and the Madras Government would confer a benefit on humanity by enabling Dr. Balfour to devote himself to this especial end.

From the *Fort St. George Gazette*, No. 3055, Dated 5th September *1856 p. 339.*

The following Notification is published for the information of the Authorities concerned.

NOTIFICATION.

Deeming the investigation into the remote and proximate causes of Cholera, upon which Dr. Balfour is engaged, to be one of great interest and importance, the Right Honorable the Governor in Council is pleased to direct that all Civil, Political, Military and Medical authorities will afford to that Officer every assistance in their power, and supply him with such information as he may seek in the prosecution of his enquiries.

By order of the Right Honorable the Governor in Council.

(Signed) T. PYCROFT, *Chief Secretary.*

From the Bombay Times.

A very interesting work has just been published by Dr. Balfour of the Madras Army, on the Localities in India exempt from Cholera, and this forms an element for an addition to our physical Atlases, we were not prepared for. A set of cholera or pestilence maps for India * * * would bring under the eye at once in graphic form the vast mass of facts here appearing as statistics. * * Dr. Balfour does not confine himself to dry Tables or abstracts; but gives in his narrative an account of the geological and other leading features of the country.. * * The work is one of the many Dr. Balfour has given to the world where the mass of printed matter affords a very inadequate idea of the amount of labour expended on its preparation for the press, or the very great value of the facts comprised within the narrowest limits that can be assigned to them.

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Revenue Board, Fort St. George, Revenue Consultation No. 54 of 2nd June 1857.

* * The paper compiled by Dr. Balfour will be a useful record for reference in the offices of the Board and the several Maritime Collectors. * * The arrangement adopted by Dr. Balfour is clear and precise. * * *

From the Madras Athenæum.

An unpretending publication has just been issued from the Scotch Mission Press, containing in a small compass, much information of interest to all whose pursuits require them to know in what the commercial wealth of this country consists. Styled "the commercial products of the Madras Presidency, as shown by its Exports and Imports, their quantities and values, for the four years 1852-53, to 1855 56 inclusive," it gives in detail every article of Export and Import forming the trade of the whole Madras Presidency. The value, of the total exports for that period, we observe, stated at Rs. 14,32,93,799 and that of the Imports at Rs. 11,35,20,461.

* * * These are some of the thoughts which have occurred to us from a hasty glance at these Commercial Tables, which we received yesterday; we will

refer to them again at leisure, as the matter they contain is of great general importance. * * We consider they supply a general want which we ourselves have often felt.—*Madras Athenæum, March* 3, 1857.

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